

Supplementary Agenda for the public excluded section of the extraordinary meeting of the Waikato District Council to be held on **MONDAY, 20 JULY 2020.**

I. **REPORT ATTACHMENTS**

- I.1 Approval of the Proposed Waikato District Plan Stage 2 (Natural Hazards and Climate Change) for Notification – **Attachments only**
- | | |
|--|-----|
| A. Proposed District Plan Stage 2 – new chapter 15 | 2 |
| B. Planning Maps showing natural hazard areas | 38 |
| C. Proposed District Plan – Variation 2 to Stage 1 | 123 |
| D. Section 32 Report | 218 |

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PROPOSED WAIKATO DISTRICT PLAN (STAGE 2)

OF THE WAIKATO DISTRICT COUNCIL

Pursuant to Sections 73 and 79 and Clause 5 of Schedule 1 of the Resource Management Act 1991, the Waikato District Council has resolved to approve the Proposed Waikato District Plan (Stage 2) and associated Planning Maps for public notification on 27 July 2020.

It is hereby certified that this is the Proposed Waikato District Plan (Stage 2) approved by resolution on 20 July 2020.

The COMMON SEAL of the WAIKATO DISTRICT COUNCIL

Is affixed hereto in the presence of:

..... **Mayor Allan Sanson**

..... **Chief Executive Gavin Ion**

Dated at Ngaruawahia on 27 July 2020.

PROPOSED WAIKATO DISTRICT PLAN



NATURAL HAZARDS & CLIMATE CHANGE

27 July 2020

Proposed Waikato District Plan (Stage 2)

How to read this document:

- The following document replaces the place-holder for Chapter 15 in Stage 1 of the Proposed Waikato District Plan.
- The text is shaded orange to differentiate it from Stage 1 text in e-plan.

Chapter 15: Natural Hazards and Climate Change

15.1 Introduction

Stage 2 Content

- (1) The Natural Hazards chapter manages land use in areas subject to the risk from natural hazards. It identifies areas where certain types of new development will be avoided because of the natural hazards present, but also recognises that there is existing development, including infrastructure and historic heritage, already located on land subject to natural hazards. These areas will require management through mitigation and adaptation to ensure that the risk of damage to property or injury or loss of lives is not increased.
- (2) Maaori freehold land has particular considerations when addressing the potential impact of natural hazards and climate change. This issue has been recognised in this chapter.
- (3) This district plan adopts a risk-based approach to natural hazard management. The risk that natural hazards pose to the Waikato District is made up of several factors including:
 - (a) the nature, magnitude and extent of the hazard;
 - (b) the anticipated frequency or probability of the hazard event occurring; and
 - (c) the exposure and vulnerability of the environment to the hazard, including the likely community losses/damages that could occur.
- (4) An understanding of both the scale and likelihood of the natural hazard event, and the likely consequences to the community, are central to the risk-based approach. From a district plan perspective, a risk-based approach requires identification and management of activities based on the level of risk to which they are exposed (e.g. farming may be acceptable in a high flood risk area, whereas residential development may not). The level of control over activities in the district plan is therefore related to the level of risk, and whether such risks are considered acceptable or not.
- (5) More frequently occurring natural hazards in the Waikato District include flooding, coastal erosion and land instability (land slips and subsidence). The Waikato and Waipa Rivers for instance, flow through the district and can carry large flood flows. The coastal margins are subject to storm events, and sandy areas are particularly vulnerable to erosion by such events. In addition, flood ponding often occurs after heavy rainfall in the Waikato basin.
- (6) New Zealand in general is a high earthquake hazard region and earthquake (and associated fault movement, ground shaking and liquefaction) considerations are integral to the design of the built environment [1]. Location of faults in Waikato District may be problematic, due to alluvial sediment and associated processes masking fault traces. While liquefiable soils are generally found within Holocene sediments in river valleys, more work is required within the Waikato District to determine areas where the liquefaction risk is high.
- (7) Less frequent natural hazards in the Waikato District, such as wild fires, tsunamis, extreme wind events and drought, may not need a district plan response. Emergency management by groups such as Civil Defence play a significant role, using hazard management tools such as education and advocacy, warning systems and emergency preparedness. There are also non-statutory instruments or processes, such as civil

defence recovery plans, and programmes to increase community preparedness, including contingency planning. Insurance and emergency services also play an important role.

- (8) High quality up-to-date information is important for natural hazard risk management. The district plan requires the use of the best information available to identify land that may be subject to natural hazards. This includes hazard maps, databases (such as the regional and district hazard registers) and technical reports held by the Council, and the interpretation of these by qualified and experienced professionals.
- (9) Climate change has the potential to increase risk through exacerbating natural hazards, but will also have effects on the environment beyond natural hazards. The Ministry for the Environment predicts the effects of climate change on the Waikato District to include overall warmer temperatures, fewer frosts, a decrease in spring rainfall, increased storm events (including extreme winds) and an average rise in mean sea level. This is likely to mean more frequent droughts leading to water shortages, more inland flooding and salt water intrusion in low-lying coastal areas and an increase in erosion and land instability. For this reason, an allowance for the projected effects of climate change has been included in the 2D flood modelling of key risk areas within this district plan (Horotiu - Huntly - Ohinewai). Specific provision has also been made within the Coastal Sensitivity Areas in respect to development that may be impacted by the projected effects of sea level rise over a 100 year timeframe.
- (10) The Floodplain Management Area is the 1% Annual Exceedance Probability (AEP) floodplain, and is identified through both 1D and 2D modelling, depending on the level of information available. Between Horotiu - Huntly – Ohinewai, where 2D modelling is available, High Flood Risk Areas have also been identified. These are areas within the flood plain where the depth of flood water in a 1% AEP flood event exceeds 1 metre and the speed of flood water exceeds 2 metres per second, which is considered to put the community at an unacceptable (or intolerable) level of risk in terms of the potential for loss of life, injury or serious damage to property. Subdivision and new activities within the High Flood Risk overlay are carefully regulated.
- (11) The planning maps identify only two flood ponding areas that experience floodwater ponding in a 1% AEP rainfall event. One of the areas is located in the southern part of Huntly adjacent to the river and the other is west of Huntly across the Waikato River adjacent to Lake Waahi and Lake Puketirini. The flood plain rules in this district plan apply to 1% AEP ponding areas including the two specifically identified in the district plan. Other 1% AEP ponding areas will be required to be identified by a suitably-qualified and experienced professional as part of an application for resource consent or a plan change.
- (12) Residual Risk Areas are areas of land that would be at risk from a natural hazard event if it were not for a structural defence such as a stopbank. In the district plan, these are areas of land protected by stopbanks with a design level of service of at least a 1% AEP flood event, and are generally located along the length of the Waikato River. For the purpose of the district plan, these areas have been called Defended Areas. The district plan includes provision for land protected by stopbanks to ensure that the residual risk is understood and considered as part of any subdivision or development proposals, or any proposal to rezone land to a more intensive land use.

- (13) The High Risk Coastal Hazard (Inundation) Area and High Risk Coastal Hazard (Erosion) Area overlays identify land where there is significant risk from either coastal inundation or coastal erosion with existing sea level and coastal processes. The Coastal Sensitivity Area (Erosion) and Coastal Sensitivity Area (Inundation) overlays identify land that is potentially vulnerable to either coastal erosion or coastal inundation over a 100 year period to 2120, assuming a sea level rise of 1.0 metre.
- (14) While liquefaction areas have not been identified on the planning maps, provisions in the district plan require this seismically-induced natural hazard to be assessed before new zonings or subdivision and development are undertaken. This will primarily be achieved through resource consent or plan change processes.
- (15) Areas of slope instability can occur within the district. To comprehensively identify these areas over the entire district is not practical, given the size of the district and the changing circumstances in which slope instability occurs (often after high rainfall or seismic events). Consequently, assessment matters are included in the subdivision rules that require a geotechnical investigation to confirm that a building platform is stable before subdivision or development takes place.
- (16) Subsidence has occurred at Huntly due to former underground coal mining and is identified as a Mine Subsidence Risk Area. Risk to new dwellings in this area is regulated through a discretionary activity resource consent process.
- (17) Wind and seismic loadings are controlled by the Council under the Building Act 2004. The risk of fire hazard is controlled by the Waikato Regional Council, the Department of Conservation and the Waikato District Council through legislation other than the RMA, using both regulation and by increasing public awareness through information.
- (18) Methods to increase resilience to projected changes in climatic conditions will increasingly be incorporated into all aspects of land use planning and natural hazard management. Further to this, there will be an increased focus on environmental protection and facilitating inland migration of biodiversity. Methods in this district plan will include promoting low impact urban design and green infrastructure, and increased coastal hazard setbacks to provide a more sustainable and adaptive approach to development.

[1] MBIE module 3: Identification, Assessment and Mitigation of Liquefaction Hazards May 2016 Rev 0

15.2 Objectives and policies

Objective 15.2.1 - Resilience to natural hazard risk

Stage 2 Content

A resilient community where the risks from natural hazards on people, property, infrastructure and the environment from subdivision, use and development of land are avoided or appropriately mitigated.

Policy 15.2.1.1 - New development in areas at significant risk from natural hazards

Stage 2 Content

- (a) Avoid new subdivision, use and development where they will increase the risk to people's safety, well-being and property in the following areas identified as being at significant risk from natural hazards:

- (i) High Risk Flood Area;
- (ii) High Risk Coastal Hazard (Inundation) Area;
- (iii) High Risk Coastal Hazard (Erosion) Area.

Policy 15.2.1.2 - Changes to existing land use activities and development in areas at significant risk from natural hazards

Stage 2 Content

- (a) In areas of High Risk Flood, High Risk Coastal Hazard (Erosion) and High Risk Coastal Hazard (Inundation), ensure that when changes to existing land use activities and development occur, a range of risk reduction options are assessed, and development that would increase risk to people's safety, well-being and property is avoided.

Policy 15.2.1.3 - New emergency services and hospitals in areas at significant risk from natural hazards

Stage 2 Content

- (a) Avoid locating new emergency service facilities and hospitals in areas which are at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion), unless, considering engineering and technical constraints or functional and operational requirements, they cannot be reasonably located elsewhere and will not increase the risk to or vulnerability of people or communities.

Policy 15.2.1.4 - New infrastructure and utilities in areas subject to significant risk from natural hazards

Stage 2 Content

- (a) Enable the construction of new infrastructure and utilities in areas at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) areas only where:
 - (i) the infrastructure and utilities are technically, functionally or operationally required to locate in areas subject to natural hazards, or it is not reasonably practicable to be located elsewhere; and
 - (ii) any increased risks to people, property and the environment are mitigated to the extent practicable; and
 - (iii) the infrastructure and utilities are designed, maintained and managed, including provision of hazard mitigation works where appropriate, to function to the extent practicable during and after natural hazard events.

Policy 15.2.1.5 - Existing infrastructure and utilities in all areas subject to natural hazards

Stage 2 Content

- (a) Provide for the operation, maintenance and minor upgrading of existing infrastructure and utilities in all areas subject to natural hazards.

Policy 15.2.1.6 - Managing natural hazard risk generally

Stage 2 Content

- (a) Provide for rezoning, subdivision, use and development outside High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) Areas where natural hazard risk has been appropriately identified and assessed and can be adequately avoided, remedied or mitigated and does not transfer or exacerbate risk to adjoining properties.

Policy 15.2.1.7 - Protection from risks of coastal hazards

Stage 2 Content

- (a) Recognise the importance of natural features and buffers, and soft hazard protection works, and prefer them wherever practicable over hard protection structures, where new hazard mitigation measures and/or works are required to protect people, property infrastructure and the environment from the risks of coastal hazards.

Policy 15.2.1.8 - Limitations on hard protection works for coastal hazard mitigation

Stage 2 Content

- (a) Ensure that where new hard protection structures and works are necessary to protect existing development on public or privately-owned land from coastal hazards, they are appropriately assessed and controlled and:
 - (i) have primarily a public and/or environmental benefit when located on public land;
 - (ii) are effective;
 - (iii) the economic, social and environmental benefits outweigh costs; and
 - (iv) do not transfer or increase risk to other people, property, infrastructure, the natural environment, historic heritage or Maaori Sites and Areas of Significance.
- (b) Ensure that when new hard protection structures are to be located in an area where an adaptive management strategy has been prepared to manage coastal hazards, they are consistent with that strategy.

Policy 15.2.1.9 - Natural features and buffers providing natural hazard protection

Stage 2 Content

- (a) Protect, maintain and, where appropriate, enhance the integrity of natural features and buffers which provide a natural defence against the effects of natural hazards and sea level rise, including natural ponding areas, coastal dunes, intertidal areas, wetlands, waterbody margins, riparian/coastal vegetation and floodways.

Policy 15.2.1.10 – Areas defended by stopbanks adjacent to the Waikato River

Stage 2 Content

- (a) Control subdivision, use and development in areas identified as Defended Areas adjacent to the Waikato River by:
 - (i) assessing the potential risk of overtopping or structural failure of the stopbanks, and overwhelming of associated flood protection structures, before subdivision and development occurs; and
 - (ii) requiring that consideration be given to appropriate mitigation to reduce any residual risk

- identified; and
 - (iii) ensuring that any residual risk is not transferred to neighbouring sites.
- (b) Specify minimum setbacks for buildings and earthworks from stopbanks to:
- (i) protect the structural integrity of the stopbanks; and
 - (ii) provide a buffer to reduce the potential risk to life and damage to property from deep and fast-flowing flood waters in the event of a breach.

Policy 15.2.1.11 - New development that creates demand for new protection structures and works

Stage 2 Content

- (a) Avoid locating new subdivision, use and development in High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) Areas where a demand or need for new structural protection works will be required to reduce the risk from natural hazards to acceptable levels.

Policy 15.2.1.12 - Reduce potential for flood damage to buildings located on the Waikato and Waipa River floodplains and flood ponding areas

Stage 2 Content

- (a) Reduce the potential for flood damage to buildings located on the Waikato and Waipa River floodplains and flood ponding areas by ensuring that the minimum floor level of building development is above the design flood levels / ponding levels in a 1% AEP flood event, plus an allowance for freeboard, unless:
- (i) the building development is of a type that is not likely to suffer material damage during a flood; or
 - (ii) the building is a small-scale addition to an existing building; or
 - (iii) the risk from flooding is otherwise avoided, remedied or mitigated.

Policy 15.2.1.13 - Control filling of land within the 1% AEP floodplain and flood ponding areas

Stage 2 Content

- (a) Control filling of land within the 1% AEP floodplain and flood ponding areas to ensure that the potential adverse effects on flood storage capacity, overland flows, run-off volumes on surrounding properties on infrastructure, are avoided or mitigated.

Policy 15.2.1.14 – Hazardous substances located within floodplain and flood ponding areas

Stage 2 Content

- (a) Ensure that the location and storage of hazardous substances within the 1% AEP floodplain and flood ponding areas do not create an unacceptable hazard to people, property or the environment.

Policy 15.2.1.15 - Flood ponding areas and overland flow paths

Stage 2 Content

- (a) Manage stormwater hazards by requiring new subdivision and development within flood ponding areas and overland flow paths to adopt integrated catchment plan-based stormwater management methods which:

- (i) maintain the flood storage capacity of natural floodplains, wetlands and ponding areas; and
- (ii) retain the function and capacity of overland flow paths to convey stormwater run-off; and
- (iii) do not transfer or increase risk elsewhere; and
- (iv) promote low impact stormwater management practices with reference to the [Waikato Stormwater Management Guideline](#) and the [Regional Infrastructure Technical Specifications \(RITS\)](#); and
- (v) minimise impervious surfaces.

Policy 15.2.1.16 - Development in the Coastal Sensitivity Areas

Stage 2 Content

- (a) In Coastal Sensitive Areas identified on the planning maps, control subdivision, use and development by ensuring that the subdivision, use or development is:
 - (i) supported by a detailed site-specific risk assessment, which includes measures to address the effects of climate change; and
 - (ii) designed, constructed and located to minimise the level of risk to people, property and the environment.

Policy 15.2.1.17 - Setbacks from the coast

Stage 2 Content

- (a) Avoid increasing the risk from coastal hazards by requiring new built development to be set back from the coastal edge, unless there is a functional or operational need for facilities to be located at or near the coast.

Policy 15.2.1.18 - Residential development potentially subject to fire risk

Stage 2 Content

- (a) In areas assessed or identified as being potentially subject to elevated fire risk, ensure that an appropriate buffer area or setback is provided around new residential subdivision and development.

Policy 15.2.1.19 - Development on land subject to instability or subsidence

Stage 2 Content

- (a) Avoid locating new subdivision, use and development, including rezoning, on land assessed as being subject to, or likely to be subject to, instability or subsidence, unless appropriate mitigation is provided and the activity does not increase the risk to people, property or infrastructure.

Policy 15.2.1.20 - Development of land in the Mine Subsidence Risk Area

Stage 2 Content

- (a) On land identified within the Mine Subsidence Risk Area, ensure that:
 - (i) an assessment by an appropriately-qualified engineer occurs before subdivision, use or development takes place to confirm that the land is suitable for development; and
 - (ii) buildings are designed and constructed, and uses appropriate materials, to effectively minimise

the risk of damage to the buildings from ground subsidence.

Policy 15.2.1.21 - Stormwater management in areas subject to risk of land instability or subsidence

Stage 2 Content

- (a) Avoid discharge of stormwater directly to ground on land that is potentially at risk of land instability or subsidence unless:
 - (i) an assessment has been undertaken by an appropriately-qualified geotechnical specialist, indicating that the site is suitable for the proposed discharges; and
 - (ii) any adverse effects on the site and receiving environment can be appropriately mitigated.

Policy 15.2.1.22 - Liquefaction-prone land risk assessment

Stage 2 Content

- (a) On land potentially prone to liquefaction, ensure that:
 - (i) an assessment by a geotechnical specialist occurs before new subdivision, use or development takes place; and
 - (ii) the level of assessment reflects the type and scale of the subdivision, use or development and the overall vulnerability of the activity to the effects of liquefaction.

Policy 15.2.1.23 – Control activities on land susceptible to damage from liquefaction

Stage 2 Content

- (a) Control subdivision, use and development on land assessed as being susceptible to liquefaction-induced ground damage, to ensure that appropriate mitigation is provided so that the level of risk to people, property, infrastructure and the environment is acceptable.

Objective 15.2.2 - Awareness of natural hazard risks

Stage 2 Content

A well-informed community that:

- (a) is aware of, and understands, which natural hazards affect the district; and
- (b) is able to effectively and efficiently respond to, and recover from, natural hazard events.

Policy 15.2.2.1 - Natural hazard risk information

Stage 2 Content

- (a) Enable people to be informed and have access to information on the natural hazards affecting their properties and surrounding area, including through:
 - (i) provision of Land Information Memoranda;
 - (ii) natural hazard technical information, risk registers and mapping on the Council's website, the Waikato Regional Council Hazards Portal, this district plan and accompanying planning maps;
 - (iii) education, provision of information and community engagement; and

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- (iv) alignment with the work of other agencies including iwi and the Waikato Regional Council.

Policy 15.2.2.2 - Awareness of Community Response Plans

Stage 2 Content

- (a) Improve response to and recovery from natural hazard events by encouraging community awareness and use of information and methods contained in Community Response Plans.

Objective 15.2.3 - Climate change

Stage 2 Content

A well-prepared community that:

- (a) is able to adapt to the effects of climate change; and
- (b) has transitioned to development that prioritises lower greenhouse gas emissions.

Policy 15.2.3.1 - Effects of climate change on new subdivision and development

Stage 2 Content

- (a) Ensure that adequate allowances are made for the projected effects of climate change in the design and location of new subdivision and development throughout the district, including undertaking assessments where relevant that provide for:
 - (i) the projected increase in rainfall intensity, as determined by national guidance, but being not less than 2.3°C by 2120;
 - (ii) the projected increase in sea level, where relevant, as determined by national guidance, but being not less than 1m by 2120;
 - (iii) in respect to new urban zoning, stress testing under the RCP 8.5 scenario for [rainfall](#) and RCP 8.5H+ for [sea level rise](#); and
 - (iv) in respect to the coastal environment, increases in storm surge, waves and wind.

Policy 15.2.3.2 - Future land use planning and climate change

Stage 2 Content

- (a) Increase the ability of the community to adapt to the effects of climate change when undertaking future land use planning by:
 - (i) ensuring the potential environmental and social costs of climate change, including effects on indigenous biodiversity (inland migration), historic heritage, Maaori Sites and Areas of Significance, mahinga kai, public health and safety, public access to the coast and waterway margins, and the built environment are addressed.
 - (ii) encouraging the incorporation of sustainable design measures within new subdivision, landuse and development, including:
 - (A) low impact, stormwater management, urban design and green infrastructure;
 - (B) of relocatable buildings and structures in areas potentially at risk due to sea level rise or increased flood levels;
 - (C) efficient water storage;

- (D) provision of renewable energy generation; and
- (E) transferring to activities with lower greenhouse gas emissions.
- (iii) providing ongoing monitoring of changes to the environment due to climate change; and
- (iv) facilitating community discussion on adaptive pathways to manage the risks associated with climate change and incorporating them, where appropriate, into the district plan through plan changes.

Policy 15.2.3.3 - Precautionary approach for dealing with uncertainty

Stage 2 Content

- (a) In areas throughout the district likely to be affected by climate change over the next 100 years, adopt a precautionary approach towards new subdivision, use and development which may have potentially significant or irreversible adverse effects, but for which there is incomplete or uncertain information.

Policy 15.2.3.4 - Provide sufficient setbacks for new development

Stage 2 Content

- (a) Protect people, property and the environment from the projected adverse effects of climate change, including sea level rise, by providing sufficient setbacks from water bodies and the coast when assessing new development.
- (b) Ensure that, in establishing development setbacks, adequate consideration is given to:
 - (i) the protection of natural ecosystems, including opportunities for the inland migration of coastal habitats;
 - (ii) the vulnerability of the community;
 - (iii) the maintenance and enhancement of public access to the coast and public open space;
 - (iv) the requirements of infrastructure; and
 - (v) natural hazard mitigation provision, including the protection of natural defences.

Policy 15.2.3.5 - Assess the impact of climate change on the level of natural hazard risks

Stage 2 Content

- (a) For all new subdivision, use and development requiring rezoning or a resource consent, ensure that account is taken of the projected effects of climate change over the next 100 years when assessing any identified risks from natural hazards, and their effects on people, property, infrastructure and the environment.
- (b) Ensure that, when assessing the effects of climate change on the level of natural hazard risk in accordance with Policy 15.2.3.5(a) above, the allowances in Policy 15.2.3.1(a)(i)-(iv) are applied.
- (c) Where the assessment required by Policy 15.2.3.5(a) and Policy 15.2.3.5(b) above indicates that natural hazards are likely to be exacerbated by climate change, ensure that subdivision and development are designed and located to avoid, or appropriately mitigate, any increased and cumulative risk, including increased risk of flooding, liquefaction, coastal inundation, coastal erosion, slope instability, fire, and drought.

15.3 How to use and interpret the rules

Stage 2 Content

- (a) The activities covered by the rules in this chapter are also subject to the rules in the relevant zone chapters

and the district-wide rules in Chapter 14 Infrastructure and Energy.

- (b) Where subdivision is specified, a subdivision consent is also required under the provisions of the relevant zone chapter, and the district-wide rules in Chapter 14 Infrastructure and Energy will also apply.
- (c) The rules in this chapter do not apply to:
 - (i) any activity which is a regulated activity under the National Environmental Standards for Telecommunication Facilities 2016 (NESTF);
 - (ii) plantation forestry activities regulated under the National Environmental Standards for Plantation Forestry (NESPF).
- (d) The information requirements for resource consent applications in respect to natural hazards are set out in Rule 15.13.

15.4 Flood Plain Management Area and Flood Ponding Areas

15.4.1 Permitted Activities

Stage 2 Content

- (a) The activities listed below are permitted activities within the Flood Plain Management Area shown on the Planning Maps or in a Flood Ponding Area, if they meet the activity-specific conditions set out in this table.
- (b) Activities may also be restricted discretionary or discretionary activities, as specified in Rules 15.4.2 and 15.4.3.

Activity		Activity-specific conditions
P1	Construction of a new <u>building</u> or an addition to an existing <u>building</u> , unless specified in P2 – P5 in Rule 15.4.1.	<ul style="list-style-type: none"> (a) The minimum floor level is at least 0.5m above the 1% AEP flood level; and (b) Compliance with condition (1) shall be demonstrated by a suitably qualified engineer with experience in hydrology.
P2	Additions to an existing <u>building</u> that does not increase the ground floor area of the <u>building</u> by more than 15m ² .	Nil
P3	<u>Standalone garage</u> with a <u>gross floor area</u> not exceeding 40m ² .	Nil
P4	<ul style="list-style-type: none"> (1) Construction of an <u>accessory building</u> without a floor; (2) Construction of a <u>farm building</u> without a floor. 	Nil
P5	Construction, replacement, repair, maintenance, <u>minor upgrading</u> or upgrading of <u>utilities</u> .	Nil

P6	<u>Earthworks</u> associated with construction, replacement, repair, maintenance, <u>minor upgrading</u> or upgrading of utilities, including the formation and maintenance of access tracks.	Nil
P7	<u>Earthworks</u> to create a building platform for residential purposes.	Filling height is only to the extent necessary to achieve compliance with Rule 15.4.1 P1(a).
P8	<u>Earthworks</u> not provided for under Rule 15.4.1 P6 or P7.	<p>(a) In the Residential, Village and Country Living Zones - a maximum volume of filling above natural ground level of 10m³ per <u>site</u>, and a maximum cumulative volume of filling and excavation of 20m³; or</p> <p>(b) In the Rural Zone - a maximum volume of filling above natural ground level of 100m³ per <u>site</u>, and a maximum cumulative volume of filling and excavation of 200m³ per site; or</p> <p>(c) All other zones - a maximum volume of filling above natural ground level of 20m³ per <u>site</u>, and a maximum cumulative volume of filling and excavation of 50m³ per site; and</p> <p>(d) Height and depth of earthworks in all zones</p> <p style="padding-left: 40px;">(i) a maximum height of 0.2m of filling above natural ground level; and</p> <p style="padding-left: 40px;">(ii) a maximum depth of excavation of 0.5m below natural ground level.</p>

15.4.2 Restricted Discretionary Activities

Stage 2 Content

- (a) The activities listed below are restricted discretionary activities within the Flood Plain Management Area shown on the Planning Maps or in a Flood Ponding Area.
- (b) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.
- (c) Any application arising from this rule shall not be limited or publicly notified.

Activity	Matters of Discretion
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RD1	Earthworks that are not a permitted activity under Rule 15.4.1 P6 or P7 or earthworks that exceed the activity specific conditions in Rule 15.4.1.P8.	<p>Discretion is restricted to:</p> <p>(a) Timing, location and scale of <u>earthworks</u>;</p> <p>(b) Adverse effects on:</p> <ul style="list-style-type: none"> (i) Existing overland flow paths and surface drainage patterns; (ii) flood storage capacity; (iii) runoff volumes; (iv) adjoining properties, including the transfer of risk; (v) <u>infrastructure</u> and flood protection works; (vi) consideration of soil types and potential for erosion; <p>(c) Mitigation including compensatory storage, or other flood management measures proposed.</p>
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15.4.3 Discretionary Activities

Stage 2 Content

- (a) The activities listed below are discretionary activities within the Flood Plain Management Area shown on the Planning Maps or in a Flood Ponding Area.

D1	Construction of a new <u>building</u> and additions to an existing <u>building</u> which are not permitted by Rule 15.4.1 P1 – P5.
D2	<u>Subdivision</u> to create one or more additional vacant lot(s) other than a <u>utility allotment</u> , <u>access allotment</u> or subdivision to create a reserve allotment.
D3	A <u>hazardous facility</u>

15.5 High Risk Flood Area

Stage 2 Content

The High Risk Flood Area is located within the Flood Plain Management Area. The rules in this section are to be read in conjunction with the rules for the Flood Plain Management Area and Flood Ponding Areas (Rule 15.4).

15.5.1 Permitted Activities

Stage 2 Content

- (a) The activities listed below are permitted activities within the High Flood Risk Area shown on the Planning Maps, if they meet the activity-specific conditions set out in this table.
- (b) Activities may also be restricted discretionary, discretionary or non-complying activities, as specified in Rules 15.5.2, 15.5.3 and 15.5.4.

Activity			Activity-specific conditions
P1	(1)	Repair, maintenance or <u>minor upgrading</u> of existing <u>utilities</u> .	Nil
	(2)	New telecommunication lines, poles, cabinets and masts/ poles supporting antennas.	
P2	(1)	Construction of an <u>accessory building</u> without a floor;	Nil
	(2)	Construction of a farm <u>building</u> without a floor.	

15.5.2 Restricted Discretionary Activities

Stage 2 Content

- (a) The activities listed below are restricted discretionary activities within the High Risk Flood Area.
- (b) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity			Activity-specific conditions
RD1	(1)	New <u>utilities</u> not provided for in Rule 15.5.1 P1(2).	Discretion is restricted to: <ul style="list-style-type: none"> (a) Functional and operational requirements to be located in the High Risk Flood Area; (b) The adverse effects on people and property from establishing or upgrading the utility in the High Risk Flood Area; (c) The potential for the development to transfer/increase flood risk to neighbouring properties; (d) Consideration of alternative locations; (e) Consideration of the projected effects of climate change; (f) Any mitigation measures to reduce the risk to people's safety, well-being and property.
	(2)	Upgrading of existing utilities not provided for in Rule 15.5.1 P1(1).	

RD2	One addition to a lawfully established building existing at <i>[the date this rule becomes operative]</i> , where the addition does not increase the ground floor area of the existing <u>building</u> by more than 15m ² , unless provided for in Rule 15.5.2 RD1.	Discretion is restricted to: <ul style="list-style-type: none"> (a) The ability to manage flood risk through appropriate <u>building</u> materials, structural or design work or other engineering solutions; (b) The setting of an appropriate floor level for the addition, taking into consideration the location of the addition and the floor level of the existing <u>building</u>; (c) Any mitigation measures to reduce the risk to people's safety, well-being and property.
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15.5.3 Discretionary Activities

Stage 2 Content

- (a) The activities listed below are discretionary activities in the High Risk Flood Area.

D1	<ul style="list-style-type: none"> (1) <u>Subdivision</u> that creates one or more additional vacant lot(s) where: <ul style="list-style-type: none"> (a) The additional lot(s) are located entirely outside the <u>High Risk Flood Area</u>; or (b) The additional lot(s) are partially within the <u>High Risk Flood Area</u> and each additional lot(s) contains a net site area capable of containing a complying <u>building platform</u> entirely outside the <u>High Risk flood Area</u>. (2) This rule does not apply to subdivision for a <u>utility allotment</u>, <u>access allotment</u> or subdivision to create a reserve allotment.
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15.5.4 Non-Complying Activities

Stage 2 Content

- (I) The activities listed below are non-complying activities in the High Risk Flood Area.

NC1	Construction of a new <u>building</u> or additions to an existing <u>building</u> , not provided for in Rule 15.5.1 P1 – P2 or Rule 15.5.2 RD1 and RD2.
NC2	<ul style="list-style-type: none"> (1) <u>Subdivision</u> that does not comply with Rule 15.5.3 D1. (2) This rule does not apply to subdivision for a <u>utility allotment</u>, <u>access allotment</u> or subdivision to create a reserve allotment.
NC3	<u>Emergency services facilities</u> and hospitals.

15.6 Defended Area (Residual Risk)

15.6.1 Permitted Activities

Stage 2 Content

- (a) Activities are permitted activities within the Defended Area identified on the planning maps, unless specified in Rules 15.6.2 or 15.6.3 below, or as otherwise specified in the relevant zone chapter or the district-wide rules in Chapter 14 Infrastructure and Energy.

15.6.2 Restricted Discretionary Activities

Stage 2 Content

- (a) The activities listed below are restricted discretionary activities within the Defended Area shown on the Planning Maps.
- (b) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.
- (c) Activities may also be discretionary activities, as specified in Rule 15.6.3.

Activity	Matters of Discretion
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RD1	<p>Subdivision that creates one or more additional vacant lot(s). Rule 15.6.2 RD1(1) does not apply to subdivision for a <u>utility allotment</u>, an <u>access allotment</u> or subdivision to create a reserve allotment.</p>	<p>Discretion is restricted to:</p> <ul style="list-style-type: none"> (a) The actual level of service provided by the structural defence and associated flood protection works, including any change in the level of service anticipated due to climate change and sea level rise; (b) The impact of any planned improvements, maintenance or upgrading on the residual risk; (c) The effect of groundwater levels and variability in ground conditions on stop-bank security at and adjacent to the site to be subdivided; (d) the likely depth and duration of flooding as a result of a breach or overtopping event or flood ponding; (e) the location of the subdivision, including services such as wastewater, water supply and roading/access (including escape routes), in relation to potential breakout points (failure zone); (f) The adverse effects to people and property and overall vulnerability from potential failure or overwhelming of the structural defences and associated flood protection works relevant to the proposed new lot(s); (g) Potential for the development to transfer/increase flood risk/residual risk to neighbouring properties; (h) Any additional mitigation measures proposed or site features which reduce residual risk (e.g. natural high ground; evacuation plan).
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15.6.3 Discretionary Activities

Stage 2 Content

- (a) The activities listed below are discretionary activities within the Defended Area.

D1	Construction of a new <u>building</u> or new <u>accessory building</u> , located within 50m of the toe of a stop-bank where the stop-bank is under the responsibility of the Council, the Waikato Regional Council or the Crown.
D2	<u>Earthworks</u> located within 50m of the toe of a stop-bank where the stop-bank is under the responsibility of the Council, the Waikato Regional Council or the Crown.

15.7 Coastal Sensitivity Area (Erosion) and Coastal Sensitivity Area (Open Coast)

15.7.1 Permitted Activities

Stage 2 Content

- (a) The activities listed below are permitted activities within the Coastal Sensitivity Area (Erosion) and Coastal Sensitivity Area (Open Coast) shown on the Planning Maps, if they meet the activity-specific conditions set out in this table.
- (b) Activities may also be restricted discretionary activities or discretionary activities, as specified in Rules 15.7.2 and 15.7.3.

Activity		Activity-specific conditions
P1	Additions to an existing lawfully established building.	(a) The gross floor area of all additions to the building from [date this rule becomes operative] do not exceed a total of 15m ² .
P2	(1) Construction of an accessory building without a floor; (2) Construction of a farm building without a floor.	Nil
P3	Construction, upgrading, minor upgrading, replacement, repair or maintenance of utilities.	Nil
P4	Maintenance or repair of an existing lawfully established coastal protection structure.	Nil

15.7.2 Restricted Discretionary Activities

Stage 2 Content

- (a) The activities listed below are restricted discretionary activities in the Coastal Sensitivity Area (Erosion).
- (b) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity	Matters of Discretion
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RD1	Construction of a new building or additions to an existing building not provided for in Rule 15.7.1 P1-P3 and not listed in Rule 15.7.3 D1.	<p>Discretion is restricted to:</p> <ul style="list-style-type: none"> (a) The ability to manage coastal hazard risk through appropriate building materials, structural or design work, engineering solutions or other appropriate mitigation measures, including the ability to relocate the building; (b) The application of mitigation through natural features and buffers where appropriate; (c) The ability to impose time limits or triggers to determine when the building and services to be removed or relocated; (d) The degree to which coastal hazard risk, including the effects of climate change over a period to 2120, has been assessed in a site specific coastal hazard risk assessment; (e) Suitability of the site for the proposed use, including the provision for servicing such as access, wastewater, stormwater, and water supply; (f) Adverse effects to people and property and overall vulnerability from the establishment of the new building or additions to an existing building and any mitigation measures to reduce risk; (g) Whether there is any suitable alternative location for the activity to locate within the site; (h) Coastal Sensitivity Area (Open Coast) only - the setting of minimum floor levels in areas subject to inundation.
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15.7.3 Discretionary Activities

Stage 2 Content

- (a) The activities listed below are discretionary activities in the Coastal Sensitivity Area (Erosion).

D1	Construction of a new coastal protection structure.
D2	Subdivision to create one or more additional vacant lot(s) other than a utility allotment, access allotment or subdivision to create a reserve allotment.

15.8 Coastal Sensitivity Area (Inundation)

15.8.1 Permitted Activities

Stage 2 Content

- (a) The activities listed below are permitted activities within the Coastal Sensitivity Area (Inundation) shown on the Planning Maps if they meet the activity-specific conditions set out in this table.
- (b) Activities may also be restricted discretionary activities or discretionary activities, as specified in Rules 15.8.2 and 15.8.3.

Activity		Activity-specific conditions
P1	Additions to an existing lawfully established building.	(a) The gross floor area of all additions to the building from [date this rule becomes operative] do not exceed a total of 15m ² .
P2	(1) Construction of an accessory building without a floor; (2) Construction of a farm building without a floor.	Nil
P3	Construction, upgrading, minor upgrading, replacement, repair or maintenance of utilities.	Nil
P4	Maintenance or repair of an existing lawfully established coastal protection structure.	Nil

15.8.2 Restricted Discretionary Activities

Stage 2 Content

- (a) The activities listed below are restricted discretionary activities in the Coastal Sensitivity Area (Inundation).
- (b) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity	Matters of Discretion
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RD1	Construction of a new building or addition to an existing building not provided for in Rule 15.8.1 P1- P3 and not listed in Rule 15.8.3 D1.	Discretion is restricted to: <ul style="list-style-type: none"> (a) The ability to manage coastal hazard risk through appropriate building materials, structural or design work, engineering solutions including the ability to relocate the building, or other appropriate mitigation measures, including the setting of minimum floor levels where appropriate; (b) The application of mitigation through natural features and buffers where appropriate; (c) The ability to impose time limits or triggers to determine when the building and services to be removed or relocated; (d) The degree to which coastal hazard risk, including the effects of climate change over the period to 2120, has been assessed in a site specific coastal hazard risk assessment; (e) Suitability of the site for the proposed use and the ability to, provide servicing such as access, wastewater, stormwater and water supply; (f) Adverse effects to people and property and overall vulnerability from the establishment of the new building or additions to existing building; (g) Whether there is any suitable alternative location for the activity to locate within the site.
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15.8.3 Discretionary Activities

Stage 2 Content

- (a) The activities listed below are discretionary activities in the Coastal Sensitivity Area (Inundation).

D1	Construction of a new coastal protection structure.
D2	Subdivision to create one or more additional vacant lot(s) other than a utility allotment, access allotment or subdivision creating a reserve allotment.

15.9 High Risk Coastal Hazard (Erosion) Area

15.9.1 Permitted Activities

Stage 2 Content

- (a) The activities listed below are permitted activities within the High Risk Coastal Hazard (Erosion) Area shown on the Planning Maps, if they meet the activity-specific conditions set out in this table.
- (b) Activities may also be discretionary or non-complying activities, as specified in Rules 15.9.2 and 15.9.3.

Activity	Activity-specific conditions
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P1	(1) Construction of an accessory building without a floor; and (2) Construction of a farm building without a floor.	(a) The gross floor area of the building does not exceed 40m ² .
P2	(1) Repair, maintenance or minor upgrading of existing utilities. (2) New telecommunication lines, poles, cabinets and masts/ poles supporting antennas.	Nil
P3	Maintenance or repair of an existing lawfully established coastal protection structure.	Nil
P4	Earthworks for an activity listed in Rule 15.9.1 P1 - P3, including the maintenance and repair of access tracks.	(a) The maximum volume of filling does not exceed 10m ³ per site; and (b) The maximum depth of any excavation or filling does not exceed 0.5m above or below ground level.

15.9.2 Discretionary Activities

Stage 2 Content

(a) The activities listed below are discretionary activities in the High Risk Coastal Hazard (Erosion) Area.

D1	Earthworks not provided for in Rule 15.9.1 P4.
D2	(I) Relocation of an existing building within the same site where: (a) The building is relocated landward of its existing position.
D3	(I) Replacement of an existing building within the same site where: (a) The replacement building is located landward of the existing building that it replaces; and (b) The replacement building is relocatable on a suspended timber floor; and (c) The gross floor area of the replacement building is no larger than the existing building that it replaces.
D4	Construction of a new coastal protection structure.
D5	Construction of new utilities not provided for in Rule 15.9.1 P2
D6	Upgrading of existing utilities not provided for in Rule 15.9.1 P2.

D7	<p>(1) Subdivision that creates one or more additional vacant lot(s) where:</p> <p style="margin-left: 40px;">(a) The additional vacant lot(s) are located entirely outside the High Risk Coastal Hazard (Erosion) Area; or</p> <p style="margin-left: 40px;">(b) The additional lot(s) are partially within the High Risk Coastal Hazard (Erosion) Area and each additional lot(s) contains a net site area capable of containing a complying building platform entirely outside the High Risk Coastal Hazard (Erosion) Area.</p> <p>(2) Rule 15.9.2 D7(1) does not apply to subdivision for a utility allotment, access allotment or subdivision to create a reserve allotment.</p>
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15.9.3 Non-Complying Activities

Stage 2 Content

- (a) The activities listed below are non-complying activities in the High Risk Coastal Hazard (Erosion) Area.

NC1	Construction of a new building or additions to an existing building, not provided for in Rule 15.9.1 P1 – P2 or Rule 15.9.2 D2- D6.
NC2	<p>(1) Subdivision to create one or more additional lot(s) that does not comply with Rule 15.9.2 D7.</p> <p>(2) Rule 15.9.3 NC2(1) does not apply to subdivision for a utility allotment, access allotment or subdivision to create a reserve allotment.</p>
NC3	Emergency services facilities and hospitals.

15.10 High Risk Coastal Hazard (Inundation) Area

15.10.1 Permitted Activities

Stage 2 Content

- (1) The activities listed below are permitted activities within the High Risk Coastal Hazard (Inundation) Area shown on the Planning Maps, if they meet the activity-specific conditions set out in this table.
- (2) Activities may also be discretionary or non-complying activities, as specified in Rules 15.10.2 and 15.10.3.

Activity	Activity-specific conditions
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P1	<p>(1) Construction of an accessory building without a floor;</p> <p>(2) Construction of a farm building without a floor.</p>	(a) The gross floor area of the building does not exceed 40m ² .
P2	<p>(1) Operation, repair, maintenance or minor upgrading of existing utilities.</p> <p>(2) New telecommunication lines, poles, cabinets and masts/poles supporting antennas.</p>	Nil
P3	Maintenance or repair of an existing lawfully established coastal protection structure.	Nil
P4	Earthworks for an activity listed in Rule 15.10.1 P1 - P3, including the maintenance and repair of access tracks.	<p>(a) The maximum volume of filling does not exceed 10m³ per site; and</p> <p>(b) The maximum depth of any excavation or filling does not exceed 0.5m above or below ground level.</p>

15.10.2 Discretionary Activities

Stage 2 Content

(1) The activities listed below are discretionary activities in the High Risk Coastal Hazard (Inundation) Area.	
D1	Earthworks not provided for in Rule 15.10.1 P4.
D2	<p>(1) Replacement and relocation of an existing building within the same site where:</p> <p>(a) There is no increase in the ground floor area of the building.</p>
D3	Construction of a new coastal protection structure.
D4	Construction of new utilities not provided for in Rule 15.10.1 P2.
D5	Upgrading of existing utilities not provided for in Rule 15.10.1 P2.

D6	<p>(1) Any subdivision which creates one or more additional vacant lot(s) where:</p> <p style="margin-left: 40px;">(a) The additional vacant lot(s) are located entirely outside the High Risk Coastal Hazard (Inundation) Area; or</p> <p style="margin-left: 40px;">(b) The additional lot(s) are partially within the High Risk Coastal Hazard (Inundation) Area and each additional lot(s) contains a net site area capable of containing a complying building platform entirely outside the High Risk Coastal Hazard (Inundation) Area.</p> <p>(2) Rule 15.10.2 D6(1) does not apply to subdivision for a utility allotment, access allotment or subdivision to create a reserve allotment.</p>
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15.10.3 Non-Complying Activities

Stage 2 Content

(1) The activities listed below are non-complying activities in the High Risk Coastal Hazard (Inundation) Area.	
NC1	Construction of a new building or additions to an existing building, not provided for in Rule 15.10.1 P1 – P2 or Rule 15.10.2 D2 - D5.
NC2	<p>(1) Subdivision to create one or more additional lot(s) that does not comply with Rule 15.10.2 D6.</p> <p>(2) Rule 15.10.3 NC2(1) does not apply to subdivision for a utility allotment, access allotment or subdivision to create a reserve allotment.</p>
NC3	Emergency service facilities and hospitals.

15.11 Mine Subsidence Risk Area

15.11.1 Permitted Activities

Stage 2 Content

Page 2 Content

(1) The activities listed below are permitted activities within the Mine Subsidence Risk Area shown on the Planning Maps if they meet the activity-specific conditions set out in this table.

(2) Activities may also be restricted discretionary activities or discretionary activities, as specified in Rules 15.11.2 and 15.11.3.

Activity		Activity-specific conditions
P1	Additions to an existing building.	<p>(a) Additions do not increase the gross floor area of the building by more than 15m²; and</p> <p>(b) Additions do not result in the length of any wall of the building exceeding 20m.</p>

P2	Standalone garage	(a) The gross floor area of the building does not exceed 55m ² ; and (b) The maximum length of any wall does not exceed 20m.
P3	Construction, replacement, repair, minor upgrading, upgrading or maintenance of utilities.	Nil
P4	Earthworks	(a) The maximum volume of filling does not exceed 20m ³ per site; and (b) The maximum depth of any excavation or filling does not exceed 1m above or below ground level.

15.11.2 Restricted Discretionary Activities

Stage 2 Content

- (1) The activities listed below are restricted discretionary activities in the Mine Subsidence Risk Area.
- (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Matters of Discretion
RD1	Earthworks that do not comply with Rule 15.11.1 P4.	Discretion is restricted to: (a) Location and scale of earthworks; (b) Geotechnical and geological stability of the site following the completion of earthworks; (c) Risk to people and property from subsidence as a result of earthworks; (d) Any other mitigation measures to reduce risk.

15.11.3 Discretionary Activities

Stage 2 Content

- (1) The activities listed below are discretionary activities in the Mine Subsidence Risk Area.

D1	Construction of a building or additions to an existing building not provided for in Rule 15.11.1 P1 - P3.
D2	Subdivision to create one or more additional vacant lot(s) other than a utility allotment, access allotment or subdivision to create a reserve allotment.

15.12 Liquefaction

15.12.1 Overview of method

Stage 2 Content

- (1) Areas in the district susceptible to liquefaction have not been identified on the planning maps as a natural hazard overlay as is the case with the other natural hazards in this chapter. Where specific land uses have already been identified as restricted discretionary activities in the activity status tables in the relevant zone, liquefaction risk has been added as a matter over which the Council will reserve its discretion, where it is considered relevant for that activity. To satisfy the requirements of sections 104 and 106 of the RMA, identification of appropriate mitigation may be required where the site and proposed development are considered vulnerable to liquefaction based on site-specific characteristics. It is expected that best practice geotechnical and engineering methods will be used to ensure that the site is suitable for the intended use.
- (2) Where potential liquefaction risk is identified as a matter that the Council restricts its discretion to, the additional matters outlined in Rules 15.12.2 and 15.12.3 below apply where relevant.

15.12.2 Additional matters of restricted discretion for subdivision to create one or more additional vacant lots – liquefaction risk

Stage 2 Content

- (1) Where potential liquefaction risk is identified as a matter that the Council will restrict its discretion to in a subdivision rule elsewhere in this Plan, and where that proposal involves subdivision to create one or more additional vacant lots, the Council restricts its discretion to the following additional matters (note: these matters will also be relevant to the assessment of a discretionary or non-complying resource consent application where a potential liquefaction hazard has been identified on a site):
 - (a) Geotechnical assessment and/or investigation of any potential liquefaction hazard on the site at a level sufficient to confirm the level of risk and its suitability for the proposed activity (see information requirements in section 15.13);
 - (b) Measures proposed to mitigate the effects of liquefaction hazard if present including:
 - (i) Location, size, layout and design of allotments, structures, and building platforms, including consideration given to alternative siting away from where liquefaction risk is greatest;
 - (ii) Location, timing, scale and nature of earthworks;
 - (iii) Provision for ground strengthening and foundation design;
 - (iv) Provision for resilient services and infrastructure, including wastewater, water supply, roads and access;
 - (v) Setbacks in relation to waterways, waterbodies or any steep change in ground elevation, sloping ground or free face, or alternative geotechnical measures to address any identified potential for lateral spread;
 - (vi) Effects on adjoining properties.

15.12.3 Additional matters of restricted discretion for new land use (e.g. multi-unit development) – liquefaction risk

Stage 2 Content

- (I) Where potential liquefaction risk is identified as a matter that the Council will restrict its discretion to in a rule elsewhere in this Plan for new land use, the Council restricts its discretion to the following additional matters (note: these matters will also be relevant to the assessment of a discretionary or non-complying resource consent application where a potential liquefaction hazard has been identified on a site):
 - (a) Geotechnical assessment and/or investigation of any potential liquefaction hazard on the site at a level sufficient to confirm the level of risk and its suitability for the proposed activity (see information requirements in section 15.13);
 - (b) Measures proposed to mitigate the effects of liquefaction hazard, if present, including:
 - (i) Location, size, layout and design of buildings, structures, car parking areas, access and provision for resilient infrastructure and services, including wastewater, stormwater and water supply;
 - (ii) Location, timing, scale and nature of earthworks;
 - (iii) Provision for ground strengthening and foundation design;
 - (iv) Setbacks in relation to waterways, waterbodies or any steep change in ground elevation, sloping ground (or free face, or alternative geotechnical measures to address any identified potential for lateral spread);
 - (v) Consideration given to ease of repair (including access to repair damaged structures) of liquefaction-induced damage;
 - (vi) Effects on adjoining properties.

15.13 Information requirements for all resource consent applications addressing natural hazards

15.13.1 General

Stage 2 Content

- (I) The following documents, to the extent relevant to the proposal:
 - (a) Geotechnical assessment, including identification and assessment of any potentially liquefaction-prone land and land subject to slope instability;
 - (b) An assessment of natural hazard risk, including the type of natural hazards present, such as flooding, slope stability, liquefaction, subsidence and coastal hazards. The assessment shall include the level of risk and any increase in risk as a result of the proposal associated with each hazard. Where applicable, the projected effects of climate change over the period to 2120 must be included;
 - (c) Remediation and mitigation measures necessary to make the site and any proposed buildings suitable for the proposed use, such as minimum floor levels, foundation design for relocatability, and appropriate time limits and/or triggers for

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the removal of any building and onsite wastewater disposal systems.

- (2) Plans identifying:
 - (a) Topographical features within the site and surrounding area;
 - (b) The location of natural hazards on all or part of the site.

15.13.2 Liquefaction Potential

Stage 2 Content

- (1) For land use resource consent applications where the additional matters the Council will restrict its discretion to include liquefaction, as per Rule 15.12.3, the following information is required:
 - (a) A preliminary geotechnical assessment in sufficient detail to determine:
 - (i) the liquefaction vulnerability category, being either “liquefaction damage is unlikely” or “liquefaction damage is possible”, as shown in Table 4.4 in “Preliminary Document: Planning and engineering guidance for potentially liquefaction-prone land – Resource Management Act and Building Act aspects. Pub MfE and MBIE, September 2017”; or
 - (ii) whether or not the site is susceptible to liquefaction using an alternative accepted method, observation, or desk-top study.
 - (b) Where a “liquefaction damage is possible” category has been identified for the site as per 15.13.2(1)(a)(i) above, or an alternative accepted method, observation or desktop study indicates that the site is susceptible to liquefaction as per 15.13.2(1)(a)(ii) above, the assessment will be required to determine the liquefaction vulnerability in more detail, and in proportion to the scale and significance of the liquefaction hazard, and must:
 - (i) Identify any areas which require particular ground strengthening or other mitigation measures, and recommendations for such mitigation; and
 - (ii) Identify areas to be excluded from built development, due to liquefaction hazard constraints (which includes lateral spread), or which require geotechnical setbacks; and
 - (iii) Indicate options and recommended locations for the proposed activities and infrastructure recommended by the geotechnical engineer.
 - (c) All geotechnical assessments in respect of liquefaction risk are to be prepared by a suitably-qualified and experienced engineer with experience in geotechnical engineering or a Professional Engineering Geologist (IPENZ registered).
- (2) For subdivision consent applications that create one or more additional vacant lots as per Rule 15.12.2:
 - (a) an assessment in accordance with 15.13.2(1)(a) above will be required to be provided.
 - (b) Where a “liquefaction damage is possible” category has been identified for the site as per 15.13.2(1)(a)(i) above, or an alternative accepted method, observation, or

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desktop study indicates that the site is susceptible to liquefaction as per 15.13.2(1)(a)(ii) above, the subdivision application will be required to include sufficient information and proposed measures to satisfy that liquefaction risk can be adequately avoided, remedied or mitigated, including the potential effects of lateral spread.

- (c) Subdivision plans shall show, to the extent relevant or appropriate to the scale and significance of the liquefaction hazard identified:
 - (i) any areas which require particular ground strengthening or other mitigation measures, and recommendations for such mitigation; and
 - (ii) any areas which should be excluded from built development due to geotechnical constraints, or which require geotechnical setbacks; and
 - (iii) any features of subdivision layout recommended by the geotechnical engineer, for example any recommended locations for proposed activities and other infrastructure as a result of geotechnical constraints.
- (d) All geotechnical reports in respect of liquefaction potential are to be prepared by a suitably-qualified and experienced engineer with experience in geotechnical engineering or a Professional Engineering Geologist (IPENZ registered).

15.13.3 Country Living Zone - Tamahere

Stage 2 Content

- (I) Any resource consent in relation to land located in the Country Living Zone in Tamahere will be required to include details of ponding of stormwater and overland flow paths as a result of a 1% AEP storm event (with rainfall events adjusted for climate change), as well as mitigation measures taking account of information that the Council holds in respect to the Tamahere stormwater catchment area.

15.13.4 Defended Areas

Stage 2 Content

- (I) For any Restricted Discretionary Activity land use and subdivision applications within the Defended Area, the following information is required to the extent relevant to the scale of the proposal:
 - (a) a risk assessment, carried out by a suitably-qualified and experienced risk assessment practitioner, which identifies the nature and level of residual risk, and details of appropriate methods to further reduce residual risk, where appropriate.

15.14 Definitions

Coastal Sensitivity Area (Erosion)

Coastal Sensitivity Area (Erosion)

Stage 2 Content

Means an area identified on the planning maps that is potentially vulnerable to coastal erosion over the period to 2120, assuming sea level rise of 1.0 m.

Coastal Sensitivity Area (Inundation)

Coastal Sensitivity Area (Inundation)

Stage 2 Content

Means an area identified on the planning maps that is potentially vulnerable to coastal inundation over the period to 2120, assuming sea level rise of 1.0 m.

Defended Area

Defended Area

Stage 2 Content

Means an area identified on the planning maps which could normally flood in a 1% AEP flood event but is protected from flooding by a flood protection scheme managed by the Waikato Regional Council, the Waikato District Council or the Crown.

Emergency service facility

Emergency service facility

Stage 2 Content

Means a fire station, ambulance station, police station or an emergency co-ordination facility.

Farm building

Farm building

Stage 2 Content

For the purposes of Chapter 15, means a building that supports the primary use of the site for farming. It excludes residential units.

Flood plain management area

Flood plain management area

Stage 2 Content

Means an area identified on the planning maps which is at risk of flooding in a 1% AEP flood event and is otherwise described as the 1% AEP floodplain.

Flood ponding area

Flood ponding area

Stage 2 Content

Means an area shown on the planning maps as an identified flood ponding area or an area that experiences floodwater ponding in a 1% AEP rainfall event.

High risk flood area

High risk flood area

Stage 2 Content

Means an area identified on the planning maps, located within the Flood Plain Management Area,

which is subject to river or surface flooding during an event with an annual exceedance probability of no more than 1%, and during such an event:

- (a) the depth of flood waters exceeds one metre; or
- (b) the speed of flood waters exceeds two metres per second; or
- (c) the flood depth multiplied by the flood speed exceeds one.

High Risk Coastal Hazard (Erosion) Area

High Risk Coastal Hazard (Erosion) Area

Stage 2 Content

Means an area identified on the planning maps which is currently at risk from coastal erosion with existing sea level and existing coastal processes.

High Risk Coastal Hazard (Inundation) Area

High Risk Coastal Hazard (Inundation) Area

Stage 2 Content

Means an area identified on the planning maps which is currently at risk from coastal inundation with existing sea level and coastal processes.

Mine Subsidence Risk Area

Mine Subsidence Risk Area

Stage 2 Content

Means an area identified on the planning maps which is currently at risk of surface subsidence as a result of historic underground coal mining operations.

Minor upgrading

Minor upgrading

Stage 2 Content

For the purposes of Chapter 15 means an increase in the capacity, efficiency or security of existing utilities where this utilises existing structures and networks and/or structures and networks of a similar scale and character.

Risk assessment

Risk assessment

Stage 2 Content

Means the overall process of risk identification, risk analysis and risk evaluation.

Standalone Garage

Standalone Garage

Stage 2 Content

Means a roofed and enclosed building which is detached from the main residential unit and designed to accommodate one or more motor vehicles.

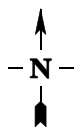
Utility

Utility

Stage 2 Content

For the purpose of Chapter 15 Natural Hazards means:

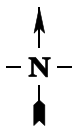
- (1) Transformation, transmission, generation or distribution of electricity provided by network utility operators or requiring authorities, including:
 - (a) transmission lines and electricity distribution lines and associated equipment; and
 - (b) private connections to such utilities;
- (2) Telecommunication and radiocommunication facilities, including:
 - (a) transmitting/receiving devices such as aerials, antennas, dishes (including cables), insulators, castings, tunnels and associated equipment; and
 - (b) support structures such as towers, masts and poles, accessory buildings and private receiving dish antennas;
- (3) Storage tanks and pipes for the distribution or transmission of petroleum or natural or manufactured gas, including necessary incidental equipment provided by network utility operators or requiring authorities, and private connections to such utilities;
- (4) Reticulated water for supply or irrigation, stormwater management basins, swales or drainage systems, and reticulated sewerage, including:
 - (a) private stormwater facilities connecting to such utilities; and
 - (b) necessary incidental equipment, including water storage tanks and pumping facilities; and
- (5) Meteorological facilities, navigation aids and beacons, including approach control services within the meaning of the Civil Aviation Act 1990.
- (6) Flood management infrastructure including stopbanks and erosion protection structures associated with flood management where owned or operated by the Waikato Regional Council, the Waikato District Council or the Crown.
- (7) Public roads and railway lines.
















Proposed Waikato District Plan (Stage 2) Map Index

Map No.	Name	Scale
5	Aka Aka	50000
29	Aotea	50000
27.3	Bruntwood	10000
27.6	Eureka	10000
27	Eureka	50000
19.2	Glen Afton Pukemiro	10000
19.3	Glen Massey	10000
21.3	Gordonton	10000
20	Hakarimata	50000
26	Hamilton Environs	50000
8.2	Hampton Downs	10000
15	Hapuakohe	50000
32	Hautapu	50000
26.1	Horotiu	10000
20.2	Huntly East	10000
20.3	Huntly South	10000
20.4	Huntly Town Centre	5000
20.1	Huntly West	10000
3	Hunua Ranges East	50000
1	Hunua Ranges North	50000
2	Hunua Ranges West	50000
14	Lake Waikare	50000
13	Lake Whangape	50000
9.1	Mangatangi	10000
23.1	Manu Bay	10000
9.2	Maramarua	10000
9	Maramarua State Forest	50000
27.4	Matangi	10000
7.8	Mercer	10000
8.1	Meremere	10000
4	Miranda	50000
12.1	Naike	10000
20.6	Ngaruawahia	10000
20.7	Ngaruawahia South	10000
	Ngaruawahia Town	
20.8	Centre	5000
10	Okaeria	50000
6.1	Onewhero	10000
21.1	Orini North	10000
21.2	Orini South	10000
5.1	Otaua	10000
30	Pirongia	50000
7.6	Pokeno East	10000
7.7	Pokeno Town Centre	5000
7.5	Pokeno West	10000
11.1	Port Waikato	10000
7.9	Pukekawa	10000
23	Raglan Coast	50000
23.4	Raglan East	10000
23.2	Raglan Heads	10000
23.5	Raglan Town Centre	5000
23.3	Raglan West	10000
14.5	Rangiriri	10000
19.1	Renown Waikokowai	10000
19	Rotowaro	50000
27.1	Ruakura	10000
28	Scotsman Valley	50000
27.2	Tamahere	10000
22	Tauhei	50000
20.5	Taupiri	10000
28.1	Tauwhare	10000
27.5	Tauwhare Pa	10000
15.1	Te Hoe	10000
14.2	Te Kauwhata East	10000
14.3	Te Kauwhata South	10000
	Te Kauwhata Town	
14.4	Centre	5000
14.1	Te Kauwhata West	10000
6	Te Kohanga	50000
26.2	Te Kowhai	10000
24	Te Uku	50000
7.2	Tuakau East	10000
7.3	Tuakau Town Centre	5000
7.1	Tuakau West	10000
	Tuakau/Pokeno and	
7	Environs	50000
11	Waikato Heads South	50000
17	Waikorea Beach	50000
18	Waimai Valley	50000
12	Waimarama	50000
25	Waipa River	50000
16	Waiterimu	50000
31	Waitetuna	50000
8	Whangamarino	50000
7.4	Whangarata	10000
26.3	Whatawhata	10000
21	Whitikahu	50000

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Proposed Waikato District Plan (Stage 2) Legend

	High Risk Coastal Hazard (Inundation) Area
	Coastal Sensitivity Area (Inundation)
	High Risk Coastal Hazard (Erosion) Area
	Coastal Sensitivity Area (Erosion)
	Coastal Sensitivity Area (Open Coast)
	Mine Subsidence Risk Area
	Flood Ponding Area
	High Risk Flood Area
	Flood Plain Management Area
	Defended Area
	Property boundary
	Parcel boundary
	Water body

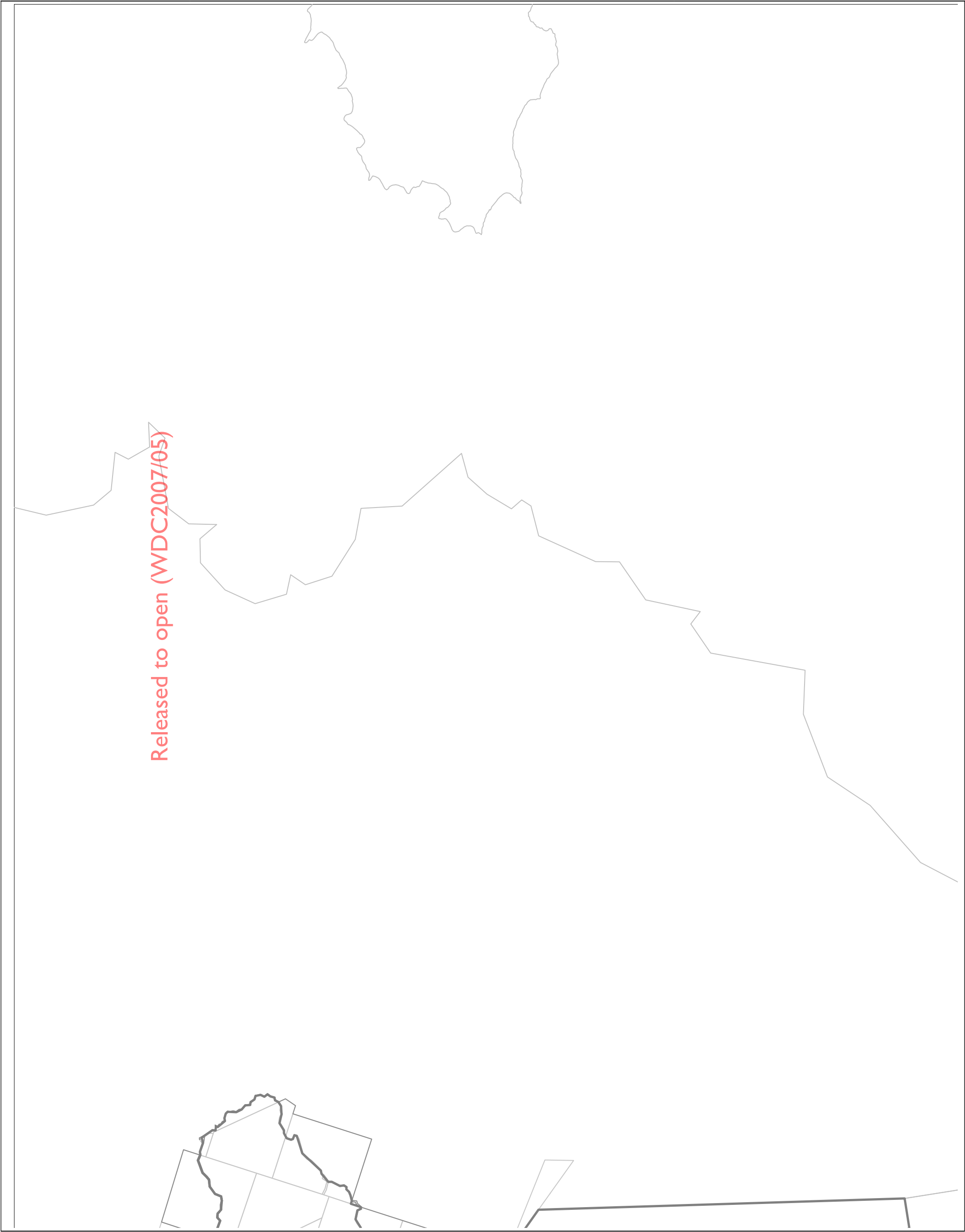
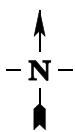
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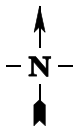
The cadastre shown on the planning maps is not part of the information in the district plan. It has been provided on the planning maps as an additional function to enhance navigability and search capability. The cadastre was based on the most recent information held by council at the date the maps were produced, sourced from Land Information New Zealand. Establishing compliance or otherwise with the plan may require formal survey.

The District boundary is as defined in the Resource Management Act, which uses the definition from the Local Government Act. The line on these maps representing the District boundary is indicative and for information purposes only. The actual boundary is as defined in the legislation. Determining right and obligations under the District plan where the District boundary is relevant many require a formal survey.

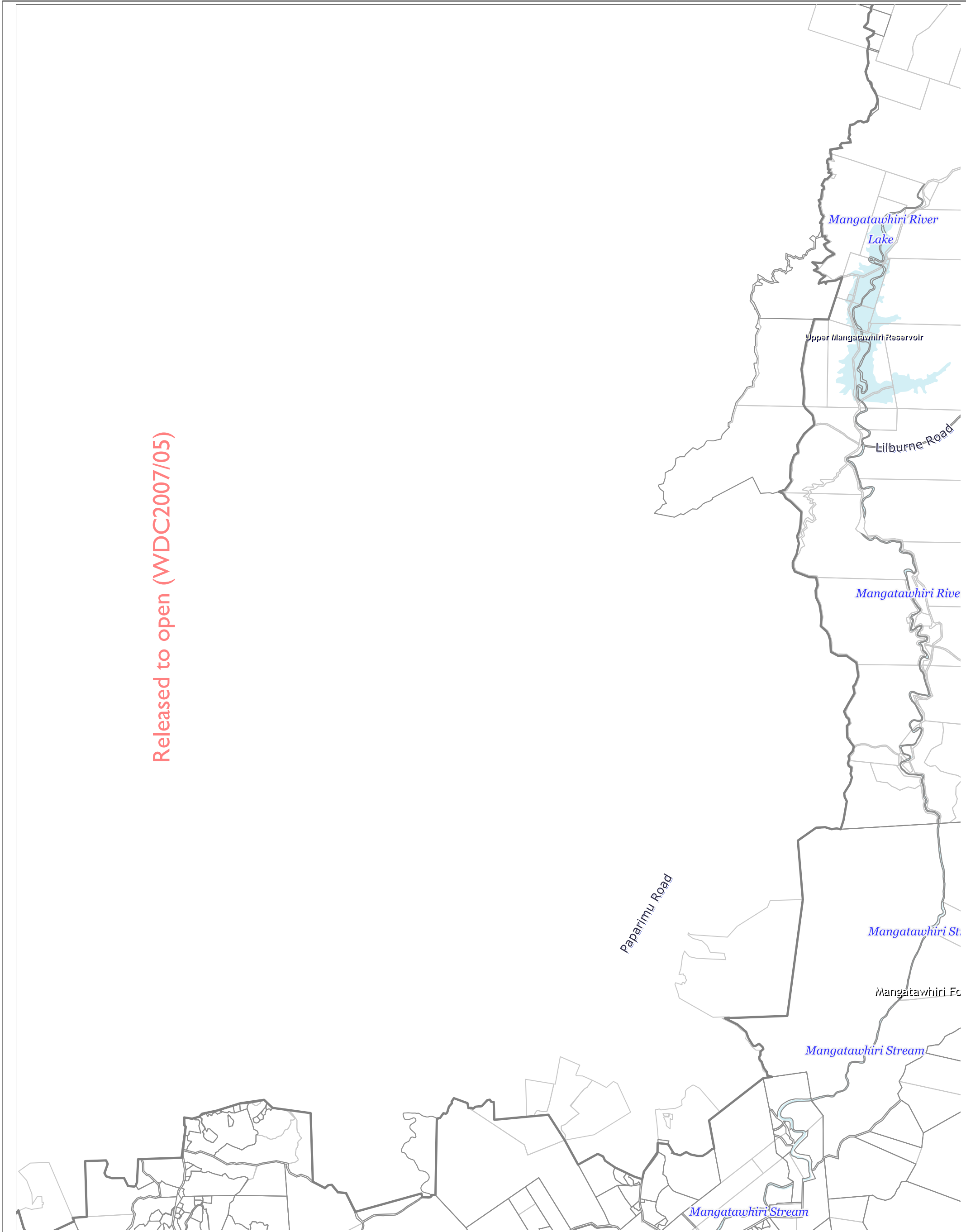
The District planning maps are at a scale of 1:5000, 1:10000 and 1:50000. Use at any other scale than specified on each map is for information purposes only, and does not form part of the District Plan.

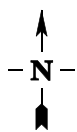
Projection: New Zealand Transverse Mercator
Datum: New Zealand Geodetic Datum 2000





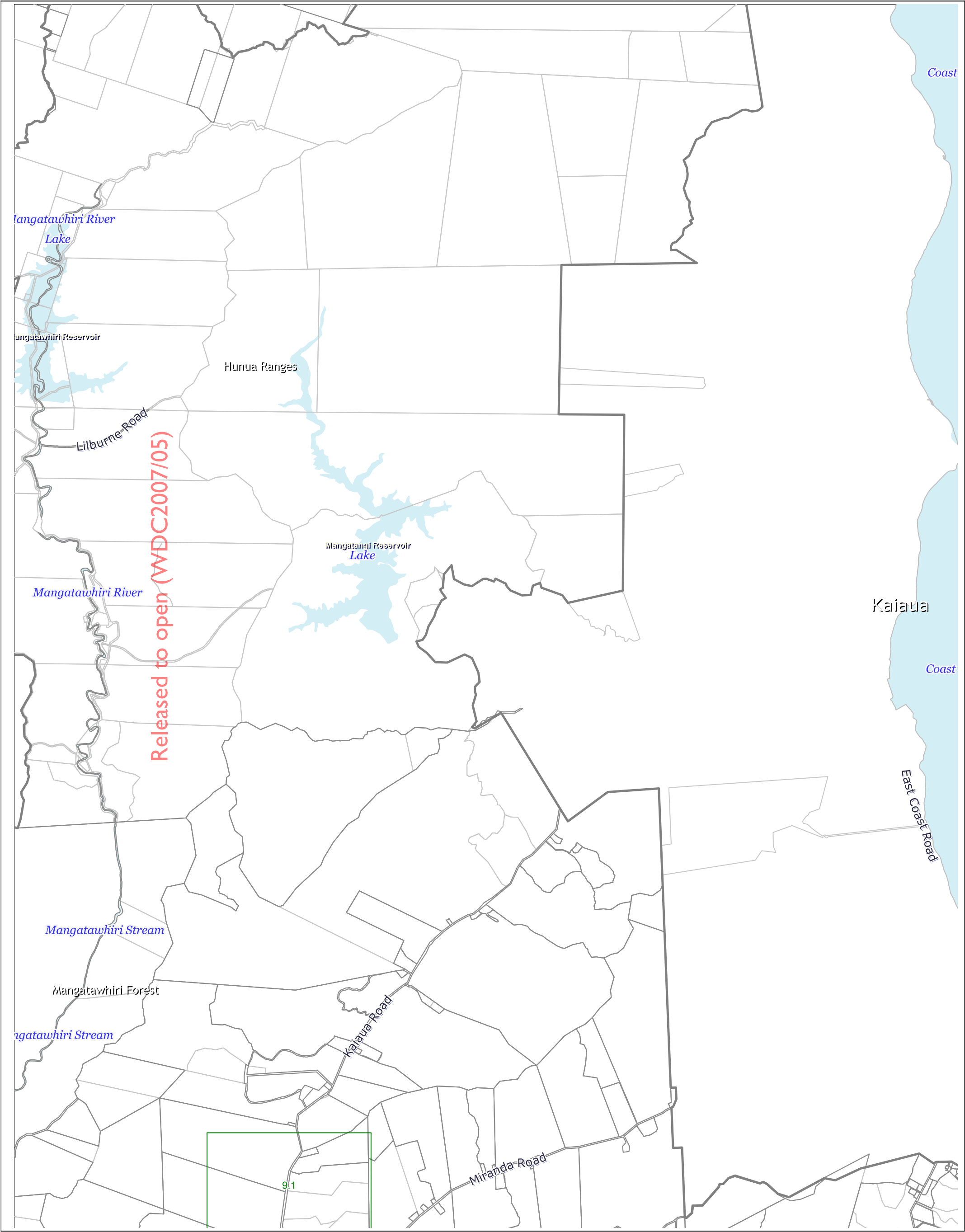
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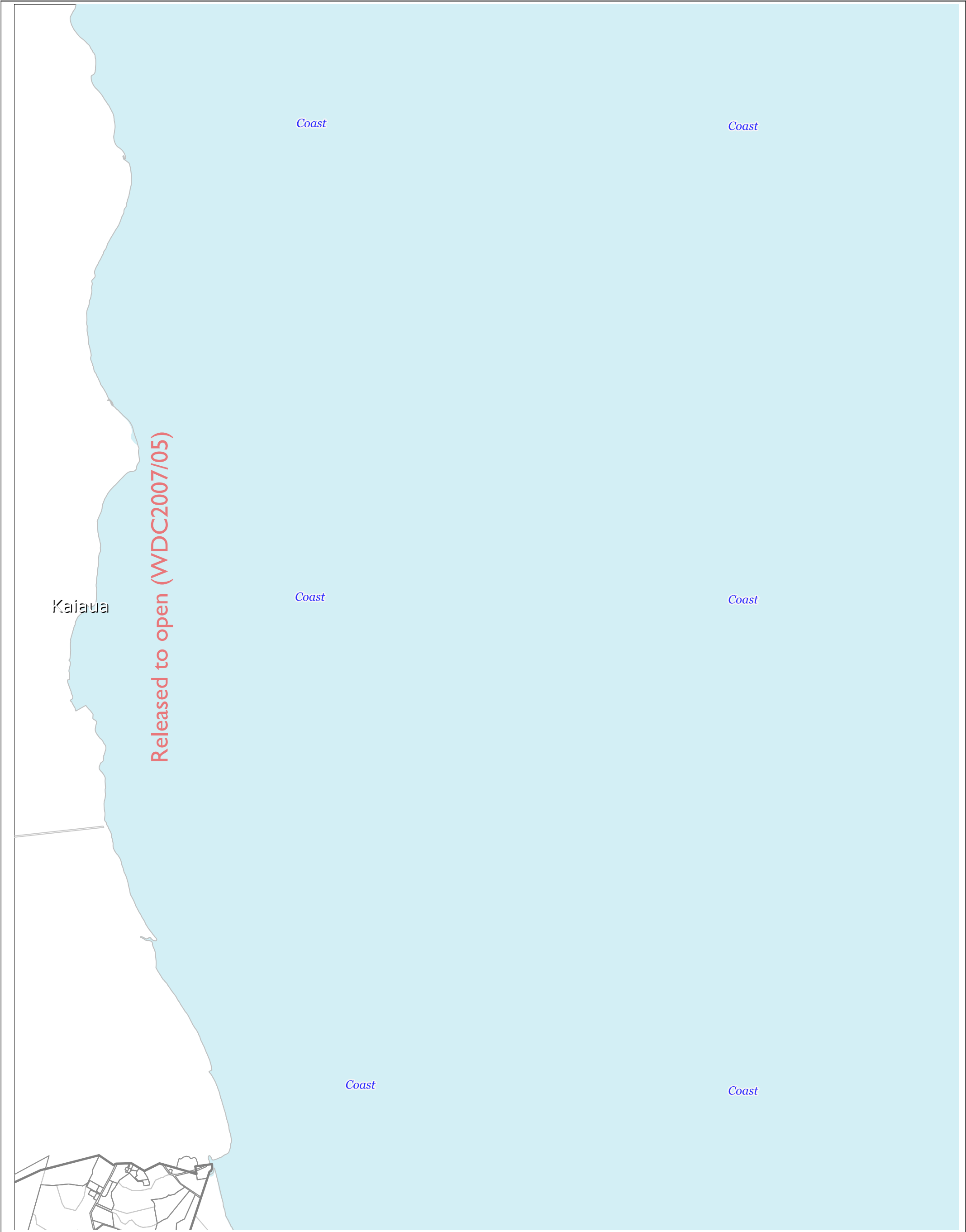
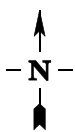


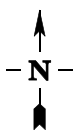


Proposed Waikato District Plan
(Stage 2)

Hunua Ranges East 3

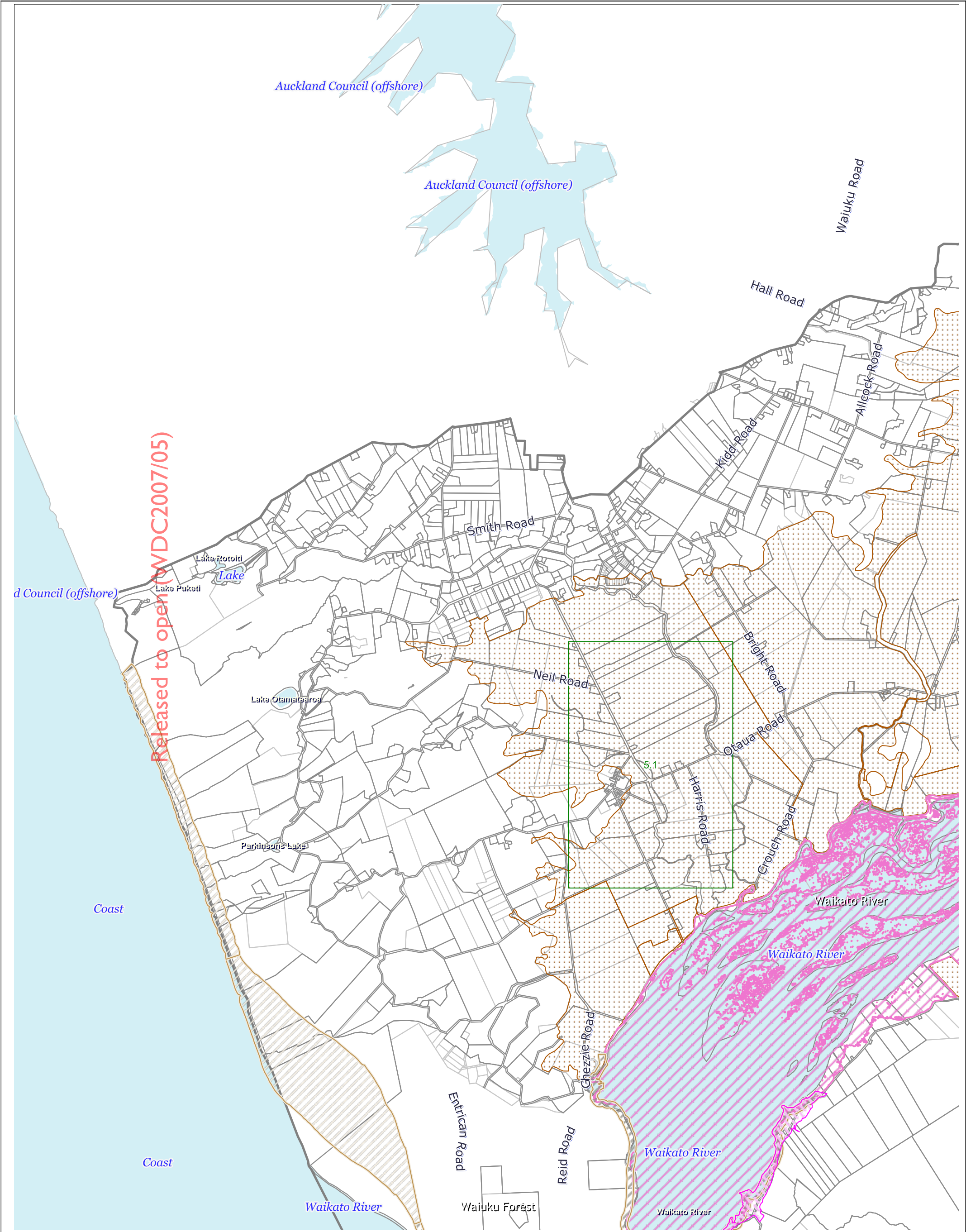


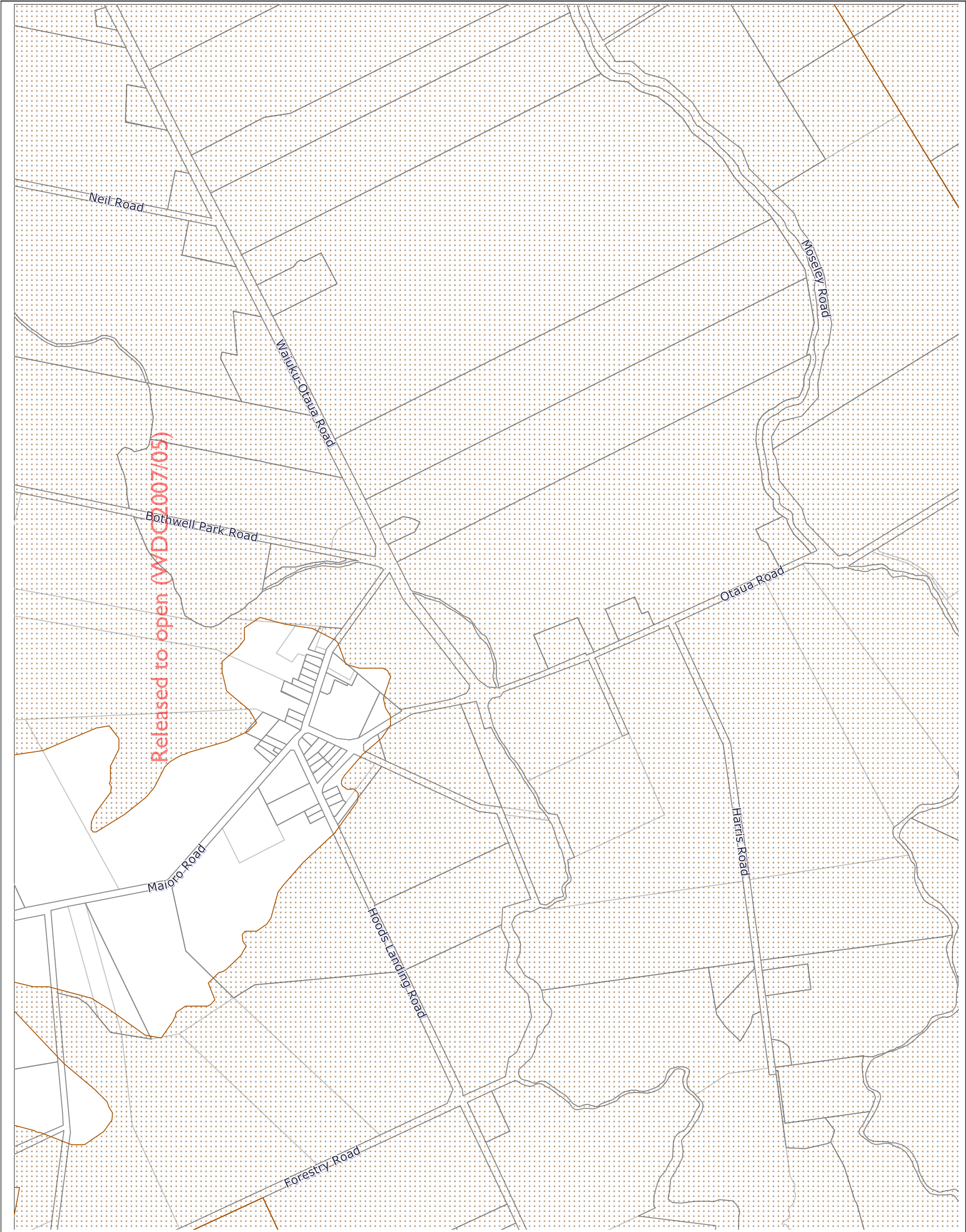
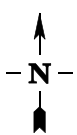


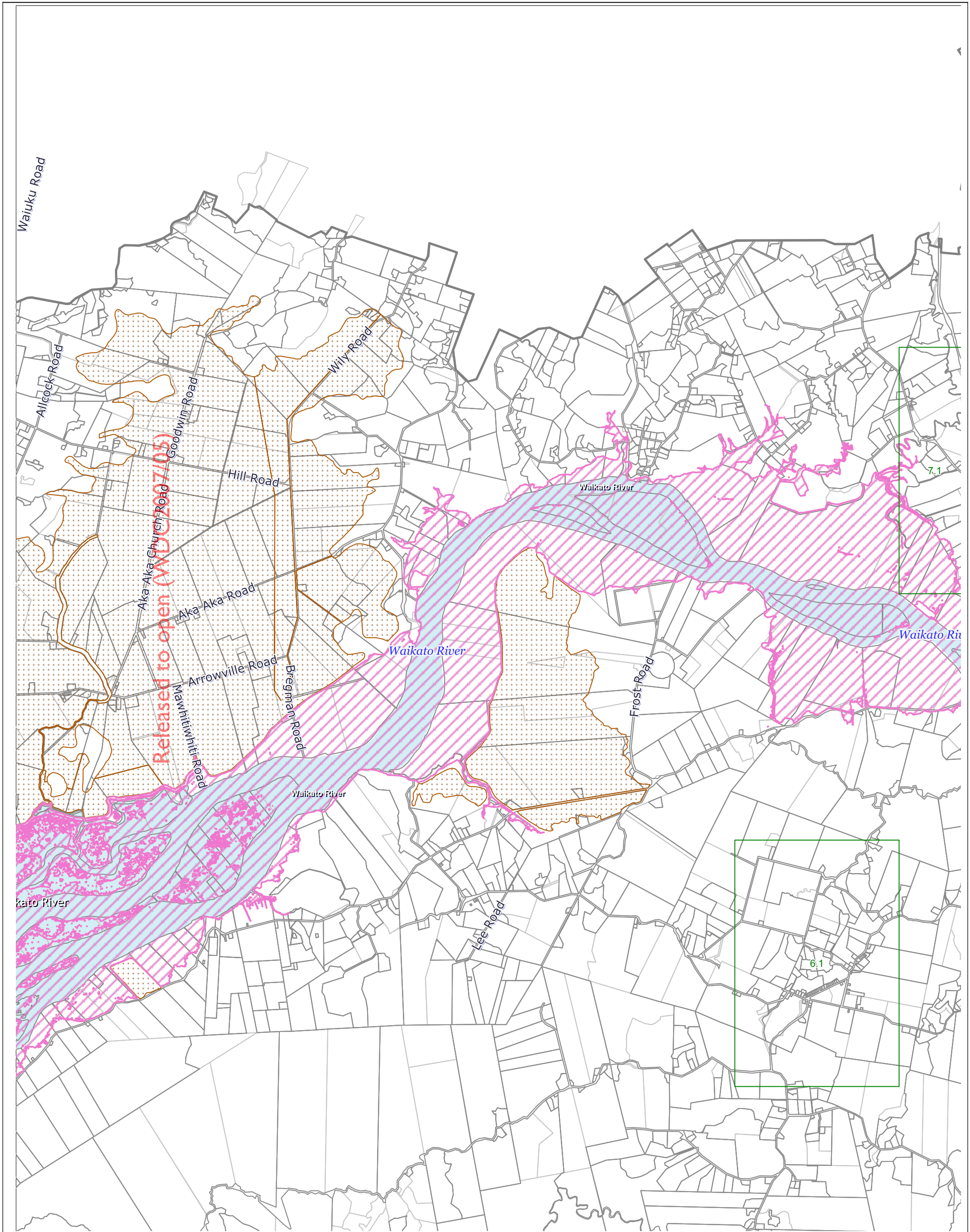
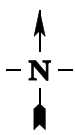


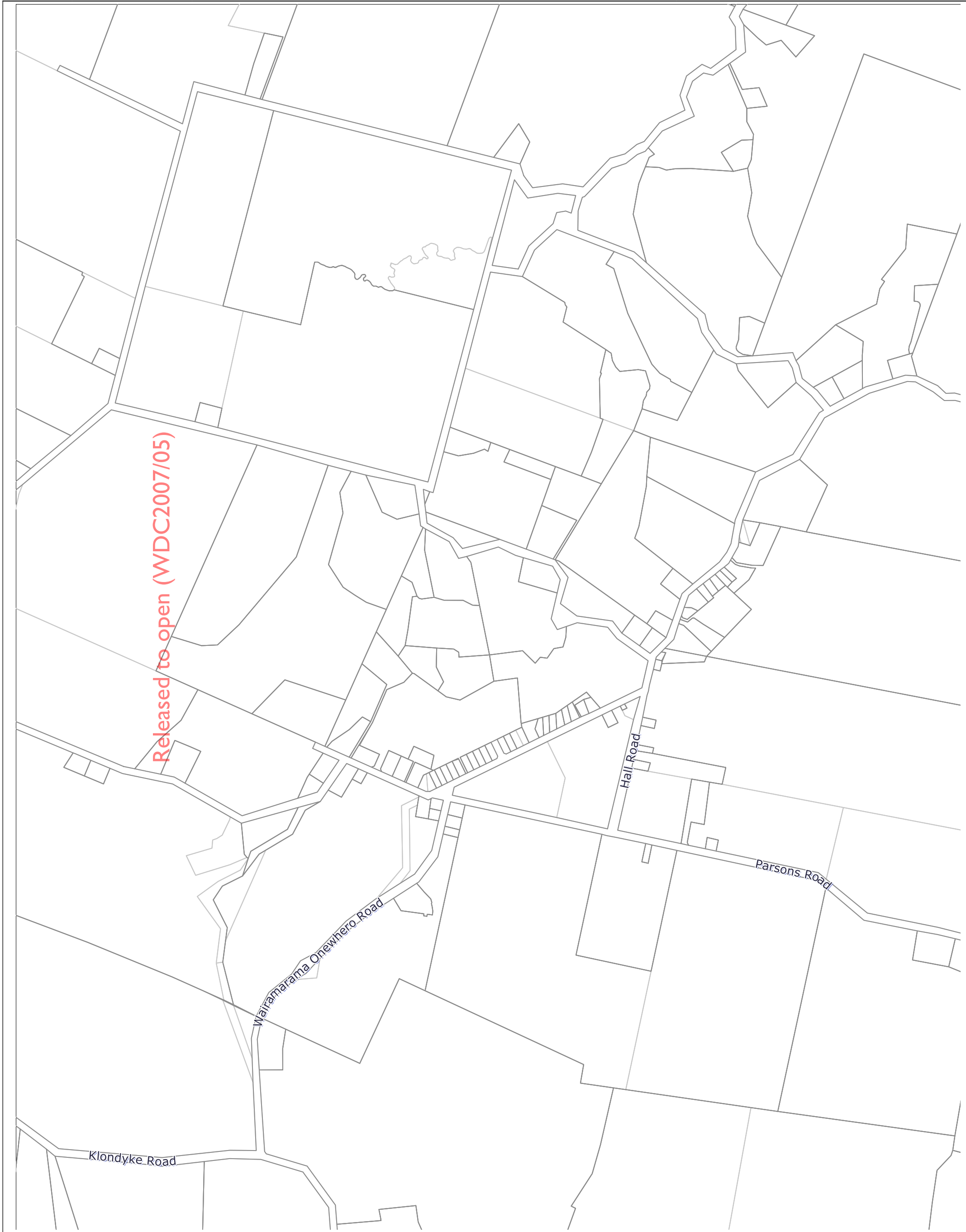
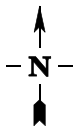
Proposed Waikato District Plan
(Stage 2)

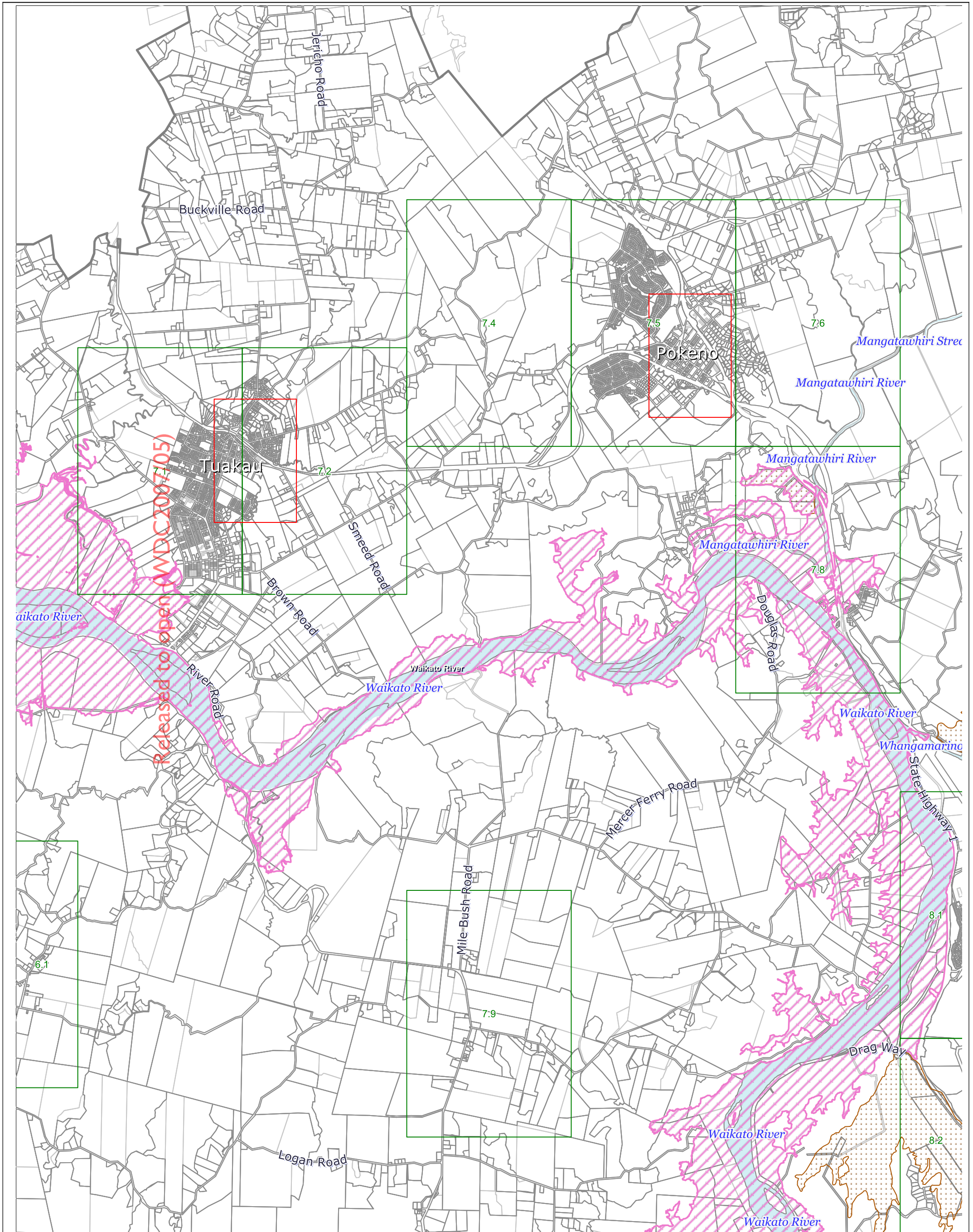
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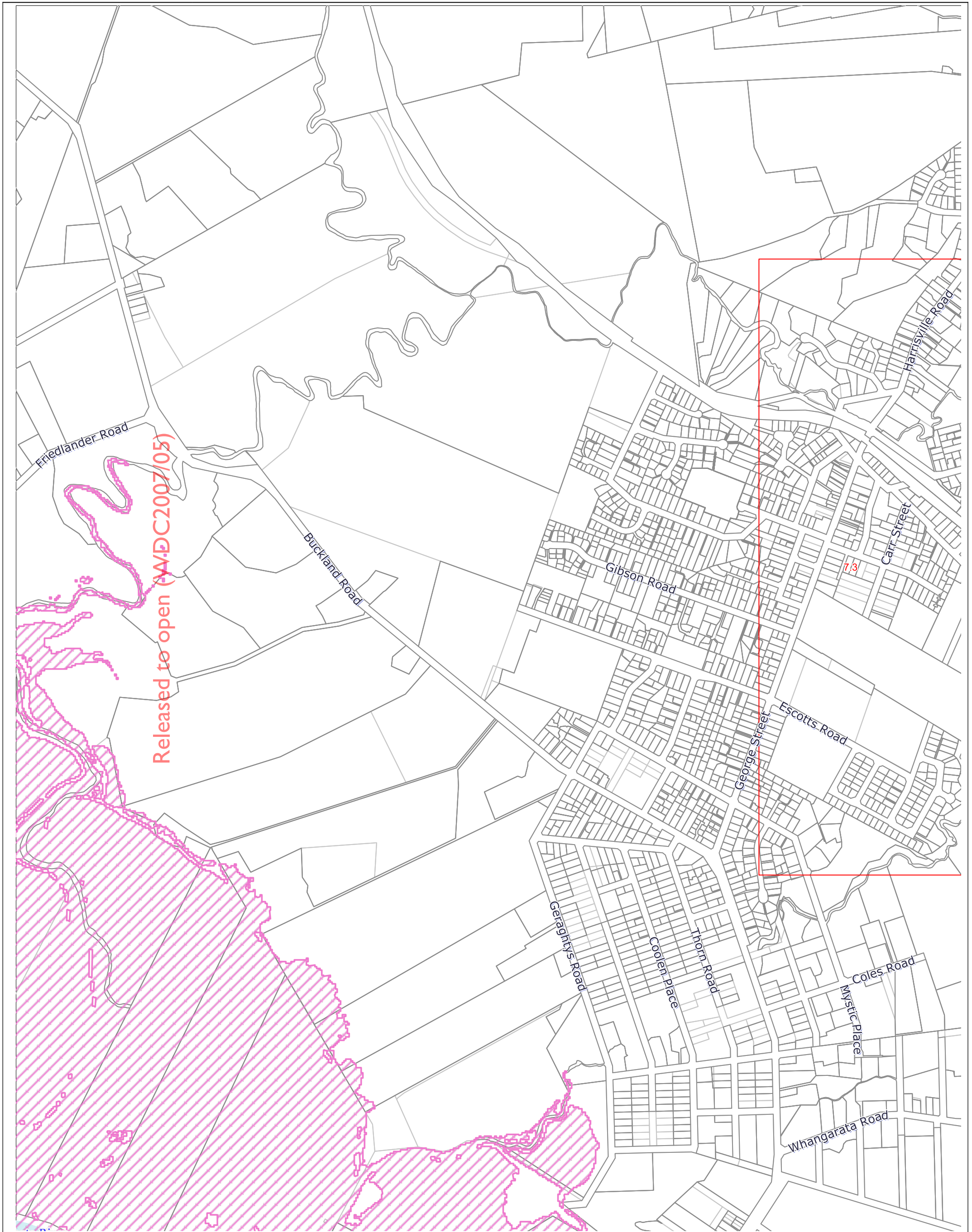
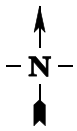






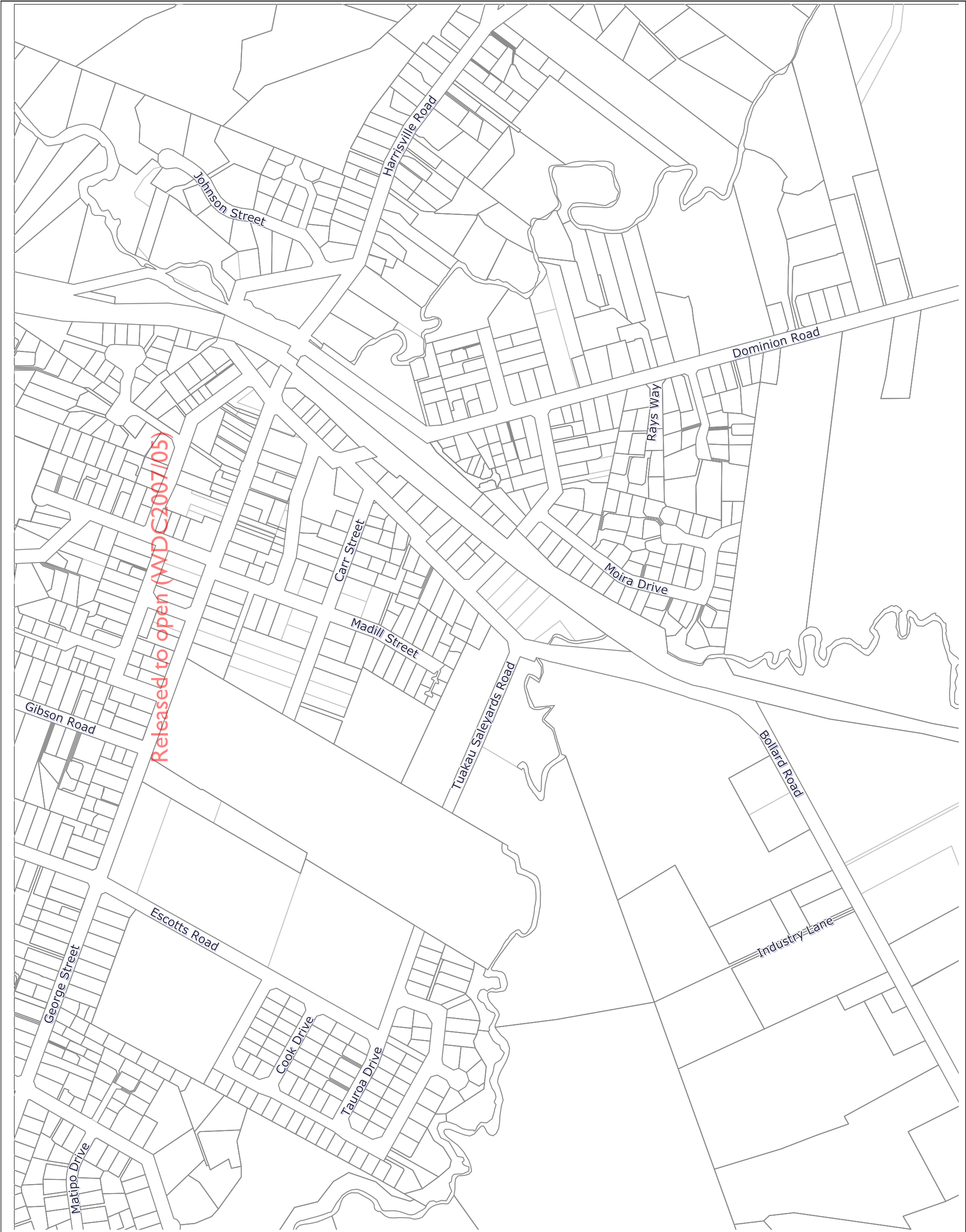
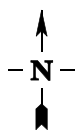


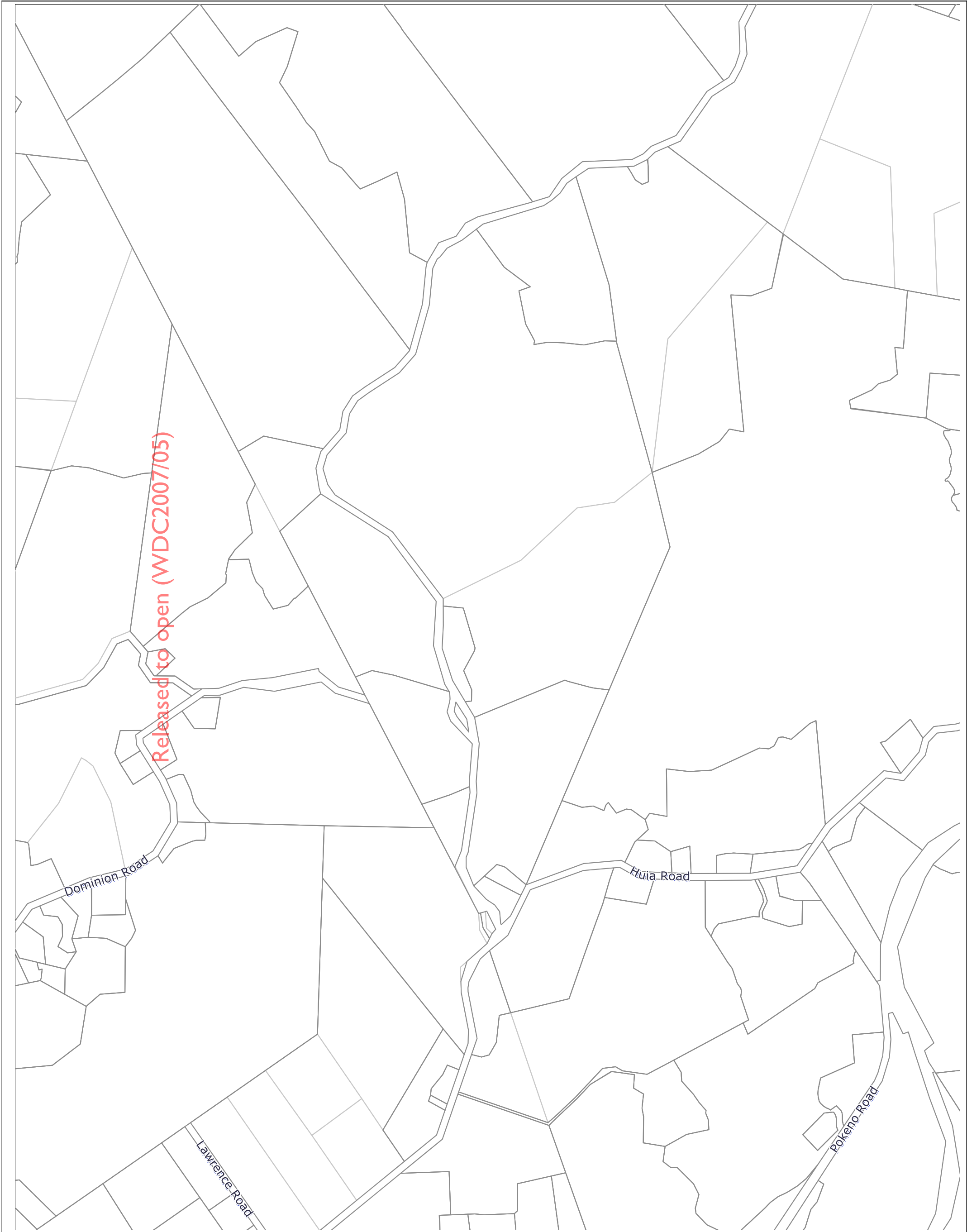
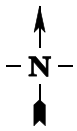


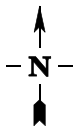


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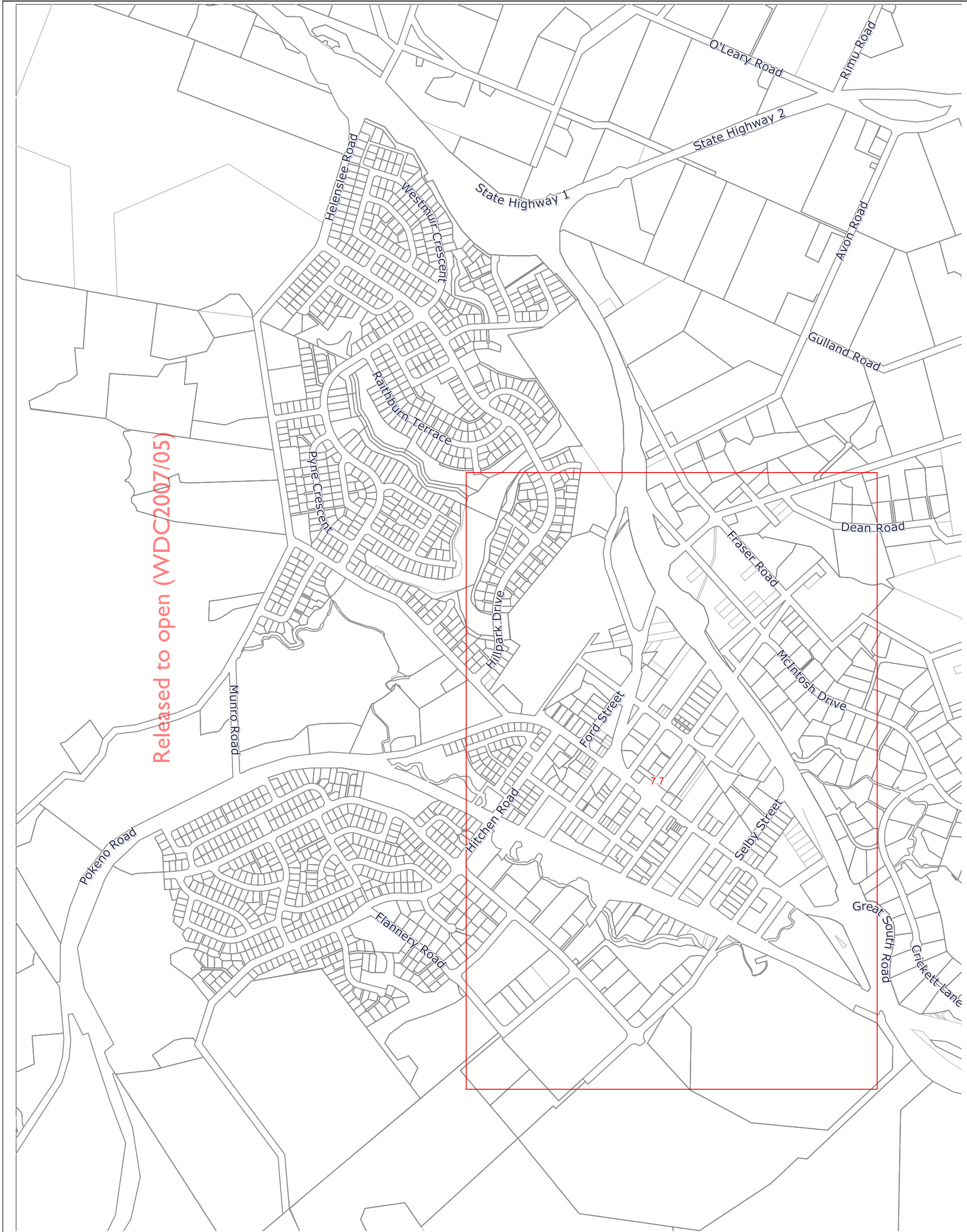




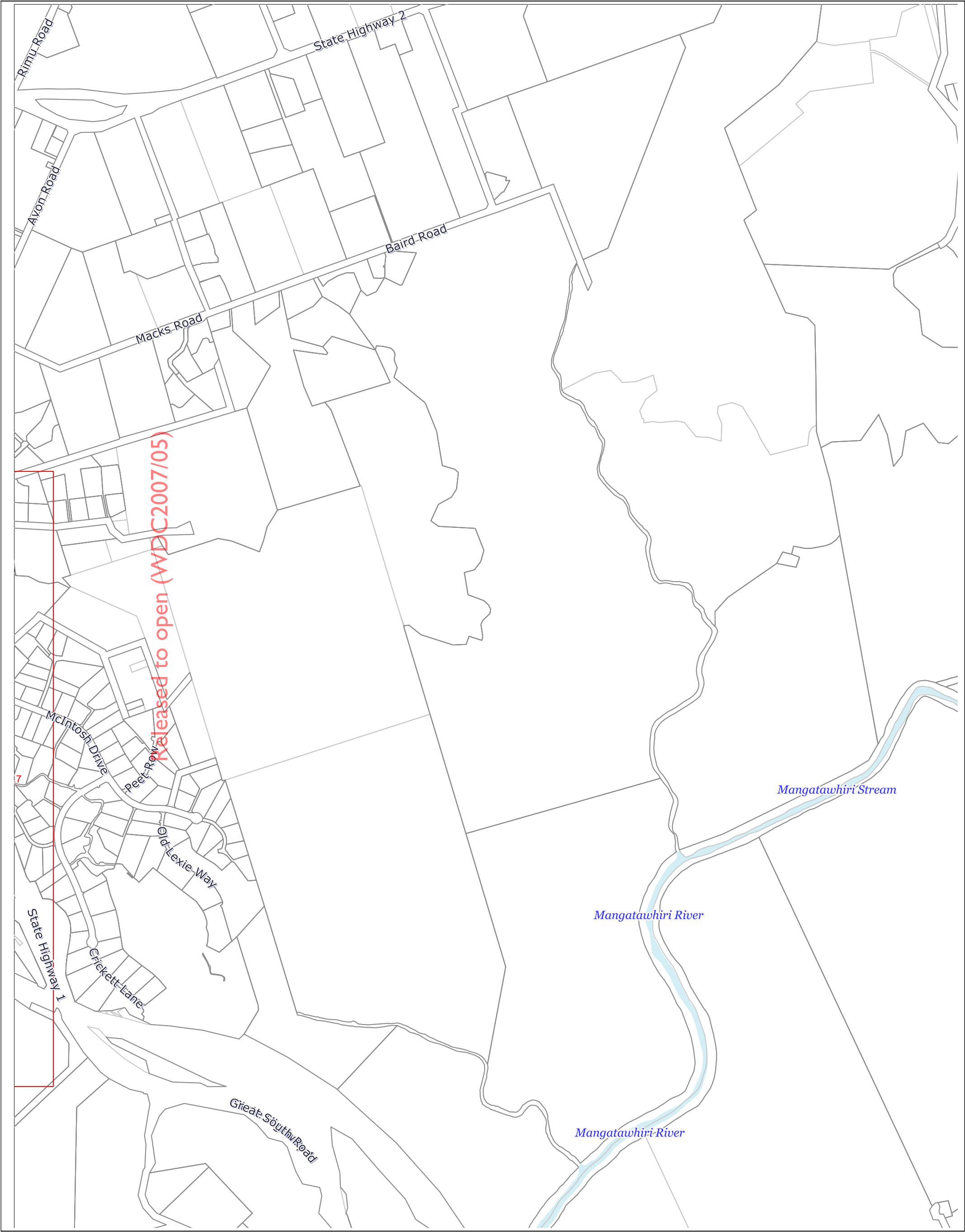
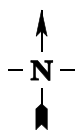


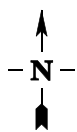
Proposed Waikato District Plan
(Stage 2)

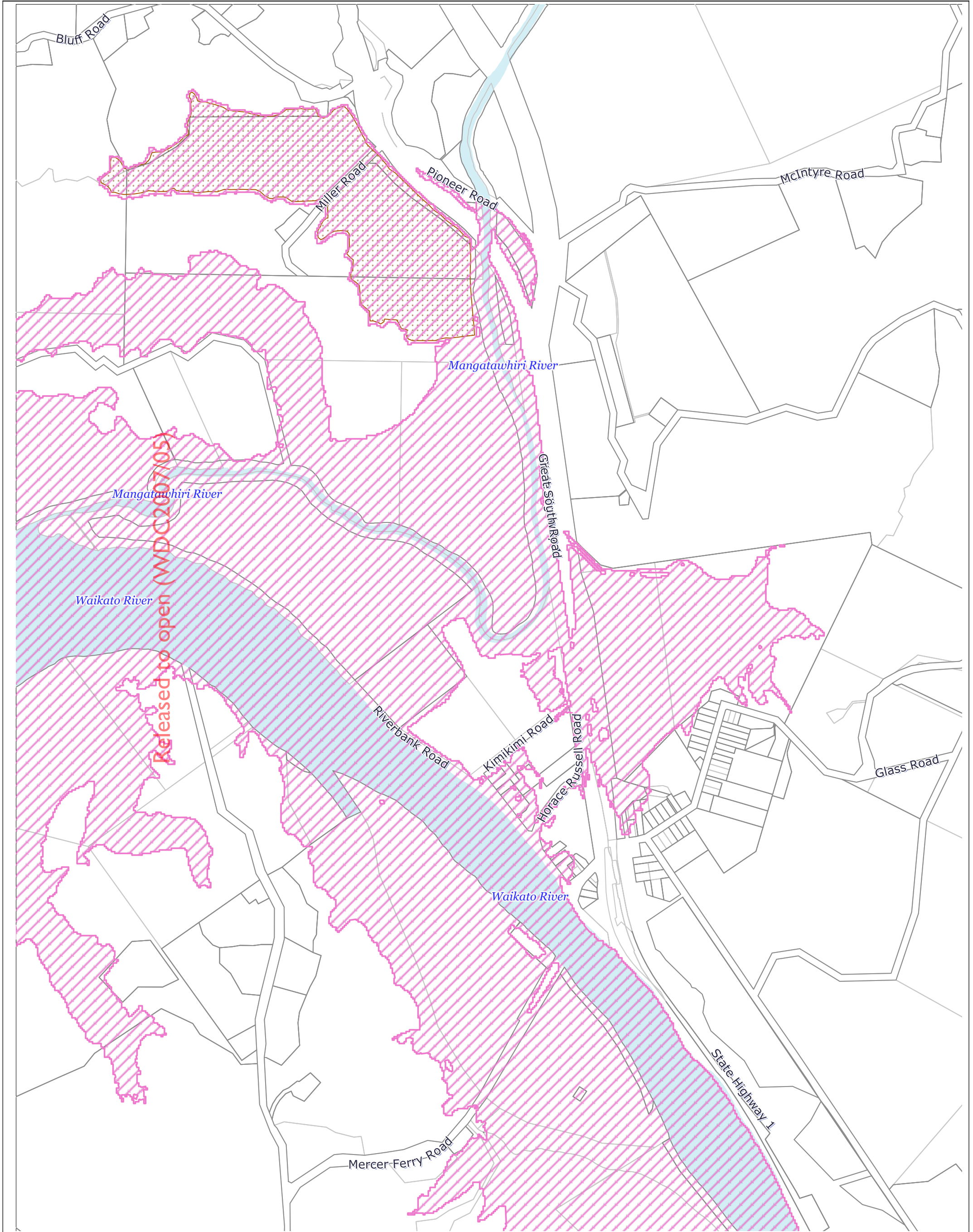
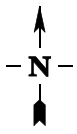
Pokeno West 7.5

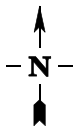


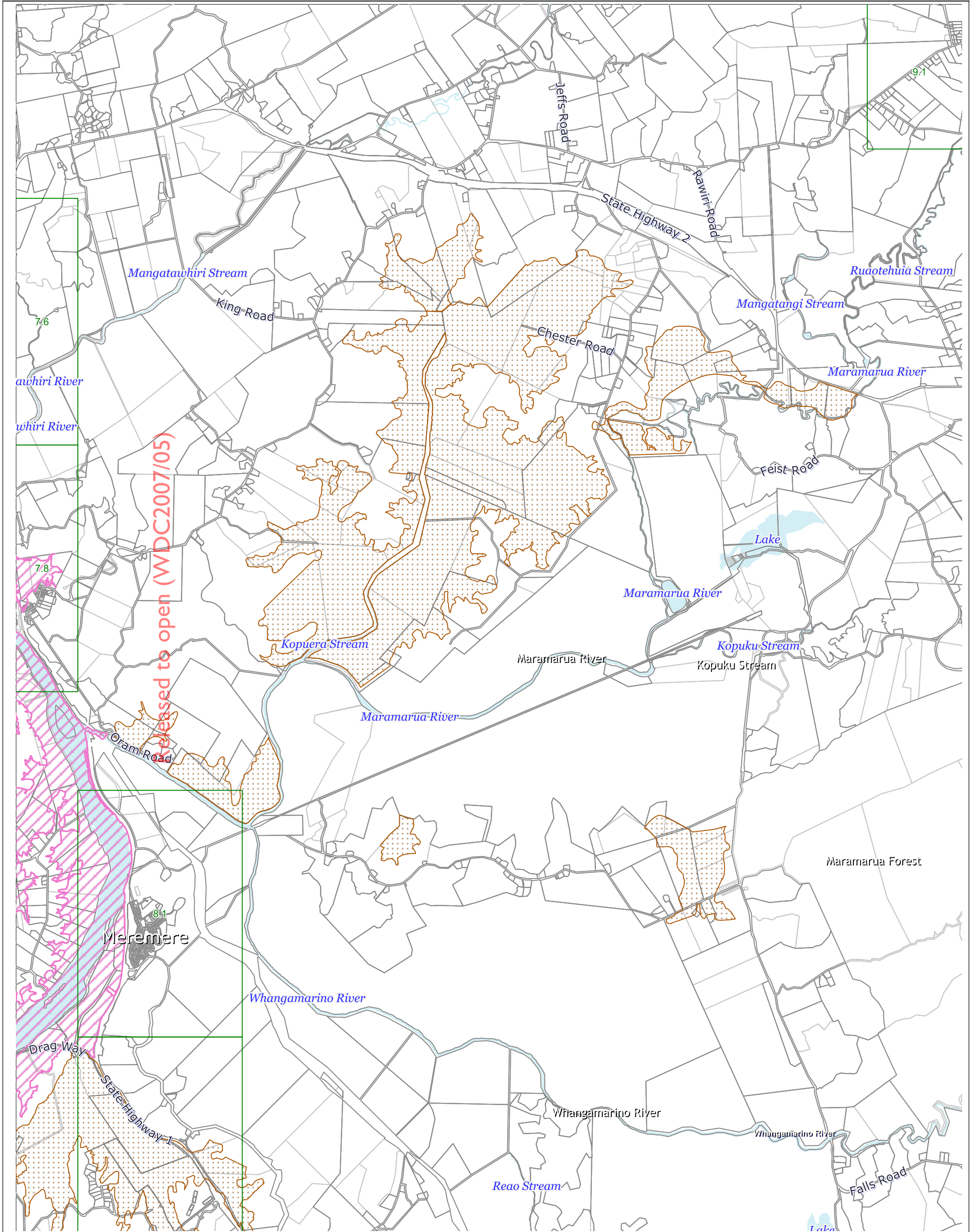
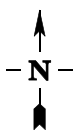
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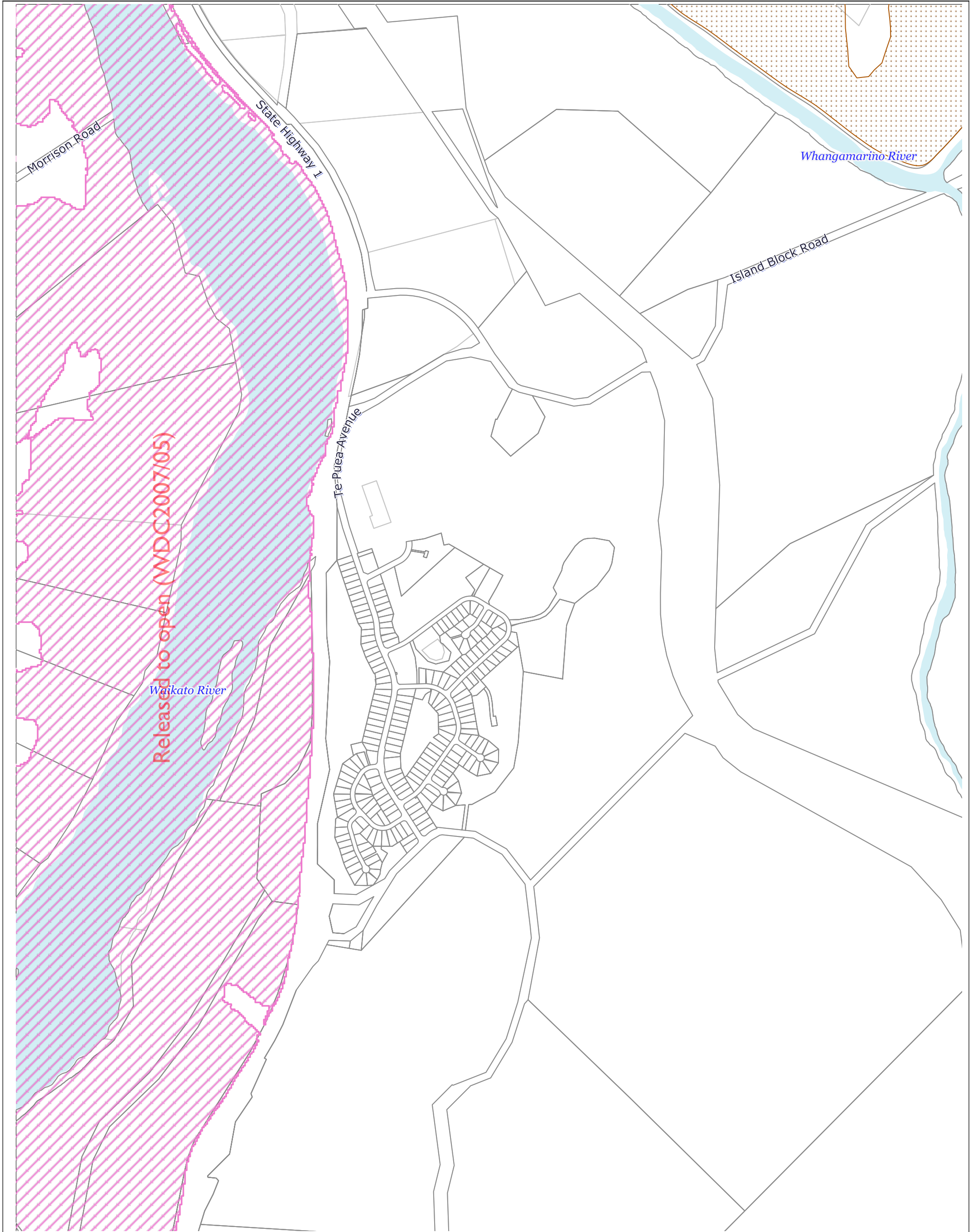
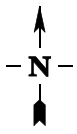


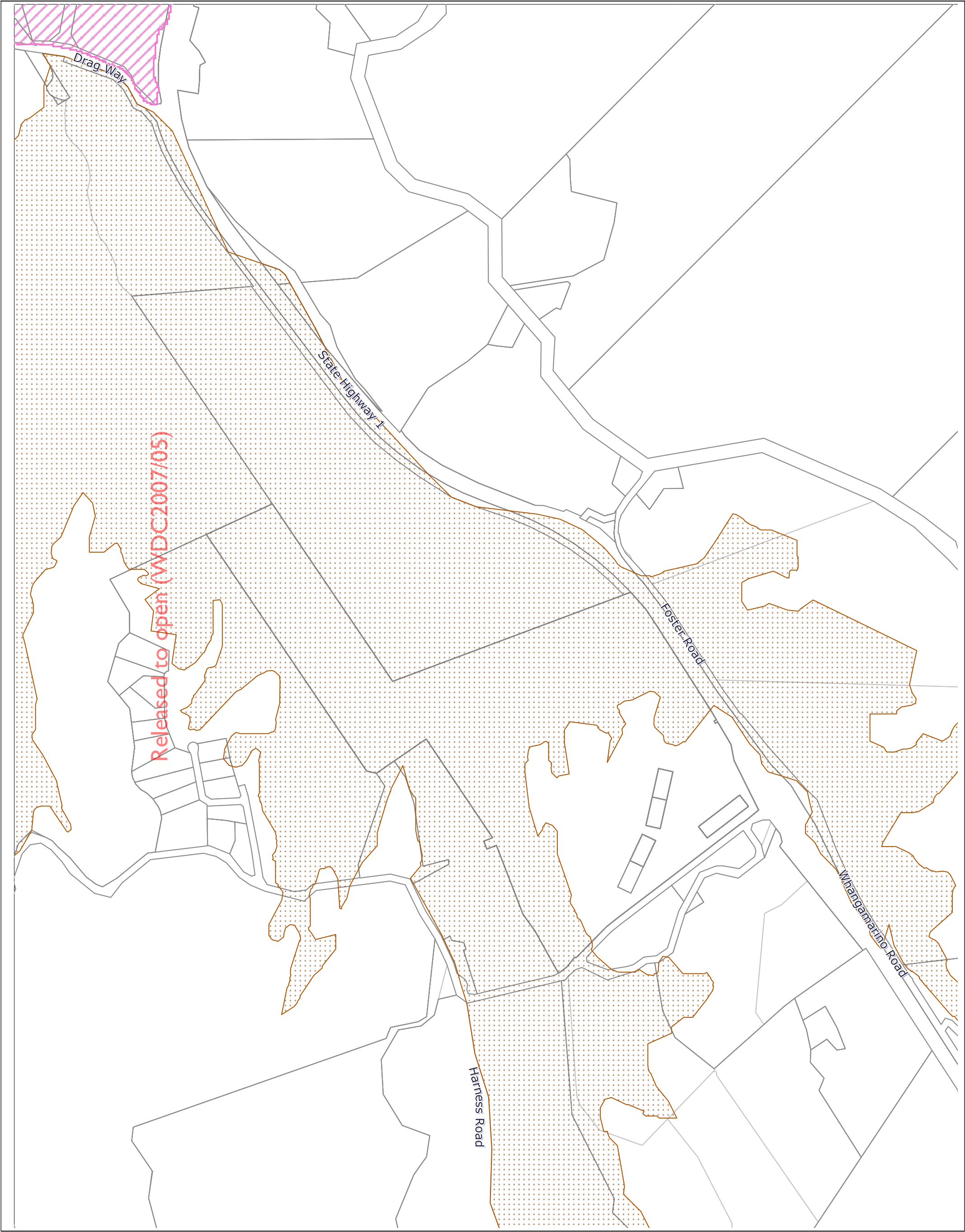
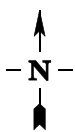


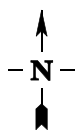






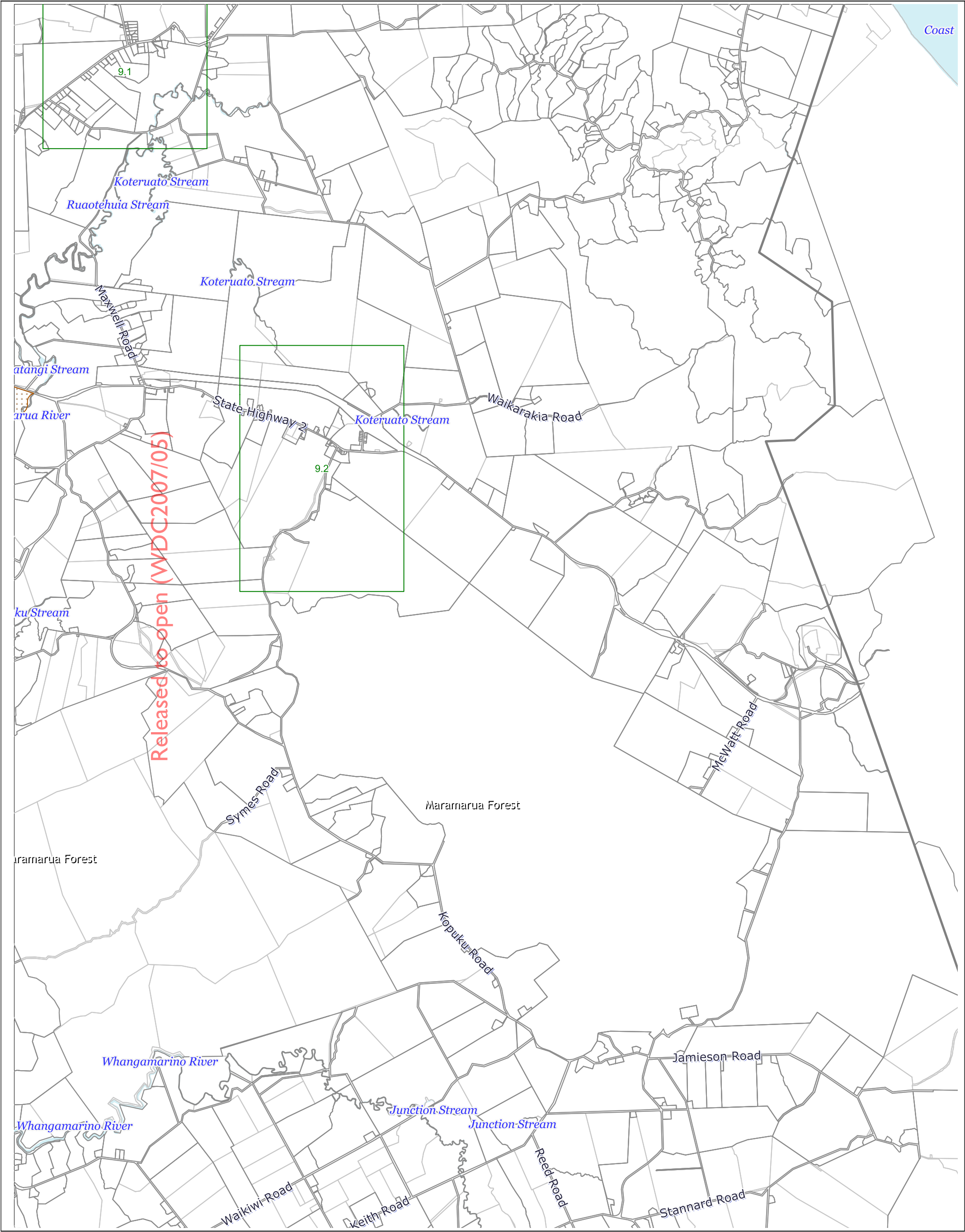


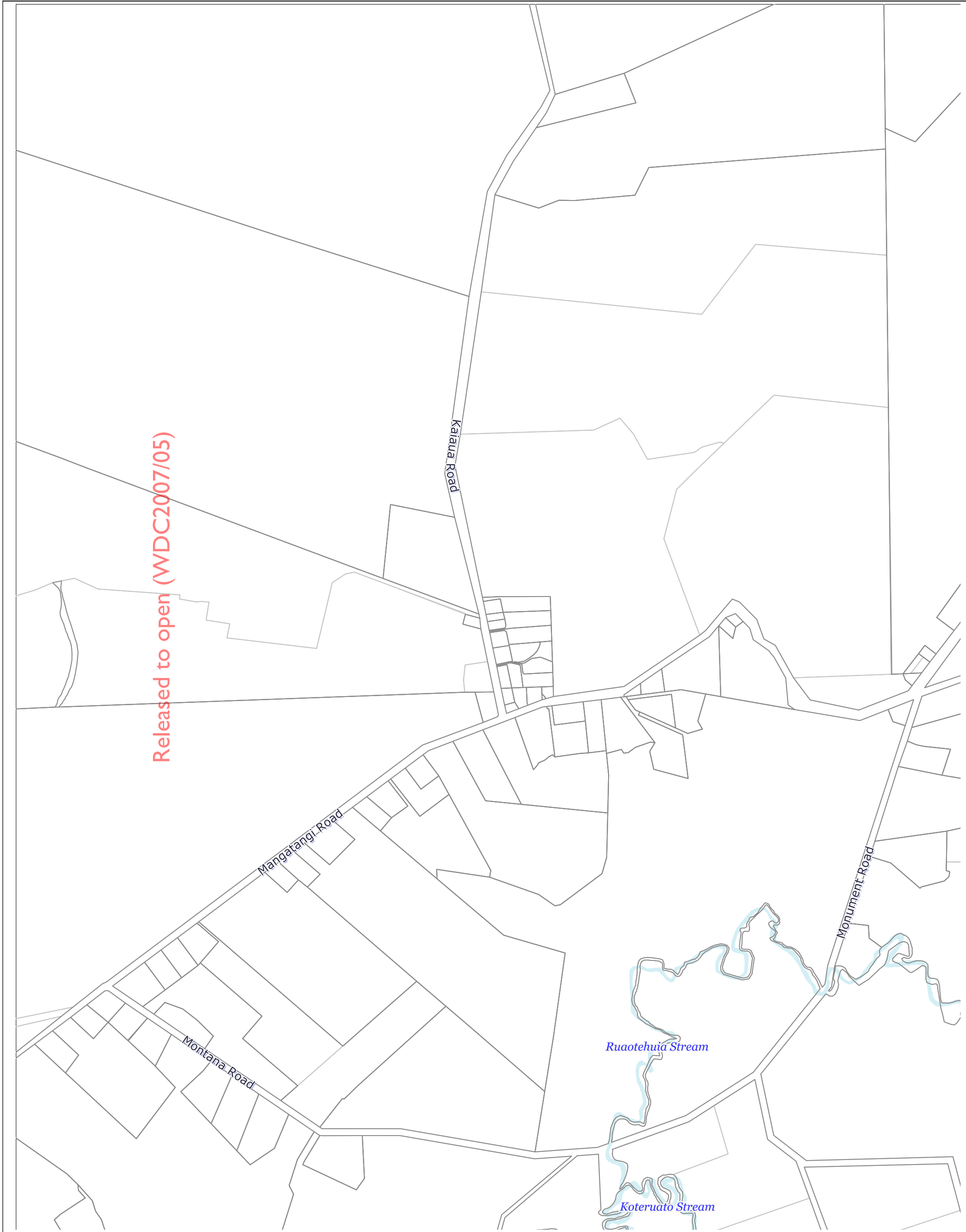
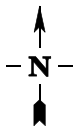


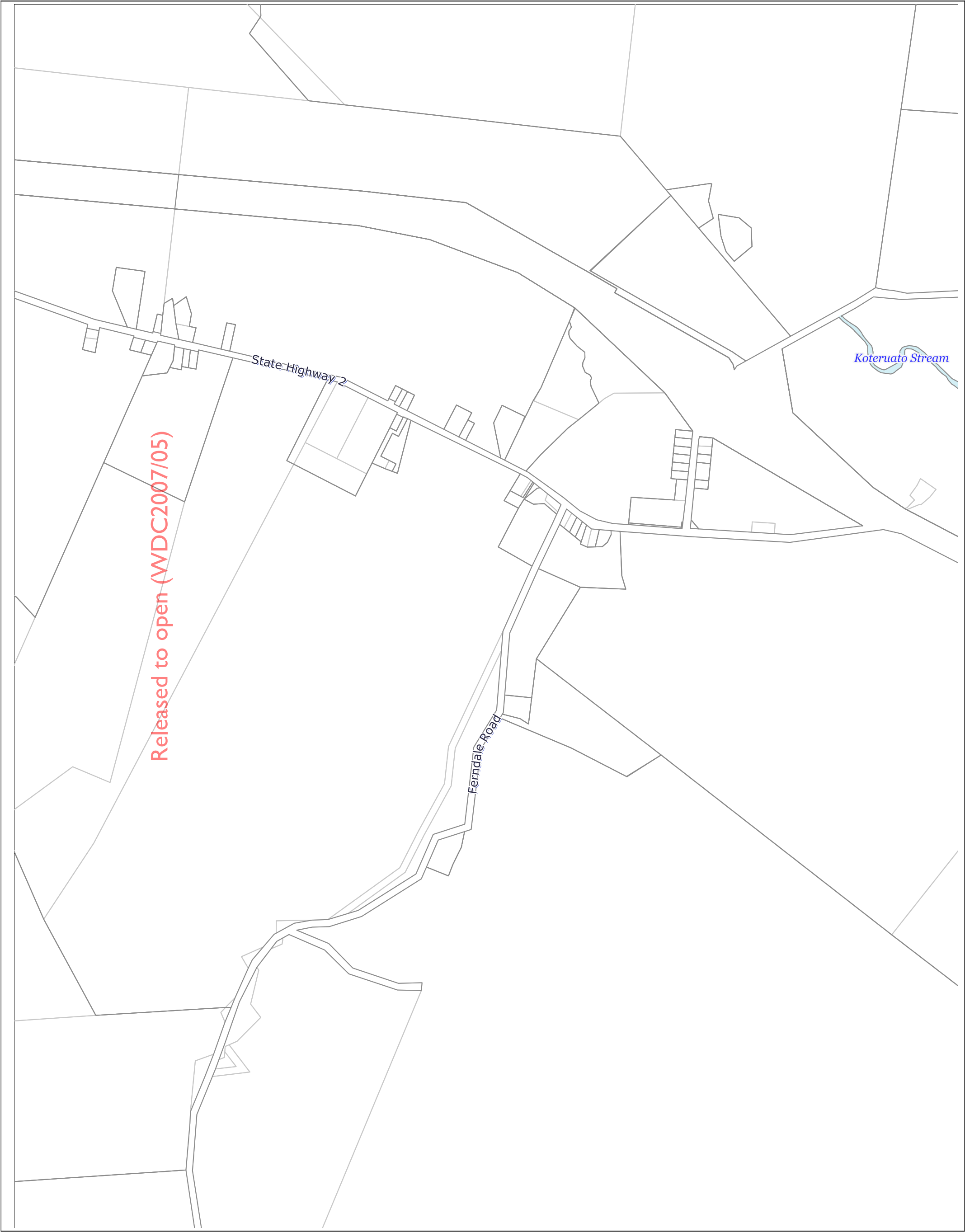
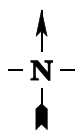


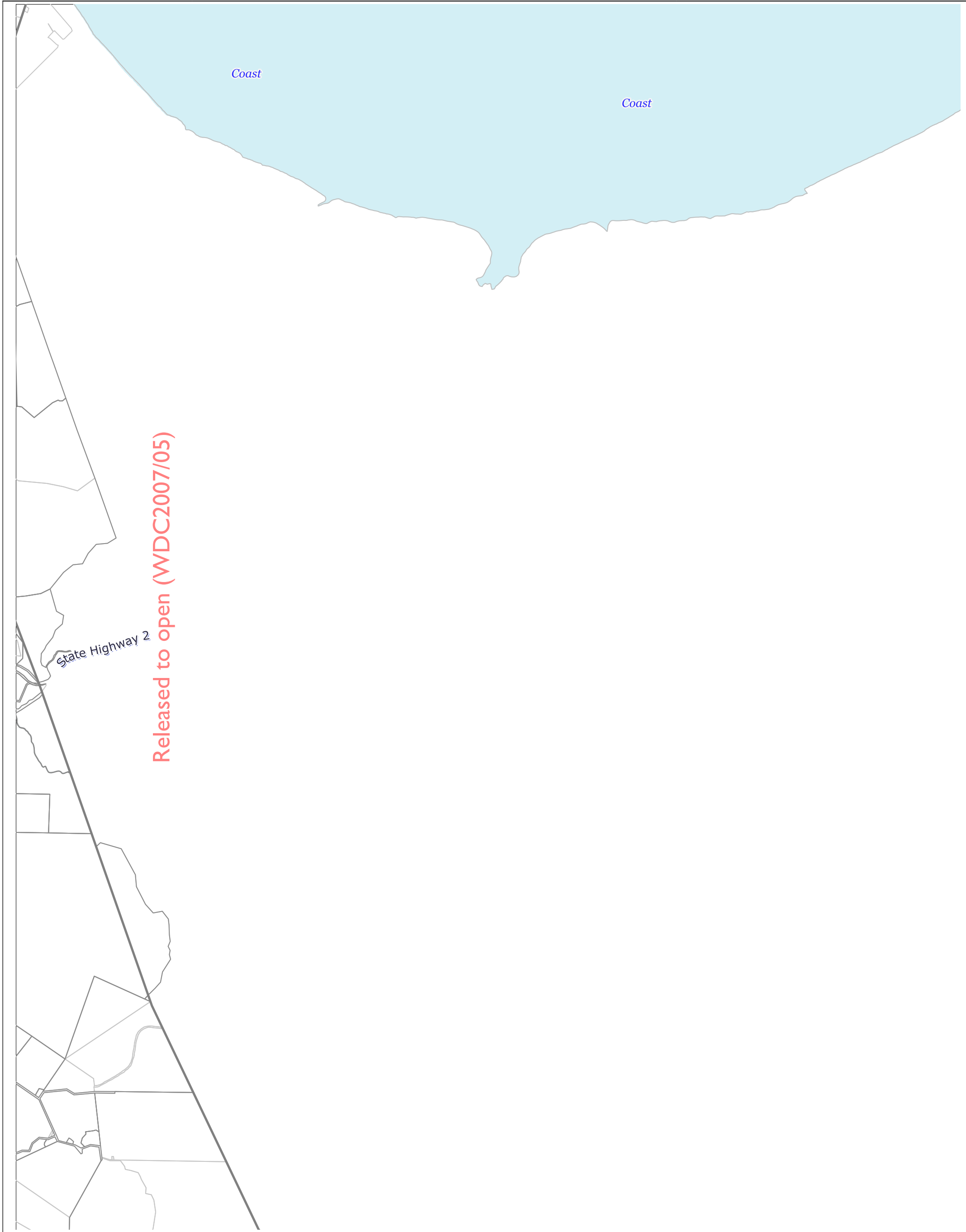
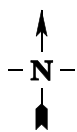
Proposed Waikato District Plan
(Stage 2)

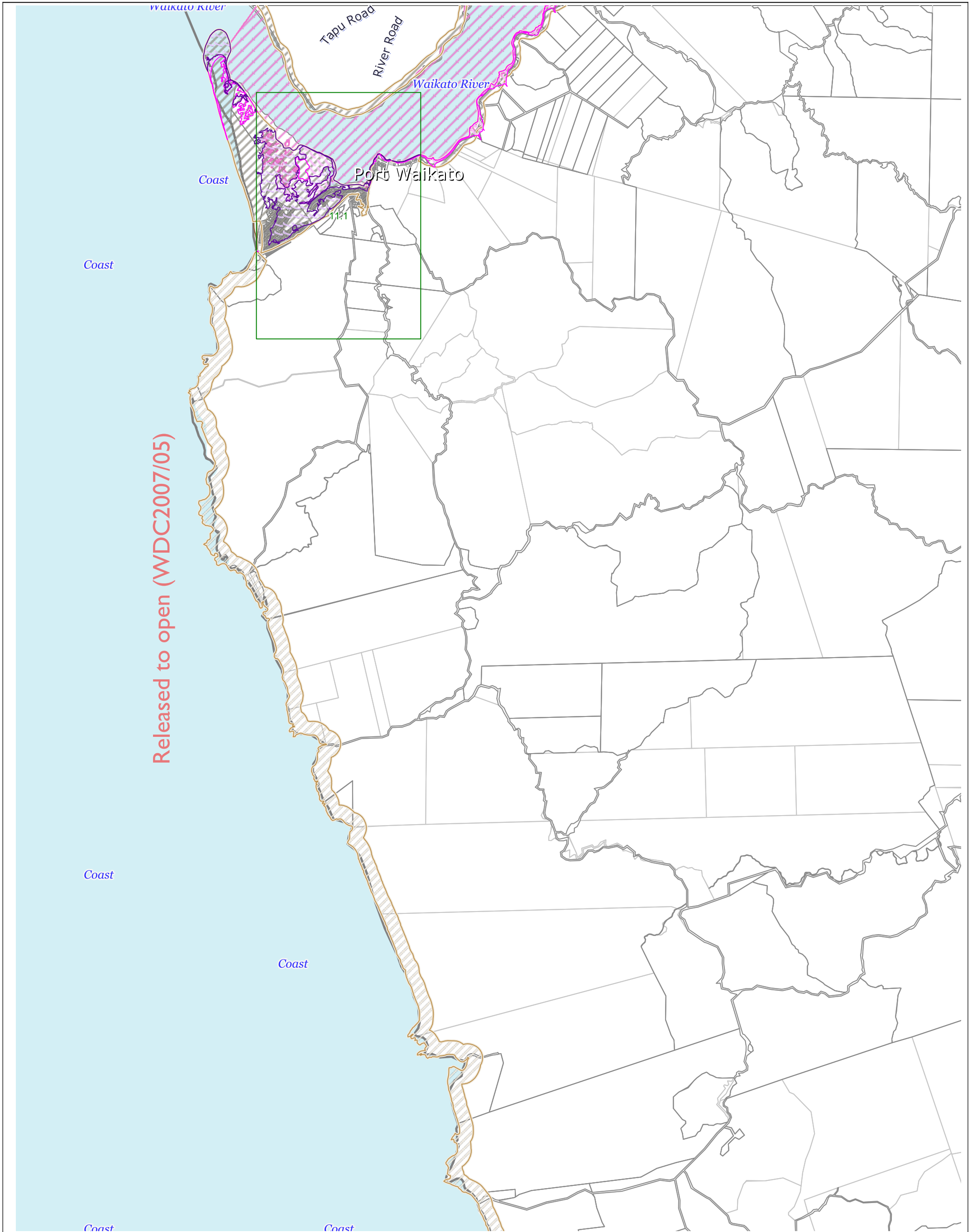
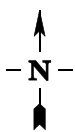
Maramarua State Forest 9

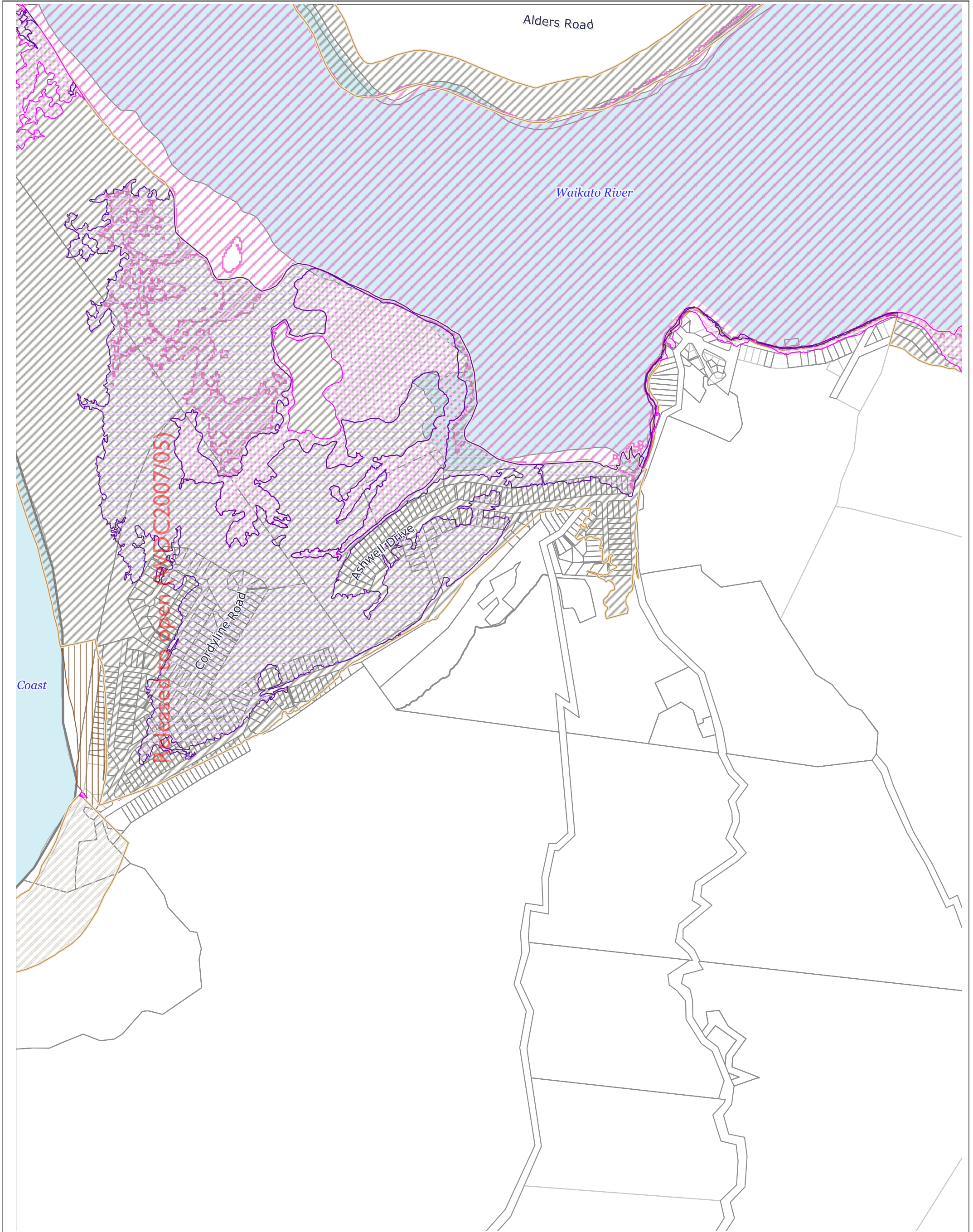
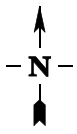


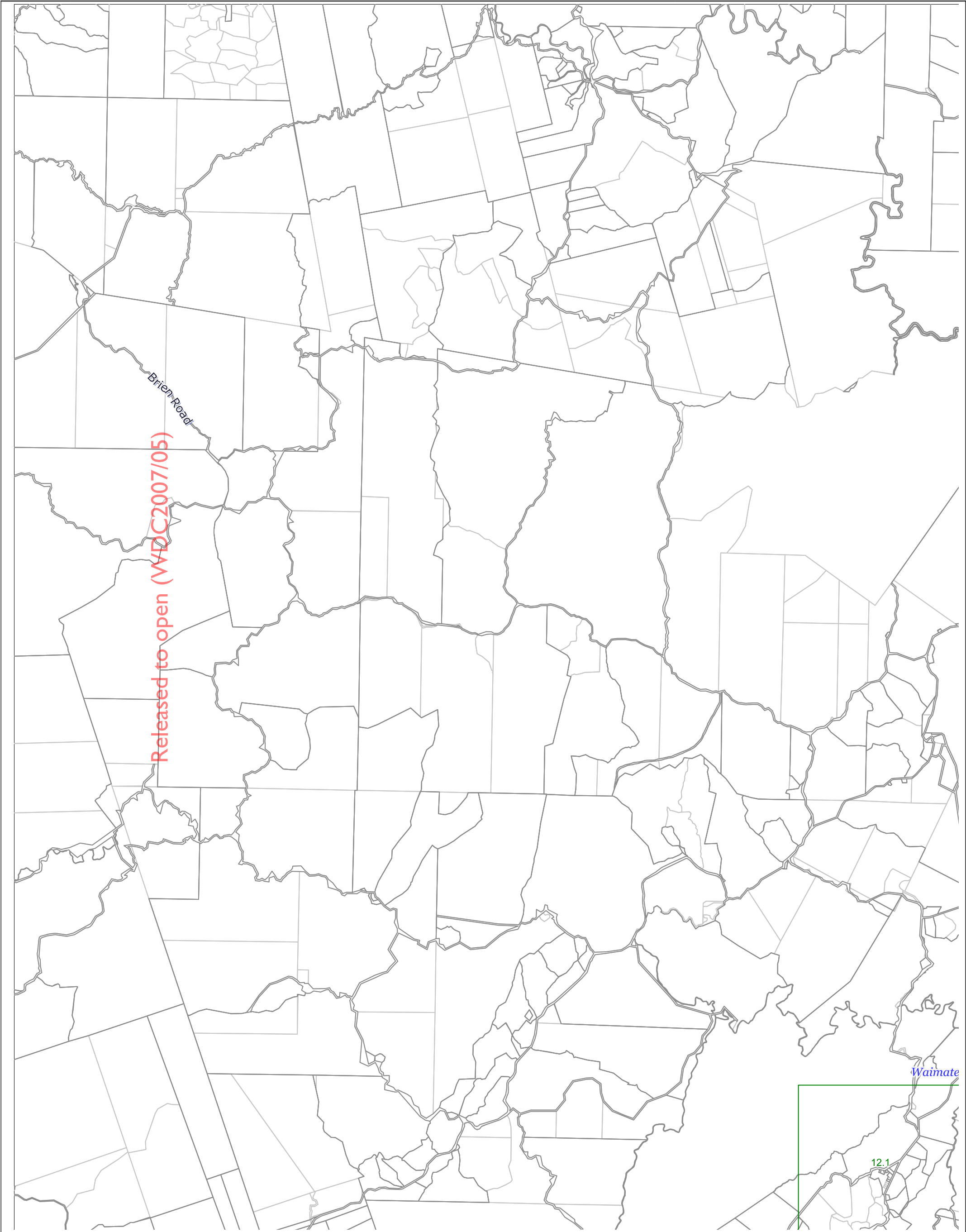
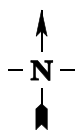


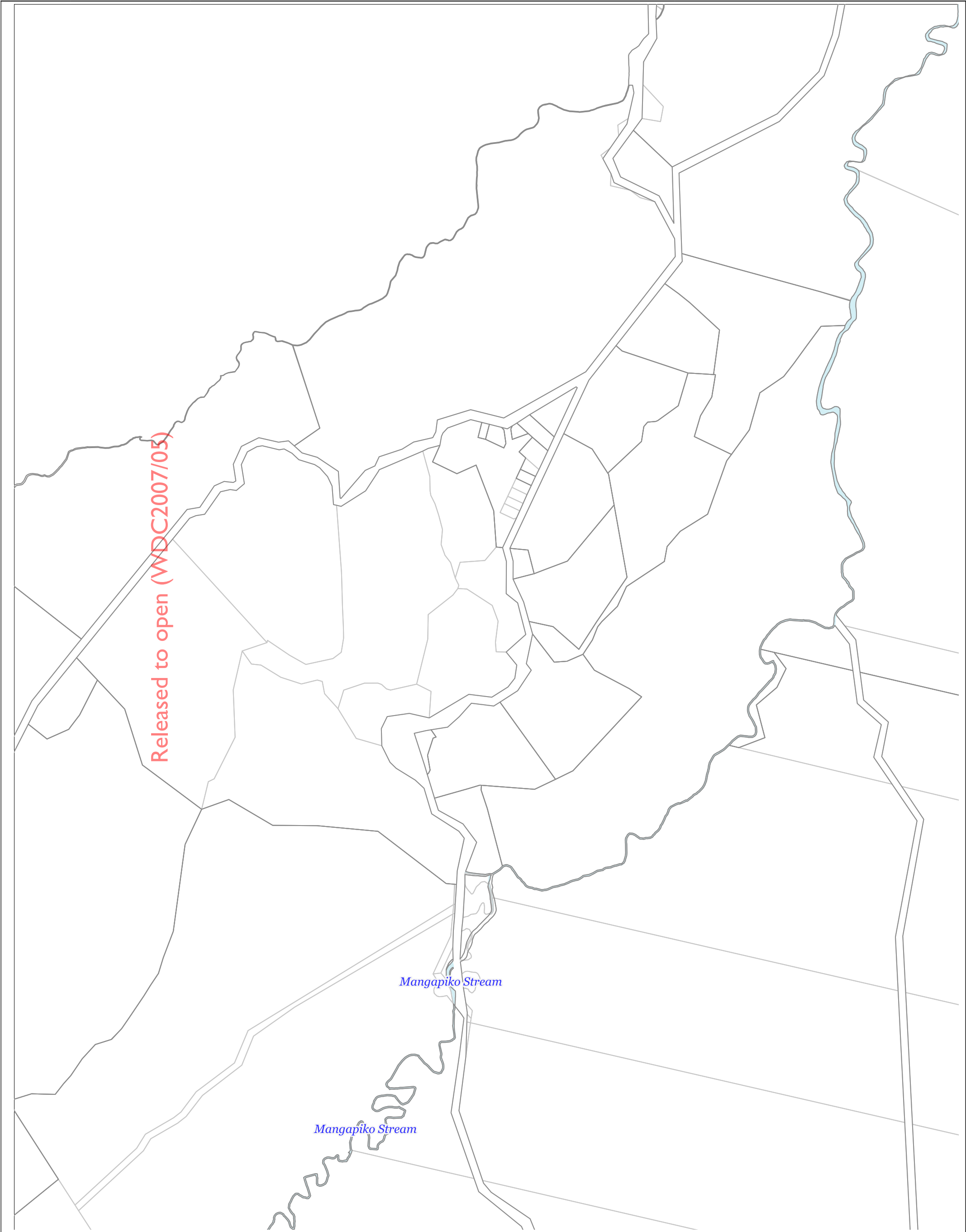
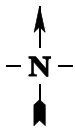


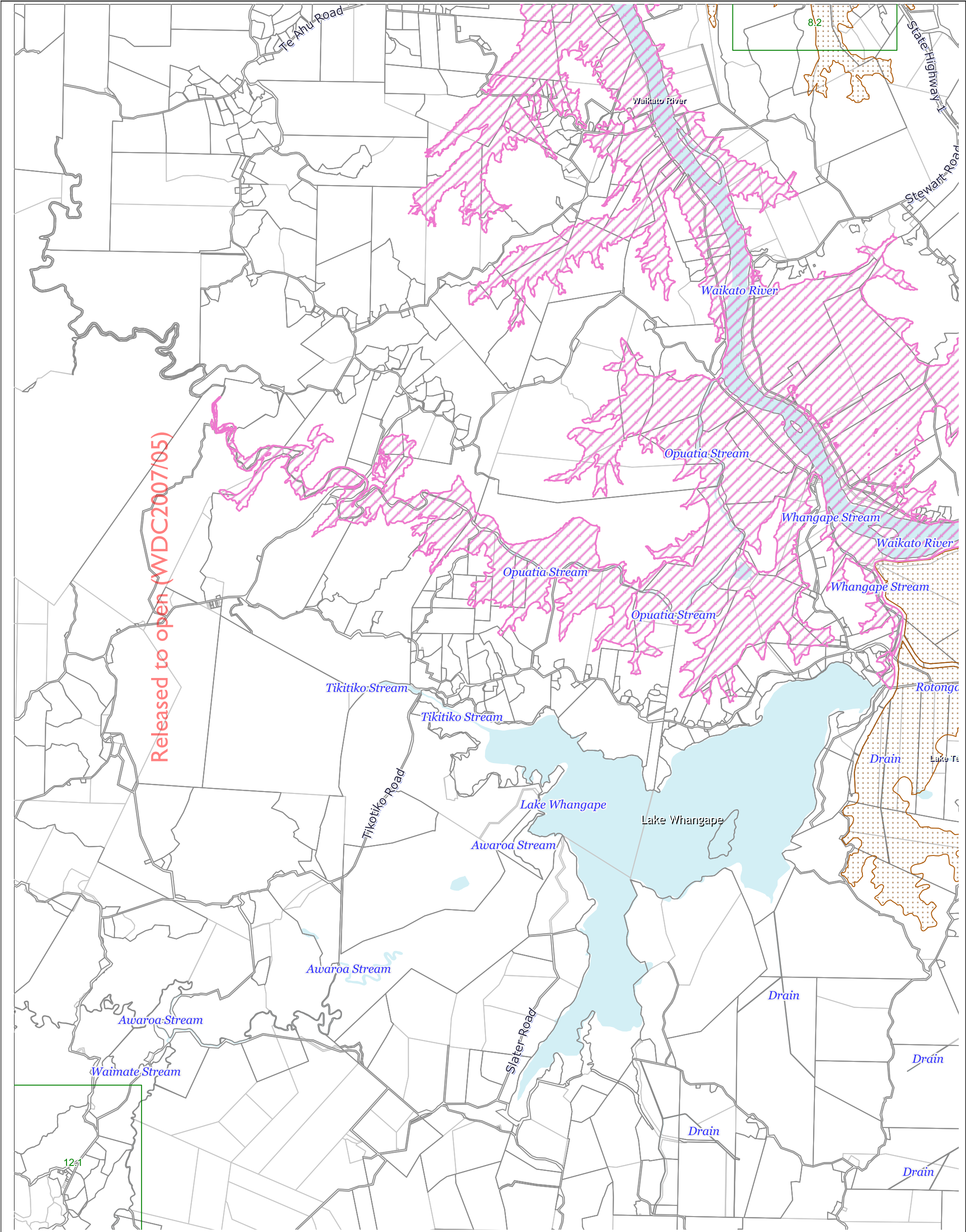
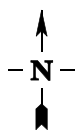


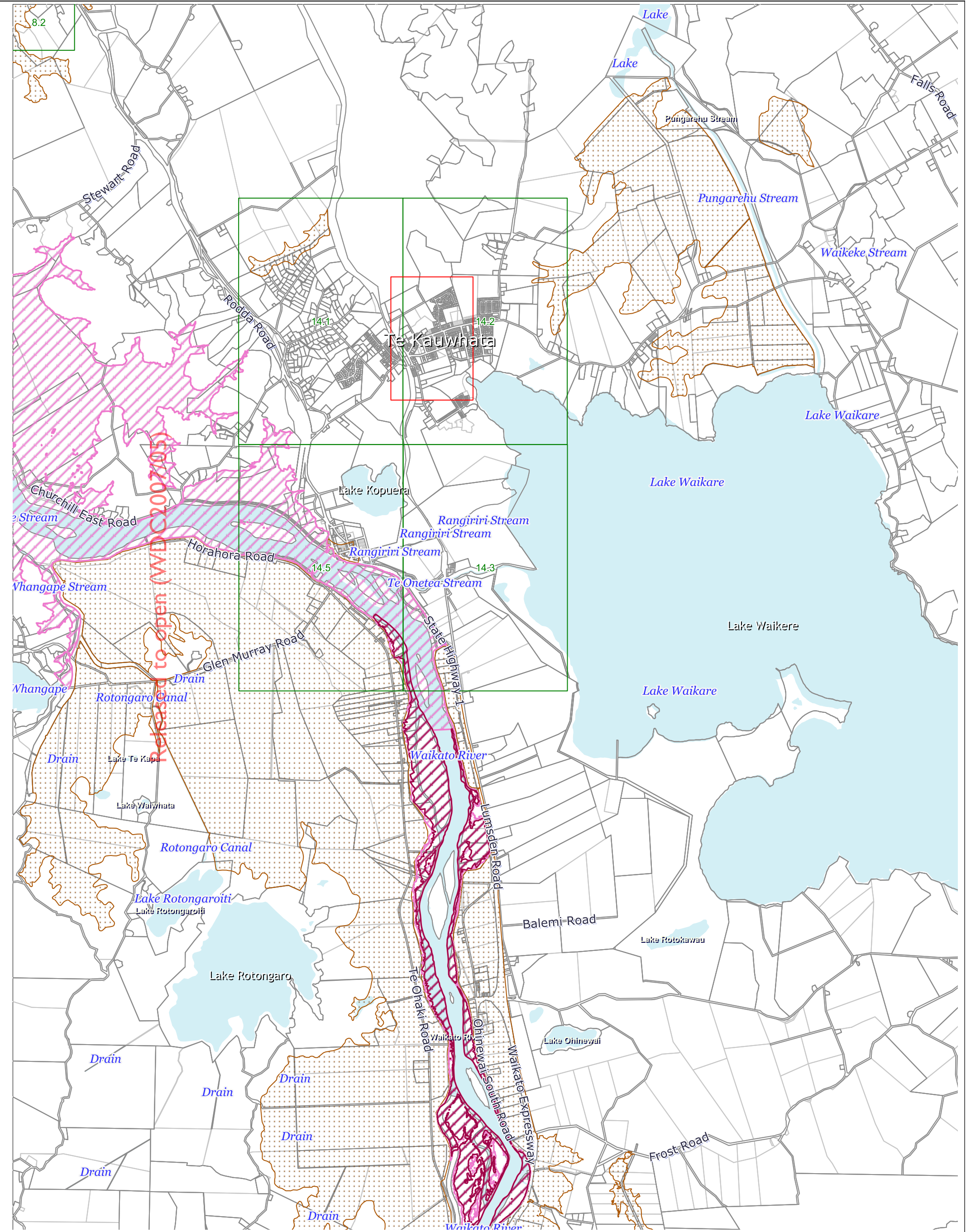
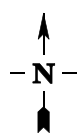


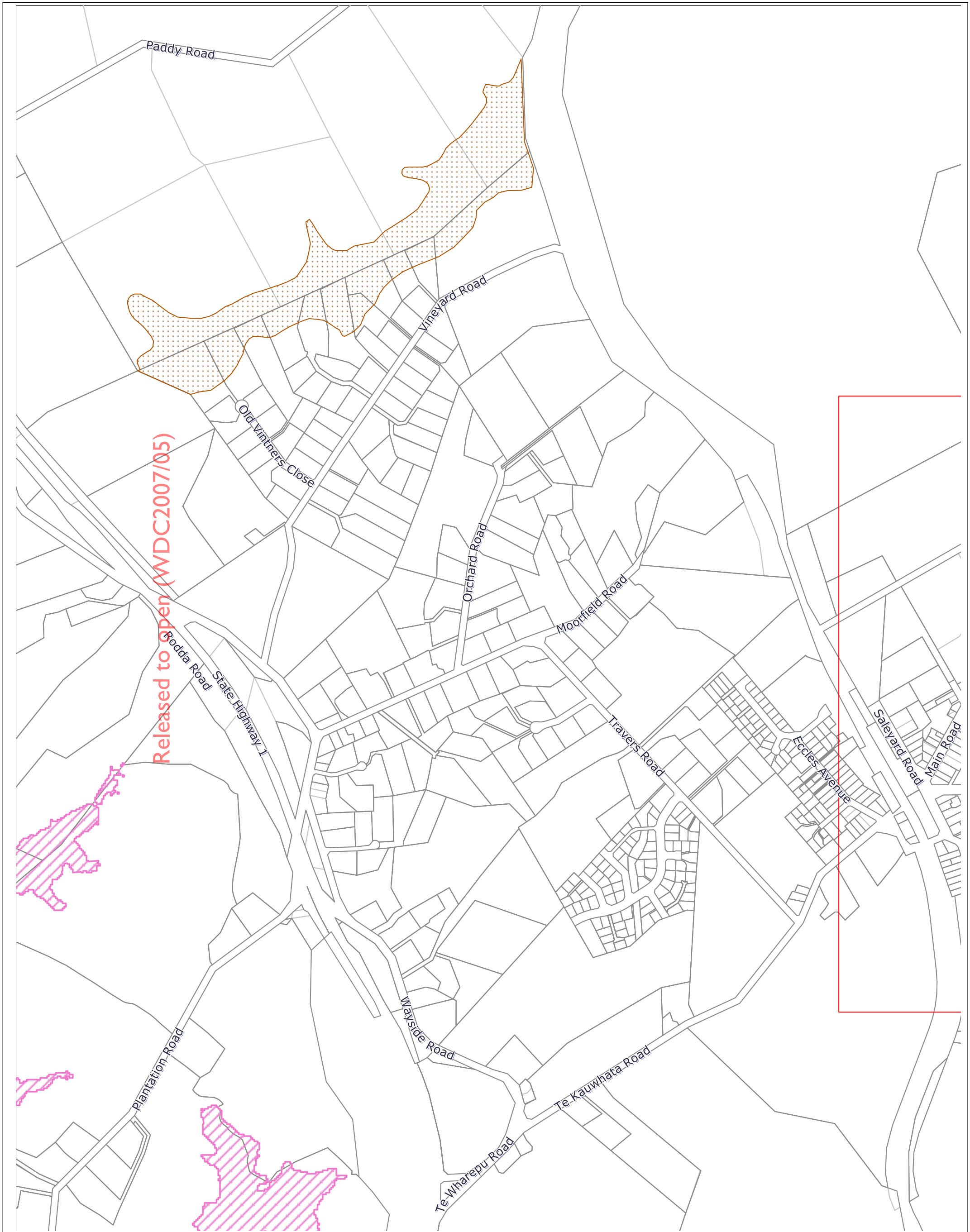
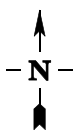


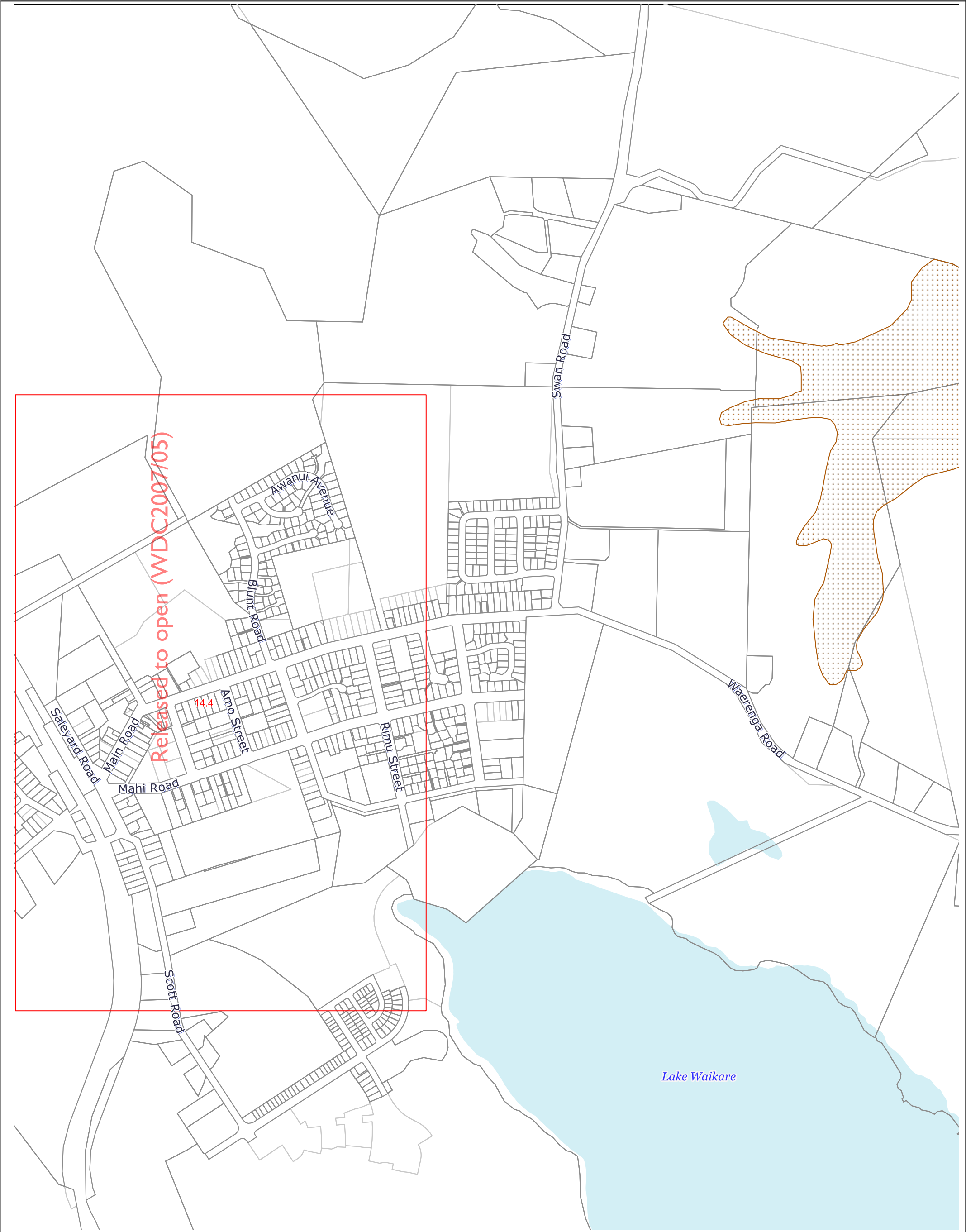
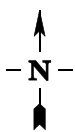


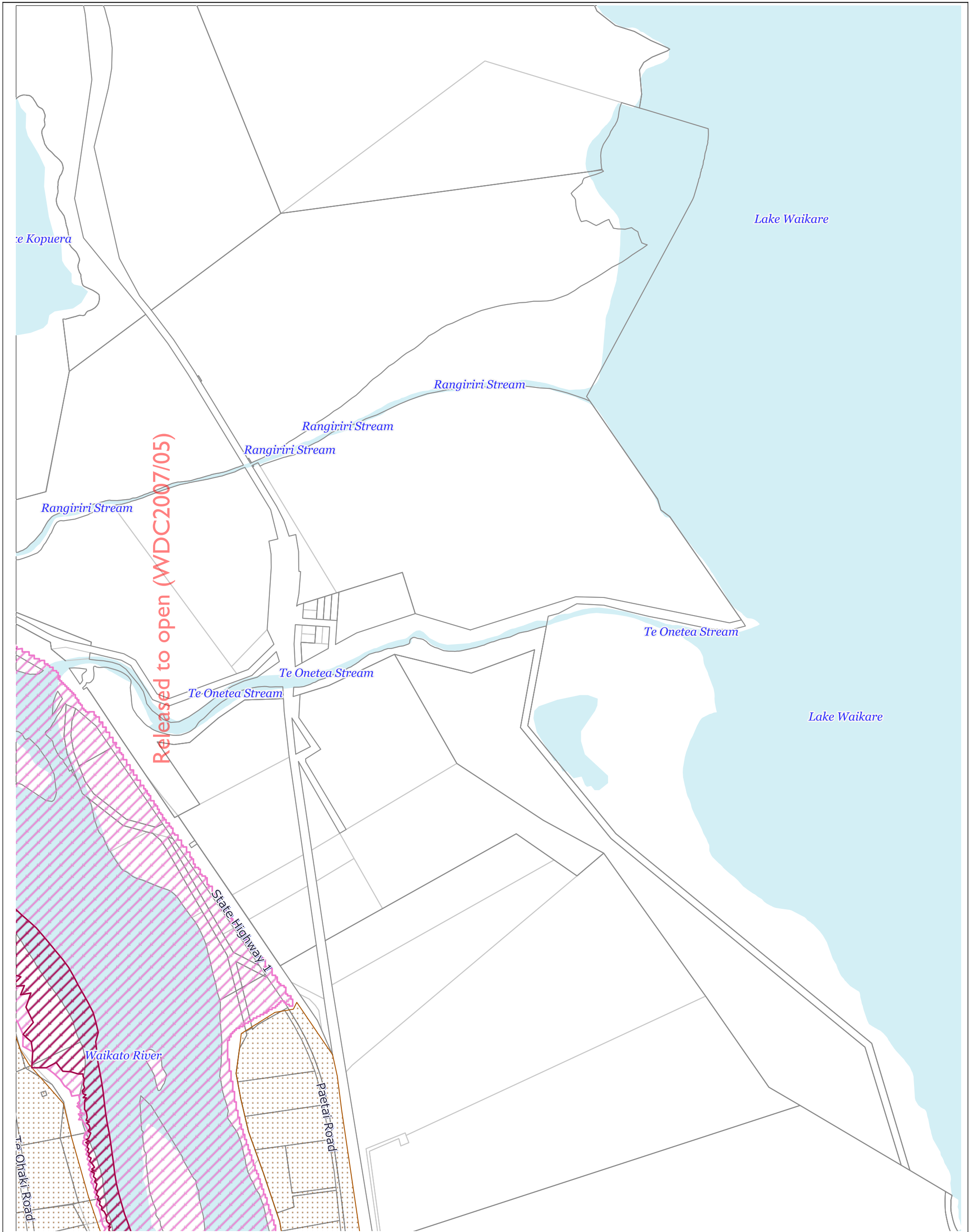
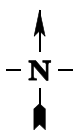


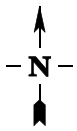


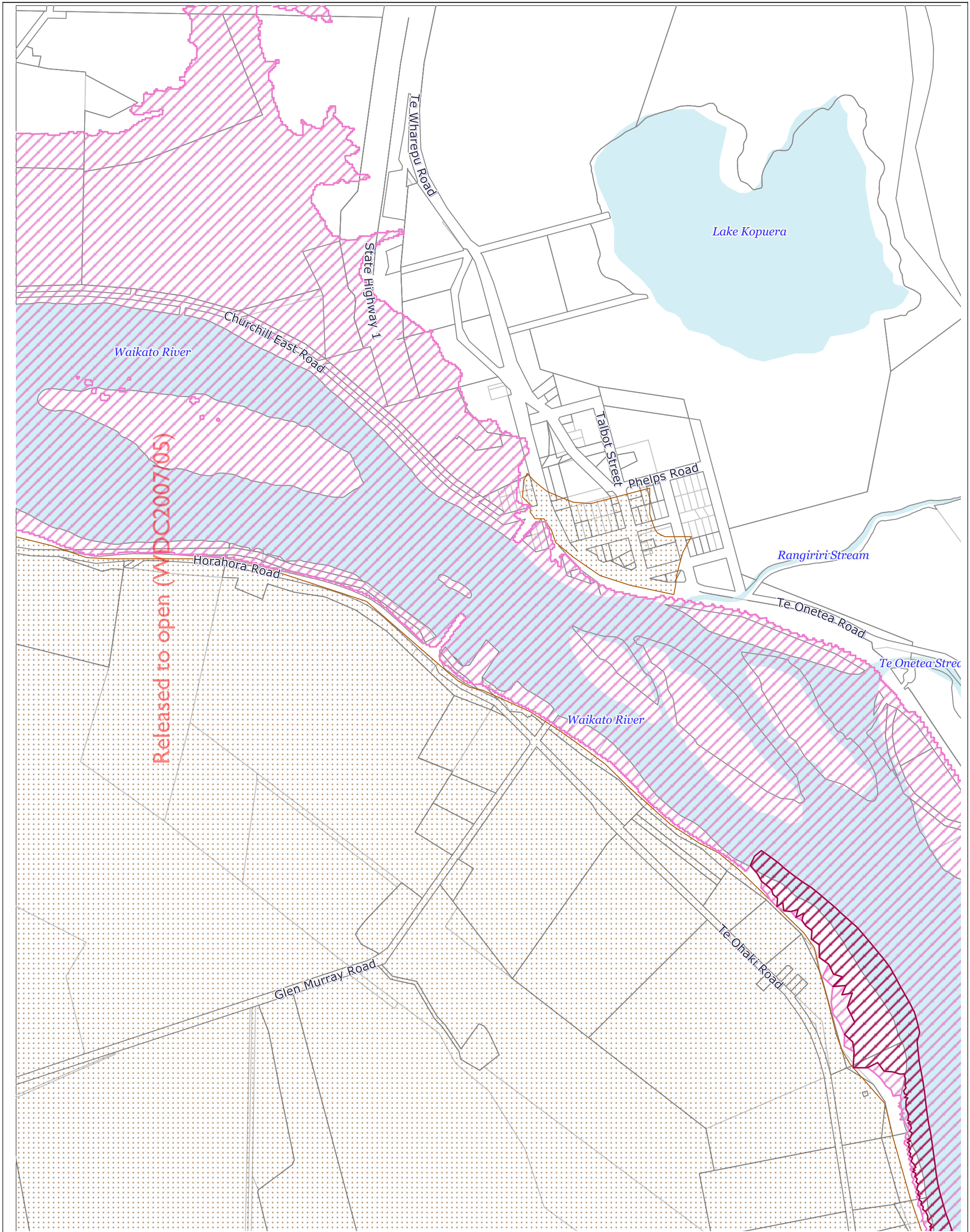
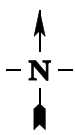


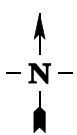






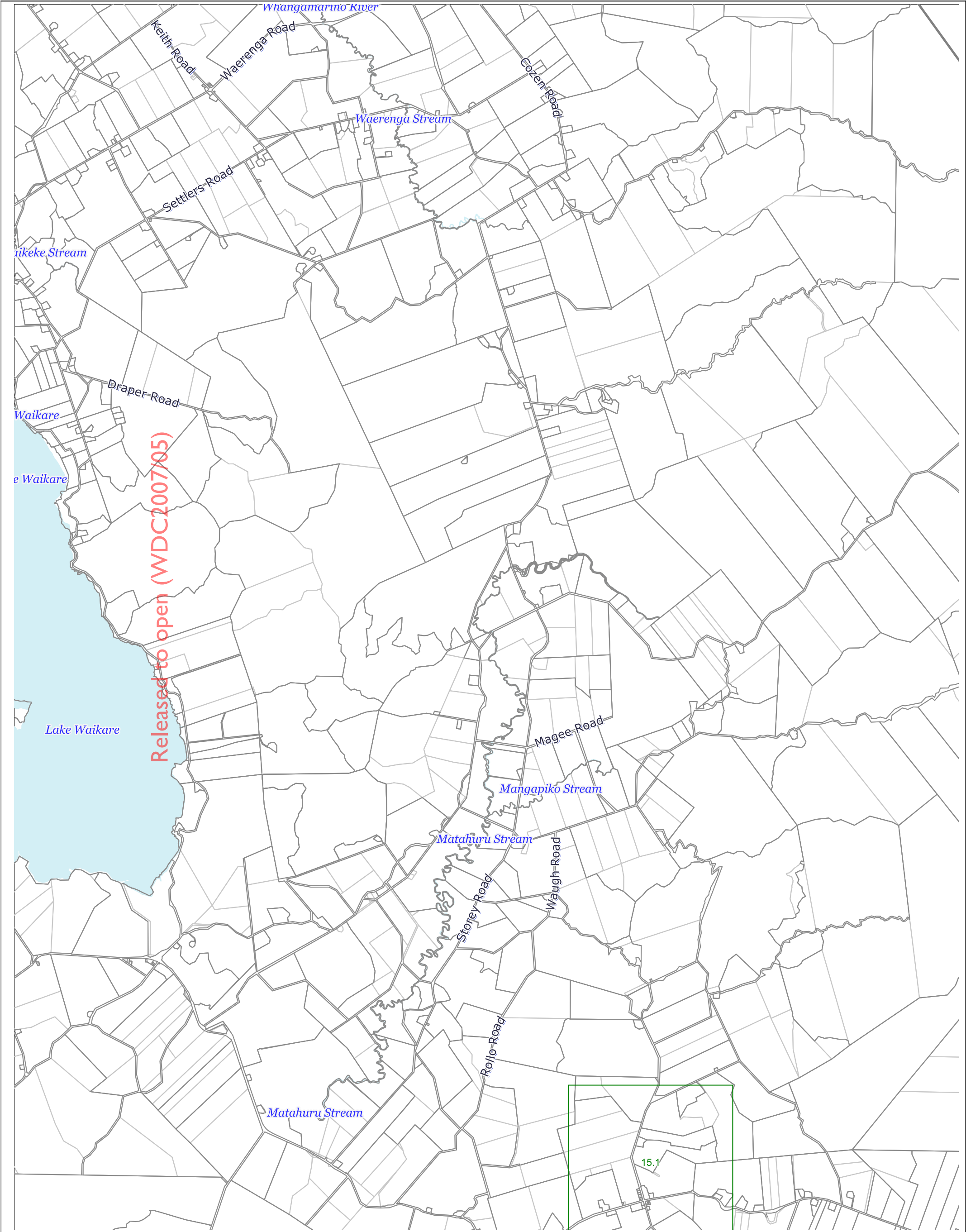


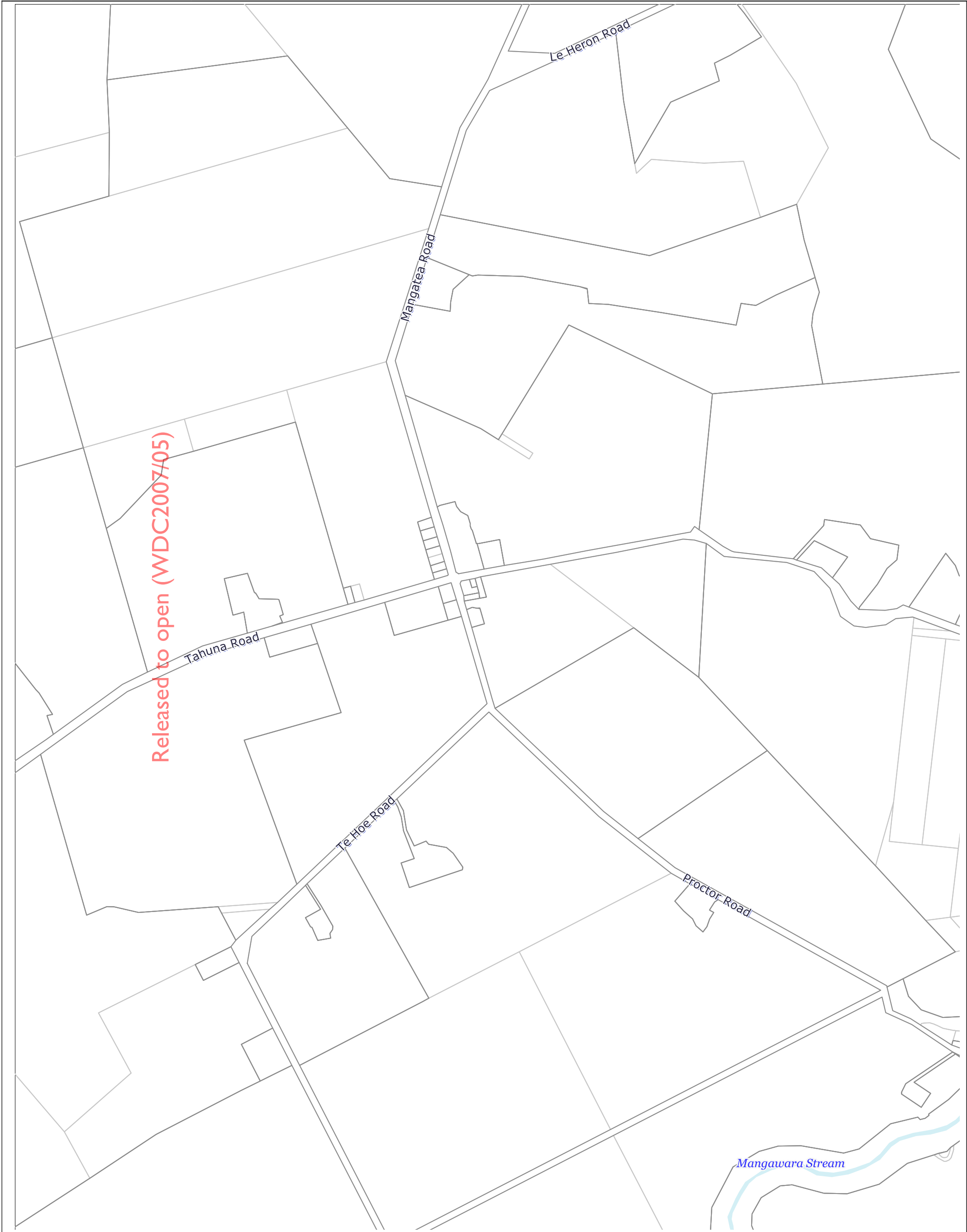
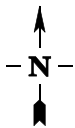


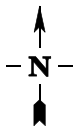


Proposed Waikato District Plan
(Stage 2)

Hapuakohe 15



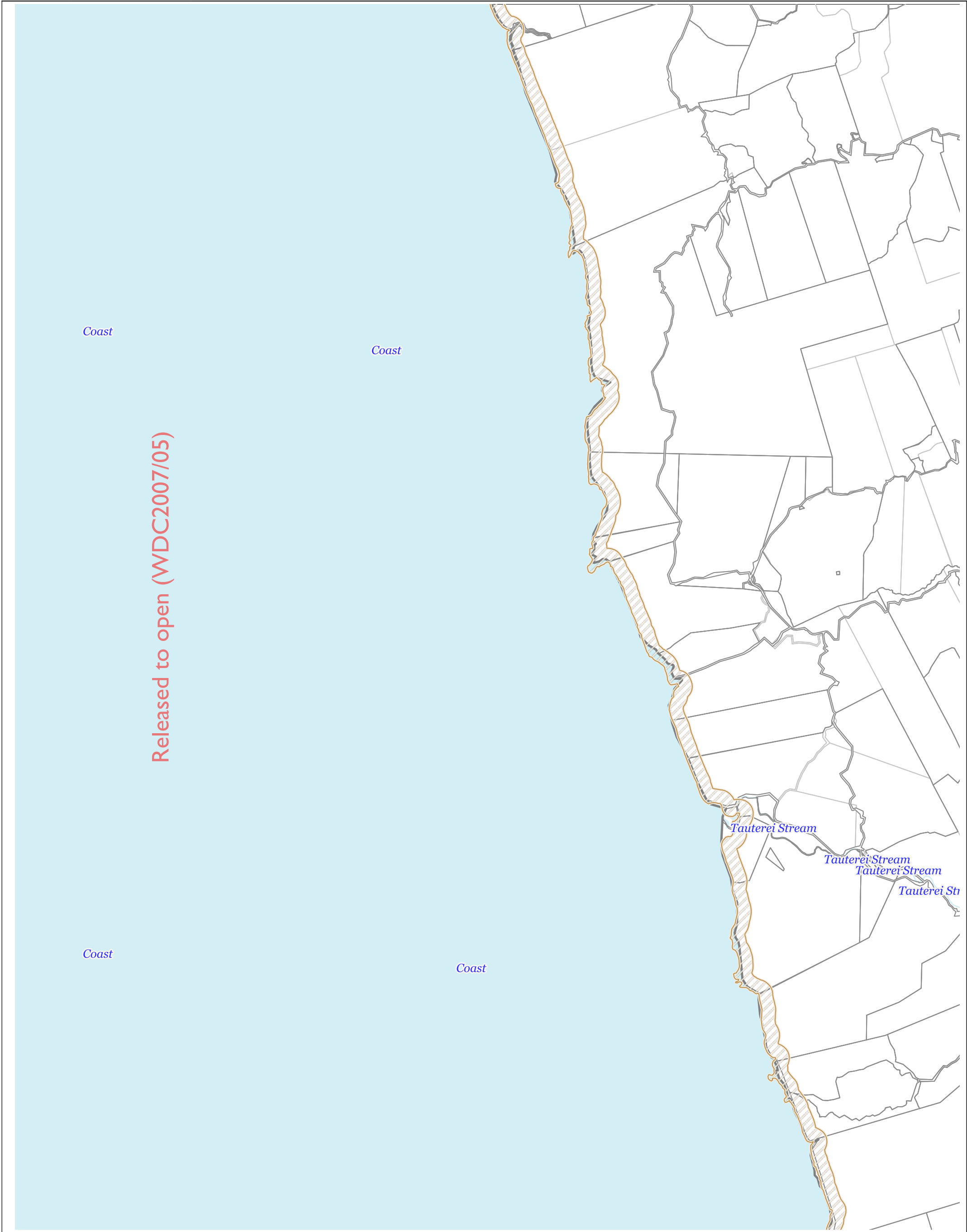
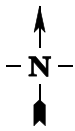


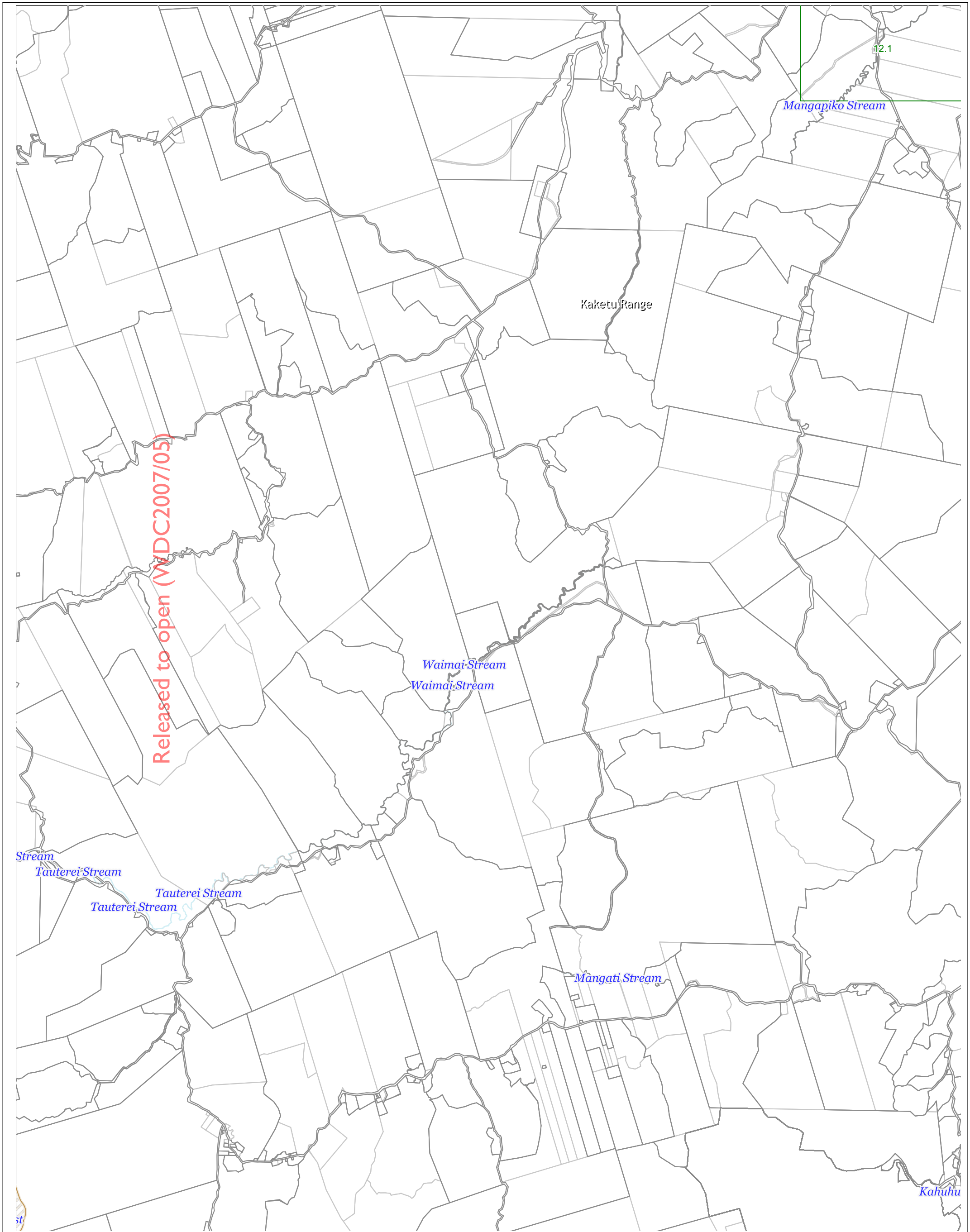
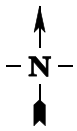


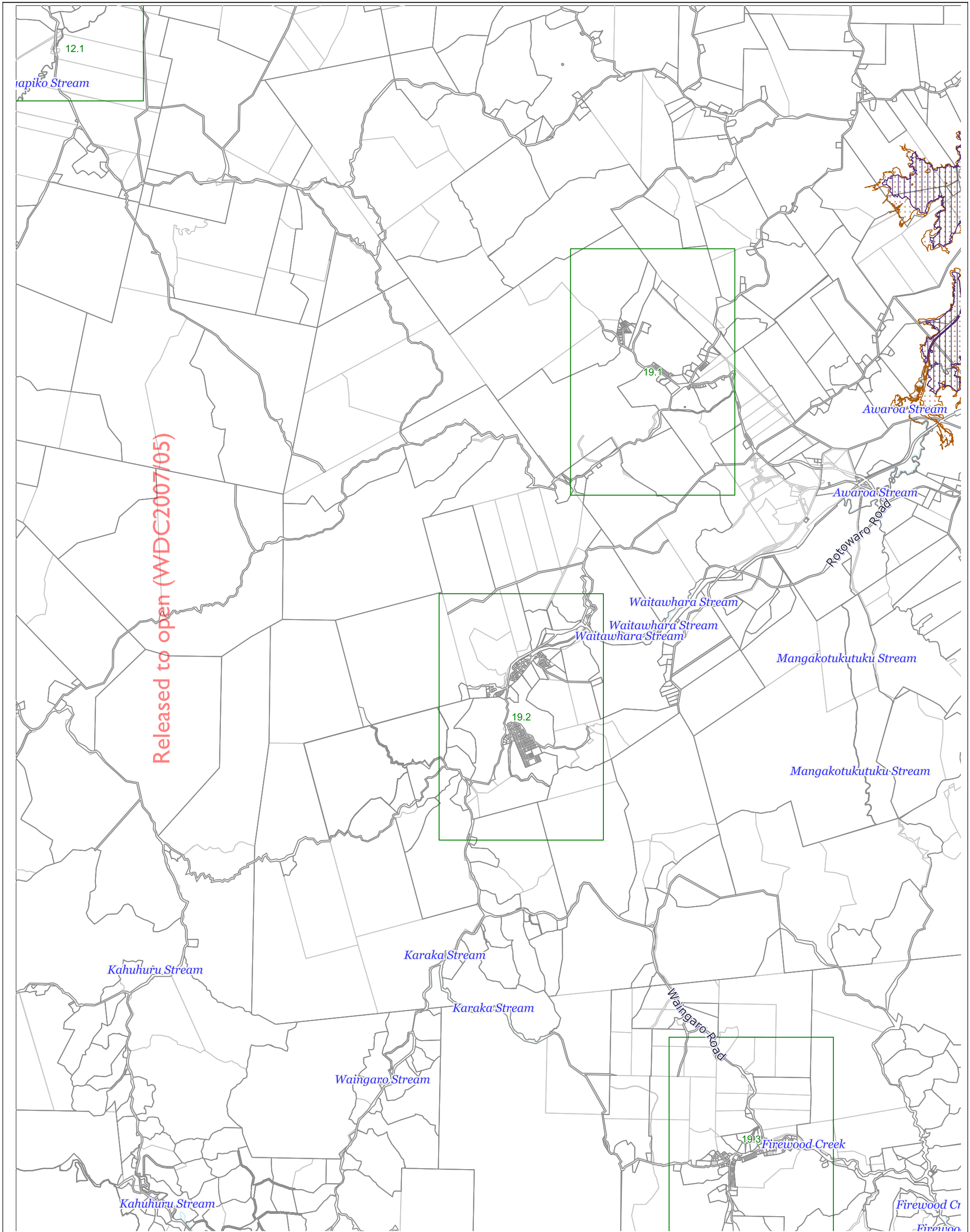
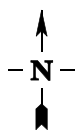
Proposed Waikato District Plan (Stage 2)

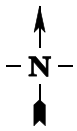
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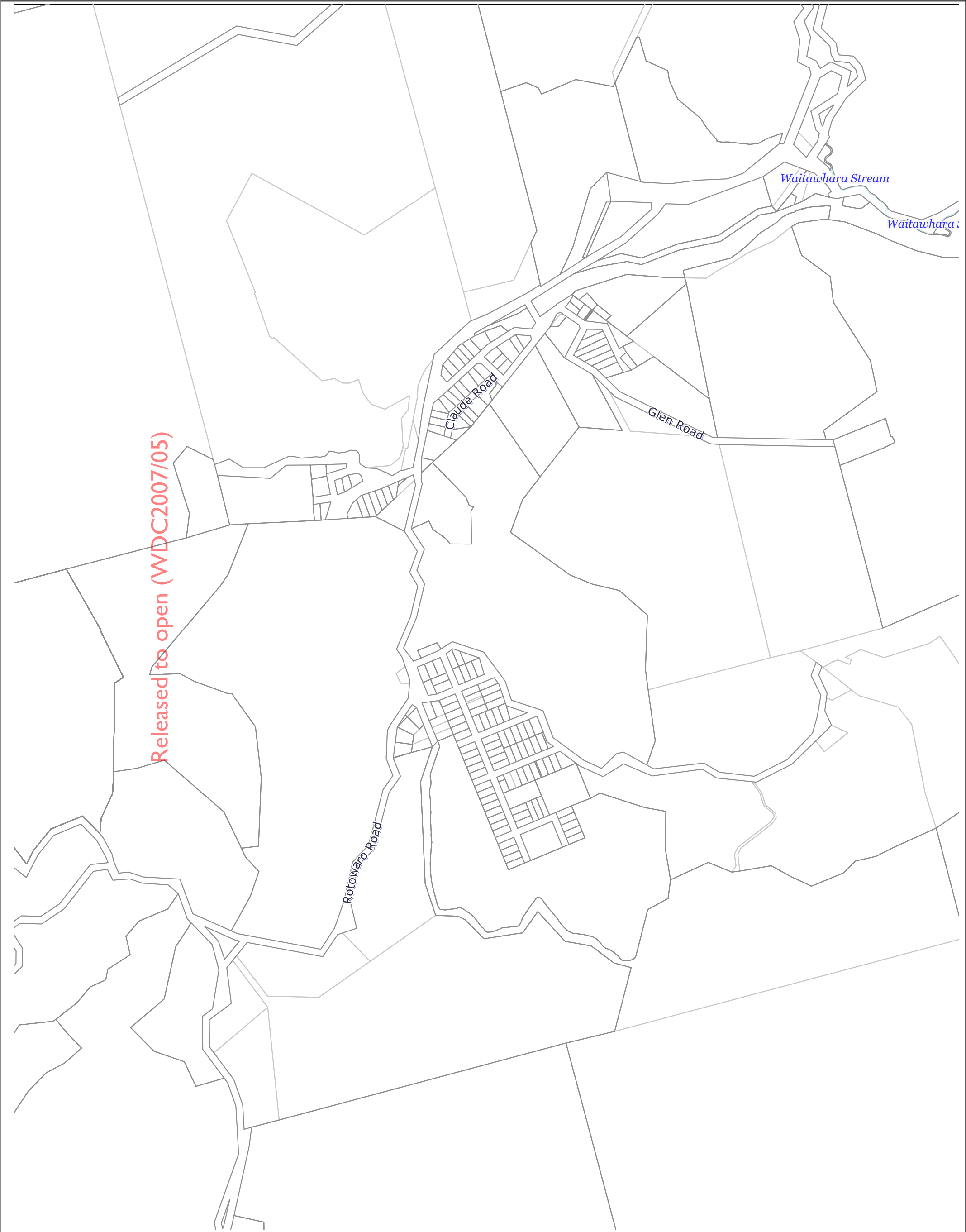
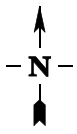


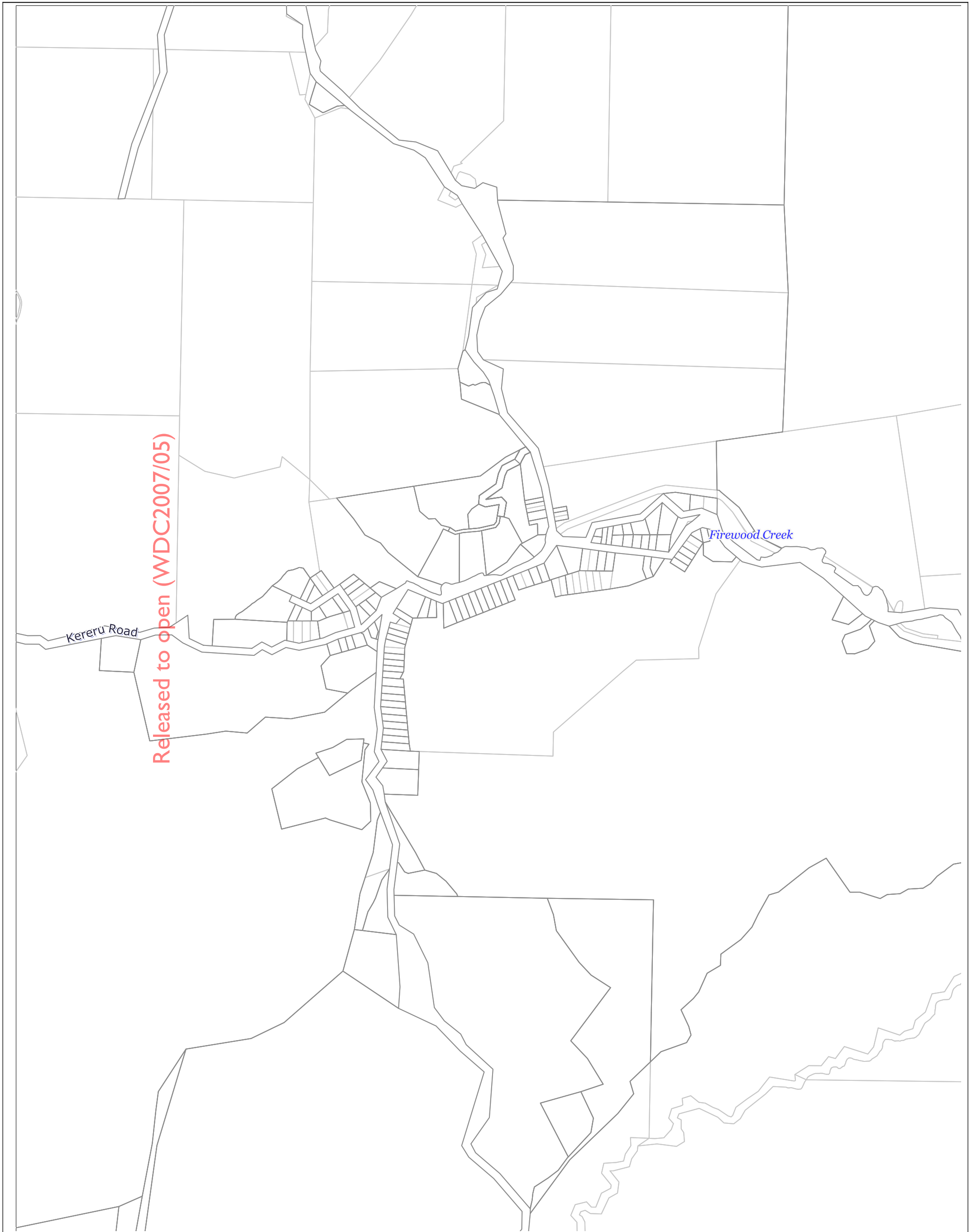
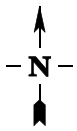


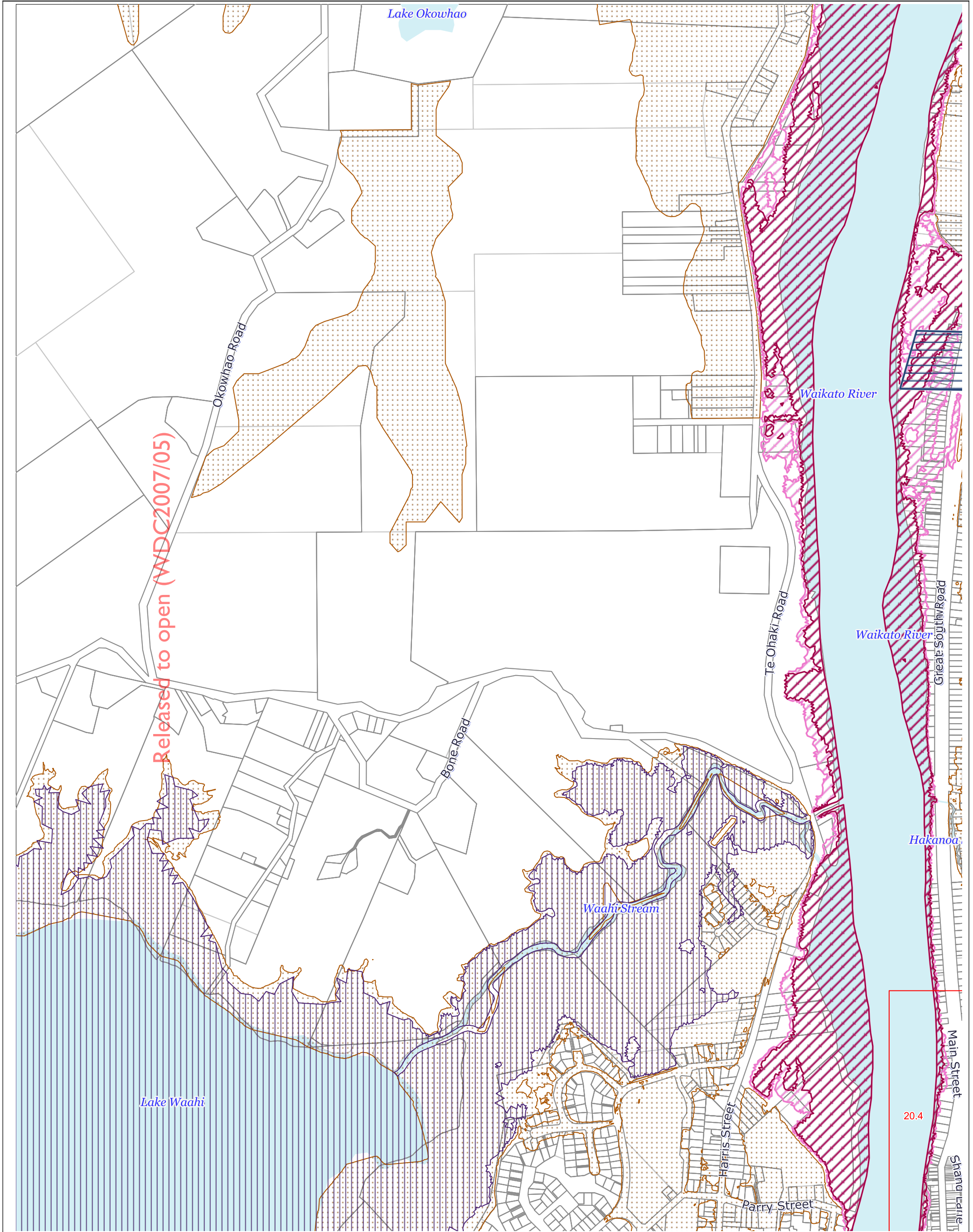
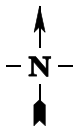


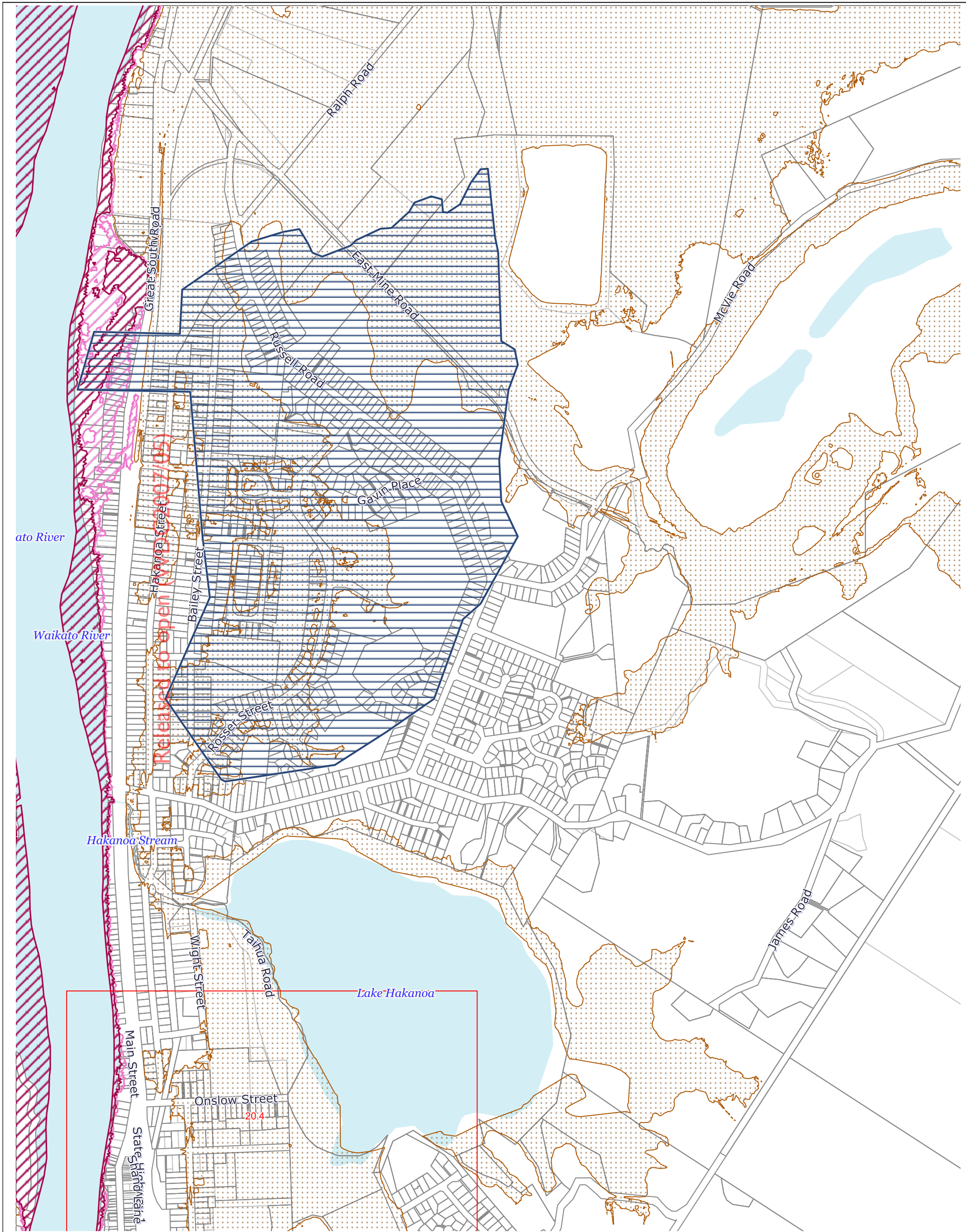
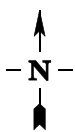


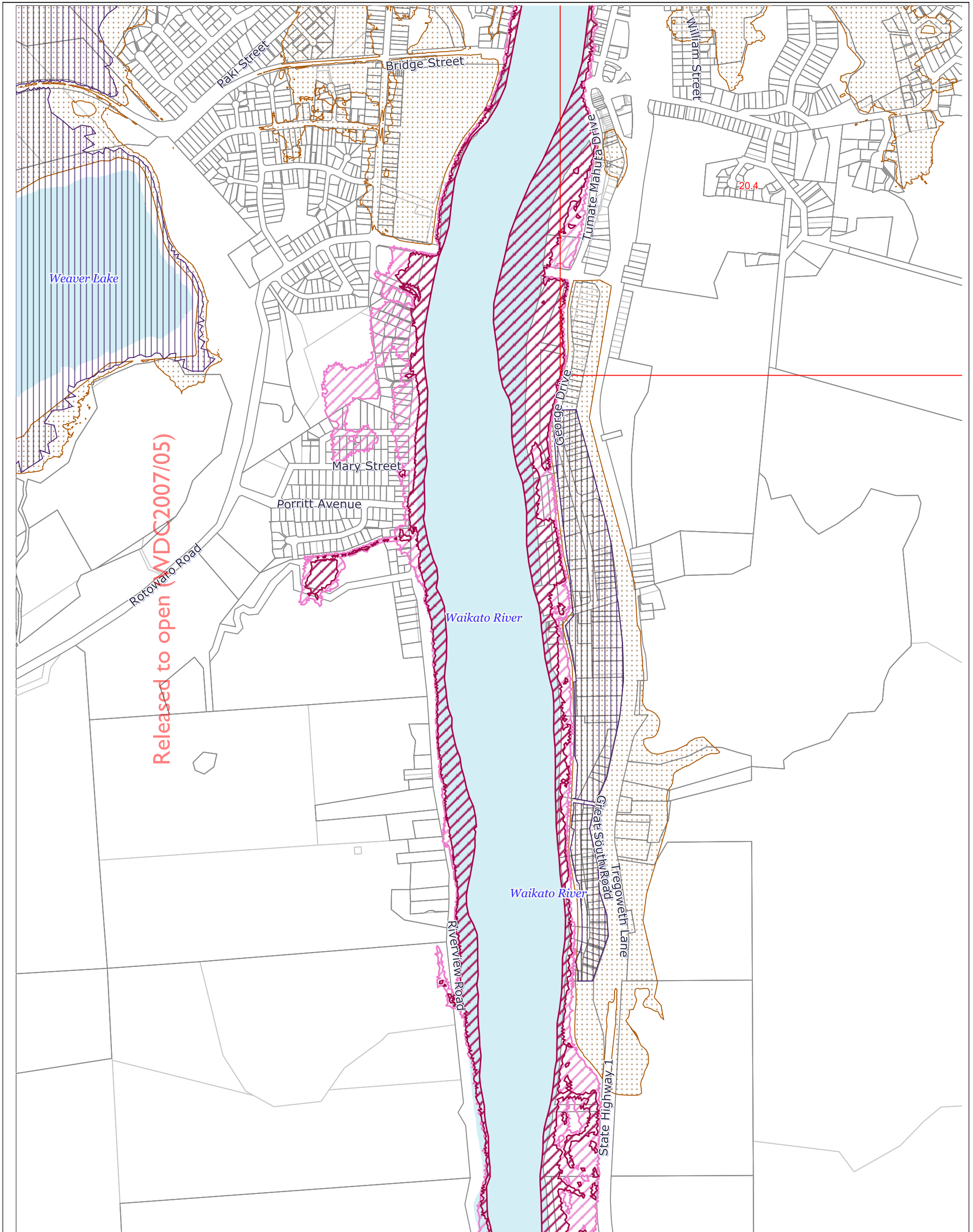
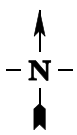


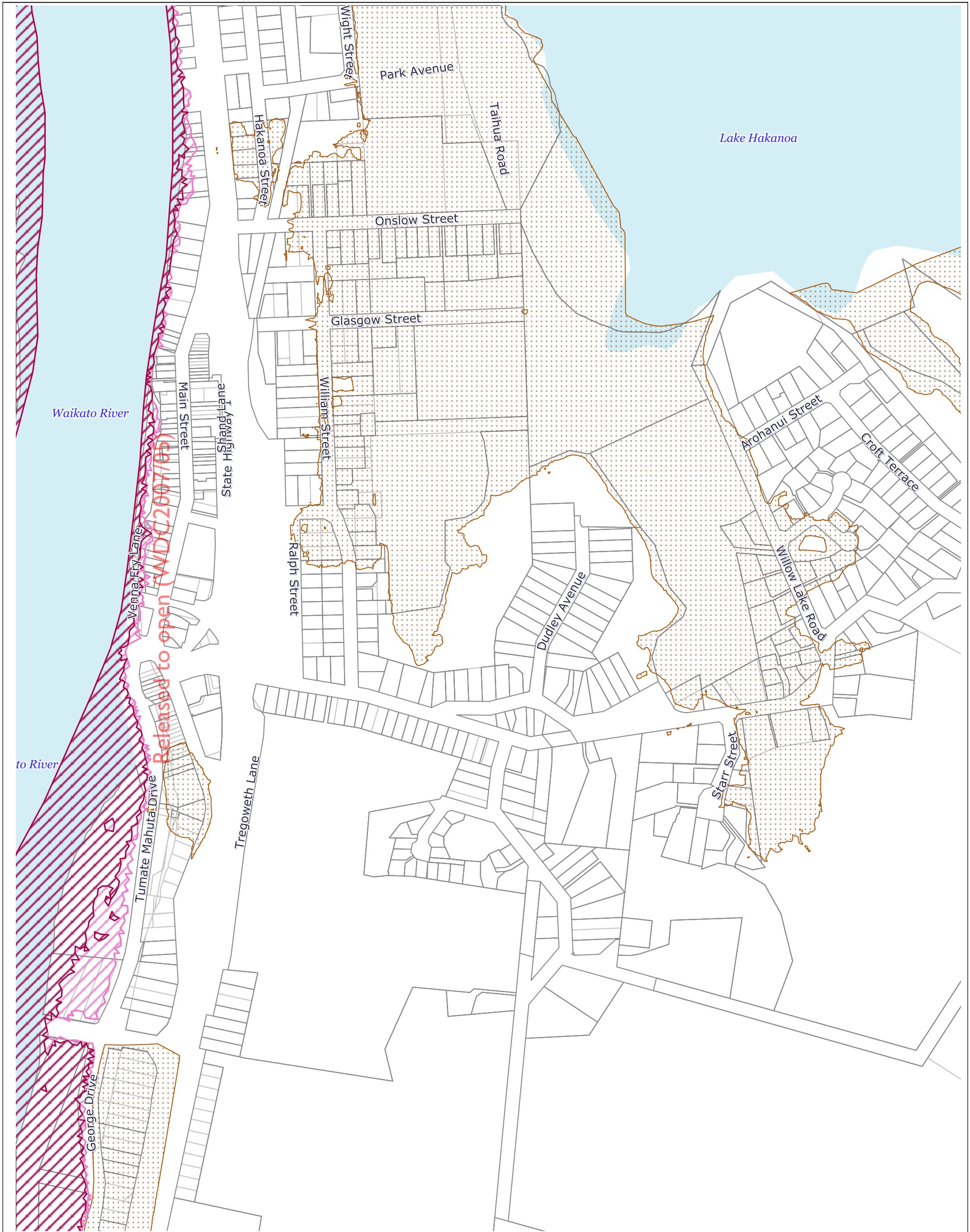
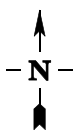


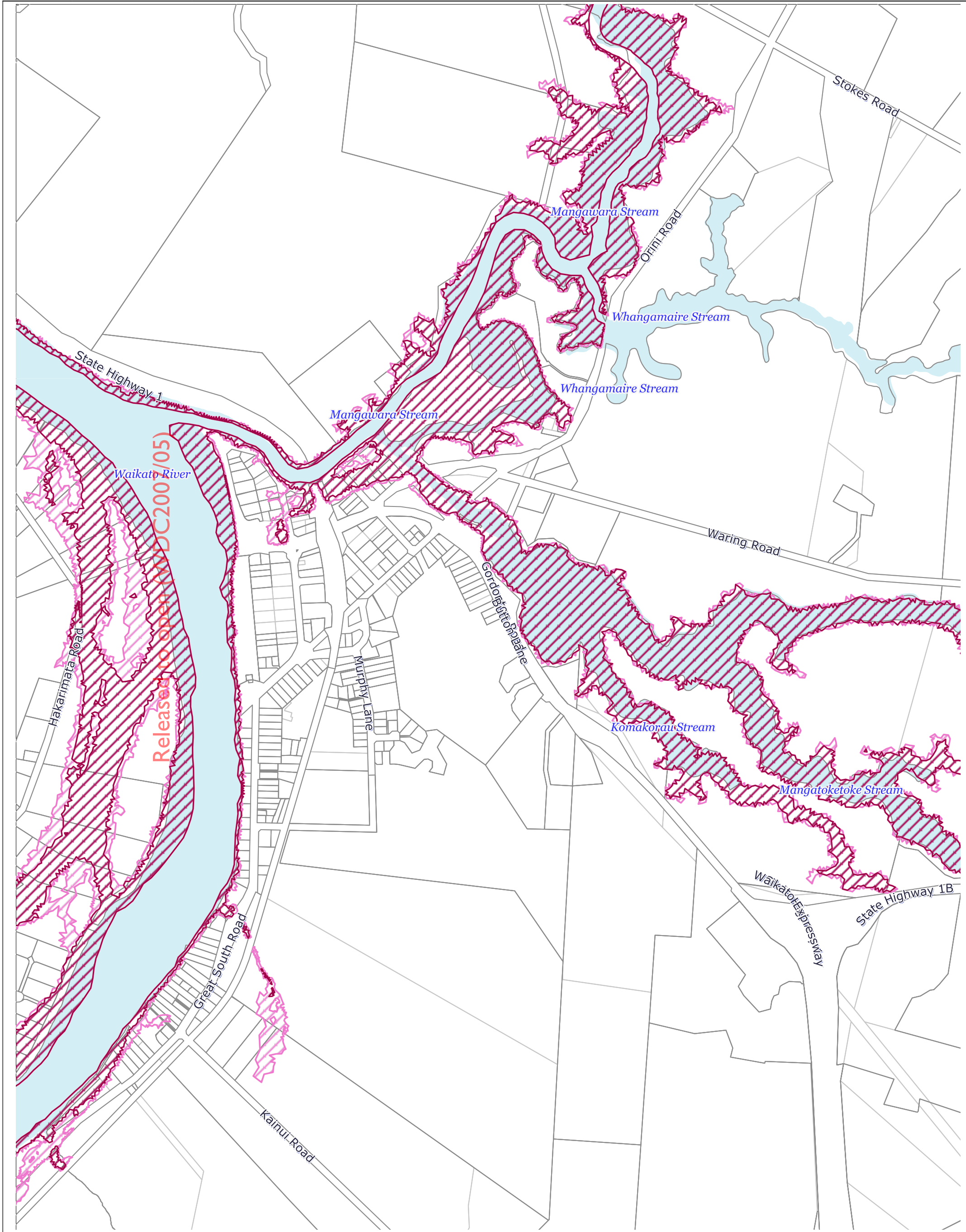
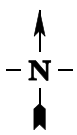


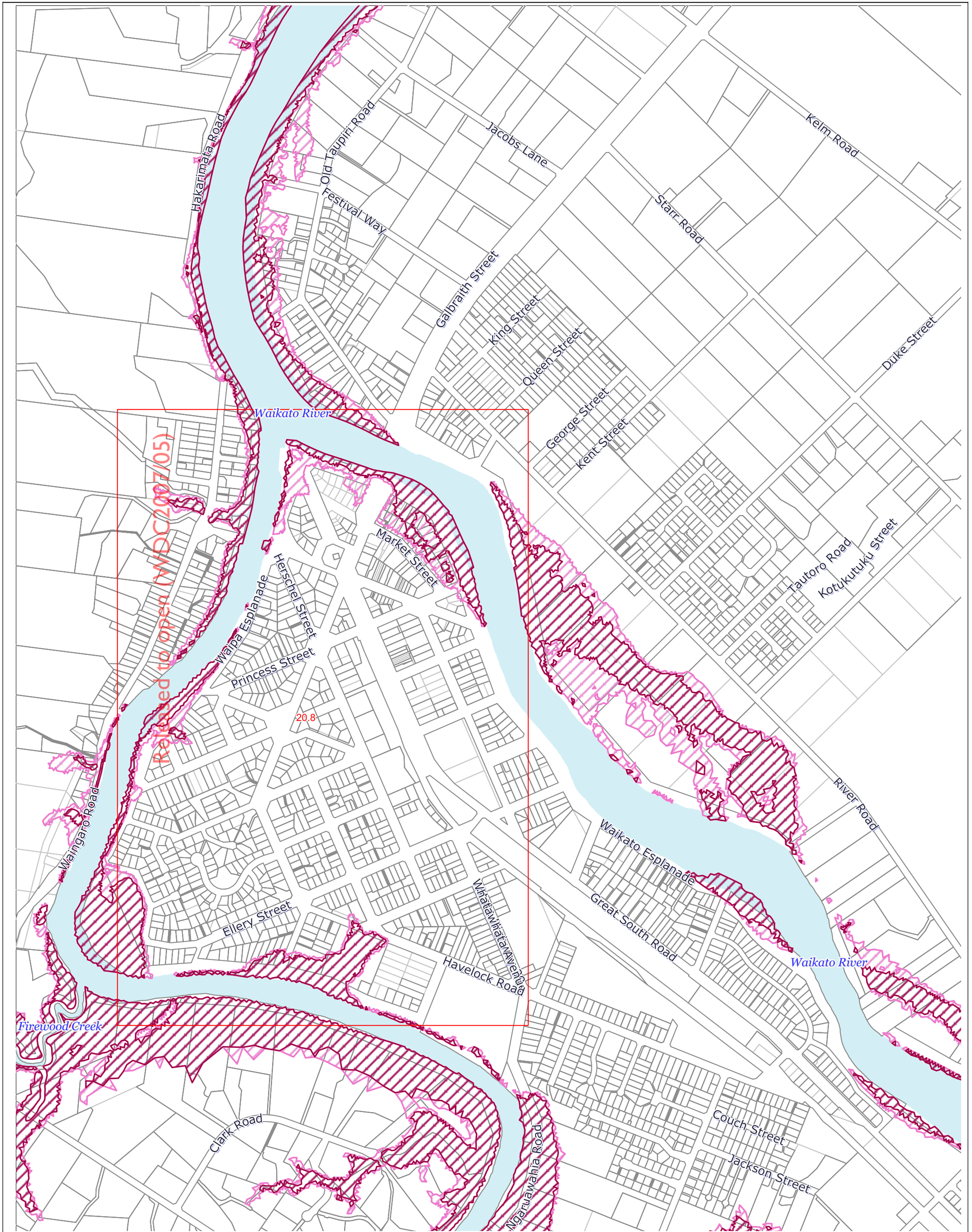
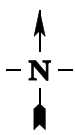


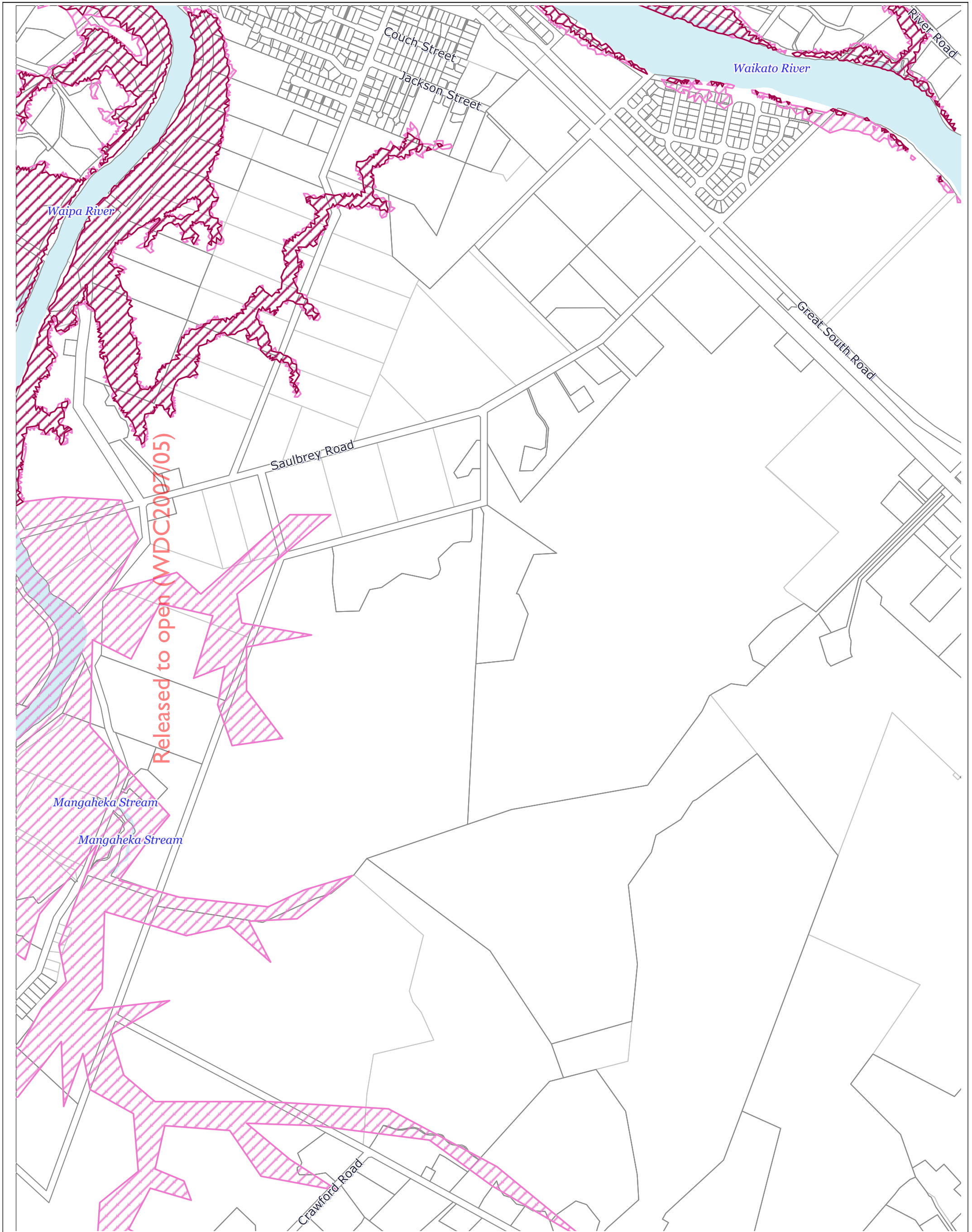
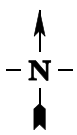


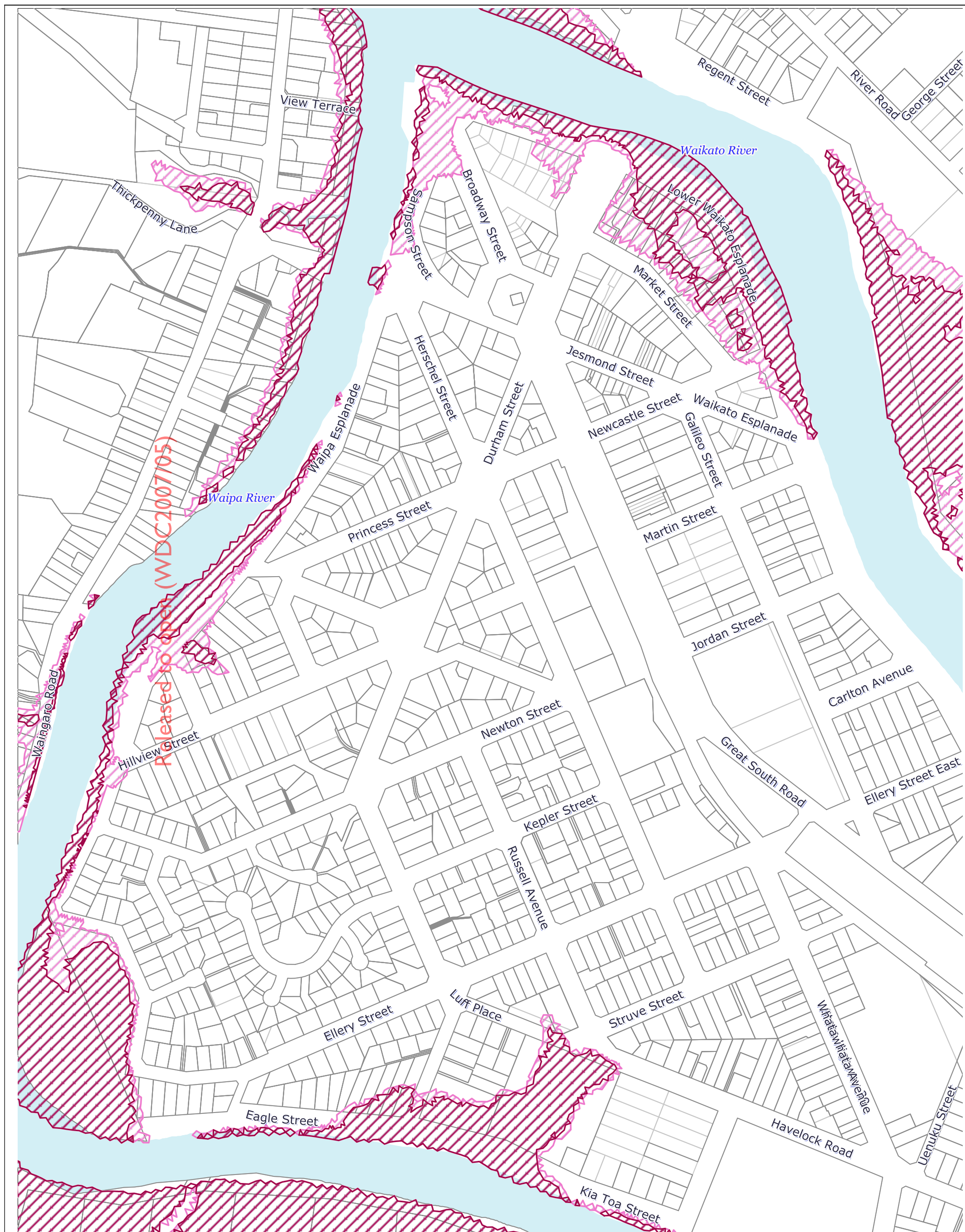


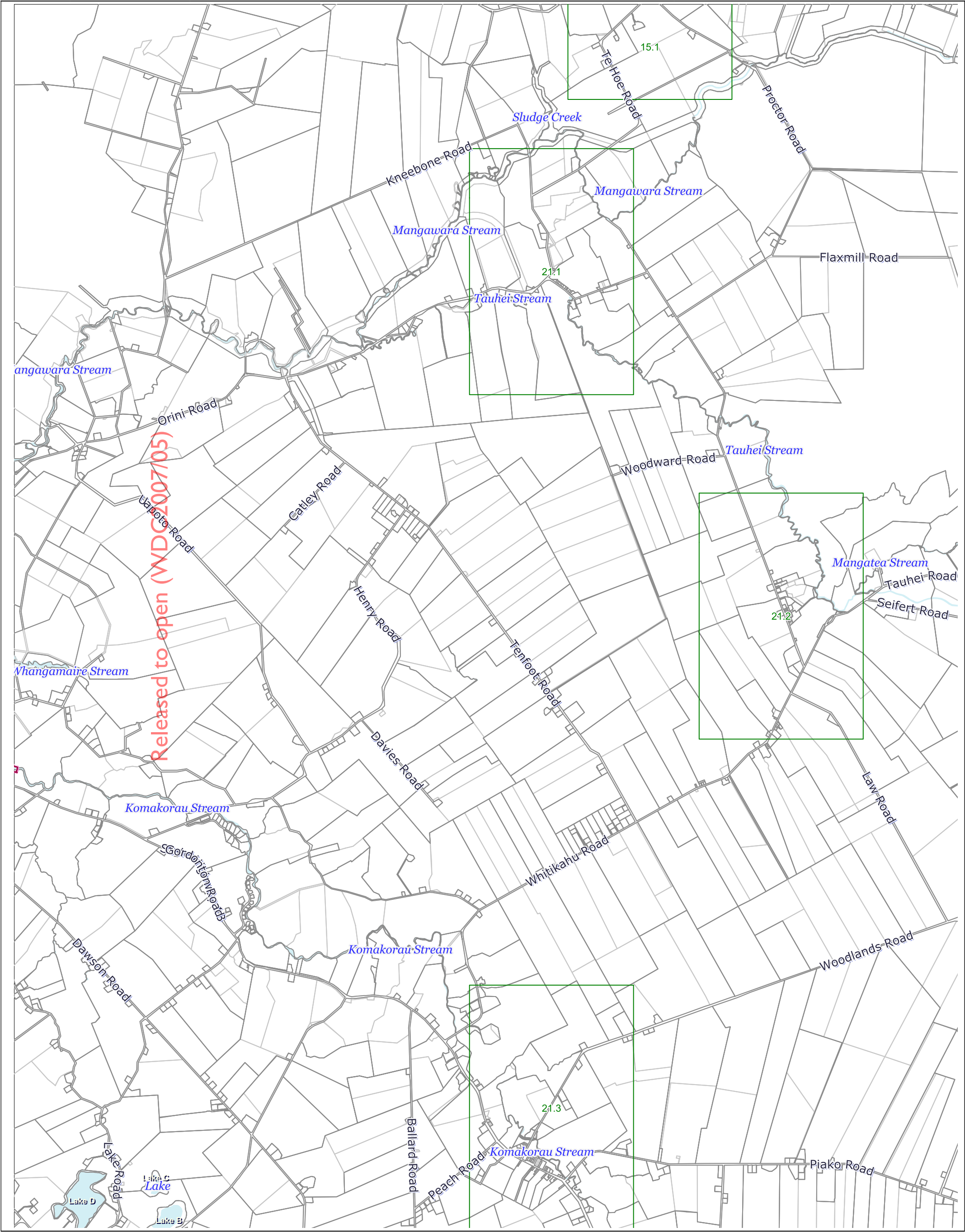


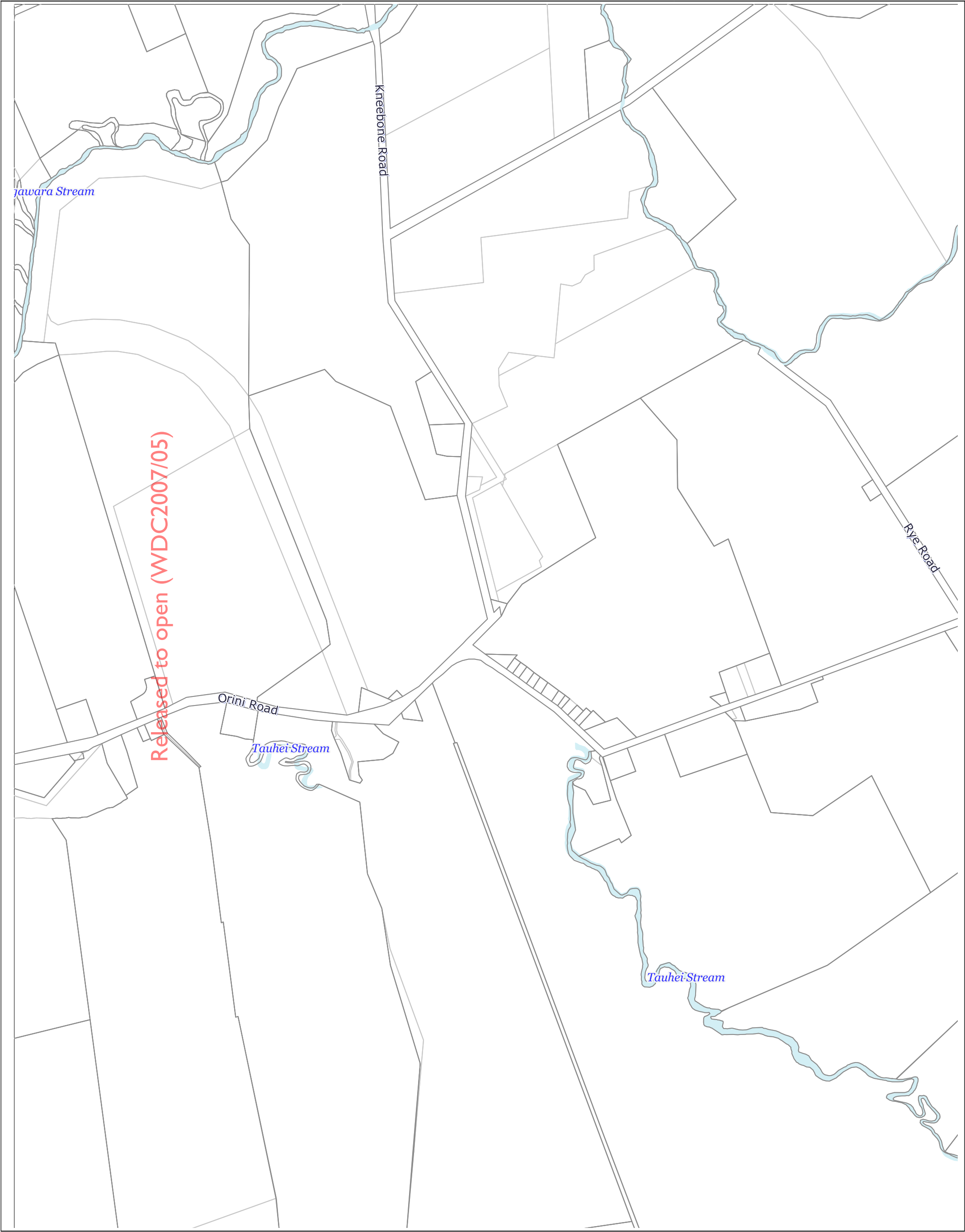
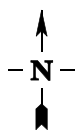


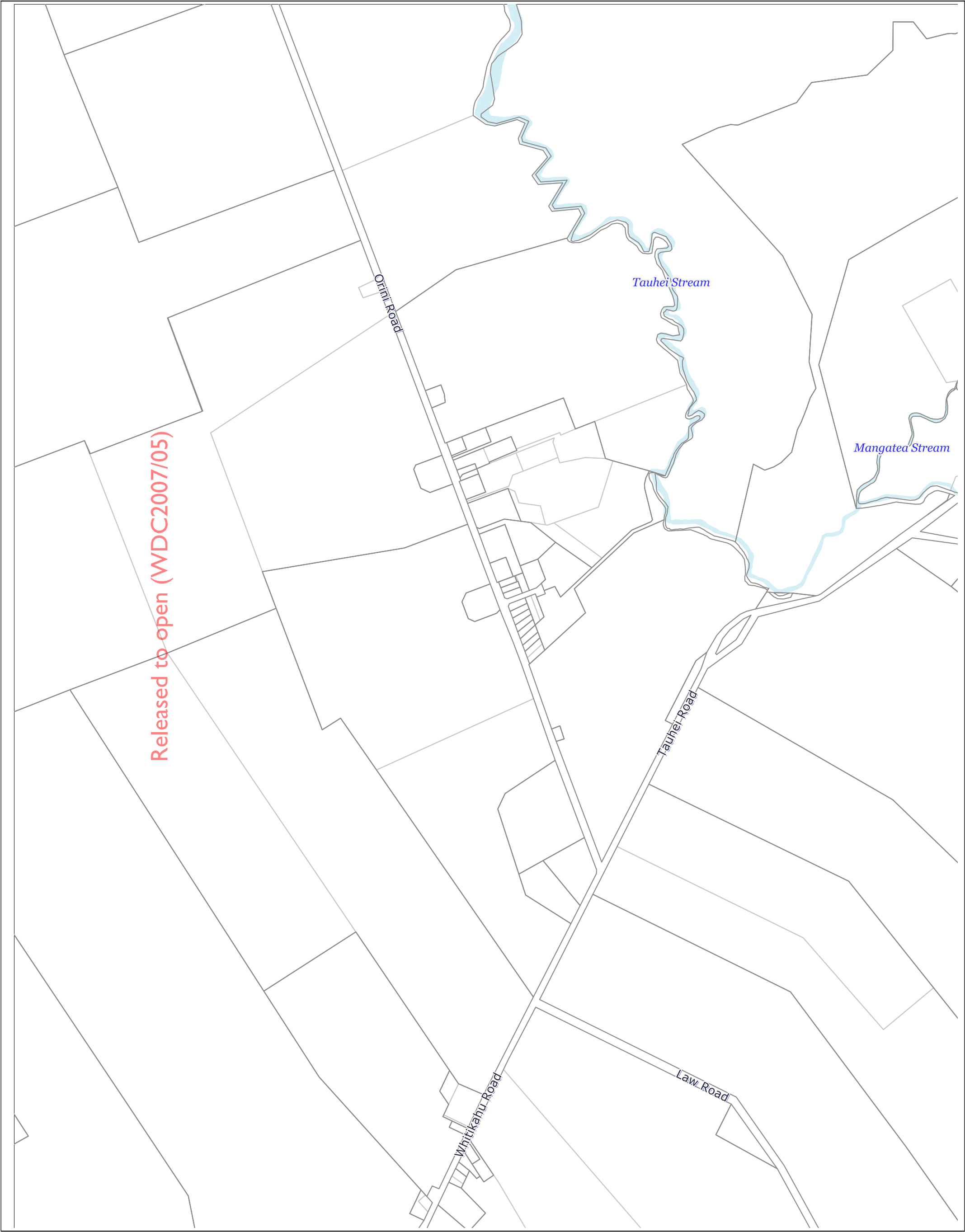
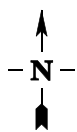


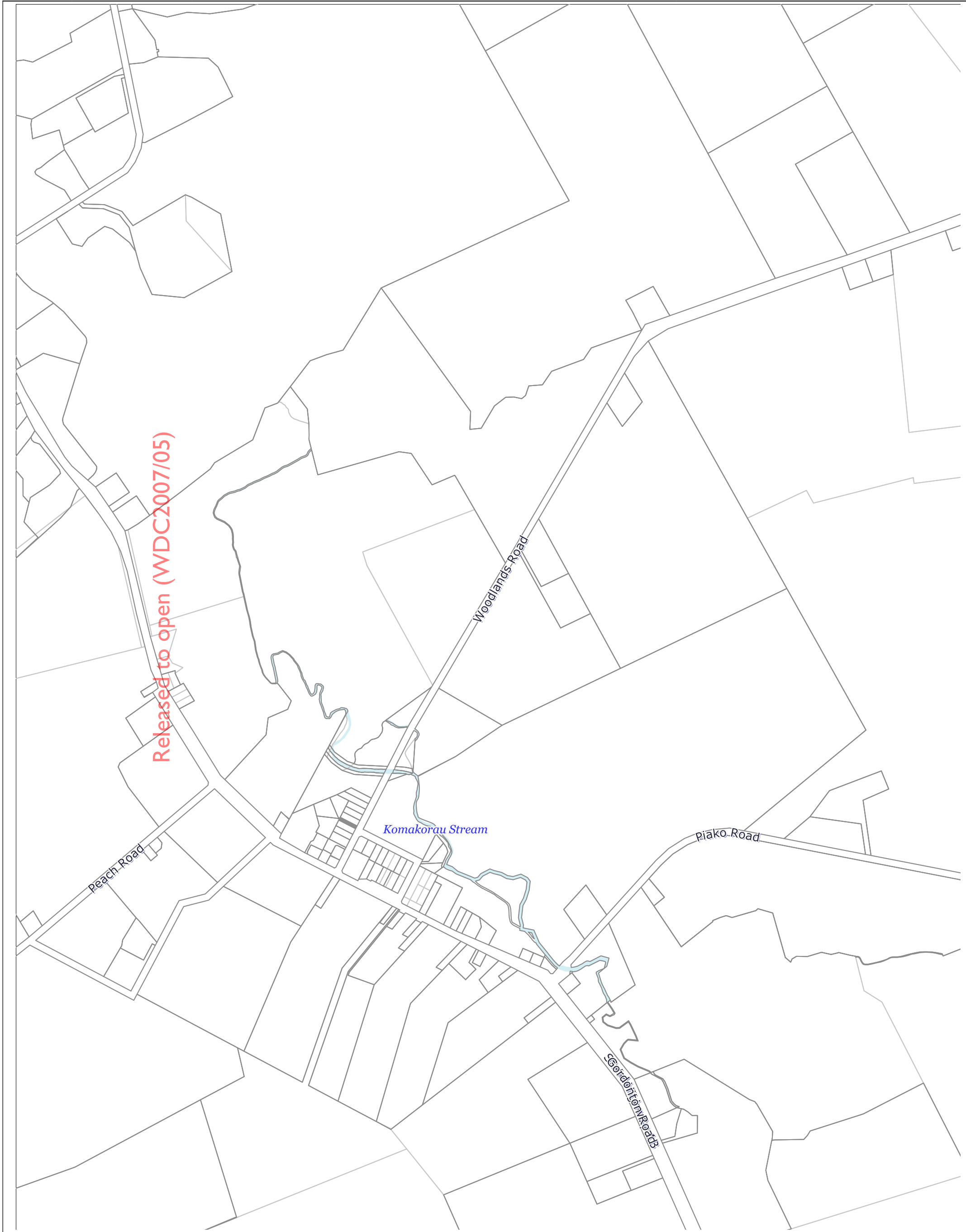
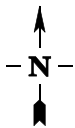


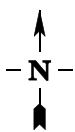


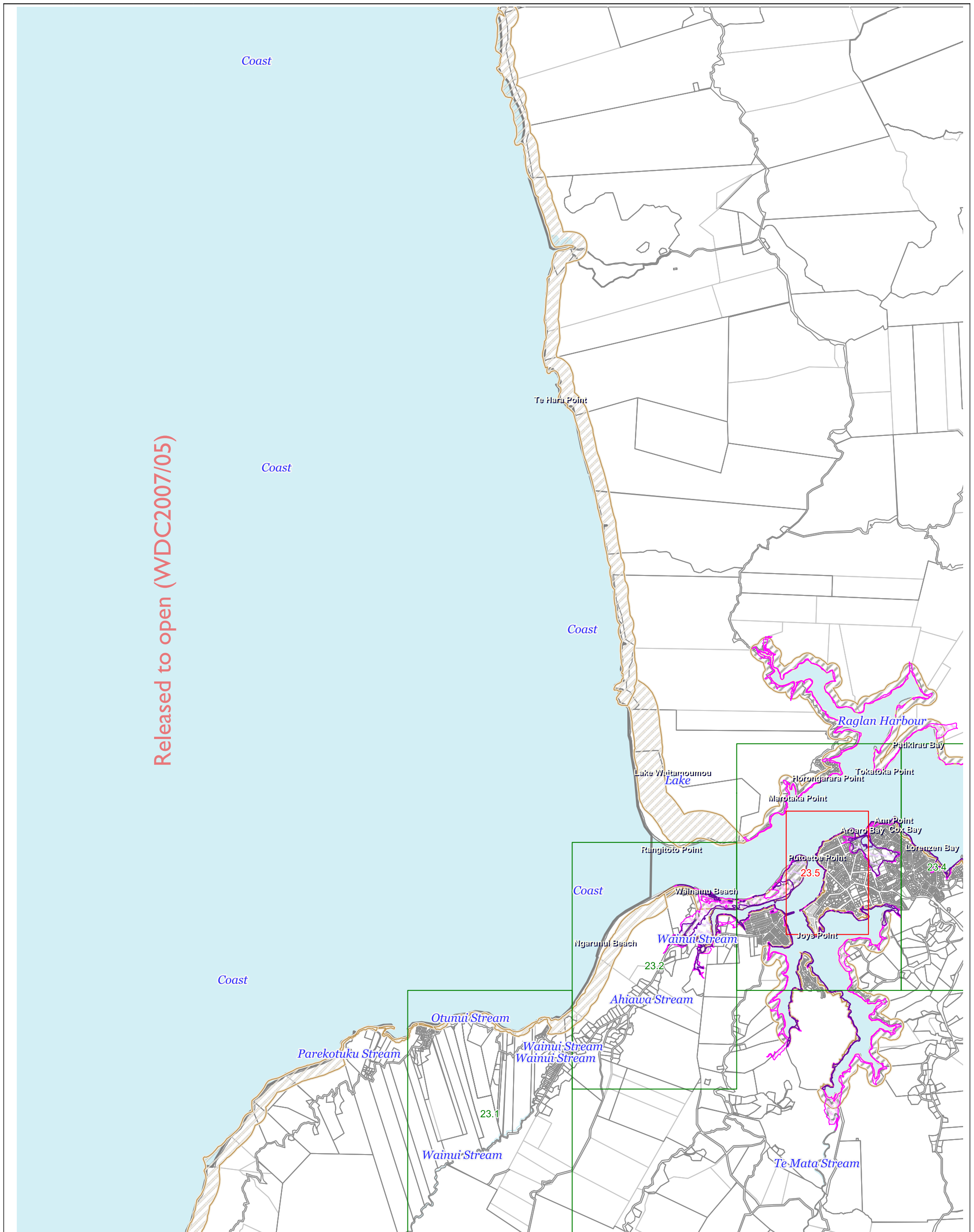


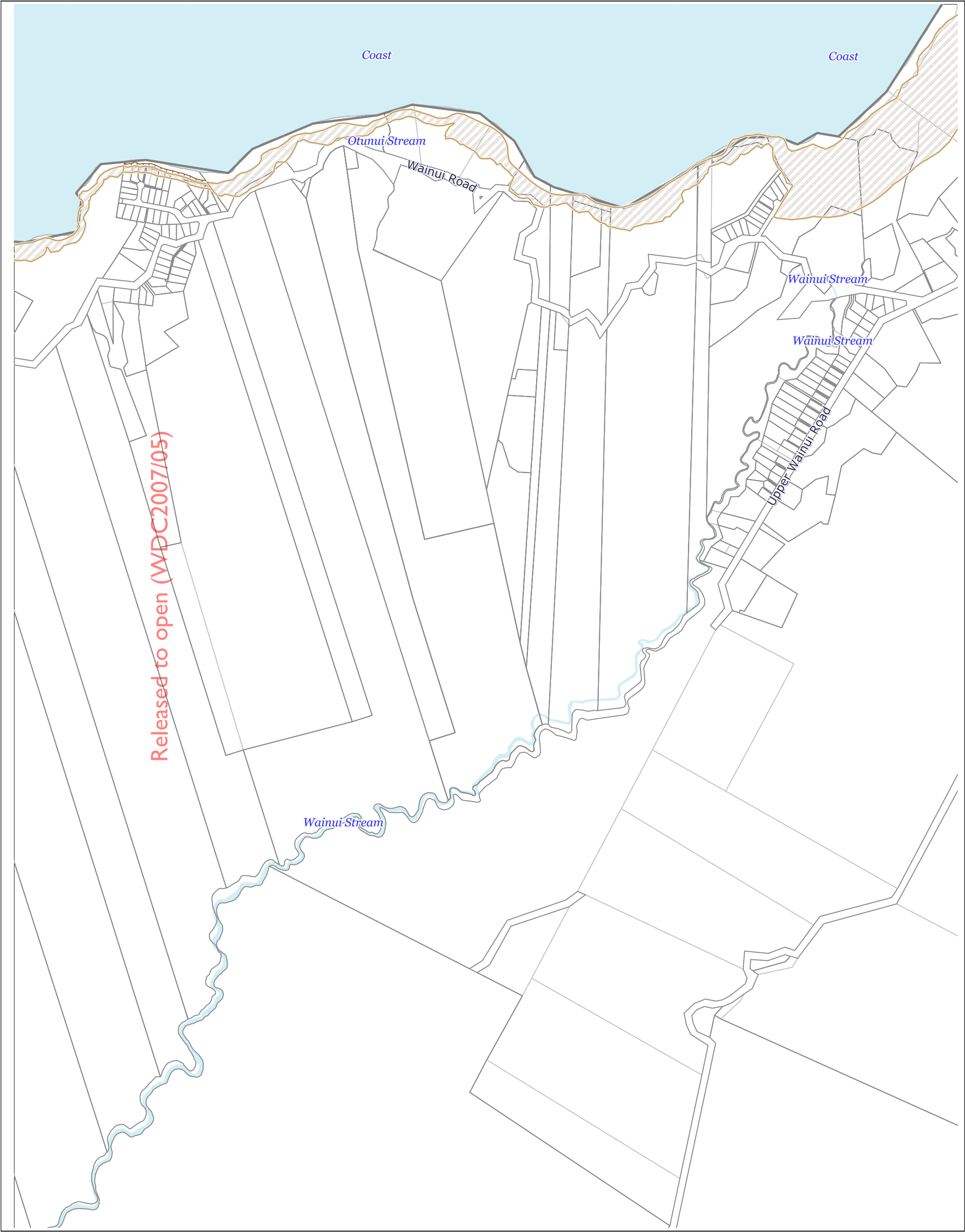
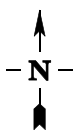


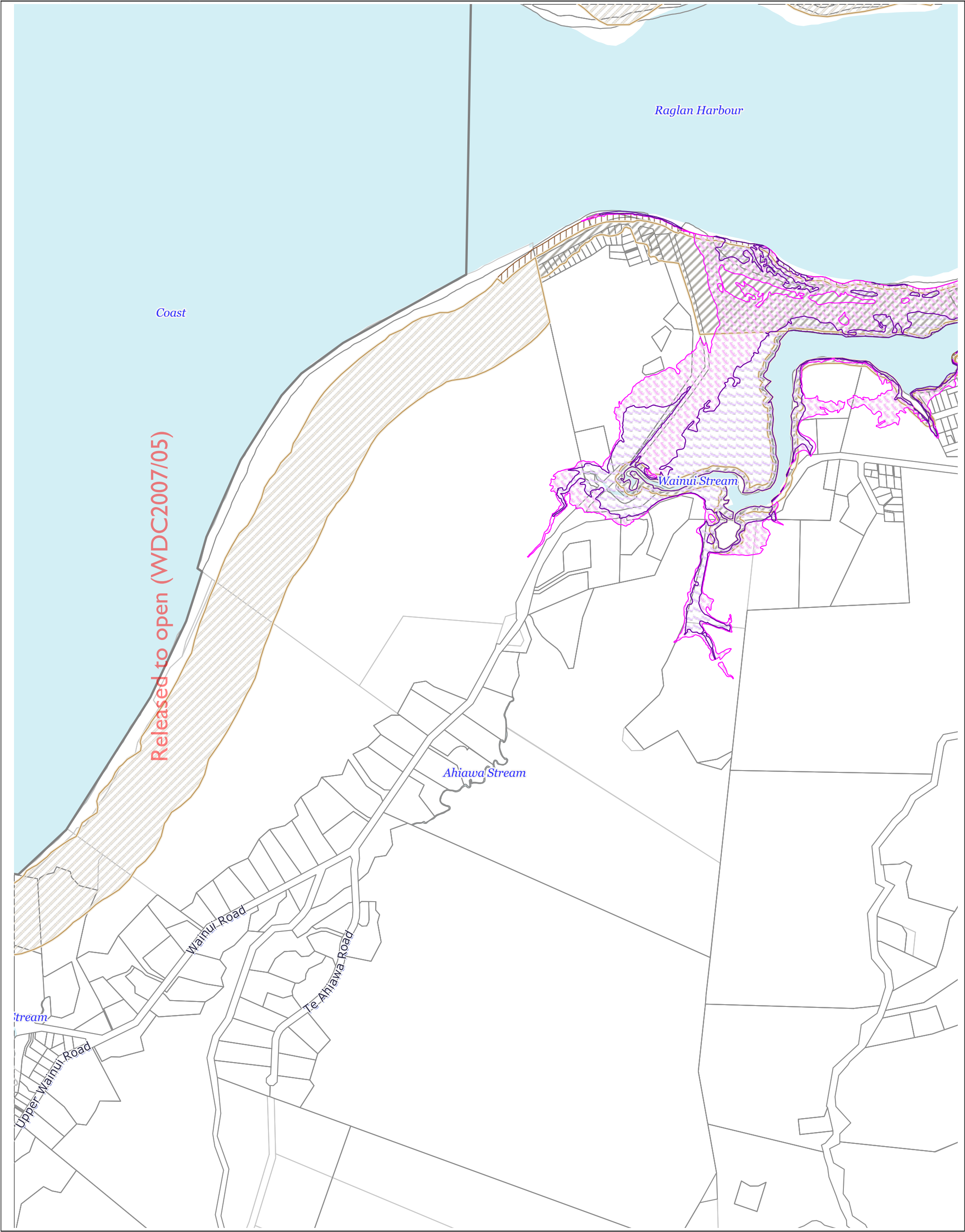
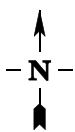


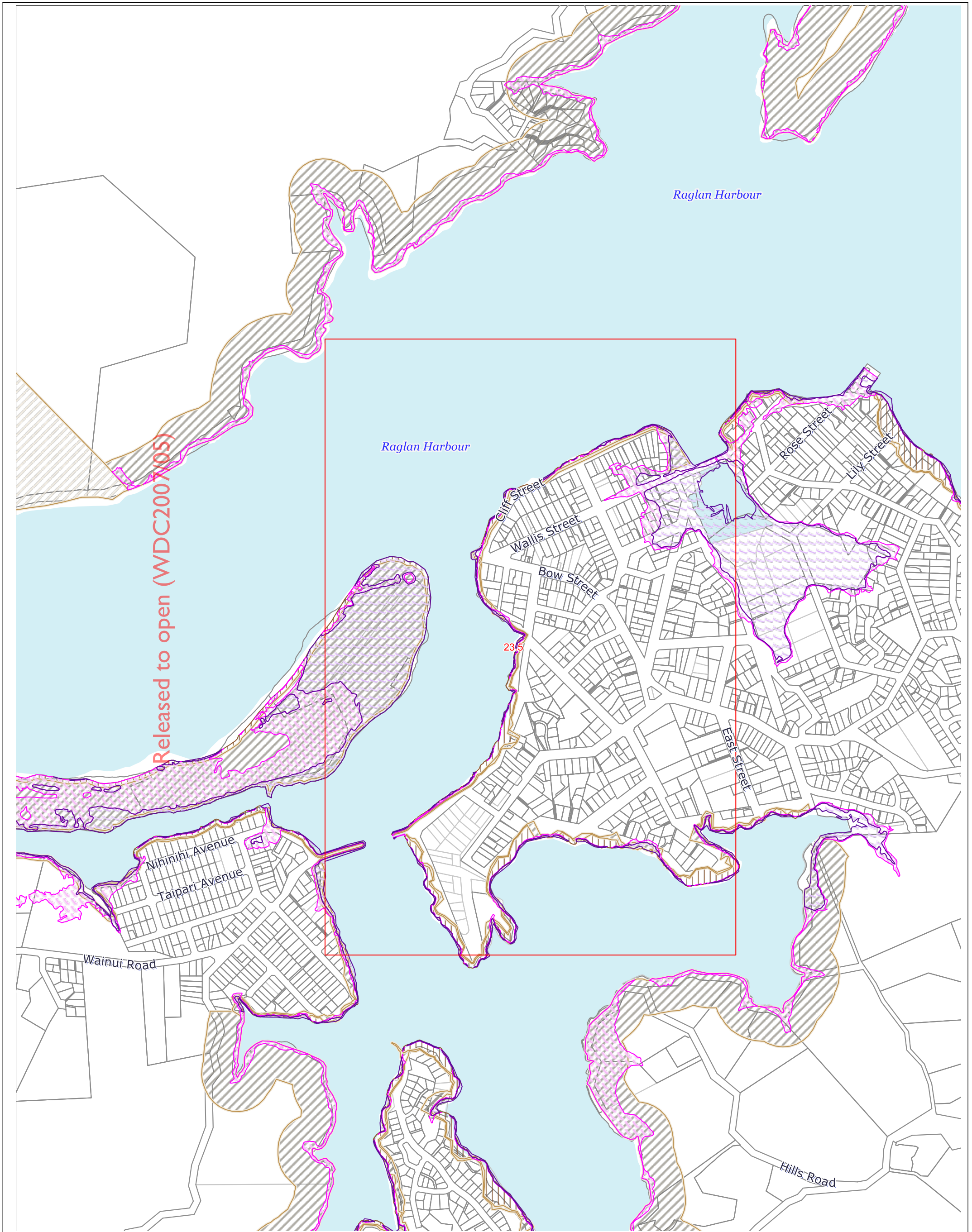
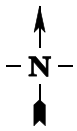


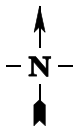






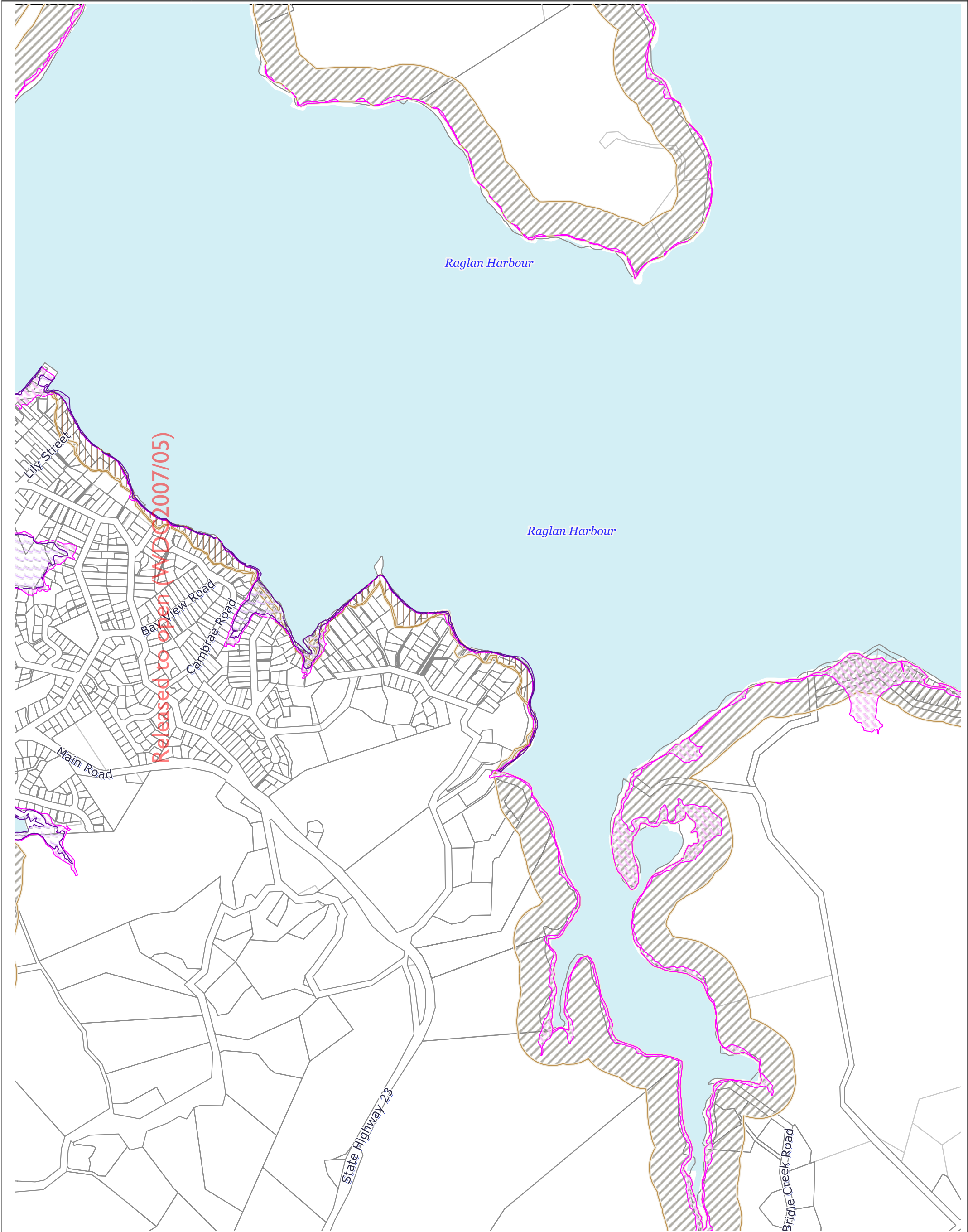


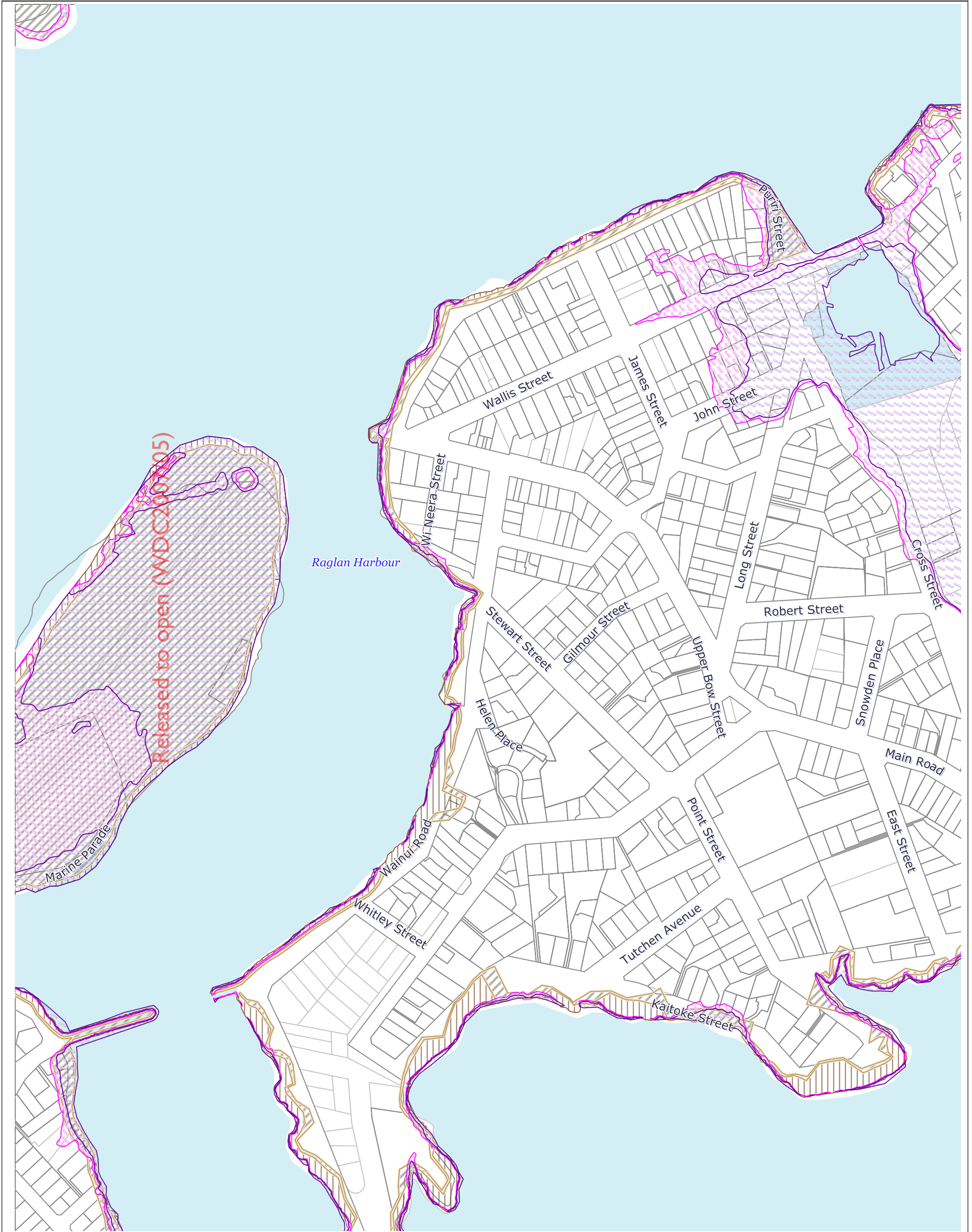
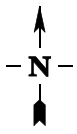


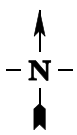


Proposed Waikato District Plan
(Stage 2)

Raglan East 23.4

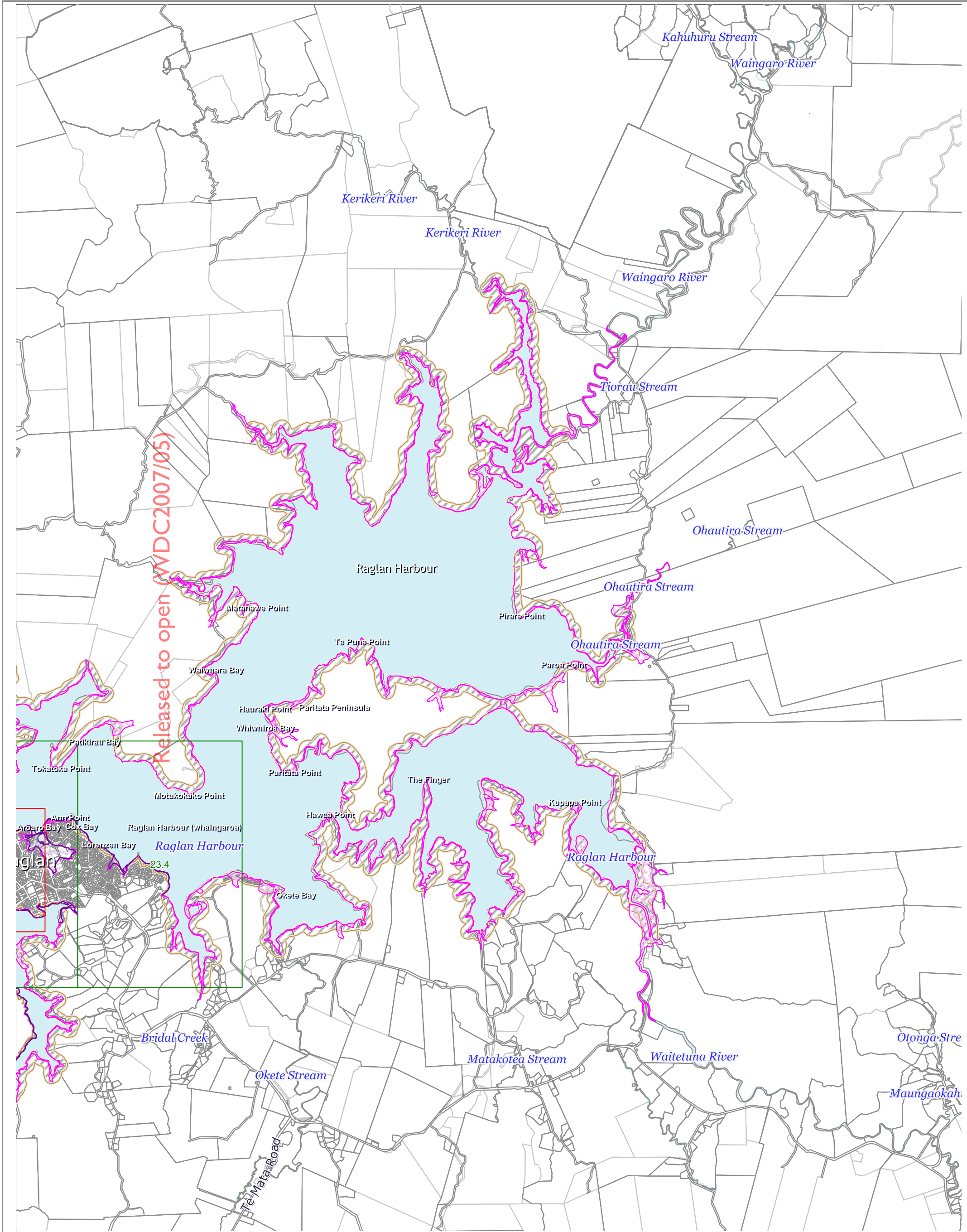


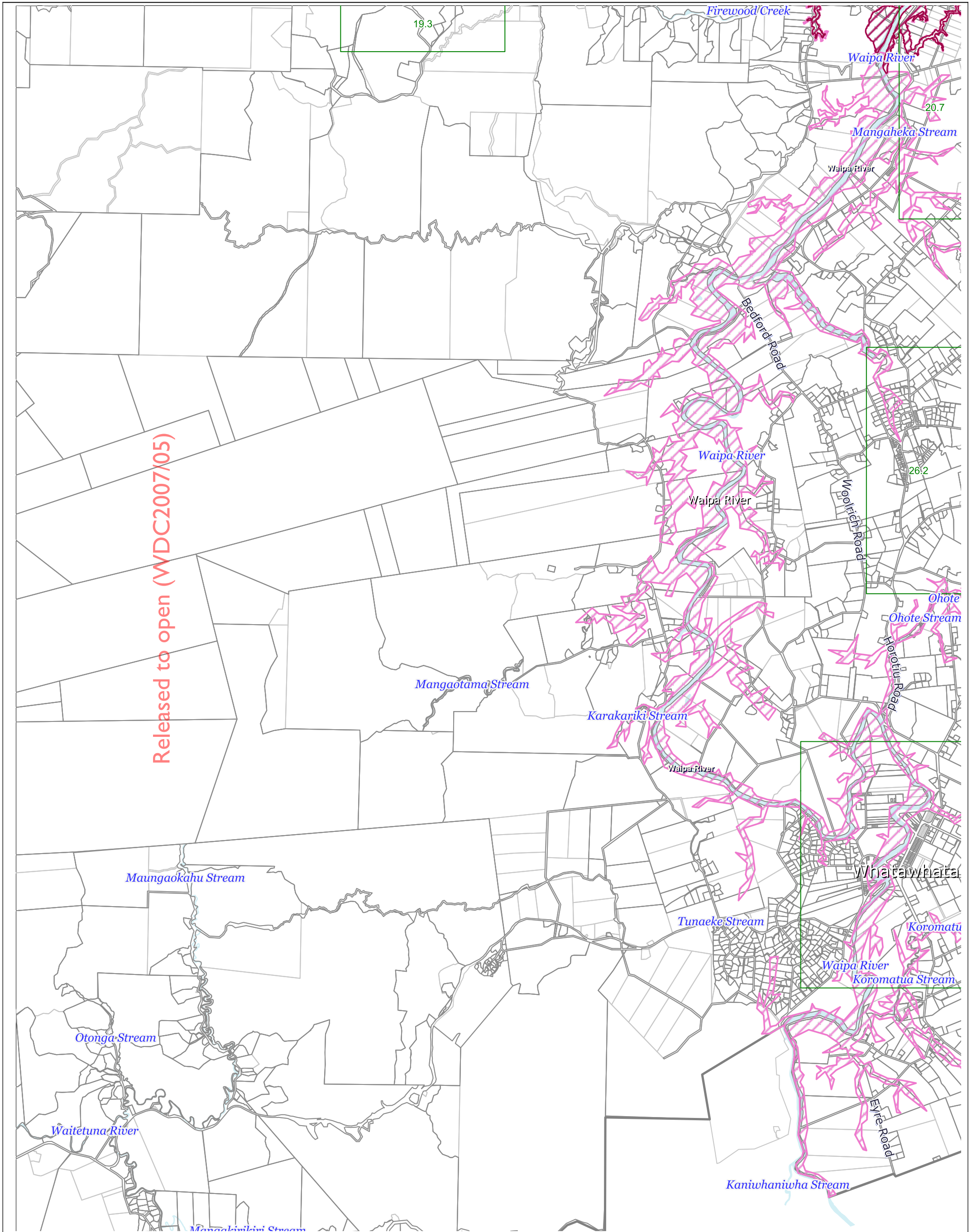
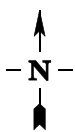


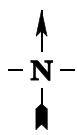


Proposed Waikato District Plan (Stage 2)

Te Uku 24

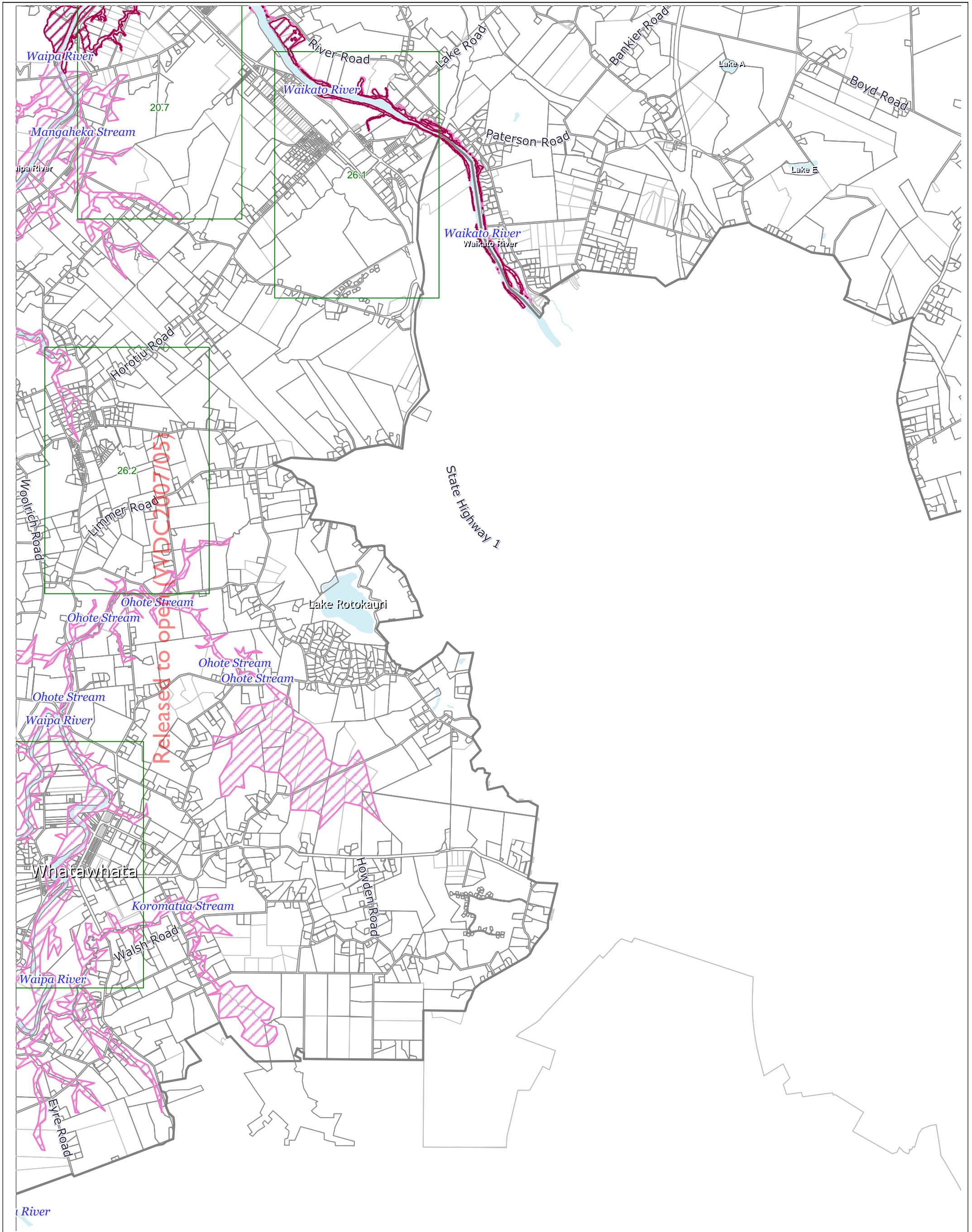


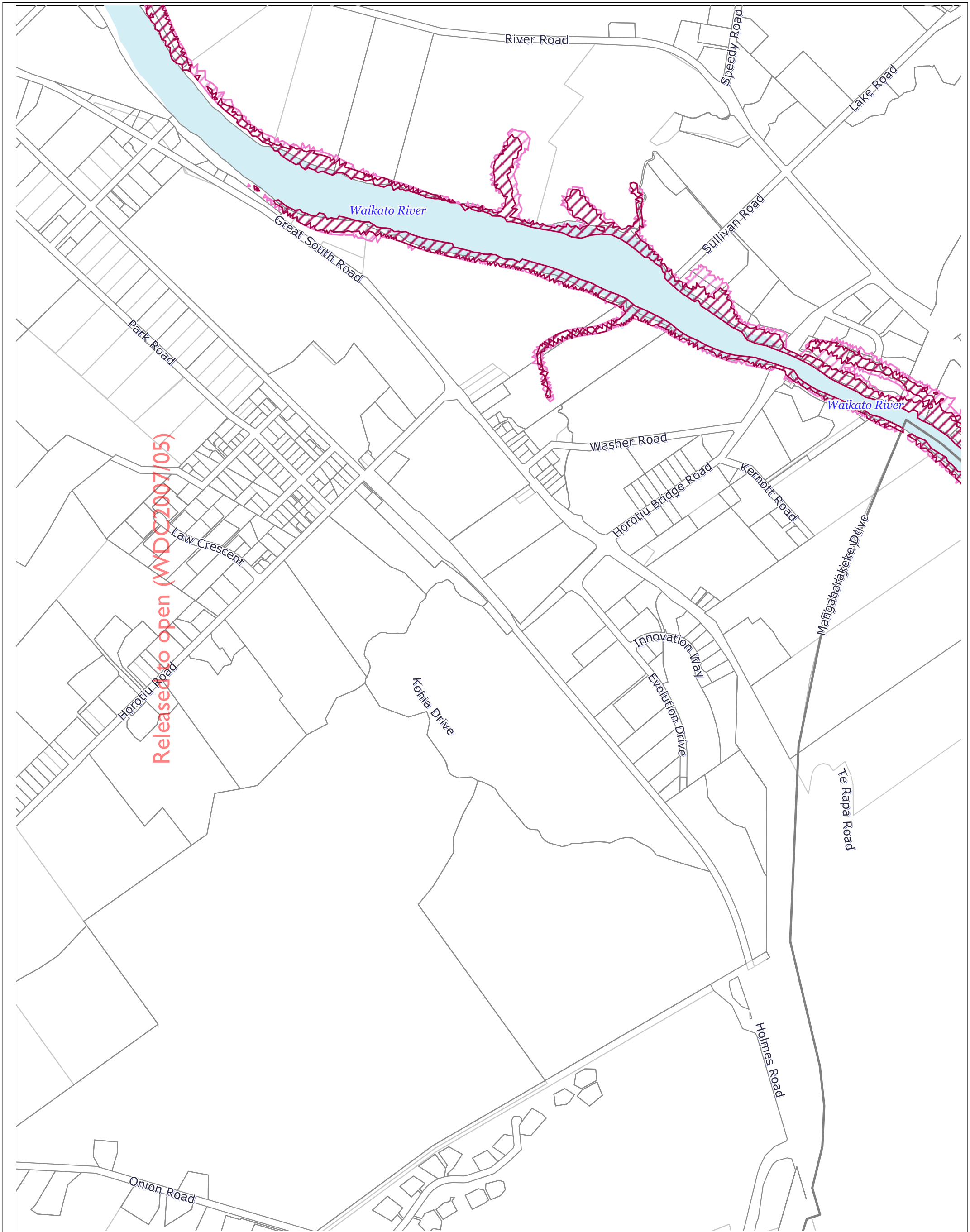
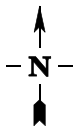


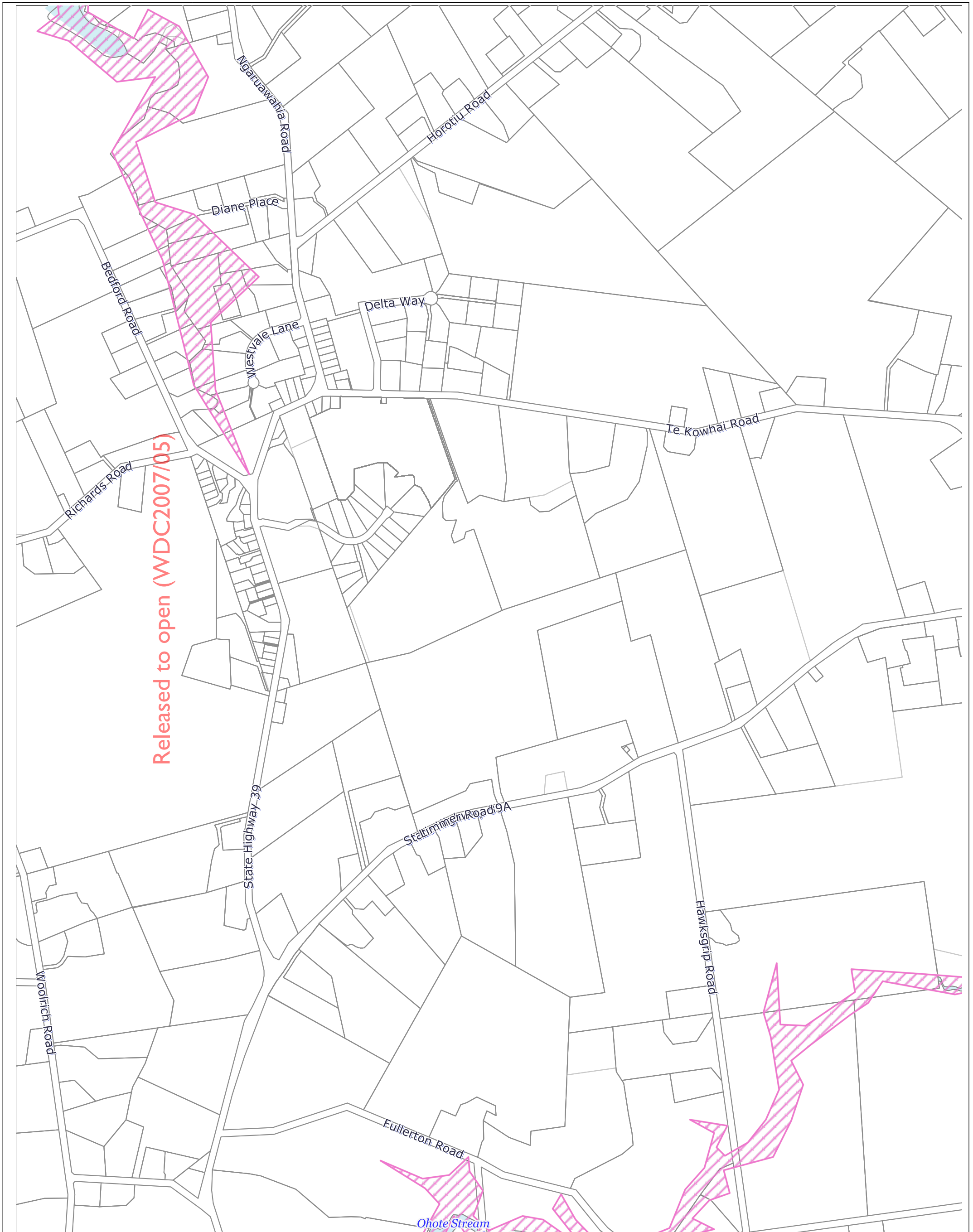
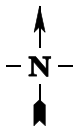


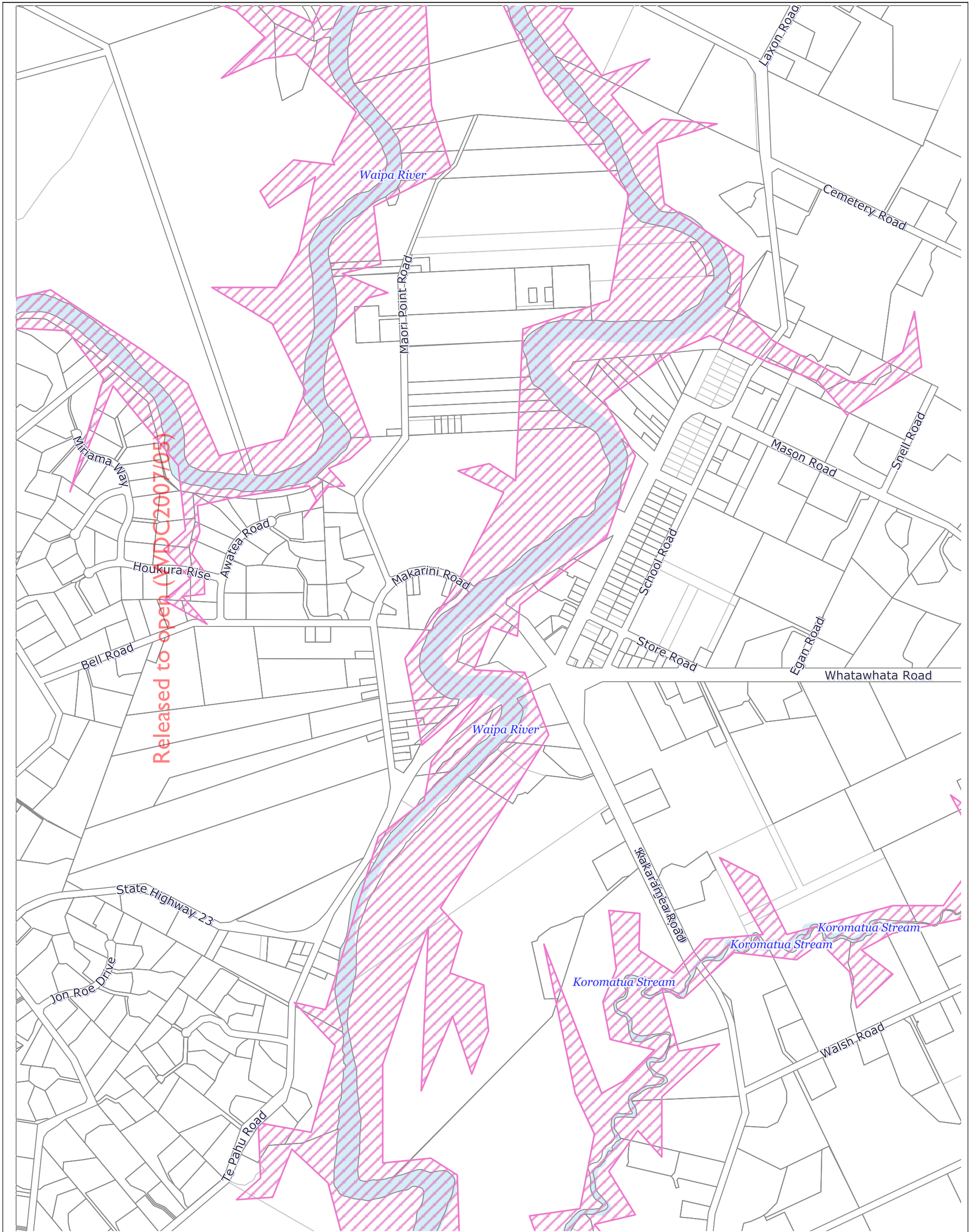
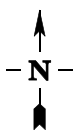
Proposed Waikato District Plan (Stage 2)

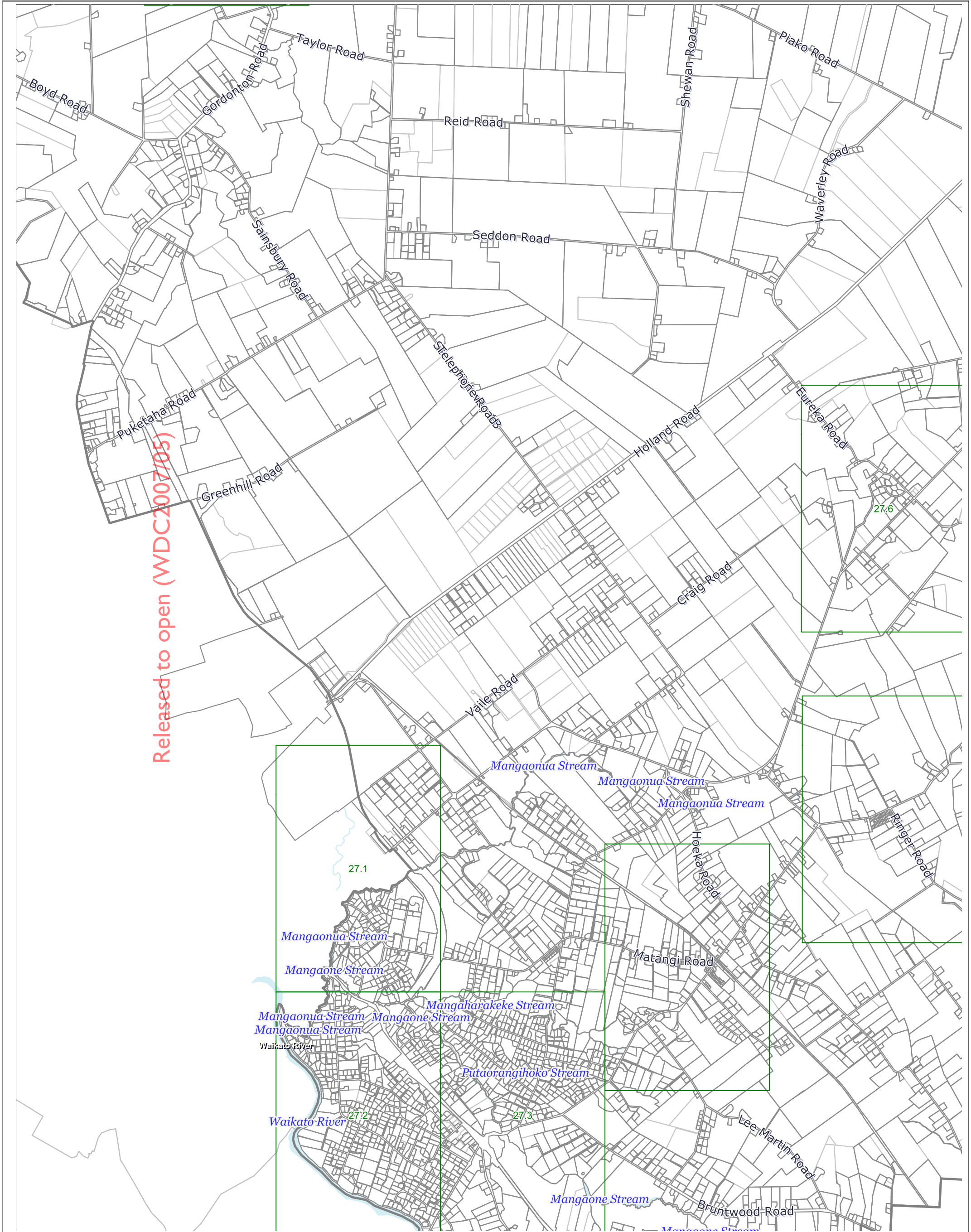
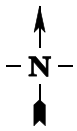
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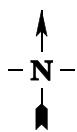




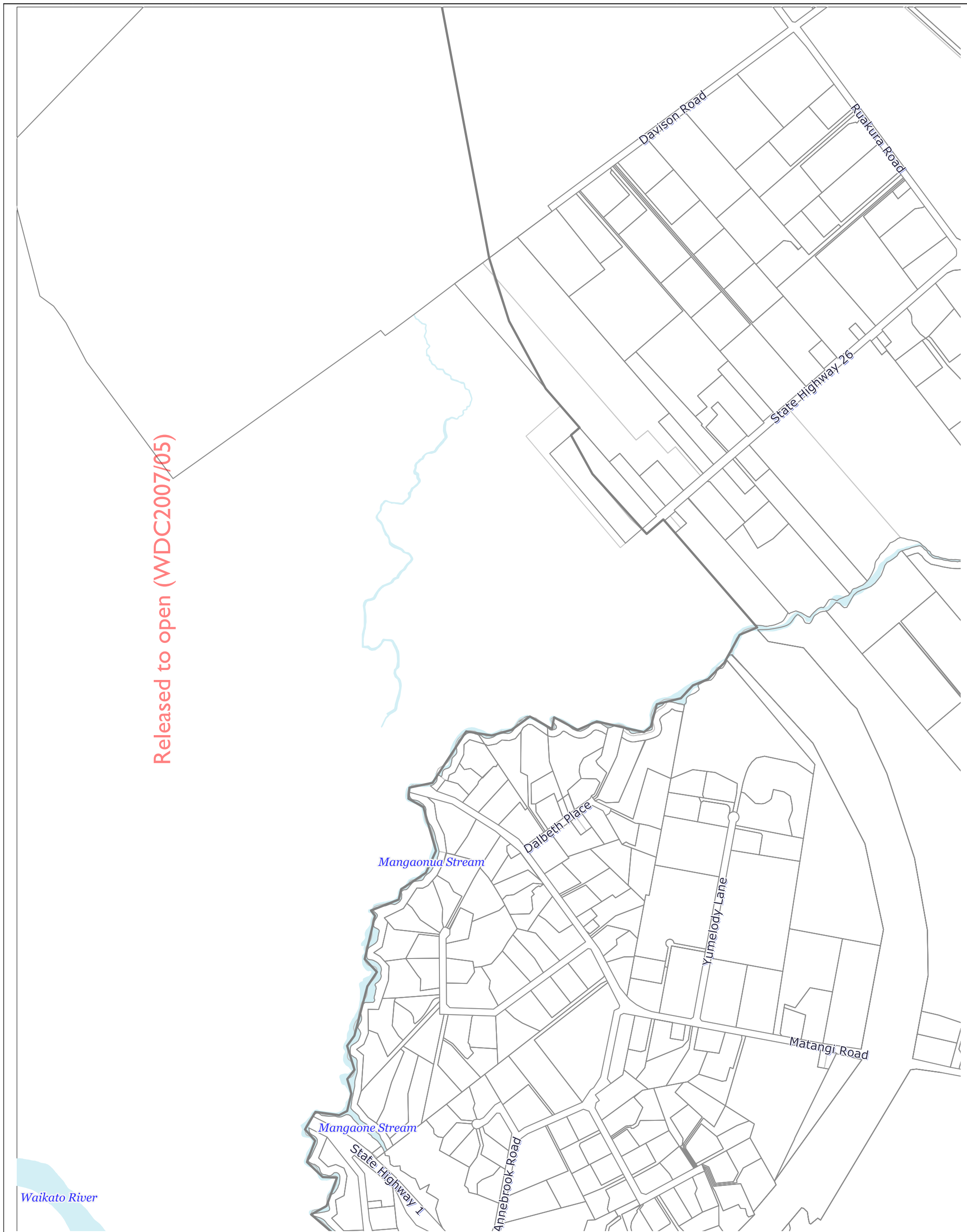


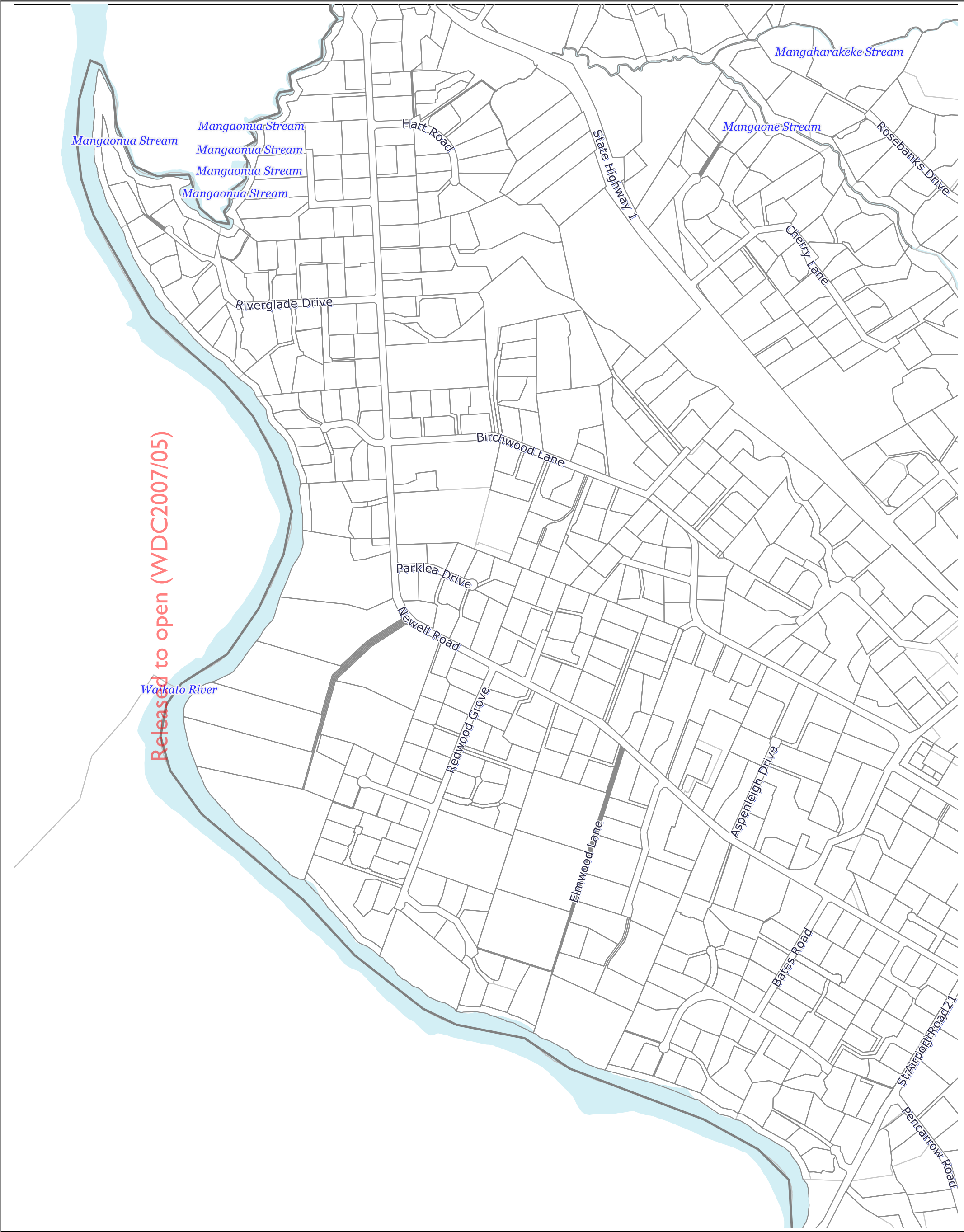
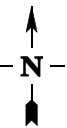




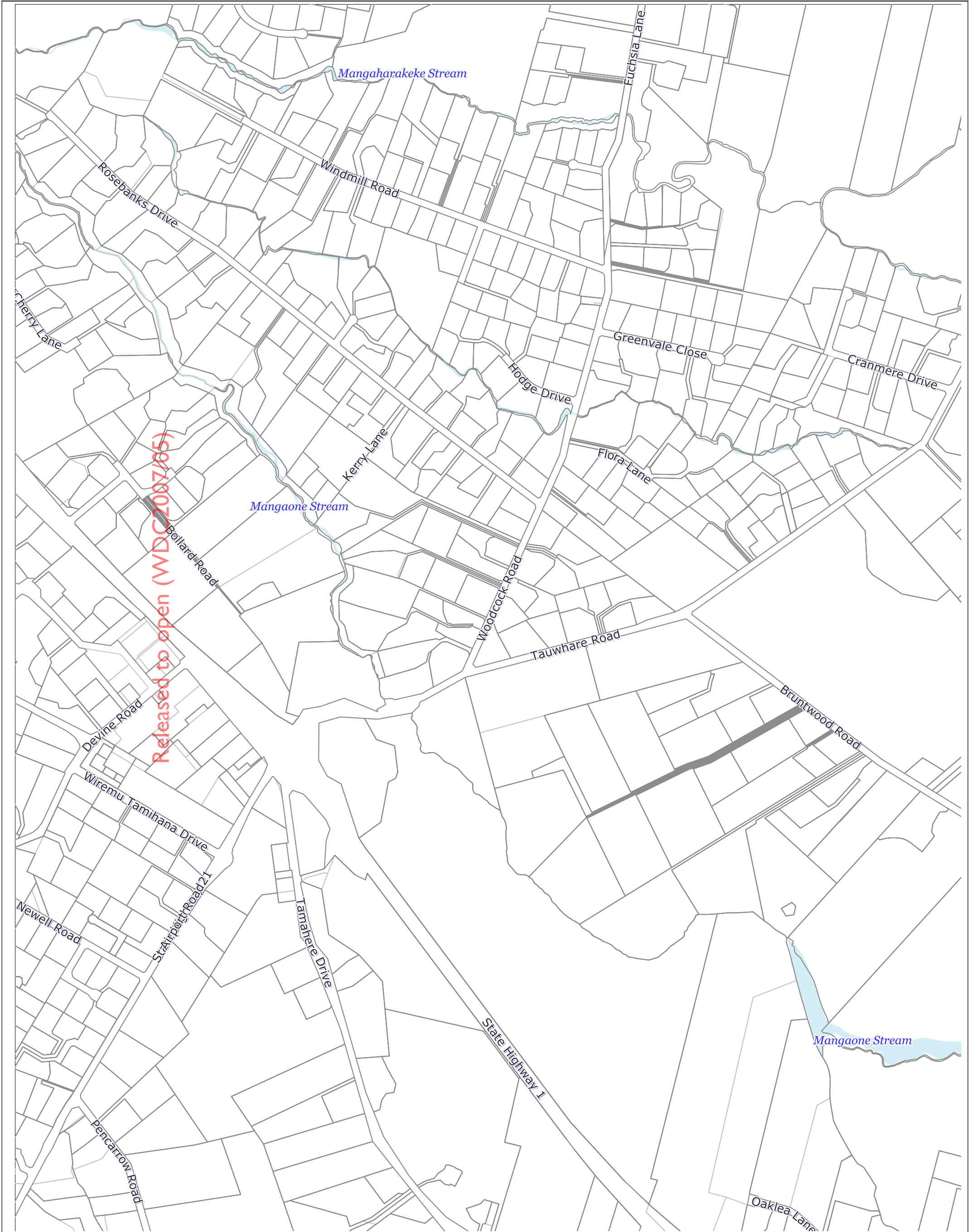
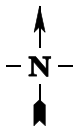


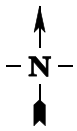
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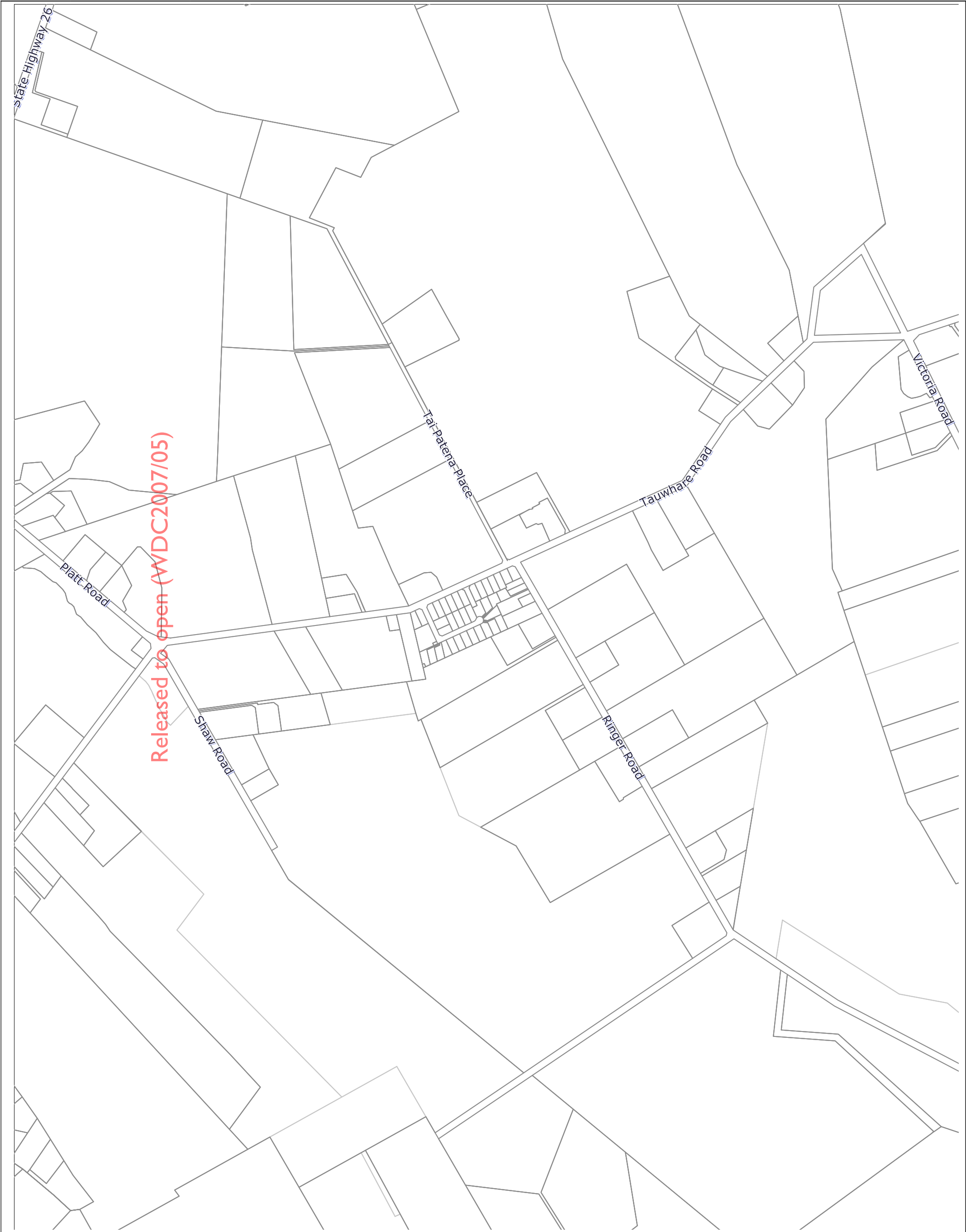
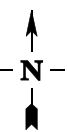


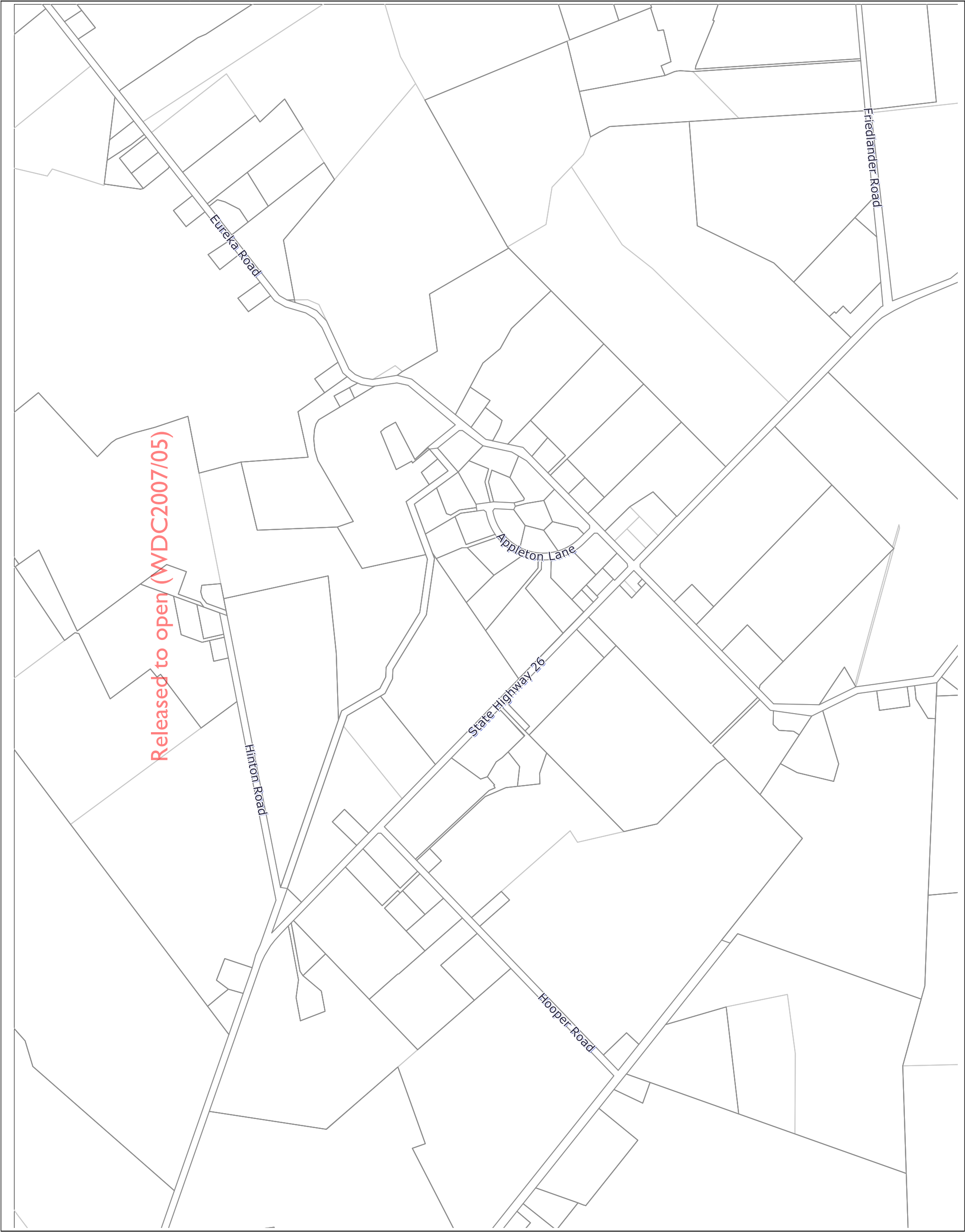
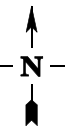


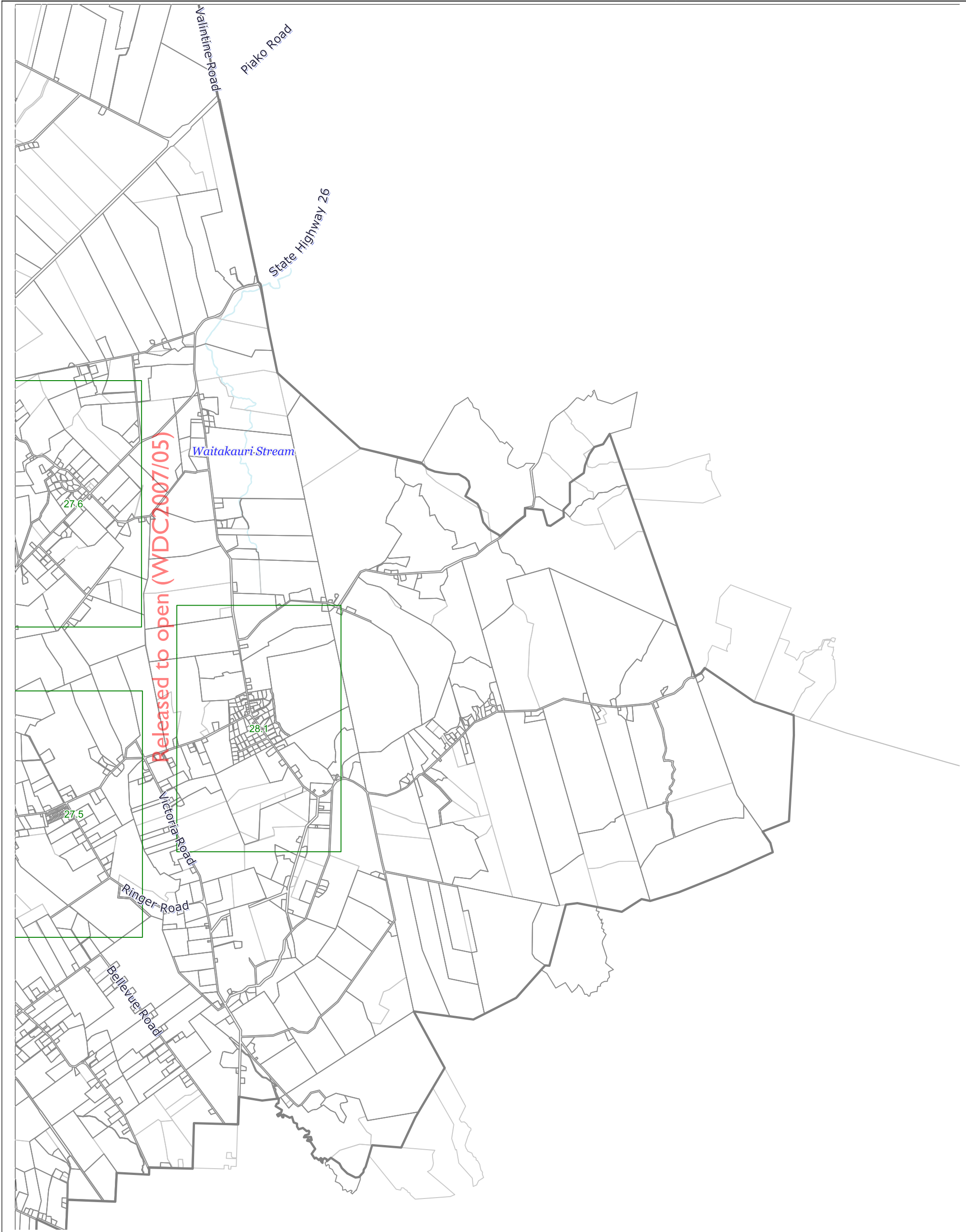
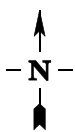
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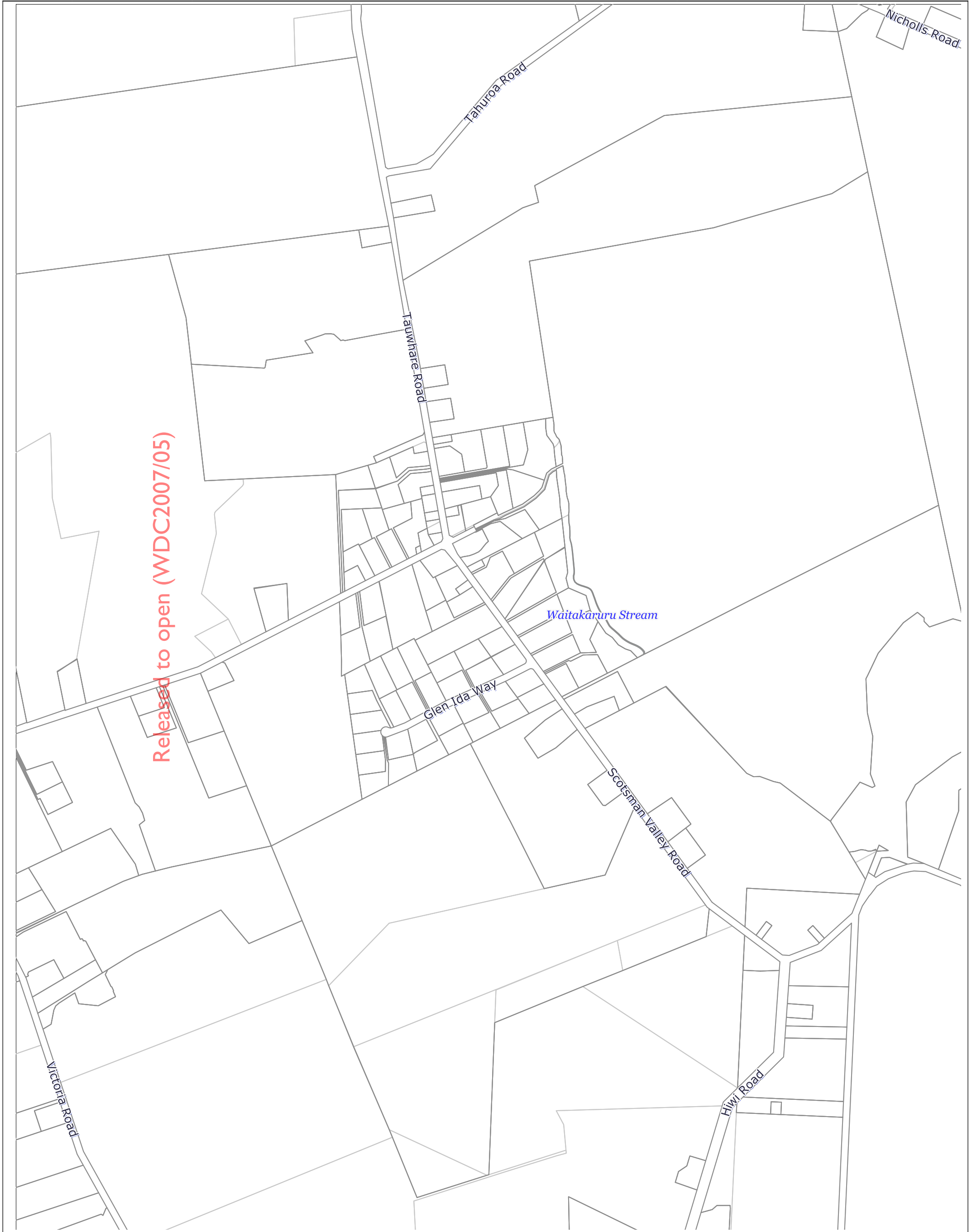
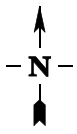


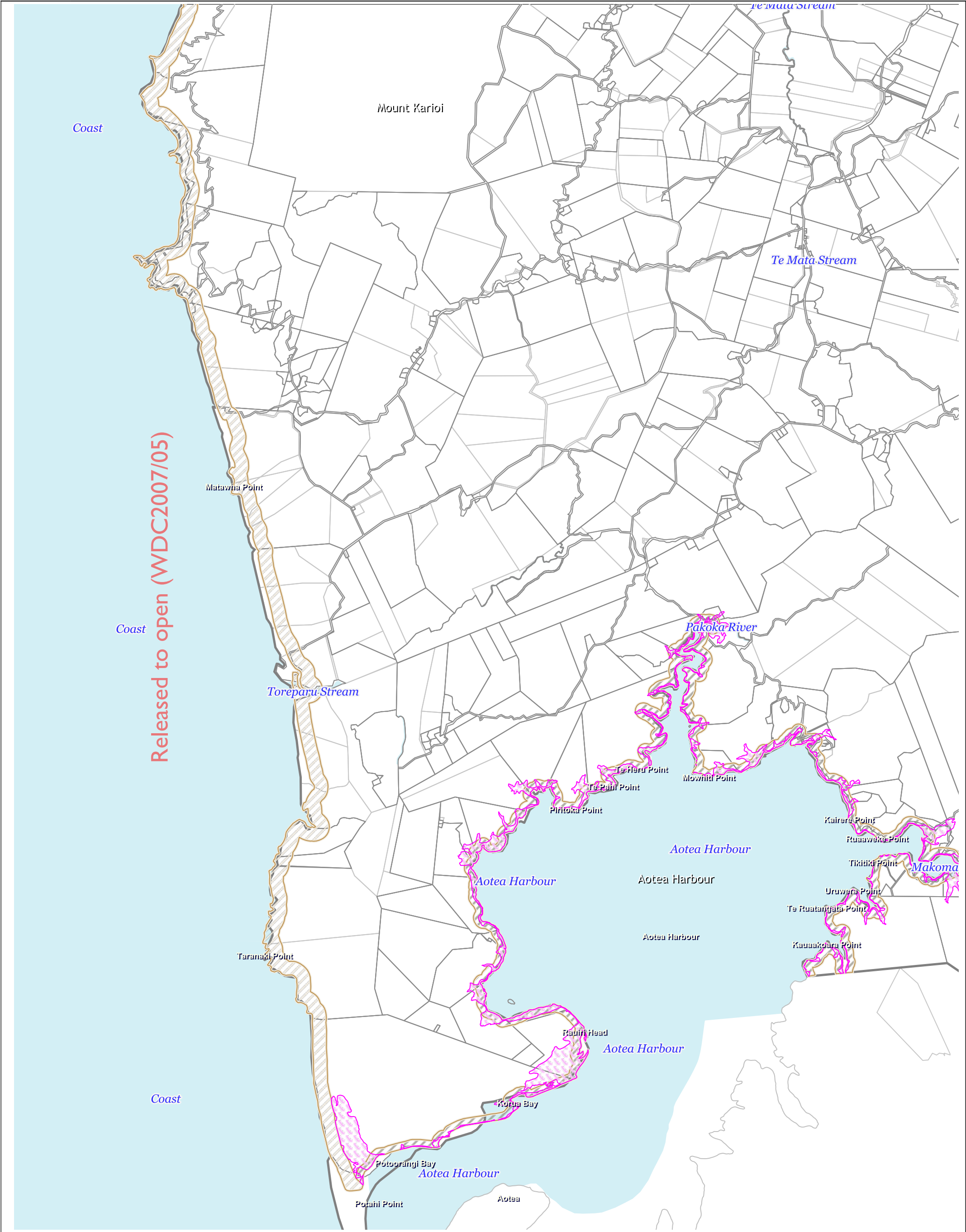
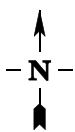




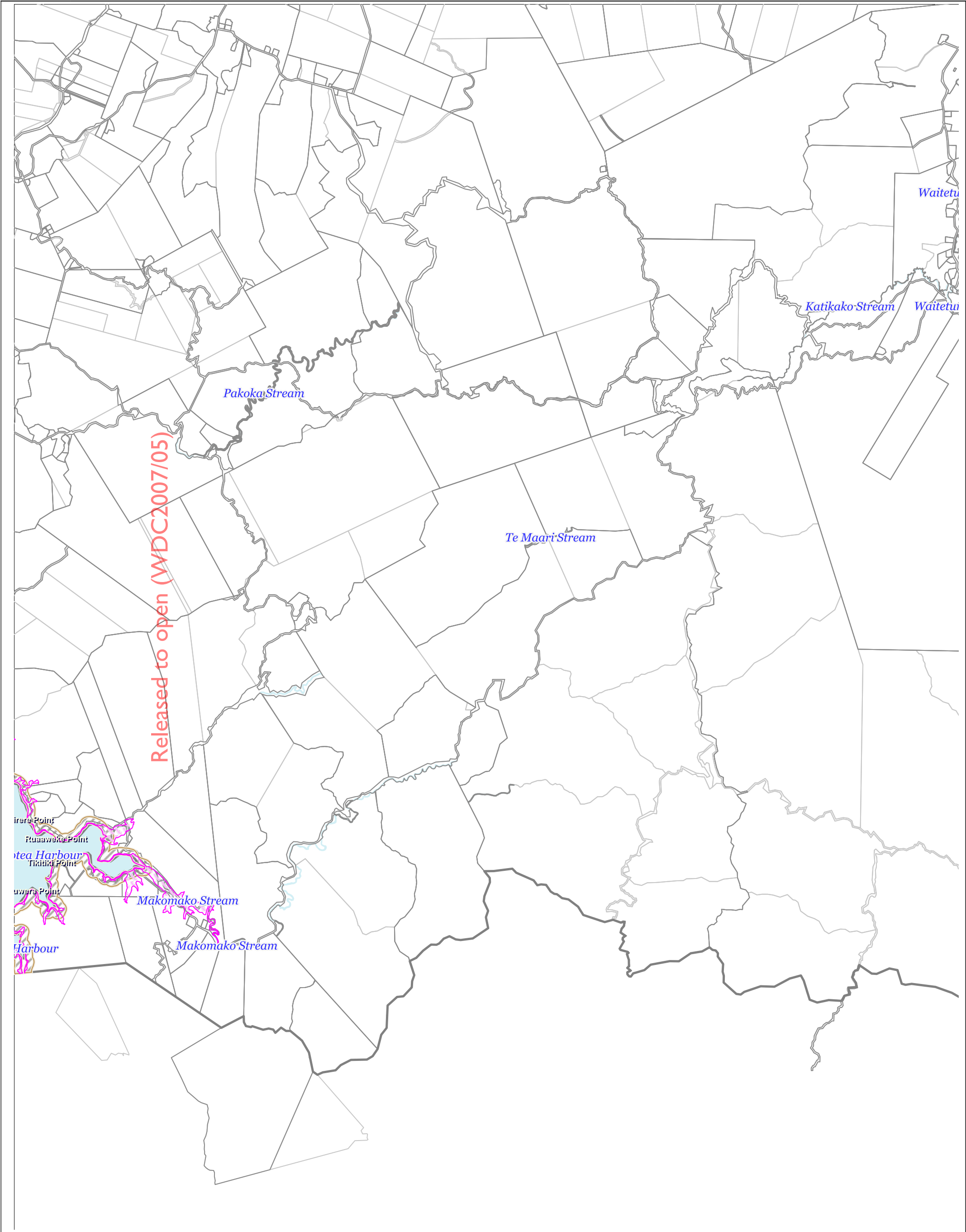
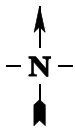


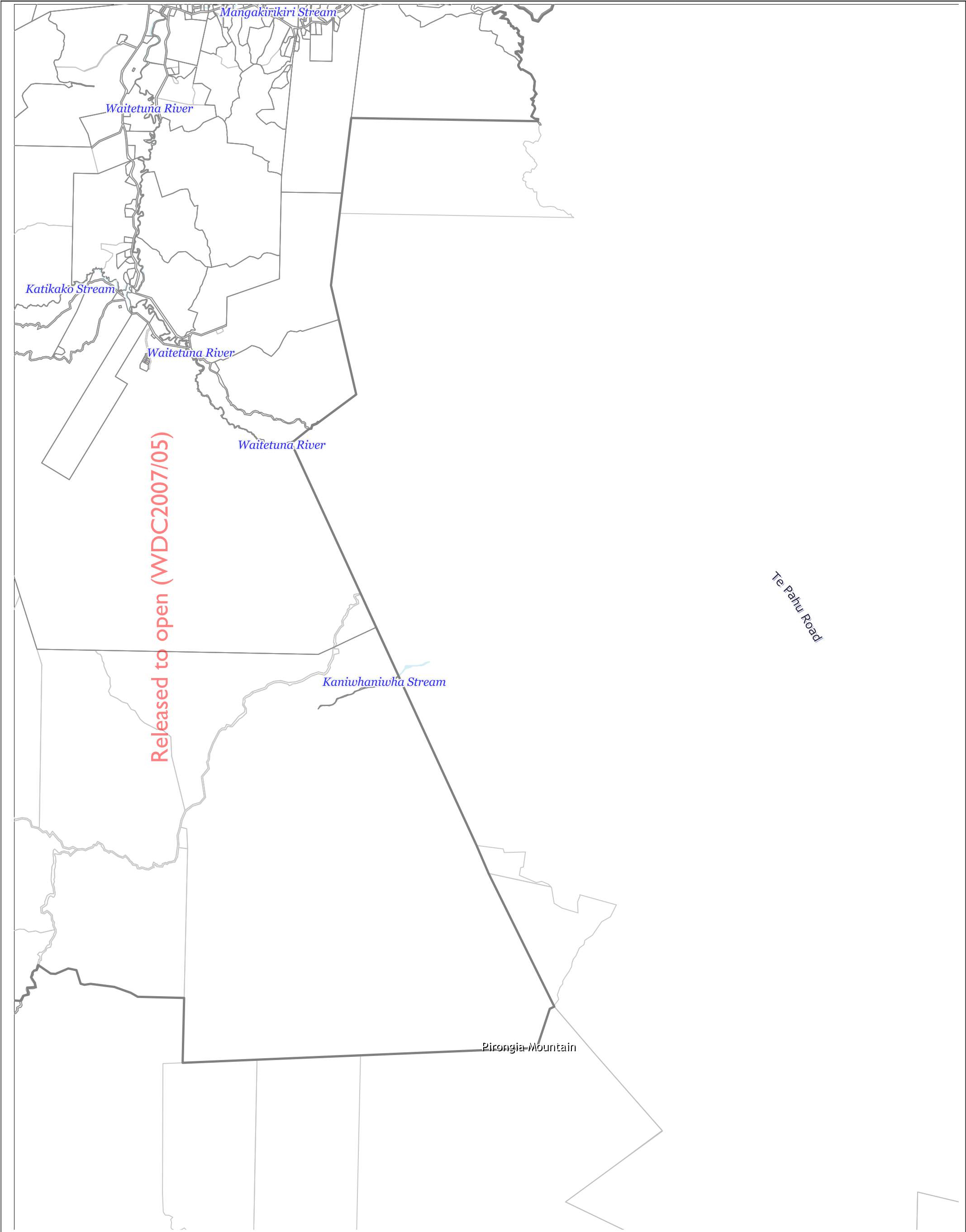
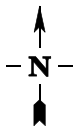


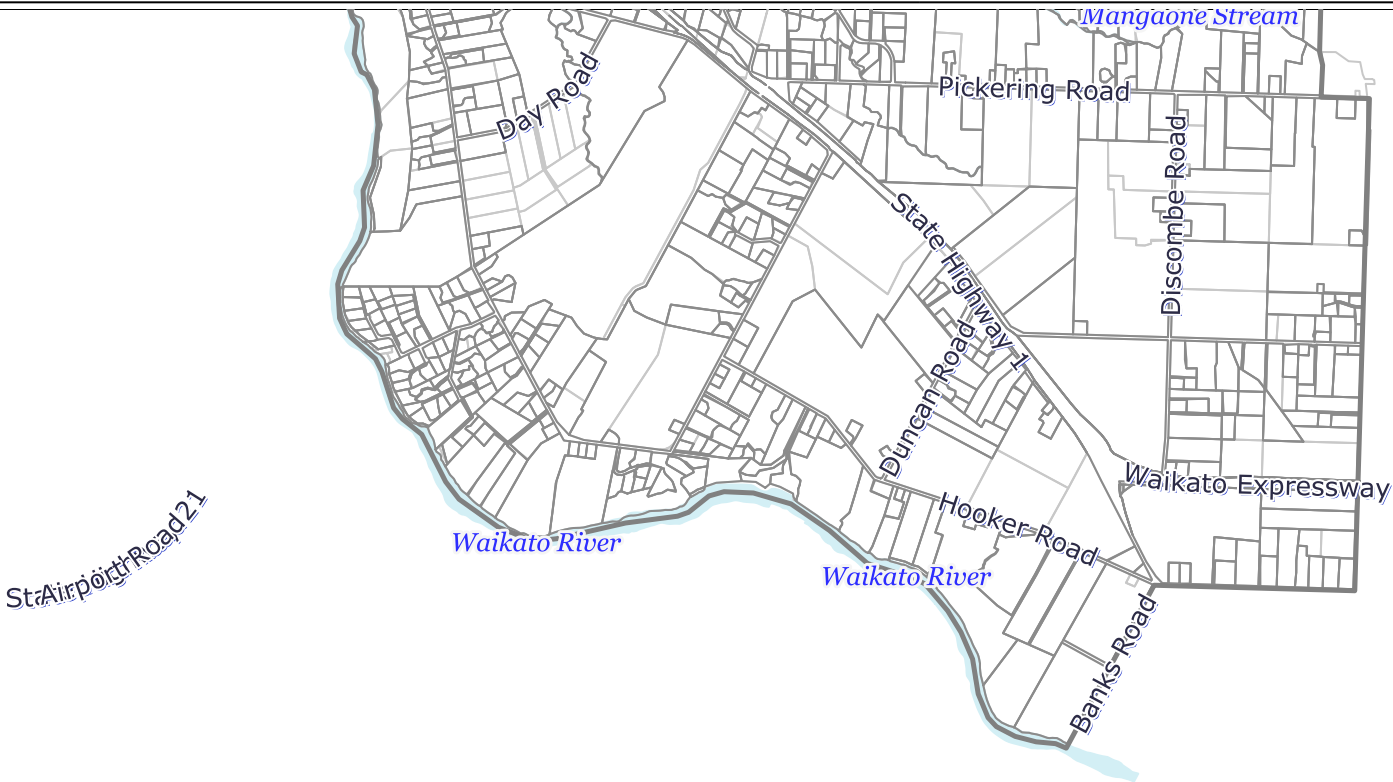
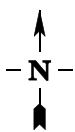




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PROPOSED WAIKATO DISTRICT PLAN

(VARIATION 2 to STAGE 1)

OF THE WAIKATO DISTRICT COUNCIL

Pursuant to Clauses 16A and 5 of Schedule 1 of the Resource Management Act 1991, the Waikato District Council has resolved to approve Variation 2 to Stage 1 of the Proposed Waikato District Plan for public notification on 27 July 2020.

It is hereby certified that this is Variation 2 to Stage 1 of the Proposed Waikato District Plan approved by resolution on 20 July 2020.

The COMMON SEAL of the WAIKATO DISTRICT COUNCIL

Is affixed hereto in the presence of:

..... **Mayor Allan Sanson**

..... **Chief Executive Gavin Ion**

Dated at Ngaruawahia on 27 July 2020.

PROPOSED WAIKATO DISTRICT PLAN

VARIATION 2 NATURAL HAZARDS & CLIMATE CHANGE

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27 July 2020

Proposed Variation 2 to the Proposed Waikato District Plan (Stage 1)

How to read this document:

- Variation 2 text is shaded orange.
- Text that is not shaded orange is text from Stage 1 of the Proposed District Plan to provide context for the variation.
- Text that is proposed to be inserted into Stage 1 by Variation 2 is in **orange, bold and underlined.**
- Text in Stage 1 that is proposed to be deleted by Variation 2 is in ~~**orange, bold and strikethrough.**~~

1.4.2.3 Challenges

(a) Economic development challenges facing the district are as follows:

- (i) Growth across the district is uneven. Population and associated economic growth is occurring predominantly in the north (Tuakau, Pokeno, Te Kauwhata) and in the south around the Hamilton periphery.
- (ii) Industrial diversity and the level of knowledge-intensive employment are low. Most new jobs appear to be in the service (tertiary) sector, whereas many of the industries driving growth in the region are of a primary nature.
- (iii) There are skills constraints, with a relatively low level of people with tertiary qualifications and a high proportion of youth not in employment, education or training.
- (iv) There is a large variation in economic well-being and household income across the district that is likely to remain into the future.
- (v) The ability for the region to manage land and water changes/demands and environmental impacts of extraction across land-based industries may constrain further growth.
- (vi) Soil resources, including soil quality, are under threat due to subdivision and intensification of land use.
- (vii) Environmental limits on water, land, and soils and to a small extent marine space mean that growth in these primary industries will need to come from increasing the value of processed products and services.
- (viii) A decline in the mining sector, with coal resources in particular becoming increasingly difficult and expensive to access, as well as public concerns about the environmental impacts of coal and mineral mining in the region, are a concern, considering its share of the district's GDP.
- (ix) With growth pressure in both the Urban and Rural sectors, maintaining and enhancing the natural environment.
- (x) Natural hazards in certain locations in the district pose a constraint on land development and urban growth in terms of reduced opportunity or cost of mitigation.
- (xi) Climate change will increasingly impact existing settlements in the district, the location of new settlements and design choices will challenge currently understood expectations of environmental limits.

1.4.4 The urban environment

- (a) A key issue for the district is to maintain the productive capacity of the rural resource and ensure that population growth and associated built development is managed in a way that results in efficient and high-amenity urban areas. Development needs to be managed so that emphasis is placed on achieving high amenity standards, while retaining existing valued characteristics as far as practicable. In these areas, development can support local infrastructure, services, and other facilities, while at the same time minimising adverse effects on productive rural activities. Commercial activity should be of a size or function that does not compromise the vitality and viability of the primary commercial centres. It is also important that we take a 'centres-based' approach to retail as per the Waikato Regional Policy Statement (WRPS). A range of housing options should be provided for, with varying land values and amenities.
- (b) Costs and inefficiencies can increase significantly, where development patterns are dispersed. For example, unplanned development, which increases vehicle traffic, may reduce roading efficiency and road safety, compromise rail operations and result in unplanned roading upgrades. Costs can be minimised, and better performance of infrastructure and services achieved, where infrastructure provision is timely in relation to demand, and optimally-sized and located. This may mean that it is necessary to stage infrastructure provision relative to growth in demand as well as ensuring that the natural environment is maintained and enhanced through Low Impact Design infrastructure.
- (c) The district plan manages activities to reduce the risks from natural hazards. The emphasis is on ensuring that appropriate assessments of natural hazard risk are undertaken prior to rezoning and new subdivision and development taking place, and greenfield development and urban intensification are avoided in areas of known high flood risk or high coastal hazard risk as required by the Regional Policy Statement. For existing areas of urban development, such as Raglan, Port Waikato and river communities, natural hazard risk, particularly coastal hazards and flooding, will require management through appropriate mitigation and adaptation over time, taking into consideration projected sea level rise and other climate change factors.

1.5.2 Planning for urban growth and development

- (a) Defined growth areas have been zoned and their development will be guided through the application of objectives and policies and through processes such as the development of master plans, comprehensive structure plans, the district plan and any future changes to the district plan. The agreed Future Proof settlement pattern for urban growth and development is to avoid unplanned encroachment into rural land and is to be contained within defined urban areas to avoid rural residential fragmentation.
- (b) As per the Waikato Regional Policy Statement, the district plan ensures that before land is rezoned for urban development, urban development planning mechanisms such as master plans or structure plans are produced, that will facilitate proactive decisions about the future location of urban development. Development which occurs in accordance with a master plan developed in consultation with the local community is one way of ensuring that valued elements of local character are respected as growth occurs. Structure plans are to be used to guide the staged provision of additional urban land and infrastructure to support areas experiencing growth or sustaining population and business growth pressures. However, when preparing structure plans or spatial plans for developing urban land, consideration of the risk posed by natural hazards such as flooding, land instability, coastal hazards and liquefaction will be important to ensure that the land is suitable for the type of development proposed and avoids increased risk from natural hazards.

1.12.8 Strategic objectives

- (a) The matters set out in paragraphs 4.1.1 – 4.1.7 provide the overarching directions for the development of the objectives, policies and other provisions within the district plan.
- (b) In summary, the overarching directions include the following:
 - (i) Urban development takes place within areas identified for the purpose in a manner which utilises land and infrastructure most efficiently.
 - (ii) Promote safe, compact sustainable, good quality urban environments that respond positively to their local context.
 - (iii) Focus urban growth in existing urban communities that have capacity for expansion.
 - (iv) Plan for mixed-use development in suitable locations.
 - (v) Encourage community collaboration in urban growth decisions
 - (vi) Protect and enhance green open space, outstanding landscapes and areas of cultural, ecological, historic, and environmental significance.
- (c) The objectives and policies that implement the strategic directions are included within Part B of the district plan (where they are relevant) at the beginning of each section. They also assist in providing an objective that encompasses more than one zone (such as [Chapter 4](#) Urban Environment) or a range of matters (such as [Chapter 6](#) Infrastructure).
- (d) Objective - Natural Hazards and Climate Change
The choice, location and design of development in the district takes into account the risks from natural hazards and potential impacts of climate change.

DELETED - Chapter 11: Natural Hazards and Climate Change (Stage 2)

Stage 2 Content

Chapter 11 Natural Hazards and Climate Change is Stage 2 of the Proposed District Plan and will be notified early 2019.

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12.1 Introduction to rules

- (a) Section C of the district plan contains the rules. Rules are one of the methods of achieving the objectives and implementing the policies set out in Section B of the district plan.
- (b) Rules describe activities (land use and subdivision), the activity status and the conditions that must be complied with to meet the specified activity status. These terms are explained in this chapter.
- (c) The rules in Section C that are highlighted in green have immediate legal effect in accordance with s86B of the Resource Management Act 1991.
- (d) Chapter 13 contains all the definitions that are used in the rules within Section C. The definitions form part of the rules and are identified by underlining and are also hyperlinked in ePlan.
- (e) Chapter 14: Infrastructure and Energy and Chapter 15: Natural Hazards and Climate Change (Stage 2 of the district plan review) apply across the whole district.
- (f) There is a chapter of rules for each zone (Chapters 16 – 28). The order of text in each chapter is:
 - (i) Introduction (for some zones only);
 - (ii) Land Use – Activities Rules;
 - (iii) Land Use – Effects Rules;
 - (iv) Land Use – Building Rules; and
 - (v) Subdivision Rules.
- (g) The spatial area of each zone is shown on the planning maps. As well as zones, there are various policy areas (such as Landscape Policy Area), sites/features (such as Historic Heritage buildings) and designations marked on the planning maps. These are referred to where relevant in the rules in each zone chapter. Every part of the district (except for roads) is in one zone and the zones do not overlap.
- (h) Roads appear white on the planning maps and are not zoned. Rules relating to activities occurring in the road corridor are set out Chapter 14: Infrastructure and Energy.
- (i) Lakes and rivers appear with a blue shading to assist users with orientation. Although the rivers and lakes are not given a zone shading, they are in a zone. All waterbodies are zoned Rural, except for Lake Hakanoa and Lake Puketirini, both of which are zoned Reserve and have reserve management plans applying to them.
- (j) The district plan regulates activities on the surface of rivers, lakes and other waterbodies. Activities are subject to the zone rules that apply. The Waikato Regional Plan regulates any structures in, on, under or over the beds of lakes and rivers, and may also be required to obtain resource consent under the Waikato Regional Plan.
- (k) Natural hazards are managed throughout the district through a suite of natural hazard overlays identified on the planning maps and provisions contained in Chapter 15. Assessment matters related to natural hazards also occur in the zone chapters.

12.5 How to find out if a resource consent is needed

- (a) To determine if an activity is provided for by the plan, or is provided for in a certain area, users of the plan should take the following steps.
 - (i) Step 1 – Check the zone that applies
 - A. Begin with the planning maps. Locate the relevant property on the zone map and determine its zoning.
 - (ii) Step 2 – Confirm if any notation, overlay or designation applies
 - A. Use the planning maps to confirm whether the property has any special feature, **natural hazard overlay**, or designation applying to it. Make a note of map notations relevant to the land you are interested in.
 - (ii) Step 3 – Confirm the activity status
 - A. Go to the zone rules chapter for the zone your site or property is located in.
 - B. Determine whether the activity is a prohibited activity, by reading the prohibited activity rule at the start of the chapter. If it is prohibited, then the activity is not permitted and no resource consent application can be considered.
 - C. If the activity is not prohibited, read through the permitted activity rules to determine if your activity is permitted. Look at all the rules that are relevant, including rules on policy areas, **natural hazards** (**Chapter 15**), notable trees, heritage items or other special features, to see if one of these applies to your property. Note the contents of these, including any conditions.
 - D. If your activity complies with all conditions for permitted activities in activity table, and the Land Use – Effects and Land Use – Building rules, then your activity is permitted and may be undertaken without resource consent. To obtain council confirmation that your proposed development is a permitted activity, you may apply to the Council for a Certificate of Compliance.
 - (ii) Step 4 – Apply for resource consent
 - A. If any condition stated for a permitted activity is not complied with, you must obtain resource consent from the Council.
 - B. Look within the following activity tables, which state the category of resource consent required (controlled, restricted discretionary, discretionary or non-complying).
 - C. After each Land Use – Effects and Land Use – Building rule, look within the table to determine the category of resource consent required.
 - D. If you are not sure, contact the Council's planning staff, who are available to help you. If more than one condition is not complied with, the whole of the activity will be assessed against the highest activity category that applies.
 - E. Decide if you want to apply for resource consent. You may prefer to redesign your proposal to fit the permitted activity conditions.
 - F. If you want to apply for consent, consider whether you need professional advice to prepare your application. Council staff can assist by providing application forms and general advice on the requirements of the plan, but cannot write the application for you.

Annual exceedance probability (AEP)

Annual exceedance probability

Means the probability of an event of a specified size occurring or being exceeded in any one year.

The probability is expressed as a percentage and in respect to flooding generally refers to storm events of a particular magnitude occurring in any given year. For example: a large flood which may

be calculated to have a 1% chance to occur in any one year, is described as 1% AEP.

- A 1% AEP has a 1% chance of occurring in any one year, or is a 1 in 100-year flood event.
- A 2% AEP has a 2% chance of occurring in any one year, or is a 1 in 50-year flood event.
- A 5% AEP has a 5% chance of occurring in any one year, or is a 1 in 20-year flood event.

14.1 Introduction

- (1) The provisions within this Infrastructure and Energy chapter of the district plan shall apply across the district in all the zones and overlays in the district plan. The zone chapters and their associated overlays, objectives, policies and rules do not apply to infrastructure and energy activities unless specifically referred to within this Infrastructure and Energy chapter. The provisions of the Natural Hazards and Climate Change chapter (Chapter 15), and associated natural hazard overlays identified in the planning maps, apply to activities in the Infrastructure and Energy chapter.
- (2) This infrastructure topic includes the land transport networks, network utilities operations, and electricity generation (including renewable electricity sources) and transmission. It should be noted that this chapter also contains a number of rules (such as on-site car parking and stormwater management) relating to district-wide land development activities; and as such these particular rules should be read in conjunction with the relevant zone chapters where applicable.
- (3) The Identified areas within the activity tables below covers the following areas and items identified within this plan:
 - (a) Urban Expansion Area
 - (b) Significant Natural Area
 - (c) Outstanding Natural Feature
 - (d) Outstanding Natural Landscape
 - (e) Significant Amenity Landscape
 - (f) Outstanding Natural Character
 - (g) High Natural Character
 - (h) Heritage Precinct
 - (i) Heritage Items
 - (j) Maaori Sites of Significance
 - (k) Maaori Areas of Significance
 - (l) Notable Trees
- (4) In the activity tables within this chapter, the letters below mean the following:
 - (a) P = Permitted Activity
 - (b) C = Controlled Activity
 - (c) RD = Restricted Discretionary Activity
 - (d) D = Discretionary Activity
 - (e) NC = Non-Complying Activity
 - (f) N/A = Not Applicable
- (5) Where relevant, the requirements of the National Code of Practice for Utility Operators' Access to Transport Corridors will apply to the placement, maintenance, improvement and removal of utility structures in roads (or unformed roads).
- (6) The requirements of the Resource Management (National Environmental Standards for Electricity Transmission Activities) Regulations 2009 ("NESETA") apply directly to the operation, maintenance, upgrading, relocation or removal of transmission line(s) that were operating or able to be operated on or before 14 January 2010 and remain part of the National Grid. In the case of conflict with any other provision of this plan, including any provision in the activity table in this section, the NESETA

provisions shall prevail.

- (7) The [Resource Management \(National Environmental Standards for Telecommunication Facilities\) Regulations 2016](#) (“NESTF”) provides national consistency in the rules surrounding the deployment of telecommunications [infrastructure](#) across New Zealand. This means that many telecommunications facilities may potentially be deployed as a permitted activity. However, telecommunications facilities which do not comply with the conditions within the [NESTF](#), or are not covered by the regulations of the [NESTF](#), will have the activity status specified in this plan.

This chapter is organised into the following rule sections:

[14.2 Rules applying to all \[infrastructure\]\(#\)](#)

[14.3 General \[infrastructure\]\(#\)](#)

[14.4 National Grid](#)

[14.5 Electrical distribution](#)

[14.6 Electricity generation](#)

[14.7 Liquid fuels and gas](#)

[14.8 Meteorological](#)

[14.9 Amateur radio](#)

[14.10 Telecommunications and radiocommunications](#)

[14.11 Water, wastewater and stormwater](#)

[14.12 Transportation](#)

14.3.2 Controlled Activities

(a) The activity listed below is a controlled activity.

Activity		Activity-specific conditions	Matters of control
CI	Subdivision to create a utility allotment for accommodating infrastructure	<p>14.3.2.1</p> <p>(1) Is undertaken by a network utility operator as defined by the Resource Management Act 1991; and</p> <p>(2) Is for infrastructure permitted under Chapter 14; or</p> <p>(3) Is for infrastructure that has all necessary resource consents granted or notices of requirement confirmed.</p>	<p>Control is reserved over:</p> <p>(a) The adequacy of the allotment for its intended use;</p> <p>(b) Whether any easement is required.</p> <p>(c) Measures to avoid or mitigate natural hazards, including liquefaction risk (refer to Chapter 15).</p>

Chapter 16: Residential Zone

- (1) The rules that apply to activities in the Residential Zone are contained in [Rule 16.1](#) Land Use – Activities, [Rule 16.2](#) Land Use – Effects and [Rule 16.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Residential Zone are contained in [Rule 16.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Residential Zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (5) The Residential Zone contains a Specific Area that is Lakeside Te Kauwhata Precinct. [Rule 16.5](#) manages all land use, building and subdivision in this location. [Rule 16.5.1](#) sets out how to apply rules to Lakeside Te Kauwhata Precinct that are either different from, or are in addition to, other rules that apply to the rest of the Resident Zone.
 - (1) The activities listed below are restricted discretionary activities.
 - (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Council's discretion shall be restricted to the following matters:
RDI	<p>A <u>Multi-Unit development</u> that meets all of the following conditions:</p> <p>(a) The Land Use – Effects rules in Rule 16.2;</p>	(a) Density of the development;

16.1.3 Restricted Discretionary Activities

- (1) The activities listed below are restricted discretionary activities.
- (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Council's discretion shall be restricted to the following matters:
RD1	<p>A Multi-Unit development that meets all of the following conditions:</p> <ol style="list-style-type: none"> (a) The Land Use – Effects rules in Rule 16.2; (b) The Land Use – Building rules in Rule 16.3, except the following rules do not apply: <ol style="list-style-type: none"> (i) Rule 16.3.1, Dwelling; (ii) Rule 16.3.8 Building coverage; (iii) Rule 16.3.9 Living court; (iv) Rule 16.3.10 Service court; (c) The minimum net site area per residential unit is 300m²; (d) The Multi-Unit development is connected to public wastewater and water reticulation; (e) Total building coverage of the site does not exceed 50%; (f) Each residential unit is designed and constructed to achieve the internal design sound level specified in Appendix I (Acoustic Insulation) – Table I4; (g) Service court areas are provided to meet the following minimum requirements for each residential unit: <ol style="list-style-type: none"> (i) At least 2.25m² with a minimum dimension of 1.5 metres of outdoor or indoor space at ground floor level for the dedicated storage of waste and recycling bins; (ii) At least 3m² with a minimum dimension of 1.5 metres of outdoor space at ground floor level for washing lines; and (iii) The required spaces in (g)(i) or 	<ol style="list-style-type: none"> (a) Density of the development; (b) The manner in which the provisions of the Multi-Unit Design contained in Appendix 3.4 have been incorporated; (c) Contribution of the development to and engagement with adjacent streets and public open space; (d) The visual quality and interest created through design such as the separation of buildings, variety in built form and architectural detailing, glazing, materials and colour; (e) The incorporation of energy efficiency measures such as passive solar principles; (f) Amenity values for occupants and neighbours in respect of outlook, privacy, noise, light spill, access to sunlight, living court orientation, site design and layout; (g) Staging needed to ensure that development is carried out in a coordinated and timely manner; (h) Avoidance or mitigation of natural hazards; (i) Geotechnical suitability for building, <u>including liquefaction risk (refer to Chapter 15);</u> (j) Provision of infrastructure to individual units

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(g)(ii) for each residential unit shall be provided individually, or as a dedicated communal service court.

- (h) Living court areas are provided to meet the following minimum requirements for each residential unit:

Duplex dwelling	Area	Minimum dimension
Studio unit or 1 bedroom	30m ²	4m
2 or more bedrooms	40m ²	4m

Apartment Building Ground Level Residential Unit	Area	Minimum dimension
Studio unit or 1 bedroom	20m ²	4m
2 or more bedrooms	30m ²	4m

Apartment Building Upper Levels Residential Unit	Area	Minimum dimension
Studio unit or 1 bedroom	10m ²	2m
2 or more bedrooms	15m ²	2m

16.4 Subdivision

- (1) Rule 16.4.1 provides for subdivision density and apply across the Residential Zone.
- (2) The following rules apply to specific areas and/or activities:
 - (a) Rule 16.4.2 - Subdivision - Te Kauwhata Ecological Residential Area;
 - (b) Rule 16.4.3 - Subdivision - Te Kauwhata West Residential Area); and
 - (c) Rule 16.4.4 (Subdivision – Multi-Unit development).
 - (d) Rules 16.4.1 to 16.4.4 are also subject to the following subdivision controls:
 - (i) Rule 16.4.5 – subdivision boundary adjustments;
 - (ii) Rule 16.4.6 – subdivision amendments and updates to cross lease flats plan and conversion to freehold;
 - (iii) Rule 16.4.7 – subdivision title boundaries ~~natural hazard area~~, contaminated land, Significant Amenity Landscape, notable trees, intensive farming and aggregate extraction areas;
 - (iv) Rule 16.4.8 – subdivision title boundaries Significant Natural Areas, heritage items, archaeological sites, sites of significance to Maaori;
 - (v) Rule 16.4.9 – Title boundaries – Maaori site and Maaori areas of significance
 - (vi) Rule 16.4.10 - subdivision of land containing heritage items;
 - (vii) Rule 16.4.11 – subdivision road frontage;
 - (viii) Rule 16.4.12 – subdivision building platform;
 - (ix) Rule 16.4.13 – subdivision reserves; and
 - (x) Rule 16.4.14 - subdivision esplanade reserves and esplanade strips.
- (3) Rules 16.4.14 and 16.4.15 apply to specific features or areas:
- (4) Rule 16.4.15 – subdivision of land containing mapped off-road walkways; and
- (5) Rule 16.4.16 – subdivision of land containing Environmental Protection Area.

16.4.1 Subdivision - General

16.4.1 Subdivision - General

RDI	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) Proposed <u>lots</u> must have a minimum <u>net site area</u> of 450m², except where the proposed <u>lot</u> is an <u>access allotment</u> or <u>utility allotment</u> or reserve to vest; (ii) Proposed <u>lots</u> must be able to connect to public-reticulated water supply and wastewater; (iii) Where roads are to be vested in Council, they must follow a <u>grid layout</u>; (iv) Where 4 or more proposed <u>lots</u> are proposed to be created, the number of rear <u>lots</u> do not exceed 15% of the total number of <u>lots</u> being created; (v) Where the <u>subdivision</u> is within a structure plan area, <u>neighbourhood centres</u> within the <u>site</u> are provided in accordance with that structure plan document. <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout; (ii) Shape of <u>lots</u> and variation in <u>lot</u> sizes; (iii) Ability of <u>lots</u> to accommodate a practical <u>building platform</u> including geotechnical stability for <u>building</u>; (iv) Likely location of future <u>buildings</u> and their potential effects on the environment; (v) Avoidance or mitigation of natural <u>hazards</u>, including liquefaction risk and fire risk (refer to Chapter 15); (vi) Amenity values and streetscape landscaping; (vii) Consistency with the matters contained within Appendix 3.1 (Residential Subdivision Guidelines); (viii) Vehicle and pedestrian networks; (ix) Consistency with any relevant structure plan or master plan including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; and (x) Provision of <u>infrastructure</u>.
DI	<u>Subdivision</u> that does not comply with a condition in Rule 16.4.1 RD1.

16.4.2 Subdivision - Te Kauwhata Ecological Residential Area

RDI	<p>(a) Proposed <u>lots</u> in the Te Kauwhata Ecological Residential Area identified on the planning maps must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) Have a minimum <u>net site area</u> of 750m²; (ii) Have a minimum average <u>net site area</u> of 875m²; (iii) Must be able to be connected to public-reticulated water supply and wastewater; (iv) Where roads are to be vested in Council, they must follow a <u>grid layout</u>; (v) Where 4 or more proposed <u>lots</u> are being created, rear <u>lots</u> must not exceed 15% of the total number of <u>lots</u> being created. <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision layout</u>; (ii) Shape of <u>lots</u> and variation in <u>lot sizes</u>; (iii) Ability of <u>lots</u> to accommodate a practical <u>building platform</u> including geotechnical stability for <u>building</u>; (iv) Likely location of future <u>buildings</u> and their potential effects on the environment; (v) Avoidance or mitigation of natural <u>hazards</u>, <u>including liquefaction risk and fire risk (Chapter 15)</u>; (vi) Amenity values and streetscape landscaping; (vii) Consistency with the matters contained within <u>Appendix 3.1</u> (Residential Subdivision Guidelines); (viii) Vehicle and pedestrian networks; (ix) Consistency with any relevant structure plan or master plan including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; and (x) Provision of <u>infrastructure</u>.
DI	<p><u>Subdivision</u> within the Te Kauwhata Ecological Residential Area that does not comply with Rule 16.4.2 RD1.</p>

16.4.3 Subdivision - Te Kauwhata West Residential Area

RDI	<p>(a) Proposed <u>lots</u> within the Te Kauwhata West Residential Area must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) Be a minimum <u>net site area</u> of 650m²; (ii) Have a minimum average <u>net site area</u> of 875m²; (iii) Be connected to public-reticulated water supply and wastewater; (iv) Where roads are to be vested in Council, they are to follow a <u>grid layout</u>; (v) Where more than 5 proposed <u>lots</u> are being created, rear <u>lots</u> must not exceed 15% of the total number of titles being created. <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision layout</u>; (ii) Shape of <u>lots</u> and variation in lot sizes; (iii) Ability of <u>lots</u> to accommodate a practical <u>building platform</u>, including geotechnical stability for <u>building</u>; (iv) Likely location of future <u>buildings</u> and their potential effects on the environment; (v) Avoidance or mitigation of natural <u>hazards</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; (vi) Amenity values and streetscape landscaping; (vii) Consistency with the matters contained within <u>Appendix 3.1</u> (Residential Subdivision Design Guidelines); (viii) Vehicle and pedestrian networks; (ix) Consistency with any relevant structure plan or master plan, including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; and (x) Provision of <u>infrastructure</u>.
DI	<p><u>Subdivision</u> within the Te Kauwhata West Residential Area that does not comply with Rule 16.4.3 RD1.</p>

16.4.4 Subdivision - Multi-unit development

RDI	<p>(a) <u>Multi-Unit development</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) An application for land use consent under Rule 16.1.3 (Multi-Unit Development) must accompany the <u>subdivision</u> or have been granted land use consent by Council; (ii) The <u>Multi-Unit development</u> is able to be connected to public wastewater and water reticulation; (iii) The minimum existing <u>lot</u> size where a new freehold (fee simple) <u>lot</u> is being created must be 300m² <u>net site area</u>. (iv) Where a <u>residential unit</u> is being created in accordance with the Unit Titles Act 2010 it must meet the following minimum <u>residential unit</u> size: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Unit of Multi-Unit</th><th>Minimum Unit Area</th></tr> </thead> <tbody> <tr> <td>Studio unit or 1 bedroom unit</td><td>60m²</td></tr> <tr> <td>2 bedroom unit</td><td>80m²</td></tr> <tr> <td>3 or more bedroom unit</td><td>100m²</td></tr> </tbody> </table>	Unit of Multi-Unit	Minimum Unit Area	Studio unit or 1 bedroom unit	60m ²	2 bedroom unit	80m ²	3 or more bedroom unit	100m ²
Unit of Multi-Unit	Minimum Unit Area								
Studio unit or 1 bedroom unit	60m ²								
2 bedroom unit	80m ²								
3 or more bedroom unit	100m ²								
	<p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout including common boundary and party walls for the <u>Multi-unit development</u>; (ii) Provision of common areas for shared spaces, access and services; (iii) Provision of <u>infrastructure</u> to individual <u>residential units</u>; (iv) Avoidance or mitigation of natural <u>hazards</u>; (v) Geotechnical suitability of <u>site</u> for <u>buildings</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; (vi) Amenity values and streetscape; (vii) Consistency with the matters contained, and outcomes sought, in Appendix 3.4 (Multi-Unit Development Guideline) (viii) Consistency with any relevant structure plan or master plan, including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; (ix) Vehicle, pedestrian and cycle networks; (x) Safety, function and efficiency of road network and any internal roads or accessways. 								
DI	<u>Subdivision</u> that does not comply with Rule 16.4.4 RD1.								

16.4.7 Title boundaries – contaminated land, notable trees, intensive farming and aggregate extraction areas

RDI	<p>(a) Subdivision of land containing <u>contaminated land</u>, notable trees, <u>intensive farming</u> and <u>Aggregate Extraction Area</u> must comply with all of the following conditions:</p> <p>(i) The boundaries of every proposed <u>lot</u> containing existing <u>buildings</u> must demonstrate compliance with the following <u>building</u> rules (other than where any non-compliance existed lawfully prior to the <u>subdivision</u>) relating to:</p> <p>A. daylight admission (<u>Rule 16.3.5</u>);</p> <p>B. building coverage (<u>Rule 16.3.6</u>);</p> <p>C. building setbacks (<u>Rule 16.3.9</u>);</p> <p>(ii) The boundaries of every proposed <u>lot</u> must not divide the following:</p> <p>A. a natural hazard area;</p> <p>A. contaminated land;</p> <p>B. Significant Amenity Landscape; or</p> <p>C. notable tree.</p> <p>(iii) The boundaries of every proposed <u>lot</u> must provide the following setbacks:</p> <p>A. 300m from any <u>intensive farming</u> activity;</p> <p>B. 500m from the boundary of an <u>Aggregate Extraction Area</u> for rock extraction; and</p> <p>C. 200m from the boundary of an <u>Aggregate Extraction Area</u> for sand excavation.</p> <p>(b) Council's discretion shall be restricted to the following matters:</p> <p>(i) Landscape values;</p> <p>(ii) Amenity values and character;</p> <p>(iii) Reverse sensitivity effects;</p> <p>(iv) Effects on existing <u>buildings</u>;</p> <p>(v) Effects on natural hazard areas;</p> <p>(vi) Effects on <u>contaminated land</u>;</p> <p>(vii) Effects on any notable trees; and</p> <p>(viii) Effects on an <u>intensive farming</u> activity.</p>
NCI	Subdivision that does not comply with Rule 16.4.7 RD1.

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16.4.12 Subdivision - Building platform

RDI	<p>(a) Every proposed <u>lot</u>, other than one designed specifically for access, <u>utility allotment</u> must be capable of containing a <u>building platform</u> upon which a <u>dwelling</u> and <u>living court</u> could be sited as a permitted activity, with the <u>building platform</u> being contained within either of the following dimensions:</p> <ul style="list-style-type: none"> (i) a circle with a diameter of at least 18m exclusive of yards; or (ii) a rectangle of at least 200m² with a minimum dimension of 12m exclusive of yards. <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout; (ii) Shape of <u>allotment</u>; (iii) Ability of <u>allotment</u> to accommodate a practical <u>building platform</u>; (iv) Likely location of future <u>buildings</u> and their potential effects on the environment; (v) Avoidance or mitigation of natural <u>hazards</u>; (vi) Geotechnical suitability for <u>building</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; and (vii) Ponding areas and primary <u>overland flow paths</u>.
DI	<u>Subdivision</u> that does not comply with Rule 16.4.12 RD1.

16.5.1 Application of rules

16.5.1 Application of rules

(a) The activity status tables and standards in the following chapters also apply to activities in the Lakeside Te Kauwhata Precinct:

14 Infrastructure and Energy:

15 Natural Hazards and Climate Change.

(1) The rules that apply to a permitted activity in Rule 16.5.2 within the Lakeside Te Kauwhata Precinct as identified on the planning maps are as follows:

(i) Rule 15.2 (Land Use – Effects) except:

- A. Rule 16.2.4.1 (Earthworks – general) and Rule 16.2.4.2 (Earthworks – Maaori Sites and Maaori Areas of Significance) does not apply and Rule 16.5.7.2 applies instead
- B. Rule 16.2.2 (Servicing hours of operation – Bankart Street and Wainui Road Business Overlay Area)
- C. Rule 16.2.6 Notable trees
 - (i) Rule 16.5.7.1 Noise and Vibration – North Island Main Trunk Line (NIMT)
 - (ii) Rule 16.3 (Land Use – Building) does not apply, Rule 16.5.8 (Land Use – Building) applies instead.

(2) The rules that apply to subdivision within the Lakeside Te Kauwhata Precinct are:

(i) Rule 16.4 (Subdivision) except:

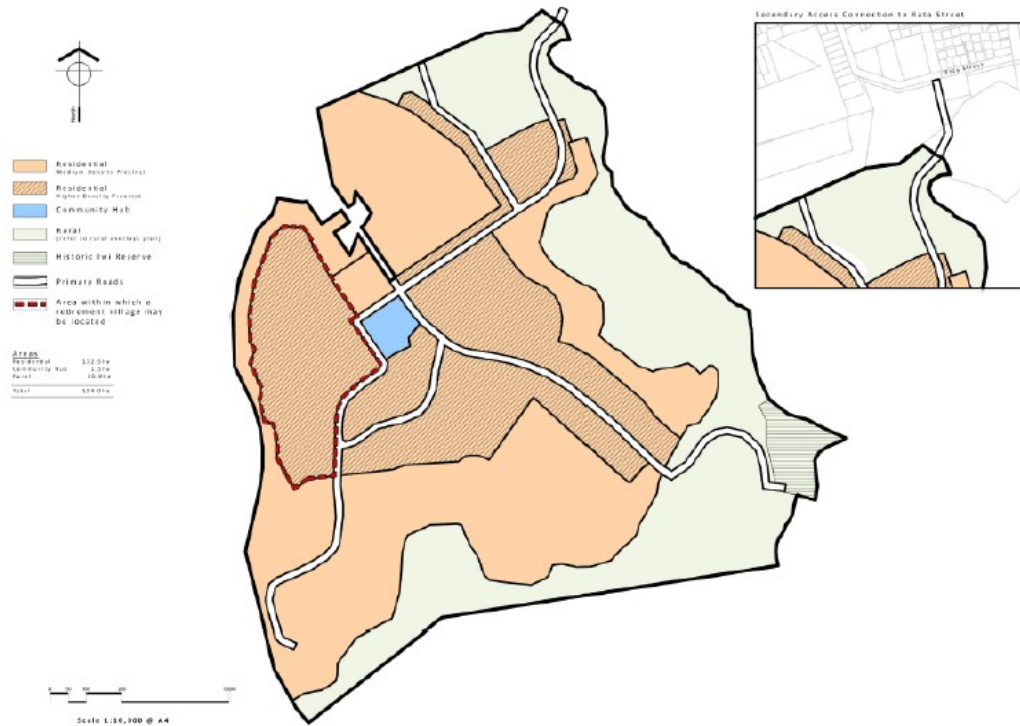
- A. Rule 16.4.1 (Subdivision General) does not apply and Rule 16.5.9.1 (Subdivision Lakeside - General) applies instead
- B. Rule 16.4.2 (Subdivision – Te Kauwhata Ecological Residential Area) does not apply
- C. Rule 16.4.3 (Subdivision – Te Kauwhata West Residential Area) does not apply
- D. Rule 16.4.4 (Subdivision – Multi-unit development) does not apply
- E. Rule 16.4.6 (Subdivision – Amendments and updates to cross lease flats plans and conversion to freehold) does not apply
- F. Rule 16.4.9 (Title boundaries – Maaori Sites and Maaori Areas of Significance) does not apply
- G. Rule 16.4.10 (Subdivision of land containing heritage items) does not apply
- H. Rule 16.4.11 (Subdivision – road frontage) does not apply
- I. Rule 16.4.12 (Subdivision – Building platform) does not apply
- J. Rule 16.4.15 (Subdivision of land containing mapped off-road walkways) does not apply
- K. Rule 16.4.16 (Subdivision of land containing an Environmental Protection Area) does not apply

(ii) Rule 16.5.9.2 (Lakeside Comprehensive Subdivision Consent)

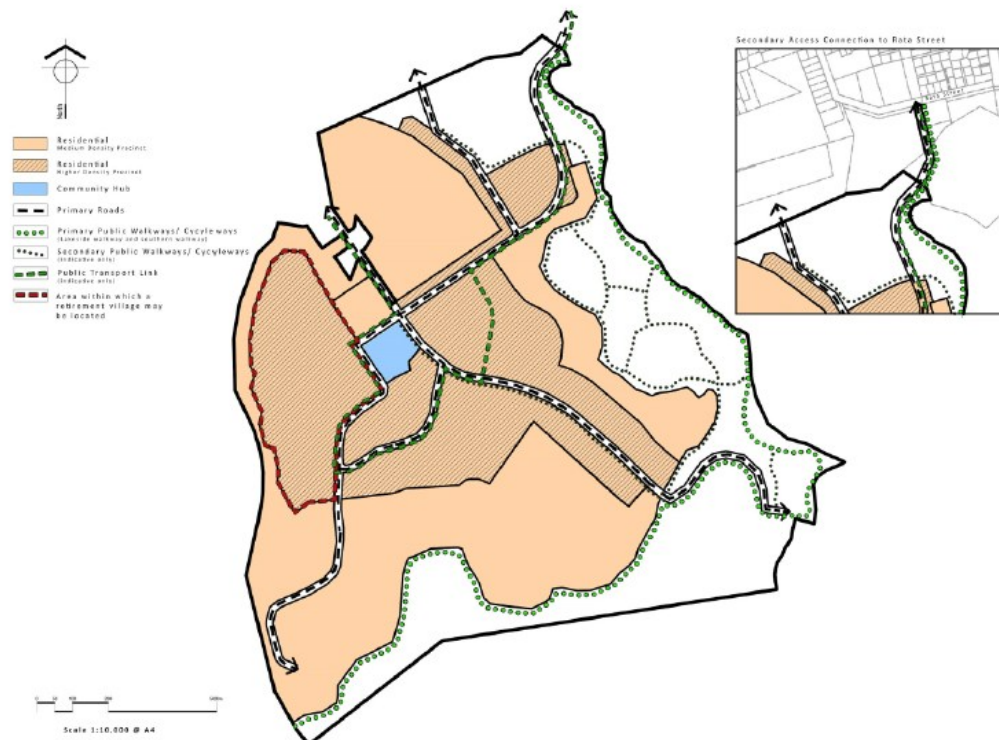
(iii) Rule 16.5.9.3 (Subdivisions less than 5ha)

(3) The following precinct plans apply in the Residential Zone within the Lakeside Te Kauwhata Precinct:

(a) Plan I Lakeside Precinct Plan: Precinct Areas



(b) Plan 2 Lakeside Precinct Plan: Public Transport, Primary Road Network and Walkways/cycleways



(c) Plan 3 Lakeside Precinct Plan: Overlays and Open Space



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16.5.3 Restricted Discretionary Activities

- (1) The activities listed below are restricted discretionary activities.
- (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Council's discretion shall be restricted to the following matters:
RDI	<p>(a) A <u>comprehensive land development consent (CLDC)</u> that meets all of the following conditions:</p> <p>(i) is in accordance with the Te Kauwhata Lakeside Precinct Plan Rule 16.5.1(3)(a); the roading network, walkways and cycleways shown on Precinct Plan Rule 16.5.1(3)(b); and the open space shown on Precinct Plan Rule 16.5.1(3)(c) as set out in the precinct parameters below; and</p> <p>(ii) A <u>CLDC</u> is in accordance with the Lakeside Precinct Plans identified above if:</p> <p>A. Primary roads are within 50m of the location shown on Precinct Plan Rule 16.5.1(3)(b);</p>	<p>(a) Discretion is reserved over:</p> <p>(i) consistency with the Te Kauwhata Lakeside Precinct Plans in Rule 16.5.1(3)(a), 16.5.1(3)(b) and 16.5.1(3)(c),</p> <p>(ii) matters identified in the assessment criteria in X,</p> <p>(iii) managing the effects of</p>

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| <p>B. The bus route is either on the alignment shown on Precinct Plan Rule 16.5.1(3)(b) or a continuous alignment that achieves the same circulation;</p> <p>C. The external boundary of the high density area within the Residential Zone is within 10m of the location shown on Precinct Plan Rule 16.5.1(3)(a);</p> <p>D. Indicative walkways/cycle ways are within 100m of the location shown on Precinct Plan Rule 16.5.1(3)(b) provided connections are retained between the Lakeside Walkway and the residential development;</p> <p>E. Lakeside Walkway is within 10m of the location shown on Precinct Plan Rule 16.5.1(3)(c);</p> <p>F. <u>Retirement village</u> boundaries are within 50m of the location shown on Precinct Plan Rule 16.5.1(3)(a);</p> <p>G. Indicative areas of open space are within 200m of the location shown on Precinct Plan Rule 16.5.1(3)(c);</p> <p>(b) A secondary road access into the Lakeside Precinct Plan Area (as shown on Lakeside Precinct Plan Rule 16.5.1(3)(b)) must be opened for traffic before the number of residential <u>allotments</u> in the Lakeside Precinct Plan Area exceeds 400 provided that:</p> <p style="margin-left: 20px;">(i) each independent living unit in a <u>retirement village</u> shall count as one <u>allotment</u>;</p> <p style="margin-left: 20px;">(ii) for the purpose of this rule, exceedance of 400 residential <u>allotments</u> shall occur at the time of issue of 224C certificate under the Resource Management Act, and exceedance of independent living unit shall occur at the time of issue of <u>building</u> consent for that unit.</p> <p>(c) The following <u>infrastructure</u> requirements are met:</p> <p style="margin-left: 20px;">(i) Demonstrate that adequate capacity within the water, stormwater and wastewater networks will be available to accommodate the proposed <u>subdivision</u> including all necessary treatment required to meet water quality, quantity and disposal requirements; and</p> <p style="margin-left: 20px;">(ii) Any wastewater disposal into Lake Waikare shall be from a new membrane bioreactor treatment plant (or plant of equal or better functionality), provided that wastewater disposal from up to 400 residential <u>allotments</u> may be connected to the existing Te Kauwhata wastewater treatment</p> | <p>wastewater and stormwater,</p> <p>(iv) roading network (including the Te Kauwhata Road level crossing safety) and compliance with a Council approved roading standard,</p> <p>(v) protection, restoration or enhancement of ecological features,</p> <p>(vi) provision and location of existing and future utilities and connections,</p> <p>(vii) location of roads and their connections,</p> <p>(viii) provision for public access to Lake Waikare,</p> <p>(ix) provision of open space, including linkages between residential areas, open space and Lake Waikare,</p> <p>(x) effects of natural hazards (including flooding), geotechnical (including liquefaction risk, refer to Chapter 15) and land contamination,</p> <p>(xi) provision of the historic Iwi overlay area shown on Precinct Plan</p> |
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	<p>plant on a temporary basis until a long-term wastewater disposal system is implemented. Where a <u>retirement village</u> is included as part of the first 400 residential <u>allotments</u>, then each independent living unit shall count as one <u>allotment</u>; and</p> <p>(iii) Every <u>allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space <u>allotment</u>, must be able to demonstrate how it will connect to a reticulated water supply, and wastewater network that has adequate capacity as per <u>infrastructure</u> standard (i) above; and</p> <p>(iv) Every <u>allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space <u>allotment</u>, must be able to demonstrate how it will provide land drainage and stormwater disposal either through a reticulated network or in accordance with Chapter 14; and</p> <p>(v) Prior to the issue of any <u>building</u> consent for a <u>dwelling</u> or <u>retirement village</u>, the <u>infrastructure</u> requirements detailed in (c)(i)(iii) above shall be implemented and operational.</p> <p>(d) A <u>CLDC</u> can relate to the entire Te Kauwhata Lakeside Precinct Plan Area, or may be for an individual stage or stages, provided that an individual stage must be 5ha or more.</p> <p>(e) Applications for approval of a <u>CLDC</u> as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>(f) <u>CLDC</u> approval does not constitute authorisation by the Waikato District Council as road controlling authority in terms of Section 357 of the Local Government Act 1974. Written authorisation is required from the Waikato District Council prior to any works commencing that affect public roads.</p>	<p>Rule 16.5.1(3) (c).</p>
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16.5.7.2 Earthworks - general

P1	<p>(a) <u>Earthworks</u> (excluding the importation of fill, within a <u>flood-risk area</u> <u>Flood Ponding Area</u>, or a CLDC), including <u>earthworks</u> necessary for the construction and maintenance of existing public roads or for construction of new roads in accordance with the Te Kauwhata Lakeside Precinct Plan, must meet all the following conditions:</p> <ul style="list-style-type: none"> (i) do not disturb or move more than 200m² within an individual <u>site</u> in a single calendar year except where the maximum area at any one time shall not exceed 400m², and (ii) in relation to the <u>height</u> of any cut or batter face do not exceed 2m, or (iii) are necessary for <u>building</u> works authorised by a building consent and: <ul style="list-style-type: none"> A. the area of earthworks is no more than 150% of the area of those <u>building</u> works, or B. the <u>earthworks</u> occur on land with an average gradient no steeper than 1:8, or C. any trenching for network utilities, or on or offsite utilities within the Te Kauwhata Lakeside Precinct Plan Area are backfilled or reinstated to original ground level, or D. traffic associated with the works is managed in accordance with a Construction Traffic Management Plan approved by the Waikato District Council as the road controlling authority; E. Including any cut and batter faces or filled areas, are revegetated to achieve 80% ground cover within 12 months of the <u>earthworks</u> being commenced; and F. Retain sediment within the construction area through the implementation and maintenance of sediment controls. <p>Note: The Waikato Pest Management Plan addresses the management of identified pest species, including alligator weed. It includes enforceable controls relating to <u>subdivision</u> and land development in infected areas.</p>
P2	<p>(a) <u>Earthworks</u> involving imported <u>fill material</u> (other than <u>earthworks</u> approved as part of a <u>CLDC</u>) meets all of the following conditions:</p> <ul style="list-style-type: none"> (i) all material for filling is <u>cleanfill</u>, and (ii) filling that is not part of <u>building</u> work, or construction of roads, or installation of <u>infrastructure</u>: <ul style="list-style-type: none"> A. does not exceed a volume of 20m² and a depth of 1m, and B. does not include a <u>building platform</u>, and C. does not include placing fill into an area of significant <u>indigenous vegetation</u> or habitat, or (iii) is for minor upgrading of existing electricity lines and does not exceed 50m², and (iv) where traffic associated with the work uses public roads, is managed in accordance with an approved Construction Traffic Management Plan or authorised in writing by Waikato District Council as the road controlling authority. <p>Note: The Waikato Pest Management Plan addresses the management of identified pest species, including alligator weed. It includes enforceable controls relating to subdivision and land development in infected areas.</p>

P3	<p>(a) <u>Earthworks</u> in a Flood Risk Area Flood Ponding Area (other than <u>earthworks</u> approved as part of a <u>CLDC</u>) shall meet the following conditions:</p> <ul style="list-style-type: none"> (i) filling is no more than is necessary to: <ul style="list-style-type: none"> A. provide a foundation for <u>building</u> approved by a <u>building</u> consent, and access to that <u>building</u>, or B. enable minor upgrading of existing electricity lines and does not exceed 50m². <p>Note 1: The Waikato Pest Management Plan addresses the management of identified pest species, including Alligator Weed. It includes enforceable controls relating to subdivision and land development in infected areas.</p> <p>Note 2: Regional <u>earthworks</u> consents may also be needed for works in a high risk erosion area.</p>
C I	<p>(a) <u>Earthworks</u> that do not comply with Rule 16.5.7.2 P I are a controlled activity provided it meets the following conditions:</p> <ul style="list-style-type: none"> (i) do not exceed 5000m² in total area at any one time except a <u>retirement village</u> where the maximum area at any one time shall not exceed 1 ha; (ii) does not involve <u>contaminated land</u> unless that land has been remediated; (iii) have erosion and sediment controls in place which will retain sediment on the <u>site</u>; (iv) any cut and batter faces or filled areas, are revegetated to achieve 80% ground cover within 12 months of the <u>earthworks</u> being commenced, or in the cases where the filled area is to be (in part or whole) within a <u>building platform</u> or hard surface area, the base course has been laid and compacted within 12 months of the <u>earthworks</u> being commenced; (v) any surplus material is disposed of within the Te Kauwhata Lakeside Precinct Plan Area in 16.5.1(3)(a), and (vi) does not adversely affect other land through changes to natural water flows or established drainage paths.
RDI	<p>(a) <u>Earthworks</u> that do not comply with 16.5.7.2 C I.</p> <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) effects on amenity values; (ii) visual effects; (iii) mitigation measures including sediment control; (iv) effects on land utilization; (v) effects on erosion; (vi) effects on cultural values; (vii) effects on heritage values; (viii) effects on the Lake Waikare flood plain.

RD2	<p>(a) <u>Earthworks</u> that do not comply with Rule 16.5.7.2 P2.</p> <p>(b) Council discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) effects on amenity values; (ii) visual effects; (iii) effects on <u>indigenous vegetation</u> and habitat; (iv) mitigation measures including replacement planting where vegetation removal is involved; (v) effects on cultural values; (vi) effects on heritage values.
DI	<u>Earthworks</u> that do not comply with Rule 16.5.7.2 P3.

16.5.9.1 Subdivision Lakeside - general

C I	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> is for an existing or approved housing development. (ii) every <u>allotment</u>, other than a <u>utility allotment</u> or <u>access allotment</u>, has a <u>net site area</u> of at least: <ul style="list-style-type: none"> A. Medium Density Precinct – a minimum <u>site</u> size of 300m² with an average <u>site</u> size of 450m², subject to (B) below; B. Higher Density Precinct – a minimum <u>site</u> size of 225m², with a minimum average <u>site</u> size of 250m². Where a <u>site</u> has legal access to private communal open space, then the percentage of that open space related to the number of properties with legal rights to use the private communal open space, will count towards the average <u>site</u> size (but not minimum <u>site</u> size); or C. 2500m² in the case of any new <u>allotment</u> that is not connected to a reticulated wastewater system. For the avoidance of doubt this rule does not apply to any <u>allotment</u> created prior to 1 January 2017. (iii) No <u>allotment</u> adjoining Lot 2 DPS 83606 included in SA66B/985 and/or Lot 4 DPS 83606 included in SA66B/987 shall be smaller than 450m² <u>net site area</u>. (iv) every <u>allotment</u> with a road <u>boundary</u>, other than an <u>access allotment</u>, access leg or <u>utility allotment</u>, has a width along the road <u>boundary</u> of at least: <ul style="list-style-type: none"> A. 12m in the Medium Density Precinct shown on Plan Rule 16.5.1(3)(a) or B. 9m in the Higher Density Precinct shown on Plan Rule 16.5.1(3)(a) or (v) every <u>allotment</u>, other than a <u>utility</u> or <u>access allotment</u>, is capable of containing a <u>building platform</u>: <ul style="list-style-type: none"> A. Upon which a <u>dwelling</u> and <u>living court</u> could be sited as a permitted activity or, in the Higher Density Precinct, outdoor living space meets the communal open space Rule 16.5.8.6, or B. In the case of vacant <u>sites</u> with no associated <u>building</u> proposal: C. A rectangle of at least 200m² with a minimum dimension of 12m exclusive of yards, and D. No part of the rectangle is located in an area identified as a stream or flood plain. (vi) every <u>allotment</u> other than a <u>utility</u>, <u>access</u> or <u>open space allotment</u> meets the <u>infrastructure</u> requirements as below: <ul style="list-style-type: none"> A. Demonstrate that adequate capacity within the water, stormwater and wastewater networks will be available to accommodate the proposed <u>subdivision</u> including all necessary treatment required to meet water quality, quantity and disposal requirements; and B. Every <u>allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space allotment must be able to demonstrate how it will connect to a reticulated water supply, and wastewater network that has adequate capacity as per infrastructure standard (a) above; and C. Every <u>allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space allotment must be able to demonstrate how it will provide land drainage and stormwater disposal either through a reticulated network or in accordance with Chapter 14. (vii) any allotment that creates a walkway or cycle way or any walkway or cycle way
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	<p>forming part of a <u>subdivision</u> is:</p> <ul style="list-style-type: none"> A. at least 3 metres wide; B. designed for shared pedestrian and cycle use; C. for connections between roads, has unimpeded visibility along the entire length; D. generally in accordance with the walkway route shown on Precinct Plan <u>Rule 16.5.1(3)(c)</u> (recognising that the detailed alignment is indicative only). <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>subdivision</u> layout; (ii) shape and orientation of <u>allotment</u>; (iii) ability of <u>allotment</u> to accommodate a practical <u>building platform</u>; (iv) variation in <u>allotment</u> size; (v) likely location of future buildings and their potential effects on the environment; (vi) avoidance or mitigation of natural hazards, <u>including liquefaction risk (refer to Chapter 15) and</u> geotechnical suitability for <u>building</u>; (vii) road efficiency and safety; (viii) vehicle and pedestrian networks; (ix) connection to open spaces; (x) amenity and streetscape; (xi) drainage; (xii) land stability; (xiii) amenity matters including batter slopes; (xiv) health and safety; (xv) easements to facilitate development beyond the <u>site</u>.
RDI	<p>(a) <u>Subdivision</u> that does not comply with conditions in Rule 16.5.9.1 C1.</p> <p>(b) The Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>subdivision</u> layout; (ii) shape and orientation of <u>allotment</u>; (iii) ability of <u>allotment</u> to accommodate a practical building platform; (iv) variation in <u>allotment</u> size; (v) likely location of future <u>buildings</u> and their potential effects on the environment; (vi) avoidance or mitigation of natural hazards geotechnical suitability for <u>building</u>; (vii) road efficiency and safety; (viii) vehicle and pedestrian networks; (ix) connection to open spaces; (x) amenity and streetscape; (xi) drainage; (xii) land stability; (xiii) amenity matters including batter slopes; (xiv) health and safety; (xv) easements to facilitate development beyond the <u>site</u>.

16.5.9.2 Lakeside Comprehensive Subdivision Consent (CS)

RDI	<p>(a) A Comprehensive Subdivision Consent (CS) that meets all of the following conditions:</p> <ul style="list-style-type: none"> (i) is in accordance with Te Kauwhata Lakeside Precinct Plan Rule 16.5.1(3)(a); the roading network, walkways and cycle ways shown on Precinct Plan Rule 16.5.1(3)(b); and the open space shown on Precinct Plan Rule 16.5.1(3)(c) as set out in the precinct parameters below; and (ii) A CS is in accordance with the Lakeside Precinct Plans identified above if: <ul style="list-style-type: none"> A. Primary roads are within 50m of the location shown on Precinct Plan Rule 16.5.1(3)(b); B. Bus route is either on the alignment shown on Precinct Plan Rule 16.5.1(3)(b) or a continuous alignment that achieves the same circulation; C. The external <u>boundary</u> of the high density area within the Residential Zone is within 10m of the location shown on Precinct Plan Rule 16.5.1(3)(a); (iii) Indicative walkways/cycle ways are within 100m of the location shown on Precinct Plan Rule 16.5.1(3)(c) provided connections are retained between the Lakeside Walkway and the residential development; (iv) The Lakeside Walkway is within 10m of the location shown on Precinct Plan Rule 16.5.1(3)(c); (v) <u>Retirement village boundaries</u> are within 50m of the location shown on Precinct Plan Rule 16.5.1(3)(b); and (vi) Indicative areas of open space are within 200m of the location shown on Precinct Plan Rule 16.5.1(3)(c). (vii) A secondary road access into the Lakeside Precinct Plan Area (as shown on Lakeside Precinct Plan Rule 16.5.1(3)(b)) must be opened for traffic before the number of residential <u>allotments</u> in the Lakeside Precinct Plan Area exceeds 400 provided that: <ul style="list-style-type: none"> A. each independent living unit in a <u>retirement village</u> shall count as one <u>allotment</u>; B. for the purpose of this rule, exceedance of 400 residential <u>allotments</u> shall occur at the time of issue of 224C certificate under the Resource Management Act, and exceedance of independent living unit shall occur at the time of issue of building consent for that unit. (viii) The following <u>infrastructure</u> requirements are met: <ul style="list-style-type: none"> A. Demonstrate that adequate capacity within the water, stormwater and wastewater networks will be available to accommodate the proposed subdivision including all necessary treatment required to meet water quality, quantity and disposal requirements; and B. Any wastewater disposal into Lake Waikare shall be from a new membrane bioreactor treatment plant (or plant of equal or better functionality), provided that wastewater disposal from up to 400 residential <u>allotments</u> may be connected to the existing Te Kauwhata wastewater treatment plant on a temporary basis until a long-term wastewater disposal system is implemented. Where a <u>retirement village</u> is included as part of the first 400 residential <u>allotments</u>, then each independent living unit shall count as one <u>allotment</u>; and C. Every <u>allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space
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- allotment, must be able to demonstrate how it will connect to a reticulated water supply, and wastewater network that has adequate capacity as per infrastructure standard (i) above; and
- D. Every allotment other than a utility allotment, access allotment or open space allotment, must be able to demonstrate how it will provide land drainage and stormwater disposal either through a reticulated network or in accordance with Chapter 14;
 - E. and prior to the issue of any 224C approval, the infrastructure requirements detailed in (viii) A-D above shall be implemented and operational.
- (ix) Individual site sizes shall not be less than the following for the identified areas on the Te Kauwhata Lakeside Precinct Plan Rule 16.5.1(3)(a).
- A. Medium Density– a minimum site size of 300m² with a minimum average site size of 450m², subject to E below.
 - B. Higher Density – a minimum site size of 225m² with a minimum average site size of 250m². Where a site has legal access to private communal open space, the percentage of that open space related to the number of properties with legal rights to use the private communal open space, will count towards average site size (but not minimum site size).
 - C. Retirement village – Medium Density precinct – a minimum exclusive area for an independent dwelling of 120m².
 - D. Retirement village – Higher Density precinct – no density limit.
 - E. No allotment adjoining Lot 2 DPS 83606 included in SA66B/985 and/or Lot 4 DPS 83606 included in SA66B/987 shall be smaller than 450m² net site area.
 - F. Where the averaging rule applies in A and B above this shall be calculated as the average of all sites zoned Residential, intended for residential purposes, and less than 2000m². Any allotment greater than 2000m² or any allotment primarily intended for roading or public infrastructure shall not be included within the average calculation.
- (x) A CS can relate to the entire Te Kauwhata Lakeside Precinct Plan Area, or may be for an individual stage or stages, provided that an individual stage must be 5ha or more.
- (b) Council's discretion shall be restricted to the following matters:
- (i) consistency with the Te Kauwhata Lakeside Precinct Plan in Rules 16.5.1(3)(a), 16.5.1(3)(b) and 16.5.1(3)(c);
 - (ii) matters identified in the assessment criteria in X;
 - (iii) managing the effects of wastewater and stormwater;
 - (iv) extent of any non-compliance with site density control;
 - (v) roading network (including the Te Kauwhata Road level crossing safety);
 - (vi) compliance with a Council-approved roading standard;
 - (vii) protection, restoration or enhancement of ecological features;
 - (viii) provision and location of existing and future utilities and connections;
 - (ix) location of roads and their connections;
 - (x) provision for public access to Lake Waikare;
 - (xi) provision of open space, including linkages between residential areas, open space and Lake Waikare;
 - (xii) effects of natural hazards (including flooding), geotechnical (including liquefaction

	<p>risk, refer to Chapter 15) and land contamination;</p> <p>(xiii) provision of the historic lwi overlay area shown on Precinct Plan Rule3/7 16.5.1(3) (c).</p> <p>(c) Applications for approval of a Comprehensive Subdivision Consent as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>Note 1: CS approval does not constitute authorisation by the Waikato District Council as road controlling authority in terms of Section 357 of the Local Government Act 1974. Written authorisation is required from the Waikato District Council prior to any works commencing that affect public roads.</p>
DI	<p>(a) A CS that does not comply with Rule 16.5.9.2 RD1 and meets all of the following conditions and conditions 16.5.9.2 RD1 (i) and (ii) relating to secondary access and <u>infrastructure</u>:</p> <ul style="list-style-type: none"> (i) Primary roads are within 50m-100m of the location shown on Precinct Plan Rule 16.5.1(3)(b); (ii) Bus route is either on the alignment shown on Precinct Plan Rule 16.5.1(3)(b) or a continuous alignment that achieves the same circulation; (iii) The external <u>boundary</u> of the high density area within the Residential Zone is within 10m-20m of the location shown on Precinct Plan Rule 16.5.1(3)(a); (iv) Indicative walkways/cycleways are within 100m-200m of the location shown on Precinct Plan Rule 15.5.2.3 provided that connections are retained between the Lakeside Walkway and the residential development; (v) Lakeside Walkway is within 10m-20m of the location shown on Precinct Plan Rule 16.5.1(3)(c); (vi) <u>Retirement village boundaries</u> are within 50m-100m of the location shown on Precinct Plan 16.5.1(3)(a); (vii) Indicative areas of open space are within 200-400m of the location shown on Precinct Plan 16.5.1(3)(c). <p>(b) The matters over which Council reserves discretion shall be used for assessing discretionary activity applications under this rule.</p>
NC1	<p>A CS that does not meet the requirements of Rule 16.5.9.2 RD1 (vii) and (viii) relating to Secondary Road Access Control and/or the Infrastructure Requirements, shall be a non-complying activity.</p>
NC2	<p>A CS that does not meet any of the parameters for a discretionary activity outlined in Rule 16.5.9.2 DI (i) to (vii) is a non-complying activity.</p>

16.5.9.3 Subdivision – Sites less than 5ha

RDI	<p>(a) <u>Subdivision</u> on sites less than 5 ha that complies with the conditions as set out below:</p> <ul style="list-style-type: none"> (i) it is in accordance with the Te Kauwhata Lakeside Precinct Plan in 16.5.1(3)(a), 16.5.1(3)(b) and 16.5.1(3)(c), (ii) environmental improvements required by the Te Kauwhata Lakeside Precinct Plan (including, but not limited to landscaping and provision of walkways and cycleways shown on the Precinct Plan Rules 16.5.1(3)(c) have been implemented to the extent required, or (iii) the requisite environmental improvements in (ii) above are proposed to be implemented as a condition of <u>subdivision</u> consent to be completed or bonded prior to the issue of a section 224(c) certificate for the subdivision. <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) consistency with the Te Kauwhata Lakeside Precinct Plans Rules 16.5.1(3)(a), 16.5.1(3)(b) and 16.5.1(3)(c), (ii) matters identified in the assessment criteria in X, (iii) managing the effects of wastewater and stormwater, (iv) extent of any non-compliance with <u>site</u> density control, (v) roading network and compliance with a Council approved roading standard, (vi) provision and location of existing and future utilities and connections, (vii) location of roads and their connections, (viii) effects of natural hazards (including flooding), geotechnical (including liquefaction risk, refer to Chapter 15) and land contamination.
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Chapter 17: Business Zone

- (1) The rules that apply to activities in the Business Zone are contained in [Rule 17.1](#) Land Use – Activities, [Rule 17.2](#) Land Use – Effects and [Rule 17.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Business zone are contained in [Rule 17.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Business Zone:
 - 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (5) The Business Zone contains a Specific Area that is Lakeside Te Kauwhata Precinct. [Rule 17.5](#) manages all land use, building and subdivision in this location. [Rule 17.5.1](#) sets out how to apply rules to the Lakeside Te Kauwhata Precinct that are either different from, or are in addition to, other rules that apply to the rest of the Business Zone.

17.1 Land Use – Activities

17.1.1 Prohibited Activities

- (1) The following activity is a prohibited activity. No application for resource consent for a prohibited activity can be made and a resource consent must not be granted.

PR I	Any <u>building</u> , structure, objects or vegetation that obscure the sight line of the Raglan navigation beacons for vessels entering Whaingaroa (Raglan Harbour) (refer to Appendix 8).
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17.1.2 Permitted Activities

- (1) The following activities are permitted activities if they comply with all of the:
 - (a) Land Use – Effects rules in [Rule 17.2](#) and Land Use – Building rules in [Rule 17.3](#) (unless the activity-specific rule and/or conditions identifies a condition(s) that does not apply); and
 - (b) Activity-specific conditions.

Activity		Activity-specific conditions
P1	<u>Commercial activity</u>	Nil
P2	<u>Commercial services</u>	Nil
P3	<u>Community activity</u>	Excluding a cemetery
P4	<u>Residential activity</u>	Located above ground floor level
P5	<u>Education facility</u>	Nil

17.1.3 Restricted Discretionary Activities

- (1) The activities listed below are restricted discretionary activities.
 (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Matters of Discretion												
RDI	<p>(a) A <u>multi-unit development</u> that meets all of the following conditions:</p> <p>(i) Land Use – Effects rules in Rule 17.2;</p> <p>(ii) Land Use – Building rules in Rule 17.3, except the following rules do not apply:</p> <p>(i) Rule 17.3.8 Dwelling;</p> <p>(ii) Rule 17.3.9 Living court;</p> <p>(iii) The <u>multi-unit development</u> must be located above the ground floor level;</p> <p>(iv) A detailed <u>site plan</u> depicting the proposed <u>lot boundaries</u> for each <u>residential unit</u> and any common areas (including access and services) must be provided, ensuring that a freehold (fee simple) or unit title <u>subdivision</u> complies with Rule 17.4.2 (Subdivision of multi-unit housing developments);</p> <p>(v) Each <u>residential unit</u> must be designed and constructed to achieve the internal design sound levels specified in Appendix 1 (Acoustic Insulation), Table 14;</p> <p>(vi) A communal service court is provided comprising:</p> <p>A. a minimum of 20m²; and</p> <p>B. a minimum dimension of 3m;</p> <p>(vii) <u>Living court</u> areas are provided above ground floor level to meet the following minimum requirements for each <u>residential unit</u>:</p>	<p>(a) Council's discretion is limited to the following matters:</p> <p>(i) The extent to which the development is consistent with Town Centre Guidelines contained in Appendix 3.3;</p> <p>(ii) The extent to which the development is consistent with the Multi-unit design guidelines contained in Appendix 3.4;</p> <p>(iii) The extent to which the development contributes to and engages with adjacent streets and public open space;</p> <p>(iv) The extent to which the development creates visual quality and interest through the separation of <u>buildings</u>, variety in built form and architectural detailing, glazing, and materials;</p> <p>(v) The extent to which the design of the development incorporates energy</p>												
	<table><tr><th><u>Residential Unit</u></th><th>Minimum Area</th><th>Minimum Dimension</th><th></th></tr><tr><td>Studio unit or 1 bedroom</td><td>10m²</td><td>2m</td><td></td></tr><tr><td>2 or more bedroom</td><td>15m²</td><td>2m</td><td></td></tr></table>	<u>Residential Unit</u>	Minimum Area	Minimum Dimension		Studio unit or 1 bedroom	10m ²	2m		2 or more bedroom	15m ²	2m		
	<u>Residential Unit</u>	Minimum Area	Minimum Dimension											
	Studio unit or 1 bedroom	10m ²	2m											
	2 or more bedroom	15m ²	2m											

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		<p>efficiency measures such as passive solar principles;</p> <p>(vi) Amenity values for occupants and neighbours in respect of outlook, privacy, noise, light spill, access to sunlight, <u>living court</u> orientation, <u>site</u> design and layout;</p> <p>(vii) The extent to which staging is necessary to ensure that development is carried out in a coordinated and timely manner;</p> <p>(viii) Avoidance or mitigation of natural hazards;</p> <p>(ix) Geotechnical suitability for <u>building, including liquefaction (refer to Chapter 15).</u></p>
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17.4.1 General subdivision

RDI	<p>(a) <u>Subdivision</u> of land must comply with all of the following conditions:</p> <p>(i) Proposed <u>lots</u> must have a minimum size of 225m² <u>net site area</u> with the exception of <u>access</u> or <u>utility allotments</u> or reserves to vest;</p> <p>(ii) Proposed <u>lots</u> must be connected to public-reticulated water supply and wastewater.</p> <p>(b) The Council's discretion shall be limited to the following matters:</p> <p>(i) amenity values;</p> <p>(ii) the extent to which a range of future business activities can be accommodated; <u>and</u></p> <p><u>(iii) avoidance and/or mitigation of natural hazards risk, including liquefaction (refer to Chapter 15).</u></p>
DI	<u>Subdivision</u> that does not comply with Rule 17.4.1 RDI.

17.4.1.1 Subdivision - Multi-unit development

RDI	<p>(a) <u>Subdivision</u> for <u>multi-unit development</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) An application for land use consent under Rule 17.1.4 (Multi-unit housing development) must either accompany the <u>subdivision</u> or been granted resource consent by Council; (ii) Be connected to public wastewater and water reticulation; and (iii) Where a <u>residential unit</u> is being created in accordance with the Unit Titles Act 2010, it meets the following minimum unit size: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Unit of Apartment</th><th>Minimum Unit Area</th></tr> </thead> <tbody> <tr> <td>Studio unit or 1 bedroom unit</td><td>60m²</td></tr> <tr> <td>2 bedroom unit</td><td>80m²</td></tr> <tr> <td>3 bedroom unit</td><td>100m²</td></tr> </tbody> </table> <p>(b) The Council's discretion shall be limited to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout including <u>notional boundaries</u> for the <u>multi-unit development</u>; (ii) Provision of common areas for shared spaces, access and services; (iii) Avoidance or mitigation of natural hazards; (iv) Geotechnical suitability of <u>site</u> for <u>buildings</u>, including liquefaction risk (refer to Chapter 15); (v) Amenity values and streetscape; (vi) Consistency with the matters contained, and outcomes sought, in Appendix 3.4 (Multi-unit development guideline); (vii) Consistency with any relevant structure plan or master plan, including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; (viii) Vehicle, pedestrian and cycle networks; (ix) Safety, function and efficiency of road network and any internal roads or accessways. 	Unit of Apartment	Minimum Unit Area	Studio unit or 1 bedroom unit	60m ²	2 bedroom unit	80m ²	3 bedroom unit	100m ²
Unit of Apartment	Minimum Unit Area								
Studio unit or 1 bedroom unit	60m ²								
2 bedroom unit	80m ²								
3 bedroom unit	100m ²								
DI	<u>Subdivision</u> that does not comply with Rule 17.4.1.1 RDI.								

17.4.1.2 Subdivision – Boundary adjustments

17.5.1 Application of rules

- (1) Rules 17.5.2, 17.5.3 and 17.5.4 apply in the Lakeside Te Kauwhata Precinct in addition to the activity rules in 17.1.2 (Permitted Activities), 17.1.3 (Restricted Discretionary Activities), 17.1.4 (Discretionary Activities) and 17.1.5 (Non-Complying Activities).
- (2) The rules that apply to a permitted activity in Rule 17.5.2 PI-PI7 within the Lakeside Te Kauwhata Precinct as identified on the planning maps are as follows:
 - (a) Rule 17.2 (Land use – Effects), except:
 - (i) Rule 17.2.5.1 (Earthworks - General) does not apply where earthworks consent has been obtained under Rule 17.5.2 (Comprehensive Land Development Consent);
 - (b) Rule 17.3 (Land use – Building), except:
 - (i) Rule 17.3.2 (Daylight admission) does not apply and Rule 17.5.5 applies instead.
 - (ii) Rule 17.3.4 (Building setbacks) does not apply and Rule 17.5.8 applies instead.
 - (c) Rule 17.5.6 (Gross floor area);
 - (d) Rule 17.5.7 (Gross leasable floor area).
- (3) Rule 17.5.9 applies in addition to Rule 17.4 (Subdivision) for subdivision within the Lakeside Te Kauwhata Precinct.
- (4) Precinct Plans 1-3 are contained in Rule 16.5.1(3).
- (5) The activity status tables and standards in the following chapters also apply to activities in the Lakeside Te Kauwhata Precinct:
 - 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change.

17.5.2 Restricted Discretionary Activities

Activity		Council's discretion shall be restricted to the following matters:
RDI	<p>(a) A <u>comprehensive land development consent (CLDC)</u> that meets all of the following conditions:</p> <p>(i) is in accordance with Te Kauwhata Lakeside Precinct Plan 16.5.1 (3)(a); the roading network, walkways and cycle ways shown on Precinct Plan 16.5.1 (3)(b); and the open space shown on Precinct Plan 16.5.1 (3)(c) as set out in the precinct parameters below; and</p> <p>(b) A <u>CLDC</u> is in accordance with the Lakeside Precinct Plans identified above if:</p> <p>(i) Primary roads are within 50m of the location shown on Precinct Plan 16.5.1 (3)(b); and</p> <p>(ii) Bus route is either on the alignment shown on Precinct Plan 16.5(3)(b) or a continuous alignment that achieves the same circulation; and</p>	<p>(a) Council's discretion is reserved over:</p> <p>(i) consistency with the Te Kauwhata Lakeside Precinct Plans in 16.5.1 (3)(a), 16.5.1 (3)(b) and 16.5.1 (3)(c);</p> <p>(ii) matters identified in the assessment criteria in X;</p> <p>(iii) managing the effects of wastewater and stormwater;</p>

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<p>(iii) Indicative areas of open space are within 200m of the location shown on Precinct Plan 16.5 (3) (b).</p> <p>(c) The following <u>infrastructure</u> requirements are met:</p> <p>(i) Demonstrate that adequate capacity within the water, stormwater and wastewater networks will be available to accommodate the proposed <u>subdivision</u> including all necessary treatment required to meet water quality, quantity and disposal requirements; and</p> <p>(ii) Every <u>Allotment</u> other than a <u>utility Allotment</u>, <u>access allotment</u> or open space <u>Allotment</u> must be able to demonstrate how it will connect to a reticulated water supply, and wastewater network that has adequate capacity as per <u>infrastructure</u> standard (i) above; and</p> <p>(iii) Every <u>Allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space <u>Allotment</u> must be able to demonstrate how it will provide land drainage and stormwater disposal, either through a reticulated network or in accordance with <u>Chapter 14</u>.</p> <p>(d) A <u>CLDC</u> can relate to the entire Te Kauwhata Lakeside Precinct Plan Area, or may be for an individual stage or stages beyond the Business Zone, provided that an individual stage is 5ha or more.</p> <p>(e) Applications for approval of a <u>CLDC</u> as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>(f) <u>LDC</u> approval does not constitute authorisation by the Waikato District Council as road controlling authority in terms of <u>section 357 of the Local Government Act 1974</u>. Written authorisation is required from the Waikato District Council prior to any works commencing that affect public roads.</p>	<p>(iv) roading network and compliance with a Council-approved roading standard;</p> <p>(v) provision and location of existing and future utilities and connections;</p> <p>(vi) location of roads and their connections;</p> <p>(vii) provision of open space, including linkages between residential areas, open space and Lake Waikare;</p> <p>(viii) effects of natural hazards (including flooding), geotechnical suitability <u>including liquefaction risk (refer to Chapter 15)</u> and land contamination.</p>
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17.5.9 Subdivision

RDI	<p>(a) A Comprehensive Subdivision Consent (CS) that meets all of the following conditions:</p> <ul style="list-style-type: none"> (i) is in accordance with Te Kauwhata Lakeside Precinct Plan 16.5.1(3)(a); the roading network, walkways and cycleways shown on Precinct Plan 16.5.1(3)(b); and the open space shown on Precinct Plan 15.5.2.3, as set out in the precinct parameters below; and (ii) A CS is in accordance with the Lakeside Precinct Plans identified above if: <ul style="list-style-type: none"> A. Primary roads are within 50m of the location shown on Precinct Plan 16.5.1(3)(b); and B. Bus route is either on the alignment shown on Precinct Plan 16.5.1(3)(b) or a continuous alignment that achieves the same circulation; and (i) Indicative areas of open space are within 200m of the location shown on Precinct Plan 16.5.1(3)(b). <p>(b) The following infrastructure requirements are met:</p> <ul style="list-style-type: none"> (i) Demonstrate that adequate capacity within the water, stormwater and wastewater networks will be available to accommodate the proposed subdivision including all necessary treatment required to meet water quality, quantity and disposal requirements; (ii) Every allotment other than a utility allotment, access allotment or open space allotment must be able to demonstrate how it will connect to a reticulated water supply, and wastewater network that has adequate capacity as per infrastructure standard (i) above; and (iii) Every allotment other than a utility allotment, access allotment or open space allotment must be able to demonstrate how it will provide land drainage and stormwater disposal either through a reticulated network or in accordance with Chapter 14. <p>(c) A CS can relate to the entire Te Kauwhata Lakeside Precinct Plan Area, or may be for an individual stage or stages beyond the business zone, provided that an individual stage is 5ha or more.</p> <p>(d) Applications for approval of a CLDC as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>(e) CLDC approval does not constitute authorisation by Waikato District Council as road controlling authority in terms of Section 357 of the Local Government Act 1974. Written authorisation is required from Waikato District Council prior to any works commencing that affect public roads.</p> <p>(f) Council's discretion is limited to the following matters:</p> <ul style="list-style-type: none"> (i) consistency with the Te Kauwhata Lakeside Precinct Plan in 16.5.1(3)(a),(b) and (c); (ii) matters identified in the assessment criteria in X; (iii) managing the effects of wastewater and stormwater; (iv) roading network and compliance with a Council approved roading standard; (v) provision and location of existing and future utilities and connections; (vi) location of roads and their connections; (vii) provision of open space, including linkages between residential areas, open space and Lake Waikare; (viii) effects of natural hazards (including flooding), geotechnical suitability including
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	<p>liquefaction risk (refer to Chapter 15) and land contamination;</p> <p>(ix) provision of the historic lwi overlay area shown on Precinct Plan 16.5.1.3(b).</p> <p>(g) Applications for approval of a CS as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>(h) CS approval does not constitute authorisation by Waikato District Council as road controlling authority in terms of Section 357 of the Local Government Act 1974. Written authorisation is required from Waikato District Council prior to any works commencing that affect public roads.</p>
DI	<p>(a) A CS that does not comply with Rule 17.5.9 RDI and meets all of the following conditions and condition 17.5.9 RDI(c) relating to <u>infrastructure</u>:</p> <p>(i) Primary roads are within 50m-100m of the location shown on Precinct Plan 16.5.1(3)(b);</p> <p>(ii) Bus route is either on the alignment shown on Precinct Plan 16.5.1(3)(b) or a continuous alignment that achieves the same circulation;</p> <p>(iii) Indicative areas of open space are within 200-400m of the location shown on Precinct Plan 16.5.1(3)(b).</p> <p>(b) The matters over which Council reserves discretion shall be used for assessing discretionary activity applications under this rule.</p>
NC1	A CS that does not meet the requirements of Rule 17.5.9 RDI(c) relating to Infrastructure Requirements, shall be a non-complying activity.
NC2	A CS that does not meet any of the parameters for a discretionary activity outlined in Rule 17.5.9 DI.

Chapter 18: Business Town Centre Zone

- (1) The rules that apply to activities in the Business Town Centre Zone are contained in [Rule 18.1](#) Land Use – Activities, [Rule 18.2](#) Land Use – Effects and [Rule 18.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Business Town Centre zone are contained in [Rule 18.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Business Town Centre Zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity.

18.1 Land Use - Activities

18.1.1 Prohibited Activities

- (i) The following activity is a prohibited activity. No application for resource consent for a prohibited activity can be made and resource consent must not be granted.

PR I	Any <u>building</u> , structure, objects or vegetation that obscure the sight line of the Raglan navigation beacons for vessels entering Whaingaroa (Raglan Harbour) (refer to Appendix 8).
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18.1.2 Permitted Activities

- (a) The following activities are permitted activities if they meet all the following:
 - (i) Land Use – Effects rules in [Rule 18.2](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (ii) Land Use – Building rules in [Rule 18.3](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (iii) Activity-specific conditions.

Activity		Activity-specific conditions
P1	<u>Commercial activity</u>	Nil
P2	<u>Residential activity</u>	Located above ground floor level
P3	<u>Commercial services</u>	Nil
P4	<u>Retail activity</u>	Nil
P5	<u>Travellers' accommodation</u>	Nil

18.1.3 Restricted Discretionary Activities

- (1) The activities listed below are restricted discretionary activities.
- (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		The Council's discretion shall be limited to the following matters:									
RDI	<p>(a) A <u>multi-unit development</u> that meets all of the following conditions:</p> <ol style="list-style-type: none"> (i) The Land Use – Effects in Rule 18.2; (ii) The Land Use – Building in Rule 18.3 except; <ol style="list-style-type: none"> A. Rule 18.3.9 (<u>Dwellings</u>) does not apply; B. Rule 18.3.10 (<u>Living court</u>) does not apply; <p>(b) The <u>multi-unit development</u> must be located above the ground floor level;</p> <p>(c) A detailed <u>site plan</u> depicting the proposed <u>title boundaries</u> for each <u>residential unit</u> and any common areas (including access and services) must be provided, ensuring that a freehold (fee simple) or unit title <u>subdivision</u> complies with Rule 18.4.2 (Subdivision of multi-unit developments);</p> <p>(d) Each <u>residential unit</u> must be designed and constructed to achieve the internal design sound levels specified in Appendix 1 (Acoustic Insulation), Table 14;</p> <p>(e) A communal service court is provided;</p> <p>(f) <u>Living court</u> areas are provided above ground floor level to meet the following minimum requirements for each <u>residential unit</u>:</p> <table border="1"> <thead> <tr> <th><u>Residential Unit</u></th><th><u>Minimum Living Court Area</u></th><th><u>Minimum Dimensions</u></th></tr> </thead> <tbody> <tr> <td>Studio unit or 1 bedroom</td><td>10m²</td><td>2m</td></tr> <tr> <td>2 or more bedrooms</td><td>15m²</td><td>2m</td></tr> </tbody> </table>	<u>Residential Unit</u>	<u>Minimum Living Court Area</u>	<u>Minimum Dimensions</u>	Studio unit or 1 bedroom	10m ²	2m	2 or more bedrooms	15m ²	2m	<p>(a) The extent to which the development is consistent with the Town Centre Guidelines contained in Appendix 3.3;</p> <p>(b) The extent to which the development is consistent with the Multi-unit design guidelines contained in Appendix 3.4;</p> <p>(c) The extent to which the development contributes to and engages with adjacent streets and public open space;</p> <p>(d) The extent to which the development creates visual quality and interest through the separation of <u>buildings</u>, variety in built form and architectural detailing, glazing, and materials;</p> <p>(e) The extent to which the design of the development incorporates energy efficiency measures such as passive solar principles;</p> <p>(f) Amenity values for occupants and neighbours in respect of outlook, privacy, noise, light spill, access to sunlight, living court orientation, <u>site design</u> and layout;</p> <p>(g) The extent to which staging is necessary to ensure that development is carried out in a coordinated and timely manner;</p>
<u>Residential Unit</u>	<u>Minimum Living Court Area</u>	<u>Minimum Dimensions</u>									
Studio unit or 1 bedroom	10m ²	2m									
2 or more bedrooms	15m ²	2m									

		<ul style="list-style-type: none"> (h) Avoidance or mitigation of natural hazards; (i) Geotechnical suitability for building, including liquefaction risk (refer to Chapter 15); (j) Adequacy of the communal service court for the intended purpose.
RD2	<ul style="list-style-type: none"> (a) The construction of any new building that meets all of the following conditions: <ul style="list-style-type: none"> (i) The Land Use – Effects in Rule 18.2; (ii) The Land Use – Building in Rule 18.3 except; <ul style="list-style-type: none"> A. Rule 18.3.9 (Dwellings) does not apply; B. Rule 18.3.10 (Living court) does not apply. 	<ul style="list-style-type: none"> (a) The Council's discretion shall be limited to the following matters: <ul style="list-style-type: none"> (i) The extent to which the building is consistent with the following matters listed in Appendix 3.3 (Town Centre Design Guidelines) including: <ul style="list-style-type: none"> A. A site and contextual analysis that identifies and addresses the matters listed in section 3.3; B. A connectivity and movement network analysis that addresses the matters listed in section 4.3; C. A neighbourhood character assessment that identifies and addresses the elements listed in section 5; D. Detailed design illustrating how the building will promote these character elements to

		<p>achieve the outcomes sought in section 5.2 of the design guide;</p> <p>(ii) Consistency with the relevant Town Centre Character Statement contained within Appendix 10.1-10.6 (Town Centre Character Statements).</p>
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18.4.1 Subdivision - general

RDI	<p>(a) <u>Subdivision</u> shall comply with all of the following conditions:</p> <p>(i) Proposed <u>lots</u> shall have a minimum size of 225m² <u>net site area</u>, with the exception of <u>access</u> or <u>utility allotments</u> or reserves to vest;</p> <p>(ii) Proposed <u>lots</u> shall be connected to public-reticulated water supply and wastewater.</p> <p>(b) The Council's discretion shall be limited to the following matters:</p> <p>(i) Amenity values;</p> <p>(ii) The extent to which a range of future business activities can be accommodated;</p> <p style="text-align: center;"><u>and</u></p> <p>(iii) <u>Avoidance and/or mitigation of natural hazards risk, including liquefaction (refer to Chapter 15).</u></p>
DI	<u>Subdivision</u> that does not comply with Rule 18.4.1. RDI.

18.4.2 Subdivision - Multi-unit subdivision

RDI	<p>(a) <u>Subdivision for multi-unit development</u> shall comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) An application for land use consent under Rule 18.1.3 (Multi-Unit Development) must either accompany the <u>subdivision</u> or have been granted resource consent by Council; (ii) Be connected to public wastewater and water reticulation; (iii) Where a <u>residential unit</u> is being created in accordance with the Unit Titles Act 2010, it meets the following minimum unit size: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th><u>Unit of Apartment</u></th><th>Minimum Unit Area</th></tr> </thead> <tbody> <tr> <td>Studio unit or 1 bedroom unit</td><td>60m²</td></tr> <tr> <td>2 bedroom unit</td><td>80m²</td></tr> <tr> <td>3 bedroom unit</td><td>100m²</td></tr> </tbody> </table> <p>(b) The Council's discretion shall be limited to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout including <u>notional boundaries</u> for the <u>multi-unit development</u>; (ii) Provision of common areas for shared spaces, access and services; (iii) Avoidance or mitigation of natural hazards; (iv) Geotechnical suitability of <u>site for buildings</u>, including liquefaction risk (refer to Chapter 15); (v) Amenity values and streetscape; (vi) Consistency with the matters contained, and outcomes sought, in Appendix 3.4 (Multi-unit development guideline); (vii) Consistency with any relevant structure plan or master plan, including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; (viii) Vehicle, pedestrian and cycle networks; (ix) Safety, function and efficiency of road network and any internal roads or accessways. 	<u>Unit of Apartment</u>	Minimum Unit Area	Studio unit or 1 bedroom unit	60m ²	2 bedroom unit	80m ²	3 bedroom unit	100m ²
<u>Unit of Apartment</u>	Minimum Unit Area								
Studio unit or 1 bedroom unit	60m ²								
2 bedroom unit	80m ²								
3 bedroom unit	100m ²								
DI	<u>Subdivision</u> that does not comply with Rule 18.4.2 RDI.								

Chapter 19: Business Zone Tamahere

- (1) The rules that apply to activities in the Business Zone Tamahere are contained in [Rule 19.1](#) Land Use – Activities, [Rule 19.2](#) Land Use – Effects and [Rule 19.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Business Zone Tamahere are contained in [Rule 19.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Business Zone Tamahere:
 - 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) P Permitted activity
 - (b) C Controlled activity
 - (c) RD Restricted discretionary activity
 - (d) D Discretionary activity
 - (e) NC Non-complying activity

19.1 Land Use – Activities

19.1.1 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 19.2](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 19.3](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity		Activity specific conditions
P1	<u>Retail activity</u>	Nil
P2	<u>Office</u>	Located above ground floor level
P3	<u>Health facility</u>	Excluding day hospitals
P4	Commercial activity	Nil
P5	Community facility	Nil

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Chapter 20: Industrial Zone

- (1) The rules that apply to activities in the Industrial Zone are contained in [Rule 20.1](#) Land Use – Activities, [Rule 20.2](#) Land Use – Effects and [Rule 20.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Industrial Zone are contained in [Rule 20.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Industrial Zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (5) The Industrial Zone contains a Specific Area that is Nau Mai Business Park. [Rule 20.5](#) manages all land use, building and subdivision in this location. [Rule 20.5.1](#) sets out how to apply rules to Nau Mai Business Park that are either different from, or are in addition to, other rules that apply to the rest of the Industrial Zone.

20.1 Land Use – Activities

20.1.1 Permitted Activities

- (a) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 20.2](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 20.3](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity		Activity specific conditions
P1	Industrial activity	Nil
P2	Trade and industry training activity	Nil
P3	Truck stop for refuelling	Nil
P4	Office ancillary to an industrial activity	(a) Less than 100m ² gfa; or (b) Does not exceed 30% of all buildings on the site.
P5	Food outlet	(a) Less than 200m ² gfa.
P6	Ancillary retail	Does not exceed 10% of all buildings on the site.

20.1.2 Discretionary Activities

- (a) The activities listed below are discretionary activities.

DI	Any permitted activity that does not comply with an activity specific condition in Rule 20.1.1 .
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20.4.1 Subdivision - General

RDI	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) proposed <u>lots</u> must have a minimum <u>net site area</u> of 1000m²; (ii) proposed <u>lots</u> must have an average area of at least 2000m²; and (iii) no more than 20% rear <u>lots</u> are created. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) the extent to which a range of future <u>industrial activities</u> can be accommodated; and (ii) amenity values <u>; and</u> (iii) <u>Avoidance and/or mitigation of natural hazards risk, including liquefaction (refer to Chapter 15).</u>
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20.5.1 Application of rules

- (a) The activity rules in [20.1.1](#) (Permitted Activities), [20.1.2](#) (Discretionary Activities) and [20.1.3](#) (Non-complying Activities) do not apply within the Nau Mai Business Park Specific Area and Rules [20.5.2](#), [20.5.3](#) and [20.5.4](#) apply instead.
- (b) The rules that apply to a permitted activity in Rule [20.5.2](#) P1-P13 within the Nau Mai Business Park Specific Area as identified on the planning maps are as follows:
- (i) [Rule 20.2](#) (Land Use – Effects), except:
 - A. [Rule 20.2.2](#) (Landscape Planting) does not apply and [Rule 20.5.5](#) applies instead;
 - B. [Rule 20.2.3.1](#) (Noise – General) does not apply and [Rule 20.5.6](#) applies instead;
 - C. [Rule 20.2.7.1](#) (Signs – General) does not apply and [Rule 20.5.7](#) applies instead;
 - D. [Rule 20.2.8](#) (Outdoor storage of goods and material) does not apply and [Rule 20.5.8](#) applies instead.
 - (ii) [Rule 20.3](#) (Land Use – Building), except:
 - A. [Rule 20.3.1](#) (Building Height) does not apply and [Rule 20.5.9](#) applies instead.
 - (iii) [Rule 20.5.10](#) (Construction Materials);
 - (iv) [Rule 20.5.11](#) (Building Coverage); and
 - (v) [Rule 20.5.12](#) (Gross Floor Area);
 - (vi) [Rule 20.5.13](#) (Building Location and Setbacks); and
 - (vii) [Rule 20.5.14](#) (Acoustic Insulation for Dwelling)
- (c) [Rule 20.4](#) (Subdivision) applies for subdivision within the Nau Mai Business Park Specific Area.
- (d) The activity status tables and standards in the following chapters also apply to activities in the Nau Mai Business Park:
- [14 Infrastructure and Energy;](#)
 - [15 Natural Hazards and Climate Change.](#)

Chapter 21: Industrial Zone Heavy

- (1) The rules that apply to activities in the Heavy Industrial Zone are contained in [Rule 21.1](#) Land Use – Activities, [Rule 21.2](#) Land Use – Effects and [Rule 21.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Industrial Zone Heavy are contained in [Rule 21.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Heavy Industrial Zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity

21.1 Land Use – Activities

21.1.1 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 21.2](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply); and
 - (b) Land Use – Building rules in [Rule 21.3](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply).

Activity		Activity specific conditions
P1	<u>Industrial activity</u>	Nil
P2	Trade and industry training activity	Nil
P3	Truck stop for refuelling	Nil
P4	<u>Office ancillary to an industrial activity</u>	less than 100m ² , or 30% of all <u>buildings</u> on the site.
P5	Food outlet	Less than 200m ² <u>gfa</u> .
P6	Ancillary retail	Does not exceed 10% of all <u>building</u> on the site.

21.1.2 Discretionary Activities

- (1) The activities listed below are discretionary activities.

D1	Any activity that does not comply with the Land Use – Effects Rule 21.1 or Land Use – Building Rule 21.3 unless the activity is specified as a controlled, restricted discretionary or non-complying activity.
D2	<u>A waste management facility</u>
D3	<u>Storage, processing or disposal of hazardous waste</u>
D4	<u>An extractive industry</u>
D5	<u>An office</u>
D6	A retail activity

21.4.1 Subdivision - General

RD1	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) proposed <u>lots</u> must have a minimum <u>net site area</u> of 1000m²; (ii) proposed <u>lots</u> must have an average <u>net site area</u> of at least 2000m²; and (iii) no more than 20% rear <u>lots</u> are created.
RD2	<p>(a) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) the extent to which a range of future activities can be accommodated; and (ii) amenity values and (iii) avoidance and/or mitigation of natural hazards risk, including liquefaction (refer to Chapter 15).

Chapter 22: Rural Zone

- (1) The rules that apply to activities in the Rural Zone are contained in [Rule 22.1](#) Land Use – Activities, [Rule 22.2](#) Land Use – Effects and [Rule 22.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Rural Zone are contained in [Rule 22.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Rural zone:
 - I 4 Infrastructure and Energy;
 - I 5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (5) The Rural Zone contains four Specific Areas listed below. These Specific Areas contain rules that are either in addition to, or different from, other rules that apply to the rest of the Rural Zone.
 - (a) [Rule 22.5](#) Agricultural Research Centre;
 - (b) [Rule 22.6](#) Huntly Power Station - Coal and Ash Water;
 - (c) [Rule 22.7](#) Whaanga Coast Development Areas
 - (d) [Rule 22.8](#) Lakeside Te Kauwhata Precinct

22.1 Land Use - Activities

22.1.1 Prohibited Activities

- (1) The following activity is a prohibited activity. No application for resource consent for a prohibited activity can be made and a resource consent cannot be granted.

PR I	Any <u>building</u> , structure, objects or vegetation that obscure the sight line of the Raglan navigation beacons for vessels entering Whaingaroa (Raglan Harbour) (refer to Appendix 7).
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22.1.2 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 22.2](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 22.3](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity	Activity specific conditions
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22.4.1

- (1) [Rule 22.4.1.1](#) lists prohibited subdivision activities in the Rural Zone
- (2) The following rules provide for various types of subdivision in the Rural Zone
 - (a) [Rule 22.4.1.2](#) - General Subdivision
 - (b) [Rule 22.4.1.3](#) – Subdivision of Maaori Freehold Land
 - (c) [Rule 22.4.1.4](#) - Boundary Relocation
 - (d) [Rule 22.4.1.5](#) - Rural Hamlet Subdivision
 - (e) [Rule 22.4.1.6](#) - Conservation Lot Subdivision
 - (f) [Rule 22.4.1.7](#) - Reserve Lot Subdivision
- (3) The following rules apply to the types of subdivision provided for in Rules 22.4.1.2 to 22.4.1.7
 - (a) [Rule 22.4.2](#) Title boundaries (~~natural hazard area~~ contaminated land, significant amenity landscape, notable trees, intensive farming and aggregate extraction areas)
 - (b) [Rule 22.4.3](#) Title boundaries, SNA's heritage items
 - (c) [Rule 22.4.4](#) Road frontage
 - (d) [Rule 22.4.5](#) Subdivision within identified area
 - (e) [Rule 22.4.6](#) Subdivision of land containing all or part of an Environmental Protection Area
 - (f) [Rule 22.4.7](#) Esplanade Reserve and Esplanade strips
 - (g) [Rule 22.4.8](#) Subdivision of land containing heritage items
 - (h) [Rule 22.4.9](#) Subdivision – building platform

22.4.1.1 Prohibited subdivision

The following activities are prohibited activities. No application for resource consent can be made for a prohibited activity and no resource consent can be granted:

PR1	Any subdivision within the Urban Expansion Area involving the creation of any additional lot.
PR2	<ol style="list-style-type: none"> (a) Subdivision of a Record of Title issued prior to 6 December 1997, which results in more than one additional lot being located on high class soil. (b) Exceptions to PR2(a) are where an additional lot is created by any of the following rules: <ol style="list-style-type: none"> (i) The conservation lot subdivision (Rule 22.4.1.6); (ii) Reserve lot subdivision (Rule 22.4.1.7); (iii) Access allotment or utility allotment using Rule 14.12 (Transportation); (iv) Subdivision of Maaori Freehold Land (Rule 22.4.1.3).

22.4.1.2 General subdivision

RDI	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) The <u>Record of Title</u> to be subdivided must have issued prior to 6 December 1997; (ii) The <u>Record of Title</u> to be subdivided must be at least 20 hectares in area; (iii) The proposed <u>subdivision</u> must create no more than one additional <u>lot</u>, excluding an <u>access allotment</u>. (iv) The additional <u>lot</u> must have a proposed area of between 8,000m² and 1.6 ha; (v) Land containing <u>high class soil</u> (as determined by a Land Use Capability Assessment prepared by a suitably qualified person) must be contained within the <u>boundaries</u> of only two <u>lots</u> as follows: <ul style="list-style-type: none"> A. one <u>lot</u> must contain a minimum of 80% of the <u>high class soil</u>; and B. the other <u>lot</u> may contain up to 20% of <u>high class soil</u>. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>subdivision</u> layout and design including dimensions, shape and orientation of the proposed <u>lot</u>; (ii) effects on rural character and amenity values; (iii) effects on landscape values; (iv) potential for reverse sensitivity effects; (v) extent of <u>earthworks</u> including <u>earthworks</u> for the location of <u>building platforms</u> and accessways ; (vi) <u>natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).</u>
NCI	General <u>subdivision</u> that does not comply with Rule 22.4.1.2. RDI.

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22.4.1.5 Rural Hamlet Subdivision

RDI	<p>(a) <u>Subdivision</u> to create a Rural Hamlet must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) It results in 3 to 5 proposed <u>lots</u> being clustered together; (ii) All existing <u>Records of Title</u> form one <u>continuous landholding</u>; (iii) Each proposed <u>lot</u> has a minimum area of 8,000m². (iv) Each proposed <u>lot</u> has a maximum area of 1.6ha; (v) The proposed balance <u>lot</u> has a minimum area of 20ha; and (vi) It does not create any additional <u>lots</u> beyond the number of existing <u>Records of Title</u>. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>subdivision</u> layout and design including dimension, shape and orientation of the proposed <u>lots</u>; (ii) effects on rural character and amenity values; (iii) effects on landscape values; (iv) potential for reverse sensitivity effects; (v) extent of <u>earthworks</u> including <u>earthworks</u> for the location of <u>building platforms</u> and access ways. (vi) <u>natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).</u>
NCI	<u>Subdivision</u> that does not comply with Rule 22.4.1.5 RDI.

22.4.2 Title boundaries – ~~natural hazard area~~, contaminated land, Significant Amenity Landscape, notable trees, intensive farming activities, aggregate extraction areas

RDI	<p>(a) Subdivision of land containing any natural hazard area, contaminated land, Significant Amenity Landscape, notable trees, intensive farming activities or Aggregate Extraction Areas must comply with all of the following conditions:</p> <p>(i) The boundaries of every proposed lot containing existing buildings must demonstrate that existing buildings comply with the Land Use - Building rules in Rule 22.3 relating to:</p> <p>A. Rule 22.3.1 (Number of Dwellings within a Record of Title);</p> <p>B. Rule 22.3.5 (Daylight admission);</p> <p>C. Rule 22.3.6 (Building coverage);</p> <p>D. Rule 22.3.7 (Building setbacks);</p> <p>(ii) Rule 22.4.2 RDI (a)(i) does not apply to any non-compliance with the Land Use - Building rules in Rule 22.3 that existed lawfully prior to the subdivision.</p> <p>(iii) The boundaries of every proposed lot must not divide any of the following:</p> <p>A. A natural hazard area;</p> <p>A. Contaminated land;</p> <p>B. Significant Amenity Landscape;</p> <p>C. Notable trees.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <p>(i) landscape values;</p> <p>(ii) amenity values and character;</p> <p>(iii) reverse sensitivity effects;</p> <p>(iv) effects on existing buildings;</p> <p>(v) effects on natural hazard areas;</p> <p>(vi) effects on contaminated land;</p> <p>(vii) effects on any notable trees;</p> <p>(viii) effects on an intensive farming activity;</p> <p>(ix) effects on any Aggregate Extraction Area.</p>
DI	Subdivision that does not comply with Rule 22.4.2 RDI.

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22.4.9 Subdivision - Building platform

RDI	<p>(a) <u>Subdivision</u>, other than an access or <u>utility allotment</u>, must provide a <u>building platform</u> on the proposed <u>lot</u> that:</p> <ul style="list-style-type: none"> (i) Has an area of 1,000m² exclusive of <u>boundary</u> setbacks; (ii) Has an average gradient not steeper than 1:8; (iii) Is certified by a geotechnical engineer as geotechnically stable; (iv) Has vehicular access in accordance with Rule 14.12.1 PI (Transportation) (v) Is not subject to inundation in a 2% <u>AEP</u> storm or flood event; (vi) a <u>dwelling</u> could be built on as a permitted activity in accordance with Land Use - Building Rules in Rule 22.3. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Earthworks</u> and <u>fill material</u> required for <u>building platforms</u> and access; (ii) Geotechnical suitability for <u>building</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; (iii) Likely location of future <u>buildings</u> and their potential effects on the environment; (iv) Avoidance <u>and/or mitigation</u> of natural <u>hazards</u>; (v) Effects on landscape and amenity; (vi) Measures to avoid storm or flood events.
DI	<u>Subdivision</u> that does not comply with Rule 22.4.9 RDI.

22.5.1 Application of Rules

- (a) The rules that apply to a permitted activity are set out in [Rule 22.5.2](#).
- (b) For any other activity not provided in Rule 22.5.2, the following rules in the Rural Zone apply:
 - (i) [Rule 22.1](#) Land Use – Activities
 - (ii) [Rule 22.2](#) Land Use – Effects
 - (iii) [Rule 22.3](#) Land Use – Building; and
 - (iv) [Rule 22.4](#) - Subdivision

(c) The activity status tables and standards in the following chapters also apply to activities in the Agriculture Research Centres:

14 Infrastructure and Energy;

15 Natural Hazards and Climate Change.

22.6.1 Application of Rules

(a) The rules that apply to a permitted activity are set out in [Rule 22.6.2](#) within the Huntly Power Station: Coal and Ash Water Specific Area as identified on the planning maps are as follows:

- (i) [Rule 22.2](#) Land Use – Effects
- (ii) [Rule 22.3](#) Land Use – Building, except:
 - A. [Rule 22.3.7](#) Building setbacks do not apply and [Rule 22.6.3](#) applies instead; and
 - B. [Rule 22.3.4](#) Height does not apply and [Rule 22.6.4](#) applies instead.
 - C. [Rule 22.6.5](#);
 - D. [Rule 22.6.6](#); and
 - E. [Rule 22.6.7](#)

(b) The rules that apply to any other activity that is not provided in [Rule 22.6.2](#) are those that apply to the Rural Zone as follows:

- (i) [Rule 22.1](#) Land Use – Activities
- (ii) [Rule 22.2](#) Land Use – Effects
- (iii) [Rule 22.3](#) Land Use – Building; and
- (iv) [Rule 22.4](#) Subdivision

(c) The activity status tables and standards in the following chapters also apply to activities in the Huntly Power Station – Coal and Ash Water:

14 Infrastructure and Energy;

15 Natural Hazards and Climate Change.

22.7.1 Application of Rules within a Whaanga Coast Development Area

- (1) The rules that apply to a permitted activity under [Rule 22.7.2](#) within a [Whaanga Coast Development Area](#) as identified on the planning maps are as follows:
- (a) [Rule 22.2](#) Land Use – Effects; except that:
 - A. [Rule 22.2.3.1](#) (Earthworks – General) does not apply and [Rule 22.7.1.3](#) applies instead.
 - (b) [Rule 22.3](#) Land Use – Building; except that:
 - A. [Rule 22.3.1](#) (Number of Dwellings within a Record of Title) does not apply;
 - B. [Rule 22.3.2](#) (Minor Dwelling) does not apply;
 - C. [Rule 22.3.3](#) (Building and structures in Landscape and Natural Character Areas) does not apply and [Rule 22.7.1.4](#) applies instead;
 - D. [Rule 22.3.4.1](#) (Height – Building General) does not apply and [Rule 22.7.1.4](#) applies instead;
 - E. [Rule 22.3.6](#) (Building Coverage) does not apply;
 - F. [Rule 22.3.7](#) (Building Setbacks) does not apply and [Rule 22.7.1.6](#) applies instead;
 - G. [Rule 22.7.1.5](#) applies;
 - H. [Rule 22.7.1.7](#) applies; and
 - I. [Rule 22.7.1.8](#) applies.
 - (c) [Rule 22.4](#) applies to subdivision within a Whaanga Coast Development Area.
- (2) The activity status tables and standards in the following chapters also apply to activities within any [Whaanga Coast Development Area](#):
- 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change (Placeholder)
- (3) The following symbols are used in the tables below:
- PR Prohibited activity
 - P Permitted activity
 - C Controlled activity
 - RD Restricted discretionary activity
 - D Discretionary activity
 - NC Non-complying activity

22.7.1.1 Permitted Activities

- (1) The following activities are permitted activities within a [Whaanga Coast Development Area](#) if they meet all the following:
- (a) Land Use – Effects rules in Rule 22.7.1(1)(a) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in Rule 22.7.1(1)(b) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity	Activity specific conditions
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22.7.2 Application of Rules outside a Whaanga Coast Development Area

- (1) The activity status tables and standards in the following chapters also apply to activities outside a Whaanga Coast Development Area:
- I 4 Infrastructure and Energy;
 - I 5 Natural Hazards and Climate Change (Placeholder).
- (2) The following symbols are used in the table below:
- D Discretionary activity
 - NCI Non-complying activity

22.7.2.2 Discretionary Activities

- (1) The following activities are discretionary activities outside a Whaanga Coast Development Area

D1	Any land use activity or building located outside a <u>Whaanga Coast Development Area</u>
D2	Subdivision for a full partition of Maaori Freehold Land outside a <u>Whaanga Coast Development Area</u> under <u>Te Ture Whenua Act 1993</u> .

22.7.2.3 Non-complying Activities

- (1) The following activities are non-complying activities outside a Whaanga Coast Development Area

NCI	Subdivision of Maaori freehold land not provided for in Rule 22.7.2.2 D2.
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22.8.1 Application of rules

(a) Rules 22.8.2, 22.8.4 and 22.8.5 apply in the Lakeside Te Kauwhata Precinct, in addition to the activity rules in:

- (i) 22.1.2 (Permitted Activities);
- (ii) 22.1.3 (Restricted Discretionary Activities);
- (iii) 22.1.4 (Discretionary Activities); and
- (iv) 22.1.5 (Non-complying Activities).

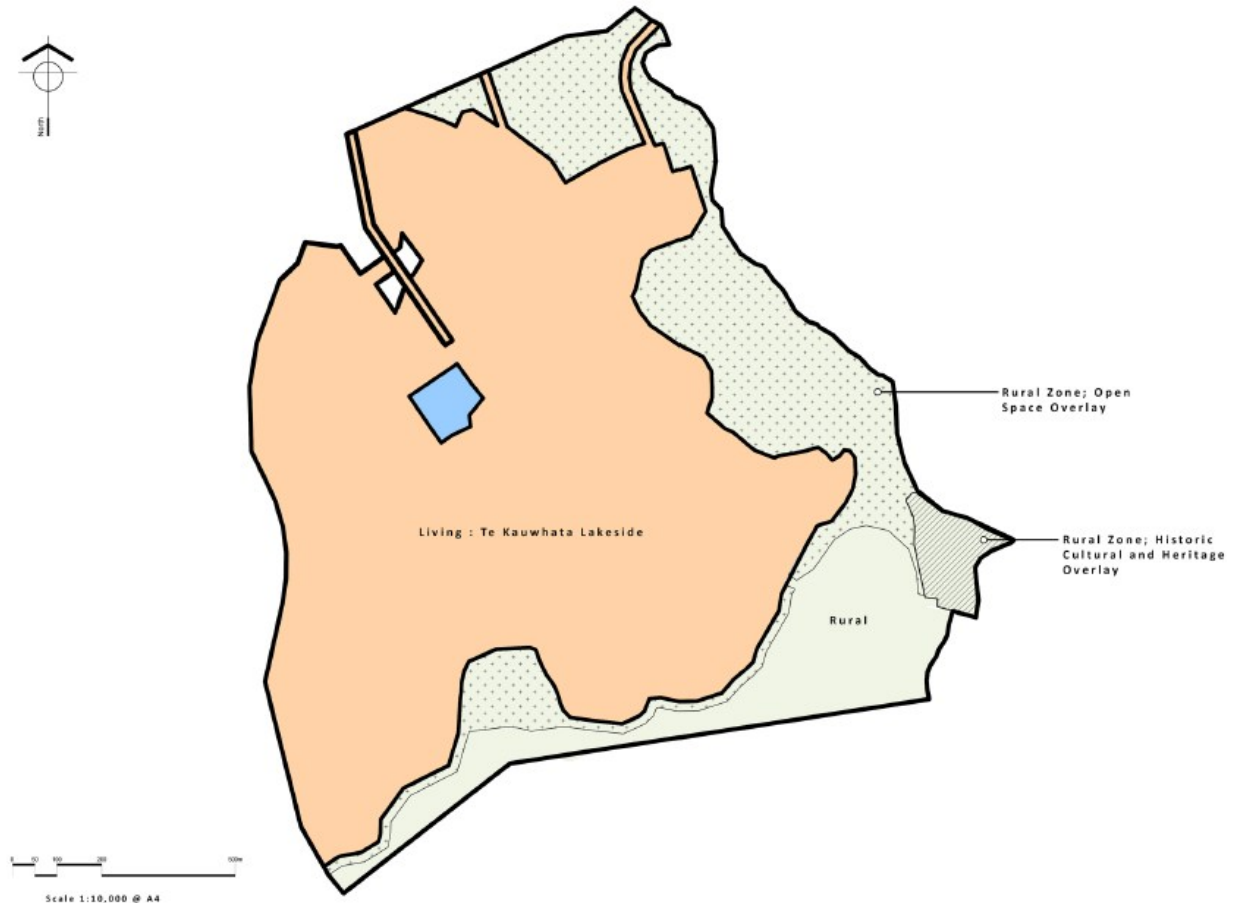
(b) The activity status tables and standards in the following chapters also apply to activities in the Lakeside Te Kauwhata Precinct:

14 Infrastructure and Energy;

15 Natural Hazards and Climate Change.

(c) The following precinct plan applies to the Rural Zone in the Lakeside Te Kauwhata Precinct as identified on the planning maps:

Lakeside Open Space and Lakeside Cultural and Heritage Overlay



22.8.6 Earthworks - General

PI	<p>(a) <u>Earthworks</u> in a Flood Risk Area Flood Ponding Area (other than earthworks approved as part of a <u>CLDC</u>) shall meet the following conditions:</p> <p>(i) filling is no more than is necessary to:</p> <p style="margin-left: 40px;">A. provide a foundation for <u>building</u> approved by a <u>building</u> consent, and access to that <u>building</u>, or</p> <p style="margin-left: 40px;">B. enable minor upgrading of existing electricity lines and does not exceed 50m².</p> <p>(b) The Waikato Pest Management Plan addresses the management of identified pest species, including alligator weed. It includes enforceable controls relating to <u>subdivision</u> and land development in infected areas.</p> <p>(c) Regional <u>earthworks</u> consents may also be needed for works in a high risk erosion area.</p>
RDI	<p>(a) <u>Earthworks</u> that do not comply with Rule 22.8.6 PI.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <p style="margin-left: 40px;">(i) effects on amenity values,</p> <p style="margin-left: 40px;">(ii) visual effects,</p> <p style="margin-left: 40px;">(iii) mitigation measures including sediment control,</p> <p style="margin-left: 40px;">(iv) effects on land utilisation,</p> <p style="margin-left: 40px;">(v) effects on erosion,</p> <p style="margin-left: 40px;">(vi) effects on cultural values,</p> <p style="margin-left: 40px;">(vii) effects on heritage values,</p> <p style="margin-left: 40px;">(viii) effects on the Lake Waikare flood plain.</p>

22.8.8 Lakeside Comprehensive Subdivision Consent

RDI	<p>(a) A Comprehensive Subdivision Consent (CS) that meets all of the following conditions:</p> <ul style="list-style-type: none"> (i) is in accordance with Te Kauwhata Lakeside Precinct Plan 16.5.1(3)(a); the roading network, walkways and cycleways shown on Precinct Plan 16.5.1(3)(b); and the open space shown on Precinct Plan 16.5.1(3)(c) as set out in the precinct parameters below; and (ii) A CS is in accordance with the Lakeside Precinct Plans identified above if: <ul style="list-style-type: none"> A. Primary roads are within 50m of the location shown on Precinct Plan 16.5.1(3)(b); and B. Bus route is either on the alignment shown on Precinct Plan 16.5.1(3)(b) or a continuous alignment that achieves the same circulation; and C. Indicative walkways/cycleways are within 100m of the location shown on Precinct Plan 16.5.1(3)(c) provided connections are retained between the Lakeside Walkway and the residential development; and D. Lakeside Walkway is within 10m of the location shown on Precinct Plan 16.5.1(3)(c). <p>(b) A CS can relate to the entire Te Kauwhata Lakeside Precinct Plan Area, or may be for an individual stage or stages, provided that an individual stage must be 5ha or more.</p> <p>(c) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) consistency with the Te Kauwhata Lakeside Precinct Plan in 16.5.1(3)(a), 16.5.1(3)(b) and 16.5.1(3)(c), (ii) matters identified in the assessment criteria in X, (iii) managing the effects of wastewater and stormwater, (iv) roading network (including the Te Kauwhata Road level crossing safety) and compliance with a Council approved roading standard, (v) protection, restoration or enhancement of ecological features, (vi) provision and location of existing and future utilities and connections, (vii) location of roads and their connections, (viii) provision for public access to Lake Waikare, (ix) provision of open space, including linkages between residential areas, open space and Lake Waikare, (x) effects of natural hazards (including flooding and liquefaction risk, refer to Chapter 15), geotechnical and land contamination, (xi) provision of the historic Iwi overlay area shown on Precinct Plan 16.5.1(3)(c). <p>(d) Applications for approval of a CS as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>(e) CS approval does not constitute authorisation by the Waikato District Council as road controlling authority in terms of section 357 of the Local Government Act 1974. Written authorisation is required from the Waikato District Council prior to any works commencing that affect public roads.</p>
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DI	<p>(a) A CS that does not comply with Rule 21.8.7 RD1 and does not exceed conditions (i) to (iv) below:</p> <ul style="list-style-type: none"> (i) Primary roads are within 50m-100m of the location shown on Precinct Plan 16.5.1(3)(b); and (ii) Bus route is either on the alignment shown on Precinct Plan 16.5.1(3)(b) or a continuous alignment that achieves the same circulation; and (iii) Indicative walkways/cycleways are within 100m-200m of the location shown on Precinct Plan 16.5.1(3)(c) provided connections are retained between the Lakeside Walkway and the residential development; and (iv) Lakeside Walkway is within 10m-20m of the location shown on Precinct Plan 16.5.1(3)(b). <p>(b) The matters over which Council reserves discretion shall be used for assessing discretionary activity applications under this rule.</p>
NCI	A CS that does not meet the requirements of Rule 22.8.8 DI.

Chapter 23: Country Living Zone

- (1) The rules that apply to activities in the Country Living zone are contained in [Rule 23.1](#) Land Use – Activities, [Rule 23.2](#) Land Use – Effects and [Rule 23.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Country Living zone are contained in [Rule 23.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Country Living Zone:
 - [14 Infrastructure and Energy](#);
 - [15 Natural Hazards and Climate Change](#) (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity

23.1 Land Use – Activities

23.1.1 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 23.2](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 23.3](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity		Activity-specific conditions
P1	<u>Residential activity</u> , unless specified below.	Nil
P2	<u>Home stay</u>	Nil
P3	<u>A temporary event</u>	(a) The event occurs no more than 3 times per single 12 month period; (b) The duration of each event is less than 72 hours; (c) It may operate between 7.30am and 8.30pm Monday to Sunday; (d) Temporary structures are: <ol style="list-style-type: none"> (i) erected no more than 2 days before the event occurs, and (ii) removed no more than 3 days after the end of the event; (e) The <u>site</u> is returned to its original condition no more than 3 days after the end of the event; (f) There is no direct site access from a national route or regional arterial road.

23.4.2 General Subdivision

RD1	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) All proposed <u>lots</u> must have a <u>net site area</u> of at least 5000m². (ii) Where the land being subdivided is inside the Airport Subdivision Control Boundary or inside the SEL 95 Boundary identified on the planning maps, the average <u>net site area</u> of all proposed <u>lots</u> must be at least 1.1ha; (iii) Where the land being subdivided straddles the Airport Subdivision Control Boundary, the maximum number of proposed titles must be the smallest nearest whole number calculated by the following formula: <p style="text-align: center;">Proposed Record of Titles = $\frac{\text{area (ha) outside}^*}{0.5} + \frac{\text{area (ha) inside}^*}{1.1}$</p> <p style="text-align: center;">* outside and inside Airport Subdivision Control Boundary</p> <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) Adverse effects on amenity values; (ii) Effects on the Airport Subdivision Control Boundary or the SEL 95 Boundary ; and (iii) <u>Avoidance and/or mitigation of natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).</u>
NC1	General <u>Subdivision</u> that does not comply with Rule 23.4.1 RD1.

23.4.4 Title boundaries – ~~natural hazard area~~, contaminated land, Significant Amenity Landscape, notable trees, intensive farming activities, aggregate extraction areas

RDI	<p>(a) Subdivision of land containing any natural hazard area, contaminated land, Significant Amenity Landscape, notable tree, intensive farming activity or Aggregate Extraction Area must comply with all of the following conditions:</p> <p>(i) The boundaries of every proposed lot containing an existing building must demonstrate compliance with the Land Use - Building rules in Rule 23.3 relating to:</p> <p>A. Rule 23.3.5 (Daylight admission);</p> <p>B. Rule 23.3.6 (Building coverage);</p> <p>C. Rule 23.3.7 (Building Setbacks);</p> <p>(ii) Rule 23.4.4 RD1 (a)(i) does not apply to any non-compliance with the Land Use – Building rules in Rule 23.3 that existed lawfully prior to the subdivision.</p> <p>(iii) Any boundary of a proposed lot must not divide the following:</p> <p>A. a natural hazard area;</p> <p>B. A. contaminated land;</p> <p>C. B. Significant Amenity Landscape;</p> <p>D. C. Notable tree.</p> <p>(iv) Any boundary of a proposed lot must provide the following setbacks:</p> <p>A. 300m from any intensive farming activity;</p> <p>B. 200m from an Aggregate Extraction Area for sand extraction;</p> <p>C. 500m from an Aggregate Extraction Area for rock extraction.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <p>(i) Landscape values;</p> <p>(ii) Amenity values and character;</p> <p>(iii) Reverse sensitivity effects;</p> <p>(iv) Effects on any existing building;</p> <p>(v) Effects on a natural hazard area;</p> <p>(vi) Effects on contaminated land;</p> <p>(vii) Effects on a notable tree;</p> <p>(viii) Effects on an intensive farming activity;</p> <p>(ix) Effects on an Aggregate Extraction Area.</p>
NCI	Subdivision that does not comply with Rule 23.4.4 RDI.

23.4.8 Subdivision - Building platform

RD1	<p>(a) <u>Subdivision</u>, other than an <u>access allotment</u> or <u>utility allotment</u>, must provide a <u>building platform</u> on the proposed <u>lot</u> that:</p> <ul style="list-style-type: none"> (i) has an area of 1000m² exclusive of <u>boundary</u> setbacks; (ii) has an average gradient no steeper than 1:8; (iii) has vehicular access in accordance with Rule 14.12.1 P 1 Infrastructure Chapter 14; (iv) is certified by a geotechnical engineer as geotechnically stable; (v) is not subject to inundation in a 2% <u>AEP</u> storm or flood event; (vi) a <u>dwelling</u> could be built on as a permitted activity in accordance with Rule 23.3. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Earthworks</u> and <u>fill material</u> required for <u>building platform</u> and access; (ii) Geotechnical suitability for a <u>building</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; (iii) Avoidance or mitigation of natural <u>hazards</u>; (iv) Effects on landscape and amenity; (v) Measures to avoid storm or flood events.
DI	<u>Subdivision</u> that does not comply with Rule 23.4.8 RD1.

Chapter 24: Village Zone

- (1) The rules that apply to activities in the Village Zone are contained in [Rule 24.1](#) Land Use – Activities, [Rule 24.2](#) Land Use – Effects, [Rule 24.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Village Zone are contained in [Rule 24.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Village zone:
 - 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity

24.1 Land Use - Activities

24.1.1 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 24.2](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 24.3](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity		Activity-specific Conditions
PI	<u>Residential activity</u> , unless specified below.	Nil

24.4 Subdivision

- (1) Rule 24.4.1 provides for subdivision density and applies across the Village Zone.
- (2) The following rules apply to specific areas and/or activities:
 - (a) Rule 24.4.2 – Subdivision in Te Kowhai and Tuakau, applies to the Village Zone in these two areas.
 - (b) Rules 24.4.1 and 24.4.2 are also subject to the following subdivision controls:
 - (i) Rule 24.4.3 – Subdivision boundary adjustments;
 - (ii) Rule 24.4.4 – Subdivision amendments and updates to cross lease flats plans and conversions;
 - (iii) Rule 24.4.5 – Title boundaries **natural hazard area**, contaminated land, Significant Amenity Landscape Dune, notable trees and intensive farming activities, aggregate extraction areas;
 - (iv) Rule 24.4.6 – Title boundaries Significant Natural Areas, heritage items, archaeological sites, sites of significance to Maaori;
 - (v) Rule 24.4.7 – Title boundaries Maaori sites and Maaori areas of significance;
 - (vi) Rule 24.4.8 - Subdivision of land containing heritage items;
 - (vii) Rule 24.4.9 – Road frontage;
 - (viii) Rule 24.4.10 – Subdivision building platform;
 - (ix) Rule 24.4.11 – Subdivision Reserves; and
 - (x) Rule 24.4.12 - subdivision esplanade reserves and esplanade strips
 - (xi) Rule 24.4.13 – subdivision of land containing mapped off-road walkways.

24.4.1 Subdivision – General

RDI	<p>(a) Proposed <u>lots</u> must have a minimum <u>net site area</u> of 3000m², except where the proposed lot is an <u>access allotment, utility allotment or reserve to vest</u>.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <ol style="list-style-type: none"> (i) Shape, location and orientation of proposed <u>lots</u>; (ii) Matters referred to in the <u>Infrastructure chapter</u>; (iii) Consistency with the matters, and outcomes sought, in <u>Appendix 3.1</u> (Residential Subdivision Guidelines); (iv) Impacts on stormwater and wastewater disposal; (v) Impacts on <u>Significant Natural Areas</u>; (vi) Impacts on identified <u>Maaori Sites of Significance</u>; and (vii) Roads and pedestrian network; and (viii) Avoidance and/or mitigation of natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).
DI	<p><u>Subdivision</u> that does not comply with a condition of Rule 24.4.1 RDI.</p>

24.4.2 Subdivision – Te Kowhai and Tuakau

RD1	<p>(a) <u>Subdivision</u> in Te Kowhai and Tuakau must comply with all of the following conditions:</p> <p>(i) Proposed <u>lots</u> not connected to public water and wastewater <u>infrastructure</u> must have a minimum <u>net site area</u> of 3000m², except where the proposed <u>lot</u> is an <u>access allotment</u> or <u>reserve lot</u>.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <p>(i) Shape, location and orientation of proposed <u>lots</u>;</p> <p>(ii) Position of proposed <u>building platforms</u> and driveways to ensure future <u>subdivision</u> is not compromised;</p> <p>(iii) Matters referred to in the <u>Infrastructure chapter</u>;</p> <p>(iv) Consistency with the matters, and outcomes sought, in <u>Appendix 3.1</u> (Residential Subdivision Guidelines);</p> <p>(v) Impacts on stormwater and wastewater disposal;</p> <p>(vi) Impacts on <u>Significant Natural Areas</u>;</p> <p>(vii) Impacts on identified archaeological sites and <u>Maaori Sites of Significance</u>; and</p> <p>(viii) Roads and pedestrian networks; and</p> <p>(ix) Avoidance and/or mitigation of natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).</p>
RD2	<p>(a) <u>Subdivision</u> in Te Kowhai and Tuakau must comply with all of the following conditions:</p> <p>(i) Proposed lots connected to public water and wastewater <u>infrastructure</u> must have a minimum <u>net site area</u> of 1,000m², except where the proposed <u>lot</u> is an <u>access allotment</u> or <u>reserve lot</u>.</p> <p>(b) The Council's discretion shall be limited to the following matters:</p> <p>(i) Shape, location and orientation of proposed <u>lots</u>;</p> <p>(ii) Position of proposed <u>building platforms</u> and driveways to ensure future <u>subdivision</u> is not compromised;</p> <p>(iii) Matters referred to in the <u>Infrastructure chapter</u>;</p> <p>(iv) Consistency with the matters and outcomes sought in <u>Appendix 3.1</u> (Residential Subdivision Guidelines);</p> <p>(v) Impacts on stormwater and wastewater disposal;</p> <p>(vi) Impacts on <u>Significant Natural Areas</u>;</p> <p>(vii) Impacts on identified archaeological sites and <u>Maaori Sites of Significance</u>; and</p> <p>(viii) Roads and pedestrian networks; and</p> <p>(ix) Avoidance and/or mitigation of natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).</p>
DI	<u>Subdivision</u> that does not comply with Rule 24.4.2 RD1 or RD2.

24.4.5 Title boundaries – ~~natural hazard area~~, Contaminated land, Significant Amenity Landscape - Dune, notable trees and intensive farming activities

RDI	<p>(a) <u>Subdivision</u> of land containing <u>contaminated land</u>, notable trees and <u>intensive farming</u> activities and <u>Aggregate Extraction Areas</u> must comply with all of the following conditions:</p> <p>(i) The <u>boundaries</u> of every proposed <u>lot</u> with existing <u>buildings</u> must demonstrate compliance with the following <u>building</u> rules (other than where any non-compliance existed lawfully prior to the <u>subdivision</u>) relating to:</p> <p style="margin-left: 20px;">A. Daylight admission (Rule 24.3.4);</p> <p style="margin-left: 20px;">B. Building coverage (Rule 24.3.5);</p> <p style="margin-left: 20px;">C. Building setbacks (Rule 24.3.6);</p> <p>(ii) The <u>boundaries</u> of every proposed <u>lot</u> must not divide the following:</p> <p style="margin-left: 20px;">A. A natural hazard area;</p> <p style="margin-left: 20px;">B.A. <u>Contaminated land;</u></p> <p style="margin-left: 20px;">B.B. <u>Significant Amenity Landscape; or</u></p> <p style="margin-left: 20px;">B.C. <u>Notable tree.</u></p> <p>(iii) The <u>boundaries</u> of every proposed <u>lot</u> must be setback by 300m from any area operating an <u>intensive farming</u> activity.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <p style="margin-left: 20px;">(i) Landscape values;</p> <p style="margin-left: 20px;">(ii) Amenity values and character;</p> <p style="margin-left: 20px;">(iii) Reverse sensitivity;</p> <p style="margin-left: 20px;">(iv) Effects on existing <u>buildings</u>;</p> <p style="margin-left: 20px;">(v) Effects on natural hazard areas;</p> <p style="margin-left: 20px;">(v) <u>Effects on contaminated land;</u></p> <p style="margin-left: 20px;">(vi) <u>Effects on any notable tree;</u></p> <p style="margin-left: 20px;">(vii) <u>Effects on an intensive farming activity.</u></p>
DA	<u>Subdivision</u> that does not comply with Rule 24.4.5 RDI.

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24.4.10 Subdivision - Building platform

RDI	<p>(a) Every proposed <u>lot</u>, other than a new <u>lot</u> specifically for access, <u>utility allotment</u> and <u>access allotment</u> must be capable of containing a <u>building platform</u> upon which a <u>dwelling</u> could be sited as a permitted activity, with the <u>building platform</u> being contained within either of the following dimensions:</p> <ul style="list-style-type: none"> (i) A circle with a diameter of at least 18m exclusive of yards; or (ii) A rectangle of at least 200m² with a minimum dimension of 12m exclusive of yards. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout; (ii) Shape of <u>allotment</u>; (iii) Ability of <u>allotment</u> to accommodate a practical <u>building platform</u>; (iv) Likely location of future <u>buildings</u> and their potential effects on the environment; (v) Avoidance or mitigation of natural <u>hazards</u>; (vi) Geotechnical suitability for <u>building</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; (vii) Ponding areas and primary <u>overland flow paths</u>.
DI	<u>Subdivision</u> that does not comply with Rule 24.4.10 RD1.

Chapter 25: Reserve Zone

- (1) The rules that apply to activities in the Reserve Zone are contained in [Rule 25.1](#) Land Use – Activities, [Rule 25.2](#) Land Use – Effects and [Rule 25.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Reserve Zone are contained in [Rule 25.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Reserve Zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (5) The Reserve Zone contains a Specific Area listed below. This Specific Area contains rules that are either in addition to, or different from, other rules that apply to the rest of the Reserve Zone:
 - (a) [25.5](#) Tamahere Park and Tamahere Village Green

25.1 Land Use - Activities

25.1.1 Prohibited Activities

- (1) The following activity is a prohibited activity. No application for resource consent can be made for a prohibited activity and no resource consent can be granted:

PRI	Any building, structure, objects or vegetation that obscures the sight lines of the Raglan navigation beacons as identified in Appendix 7 (Raglan Navigation Beacon) for vessels entering Raglan Harbour (Whaingaroa).
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25.1.2 Permitted Activities

- (1) The activities listed below are permitted activities if they meet all the:
 - (a) Land Use – Effects rules in [Rule 25.2](#) (unless the activity-specific rule and/or conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 25.3](#) (unless the activity-specific rule and/or conditions identify a condition(s) that does not apply);
 - (c) Activity-specific conditions.

Activity		Activity-specific conditions
PI	Any activity provided in a Reserve Management Plan approved under the Reserves Act 1977	Nil
P2	<u>Informal recreation</u>	Nil

25.5.1 Application of rules

The following rules of the Reserve Zone apply in the Tamahere Park and Tamahere Village Green:

- (a) [Rule 25.1.2](#) Permitted Activities
- (b) [Rule 25.1.3](#) Discretionary Activities
- (c) [Rule 25.1.4](#) Non-Complying Activities
- (d) The Land Use – Effects rules in [Rule 25.2](#) apply except:
 - (i) [Rule 25.5.2.1](#) applies instead of [Rule 25.2.7.1](#) Signs – General
- (e) The Land Use – Building rules in [Rule 25.3](#) apply except:
 - (i) [Rule 25.5.3.1](#) Building Coverage applies instead of [Rule 25.3.3](#) Building Coverage; and
 - (ii) [Rule 25.5.3.2](#) Building applies instead of [Rule 25.3.1](#) Height – General and [Rule 25.3.3](#) Building Coverage.
- (f) [Rule 25.4](#) Subdivision.

(g) The activity status tables and standards in the following chapters also apply to activities in the Tamahere Park and Tamahere Village Green:

14 Infrastructure and Energy;

15 Natural Hazards and Climate Change.

Chapter 26: Hampton Downs Motor Sport and Recreation Zone

- (1) The rules that apply to activities in the Hampton Downs Motor Sport and Recreation Zone are contained in Rule 26.1 Land Use – Activities, Rule 26.2 Land Use – Effects and Rule 26.3 Land Use – Building.
- (2) The rules relating to subdivision within the Motor Sport and Recreation Zone are contained in Rule 26.4.
- (3) The activity status tables and standards in the following chapters also apply to activities in the Motor Sport and Recreation Zone:
 - 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) P Permitted activity
 - (b) C Controlled activity
 - (c) RD Restricted discretionary activity
 - (d) D Discretionary activity
 - (e) NC Non-complying activity.

26.1 Land Use - Activities

26.1.1 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (i) Land Use – Effects rules in [Rule 26.2](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (ii) Land Use – Building rules in [Rule 26.3](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (iii) Activity-specific conditions.

26.1.1.1 Permitted Activities - Operational Motorsport Area - Precinct A Activity

Activity		Activity-specific conditions
P1	A motor sport and recreation facility	The activity is carried out in Precinct A (Operational Motor Sport Area)
P2	A day-to-day activity	The activity is carried out in Precinct A (Operational Motor Sport Area)

26.1.1.2 Permitted Activities– Business and Industrial Area - Precinct B Activity

Activity		Activity-specific conditions
P1	Automotive activities	The activity is carried out in Precinct B (Business and Industrial Area)
P2	Non-automotive activities	The activity is carried out in Precinct B (Business and Industrial Area)
P3	General warehousing	The activity is carried out in Precinct B (Business and Industrial Area)

Chapter 27: Te Kowhai Airpark Zone

- (1) The rules that apply to activities in the Te Kowhai Airpark Zone are contained in [Rule 27.2](#) Land Use – Effects and, [Rule 27.3](#) Land Use – Building.
- (2) The provision for subdivision in the Te Kowhai Airpark Zone are contained in [Rule 27.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Te Kowhai Airpark Zone:
 - 14 Infrastructure and Energy as specified in [Rule 27.2](#);
 - 15 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) P Permitted activity
 - (b) C Controlled activity
 - (c) RD Restricted discretionary activity
 - (d) D Discretionary activity
 - (e) NC Non-complying activity
- (5) The Te Kowhai Airpark comprises four separate precinct areas:
 - (a) Precinct A: Runway and Operations;
 - (b) Precinct B: Commercial;
 - (c) Precinct C: Medium Density Residential;
 - (d) Precinct D: Residential.
- (6) The Te Kowhai Airpark Zone is shown on the planning maps along with the location of the four precinct areas within the zone.
- (7) Rule Table [27.1.1](#) identifies Permitted activities (P), Controlled Activities (C), Discretionary activities (D) and Non-complying activities (NC) within each precinct.

27.1 Land Use - Activities

- (a) All Permitted and Controlled activities identified in Activity Status Table [27.1.1](#) must comply with all Land Use - Effects rules in [Rule 27.2](#) and Land Use - Building rules in [Rule 27.3](#).
- (b) With respect to controlled activities, Council reserves control over the following matters:
 - (i) the proposed site design and layout in relation to:
 - A. the sensitivity of the surrounding natural, human and physical environment,
 - B. potential hazards and exposure pathways arising from the proposed facility, including cumulative risks with other facilities, and
 - C. interaction with natural hazards (flooding, instability), as applicable,
 - (ii) proposed emergency management planning (spills, fire and other relevant hazards), and
 - (iii) proposed procedures for monitoring and reporting of incidents.
- (c) To reference the activity status use the following format:
 - (i) Rule
 - (ii) Activity status and number
 - (iii) Activity
 - (iv) Precinct

(for example 21.7 D I I Navigation Equipment Precinct B Commercial)

27.1.1 Activity Status Table

27.4.6 Building platform

RD I	<p>(a) In ALL PRECINCTS, every <u>allotment</u> must be capable of containing a <u>building platform</u>:</p> <p>(i) Upon which a <u>dwelling</u> could be sited as a permitted activity in accordance with Rule 27.3; and</p> <p>(ii) The <u>building platform</u> is able to accommodate either:</p> <p>A. A circle with a diameter of at least 10m exclusive of <u>boundary</u> setbacks; or</p> <p>B. A rectangle of at least 100 m², exclusive of <u>boundary</u> setbacks, of which each dimension is at least 8m.</p> <p>(b) Rule 27.4.6 RD I (a) does not apply to a <u>utility allotment</u> or an <u>access allotment</u>.</p> <p>(c) Council's discretion is restricted to the following matters:</p> <p>(i) <u>Subdivision</u> layout;</p> <p>(ii) Shape of <u>allotments</u>;</p> <p>(iii) Ability of <u>allotments</u> to accommodate a practical <u>building platform</u>;</p> <p>(iv) Likely location of future <u>buildings</u> and their potential effects on the environment;</p> <p>(v) Geotechnical suitability for <u>building</u>, <u>including liquefaction risk if present (refer to Chapter 15)</u>;</p> <p>(vi) <u>Avoidance and/or mitigation of natural hazards.</u></p>
DI	<u>Subdivision</u> that does not comply with Rule 27.4.6 RD I.

Chapter 28: Rangitahi Peninsula Zone

- (1) The rules that apply to activities in the Rangitahi Peninsula zone are contained in [Rule 28.1](#) Land Use – Activities, [Rule 28.2](#) Land Use – Effects and [Rule 28.3](#) Land Use – Building.
- (2) The activity status tables and standards in the following chapters also apply to activities in the Rangitahi Peninsula zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards [and Climate Change](#) (Placeholder).
- (3) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (4) The rules providing for subdivision in the Rangitahi Peninsula Zone are contained in [Rule 28.4](#).

28.1 Land Use – Activities

- (1) The following activities are permitted activities if they comply with all of the:
 - (a) Land Use - Effects rules in [Rule 28.2](#) (except for P7);
 - (b) Land Use – Building rules in [Rule 28.3](#) (except for P7);
 - (c) Activity specific conditions.

28.1.1 Specific Activities – Permitted Activities

- (1) The activities listed below are permitted activities.

Activity		Conditions
PI	<u>Residential activity</u>	<ol style="list-style-type: none"> (a) An activity that is in accordance with the Rangitahi Peninsula Structure Plan (Appendix 8); and (b) Is located within Plan I Structure Plan Area - Development Precincts shown on the Rangitahi Peninsula Structure Plan (Appendix 8).

28.1.3 Specific Activities - Restricted Discretionary Activities

- (1) The activities listed below are restricted discretionary activities.
- (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Matters of Discretion
RD1	<p>(a) Any activity that does not comply with a condition for Rule 28.1.1 P5 or Rule 28.1.1 P6 is a restricted discretionary activity provided that:</p> <p>(i) For a <u>community activity</u>, the total <u>gross floor area</u> within the Rangitahi Peninsula Structure Plan Area does not exceed 300m² within the whole of the Structure Plan Area.</p> <p>(b) For <u>Rangitahi commercial activity</u>:</p> <p>(i) The total <u>gross floor area</u> does not exceed 600m² within any of the seven neighbourhoods shown on the Rangitahi Peninsula Structure Plan (Appendix 8), or</p> <p>(ii) The total <u>gross floor area</u> does not exceed 1000m² within the whole of the Structure Plan Area.</p>	<p>(a) Council discretion is restricted to the following matters:</p> <p>(i) Effects on the role, function, and vitality, of the Raglan town centre;</p> <p>(ii) Traffic impacts on the safety and efficiency of the road network;</p> <p>(iii) Consistency with the Rangitahi Peninsula Structure Plan (Appendix 8);</p> <p>(iv) Character and amenity of development within the Rangitahi Peninsula Structure Plan (Appendix 8).</p>
RD2	<p>(a) A Comprehensive Residential Development that meets the following conditions:</p> <p>(i) The Land Use – Effects in Rule 28.2; and</p>	<p>(a) Council discretion is restricted to the following matters:</p> <p>(i) Adequacy of the information provided to</p>

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- (ii) The Land Use – Building in [Rule 28.3](#); and
 - A. [Rule 28.3.3](#) (Building height) does not apply; and
 - B. [Rule 28.3.7](#) (Living court) does not apply; and
- (iii) The site is located within the Comprehensive Residential Development locations shown in Plan 5 of the Rangitahi Peninsula Structure Plan ([Appendix 8](#)); and
- (iv) Construction or alteration of a building does not exceed 11m height; and
- (v) A detailed site plan is provided that identifies proposed title boundaries for each residential unit and any common areas (including access and services), ensuring that a freehold (fee simple) or unit title subdivision could occur in accordance with [Appendix 8](#) - Rangitahi Peninsula Structure Plan; and
- (vi) The residential unit is designed and constructed to comply with Table 14 - Internal Sound Levels in [Appendix 1](#) (Acoustic Insulation); and
- (vii) A communal service court area is provided; and
- (viii) Outdoor living courts are provided to meet the following minimum requirements for each residential unit:

<u>Duplex Dwelling</u>	Living Court Area	Minimum Dimension
Studio unit or 1 bedroom	30m ²	4m
2 bedroom	40m ²	4m
3 bedroom	40m ²	4m
<u>Apartment Building</u> Ground Level Residential Unit	Living Court Area	Minimum Dimension
Studio unit or 1 bedroom	20m ²	4m

- address matters specified, and outcomes sought, within the Multi-Unit Design Guide ([Appendix 3.4](#));
- (ii) The extent to which the development contributes to and engages with adjacent streets and public open space;
- (iii) The extent to which the access, car parking and garaging is integrated into the development in a way that is safe for pedestrians and cyclists;
- (iv) The extent to which the development incorporates environmental efficiency measures such as passive solar principles;
- (v) Amenity values for occupants and neighbours in respect of outlook, privacy, noise, light spill, access to sunlight, outdoor living court orientation, site design and layout;
- (vi) The extent to which staging is necessary to ensure that development is carried out in a coordinated and timely manner;
- (vii) Avoidance or mitigation of natural hazards;
- (viii) The safety and efficiency of roads due to traffic associated with the development;
- (ix) Geotechnical stability for building, including liquefaction risk if present (refer to Chapter 15);

	<table> <tr> <td>2 bedroom</td><td>30m²</td><td>4m</td></tr> <tr> <td>3 bedroom</td><td>30m²</td><td>4m</td></tr> <tr> <td>Apartment Building Upper Level Residential Unit</td><td>Living Court Area</td><td>Minimum Dimension</td></tr> <tr> <td>Studio unit or 1 bedroom</td><td>10m²</td><td>2m</td></tr> <tr> <td>2 bedroom</td><td>15m²</td><td>2m</td></tr> <tr> <td>3 bedroom</td><td>15m²</td><td>2m</td></tr> </table>	2 bedroom	30m ²	4m	3 bedroom	30m ²	4m	Apartment Building Upper Level Residential Unit	Living Court Area	Minimum Dimension	Studio unit or 1 bedroom	10m ²	2m	2 bedroom	15m ²	2m	3 bedroom	15m ²	2m	(x) Consistency with (Appendix 8) Rangitahi Peninsula Structure Plan.
2 bedroom	30m ²	4m																		
3 bedroom	30m ²	4m																		
Apartment Building Upper Level Residential Unit	Living Court Area	Minimum Dimension																		
Studio unit or 1 bedroom	10m ²	2m																		
2 bedroom	15m ²	2m																		
3 bedroom	15m ²	2m																		
RD3	<p>(a) Any mixed use activity comprising of a comprehensive residential development and a Rangitahi commercial activity or a community facility is a restricted discretionary activity and shall meet the conditions in Rules 28.1.1 P5-P6 and 28.1.3 RD1 and RD2;</p> <p>(b) Mixed use activities provided for under Rule RD3(a) are exempt from the requirements of Rule 28.3.6 (Accessory buildings).</p>	Council's discretion is restricted to the matters of discretion of Rules 28.1.3 RD1 (b) and RD2 (b).																		

28.4.1 Subdivision - General

RDI	<p>(a) <u>Subdivision</u> must comply with the following conditions:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> must be in accordance with the Rangitahi Peninsula Structure Plan (Appendix 8), including the density ranges specified therein for each neighbourhood in the Neighbourhood Outcomes Plans; and (ii) Compliance with the following variances will be determined to be in accordance with the Rangitahi Peninsula Structure Plan (Appendix 8) (the base figures and locations are as stated or shown in the Neighbourhood Outcome Plans that form part of the Rangitahi Peninsula Structure Plan): <ul style="list-style-type: none"> (i) Development Precinct areas (hectares) - variance up to and including 10%; (ii) Development Precinct boundaries - variance up to and including 100m; (iii) Development Precinct densities - variance up to and including 10% from the upper and lower end of the range specified; (iv) Collector Road locations - variance up to and including 50m movement outside of the road reserve; (v) Secondary access location - any variance and up to and including 30% variance in length; and (iii) Environmental improvements required by the Rangitahi Peninsula Structure Plan (Appendix 8) (including, but not limited to, restoration planting shown on the Indicative Open Space Framework Plan and provision of walkways and cycle ways shown on the Indicative Movement Network Plan) have been implemented to the extent required; (iv) The primary access to the Rangitahi Peninsula Structure Plan Area by way of an upgraded Opororu Road (inclusive of the Opororu Road/Wainui Road intersection and the bridge/causeway at each end) has been formed; and (v) There must be secondary legal access for all road users when the Opororu Road connection is not available for any reason. (vi) Council shall consider Tainui Hapuu as an affected party and require that its written approval be obtained or that notice be served on a limited notified basis. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) Extent to which <u>subdivision</u> is consistent with the Rangitahi Peninsula Structure Plan (Appendix 8); (ii) Extent of variation in <u>allotment</u> sizes from provisions of the Rangitahi Peninsula Structure Plan (Appendix 8); (iii) Matters referred to in Chapter 14 Infrastructure and Energy; (iv) Amenity and streetscape; (v) Vehicle and pedestrian networks; (vi) Implementation of environmental improvements required by the Rangitahi Peninsula Structure Plan (Appendix 8); (vii) <u>Avoidance and/or mitigation of natural hazards risk, including liquefaction risk if present (refer to Chapter 15).</u>
DI	<u>Subdivision</u> that does not comply with one or more conditions in Rule 28.4.1 RDI.

28.4.6 Subdivision - Building platform

RDI	<p>(a) Every proposed <u>lot</u>, other than an <u>access</u> or <u>utility allotment</u>, must be capable of containing a <u>building platform</u> that meets all of the following conditions:</p> <ul style="list-style-type: none"> (i) Has, exclusive of <u>boundary</u> setbacks, a circle with a diameter of at least 18m or a rectangle of at least 200m² with a minimum dimension of 12m, except that this condition shall not apply to Comprehensive Residential Development Lots; (ii) Has an average gradient not steeper than 1:8; (iii) Has vehicular access in accordance with Rule 14.12.1.1 Infrastructure and Energy Chapter; (iv) Is geotechnically stable; (v) Is not subject to inundation in a 2% <u>AEP</u> storm or flood event; <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Earthworks</u> and fill material required for subsequent <u>buildings</u>; (ii) Geotechnical suitability for <u>building</u>, <u>including liquefaction risk if present (refer to Chapter 15)</u>; (iii) Likely location of future <u>buildings</u> and their potential effects on the environment; (iv) Avoidance or mitigation of natural <u>hazards</u>; (v) Effects on landscape and amenity; (vi) Measures to avoid storm or flood events.
DI	<u>Subdivision</u> that does not comply with one or more condition in Rule 28.4.6 RDI.

Section 32 Report

Natural Hazards and Climate Change

prepared for the

Proposed Waikato District Plan – Stage 2

July 2020



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I OVERVIEW AND PURPOSE

1. This report outlines the process undertaken to review the natural hazards and climate change provisions in the Waikato District Plan, including the evaluation of the extent to which the proposed objectives are the most appropriate way to achieve the purpose of the Resource Management Act 1991 (the Act) and whether the proposed provisions (policies and rules) are the most appropriate way to achieve the objectives. This evaluation is a requirement of Section 32 of the Act.
2. The review of the natural hazards chapters of the Waikato District Plan has focussed on developing a comprehensive policy framework for managing natural hazards in the district. It includes proposed objectives, policies and rules to address natural hazards and climate change and these are set out in Chapter 15 of the Proposed District Plan. The policy framework for hazards includes general policies for multiple hazards, inside and outside high risk areas, as well as more specific policies for use and development of land within the floodplain, in coastal hazard areas, within defended areas, on land subject to slope instability and subsidence, fire risk, and liquefaction. There are also policies that focus on increasing awareness of natural hazard through information sharing and civil defence and emergency management projects and policies that focus on climate change. The climate change policies set out a framework for managing land use and development in the face of uncertainty of future sea levels and climatic conditions and includes direction on mitigation, adaptation, assessing future impacts and using a precautionary approach.
3. The objectives, policies and methods apply to areas throughout the district that have been identified as being exposed to one or more natural hazards. Some of these hazards have been assessed and their spatial extents shown as hazard overlay areas on the planning maps. Rules to regulate proposed land use, subdivision and development in each of the hazard overlay areas are also set out in Chapter 15. The spatial extents of some hazards have not been identified on the planning maps and therefore specific rules for these areas have not been developed. These areas have been addressed through the objective and policy framework and matters over which the council will restrict its discretion to.
4. This report contains a level of detail that corresponds to the scale and significance of the effects (environmental, economic, social and cultural) that are anticipated as a result of implementing the proposed provisions. A provision cascade table which shows the provisions proposed and how they relate to each other is included in Appendix I.

1.1 Topic Description

1.1.1 Natural Hazards

5. Natural hazards are naturally occurring geological or meteorological processes including any atmospheric, earth or water-related events that may have an adverse impact on human health and safety, property or the environment. They include events such as earthquakes, tsunamis, erosion, volcanic and geothermal activity, landslips, subsidence, sedimentation, wind, drought, fire, and flooding.
6. The Waikato District is susceptible to a range of natural hazards. Some of these, such as volcanic eruptions and tsunami hazards have a low frequency of occurrence but can have severe consequences. With respect to some of these events non-regulatory instruments or processes, such as education and advocacy, civil defence recovery plans, increasing community preparedness, insurance, emergency services and contingency planning can be utilised.
7. More frequent natural hazards that occur in the Waikato District, such as river flooding, flood ponding, coastal inundation and erosion and land instability (land slips and subsidence) have been addressed through a regulatory framework that focusses on reducing risk by avoiding, remedying or mitigating the effects of natural hazards to ensure that damage to property or injury or loss of lives is minimised.
8. Some natural hazards can be exacerbated by climate change. Increased temperatures can increase the likelihood and intensity of weather-related natural hazard events such as rainfall, flooding, coastal storms, drought and wildfire. Climate change will also increase mean sea level which will increase the risk of hazards such as coastal inundation and erosion on communities in some coastal areas.
9. The Ministry for the Environment predicts the effects of climate change on the Waikato District to include overall warmer temperatures, fewer frosts, a decrease in spring rainfall, increased storm events and an average rise in mean sea level. This is likely to mean more frequent droughts leading to water shortages, more inland flooding and salt water intrusion in low-lying coastal areas and an increase in erosion and land instability.
10. The review of the natural hazards provisions has focussed on developing a risk-based framework to manage natural hazard risk in line with the policy direction in the Waikato Regional Policy Statement 2016 (WRPS) as well as the NZ Coastal Policy Statement 2010 (NZCPS). The risk that natural hazards pose to the Waikato District is made up of several factors including:
 - the nature, magnitude and extent of the hazard;
 - the anticipated frequency or probability of the hazard event occurring; and
 - the exposure and vulnerability of the environment to the hazard, including the likely community losses/damages that could occur.
11. An understanding of both the scale and likelihood of the natural hazard event, and the likely consequences to the community, are central to the risk-based approach. From a district plan perspective, a risk-based approach requires identification and management of activities based on the level of risk to which they are exposed (e.g. farming may be acceptable in a high flood risk area, whereas residential development may not). The level of control over activities in

the district plan is therefore related to the level of risk, and whether such risks are considered acceptable or not.

12. The proposed policy framework includes a suite of general and specific policies for a range of natural hazards as well as policies to address the projected effects of climate change. The policy framework also recognises that there is existing development, including infrastructure, already located on land subject to natural hazards. These areas will require management through mitigation and adaptation to reduce risk either during redevelopment or through place-specific adaptive management planning processes.
13. The rules that implement the natural hazards policies rely largely, but not solely, on mapping hazard areas throughout the district. Each hazard area has a suite of additional rules to regulate new land use, including subdivision and development, based on the level of risk associated with the hazard. Certain types of new development will be avoided due to the level of risk present, while other types of new development will be able to be designed or located to effectively remedy or mitigate the risk. A summary description of hazards and hazard areas are set out below. A more detailed description of specific hazard modelling and assessments is set out in section 1.5 of this report.
14. Flood Plain Management Area
The Flood Plain Management Area is the 1% Annual Exceedance Probability (AEP) floodplain, and is identified through both 1D and 2D modelling, depending on the level of information available. 2D modelling is only available adjacent to the main stem of the Waikato River between Horotiu and Ohinewai and a small length of the Waipa River from Saulbrey Road to the confluence in Ngaruawahia. The 1D modelling extends south from Saulbrey Road to the Waikato district boundary and North from Ohinewai to Port Waikato.
15. An allowance for the projected effects of climate change has been included in the 2D flood modelling (Horotiu to Ohinewai).
16. Flood Ponding Area
Flood Ponding Areas are areas of land that experience floodwater ponding in a 1% AEP rainfall event. Only two Flood Ponding Areas have been specifically identified on the planning maps. One of the areas is located in the southern part of Huntly adjacent to the eastern bank of the Waikato River and the other is in Huntly West adjacent to Lake Waahi and Lake Puketirini.
17. High Risk Flood Area
High Flood Risk Areas have also been identified as areas within the Flood Plain Management Area where the depth of flood water in a 1% AEP flood event exceeds 1 metre and the speed of flood water exceeds 2 metres per second as required by the WRPS. These areas are considered to pose a high level of risk in terms of the potential for loss of life, injury or serious damage to property.
18. Defended Area (Residual Risk Area)
Defended Areas are areas of land that would be at risk from flooding during a 1% AEP flood event if it were not for a structural defence such as a stopbank. These areas are generally located along the length of the Waikato River from the southern boundary of Huntly township to Otatau in the northern part of the district.

19. High Risk Coastal Hazard (Erosion) Area and High Risk Coastal Hazard (Inundation) Area
The High Risk Coastal Hazard (Erosion) Area and High Risk Coastal Hazard (Inundation) Area overlays identify land where there is significant risk from either coastal erosion or coastal inundation with existing sea level and coastal processes.
20. Coastal Sensitivity Area (Erosion) and Coastal Sensitivity Area (Inundation)
The Coastal Sensitivity Area (Erosion) and Coastal Sensitivity Area (Inundation) overlays identify land that is potentially vulnerable to either coastal erosion or coastal inundation over a 100 year period to 2120, assuming a sea level rise of 1.0 metre due to the projected effects of climate change.
21. Mine Subsidence Risk Area
The Mine Subsidence Risk Area identifies land in Huntly East that is currently at risk of subsidence due to historic underground coal mining activities and the subsequent closure and refilling of the Huntly East underground mine.
22. Liquefaction
Liquefaction areas have not been identified on the plan maps, however additional assessment matters have been included in some subdivision and land use rules which may require a liquefaction assessment to be carried out before subdivision or development takes place.
23. Slope Instability
Areas of slope instability have also not been identified on the planning maps. To comprehensively identify these areas over the entire district is not practical given the size of the district and the changing circumstances in which slope instability occurs (often after high rainfall or seismic events). Therefore, a set of policies have been developed and assessment matters included in relevant rules to ensure assessment of this hazard occurs before subdivision or development takes place.
24. Wind and Seismic Loading
Wind and seismic loadings are controlled by the council under the Building Act 2004. The risk of fire hazard is controlled by the Waikato Regional Council, the Department of Conservation and the Waikato District Council through legislation other than the Act, using both regulation and by increasing public awareness through information.

1.1.2 Climate Change

25. Climate change will have impacts for the environment beyond the exacerbation of natural hazard events outlined above. Impacts such as increased periods of drought are predicted to place further strain on biodiversity. Sea level rise is also likely to impact on coastal habitat and access to the coast as coastal margins are increasingly eroded or inundated.
26. A policy framework has been included in this proposed plan to address the need for increased resilience to the projected changes in climatic conditions. These policies seek to ensure future land use planning and natural hazard management incorporate measures to address climate change. Further to this, there will be an increased focus on environmental protection and facilitating inland migration of biodiversity. Policies in this district plan will include promoting low impact urban design and green infrastructure, and increased coastal hazard setbacks to provide a more sustainable and adaptive approach for new development.

1.2 Significance of this Topic

27. Natural hazards can have a significant impact on and cause major disruption to people's lifestyles, well-being and financial stability. The Waikato district is susceptible to a range of natural hazards such as river flooding and ponding, coastal inundation and erosion and land instability (land slips and subsidence) and to a lesser extent, earthquakes and liquefaction, volcanic eruptions and tsunamis.
28. Climate change is expected to increase the likelihood and intensity of weather-related natural hazard events. The effect that climate change will have on flooding and coastal inundation and erosion has been taken into account in the flood modelling between Horotiu and Ohinewai and the assessment of coastal hazards along the west coast.
29. The legislation and policy documents relating to natural hazard management and climate change are arranged in a hierarchy where lower level documents, such as district plans, need to either be consistent with, to have regard to, or to give effect to the higher order documents. All provisions within these policy documents and plans prepared under the Act must achieve the purpose of the Act (Part 2 Section 5).
30. The management of significant risks from natural hazards is a matter of national importance under Section 6(h) of the Act, and under Section 7(i) the council is required to have particular regard to the effects of climate change when exercising its functions and powers, including the preparation of a district plan.
31. The Act outlines specific responsibilities for councils in managing natural hazards. Regional councils control the use of land in order to avoid or mitigate natural hazards. Territorial authorities control any actual or potential effects of the use, development, or protection of land for the same purpose (s31(1)(b)(i)). The Regional Policy Statement outlines the respective roles where there is an overlap between regional and territorial councils' functions.

1.3 Resource Management Issues to be addressed

32. There is competing pressure between the need for growth and development in some areas of the district and the need to regulate land use and development where land may be exposed to natural hazards. This pressure requires careful management of development to ensure the risks of natural hazard events on land use and development are either avoided or effectively remedied or mitigated.
33. The Waikato Regional Policy Statement (WRPS) sets out what the Waikato District Council is expected to do when managing natural hazard risk. The WRPS includes specific policies and methods, which are to be implemented through provisions in the district plan.
34. The WRPS requires district plan provisions to incorporate a risk-based approach when regulating subdivision, use and development in relation to natural hazards. Currently, the provisions in the Waikato and Franklin Sections of the Waikato District Plan (the Operative Plan) are not consistent with the risk-based approach outlined in the WRPS, and this needs to be addressed.

35. Some hazards may not need to be managed through the district plan (e.g. tsunami, extreme wind events and drought) as other mechanisms can be used, such as community education and advocacy, warning systems, emergency preparedness, civil defence recovery plans, and contingency planning. Insurance and emergency services also play a role.
36. For those hazards that do need a district plan response, the district plan will need to follow the direction set out in the VRPS, including:
- **identifying the areas potentially affected by flooding during a 1% AEP flood event and coastal hazards, prioritising the areas at high risk;**
 - **controlling subdivision in areas identified as high risk flood zones and high risk coastal hazard areas to avoid the demand for new protection structures;**
 - **controlling the use and development (including habitable structures, significant community infrastructure such as hospitals and emergency services, and lifeline utilities) in high risk flood zones and high risk coastal hazards risk areas;**
 - **ensuring risk to development within the floodplain or a coastal hazard area is appropriately assessed and any adverse effects either avoided, remedied or mitigated;**
 - **allowing for essential infrastructure where it cannot be located elsewhere or where it will not increase natural hazard risk;**
 - **identifying key hazard areas on the planning maps including:**
 - **1% AEP Floodplain**
 - **High risk flood zones**
 - **Residual risk zones**
 - **Coastal hazard areas**
 - **Areas at high risk of coastal hazards;**
 - **deciding how the council will manage 'residual risk' in areas where there are existing defences against flooding;**
 - **making provision for managed retreat in areas where the risk is 'intolerable';**
 - **focusing on community resilience; and**
 - **considering the potential effects of high impact, low probability natural hazard events.**

1.4 Current Objectives, Policies, Rules and Methods

37. The Operative Waikato District Plan currently consists of two sections, the Waikato Section and the Franklin Section, which is a legacy of the amalgamation of the southern part of the ex-Franklin District with the Waikato District in 2009. Each sections of the plan takes a slightly different approach to regulating use, development and subdivision of land that is subject to natural hazards.
38. The Operative District Plan recognises that natural hazards are an important issue that the plan must address. Both Waikato and Franklin Sections of the district plan seek to manage natural hazards and their risk, and advocate for a precautionary approach where there is uncertainty over the extent of future impacts. Current operative objectives, policies and methods, including rules for natural hazards and climate change are summarised below. The full suite of operative objectives, policies and methods for both sections of the Waikato District Plan are set out in Appendix 3.
39. Chapter 5 of the Waikato Section provides an objective and policy framework for natural hazards and the effects of climate change. The objective and policies focus on:
- minimising the natural hazard risk to people and property;
 - avoiding development of land that is subject to significant natural hazards;
 - mitigating risk to health, safety and property;
 - ensuring new development does not exacerbate natural hazards or compromise natural processes;
 - controlling development in areas where 0.5m of sea level rise will result in the land being either below Mean High Water Springs (MHWS) or subject to coastal erosion or subject to inundation during storm surge events;
 - minimising impervious surfaces, stormwater drainage and mitigating offsite effects of stormwater;
 - providing fire protection through fire breaks, water source for firefighting and development setbacks;
 - maintaining or enhancing natural buffers;
 - designing and locating development to avoid or mitigate the effects of climate change on natural hazards including flooding, erosion, fire and storms;
 - applying a precautionary approach where there is insufficient information or uncertainty around the effects of climate change and sea level rise;
 - managing onsite and offsite effects of stormwater;
 - retaining natural drainage systems and minimising impervious surfaces.
40. Methods to give effect to the objectives and policies include:
- identifying hazard areas on the planning maps;

- designing and locating buildings to mitigate hazard risk, i.e. requiring minimum floor levels and identifying the location of building platforms;
- specifying coastal building setbacks;
- controlling subdivision on land subject to hazards;
- utilising designations, i.e. stop banks;
- providing flood, coastal and other protection works;
- cooperating with the Waikato Regional Council to implement the public information objectives of the Regional Policy Statement;
- collating hazard information into a hazard register and updating that information regularly. The register is used when assessing building permit applications in terms of section 36 of the Building Act 2004.

41. The Franklin Section identifies climate change as a natural hazard and manages its effects through the natural hazards provisions in Part 7 and coastal issues in Part 16 and Part 17. The objectives and policies focus on:

- ensuring activities on land subject to, or likely to be subject to instability do not cause, increase or contribute to the risk from natural hazards;
- reducing the risk to property and the environment from flooding caused by watercourse, stormwater overflow and inundation by coastal waters;
- avoiding, remedying or mitigating the adverse effects to property and the environment from erosion including coastal erosion;
- avoiding land modification and development along sandy coastal margins and seaward faces of the coastal escarpments or ridgelines;
- informing the public about natural hazards in the district and why subdivision, land use and development activities must avoid, remedy, or mitigate the adverse effects from natural and land hazards;
- taking a precautionary approach to natural hazard management including sea level rise and climate change, where limited information on the hazard risk exists;
- allowing low impact design and soft flood protection works options to be considered.

42. Methods to give effect to the objectives and policies include:

- requiring site suitability reports to accompany resource consent applications to identify land instability, inundation and more specifically land within the 1% AEP flood plain and primary and secondary overland flow paths;
- controlling stormwater runoff from impervious surfaces;
- identifying the location of streams and other water bodies on the planning maps;

- identifying setback distances from waterbodies and controlling development within the setback;
 - identifying coastal setback distances and controlling development within the setback;
 - controlling development within the 1% AEP floodplain;
 - requiring minimum floor levels for new occupiable floor space above the 1% design flood level;
 - requiring provision for esplanade reserves at time of subdivision of land adjacent to coastal, stream, river and lake margins;
 - providing evidence of ability to avoid, remedy or mitigate adverse effects in resource consent applications, concept plans and structure plans;
 - using Section 106 of the Resource Management Act (RMA) to decline subdivision applications where land or any structure on the land is likely to be subject to material damage from a natural hazard.
43. The natural hazards provisions in the former Franklin District Plan (Franklin Section) were updated in 2010 through Plan Change 25 to address gaps in the management of natural hazard risk.

1.5 Information and Analysis

Risk-based Approach

44. Managing natural hazards through a risk-based approach requires a large amount of up to date and robust information. In particular, technical assessments and modelling to identify the spatial extent of different hazards. As part of the review of the natural hazards topic, information on different natural hazards such as flooding, ponding, subsidence and coastal inundation and erosion has been collated and analysed to help with the preparation of the hazard mapping and district plan provisions. This work has involved input from the Waikato Regional Council, technical experts, Civil Defence, local authorities, iwi, the community and emergency services and is described in the following paragraphs.

Flood Modelling

45. The Waikato Regional Council (WRC) completed 1D flood modelling for the 1% Annual Exceedance Probability (1% AEP) flood event along the full length of the Waikato and Waipa Rivers (within the Waikato District) in November 2016. The model was created by extrapolating the 1959 flood protection scheme design 1% AEP 1D flood model over the adjacent floodplain (topography derived from LiDAR using WaterRide Software) to create a representation of the flood extent. The resulting maps only model flooding from the main river channels (many tributaries and over bank ponding areas are not included) and do not include the projected effects of climate change on rainfall intensity and sea level rise.

46. The WRC commissioned DHI to develop a 2D model of the 1% AEP flood event for the Waikato River from Horotiu to Ohinewai and a section of the Waipa River from Saulbrey Road to the confluence at Ngaruawahia. This model includes two projected climate change scenarios in addition to the current climate (0°C temperature increase). The two climate change scenarios were based on the projected temperature increases as a result of greenhouse gas concentration trajectories, i.e. the Representative Concentration Pathway (RCP) scenarios adopted by the Intergovernmental Panel on Climate Change (IPCC). One scenario is based on the projected New Zealand land-average temperature increase between 1986-2005 and 2101-2120 for the RCP6.0: 2.3°C scenario. The other scenario is based on the projected Waikato region temperature increase between 1986-2005 and 2101-2120 for the RCP8.5: 3.8°C scenario (Appendix 5(a)).
47. The Waikato Regional Policy Statement (WRPS) requires district plans to recognise and provide for the effects of climate change, having particular regard to projected increase in rainfall intensity assuming a minimum increase in temperature of 2.1°C by 2090 (relative to 1990 levels). This is equivalent to RCP6.0: 2.3°C increase in temperature over the next 100 years to 2120. The RCP6.0 modelled scenario is the 1% AEP flood hazard overlay area in the Proposed District Plan planning maps. This model also distinguishes areas within the floodplain that, during a 1% AEP flood event, the depth of flood water exceeds one metre and the speed of exceeds two metres per second. These areas have been identified as the High Risk Flood Area on the planning maps.

Flood Ponding

48. The council has relied on existing information to identify ponding risk at Huntly South (rather than including this in the 2D flood hazard model). This existing hazard layer has not been reassessed as there is not enough data available on the Huntly stormwater network to evaluate the hazard and provide meaningful results.

Residual Risk

49. Residual risk areas have also been identified using existing information from the Regional Council. These areas are called Defended Areas in the district plan. Residual risk areas are those areas that would be at risk from flooding during a 1% AEP flood event were it not for a structural defence such as a stopbank. In the rural areas, the WRC mapping of defended areas is based on those properties that are directly protected by a stop bank and pay targeted rates to the WRC for this protection (High Benefit Areas). In Huntly, the mapping is based on land that is at or below the design flood level of the stop bank, based on LiDAR data.

Coastal Hazard Assessment

50. A coastal hazards assessment has been undertaken for the west coast, focusing initially on the urban areas of Raglan and Port Waikato (Appendix 5(f)). This has been extended to include a desk-top assessment of rural areas along the open coastline. The assessment has defined areas potentially vulnerable to coastal erosion and coastal flooding, including:
- areas at greatest risk with existing sea level - High Risk Coastal Hazard (Erosion) and High Risk Coastal Hazard (Inundation)

- additional areas that could be affected with projected sea level rise over the next 100 years
 - Coastal Sensitivity Area (Erosion), Coastal Sensitivity Area (Open Coast) and Coastal Sensitivity Area (Inundation).
51. Iwi and local communities have provided local knowledge on coastal hazards through hui, open days and public meetings. This information, along with GIS mapping, has been used in the identification of these coastal hazard risk areas.
52. The coastal hazard areas proposed are as follows:
- **A High Risk Coastal Hazard Area (Erosion) and a High Risk Coastal Hazard Area (Inundation), identifying areas where there is already significant risk from coastal erosion or inundation with existing sea level and coastal processes in the short term (within the lifespan of a district plan).**
 - **A Coastal Sensitivity Area (Erosion) and a Coastal Sensitivity Area (Inundation), identifying the areas potentially vulnerable to coastal erosion/inundation over the period to 2120, assuming sea level rise of 1.0 m.**
 - **A Coastal Sensitivity Area (Open Coast) in the rural areas along the open coastline and within the estuaries, which includes areas of the coastal margin that could potentially be impacted by coastal flooding and/or coastal erosion, assuming sea level rise of 1.0 m to 2120.**
53. A review of coastal hazards along the eastern coastline (approximately 168m at the Firth of Thames) has been undertaken as part of the Hauraki District Council Kaiaua Coast 2120 project and is not included in Stage 2. This hazard information will be incorporated into the Proposed Waikato District Plan by way of a variation at the completion of that project.

Liquefaction Studies

54. A number of studies indicate that liquefaction has the potential to occur within the district, particularly in recent Holocene soils which are susceptible to ground shaking. The Waikato Zone Natural Hazard Management Plan 2016 (LWZNHMP) includes a map showing broad areas in the Lower Waikato Zone that are most hazardous to least hazardous in respect to earthquake hazard (shaking) causing liquefaction. However, the map scale is too small for use in the district plan and does not cover the entire district. It is also generalised in that it does not include groundwater information or shaking intensities and is based mainly on lithology and underlying soil types with the assumption they can become easily saturated. While the LWZNHMP recommends the identification of liquefaction susceptible areas in the Region, including the Waikato district, no work to date has been completed. However, there are proposed changes to the Building Act that will require mapping of liquefaction risk and this work is being progressed. The WRC is working on more detailed liquefaction information taking into account groundwater and predicted earthquake shaking intensities.

55. In the absence of detailed mapping, the Proposed Chapter provides additional matters of discretion in respect to liquefaction for subdivision and higher density development, which are already restricted discretionary activities in Stage 1. A section on information requirements when liquefaction risk requires assessment is also included. The technical literature informing the liquefaction risk section of the chapter includes: Planning and Engineering Guidance for Potentially Liquefaction-prone Land, EQC, MBIE, MfE, September 2017 and Earthquake Geotechnical Engineering Practice, Module 3: Identification, Assessment and Mitigation of Liquefaction Hazards, May 2016, MBIE and NZ Geotechnical Society Inc. Others relied upon are included in the list of technical documents accompanying this Section 32 Report and the provisions of the Christchurch District Plan (referred to in the joint EQC, MBIE, MfE document referenced above), where liquefaction after the Canterbury Earthquake Sequence (2010-2011) was significant.

Mine Subsidence

56. An assessment has been carried out to confirm the likelihood of ongoing mine subsidence and methane gas migration from mine workings to the ground surface above the Huntly East mine and the South Headings as a result of the closure of the Huntly East Mine and subsequent flooding of the underground mine workings (Appendix 5(c)). This assessment included more detailed mapping of the hazard areas, and this has resulted in some changes to the spatial extent of the subsidence area. A peer review of this work confirmed the presence of both hazards (Appendix 5(d)). Council then engaged RDCL (Appendix 5(e)) to assess the level of risk from mine subsidence or gas migration to the land use and development above the mine. This work confirmed that there is a continued risk of subsidence while the mine is flooding, but the likelihood of methane gas migrating to the ground surface was considered to be extremely low due to the geology and presence of ground water above the mine obstructing the upward migration of gas.

Key Technical Reports and Peer Reviews

57. The key technical assessments and reports list in Table 1 below were prepared specifically for, and used to inform the development of, the Proposed District Plan Stage 2 provisions on natural hazards and climate change. The technical reports listed below are included in Appendix 5.

Table 1: Key technical assessments and reports prepared specifically for the Waikato District Plan Review (Stage 2)

Hazard	Title	Prepared by	Prepared for	Date
River Flood Modelling	Lower Waikato 2D Modelling – Huntly, Ohinewai and Horotiu Model Build - DHI Project No. 44801126	DHI	Waikato Regional Council and Waikato District Council	February 2020
	Lower Waikato River Model Peer Review - T+T Job No. 1005528	Tonkin + Taylor Ltd	Waikato Regional Council	May 2020
Mine Hazards	Report on hazards following mine closure, Huntly East - IRBA Project No. 1003	IRBA Geological Engineering Consultants	Waikato District Council	October 2018
	Peer Review of Ian R Brown	TerraFirma	Waikato District	January

	Associates report titled Report on Hazards following mine closure, Huntly East - Project No. TFM0096	Mining Ltd	Council	2019
	Risk Assessment for Urban Areas above the Mine – Huntly East Mine Closure Assessment - Report No. R-19357-01	RDCL	Waikato District Council	October 2019
Coastal Hazards	Waikato District Hazard Assessment - Focus Report No. 20/130	Focus Resource Management Group	Waikato District Council	February 2020
	Review of Waikato District Coastal Hazard Assessment - T+T Job No. 1012915	Tonkin + Taylor Ltd	Waikato District Council	December 2019
	Waikato District Council Coastal Hazard Assessment – Response to Peer Review	Focus Resource Management Group	Waikato District Council	March 2020
	Addendum – Amended mapping criteria for Whaanga Coast and Te Kopua	Focus Resource Management Group	Waikato District Council	June 2020
Economic Assessment	Waikato District Plan Review: Natural Hazards and Climate Change Economic Assessment	M.E Consulting	Waikato District Council	June 2020

58. Council relied on key relevant technical documents to guide and assist with the development of the proposed provisions and hazard mapping. These documents are listed in Table 2 below:

Table 2: Other relevant technical reports and guidance

Title	Prepared by	Date
Climate Change Projections for New Zealand.	Ministry for the Environment - Pub Ref No. MFE 1385	September 2018
Coastal Hazards and Climate Change, Guidance for Local Government.	Ministry for the Environment	December 2017
Earthquake Geotechnical Engineering Practice, Module 3: Identification, Assessment and Mitigation of Liquefaction Hazards.	Ministry of Business, Innovation and Employment and NZ Geotechnical Society Inc.	May 2016
Engineering Geological Feasibility Assessment – Lorenzen Bay Structure Plan Hills Road, Raglan. Prepared by Mark T Mitchell Ltd.	Waikato District Council	August 2005
Huntly Flood Management Plan, 1995.	Waikato Regional Council. Technical Publication No. 1992/15.	1995
Liquefaction Vulnerability Study. Prepared by Tonkin + Taylor Ltd.	Earthquake Commission. T+T Ref. 52020.0200/v1.0.	February 2013
Lower Waikato Waipa Control Scheme – Land Classification and Direct Benefit Analysis for Differential Rating Purpose.	Environment Waikato, TR 01/16.	January 2016
Lower Waikato Zone Natural Hazards Management Plan.	Waikato Regional Council. Internal Series No. 2016/27.	2016
Numerical Modelling of Tsunami Effects at Port Waikato, Raglan and Aotea Waikato West Coast, New Zealand – V2. Prepared by eCoast Ltd - Borrero J.C & O'Neill S	Waikato District Council	February 2016
Planning and Engineering Guidance for Potentially Liquefaction-prone Land.	Earthquake Commission, Ministry for the Environment and Ministry of Business, Innovation and Employment.	September 2017
Planning and Engineering Guidance for Potentially Liquefaction-prone Land – Resource Management Act and Building Act aspects.	Earthquake Commission, Ministry for the Environment and Ministry of Business, Innovation and Employment.	September 2017
Waikato District Council Hazard Register.	Waikato District Council	Ongoing
Waikato Regional Council Position on residual risk and implementation of PRPS Method 13.2.6.	Waikato Regional Council. WRC Document No. 3613684.	2015
Waikato Regional Flood Event of 9 to 20 July 1998.	Environment Waikato Technical Report 1998/15.	1998
Waikato Regional Policy Statement – Implementation Practice Note on Natural Hazards.	Waikato Regional Council. Document No. 12000091	March 2019

River Modelling – Meta Data		
Waikato River 1% AEP 2D Flood Extent (Horotiu to Port Waikato) as interpolated from a MIKE 1D model – Meta Data.	Waikato Regional Council. Meta Data that accompanied the flood data shape files.	January 2018
Waipa River 1% AEP 1D Flood Extent created using WaterRIDE software to create a 2D representation - Meta Data.	Waikato Regional Council. Meta Data that accompanied the flood data shape files.	October 2017
Resource Consent Technical Assessments		
Geotechnical Assessment Report for Ray Road Ngaruawahia. hdgeo, Project Number: HD703.	WDC Resource Consent	September 2018
Preliminary Subdivision Assessment for 21 Galbraith Street, Ngaruawahia - DB Consulting Engineers. Ref I80848.	WDC Resource Consent	July 2018
AS/NZS and NZ Standards		
AS/NZS1547:2012 – Australian/New Zealand Standard. On-site domestic wastewater management.	NZ Standards	2012
NZS4404:2010 – New Zealand Standard. Land Development and Subdivision Infrastructure.	NZ Standards	2010
Stormwater Catchment Management Plans and flood management plans		
Tamahere Stormwater Catchment Management Plan.	Prepared by GHD for the Waikato District Council	March 2011
Te Kauwhata Catchment Management Plan.	Prepared by Beca Infrastructure Ltd for the Waikato District Council.	July 2009
Ngaruawahia Catchment Management Plan.	Prepared by T+T for the Waikato District Council.	March 2015
Tuakau Draft Catchment Management Plan.	Prepared by T+T for the Waikato District Council.	July 2014
Pokeno Catchment Management Plan.	Prepared by Franklin District Council.	2010
Port Waikato Stormwater Catchment Management Plan.	Prepared by City Design Ltd for the Franklin District Council.	September 2004

1.6 Consultation Undertaken

59. To help the council prepare the new natural hazard provisions, consultation with a wide range of stakeholders was carried out at different times throughout the review. This included consultation with communities, individual land owners, Iwi Authorities, hapuu and organisations either directly or indirectly affected by natural hazards and climate change. In addition, Waikato District Council staff with different functions related to natural hazards; the Waikato Regional Council hazard advisory team; and central government departments (LINZ, Worksafe and MBIE), provided their expertise during the development of the draft provisions and hazard mapping.

60. The engagement on the natural hazards topic started when the draft objectives and policies and the 1% AEP flood modelling for the Waikato and Waipa Rivers were made available for public feedback along with the Stage 1 Draft Proposed District Plan in November 2017. A series of community drop-in sessions were held throughout the district following the release of the draft to allow the community to discuss with staff and councillors about any topic in the district plan that was important to them. There was interest in the natural hazards and climate change topics from a small number of stakeholders at that time. The main feedback received was from Mercury Energy. Its feedback was regarding the inclusion of objectives and policies without having completed the hazard modelling; stating it was impossible to carry out a risk-based approach without an understanding of the location and extent of hazard areas. Mercury Energy also opposed the staging of the district plan review and suggested that the Proposed District Plan not be notified until the natural hazards and climate change topics were completed.
61. Community and iwi input was specifically sought during the assessment of coastal hazards, with public workshops and/or open days being held at Port Waikato and Raglan in December 2017 and November 2018 and workshops with iwi being held with Tainui o Tainui in Raglan in March 2019 and November 2019 and with Ngati Karewa/Ngati Tahinga Trust in Port Waikato in May 2019 and January 2020. The initial sessions were to gather information about coastal hazards from the local communities. The subsequent sessions were to provide an opportunity to share the findings of the coastal hazard assessment and to give the community and iwi an opportunity to provide feedback.
62. Workshops were held in February and August 2019 with council staff (including representatives from building consents, roading, three waters infrastructure, resource consents and planning policy), consultants, and staff from LINZ, Worksafe and MBIE to specifically discuss the issues and hazards associated with the Huntly East Mine and the South Headings.
63. A collaborative partnership with Waikato Regional Council staff was established for the development of Stage Two with both councils contributing to the development of the 1% Annual Exceedance Probability 2D flood modelling for the Waikato and Waipa rivers and the Waikato Regional Council staff contributing technical information and support to Waikato District Council staff throughout the development of the draft provisions and hazard maps. Mercury were also included in some discussions in relation to the outputs of the 1D and 2D 1% AEP flood modelling and the defended area mapping.
64. Communities, including iwi and key stakeholders across the entire district, were given an opportunity to submit feedback on draft provisions and hazard maps during the release of the draft Chapter 15, the hazard maps and Variation 2 to Stage 1 Proposed district plan when these documents were released for public feedback at the end of September 2019. The release of the draft was followed by stakeholder meetings and public drop-in sessions held in Raglan, Ngaruawahia, Huntly, Tuakau and Port Waikato in October and November 2019.
65. Hui were held with iwi to discuss the Draft District Plan provisions, hazards maps and the variation with Tainui o Tainui in Raglan in late November 2019 and with Ngati Karewa/ Ngati Tahinga Trust in Port Waikato in January 2020. Two further hui were held with Tainui o

Tainui on 21 May and 4 June 2020 to discuss the implications of hazard mapping and draft provisions for development on Maaori Freehold Land.

66. Email correspondence was also sent to the Minister for the Environment, the Minister for Climate Change, the Minister for Land Information, the Minister for Conservation, and the Minister for Energy and Resources, as well as adjacent local authorities including Waikato Regional Council, Hamilton City Council, Waipa District Council and Hauraki District Council following the release of the draft in September 2019.
67. Issues raised through public feedback on the draft provisions and hazard maps were assessed and considered and, where appropriate, draft provisions were amended to incorporate feedback.
68. A schedule of all consultation undertaken is contained in Appendix 6 and includes who was consulted, what they were consulted on, the date of consultation and a summary of feedback received.

1.7 Iwi Authority Advice

69. The council is required to undertake further consultation with iwi authorities on a draft proposed plan prior to notification of the plan and to take into account any advice received from those authorities before it notifies a proposed plan¹. This section of the report sets out the process carried out and the advice received from iwi authorities and how that advice has been taken into account.
70. Council emailed a copy of the draft Stage 2 documents, including the draft Chapter 15, the draft Variation 2 to Stage 1 PDP and an electronic link to the online draft hazard maps to the Iwi Authorities and Hapuu listed below on 14 April 2020.
 - Waikato Tainui
 - Whanake Taiao-Maniapoto Maaori Trust Board
 - Waahi Whaanui Trust
 - Ngāti Wairere
 - Tainui Hapū Environmental Management Committee
 - Ngāti Tamaoho Trust
 - Ngāti Paoa Iwi Trust
 - Ngāti Hauā Iwi Trust
 - Moana Rāhui o Aotea
 - Hauraki Collective
71. Follow up emails and phone calls were made to ensure the documents were received and not overlooked. Each recipient was provided with an opportunity to meet with the council project team to talk through the approach taken with Stage 2 and to ask questions. As a result of this process, a total of five (online) hui were held with Waikato Tainui, Maniapoto, Ngāti Wairere and Tainui o Tainui (Raglan) and phone conversations with Ngāti Tamaoho Trust, Moana Rahui o Aotea, Ngāti Haua Iwi Trust and Waahi Whaanui Trust. Council staff

¹ Clause 4A of Schedule 1 of the RMA

tried to make phone contact with the Hauraki Collective and Ngāti Paoa Iwi Trust but were unsuccessful.

72. The advice and feedback received to date are summarised in Table 3 below.

Table 3: Consideration of advice from Iwi Authorities

Date	Iwi Authority /Hapuu	Subject Matter/Purpose	Information Received	Consideration of information and resulting amendments
14 April 2020	Waikato Tainui Released to open (WDC2007/05)	Draft District Plan (Stage 2), Variation 2 to Stage 1, online link to Draft Hazard Maps and a letter from WDC explaining the request for feedback and timeframe for Notification.	Hui held on 15 April, 4 June and 1 July 2020 and included Waikato Tainui, Ngāti Wairere and Maniapoto to discuss the broad approach taken in Stage 2 to manage natural hazard risk and the effects of climate change. <u>Feedback received on 1 July 2020 -</u> <ul style="list-style-type: none"> Requested that Stage 2, Variation 2 and the s32 report to recognise the Vision and Strategy as the primary direction setting document with regards to the Waikato River and for activities in the catchment; and ensure that stage 2 topics are given adequate consideration during zoning hearings; <u>General support for:</u> <ul style="list-style-type: none"> the risk-based approach as this aligns with the directions set out in the Waikato-Tainui Environmental Plan (WTEP); the identification/mapping of hazard areas as it gives a greater degree of certainty, noting that worse case scenarios should also be modelled and discussed with communities outside of the district plan context; and the avoidance of increased risks to 	In respect of Chapter 15 - Accepted Reference in the introduction (2nd paragraph) to the particular considerations that should be considered when addressing potential impacts of natural hazards on Maori Freehold Land; Amended Policy 15.2.1.8(a)(iv) to include reference to hard protection works not transferring or increasing risk to Maori Sites and Areas of Significance; Amended Policy 15.2.2.1(a)(ii) to include the Waikato Regional Council Hazard Portal and added 15.2.2.1(a)(iv) to ensure alignment with the work of other agencies including WRC and Iwi; Amended Policy 15.2.3.1(a)(iii) to include in respect of rezoning, the requirement for an assessment under the RCP 8.5 climate change scenario for rainfall and RCP 8.5H+ climate change scenario for sea level rise; Amended Policy 15.2.3.2(a)(i) to include reference to addressing the potential environmental and social costs of climate change.

	Released to open (WDC2007/05)		<p>significant natural hazards as this aligns with the directions set out in the WTEP;</p> <ul style="list-style-type: none"> Continued community engagement and awareness of climate change and natural hazards, carried out in a coordinated way with Iwi and other lead agencies such as WRC. Add a permitted/controlled activity to enable earthworks for the establishment and reinstatement of wetland habitat and creation of eel and whitebait habitat. <p><u>Climate change:</u></p> <ul style="list-style-type: none"> The Waikato-Tainui 5-year plan, Te Ara Whakatupuranga 2050, identifies the need to support whaanau to respond to climate change impacts through the development and implementation of marae-based climate change mitigation plans. The technical/spatial information presented in the plan change will assist in the development of these Marae Plans. Further assistance and support should be available from council and central government to assist hapuu and marae to adapt to the effects of climate change, particularly given the costs of adaptation that Maaori throughout the takiwaa and motu have already been forced to undergo. Waikato District Council should take 	<p>Rejected</p> <p>Amendment to Policy 15.2.1.4(a) to reference avoidance rather than enablement. The policy enables new infrastructure in areas at significant risk of natural hazards as it recognises there are situations where infrastructure and utilities are technically, functionally or operationally required to be located there and it is not practical to be located elsewhere. Any increase in risk is still required to be mitigated.</p> <p>Amendment to Policy 15.2.3.2(a)(ii)(C) to qualify efficient water to be only for 'reuse' as this change is considered unnecessary and more restrictive;</p> <p>Adding 15.2.3.2(a)(v) to include 'raising community awareness of worst case scenarios associated with climate change'. It was considered that a change relating to community awareness was better reflected in Policy 15.2.2.1. The worst case flooding scenario is shown on the WRC Hazards Portal in relation to a dam burst. Any flood modelling for an RCP 8.5 climate change scenario are only required to be carried out when proposing rezoning;</p> <p>New permitted/controlled activity to enable earthworks for the establishment and reinstatement of</p>
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			<p>an active role in this space – particularly around lobbying government for funding assistance where there is a pressing need for adaptation.</p> <ul style="list-style-type: none"> • Waikato-Tainui expect a stronger stance on climate change; <p><u>Specific feedback on Stage 2 and Variation 2</u></p> <ul style="list-style-type: none"> • Amend text to include commentary on the location of each hazard area in regard to affected communities (towns and villages) and Maaori Freehold Land and Marae; • Make minor amendments to provisions to better reflect Waikato-Tainui values and impacts on communities and owners of MFL. 	<p>wetland habitat and creation of eel and whitebait habitat. This is a substantial change. There was not enough time to give this change consideration. Waikato-Tainui agreed to consider including this in a submission to the PDP (Stage 2).</p> <p>In respect to Variation 2 – Accepted Reference to river communities in 1.4.4 The urban environment; Reference to addressing natural hazard risk when preparing plans for developing urban land. Waikato-Tainui feedback requested the use of the terms growth planning and master planning. Rather than using those terms the amendment refers to spatial planning as this is a term that can be used to describe land use planning over various scales.</p>
14 April 2020	Whanake Taiao-Maniapoto Maaori Trust Board	Draft District Plan (Stage 2), Variation 2 to Stage 1, online link to Draft Hazard Maps and a letter from WDC explaining the request for feedback and timeframe for Notification.	<p>Feedback received on 30 June 2020. Main issues raised in feedback included:</p> <ul style="list-style-type: none"> • Maniapoto Maaori Trust Board advise and recommend Stage 2 recognises and provides for Ko Tā Maniapoto Mahere Taiao Maniapoto - Environmental Management Plan by ensuring the Maniapoto actions are clearly expressed and referenced in the Plan • Maniapoto supports Waikato-Tainui feedback on Stage 2; 	<p>No changes were made to Chapter 15 or Variation 2 through feedback from the Maniapoto Maaori Trust Board. The development of stage 2 of the district plan review had particular regard for Ko Tā Maniapoto Mahere Taiao Maniapoto - Environmental Management Plan. Further refinement can be considered through a formal submission;</p> <p>Further engagement with the Maniapoto Maaori Trust Board will be</p>

			<ul style="list-style-type: none"> Requests further engagement with iwi following formal notification. 	carried out prior to Maniapoto making a formal submission.
14 April 2020	Waahi Whaanui Trust	Draft District Plan (Stage 2), Variation 2 to Stage 1, online link to Draft Hazard Maps and a letter from WDC explaining the request for feedback and timeframe for Notification.	Waahi Whaanui Trust supports feedback from Waikato Tainui	
14 April 2020	Ngati Wairere	Draft District Plan (Stage 2), Variation 2 to Stage 1, online link to Draft Hazard Maps and a letter from WDC explaining the request for feedback and timeframe for Notification.	Ngati Wairere supports feedback from Waikato Tainui	
14 April 2020	Tainui Hapū Environmental Management Committee	Draft District Plan (Stage 2), Variation 2 to Stage 1, online link to Draft Hazard Maps and a letter from WDC explaining the request for feedback and timeframe for Notification.	<p>Hui held on 21 May and 4 June 2020. Main issues raised at the hui included:</p> <ul style="list-style-type: none"> The Whaanga Coast Coastal Sensitivity Area mapping is too conservative and places too heavier burden on owners of Maaori Freehold Land to develop land in accordance with development aspirations; Council regulatory instruments have continuously placed significant restrictions on land development along the Whaanga Coast that result in costly regulatory processes for landowners; Te Kopua land MFL blocks significantly affected by hazard modelling - Coastal Sensitivity Areas (inundation and erosion). This places an additional 	<p>Agreement was reached between council and the Tainui Hapuu Environmental Management Committee to carry out detailed modelling for the Coastal Sensitivity Area for the Maaori Freehold Land blocks along the Whaanga Coast from just west of Whale Bay to the just west of Wainui Reserve. Also a minor amendment was made to the Coastal Sensitivity Area (Erosion) overlay area to remove the overlay from part of the Te Kopua 2B3 land block (western side of Riria Kereopa Memorial Drive). Both updates to the mapping have been completed.</p> <p>With regard to the issue of requiring resource consent to develop land at</p>

			<p>burden of needing resource consent to construct any buildings on this land where the land may not be affected by coastal hazards for some decades.</p> <ul style="list-style-type: none"> Addressing future hazards areas (as a result of sea level rise) through an adaptive management approach was debated. This approach was generally supported but only if rules could be redrafted to allow development as a permitted activity. <p>No formal written feedback submitted. However, through discussions at both hui, agreement was reached on an approach to resolve the main issues raised.</p>	<p>Te Kopua, an agreement was reached to consider development of rules for that land to allow development as a permitted activity where an approved adaptive management plan is in place and development is carried out in accordance with the plan.</p> <p>The Tainui Hapuu Environmental Management Committee agreed to investigate the criteria for an adaptive management plan and to formally submit on this matter through a submission on the Proposed District Plan.</p>
14 April 2020	Ngati Tamaoho Trust	Draft District Plan (Stage 2), Variation 2 to Stage 1, online link to Draft Hazard Maps and a letter from WDC explaining the request for feedback and timeframe for Notification.	<p>Feedback received 14 May 2020.</p> <p>Main issues raised in feedback included:</p> <ul style="list-style-type: none"> Request to identify waterways/over land flow paths and intermittent streams in stage 2; and To include provision for "green infrastructure" as a means to address climate change. 	<p>Permanent waterways are currently shown in the District Plan maps. Council drains are shown on the Waikato Regional Council Hazards Portal.</p> <p>Overland flow paths and ponding areas for most urban and peri urban areas throughout the district are included in the publicly available stormwater catchment management plans.</p> <p>The ponding areas could not be included in the District Plan as they have not been modelled using the consistent methodology. This makes it difficult to apply a consistent ponding area overlay in the District Plan.</p>

				Low impact, stormwater management and green infrastructure, as measures to help mitigate the effects of climate change, are provided for in the proposed Policy 15.2.3.2. Rules are included in Proposed Plan Chapter 14 with the Regional Infrastructure Technical Specifications providing acceptable means of compliance standards for low impact design features.
14 April 2020	Ngāti Paoa Iwi Trust	Draft District Plan (Stage 2), Variation 2 to Stage 1, online link to Draft Hazard Maps and a letter from WDC explaining the request for feedback and timeframe for Notification.	No feedback received	
14 April 2020	Ngāti Hauā Iwi Trust	Draft District Plan (Stage 2), Variation 2 to Stage 1, online link to Draft Hazard Maps and a letter from WDC explaining the request for feedback and timeframe for Notification.	No feedback received	
14 April 2020	Moana Rāhui o Aotearoa	Draft District Plan (Stage 2), Variation 2 to Stage 1, online link to Draft Hazard Maps and a letter from WDC explaining the request for feedback and timeframe for Notification.	No feedback received	
14 April 2020	Hauraki Collective	Draft District Plan (Stage 2), Variation 2 to Stage 1, online link to Draft Hazard Maps and a letter from WDC explaining the request	No feedback received	

		for feedback and timeframe for Notification.		
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Released to open (WDC2007/05)

1.8 Decision-making

73. The process of deciding how the council should manage natural hazards through its district plan requires much discussion between the council, council staff and technical experts. This section describes the process that was followed and the focus of the discussions that took place.
74. The process started with the preparation of two discussion documents, one for natural hazards and one for climate change, which were presented and discussed at council workshops in December 2015 and March 2016 respectively. This was followed by a project update, gap analysis (which identified where the operative plan was not meeting the requirements of the WRPS) and a workshop on the draft objectives and policies in August 2017.
75. In February 2018 the council decided to separate the district plan review into two stages. Delays to the coastal hazard assessment and flood modelling work meant that critical information was missing from the natural hazards and climate change topics. Work on these chapters was put on hold until the flood modelling and coastal assessment work could be completed.
76. Once this information was available, a series of council workshops were held between June and August 2019 to discuss the findings, draft policy framework and provisions/approaches to specific hazards. This included workshops to discuss flood risk, liquefaction, mine subsidence and coastal hazards. Detailed discussions were had during these workshops in relation to the draft provisions. In September 2019, the council approved release of the draft (Stage 2) natural hazard provisions, draft hazard maps, along with the draft variation to relevant provisions in the Stage 1 of the Proposed District Plan. A further workshop was held in March 2020 to present the finalised provisions (which had been modified in response to public feedback). Towards the end of July 2020, the council approved the provisions for public notification.
77. Appendix 7 provides a timeline of council workshops and meetings, what topics were discussed, and what decisions were made. The process included:
- **Preparation of briefing papers for councillors, followed by officer or technical expert presentations, with an opportunity for questioning;**
 - **Formal committee meetings (Strategy and Finance Committee) to approve key decisions (e.g. the decision to split the plan review into two stages and to publish draft provisions for consultation);**
 - **Project updates, to keep all councillors informed of progress;**
 - **Councillor workshops on particular types of natural hazards, with detailed discussions on the policy framework, degree of consistency with the WRPS, neighbouring council's approaches, and draft rules.**

2 ISSUES, OBJECTIVES, POLICIES AND RULES

2.1 Relevant Legislation

78. This section of the report summarises the legal framework and high-level guidance the council works within. These documents help to frame or define the resource management issues and provide higher-level policy direction to resolve the issues. A summary is provided in Table 4 below and the relevant legislation and strategic direction setting provisions are set out in Appendix 2.
79. Six key statutes guide the council in the management of natural hazards. These are set out below. However, for the purpose of Stage 2 of the district plan review, the provisions of the Resource Management Act 1991, the Civil Defence and Emergency Management Act 2002, the Local Government Act 2002 and the Building Act 2004 are the most important statutes for providing legislative guidance for the management of natural hazard risk. The Resource Management Act outlines the specific responsibilities of regional and district councils with regard to the regulatory functions and development of a regulatory framework for managing natural hazards.
80. Effective management of natural hazard risk and climate change relies on the interplay between multiple statutes and the coordination of the various agencies that exercise powers and functions under them. However, it is important to note that the policy guidance within these statutes remains very high level and much is left to the discretion and judgement of those responsible for implementation.

2.1.1 Resource Management Act 1991

81. The Act outlines the specific responsibilities of regional and district councils when managing natural hazards.
82. Part 2 Section 5 sets out the purpose of the Act, which includes promoting the sustainable management of natural and physical resources, while enabling people and communities to provide for their wellbeing and for the health and safety and avoiding, remedying or mitigating any adverse effects of these activities on the environment. In achieving the purpose of the Act, Section 6(h) of the RMA requires the management of significant risks from natural hazards as a matter of national importance to be recognised and provided for, and section 7(i) requires particular regard to be given to the effects of climate change.
83. Section 75 of the Act requires territorial authorities to prepare a district plan that provides objectives, policies and rules (if any) to fulfil its functions under Section 31 of the RMA. This includes under section 31(1)(b)(i)) the control of any actual or potential effects of the use, development, or protection of land for the purpose of the avoidance or mitigation of natural hazards.
84. Section 75(3)(a)-(c) of the Act states that a district plan must give effect to any national policy statement, any New Zealand coastal policy statement, any national planning standard and any regional policy statement. The NZ Coastal Policy Statement and the Waikato

Regional Policy Statement apply and relevant provisions are described below. Section 75(4) of the Act states that a district plan must not be inconsistent with a regional plan.

85. Natural hazards are defined under section 2 of the Act as being “any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment”.
86. Climate change is defined as “a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods”.
87. Section 31 of the Act requires council to control the actual or potential effects of land use, development and protection of land for the purpose of avoiding or mitigating natural hazards. Section 35 requires council to gather information, monitor and keep records, including “records of natural hazards to the extent that the local authority considers appropriate for the effective discharge of its functions”.
88. Section 106 Act enables a consent authority to refuse to grant subdivision consent if it considers that there is a significant risk from natural hazards. The consent authority can request an assessment of the risk from natural hazards, which may include a combined assessment of the material damage to, the land being subdivided, or any structures, or any other land, or any likely subsequent use of the land, that would result from natural hazards; and that would accelerate, worsen, or result in material damage.
89. Schedule 4(7)(1)(f) of the Act requires the assessment of environmental effects (AEE) that must be prepared to accompany an application for resource consent to consider, “any risk to the neighbourhood, the wider community or the environment through natural hazards...” This implies natural hazards will be a consideration in the assessment of resource consent applications. (Although the extent to which that is relevant will depend on the proposed activity, plan provisions and the type of consent required.)

2.1.2 Local Government Act 2002

90. The Local Government Act 2002 (LGA) is the primary statute that mandates many local government functions. Section 10 of the LGA sets out the purpose of local government, and includes the requirement to promote the social, economic, environmental, and cultural well-being of communities in the present and for the future.
91. A key requirement of the LGA is to prepare long term plans (LTPs) (under section 93). LTPs identify local authorities’ activities and expenditure over at least a 10-year planning horizon and provide a basis for accountability. Section 101A requires that as part of their LTP, local authorities must prepare financial strategies, which include asset management planning (i.e. what capital expenditure for network infrastructure, flood protection and flood control works are required to maintain existing levels of service).

92. Through the LTP and asset management planning process, local authorities must make decisions about what level of natural hazard protection their assets are to provide (in the case of flood protection works) or what level of event they are to withstand (in the case of network infrastructure). A separate infrastructure strategy must be prepared (under section 101B), which covers at least 30 consecutive financial years. The Strategy must give explicit consideration to the resilience of infrastructure in the event of natural disasters; the identification and management of risks relating to natural hazards and make appropriate financial provision for those risks. The Waikato District Council LTP contains objectives in relation to community resilience and capacity to respond and recover in an emergency.
93. There is no direct reference to climate change in the LGA, however as local government are to take a sustainable development approach to promoting the wellbeing of communities, it is likely that climate change adaptation and mitigation will be a consideration in future infrastructure planning.

2.1.3 Building Act 2004

94. One of the purposes of the Building Act (BA) is to ensure that buildings are designed, constructed, and are able to be used in ways that promote sustainable development (Section 3(a)(iv)).
95. Sections 71 to 74 of the Building Act relate to land subject to a known natural hazard. Under Section 71, councils must refuse building consent if the land on which the building work is to be carried out is subject to, or is likely to be subject to one or more natural hazards; or the building work is likely to accelerate, exacerbate, or result in a natural hazard on that land or any other property. The exception to this is if provision can be made to protect the land, building work, or other property, or restore any damage to that land or other property as a result of the building work.
96. The presumption of section 71(1) can be reversed by section 72, which states that the territorial authority must issue a building consent for building work on land subject to a natural hazard if the building work will not accelerate, worsen or result in a natural hazard on the land on which the building work is to be carried out or any other property; and it is reasonable to grant a waiver or modification of the Building Code in respect of the natural hazard concerned.
97. Where the territorial authority grants a building consent under section 72, a notice identifying the hazard must be registered on the Record of Title. This process alerts future owners of the presence of the hazard and ensures territorial authorities are protected against civil liability when granting consent to build on land subject to a natural hazard.
98. 'Natural hazard' is defined in section 71 of the BA as any of the following:
 - (a) erosion (including coastal erosion, bank erosion, and sheet erosion);
 - (b) falling debris (including soil, rock, snow, and ice);
 - (c) subsidence;
 - (d) inundation (including flooding, overland flow, storm surge, tidal effects, and ponding); and

(e) slippage.

99. Although climatic conditions are taken into account prior to issuing a building consent, climate change is also not explicitly referenced in the Building Act.
100. The Building Act requires new buildings to meet the performance requirements of the Building Code (these requirements are designed to protect against certain hazards (ground shaking and flooding).

2.1.4 Civil Defence and Emergency Management Act 2002 (CDEM)

101. The purpose of the CDEMA is to promote the sustainable management of hazards and encourage communities to achieve acceptable levels of risk.
102. Council is required to plan and provide for civil defence emergency management within its district with regards to reduction, readiness, response, and recovery. This means that the less frequently occurring natural hazards can be dealt with through contingency controls such as civil defence and insurance systems. Reduction and readiness are 'business as usual' functions of the council while response and recovery commence as soon as a hazard event occurs. The CDEMA has a post-event focus, with the risk reduction element being covered through a link to the Act (Section 17(3)). District Plan provisions and asset management plans should be developed in conjunction with CDEM and emergency services to ensure they manage activities to reduce the risk from natural hazards.
103. Most natural hazard events occur at the local or regional level. Individuals, communities and local government are best placed to develop the management options suited to them, for example, through land-use planning and building control activities. Local CDEM Plans identify the most common natural hazards affecting the district or region and identify how each of these can be managed in terms of reduction (generally through the district plan regulatory framework), readiness, response and recovery.
104. The local Waikato District CDEM plan's vision is for people, organisations and communities to work together to increase resilience to hazards. The plan's goals are around reducing risk, enhancing capability to respond and recover, building effective leadership and partnerships, increasing preparedness and ownership, building and sustaining understanding of hazards and risks and monitoring outcomes. Reducing areas of greatest risk can be achieved through initial identification of high-risk areas, carrying out community consultation and providing a regulatory framework through the District Plan that focuses on reducing risk through either avoidance, remediation or mitigation.
105. Stage 2 of the District Plan Review has been carried out in consultation with the local CDEM team to ensure that the provisions within the Proposed District Plan support the outcomes sought in the Local CDEM Plan.

2.1.5 Soil Conservation and Rivers Control Act 1941 (SCRCA)

106. The original Soil Conservation and Rivers Control Act 1941 (SCRCA) established a framework for the appointment of catchment boards and a systematic approach to erosion and flood control issues. Many of the soil conservation reserves and flood protection schemes now administered by regional councils were developed with government and local government funding appropriated under the SCRCA.
107. While much of the original SCRCA has since been repealed, it still provides powers for regional councils (and the Minister for the Environment) to undertake catchment works to promote soil conservation or minimise and prevent damage by floods and erosion. These works are subject to the RMA.
108. Section 10 sets out the 'objects' of the SCRCA, which include the promotion of soil conservation, the prevention and mitigation of soil erosion, the prevention of damage done by floods, and the utilisation of lands in a manner which achieves these objectives. Section 10A of the SCRCA sets out the relationship with the RMA, which has primacy over the provisions in the SCRCA.

2.1.6 Local Government Official Information and Meetings Act (LGOIMA) 1987

109. Under the LGOIMA local authorities are obligated to issue Land Information Memoranda (LIM) on request. A LIM must include information known to the territorial authority on (amongst other things) the potential erosion, avulsion, falling debris, subsidence, slippage, alluvion (accretion), or inundation related to the site. The territorial authority is not required to supply information in a LIM that is included in a district plan.

2.2 Higher Level Planning Documents

2.2.1 New Zealand Coastal Policy Statement 2010 (NZCPS)

110. The NZCPS sets out policies to achieve the purpose of the Act in relation to New Zealand's coastal environment. The coastal environment has characteristics, qualities and uses that mean there are particular challenges in promoting sustainable management. Activities in the coastal environment are susceptible to the effects of natural hazards such as coastal erosion and tsunami, and those associated with climate change including sea level rise.
111. In order to give effect to the NZCPS, district plans must identify areas of the coastal environment where particular activities and forms of subdivision, use, and development are inappropriate (Policy 7) and identify areas in the coastal environment that are potentially affected by coastal hazards (including tsunami), giving priority to the identification of areas at high risk of being affected (Policy 24). Hazard risks, over at least the next 100 years are to be assessed while having regard to a number of matters, including climate change.
112. Once hazard risk areas have been identified, provision must be included in district plans to ensure that activities (subdivision, land use and development) within these areas do not increase the risk of adverse effects from coastal hazards (Policy 25). In areas subject to

existing development, district plans may encourage redevelopment and changes in land use to reduce risk. A range of options are to be considered (Policy 27) and may include 'managed retreat' by relocation or removal of existing structures and designing structures for relocatability or recoverability following a hazard event.

- I13. The NZCPS also encourages natural defences against coastal hazards (Policy 26) while providing exceptions for hard structural defences to protect existing infrastructure of national or regional importance where there is no practical alternative.
- I14. It is important to recognise the special and enduring relationship that taangata whenua have with areas of the coastal environment and to take into account any relevant iwi resource management plan and any other relevant planning document recognised by the appropriate iwi authority or hapuu and lodged with the council. Taangata whenua should also be provided opportunities to exercise kaitiakitanga over waters, forests, lands and fisheries in the coastal environment (Policy 2).
- I15. A precautionary approach is required to be adopted where the effects of proposed activities on the coastal environment are unknown, and in particular, where coastal resources are potentially vulnerable to climate change effects (Policy 3).
- I16. Section 75(3) the Act requires a district plan to give effect to the NZ Coastal Policy Statement.

2.2.2 Te Ture Whaimana o Te Awa o Waikato – the Vision and Strategy for the Waikato River

- I17. The Vision and Strategy in Schedule 2 of the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010, is the primary direction setting document for the Waikato River and its catchments, including the lower reaches of the Waipa River. The Vision and Strategy is deemed in its entirety to be part of the Waikato Regional Policy Statement (WRPS) and if any part of the WRPS, or any NPS, including the NZCPS is inconsistent with the Vision and Strategy, the Vision and Strategy prevails.
- I18. The Vision is for a future where a healthy Waikato River sustains abundant life and prosperous communities who, in turn, are all responsible for restoring and protecting the health and wellbeing of the Waikato River, and all it embraces, for generations to come. In order to realise the vision a number of objectives are to be pursued and strategies to be followed. The objectives and strategies that are most relevant to Stage 2 PDP are as follows:

Objectives

- the recognition that the strategic importance of the Waikato River to New Zealand's social, cultural, environmental, and economic wellbeing requires the restoration and protection of the health and wellbeing of the Waikato River:
- the promotion of improved access to the Waikato River to better enable sporting, recreational, and cultural opportunities:
- application to the above of both maatauranga Maaori and the latest available scientific methods.

Strategies

- recognise and protect waahi tapu and sites of significance to Waikato-Tainui and other Waikato River iwi (where they do decide) to promote their cultural, spiritual, and historic relationship with the Waikato River;
- ensure appropriate public access to the Waikato River while protecting and enhancing the health and wellbeing of the Waikato River.

119. Although natural hazards or climate change are not specifically mentioned in the Vision and Strategy, natural hazards and the effects of climate change may impact on certain aspects of the restoration and protection of the river. Of note is the recognising that the river is of strategic importance to New Zealand's social, cultural, environmental and economic wellbeing; that flooding may impact on public access to the river which provides sporting, recreational and cultural opportunities; that flooding may have adverse impacts on waahi tapu and sites of significance to Waikato-Tainui and other Waikato River iwi and that both Maatauranga Maaori and scientific methods are important for the restoration and protection of the health and wellbeing of the river.

2.2.3 Waikato Regional Policy Statement 2016 (WRPS)

120. The purpose of the WRPS is to provide an overview of the resource management issues of the region, and together with objectives, policies and methods, provides guidance for the regional and territorial authorities when developing their regional, coastal and district plans. This supports an integrated and consistent approach to the management of natural and physical resources across the region.
121. *Issue 1.2 – Effects of Climate Change* acknowledges that climate change is a significant issue for the region due to its effects on wellbeing, including health and safety and that, when addressing this issue, focus should be directed to an increase in the potential for storm damage and weather-related natural hazards; and to the long term risk that sea level rise poses to settlements and infrastructure through coastal erosion and flooding.
122. *Issue 1.4 – Managing the Built Environment* acknowledges that development can have either positive or negative impacts on natural and physical resources and the provision for our wellbeing and that focus should be directed to, amongst other matters, the increasing potential for natural hazards.
123. The WRPS provides policy direction for managing natural hazard risk and climate change adaptation through a number of either general or specific objectives, policies and implementation methods within chapters 3, 4, 6, 11, 12 and 13 and identifies where policies must be given effect to through district plans.
124. *Objective 3.6 - Adapting to climate change* promotes land use management that avoids the potential adverse effects of climate change, including sea level rise on amenity, the built environment, infrastructure, indigenous biodiversity, natural character, public health and safety and public access. Relevant policies are 4.1, 6.1, 6.2, 12.4, 13.1 and 13.2.
125. *Objective 3.7 – Coastal environment* promotes integrated management of the coastal environment that, amongst other matters, recognises the dynamic, complex and

interdependent nature of natural biological and physical processes. Relevant policies are 4.1, 6.2, 6.3 and 12.4.

126. *Objective 3.23 – Public access* promotes the maintenance and enhancement of public access to the coast, lakes and rivers. Relevant policies are 4.1, 6.1, 6.2 and 12.4.
127. *Objective 3.24 – Natural Hazards* promotes managing the effects of natural hazards on people, property and the environment by increasing community resilience, reducing risk to acceptable or tolerable levels and enabling the effective and efficient response and recovery from natural hazard events. Policies 4.1, 6.1, 6.2, 13.1, 13.2 and 13.3.
128. *Policy 4.1 – Integrated approach* requires the adoption of an integrated approach to the management of resources through the recognition of the inter-connectedness of natural and physical resources; the benefits of aligning decisions of agencies across boundaries; maximising benefits and efficiencies of working together; the multiple values of natural and physical resources including ecosystem services; the nature and values of resources and the diversity of effects that can occur; the ability to maximise opportunities to achieve multiple objectives; the benefits of taking a long term strategic approach that recognises the change to the environment, resource use and pressures and trends; best consistent and practice standards and processes to decision making; and the establishment of a planning framework that sets clear limits and thresholds for resource use.
129. *Policy 6.1 – Planned and co-ordinated subdivision, use and development* seeks to ensure that subdivision, use and development is planned and co-ordinated and is based on sufficient information to allow assessment of potential cumulative and long-term effects of the development; has regard to the existing built environment; and has regard to the development principles in section 6A.
130. *Section 6A - Development Principles.* The specific principles in section 6A relating to natural hazards and climate change are, 6A(h) ensure development is directed away from natural hazard areas, 6A(l) maintain and enhance public access to and along the coast marine area, 6A(p) be appropriate with respect to the projected effects of climate change and be designed to allow adaptation to these effects, and 6A(q) consider the effects on the unique taangata whenua relationships, values, aspirations, roles and responsibilities with respect to an area.
131. *Policy 6.2 - Planning for development in the coastal environment* seeks to ensure the built environment, within the coastal environment is managed, amongst other matters, through the use of sufficient setbacks to protect natural hazard mitigation functions of the coast, allow for the potential effects of sea level rise, avoid increasing natural hazard risk associated with coastal erosion and inundation, and have regard to the potential effects of a tsunami event, including taking appropriate steps to avoid, remedy or mitigate that risk.
132. *Policy 12.4 – Maintain and enhance public access*, seeks to maintain and enhance public access to and along the coastal marine area by, amongst other matters, ensuring that subdivision, use and development does not constrain the ability of the land/water edge to adjust over time in response to natural processes, including the effects of climate change.

133. *Policy 13.1 - Natural hazard risk management approach* directs district plans to utilise a risk-based approach to managing natural hazard risks through an integrated holistic approach. This approach focusses on avoiding the creation of new 'intolerable' risk and reducing existing intolerable risk to tolerable or acceptable levels. The policy also focusses on protecting health and safety, enhancing community resilience, aligning civil defence approaches, and encouraging the use of natural features over man-made defences, while also promoting a natural systems/whole systems approach and using the best available information and best practices.
134. *Policy 13.2 - Manage activities to reduce the risks from natural hazards* sets out a framework for assessing subdivision, use and development on land subject to natural hazards to ensure risk is maintained at an acceptable or tolerable level, while avoiding levels of risk that are considered intolerable and minimising vulnerability to residual risk. This framework also discourages the use of hard protection structures, while promoting the use of natural defences, and also strongly discourages development that creates a demand for new protection structures.
135. In order to manage risk to subdivision, land use and development, district plans must first identify areas within the district that are subject to natural hazards, including areas at risk of flooding during a 1% AEP storm event; coastal hazards and residual risk, prioritising areas at high risk, (i.e. areas at high risk of flooding and coastal areas that are at high risk of either coastal erosion or inundation) and then controlling activities within those areas, including ensuring development is appropriate in areas at high risk.
136. *Policy 13.3 - High impact, low probability natural hazard events* requires local authorities to consider the potential effects of high impact, low probability natural hazard events such as tsunamis, volcanic eruptions and earthquakes and to direct vulnerable development away from high risk hazard areas, and to promote contingency planning through civil defence readiness, response and recovery.

2.2.4 Waikato Regional Plan 2012 (WRP)

137. The WRP is currently under review, which will be carried out in stages over a number of years. The existing Regional Plan has not yet given effect to all relevant matters in the WRPS. The current Regional Plan provisions address accelerated soil erosion (Chapter 5) which can cause land instability hazards, particularly in steep hill country, and also addresses discharge onto or into land which can increase the risk of flooding and land instability. Objective 5.1.2 seeks a net reduction of accelerated erosion across the Waikato region. Section 5.1.3 sets out three policies to manage accelerated erosion, including non-regulatory methods, the use of regulatory methods in high risk erosion areas and promotion of good practice.

2.2.5 Waikato Regional Coastal Plan 2014 (WRCP)

138. The purpose of the WRCP is to achieve integrated management of the coastal environment, including the Coastal Marine Area (CMA), which applies from the Mean High Water Springs (MHWS) to the 12 mile nautical limit of territorial sea.

139. The WRCP includes policies that apply to all of the coastal environment (landward and seaward of MHWS), while the district council's jurisdiction is applicable to management of land landward of MHWS. However, both the district and the regional plans acknowledge and seek to address natural hazard risk. Objective 8.1 of the WRCP acknowledges that coastal hazards are a risk to people and property and should be avoided or mitigated. Policies 8.1.1 to 8.1.4 seek to:

- **identify areas of coastal hazard risk and develop integrated management strategies for these areas,**
- **adopt a precautionary approach in the assessment of coastal hazard risks,**
- **promote the protection of natural features that provide a buffer against natural hazards,**
- **ensure the use of any structures to control coastal erosion is necessary and avoids or remedies any adverse effects on other coastal processes and natural character.**

2.2.6 Iwi Management Plans

140. The council must take into account provisions in iwi management plans which are relevant to the resource management issues being considered by the plan review (s74). In the Waikato district, this includes the Waikato-Tainui Environmental Plan (Tai Tumu Tai Pari Tai Ao) (WTEP) and the Maniapoto Environmental Management Plan (MEMP).

2.2.6.1 Waikato-Tainui Environmental Plan (Tai Tumu Tai Pari Tai Ao) (WTEP)

141. Chapter 17 lists three key issues - land use, risk management and climate change in relation to natural hazards and provides an objective and policy framework to address these issues.
142. The WTEP includes provision for climate change, but only in so far as it relates to human induced climate change (noting that this is consistent with the definition in the RMA). The WTEP recognises that global warming and climate change are likely to result in coastal inundation from an increase in mean sea level rise; more extreme weather events; changes to rainfall patterns; increased erosion; changes in the population density and distribution of fish and wildlife; and changes in the viability of cultural and/or spiritual resources and activities. The WTEP also recognises that human-induced climate change and its projected effects are a controversial issue both globally and nationally.
143. The impact that climate change has on indigenous flora and fauna is largely unknown, therefore Waikato-Tainui consider it vital that they actively engage and contribute to any nationally-led initiatives, policies, guidelines and programmes on climate change. Most importantly, Waikato-Tainui wants to avoid any disruption that climate change causes to indigenous ecosystems, Waikato-Tainui cultural and/or spiritual beliefs and/or practices.

144. Climate change is intricately linked with natural hazards, as climate change is predicted to increase the frequency and magnitude of weather-related natural hazards. The WTEP identifies sea level rise, more frequent and intense rainfall as well as increased frequency and duration of drought as likely impacts of climate change. The plan identifies the need to change the way hazards are managed to protect developments in areas that may be at risk in the future and that human activity and the cumulative effect of discharges, farming, industry and commercial practices, and deforestation may adversely contribute to climate change, global warming, and the reduction in the ozone layer.

2.2.6.2 Maniapoto Environmental Management Plan (MEMP)

145. Parts 13 (climate change), 15 (wetlands) and 20 (natural hazards) of the MEMP highlight issues with regards to increasing risk from natural hazards; preparedness and resilience; climate change; and flood protection and drainage.
146. The MEMP defines natural hazards as naturally occurring processes that pose a risk to people and property, and within its rohe includes climate-related hazards such as flooding, drought, coastal hazards and hill country erosion. It also recognises that Maniapoto cannot avoid the events occurring, but can take steps to reduce the risk, prepare responses and increase resilience.
147. The MEMP recognises climate change as a key driver for more frequent and severe natural hazard events.
148. Flood protection and drainage schemes are recognised as key components that ensure continued productivity. Natural infrastructure such as wetlands is a major asset in combating and adapting to climate change.

2.2.7 Catchment Management Plans

149. A number of catchment management plans have been prepared which consider the potential for flooding or significant ponding and the constraints on growth in particular areas. Catchment management plans have been prepared for Ngaruawahia; Tamahere; Port Waikato; Pokeno; Te Kauwhata and Tuakau.

2.2.8 Future Proof Growth Strategy and Implementation Plan 2009

150. Future Proof is a joint strategy prepared by the Waikato Regional Council and district councils – Hamilton, Waikato and Waipa – to manage growth across territorial boundaries. It is a non-statutory document, implemented through the WRPS and district plans, LTPs and other regional strategies. The Strategy includes a section (8.13) on natural hazards and climate change. Key approaches to addressing the challenges of natural hazards and climate change include:

- **Ensuring risks are appropriately assessed before development decisions are made;**

- In general, directing urban and rural-residential development away from the flood plains, natural ponding areas and poorly drained areas, including areas subject to flood protection schemes;
- Proactively identifying, avoiding and mitigating natural hazards and establishing systems and procedures of response;
- Educating the community about natural hazards and how to respond to them to increase community resilience;
- Linking the growth projects of the Strategy with the CDEM plans;
- Avoiding development in areas subject to high likelihood of natural hazards;
- Ensuring strategic transport infrastructure is located away from hazard areas.

2.2.9 Summary of relevant statutory and non-statutory documents

151. Table 4 summarises the relevant provisions from the statutes and documents discussed above.

Table 4: Relevant legislation and higher order documents

Document	Relevant provisions Stage 2 is required to take into account/give effect to
Resource Management Act	Sections 2, 5, 6, 7, 8, 31, 35, 75, 106 and Schedule 4
Local Government Act 2002	Sections 10 and 101B
Building Act	Sections 71, 72, 73, 74
Civil Defence and Emergency Management Act (CDEM) 2002	Section 17(3)
Soil Conservation and Rivers Control Act 1941 (SCRCA)	Sections 10, 10A
Local Government Official Information and Meetings Act (LGOIMA) 1987	Section 4
The New Zealand Coastal Policy Statement, 2010	Objectives 3, 4 and 5, Policies 2, 3, 7, 18, 24, 25, 26 and 27
Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010	Schedule 2 - Te Ture Whaimana o Te Awa o Waikato – the Vision and Strategy for the Waikato River
Waikato Regional Policy Statement, 2016	Issues 1.2 and 1.4, Objectives 3.6, 3.7, 3.23, 3.24, Policies 4.1, 6.1, 6.2, 6A, 12.4, 13.1, 13.2, 13.3
Waikato Regional Plan, 2012 (reprinted)	Chapter 5, Objective 5.1.2, Policies 5.1.3
Waikato Regional Coastal Plan 2014	Objective 8.1, Policies 8.1.1, 8.1.2, 8.1.3, 8.1.4
Waikato-Tainui Environmental Plan (Tai	Objective 17.3.1, Policy 17.3.1.1, Objective 17.3.2,

Tumu Tai Pari Tai Ao)	Policy 17.3.2.1, Objective 17.3.3, Policy 17.3.3.1
Maniapoto Environmental Management Plan	Objectives 13.3.1, 13.3.2, 13.3.3, Policies 13.3.1.1, 13.3.2.1, 13.3.3.1 Objectives 15.3.2, 15.3.3, Policies 15.3.2.1, 15.3.3.1 Objectives 20.3.1, 20.3.2, 20.3.3, Policies 20.3.1.1, 20.3.2.1, 20.3.3.1

2.3 Issues

152. The first step in considering how to manage the risks from natural hazards through the District Plan is to set out clearly what resource management issues need to be addressed. This is informed by the legislative and policy framework described above, feedback from iwi, stakeholders and the community; and the technical assessments and information which has been collated. The objectives in the plan should address these issues and set out the outcomes the council plans to achieve.
153. The following tables set out the key issues that form the basis for evaluating the objectives and provisions in the following sections.

Issue statement	Risks from Natural Hazards
	<p>Land use, subdivision and development on land that is prone to natural hazards can increase risks to people, property, infrastructure and the environment and reduces the resilience of the community to natural hazards.</p> <p>Natural hazards are a result of natural processes that form, shape and alter the environment. These processes can have an adverse effect on human health and safety, property or the environment. Natural hazards which could occur in the district include low frequency but severe consequence events such as earthquakes and liquefaction, volcanic eruptions, cyclones and tsunami hazards, as well as higher frequency hazards such as flooding, coastal inundation, land instability (land slips and subsidence) and coastal erosion.</p> <p>The technical reports for this topic describe the nature and extent of hazards which may be present in the district (these are expanded on below), and what risks they might pose. A large portion of the land within the district is potentially subject to some form of natural hazard.</p> <p>The risk of a natural hazard occurring is based on the likelihood or probability of an event occurring and the impact or consequences that it may have on people, property or the environment. The impact on people and property is dependent on the community's resilience to it.</p> <p>The purpose of the Act is to promote the sustainable management of natural and physical resources where sustainable management includes the protection of these resources in a way that provides for the social, economic and cultural well-being and the health and safety of people and communities. Not managing the risks associated with natural hazard events is contrary to the purpose of the Act. The need to manage risks associated with natural hazards is explicitly expressed in Part 2, Section 6 of the Resource Management Act, in the New Zealand Coastal Policy Statement and the Waikato Regional Policy Statement.</p>
	<p>Flooding and ponding</p> <p>Flooding can be caused by a range of factors and circumstances including:</p> <ul style="list-style-type: none"> • high, or particularly intense, periods of rainfall

- **snowmelt (which may also coincide with high rainfall)**
- **obstructed waterways or drainage systems (including natural damming after landslips or earthquake, or vegetation blocking drains, creeks or streams).**

Human activity can also contribute to, or exacerbate, flood hazards by, for example:

- **obstructing natural overland flow paths (such as by placing buildings, raised roadways, embankments and other similar obstacles in the flow path or flood channel)**
- **increasing the flow of water into natural or man-made drainage systems (removing vegetation, increasing areas of impermeable surfaces, or increasing the number of stormwater outlets, and thereby the amount of stormwater that enters a particular drainage system²).**

The effects of flooding include movement of debris carried by flood waters, build-up of debris against structures, silt and/or mud deposition, erosion, and water damage to buildings and vehicles. Overloaded sewerage systems or transportation of hazardous substances can result in contamination which can adversely affect human health.

The Waikato and Waipa rivers flow through the district and can carry large flood flows, which bears a risk to people, property and the environment. The Lower Waikato has a flood plain of approximately 36,400 hectares. This risk could be increased by heavier and longer periods of rain, which is one of the predicted effects of climate change. Flood modelling has been undertaken to identify where the risks are greatest³. The 2D modelling completed for a portion of the Waikato River between Horotiu and Ohinewai and a short portion of the Waipa River between Saubrey Road and the confluence at Ngaruawahia has also included the effects of climate change based on the RCP 6.0 climate change scenario.

After heavy rainfall, ponding of flood water often occurs across the Waikato basin. Where there is little change in elevation through the river system, this can result in flooding or ponding that can take weeks to drain. This water can reach depths that can cause damage to property and a risk to the safety of communities. This can be an issue on land protected by stopbanks and around the lakes near the Waikato River.

Around 21,500 hectares of the Waikato floodplain is defended by stopbanks, which protect against flooding of specified magnitude anywhere from a 10% AEP to 1% AEP. The 1% AEP stopbanks defend an area of 13,800 hectares and for the purpose of the District Plan are called Defended Areas. Although the stopbanks are designed and constructed to achieve a specified level of protection, there is still a 'residual' level of flood risk from, for example, the stop banks failing or a flood occurring that was larger than the stopbanks were designed to withstand. This residual risk needs to be assessed when considering new development in such areas.

Coastal hazards (inundation, tsunami, coastal erosion)

Storm surge, coastal erosion, sea-level rise, coastal flooding, and tsunami are natural processes that become a hazard when they threaten property and life. Storms can result in flooding and erosion; sandy areas are particularly vulnerable to erosion during coastal storms. Large areas of the district's coastline are remote and undeveloped, but there are areas such as the Raglan Harbour shoreline and Port Waikato which are densely developed and, in places, highly modified. In Raglan and at Port Waikato, existing residential areas and public reserve are vulnerable to coastal erosion

² See the Quality Planning website: <https://qualityplanning.org.nz/node/812>

³ 1% Annual Exceedance Probability

and coastal flooding. The extent and type of hazard varies along the shorelines in these areas, which include open sandy beaches, estuarine intertidal sand flats and beaches, cliffed shorelines, and low-lying estuarine margins.

Tsunami are a series of large waves generated by sudden displacement of water (caused by earthquake, volcanic eruption or submarine landslide) that are capable of travelling over large distances. These waves cause a destructive surge when they reach land, which is a risk to life, property and the environment. This inundation of water can also contain debris. There is only a minor risk of coastal inundation resulting from tsunami along the west coast and Raglan harbour.

Wild fire

Fires can cause damage to infrastructure, property, the environment and loss of life. Fires can be caused by lightning strike or accidentally through human activities (such as sparks from machinery, arson or discarded cigarette butts).

The risks from wild fire in New Zealand is expected to increase in severity and frequency as a result of climate change, which is predicted to result in less rainfall, higher temperatures and stronger winds. More homes (and people) are likely to be at risk as a result of expanding urban development and increasing lifestyle block development in close proximity to forestry. An increase in exotic plantation forests will also add to the risk. While the Waikato Region is less affected than some regions, the risk is still expected to increase.

Land instability and subsidence

Land instability includes landslides, slips, debris flows and subsidence. There are many different types of landslides⁴. The most common landslide trigger is prolonged or intense rainfall, however large earthquakes, volcanic eruptions and geothermal activity can also trigger landslides.

Land instability can cause a risk to life, property, and infrastructure. Communities in hilly areas can be cut off if landslides or slips block access roads or destroy 'lifeline' services such as water, power, telecommunication and transport networks. They can also increase the risk of further erosion.

Landslides on steep land have a greater chance of slope failure. Other factors such as high rainfall, accelerated soil erosion, unstable basement rock structure or earthquakes also increase the risk. Human activities such as mining, quarrying and road construction, explosions and the use of heavy equipment, can also initiate landslides. The removal of vegetation can increase the rate of erosion or increase the rate at which the soil absorbs water, raising the ground water level and de-stabilising the slopes.

Areas of slope instability occur within the Waikato district, but it is difficult to identify and map out all at risk areas, because the level of risk can change under different environmental conditions. Ground shaking, high rainfall and soil type, topography, underlying geology and vegetation type all play a part in the potential for slope failure and some of these factors can change over time.

Subsidence is the sinking of the ground surface due to a loss of underlying support. The early signs of subsidence are not always visible before a major slump occurs. Subsidence can occur on peat soils where soil shrinks when the surrounding land is drained and during dry periods.

Coal mining in the Huntly area has resulted in subsidence in areas where the underlying coal has been extracted. A study (2019) has assessed the risk presented by the closed mine, both in terms of subsidence and methane gas leakage from the mine workings.

Earthquake and seismic hazards

New Zealand is a high earthquake hazard region. The construction of buildings, roads and other

⁴ For example: earth flows, topples, debris flows, rock falls, block slides, debris avalanches, lateral spreads, and rotational and translational landslides (see the Quality Planning website: <https://qualityplanning.org.nz/node/812>)

utilities needs to take into account potential seismic hazards, including fault line and mass movement, ground shaking and liquefaction.

A fault is a fracture in the Earth's crust, which can suddenly rupture as stress builds up. In a large rupture, shock waves cause the earth to shake violently and cause an earthquake.

An active fault is a fault that has ruptured repeatedly in the past, and whose history indicates that it is likely to rupture again. Active faults can include faults that weren't previously identified. An active fault increases earthquake risk. There are few known active faults with a surface expression in the Waikato district, although there are number of 'potentially active' or 'inactive' faults.

When the ground shakes, and/or when there is surface rupture on a fault line causing ground deformation, there is likely to be damage and/or destruction of structures built across or near the fault line. Earthquakes may also trigger other hazards such as liquefaction, tsunami, landslides, and flooding, although this depends on the intensity of the earthquake and a combination of other factors such as location, geology, weather and ground conditions and soil types.

Issue statement	Climate Change The effects of climate change (including climate variability) can exacerbate weather-related natural hazards and increase mean sea level. This may have adverse impacts on people (including their health and safety), land use, development, infrastructure and the natural environment.
<p>In the Waikato district, climate change is likely to result in overall warmer temperatures, fewer frosts, a decrease in spring rainfall, a rise in mean sea level and increased storm events including extreme winds. This is likely to result in:</p> <ul style="list-style-type: none"> • more frequent droughts leading to water shortages, • more inland flooding and salt water intrusion in low lying coastal areas, • an increase in erosion and land instability, • increased risk of invasive weeds and pests, • higher lake levels and • possible opportunities for a longer agricultural growing season. <p>Climate change isn't a natural hazard itself, but it does have an impact on the frequency and intensity of natural processes, including weather-related natural hazard events. Climate change may affect food and water security, and biodiversity, and may increase risks to life and property through impacts on weather-related natural hazards. In coastal areas, the potential for increased coastal flooding and erosion through storm surges and sea level rise will adversely impact coastal margins, including coastal habitats, and coastal development, including infrastructure and public access to the coast.</p>	

3 SCALE AND SIGNIFICANCE EVALUATION

154. There is a range of options to address the key resource management issues identified in the previous section. The scale and significance assessment must consider the environmental, economic, social and cultural effects of the provisions in each option. To identify the scale of the problem, and how significant it might be, the following questions have been asked:

- (a) Is the issue of regional- or district-wide significance?

- (b) Would it have effects on resources that are considered to be a matter of national importance in terms of Section 6 of the RMA?
- (c) Would it adversely affect people's health and safety?
- (d) Would it result in a significant change to the character and amenity of local communities?
- (e) Would it adversely affect stakeholders with particular or special interests, including Maaori?
- (f) Would it limit options for future generations to remedy effects?
- (g) Have higher level documents considered the effects and specified how to deal with them?
- (h) Would dealing with this issue be likely to result in regulations or other interventions that will impose significant costs on individuals or communities?
- (i) A summary of the assessment of the key issues (and associated provisions) is set out in Appendix 8.

Table 5: Scale and significance assessment

Issue	Provisions which address the issue	Scale and Significance Reasoning
Land use, subdivision and development on land that is prone to natural hazards can increase risks to people, property, infrastructure and the environment and reduces the resilience of the community to natural hazards.	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policies 15.2.1.1 – 15.2.2.2, Rules 15.4 – 15.5, Assessment matters in 15.12 and Variation 2 and mapped hazard areas shown on the planning maps.</p> <p>Information requirements in 15.13.</p> <p>Also includes processes outside the District Plan such as LIMs, Hazard Register, stormwater management plans and CDEM community response plans.</p>	<p><i>Overall, this issue is considered to be of district-wide scale and highly significant, because of its potential to adversely affect not just individuals and their property, but the wider community, the natural environment and future generations.</i></p>
Risks to people, property, infrastructure and the natural environment from flooding and ponding of flood waters.	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policies 15.2.1.1 – 15.2.1.6, 15.2.19 – 15.2.1.15 and 15.2.2.1 – 15.2.2.2.</p> <p>Rules 15.4 – 15.6</p> <p>Assessment matters Variation 2, mapped hazard areas shown on the planning maps and information requirements in 15.13. Also includes processes outside the District</p>	<p><i>Overall, this issue is considered to be at a scale which is more than localised, but still a district-wide issue. It is considered of high significance, because of the potential risks to people's health, safety and property, essential infrastructure and the environment. It also has an impact on future generations.</i></p>

Issue	Provisions which address the issue	Scale and Significance Reasoning
	Plan such as LIMs, Hazard Register, stormwater management plans and CDEM community response plans.	
Risks of coastal inundation and erosion on people, property, infrastructure and the coastal environment.	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policies 15.2.1.1 – 15.2.1.9, 15.2.1.11, 15.2.16 – 15.2.1.17 and 15.2.2.1 – 15.2.2.2.</p> <p>Rules 15.7 – 15.10.</p> <p>Assessment matters Variation 2, mapped hazard areas shown on the planning maps and information requirements in 15.13. Also includes processes outside the District Plan such as LIMs, Hazard Register, stormwater management plans and CDEM community response plans.</p>	<p><i>Overall, this issue is considered to be localised in scale (the effects are limited to discrete communities on the coastal margin) but of high significance, because of the potential risks to people's health, safety and property, essential infrastructure and the environment. It also has an impact on future generations.</i></p>
Risks to people, property, infrastructure and the natural environment from wild fire.	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policy 15.2.1.18 and 15.2.2.1 – 15.2.2.2.</p> <p>Assessment matters Variation 2. Also includes processes outside the District Plan such as Hazard Register.</p>	<p><i>Overall, this issue is considered to be of local scale and of lower significance at present. The significance of this issue is expected to increase over time with climate change.</i></p>
Risks to people, property, infrastructure and the natural environment from landslides, slips and subsidence, including mine subsidence.	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policy 15.2.1.19 – 15.2.1.20 and 15.2.2.1 – 15.2.2.2.</p> <p>Assessment matters Variation 2. Also includes processes outside the District Plan such as stormwater management plans, CDEM community response plans and the Hazard Register.</p>	<p><i>Overall, the risks to people, property and the environment from landslides, slips and subsidence is considered to be an issue of lower significance and local scale, because only a very small percentage of land in the district is subject to such hazards.</i></p>
Risks to people, property, infrastructure and the natural environment from earthquakes and liquefaction of soils.	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policy 15.2.1.22 – 15.2.1.23 and 15.2.2.1 – 15.2.2.2.</p> <p>Assessment matters Variation 2 and information requirements in</p>	<p><i>A large earthquake could happen in Waikato District and liquefaction could be severe in localised areas of Holocene soils. The Waikato district could also be significantly affected by a large earthquake in the lower North Island or upper South Island which could have a significant impact on</i></p>

Issue	Provisions which address the issue	Scale and Significance Reasoning
	15.13. Also includes processes outside the District Plan such as LIMs, Hazard Register, and CDEM community response plans.	<i>people, property, infrastructure and the natural environment. The risk is considered to be of a localised scale but of high significance.</i>
The effects of climate change (including climate variability) can exacerbate weather related natural hazards and increase mean sea level. This may have adverse impacts on people (including their health and safety), land use, development, infrastructure and the natural environment.	<p>Objective 15.2.3 - Climate change Includes Policies 15.2.3.1 – 15.2.3.5 and includes 2D flood hazard modelling and the coastal hazard assessment and coastal hazard maps.</p> <p>Rules 15.4, 15.5, 15.7 and 15.8 and assessment matters in Variation 2.</p>	<p><i>Climate change is a slow onset phenomena that has the potential to significantly adversely affect people not just at the individual and property level but also across the wider community through adverse effects on infrastructure, the natural environment and the social, cultural and economic wellbeing of current and future generations. Mitigation measures to reduce the effects of climate change (i.e. either a reduction in activities that produce greenhouse gas emissions or activities that help to reduce the amount of greenhouse gas emissions entering the atmosphere) are challenging, complex and difficult to administer.</i></p> <p><i>A certain degree of climate change is already locked in regardless of any efforts to reduce carbon emissions. For this reason, it is important to focus on adapting to impacts such as coastal inundation and erosion resulting from sea level rise and potential increase in the scale and intensity of weather-related natural hazard events.</i></p> <p><i>Overall, this issue is considered to be of district-wide scale and highly significant.</i></p>

4 EVALUATION OF OBJECTIVES

155. Having considered the scale and significance of the issues which are to be addressed, the council is required to consider what options or approaches it could adopt to address them. The Act enables objectives, policies and rules/methods to be specified under the district plan to address resource management issues. In terms of the objectives, an evaluation under s32 of the Act is required to determine whether the objectives chosen are the most appropriate objectives to achieve the purpose of the Act. That evaluation is provided below.
156. To assist this evaluation three options have been identified.
- **Option 1** - Status quo/do nothing option: retain the existing objectives in the Operative District Plan.
 - **Option 2** – Develop amended and/or new objectives
 - **Option 3** - Step back from a district plan regulatory approach and rely on other methods – no objectives.
157. An evaluation of whether the objectives chosen are the most appropriate to achieve the purpose of the Act includes an assessment of whether the objectives give effect to the relevant higher order statutory directions promulgated under the Act. The most important statutory directions and documents have been identified in Section 2. This includes the WRPS (particularly objectives 3.6 and 3.24 and the policies and methods in Chapter 13) and the NZCPS (particularly objective 5 and policies 3, 24, 25, 26, and 27). These statutory directions are discussed below.

4.1 Evaluation Summary

158. The evaluation of the objectives is provided in Table 6 below. The existing objectives in the Operative Plan (Option 1) are considered against amended/new objectives (Option 2) and other methods/no district plan objectives (Option 3).

Table 6: Evaluation of the objectives

Objective - Most appropriate way to achieve the purpose of the Act	
Existing Objectives (Option 1)	Summary of evaluation
Waikato Section	<p>Individually the objectives, particularly Objective 5.2.1, address key resource management issues and Part 2 of the Act. However Objective 5.2.1 only applies over the Waikato Section geographical area of the district, and the objectives (7.2.2, and 17E.7.3) only apply over the Franklin geographical area of the district.</p> <p>As a package the existing suite of objectives currently contained within both sections of the Operative Plan need to be rationalised and amended to:</p> <ul style="list-style-type: none"> • be consistent over the entire amalgamated district; • give better effect to the Act and WRPS by incorporating an
5.2.1 Risks from natural hazards to health, safety and property, resulting from use, development or protection of land, are minimised.	
Tamahere Country Living Zone	

<p>5.2.11 Hydrological characteristics of the Mangaonua, Mangaone and Mangaharakeke Streams and their tributaries are retained.</p> <p>5.2.15 Risks from ponding of surface water and poor drainage are avoided.</p>	<p>objective on climate change (section 7(i) of the Act, and Objective 3.6, WRPS);</p> <ul style="list-style-type: none"> • providing stronger direction to avoid the effects of natural hazards or appropriately mitigate (s31 of the Act), and; • focus on community resilience and reducing risk (Objective 3.24 of the WRPS).
<p>Franklin Section</p>	
<p>7.2.2 Objectives</p> <p>Instability</p> <p>1) To ensure activities on land subject to, or likely to be subject to instability, do not cause, increase or contribute to the risk from natural hazards.</p> <p>Inundation</p> <p>2) To ensure that the risk to property and the environment from flooding caused by watercourse, stormwater overflow and inundation by coastal waters are reduced.</p> <p>Erosion</p> <p>3) To ensure that the adverse effects to property and the environment from erosion including coastal erosion are avoided, remedied or mitigated.</p> <p>General</p> <p>4) To ensure that the public are informed about natural hazards in the district and understand why subdivision, land use and development activities must avoid, remedy, or mitigate the adverse effects from natural and land hazards.</p> <p>17E.7.3 Tasman Coast Objectives</p> <p>To recognise natural coastal processes by avoiding</p>	<p>In terms of Option 1 (the status quo) the possibility of utilising the Franklin Plan provisions over the entire district or conversely the Waikato Section provisions over the entire district, rather than the separate operative provisions as they currently fall within each geographic section of the district was also considered. This was disregarded as neither Objective 5.2.2 in the Waikato Section or the suite of objectives in the Franklin Section in themselves fully gave effect to the WRPS. It was also noted that the Franklin objectives were phrased more like policies. It was considered that amalgamating and redrafting would be more appropriate and result in objectives that would be more effective in achieving the purpose of the Act and Part 2, than retaining the existing objectives.</p>

subdivision, use and development which would create coastal hazards.	
Proposed Objectives (Option 2)	Summary of evaluation
<p>Strategic objective: The choice, location and design of development in the district takes into account the risks from natural hazards and potential impacts of climate change.</p> <p>Objective 15.2.1 - Resilience to natural hazard risk A resilient community where risks from natural hazards to people, property, infrastructure and the environment from subdivision, use and development of land are avoided or appropriately mitigated.</p> <p>Objective 15.2.2 – Awareness of natural hazard risks A well-informed community that:</p> <ul style="list-style-type: none"> (a) Is aware of, and understands which natural hazards affect the district; and (b) Is able to effectively and efficiently respond to, and recover from, natural hazard events. <p>Objective 15.2.3 - Climate change A well-prepared community that:</p> <ul style="list-style-type: none"> (a) is able to adapt to the effects of climate change; and (b) has transitioned to development that prioritises lower greenhouse gas emissions. 	<p>The proposed strategic objective has no equivalent in the Operative Plan, but is considered appropriate as an overarching objective to achieve the purpose of the Act, thus providing for the protection of natural and physical resources, the health and safety of communities, and for their social, economic and cultural wellbeing (Part 2, section 5 – Act). This objective sets the overall importance of assessing natural hazard risk (s6(h), s31, and s106 Act and considering climate change (7 (i) Act) in deciding on the location and design of future development in the district. The strategic objective ties in with and complements the three objectives proposed in the Natural Hazards and Climate Change Chapter.</p> <p><u>Proposed Objective 15.2.1</u> is an amended form of the existing general objective 5.2.1 in the operative Waikato Section. It is considered that this objective is appropriate to provide an overall objective that is applicable over both geographic sections (Franklin and Waikato) covered by the existing Operative Plan. It achieves the purpose of the Act (Part 2, s5) and has specific regard to s6(h) (management of significant risks from natural hazards), s31 and s106. The following higher statutory documents are given effect to:</p> <ul style="list-style-type: none"> • the WRPS, and specifically Objective 3.24 Natural Hazards, which requires that the effects of natural hazards on people, property and the environment are managed by increasing community resilience to hazard risks; reducing risks to acceptable/tolerable levels, and enabling efficient and effective response and recovery from natural hazard events. <p>Where the risks from natural hazards associated with subdivision, use and development are avoided or mitigated as per proposed Objective 15.2.1 community resilience will increase and risks will be reduced to acceptable levels. This will be achieved through targeting areas of greatest risk, implementing measures such as <u>avoiding</u> rezoning in areas subject to risks from natural hazards or <u>mitigating</u> the risk such as through setting appropriate minimum floor levels.</p> <ul style="list-style-type: none"> • the NZCPS and specifically objective 5. Objective 15.2.1 applies to natural hazards which includes coastal hazards. Objective 15.2.1 anticipates an outcome where new development is required to be directed away from areas prone to coastal hazard risk (avoided) unless able to be appropriately mitigated (i.e. no longer prone to risks). <p>Overall, proposed Objective 15.2.1 drives a risk-based approach as required by the WRPS, which enables policies and rules to be developed that recognise, spatially and over time (through planning map overlays), where and when avoidance is necessary and where and when mitigation is appropriate depending on the level of risk, to achieve a more resilient community. The target land use planning</p>

	<p>activities are clearly stated as subdivision, use and development. The objective recognises that managing natural hazards through managing the activities occurring in the environment will reduce the level of risk from natural hazard events for future generations. The proposed objective is therefore more appropriate and efficient in achieving the purpose of the Act than Option 1 or 3.</p> <p>Resource management issues identified in Section 2.3 are addressed by this objective.</p> <p><u>Proposed Objective 15.2.2</u> amends and extends the Objective 7.2.2 <u>General</u> in the Franklin Section of the Operative Plan which identifies the need to ensure the public is aware of natural hazards. The revised objective 15.2.2 improves on this original objective and gives better effect to the WRPS (which requires the WRC to store natural hazard information which is available and relevant to the Waikato Region, and share this information with territorial authorities and other relevant stakeholders). It also better considers the CDEM Act (which encourages readiness for a natural hazard event and has a mandate to increase public awareness).</p> <p>The WRPS, specifically requires through Objective 3.24 that effects of natural hazards on people, property and the environment are managed by enabling the effective and efficient response and recovery from natural hazard events. Proposed Objective 15.2.2 is consistent with and gives effect to Objective 3.24. Proposed Objective 15.2.2 also gives effect to WRPS requirement 13.1.5, to develop and implement public education and awareness programmes on natural hazards and their associated risks, in collaboration with other agencies.</p> <p>Furthermore, the council is required under section 35 of the Act to gather information in areas subject to natural hazards. This objective will drive practices to ensure that the council continues its obligation to gather more technical information as appropriate and use it in its district planning maps, its GIS systems and other documents as appropriate, increasing public awareness of natural hazards. While it is largely a “process objective” it is considered appropriate to achieve Part 2 of the Act (enabling communities to provide for their social, economic and cultural well-being). This objective, therefore, assists the council to carry out its functions under the RMA s31(1)(a) and (b).</p> <p>There are also considerable obligations under LGOIMA and the LGA to enable people to find out information and be aware of the natural hazards in the district. It is not feasible to identify and map every hazard prone area on the planning maps, because of costs and information deficiencies. Information provided under this objective will help to enable communities to provide for their health and safety against these types of hazards.</p> <p>Under the status quo option (Option 1) of retaining the operative provisions, it is noted that there is no similar objective in the Waikato Section. The Franklin Section objective would be required to be extended over the Waikato section geographical area if it was to be retained in its entirety. Overall, it is considered that the</p>
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	<p>proposed objective 15.2.2 is clearer and is an appropriate improvement to the operative provision.</p> <p>Objective 15.2.2 achieves the purpose and principles of the RMA and makes a material contribution to sustainable management (s5) and managing the risks of natural hazards (s6) by improving community knowledge and resilience to natural hazards.</p> <p>Resource management issues identified in Section 2.3 are addressed by this objective. Objective 15.2.2 addresses the risks of natural hazards through increasing the community's awareness and understanding, which will influence development proposals and help to redress market failures.</p> <p>The objective is realistically able to be achieved. While public information programmes will require funding independently of the District Plan, the funding requirement is not excessive and it is realistic that it can be achieved with the council's civil defence emergency management programmes. It will not result in unjustifiably high costs on the community or part of the community. The collaborative approach required under the regional policy statement will share the costs between relevant central and local government agencies.</p> <p>Overall, it is considered that this objective is appropriate in achieving the purpose of the RMA. A well-informed community is usually more able to effectively respond to natural hazard events.</p> <p><u>Proposed Objective 15.2.3</u> is a new objective. It has no similar counterpart in the Operative Plan (Option 1). It is considered that this new objective (first limb) provides an objective that is applicable over both geographic sections (Franklin and Waikato). It gives effect to Part 2, particularly s5, and s7(i), and s31 of the Act and the following higher statutory documents:</p> <ul style="list-style-type: none"> the WRPS, and specifically Objective 3.6 - Adapting to climate change, which requires that land use is managed to avoid potential effects of climate change-induced weather variability. The WRPS objective focuses on the built environment, infrastructure, indigenous biodiversity, natural character, public health and safety and public access, which is addressed in the first limb of the proposed objective. the coastal hazards and climate change focus of the NZCPS and specifically objective 4 and 5 in relation to the effects of inland migration and adaptive responses (e.g. managed retreat). <p>The second limb of the proposed objective focuses on the need to address greenhouse gas emissions which gives appropriate regard to Climate Change Response (Zero Carbon) Amendment Act 2019.</p> <p>Overall, proposed Objective 15.2.3 is more consistent with the WRPS and the intentions of the Zero Carbon Amendment Act. Proposed Objective 15.2.3 more appropriately addresses s7(i) of the Act than Option 1 or 3.</p> <p>Resource management issues identified in Section 2.3 are addressed</p>
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	<p>by this objective.</p> <p>Neither Option 1 nor Option 3 give better effect to the higher order statutory directions outlined above. Consequently, it is considered that the proposed objectives in Option 2 are more appropriate and efficient to achieve the Act.</p>
<p>Other methods (Option 3) – no objective in the District Plan</p>	<p>This option comprises a less directive/regulatory approach than would be provided by including objectives and policies in a district plan. Such an approach could include the use of guidelines, relying on the Building Code, insurance, and evacuation plans under CDEM. The higher order documents, require district plans to include objectives, policies and rules/methods to address natural hazards and climate change in controlling appropriate subdivision, use and development. An approach devoid of objectives and a supporting framework of provisions would not give effect to the higher order documents.</p> <p>The third option could involve a strategy where district planning provides less direction rather than no direction. Such an approach would include an objective which effectively handed the responsibility over to other institutions or individual property owners to undertake their own future planning for natural hazards and climate change but with a corresponding increase in measures outside the District Plan, such as GIS information and guidelines for developing in hazard prone areas.</p> <p>Under either approach, Option 3 would provide minimal incentive for land developers and property owners to avoid or mitigate natural hazard risk. Relying on insurance is, however, a form of mitigation which could be effective to an extent.</p> <p>Overall, the Waikato District Council would not be upholding its obligations and responsibilities under s31, s6(h), s(7) and s106 of the Act if it did not include objectives and supporting provisions in the District Plan. Furthermore, the council would fail to give effect to the WRPS in terms of the policies and implementation methods required of district councils in the management of natural hazards (Chapter 13) and consideration of climate change (Objective 3.6).</p> <p>It is noted that Options 1 and 2 above, are able to be supplemented by the type of direction offered in Option 3 such as guidelines, GIS information, hazard portals, insurance, reliance on the Building Code and CDEM activities. These methods remain effective additions to any strategy to address natural hazard risk.</p> <p>Overall, however, Option 3 fails as it would not give effect to the higher statutory documents or the obligations of district councils under s31 of the Act, and is not a complete option on its own.</p>

4.2 Recommendation

159. The recommendation is to adopt Option 2 which includes two amended and rationalised objectives and a new objective in order to:

- give better effect to the higher order planning documents particularly Objective 3.24 and Objective 3.6 of the WRPS;
- provide a more focused, streamlined and updated set of objectives on which to develop more directive provisions on natural hazards and provide a new objective on climate change;

160. The proposed objectives (Option 2) are in accordance with the purpose and principles of the Act and reflect the role and functions of the council in respect to natural hazards and climate change. Overall, the proposed objectives support a risk-based approach which is consistent with the WRPS and are considered the most appropriate to achieve the purpose of the Act.

5 EVALUATION OF PROPOSED POLICIES, RULES AND METHODS

161. Once the objectives are chosen, the council must consider a range of policy options and decide which of these options would be the most appropriate way to achieve the objectives. In choosing an option, the council must think about how efficient and effective that option would be if it was put into place. This includes identifying the benefits and costs of any environmental, economic, social and cultural effects that would arise if the option was implemented, and any opportunities it might provide for economic growth and employment. The benefits and costs should be quantified where practicable. The council must also assess the risk of acting or not acting if there is uncertain or insufficient information available.
162. This is a complex process, and the council is not required to conceive of and consider every possible course of action.

5.1 Identification of reasonably-practicable options – for achieving objective(s)

163. The following tables set out the broad options that were considered for achieving the objectives that the council considers to be the most appropriate to achieve the purpose of the RMA and the high-level screening process that was undertaken to consider how effective each broad option might be. Only those options considered to be reasonably practicable have been evaluated.
164. The options evaluated comprise broad approaches, rather than detailed provisions and range from a non or minimal regulatory approach through to a more restrictive regime of new provisions to manage natural hazard risk.
165. To identify the broad options, the council considered:
- **Option 1: Status quo** – retain existing objectives, policies and rules in the operative plan including where they fall geographically. Alternatively:
 - **Sub Option 1a:** Status quo for Franklin Section part of the district, and amend Waikato Section so that Franklin provisions extend to the part of the district currently covered by the Waikato section.
 - **Sub Option 1b:** Status quo for Waikato section part of the district and amend Franklin Section so that Waikato provisions extended to the part of the district currently covered by the Franklin section.
 - **Option 2: New or revised objective and policy framework** to strengthen and reflect new information and updated statutory directions.
 - **Sub Option 2a:** A more restrictive regime which does not provide permitted activities in natural hazard areas.
 - **Sub Option 2b:** A less restrictive new regime with greater use of permitted activities and restricted discretionary activities

- **Option 3: Non or minimal regulatory approach** - Relies largely on other legislation such as the Building Act and the Civil Defence Emergency Management Act, non-regulatory guidelines, technical information, GIS mapping information and insurance.

Table 7: Reasonably Practicable Options for Achieving Objective

Objective(s)	Objective 15.2.1 - Resilience to natural hazard risk A resilient community where the risks from natural hazards to people, property, infrastructure and the environment from subdivision, use and development of land are avoided or appropriately mitigated.				
Options Approach to achieve objective(s)	Description (brief) Describe the option and acknowledge the source of this option (if there is one e.g. feedback from consultation, suggestions from workshops with elected members etc).	Relevance How effective provisions are in achieving the objective(s).	Feasibility Within council's powers, responsibilities and resources, degree of risk and uncertainty of achieving objectives, ability to implement, monitor and enforce.	Acceptability Level of equity and fair distribution of impacts, level of community acceptance. Where possible identify at a broad level social, economic, environmental, cultural effects.	Recommendation Discard or evaluate further (with brief explanation).
Option 1: Status quo Retain existing objectives policies and rules as they currently stand in both sections of the ODP	Retain existing objectives, policies and rules in the operative plan including where they fall geographically.	The Operative District Plan contains objectives, policies and rules to reduce risk of natural hazards and increase resilience. Currently the plan has two sets of provisions and provides an inconsistent approach to achieving the objective. The Operative District Plan does not include mapped coastal hazard areas, minimal flood hazard and ponding areas, no provision for	This option does not meet council's responsibility to give effect to the WRPS and the NZCPS.	This option does not provide a consistent approach across the district.	Discard

		liquefaction, and no residual risk areas.			
<u>Option 2:</u> <u>New or revised objective and policy framework</u>	New objective and policy framework developed to strengthen and reflect new information and updated statutory directions.	Option 2 provides a comprehensive suite of policies, rules and other methods (including hazard maps) to achieve the objective.	This option is within council's powers, and meets council's statutory responsibilities. Council has the ability to implement, monitor and enforce this option. There is a low degree of risk and uncertainty of achieving the objective with this option.	Option 2 includes new hazard mapping which provides certainty to the whole community. Rules apply to mapped hazard areas, with the exception of ponding areas that may occur throughout the district. This approach reduces the requirement to unnecessarily carryout hazard assessments to determine if a site is subject to a hazard. This option introduces assessment criteria for evaluation of liquefaction vulnerability (required at the time of subdivision and proposals for multi-unit development). However, this is currently a requirement for subdivision applications under the Operative District Plan to satisfy s106 RMA.	Further evaluation
Sub Option 2a: A more restrictive	New objective with a more restrictive policy framework which	Option 2a would provide a similar suite of policies, rules and other	This option does not meet council's responsibility to give	This option would not provide a level of equity and fairness or a high	Discard

Released to open (WDC2007/05)

regime	does not provide permitted activities in natural hazard areas.	methods (including hazard maps) to achieve the objective, but would strengthen policies to be less enabling. Rules would be less permissive and require consent for any activity in an identified hazard area. This option would achieve the objective.	effect to the WRPS and the NZCPS.	level of community acceptance as it would unnecessarily increase the cost of development and number of consents required to achieve the same outcomes as Option 2.	
<u>Option 3:</u> <u>Non or</u> <u>minimal</u> <u>regulatory</u> <u>approach-</u>	Minimal regulatory intervention within the district plan. Relies largely on other legislation such as the Building Act and the Civil Defence Emergency Management Act, non-regulatory guidelines, technical information, GIS mapping information and insurance.	Option 3 potentially reduces the number of policies, rules and other methods (including hazard maps) and would rely on other legislation and ad hoc methods to achieve the objective. Although mapping would be available, it would rely on the building consent process to manage risk and new subdivision applications to assess significant risk of natural hazards. CDEM would be responsible for reducing risk through readiness, response and recovery.	A number of the regulatory and non-regulatory guidelines and methods are within council's powers and responsibility to regulate and control. This approach would not absolve council from its responsibility to give effect to the WRPS or the NZCPS by providing a risk-based policy approach and hazard mapping in the District Plan.	This option does not provide a consistent approach across the district and does not provide a high level of certainty to the community, council, insurers and other agencies and stakeholders. It may result in inconsistent outcomes, and be ineffective and reducing risk and increasing resilience.	Discard

Released to: Open (WDC2007/105)

Objective(s)	Objective 15.2.2 - Awareness of natural hazard risks A well-informed community that: (a) is aware of, and understands, which natural hazards affect the district; and (b) is able to effectively and efficiently respond to, and recover from, natural hazard events.				
Options Approach to achieve objective(s)	Description (brief) Describe the option and acknowledge the source of this option (if there is one e.g. feedback from consultation, suggestions from workshops with elected members etc).	Relevance How effective are the provisions in achieving the objective(s).	Feasibility Within council's powers, responsibilities and resources, degree of risk and uncertainty of achieving objectives, ability to implement, monitor and enforce.	Acceptability Level of equity and fair distribution of impacts, level of community acceptance. Where possible identify at a broad level social, economic, environmental, cultural effects.	Recommendation Discard or evaluate further (with brief explanation).
Option 1: Status Quo Retain existing objectives policies and rules as they currently stand in both sections of the ODP	Rely on current policies and methods in the Operative District Plan (both sections)	The ODP contains policies and methods relating to information and advocacy. However it is more effective and efficient to update the policy framework to be more directive in terms of outlining the methods through which information can be made available to the public in order to achieve Objective	Council has a responsibility to control the effects of the use, development or protection of land for the purpose of avoiding or mitigating natural hazards and to manage significant risks from natural hazards. As a consenting authority Council can also refuse subdivision consents where there is significant	Providing up to date information on natural hazards and making it available to the public fairly distributes the information and any impacts of that information. Without up to date information being available means the community will look elsewhere for information and this may be adhoc and	Discard

		15.2.2.	risk of natural hazards. It is more efficient for Council to have up to date information on natural hazard risk areas and to make that available to the public.	hard assess This option would not be as effective for informing the community.	
<p>Option 2: New objective and policy framework developed to be more directive and reflect new information and updated higher order statutory direction.</p>	<p>Information would be made available through LIMs, the hazards register, Stormwater Catchment Management Plans on the Council website, district planning maps, Regional Hazards Portal, signage, education, and community engagement and developing awareness of CDEM Community Response Plans</p> <p>Improved community awareness of community response</p>	<p>It is more effective and efficient to update the policy framework to be more directive in terms of outlining the methods through which information can be made available to the public in order to achieve Objective 15.2.2.</p>	<p>This is feasible as being within council control. New risks can be included as it emerges over time. Education programmes can be developed in collaboration with other agencies. This is feasible as being within council control and can programmes be developed in collaboration with other agencies.</p>	<p>It is more efficient and cost effective for Council and the community when Council carry out hazard modelling; collect and store hazard information; develop community response plan and make all information available to the public so all parties have access to the same information.</p> <p>This will be acceptable to stakeholders. While LIM reports can be controversial, the messaging can be managed</p>	<p>Evaluate further</p>

Released to open (VDC0007/05)

Released to open (WDC2007/05)	plans will help to improve response to and recovery from natural hazard events.			<p>appropriately. The majority of the community can access the council website. This will be acceptable to stakeholders.</p> <p>Engagement with communities on the plans will assist to increase knowledge of the plans and the hazards.</p> <p>This option allows for gradual development of community knowledge in accessible ways. This option helps to develop a well-informed community able to respond to, and recover from, natural hazard events.</p>	
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Objective(s)	Objective 15.2.3 - Climate change A well-prepared community that: <ul style="list-style-type: none"> a) is able to adapt to the effects of climate change; and b) has transitioned to development that prioritises lower greenhouse gas emissions. 				
Options Approach to achieve objective(s)	Description (brief) Describe the option and acknowledge the source of this option (if there is one e.g. feedback from consultation, suggestions from workshops with elected members etc).	Relevance How effective provisions are in achieving the objective(s).	Feasibility Within council's powers, responsibilities and resources, degree of risk and uncertainty of achieving objectives, ability to implement, monitor and enforce.	Acceptability Level of equity and fair distribution of impacts, level of community acceptance. Where possible identify at a broad level social, economic, environmental, cultural effects.	Recommendation Discard or evaluate further (with brief explanation).
Option 1: <u>Status quo</u> Retain existing objectives policies and rules as they currently stand in both sections of the ODP	Retain existing objectives, policies and rules in the operative plan including where they fall geographically.	Minimal provision for either mitigating or adapting to climate change in either section of the ODP. Operative provisions do not give effect to the WRPS or the NZCPS.	Council has a statutory obligation to give effect to higher order policy documents prepared under the RMA. The Status Quo provisions do not give effect to the WRPS or the NZCPS in respect of addressing the projected effects of climate change. This option does not achieve this.	Retaining the status quo provisions will not provide certainty for current or future generations, could place the community at risk, reducing resilience of communities over time and burdening future generations with the cost of retreating from future hazard areas.	Discard
Option 2: <u>New or</u>	New objective and policy framework	New provisions provide a comprehensive	Council has a statutory obligation to give effect	This option provides more certainty to	Further evaluate

<p><u>revised objective and policy framework</u></p>	<p>developed to strengthen and reflect new information and updated statutory directions.</p>	<p>approach to addressing the projected effects of climate change, including guidance on the allowances to use when undertaking technical assessments. Policies support Stage I coastal setback rules and support a precautionary approach when there is insufficient information or uncertainty with regards to the scale of future effects, such as the rate and timing of sea level rise.</p>	<p>to higher order policy documents prepared under the RMA. The Status Quo provisions do not give effect to the WRPS or the NZCPS in respect of addressing the projected effects of climate change.</p>	<p>council officers and the community with regards to the most up to date flood and coastal hazard modelling, incorporating climate change projections based on national guidelines.</p> <p>This option also provides guidance on assessing the effects of climate change in technical assessments using most up to date national guidelines.</p> <p>The enable adaptive pathways approach results in a higher level of resilience and reduces financial burden for future generations.</p>	
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5.2 Evaluation of selected options

166. The tables in section 5.1 set out the high-level screening that was undertaken to narrow down the broad options that should then be evaluated in more detail. This section contains an evaluation of those options which warranted further consideration.
167. The short list of options has been developed further to include the specific policies, rules and other methods (provisions). In some instances, these provisions have been bundled into packages of provisions where they are designed to work together to provide a comprehensive approach to achieving the relevant objective. Each evaluation focuses on the approach that is taken by each package of provisions, rather than a detailed analysis of every policy and every rule. The level of detail in each evaluation depends on the extent to which the options are departing from the existing District Plan provisions and the scale and significance of each option.
168. The provisions (policies and rules, or other methods) that work together to achieve the three objectives can be separated into eight bundles. The objectives, the overall policy framework to address each objective and the bundles of provisions are set out in the table below. In some cases policies can appear in multiple bundles. This is due to the provision to address multiple hazards within some of the more general policy.

Objective	Policy Framework	Bundles
15.2.1 Resilience to natural hazard risk A resilient community where the risks from natural hazards to people, property, infrastructure and the environment from subdivision, use and development of land are avoided or appropriately mitigated.	Policies 15.2.1.1 to 15.2.1.23 work together to achieve Objective 15.2.1 and are structured to include general policies and rules to address significant hazard risk for a range of activities; general policies and rules to address activities on land outside high risk areas; and policies and rules or matters of restricted discretion to address specific natural hazards or activities in hazard areas. The specific hazards include flooding and ponding, flood management infrastructure, coastal inundation and erosion, including current risk areas and areas potentially at risk with 1 metre of sea level rise, coastal hazard protection works, earthworks in hazard areas, hazardous substances within the floodplain, stormwater management, fire risk, land instability, mine subsidence and liquefaction.	There are a number of policies to address different types of hazards that work together to achieve objective 15.2.1. These policies can be evaluated together in the following bundles: (1) Floodplain Management Area <ul style="list-style-type: none"> • Policies 15.2.1.1 – 15.2.1.6, and 15.2.1.11 - 15.2.1.15; • Rules 15.4 and 15.5; and matters of restricted discretion in stage 1 PDP rules; • Floodplain Management Area, High Risk Flood Area and Ponding Area Mapping. (2) Defended Areas <ul style="list-style-type: none"> • Policy 15.2.1.10; • Rules 15.6 • Defended Area Mapping. (3) Coastal Hazards <ul style="list-style-type: none"> • Policies 15.2.1.1 – 15.2.1.9, 15.2.1.11, 15.2.1.16 and 15.2.1.17;

		<ul style="list-style-type: none"> • Rules 15.7 to 15.10; • Coastal Sensitivity Area and High Risk Coastal Hazard Area mapping. <p>(4) <u>Natural Features and Buffers</u></p> <ul style="list-style-type: none"> • Policy 15.2.1.9 • Rules 15.4, 15.9 and 15.10 and building setbacks from the coast (Stage 1 PDP rules) <p>(5) <u>Fire Risk, Land Instability and Subsidence</u></p> <ul style="list-style-type: none"> • Policies 15.2.1.18, 15.2.1.19 and 15.2.1.21; • Matters of restricted discretion in Stage 1 subdivision rules. <p>(6) <u>Mine Subsidence</u></p> <ul style="list-style-type: none"> • Policies 15.2.1.19 – 15.2.1.21; • Mine Subsidence Risk Area mapping. <p>(7) <u>Liquefaction</u></p> <ul style="list-style-type: none"> • Policies 15.2.1.22 and 15.2.1.23; • Matters of restricted discretion in Stage 1 subdivision rules.
<p>15.2.2 Awareness of natural hazard risks</p> <p>A well informed community that:</p> <ol style="list-style-type: none"> is aware of and understands which natural hazards affect the district, and is able to effectively and efficiently respond to and recover from natural hazard events. 	<p>The policy framework to support this objective includes two policies that set out a range of methods to increase community awareness of natural hazard risk. The associated methods, with the exception of hazard overlay areas on the planning maps, are non-regulatory methods and processes that sit outside the District Plan.</p>	<p>(8) <u>Awareness of natural hazard risks</u></p> <p>The following policies, rules and/or other methods work together to achieve objective 15.2.2 and can be evaluated as one bundle:</p> <ul style="list-style-type: none"> • Policies 15.2.2.1 and 15.2.2.2; • Hazard overlay areas on planning maps; • CDEM processes; • Other means of making information to the public.
<p>15.2.3 Climate change</p> <p>A well prepared community that:</p> <ol style="list-style-type: none"> is able to adapt to the effects of climate change; and has transitioned to development 	<p>The policy framework to support this objective includes guidance for allowances when assessing the projected effects of climate change, mitigation and adaptation methods, taking a precautionary approach, assessing the impacts of climate change on natural hazards and providing sufficient coastal setbacks for new development. These policies largely provide guidance for</p>	<p>(9) <u>Climate change</u></p> <p>The following policies, rules and/or other methods work together to achieve objective 15.2.3 and can be evaluated as one bundle:</p> <ul style="list-style-type: none"> • Policies 15.2.3.1 to 15.2.3.5; • 2D flood modelling; • Coastal Sensitivity Areas mapping;

that prioritises lower greenhouse gas emissions	assessments that are undertaken to ensure development can either avoid, remedy (adapt to) or mitigate the impacts of climate change.	<ul style="list-style-type: none"> • Rules 15.4, 15.5, 15.7, 15.8 • Rules 15.9 and 15.10 and all coastal setback rules in Stage 1 PDP apply to Policy 15.2.3.4
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169. The general approach taken to managing natural hazard risk is to strictly regulate vulnerable land uses and development and certain activities within high risk areas, while applying a more lenient approach to land use and development outside high risk areas where realistic and effective mitigation measures can be utilised to reduce risk. For this reason the high risk areas within the Floodplain Management Area and the Coastal Hazard areas have been evaluated separately.
170. The evaluation of the effectiveness and efficiency of each bundle of provisions in achieving the objective is set out in the following tables. In some cases, where there is limited information available, the effectiveness and efficiency of each option cannot be quantified. In these instances, the evaluations rely on qualitative analysis, national and regional policy guidance and guidelines and best practice approaches.

5.2.1 Flooding and ponding

Provisions (Policies, Rules, Methods) most appropriate way to achieve the objective

Objective 15.2.1 Resilience to natural hazard risk

A resilient community where the risks from natural hazards to people, property, infrastructure and the environment from subdivision, use and development of land are avoided or appropriately mitigated.

Evaluation of Option 2: New or revised policy and rules/methods to strengthen and reflect new information and updated statutory directions.

Policies relating to Flood Risk

Provisions most appropriate

High Risk Flood Areas

Policy 15.2.1.1 - New development in areas at significant risk from natural hazards

- (a) Avoid new subdivision, use and development where it will increase the risk to people's safety, well-being and property in the following areas identified as being at significant risk from natural hazards:
- (i) High Risk Flood Area;
 - (ii) High Risk Coastal Hazard (Inundation) Area;
 - (iii) High Risk Coastal Hazard (Erosion) Area.

Policy 15.2.1.2 – Changes to existing land use and development in areas at significant risk from natural hazards

- (a) In areas of High Risk Flood, High Risk Coastal Hazard (Erosion) and High Risk Coastal Hazard (Inundation), ensure that when changes to existing land use activities and development occur, a range of risk

Effectiveness, Efficiency, Benefits & Costs

Effectiveness and Efficiency

- Land use provisions that avoid subdivision, use and development occurring in localities where there is potential for increased risk from flood hazards, or require mitigation to ensure that the risk does not increase, have been found nationally and internationally to be an effective means of flood risk management. It reduces the risk of harm to people and property, including infrastructure, during large flood events.
- The proposed policies (Option2) identify specific areas likely to be affected by a 1% AEP design flood event as required by Method 13.2.6 of the WRPS (a large flood event). The mapped area (overlay) shows the flood extent and spatially limits where the policies and rules apply. This is more effective, efficient and certain than having policies and rules applying across the board (with no mapped extent) as per both Waikato and Franklin Sections of the existing Operative Plan (Option 1). These existing Operative Plan provisions rely on various sources of information to determine where the 1% AEP flood plain and ponding

reduction options are assessed, and development that would increase risk to people's safety, well-being and property is avoided.

Policy 15.2.1.3 – New emergency services and hospitals in areas at significant risk from natural hazards

- (a) Avoid locating new emergency service facilities and hospitals in areas which are at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion), unless, considering engineering and technical constraints or functional and operational requirements, they cannot be reasonably located elsewhere and will not increase the risk to or vulnerability of people or communities.

Policy 15.2.1.4 – New infrastructure and utilities in areas subject to high risk natural hazards

- (a) Enable the construction of new infrastructure and utilities in areas at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) areas only where:
- (i) the infrastructure and utilities are technically, functionally or operationally required to locate in areas subject to natural hazards, or it is not reasonably practicable to be located elsewhere; and
 - (ii) any increased risks to people, property and the environment are mitigated to the extent practicable; and
 - (iii) the infrastructure and utilities are designed, maintained and managed, including provision of hazard mitigation works where appropriate, to function to the extent practicable during and after natural hazard events.

Policy 15.2.1.11 - New development that creates demand for new protection structures and works

- (a) Avoid locating new subdivision, use and development in high risk areas

areas occur.

- It is noted, however, only two flood ponding areas have been identified in the proposed provisions. The status quo method is retained for the remainder of the flood ponding areas due to the lack of information on flood ponding areas (i.e. they are not mapped).
- The rules operate only where the flood overlay falls. This means that if a property owner has a large site with land within the Flood Plain Management Area and also land outside of it, then the rule only applies to that part of the property within the Flood Plain Management Area.
- Policies and rules (Policy 15.2.1.12 and Rule 15.4.1) which require minimum floor levels for new buildings and additions, build upon those already in the Operative Plan. Minimum floor levels have already proven their effectiveness at mitigating flood hazard over a number of years and hence will be effective in achieving Objective 15.2.1 (increasing community resilience and mitigating risk). This level of intervention is also consistent with the policy framework in the WRPS (Policy 3.24 and Implementation Method 13.2.6 a) iv)).
- Under Rule 15.4.1 new buildings and additions to existing buildings are required to provide finished floor levels above the level of a 1% AEP design flood level plus an allowance for 500mm freeboard. The area from Horitiu – Huntly – Ohinewai where 2 D flood modelling was undertaken, also includes an allowance for climate change. The climate change allowance equates to greater rainfall volumes as a result of a projected temperature increase of 2.3° C. Exceptions for some activities are provided for activities that are not likely to suffer material damage and the risk to them has been assessed as acceptable as provided for in Implementation Method 13.2.6 of the WRPS.
- The 2D modelling was also used to identify a High Risk Flood Area where the depth of water is predicted to exceed 1m or where the speed of water exceeds 2m/s in a 1% AEP event (see full definition in the Proposed Chapter 15 Rules and the definition in the WRPS). In these areas Rule 15.5.4 requires construction of a new building or additions to an existing building to be assessed as a non-complying

where a demand or need for new structural protection works will be required to reduce the risk from natural hazards to acceptable levels.

Floodplain Management Area and Ponding Areas

Policy 15.2.1.5 – Existing infrastructure and utilities in all areas subject to natural hazards

- (a) Provide for the operation, maintenance and minor upgrading of existing infrastructure and utilities in all areas subject to natural hazards.

Policy 15.2.1.6 – Managing natural hazard risk generally

- (a) Provide for rezoning, subdivision, use and development outside High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) Areas where natural hazard risk has been appropriately identified and assessed and can be adequately avoided, remedied or mitigated and does not transfer or exacerbate risk to adjoining properties.

Policy 15.2.1.12 – Reduce potential for flood damage to buildings located on the Waikato and Waipa River floodplains and flood ponding areas

- (a) Reduce the potential for flood damage to buildings located on the Waikato and Waipa River floodplains and flood ponding areas by ensuring that the minimum floor level of building development is above the design flood levels/ponding levels in a 1% AEP flood event, plus an allowance for freeboard, unless:
- (i) the building development is of a type that is not likely to suffer material damage during a flood; or
 - (ii) the building is a small-scale addition to an existing building; or
 - (iii) the risk from flooding is otherwise avoided, remedied or mitigated.

Policy 15.2.1.13 – Control filling of land within the 1% AEP

activity unless provided as permitted or restricted discretionary activities in Rules 15.5.1 or 15.5.2. Subdivision located entirely within in High Risk Flood Area and emergency facilities and hospitals are also non-complying activities. This set of rules is consistent with the requirements of VRPS Implementation Method 13.2.5 which requires avoiding the placement of structures or development where these would be vulnerable to a natural hazard event or would place the community at intolerable risk. Examples of such structures are habitable structures, hospitals and emergency services. While lifeline utilities are included in the list, the functions of these activities as defined in the CDEM make it difficult and impractical for them to be included in Rule 15.5.4 as a non-complying activity. It is anticipated that they can be controlled efficiently under Rule 15.5.2 (utilities).

- Some exceptions for small building additions have also been provided as the increased risk associated with them is expected to be minimal.
- There are also policies and rules relating to earthworks and utilities.
- The policies and rules provide a more permissive regime for utilities recognising that in many instances utilities are required to be located in areas subject to natural hazards and will be designed and located by utility providers in a manner that takes these risks into account. In the High-Risk Flood Area new utilities, and upgrading of existing utilities, require resource consent and will be assessed in accordance with the matters of restricted discretion. These matters acknowledge that it is difficult for infrastructure to locate elsewhere due to functional and location requirements. They also acknowledge that in most circumstances appropriate mitigation can be implemented to ensure the risk to people and property (including the infrastructure itself) is not increased.
- It is noted that the proposed provisions do not affect owners existing use rights in respect to existing buildings under s10 of the RMA. Where existing use rights are able to be relied upon the rules do not apply. In this respect the effectiveness of the new rules could be reduced but this is an inherent feature of the RMA and applies to Option 1 and Option 2 depending on when the original building was

floodplain and flood ponding areas

- (a) Control filling of land within the 1% AEP floodplain and flood ponding areas to ensure that the potential adverse effects on flood storage capacity, overland flows, run-off volumes on surrounding properties or infrastructure, are avoided or mitigated.

Policy 15.2.1.14 – Hazardous substances located within floodplain and flood ponding areas

- (a) Ensure that the location and storage of hazardous substances within the 1% AEP floodplain and flood ponding areas do not create an unacceptable hazard to people, property or the environment.

Policy 15.2.1.15 – Flood ponding areas and overland flow paths

- (a) Manage stormwater hazards by requiring new subdivision and development within flood ponding areas and overland flow paths to adopt integrated catchment plan-based stormwater management methods which:
- (i) maintain the flood storage capacity of natural floodplains, wetlands and ponding areas; and
 - (ii) retain the function and capacity of overland flow paths to convey stormwater run-off; and
 - (iii) do not transfer or increase risk elsewhere; and
 - (iv) promote low impact stormwater management practices with reference to the Waikato Stormwater Management Guideline and the Regional Infrastructure Technical Specifications (RITS); and
 - (v) minimise impervious surfaces.

171.

Relevant rules include:

- Rule 15.4 Flood Plain Management Area and Flood Ponding Areas, and

constructed.

Benefits

- The proposed policies provide clear guidance for managing activities to ensure acceptable levels of risk.
- The proposed Flood Plain Management Area overlay, and within that, the High Risk Flood Area overlay, provides important up-to-date information for property owners, developers and the community on flood risk in the district.
- The proposal also makes more use of permitted activities when compared to the Operative Plan, in respect of flooding hazard, thus reducing unnecessary resource consents.
- Damages to property are avoided by requiring new subdivision, use and development to be avoided in areas of significant risk. Damages are also avoided or reduced in other areas subject to flood risk where development is able to proceed under mitigation measures such as implementation of the required minimum floor levels (Rule 15.4.1).
- It is noted that loss of life from flooding is not common in New Zealand (being more related to outdoor pursuits during flash floods in high country/remote areas).
- Increased certainty is an additional benefit from the proposed framework. Areas not identified in the Flood Plain Management Area and High Risk Flood Areas have certainty and have minimal expectation to investigate flood hazard (the exception to this is flood ponding areas). On the other hand, for property owners with land identified within the Flood Plain Management Area or the High Risk Flood Area, there is greater certainty about the processes that will be required to develop the land, such as engaging the relevant experts to ensure appropriate mitigation such as minimum floor levels, or alternatively identify no-go areas.
- Avoiding development in areas with significant risk of flooding (high risk) and mitigation risk where that is economically viable will help build resilience, and potentially help reduce the need for costly

<ul style="list-style-type: none"> • Rule 15.5 High Risk Flood area <p>172.</p> <p>Planning maps:</p> <ul style="list-style-type: none"> • Flood Plain Management Area overlay • High Risk Flood overlay <p>Variation to Stage I where added matters that discretion is restricted to includes avoidance and/or mitigation of natural hazards.</p>	<p>remediation/retreat after an event.</p> <ul style="list-style-type: none"> • The actual cost of loss of life (less likely in flood risk) and damage to property and infrastructure will be reduced overall by a policy and rule framework that is effective in signalling where avoidance should occur and where mitigation is appropriate. • Flooding of floors bears a high cost in house and contents repair, high personal disruption and increased health risks (mould, rising damp and cleaning up contaminated water under homes). Policies that require avoidance or mitigation prior to an event is therefore beneficial, enabling such damage and disruption to be prevented. • The requirement to identify and assess flood risk under Policy 15.2.1.6 and to provide technically robust recommendations to avoid, remedy or mitigate the flood risk, and ensure the risk is not transferred elsewhere, will provide increased employment opportunities in hydrology and risk assessment fields of expertise and contribute to the economic growth of the district, support universities and technical colleges, and tertiary education. This will also have the benefit growing the body of knowledge within the district on flood hazards. <p><u>Costs</u></p> <ul style="list-style-type: none"> • Some proposed rezonings of rural land to urban may be curtailed by the proposed High Risk Flood Area policies and rules. This could possibly result in loss of development capacity for the district as a whole on greenfield areas (areas of new urban development). More suitable land areas for urban growth may need to be found. • Individual property owners may experience costs from: <ul style="list-style-type: none"> ○ loss of development potential of their land, where policies require avoidance; or ○ Increased cost of developing land where increased or unexpected mitigation is required. • This could occur, for example, where as a result of falling within the floodplain mapped extent, an increased floor level to 1% AEP (a one in one-hundred-year event) is required rather than the Building Code 2%
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Released to open (WDC2007/155)

Released to open (WDC2007/05)

AEP requirement (one in fifty year event). It should be noted that this results from both Option 1 (retaining the existing provisions) and Option 2 (developing revised/new provisions), as both the Operative Plans and this Proposed Plan require a floor level above the 1% AEP event. However, Option 2 more clearly defines where that 1% AEP floor level will apply, and requires a freeboard of 500mm. The Franklin Section of the Operative Plan requires a 500mm freeboard, whereas the Waikato Section requires 300mm. Neither section of the Operative Plan identified on the planning maps where the minimum floor level rules apply.

- There could be a negative perception on land values for those identified in the flood plain area of the planning maps and more so for those areas identified as High Risk Flood Area. There is also the potential for impact on insurance premiums or ability to obtain insurance.
- There is also a cost to developers and the community for flood hazard advice, assessments, mapping, modelling and engagement, and plan drafting, but this is considered to be greatly outweighed by the benefits of appropriate awareness and regulatory planning for flood hazards, noting council's responsibility to collect and share information on natural hazards under the RMA, LGA and WRPS and the council's responsibility to manage natural hazards (s31). These costs are likely under all three Options proposed to manage natural hazards including flood risk.
- Costs will also occur in the administration, monitoring and enforcing the District Plan rules, noting that this is the case for Option 1 and Option 2. This cost falls onto the Council, but is also passed on to developers and property owners to the extent that relevant legislation enables the Council to pass on such costs. Where the costs cannot be passed on, it ultimately falls on ratepayers.
- Property owners will also bear the costs in terms of mitigation of flooding hazard on individual properties, or the developer will pay in order to get approval for the development (see above). This includes the costs of preparing resource consent applications under the rules

<p style="color: red; transform: rotate(-90deg); transform-origin: left top;">(WDC2007/05)</p>	<p>and the processing costs of those applications. On-going monitoring costs are also passed on by the council in most instances through conditions of consent.</p> <ul style="list-style-type: none"> • Overall, there is difficulty in quantifying the benefits and costs of the flood hazard policies and rules (Option 2) because there are no mapped areas under the Operative Plans (Option 1) that confine the assessment of the 1% AEP floodplain or define the High Risk Flood Area. Consequently, there is no basis for a useful comparison of the increase/decrease of the areas identified within the planning maps subject to the new rules. • Many areas identified in the floodplain and in areas of high flood risk would already have had to provide flood assessments and comply with minimum floor levels. But it is difficult to quantify the actual difference between the two options. • The proposed provisions do however, provide more certainty where those areas are.
Risks of acting or not acting	
<p>It is considered that there is enough information on which to base the proposed policies and rules. The risk of not acting, could be significant in terms of developing on land subject to flooding, including significant damage to property. The community would be more vulnerable (less resilient) and would not effectively avoid or mitigate risks of flooding and therefore would not meet proposed Objective 5.2.1 or Policy 3.24 in the WRPS. More information on the ID modelled areas of the planning maps would be helpful and will possibly form the basis of further work. It does not, however, mean that there is reason to delay implementing this policy framework.</p> <p>The information provided in Option 2 via new flood modelling adds significantly to the robustness of the approach. The Operative Plan was deficient in terms of the modelling and mapping of flood risk, which previously led to appeals to the Environment Court during the previous review process and added to lengthy debate over unsettled provisions. Further delay is not warranted.</p>	
Appropriateness	
<p>The proposed policy framework developed for Stage 2 works towards avoiding increase in risk to people's safety well-being and property.</p> <p>The supporting rules and planning maps clearly define flood hazard areas where subdivision, use and development should be avoided (high hazard areas) and where mitigation is acceptable (the flood plain) - the policies effectively target the level of risk.</p>	

The policies and rules apply the most up to date information from a wide range of sources from other organisations and technical reports, including from WRC, DHI, MfE, and NIWA.

The information on flood hazard risk is applied using risk-based approaches. This includes 2D modelling of the most intensively developed parts of the district and separately identifying within the flood plain those areas at high flood risk.

The cost of a large flood hazard event can be substantial in terms of damage to property, clean-up time and time out of action. The financial cost of hazards can also, in part, be measured through insurance pay outs. However, there are also uninsured items (temporary accommodation, where homes become uninhabitable due to wet carpets and walls, exceeding the insurance policy allowances) social disruption, days lost when businesses cannot operate, and cost of civil defence responses, and there are intangibles such as unhappiness, stress, and psychological and physical health impacts (damp and mouldy homes).

Avoidance of development in flood hazard areas or those requiring mitigation (various forms: house tanking, raised floor levels, relocatability) can substantially reduce the costs associated with flood hazard events.

It is considered, overall, that the policy and rules framework developed to give effect to Objective 15.2.1 will be effective and efficient in avoiding increased risk from high flood hazards, and in mitigating flood risk within the floodplain generally and will result in a more resilient community.

It is also considered that, overall, the benefits of proposed Option 2 will outweigh the costs in comparison to implementing the other options and is the most appropriate to achieve Objective 15.2.1.

It is considered that the new overlay identifying the Flood Plain Management Area and the High Risk Flood Area will be more effective than the previous Operative Plan provisions (Option 1), as it better identifies those properties affected by the 1% AEP flood event.

Option 3 is only useful in conjunction with Option 2. It is acknowledged that flood hazard information is shared between the WRC, the Waikato District Council and adjoining councils, and this information increases preparedness for event. Coupled with CDEM and the Building Code, it is effective. However, it is not a solution in itself. If this option was implemented on its own without the proposed District Plan provisions, it would fail to meet the requirements of the higher order planning documents and would not give effect to the WRPS.

Option 3 would also leave the community largely at the mercy of a 1% AEP flood event, as the Building Code only requires floor levels to a 2% AEP. The non-regulatory approach does not effectively avoid or mitigate flood hazards risks.

5.2.2 Defended Areas

Policies relating to Defended Areas	
Provisions most appropriate	Effectiveness, Efficiency, Benefits & Costs
<p>Policy 15.2.1.10 – Areas defended by stopbanks adjacent to the Waikato River</p> <p>(a) Control subdivision, use and development in areas identified as Defended Areas adjacent to the Waikato River by:</p> <ul style="list-style-type: none"> (i) assessing the potential risk of overtopping or structural failure of the stopbanks, and overwhelming of associated flood protection structures, before subdivision and development occurs; and (ii) requiring that consideration be given to appropriate mitigation to reduce any residual risk identified; and (iii) ensuring that any residual risk is not transferred to neighbouring sites. <p>(b) Specify minimum setbacks for buildings and earthworks from stopbanks to:</p> <ul style="list-style-type: none"> (i) protect the structural integrity of the stopbanks; and (ii) provide a buffer to reduce the potential risk to life and damage to property from deep and fast-flowing flood waters in the event of a breach. <p>Relevant rules include:</p>	<p><u>Effectiveness and Efficiency</u></p> <ul style="list-style-type: none"> • The Defended Area policies and rules are new provisions (Option 2) and do not have equivalent policies and rules in the Operative Plan (Option 1). WRPS Policy 3.24 specifically states that the risks of natural hazards are to be reduced to an acceptable or tolerable level including by, amongst other things, minimising any increase in vulnerability due to residual risk (Policy 3.24 d)). Furthermore, Implementation Method 13.2.7 specifies that district plans shall implement residual risk zones and shall control subdivision, use and development within these zones so that residual risk is minimised. The method also requires regard be had to: <ul style="list-style-type: none"> ○ the level of service provided by the structural defences; ○ the physical, environmental and financial sustainability of the structural defences over a period of at least 100 years; ○ the impact caused by overwhelming or a structural failure of protection works; and ○ a reduction in the ability of a community to respond to and recover from a natural hazard event. • The Natural Hazard Stage 2 policies and rules relating to defended areas have been developed to give effect to the WRPS policy and method described above. To assist with the mapping of residual risk areas the WRC provided mapping of areas of the Waikato River defended by stopbanks (distilled from maps of benefit areas from the Lower Waikato Scheme), as per WRC residual risk guidance note⁵. Discussions with WRC also indicated that the preferred terminology was “defended areas”. • Defended Areas are defined in the proposed provisions as “an area identified on the planning maps which would normally flood in a 1% AEP flood event but is protected from flooding by a flood protection scheme managed by the Waikato Regional Council,

⁵ Residual Risk Zones- Recommended Practice: correspondence from R Leifting to K Nicolson 03 October 2018

<p>Rule 15.6 Defended Area (Residual Risk)</p> <ul style="list-style-type: none"> • Rule 15.6.1 Permitted activities • Rule 15.6.2 Restricted Discretionary Activities <p>Planning maps</p> <ul style="list-style-type: none"> • Defended Area overlay 	<p>the Waikato District Council or the Crown”. The WRPS defines residual risk zones. The proposed definition of “defended area” is consistent with the WRPS definition. The definition also includes the design level of service of the defence structure (in this case 1% AEP).</p> <ul style="list-style-type: none"> • The WRPS also states in Implementation Method 13.1.3 the need for long term community strategies to consider and address the implications of allowing development in residual risk zones. It is considered that the proposed policy and accompanying rule framework, while not an entire community strategy, will assist in achieving Implementation Method 13.1.3. • Policy 15.2.1.10 and Rule 15.6 will be effective in achieving Objective 15.2.1 as it will support improved community resilience by providing for assessment of the potential risk of overtopping or structural failure of the stopbanks located along the Waikato River, before subdivision and development occurs. The policies and rules also allow for appropriate setbacks to protect structural integrity of the stopbanks and allow a buffer area to reduce the potential risk to life from a high velocity water or depths during a breach. • The provisions are efficient in that they clearly signal the area close to the stopbanks of most concern through the setback area and the mapped Defended Area. • Option 2 therefore gives better effect to the WRPS and is more appropriate. Neither Option 1 nor Option 3 are able to effect to the WRPS requirement to include residual risk zones in the District Plan in order to ensure residual risk is minimised. • While warning systems, education, insurance and evacuation plans may help in situations of stopbank overtopping or stopbank failure, it is considered that this is not as effective or efficient in addressing residual risk of development protected by stopbanks on its own. The Edgecumbe disaster is a case in point. 6 The Panel stated in its summary “Residual risk to flood protection structures from variability in ground conditions should be taken into account in land use planning and emergency planning, including alert and evacuation procedures”. <p><u>Benefits</u></p> <ul style="list-style-type: none"> • The proposed policy and rules framework will enable assessment of whether the
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⁶ Rangitaiki River Scheme Review, April 2017 Flood Event – Final report to Bay of Plenty Regional Council- Rangitaiki River Scheme Review Panel, 18 September 2017

residual risk is acceptable and whether mitigation is required. The risk assessments required will ensure identification where a breach is likely and assist in decision-making for land in that category before it is developed. These are important considerations as currently no break-out modelling exists for the lower Waikato to assist land use planning. Overall, the proposed provisions will provide for greater community resilience and achieve Objective 15.2.1 more than the other two options.

- Identifying Defended Areas will assist in reducing public perception and a false sense of security that the presence of the stopbank means there is no risk from flooding.
- The setback provision will potentially prevent development that could undermine the structural integrity of the stopbank. It also provides an important buffer which could save lives if high velocities and depths occur close to the stop bank during a break out.

Costs

- The proposed option will increase compliance costs related to the need to obtain resource consents in the Defended Area and within the setbacks applied. In terms of subdivision, it is noted that the Proposed Plan already requires a restricted discretionary resource consent to be obtained, so the rule is effectively an additional set of matters the council will restrict its discretion to, including the need for assessment of the residual risk. This will require additional expert input not currently required through Option 1 in the Operative Plan. However, it is noted that natural hazards are an issue that is relevant for subdivision, and arguably such reports could be requested under the status quo. It is understood that assessment of residual risk from potential break out of the stopbanks was a relevant consideration in respect to the recent rezoning plan change at Ohinewai.
- Requiring residual risk to be considered in resource consent applications may increase uncertainty for the developer, but will have longer term benefits in respect to risk management for people who work or live in these areas.
- The setback requirement may also impose further restriction on the use of land, and could potentially lead to inefficient land use. However, it is considered that the purpose of this rule is to ensure appropriate assessment is provided and appropriate conditions are imposed when a developer wishes to locate inside the setback, rather than declining the application. In some rare circumstances the proposed location may be inappropriate but, overall, it is considered that the risk of inefficient use of land is small.

- Warning systems, education and information provision (Option 3) are not without costs. Costs occur with both implementing advanced warning systems and on-going upkeep. These measures are not a complete solution in themselves and can give rise to a false sense of security. They can also result in liability for the agencies responsible for them if they fail. Overall, Option 3 on its own is not as efficient or effective as proposed Option 2.

Risks of acting or not acting

It is considered that there is enough information on which to base the proposed policies and rules. The risk of not acting could be significant in terms of developing without appropriate assessment on land subject to risk of stopbank failure or overtopping. The community would be more vulnerable (less resilient) and would not effectively avoid or mitigate these risks and therefore would not meet proposed Objective 5.2.1, Policy 3.24 or Implementation Method 13.2.7 in the WRPS. Breakout modelling has not been completed for the Lower Waikato and would be helpful and will possibly form the basis of further work. It does not mean, however, that there is any reason to delay implementing this policy framework. Furthermore, it is understood that the WRC regularly maintains and monitors the stopbanks, and this contributes to the information base available for risk assessment.

The Operative Plan has no similar provisions and consequently this risk was not being actively managed. There is now greater information available on residual risk and greater technical support from the WRC. Providing a policy framework and using the available information can now be used to manage that risk. Waiting for information and further modelling before developing these provisions is not efficient use of current technical knowledge and would not be appropriate.

Appropriateness

In terms of Option 1, there are no policies and rules related to defended areas (residual risk). Consequently, this option will not give effect to the WRPS.

Option 3 does not address residual risk from a future land use planning perspective and therefore relies on response and readiness under the CDEM (largely after the fact). This option will also not give effect to the WRPS or assist in achieving Objective 15.2.1. The proposed policy and rule provision (Option2) gives effect to the WRPS and better achieves Objective 15.2.1 in terms of community resilience and appropriate mitigation of risk.

5.2.3 Coastal Hazards

Policies relating to Coastal Hazards	
Provisions most appropriate	Effectiveness, Efficiency, Benefits & Costs
High Risk Coastal Hazard Areas (Erosion and Inundation)	
<p>Policy 15.2.1.1 – New development in areas at significant risk from natural hazards</p> <p>(a) Avoid new subdivision, use and development where it will increase the risk to people's safety, well-being and property in the following areas identified as being at significant risk from natural hazards:</p> <ul style="list-style-type: none"> (i) High Risk Flood Area; (ii) High Risk Coastal Hazard (Inundation) Area; (iii) High Risk Coastal Hazard (Erosion) Area. <p>Policy 15.2.1.2 – Changes to existing land use and development in areas at significant risk from natural hazards</p> <p>(a) In areas of High Risk Flood, High Risk Coastal Hazard (Erosion) and High Risk Coastal Hazard (Inundation), ensure that when changes to existing land use activities and development occur, a range of risk reduction options are assessed, and development that would increase risk to people's safety, well-being and property is avoided.</p> <p>Policy 15.2.1.3 – New emergency services and hospitals in areas at significant risk from natural</p>	<p>Effectiveness and Efficiency</p> <ul style="list-style-type: none"> Option 2 introduces a new high risk coastal hazard area. The high risk coastal erosion area covers a total area of 22 hectares of land. The high risk coastal inundation area covers a total of 140 hectares of land, or 0.1% of the total land in the district (Appendix 5(j)). Modelling of high coastal hazard areas has been confined to urban areas in Raglan, residential zoned properties at Whale Bay and the urban areas and sand spit at Port Waikato and are based on specified shorelines and contours for inundation areas and specified shorelines and slope analysis or other contour depending on the shoreline type for erosion areas (see criteria in Appendix A of the Waikato District Coastal Hazards Assessment and Addendums in Appendices 5(f), 5(h) and 5(i)). There is no equivalent hazard area or policy framework to manage high risk coastal hazards in either section of the ODP. Option 1 is to retain the status quo provisions. Policies 15.2.1.1; 15.2.1.2; 15.2.1.3; 15.2.1.4; 15.2.1.5; 15.2.1.11, rules in Chapter 15.9 High Risk Coastal Hazard (Erosion) Area and chapter 15.10 High Risk Coastal Hazard (Inundation) Area, as well as definitions and the high risk hazard areas shown on the planning maps, work together to manage risk in areas where subdivision, use and some types of development would be considered to be at significant risk of natural hazards and where serious injury or loss of life could occur. High risk coastal hazard areas represent land that, in the absence of future intervention, could be impacted by coastal inundation or erosion with existing sea level and coastal processes (over approximately a 10-15 year timeframe). These

<p>hazards</p> <p>(a) Avoid locating new emergency service facilities and hospitals in areas which are at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion), unless, considering engineering and technical constraints or functional and operational requirements, they cannot be reasonably located elsewhere and will not increase the risk to or vulnerability of people or communities.</p> <p>Policy 15.2.1.4 – New infrastructure and utilities in areas subject to high risk natural hazards</p> <p>(a) Enable the construction of new infrastructure and utilities in areas at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) areas only where:</p> <ul style="list-style-type: none"> (i) the infrastructure and utilities are technically, functionally or operationally required to locate in areas subject to natural hazards, or it is not reasonably practicable to be located elsewhere; and (ii) any increased risks to people, property and the environment are mitigated to the extent practicable; and (iii) the infrastructure and utilities are designed, maintained and managed, including provision of hazard mitigation works where appropriate, to function to the extent practicable during and after natural hazard events. <p>Policy 15.2.1.5 – Existing infrastructure and utilities in all areas subject to natural hazards</p>	<p>areas have been assessed as areas of greatest risk and therefore of highest priority for coastal hazard management (Waikato District Coastal Hazards Assessment – Appendix 5(f)).</p> <ul style="list-style-type: none"> • The policies and rules focus on specific land use, development and subdivision that are considered to be more vulnerable to significant risk such as buildings (buildings without floors and utilities excluded) and specifically new emergency services and hospitals, as well as subdivision that will introduce additional development pressures. It is considered that this type of development in these areas would pose an unacceptable or intolerable risk in these areas. Strong policy direction and non-complying activity rules for vulnerable activities is an effective means of natural hazards risk reduction and of increasing resilience. • Certain types of infrastructure and utilities may have a technical, functional or operational need to be located in high risk areas or that it is not reasonably practicable to be located elsewhere. Policy 15.2.1.4 acknowledges this by enabling less vulnerable and potentially necessary infrastructure and utilities where risk can be mitigated. • Policy 15.2.1.17 provides policy support for Stage 1 PDP rules requiring buildings to be set back a specified distance from the coast. These rules will apply in either the high risk coastal hazard area and in the coastal sensitivity areas and ensure there is a buffer between buildings and the coastal edge. This policy also works in conjunction with Policy 15.2.1.4 in that it includes exceptions for development that has a functional or operational need to be located at or near the coast. • Policy 15.2.1.2 recognises that there is existing development in high risk areas that may be at immediate risk, but where the land can continue to be utilised for some time. Rules do not prevent the opportunity for buildings to be relocated to, or reconstructed in, a less 'at risk' position within the same property so long as the buildings can be readily relocated to respond to future conditions. Examples of this situation are currently being experienced along the main beach at Port Waikato where the existing buildings are at immediate risk from coastal erosion, but the properties with deep sections allow the rest of the section to be utilised. • Linking the policies and rules to the mapped hazard areas on the planning maps (areas potentially affected by natural hazards) spatially limits where the rules apply.
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<p>(a) Provide for the operation, maintenance and minor upgrading of existing infrastructure and utilities in all areas subject to natural hazards</p> <p>Policy 15.2.1.11 - New development that creates demand for new protection structures and works</p> <p>(a) Avoid locating new subdivision, use and development in High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) Areas where a demand or need for new structural protection works will be required to reduce the risk from natural hazards to acceptable levels.</p> <p>Policy 15.2.1.17- Setbacks from the coast</p> <p>(a) Avoid increasing the risk from coastal hazards by requiring new built development to be setback from the coastal edge, unless there is a functional or operational need for facilities to be located at or near the coast.</p> <p><u>Rules and other methods</u></p> <p>Rules in 15.9 High Risk Coastal Hazard (Erosion) Area and 15.10 High Risk Coastal Hazard (Inundation) Area.</p> <p>Rules in Stage 1 PDP – Building setbacks from waterbodies</p> <ul style="list-style-type: none"> • Residential Zone - Rule 16.3.9.3 • Business Zone – Rule 17.3.4.2 • Business Town Centre Zone – Rule 18.3.7 • Industrial Zone – Rule 20.3.4.2 • Industrial Zone Heavy – Rule 21.3.4.2 • Rural Zone – Rule 22.3.7.5 	<p>Identifying specific hazard areas and applying rules for specific types of development is a more efficient way to manage risk reduction as they are designed to target specific areas rather than applying more broadly across the entire district and place the burden of investigation on the applicant to prove if a hazard exists or not.</p> <ul style="list-style-type: none"> • The policies, rules and maps apply to the most up-to-date information sourced from recent expert assessments and flood modelling, while taking direction from high level policy in the NZCPS and WRPS and technical information sourced from the WRC Regional hazards team. • The development of the policies, rules and mapping for managing natural hazards has been framed up using a risk-based approach where both the likelihood of a natural hazard event and its consequences are taken into account. An event of a specified magnitude, such as a 1% AEP storm event, would have intolerable or unacceptable consequences for certain types of development (more vulnerable activities and development). The policies and rules are therefore significantly more restrictive for these types of activities. It is more efficient to focus restrictive rules on the most vulnerable development and enabling less vulnerable activities where the risk can be mitigated or is considered to be tolerable or acceptable. • Restricting vulnerable development in high risk areas also reduces the demand for coastal hazard protection works to protect development that will be at risk with existing and future sea level and coastal processes. Rules allow for the maintenance and repair of existing, legally established coastal protection structures but new structures will need a discretionary resource consent. The evaluation of policies relating to coastal hazards mitigation works has been carried out separately (see hazard mitigation works for coastal hazards below). • The construction and ongoing maintenance and repair of protection structures placed in highly dynamic coastal environments are costly and inefficient when compared to ensuring new development is located outside of at-risk areas where future demand for protection will not be necessary and development can continue to be resilient. <p><u>Benefits</u></p> <ul style="list-style-type: none"> • The policies, rules and maps provide clear guidance for managing activities to ensure significant risk is either avoided or reduced to acceptable levels through mitigation.
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- Country Living Zone – Rule 23.3.7.5
- Village Zone – Rule 24.3.6.3
- Reserve Zone – Rule 25.3.5.2
- Rangitahi Peninsula Zone – Rule 28.3.9.3

Note that Stage 1 PDP rules for building setback distances from the coast are not open for submissions under Stage 2 PDP.

Definitions

Planning maps

High Risk Coastal Hazard (Erosion) Area

High Risk Coastal Hazard (Inundation) Area

- Hazard modelling and mapping makes information available to all landowners and developers. By carrying out detailed mapping in urban areas where a higher level of development occurs, the need for site-specific coastal hazard assessments is minimised.
- The proposed policies and rules (and maps) provide a level of detail that is sufficient to manage risk. High risk areas were not modelled in rural areas within the Aotea and Whaingaroa harbours, the Waikato river and along the open coastline as detailed modelling in areas with relatively low development pressures would be cost and time prohibitive and not an efficient use of Council's budget.
- Future damage from natural hazards and/or the need for protection works are avoided by locating new subdivision, use and development away from areas of significant risk or by effective mitigation measures where development is able to proceed.
- Risk avoidance and mitigation of risk (where effective and appropriate), will ensure development is resilient. Restrictions can reduce opportunities for land development, but can potentially prevent costly remediation, relocation or demolition of development in the future.
- Mitigating or avoiding adverse effects of natural hazards through an effective and efficient policy framework increases certainty for land owners, infrastructure providers, the community and insurers and reduce the damage incurred during a significant hazard event.

Costs

- There is potential for loss of development capacity in areas subject to significant natural hazards.
- There will be costs associated with resource consent applications and where relevant additional costs will be associated with geotechnical and other site-specific hazard information for subdivision and building. In some instances this cost can be passed on through increased values on land and buildings.
- Potential impacts on insurance premiums or insurance excesses or the overall insurability of property.
- Council (rate payers) bear the cost of technical advice, modelling, mapping,

	<p>consultation with various agencies, updating policy documents with more up to date and technically robust natural hazards information. The more detailed the hazard modelling is the higher the costs.</p> <ul style="list-style-type: none"> • The implementation, administration, monitoring and enforcement costs incurred as part of development proposals are, to a large extent, passed on to developers and property owners. Some costs cannot be passed on and are carried by council (ratepayers). • Ongoing monitoring costs are often passed on to developers/property owners through conditions of resource consent. <p><u>Opportunities for economic growth and employment</u></p> <ul style="list-style-type: none"> • The requirement for technical assessments and mitigation of risk are likely to increase employment opportunities with regards to engineering and coastal science and building design specialists. There is potential for this to contribute to economic growth related to these specialised areas. • It is considered that the overall long term community benefits of the proposed risk-based approach outweigh the potential increase in costs of implementation.
Risks of acting or not acting	
<p>The high coastal hazard areas identify land that is at risk under current climatic conditions and coastal processes and, as such, there is a high level of certainty with regards to the spatial extent of these areas. The strict regulation of development in these areas is a priority. Not acting will potentially allow inappropriate development in high risk areas, which may place development, people and community, and the environment at risk.</p>	
Coastal Sensitivity Areas (Erosion, Inundation and Open Coast)	
<p>Policy 15.2.1.5 – Existing infrastructure and utilities in all areas subject to natural hazards</p> <p>(a) Provide for the operation, maintenance and minor upgrading of existing infrastructure and utilities in all areas subject to natural hazards.</p>	<p>Overall approach</p> <ul style="list-style-type: none"> • Policies 15.2.1.5, 15.2.1.6, 15.2.1.16 and 15.2.1.17; the rules in Chapter 15.7 Coastal Sensitivity Area (Erosion) and Coastal Sensitivity Area (Open Coast) and Chapter 15.8 Coastal Sensitivity Area (Inundation); definitions and the mapped coastal sensitivity areas shown on the planning maps work together to manage development in areas that may be vulnerable to coastal erosion and/or inundation over the 100 year period to 2120, assuming 1 metre of sea level rise. • Policy 15.2.1.5 provides for existing infrastructure and utilities to continue to operate. Policies

Policy 15.2.1.6 - Risks from Natural Hazards outside High Risk Areas

- (a) Provide for rezoning, subdivision, use and development outside High Risk Areas where natural hazard risk has been appropriately identified and assessed and can be adequately avoided, remedied or mitigated and does not transfer or exacerbate risk to adjoining properties.

Policy 15.2.1.16 - Development in the Coastal Sensitivity Areas

- (a) In Coastal Sensitive Areas identified on the planning maps, control subdivision, use and development by ensuring that the subdivision, use or development is:
- (i) supported by a detailed site-specific risk assessment, which includes measures to address the effects of climate change; and
 - (ii) designed, constructed and located to minimise the level of risk to people, property and the environment.

Policy 15.2.1.17 - Setbacks from the coast

- (b) Avoid increasing the risk from coastal hazards by requiring new built development to be setback from the coastal edge, unless there is a functional or operational need for facilities to be located at or near the coast.

15.2.1.6 and 15.2.1.16 provide for rezoning, subdivision and development where natural hazard risk has been appropriately identified and assessed, and risk is either avoided, remedied or mitigated.

- Policy 15.2.1.17 provides policy support for Stage 1 PDP rules that require buildings to be setback a specified distance from the coast. These rules will apply in the high risk coastal hazard area and in the coastal sensitivity areas and ensure there is a buffer between buildings and the coastal edge.
- The purpose of the policies, rules and mapped coastal sensitivity areas is to provide a policy framework to manage the ongoing development of land in areas where there may be a risk from coastal inundation or erosion in the future. It is important to note that coastal sensitivity areas are not areas where coastal hazards have been identified, but rather, where further detailed investigation is required prior to new development or intensification of land use.
- Rules require a restricted discretionary resource consent to ensure that when new development is proposed a site-specific hazard assessment is carried out. The assessment is required to determine a number of factors such as the suitability of the site for the proposed use, how the site may be affected by climate change over time, timeframes or triggers for the relocation of development, if applicable, measures to reduce risks identified in the coastal hazard assessment, including the structural design of the building, building materials, as well as setting of minimum floor levels if the site is, or is likely to be, subject to inundation.
- The mapping of coastal sensitivity areas has been focused on the western coastline of the district. Detailed modelling to identify coastal sensitivity areas was focussed on urban areas in Raglan, Whaanga Coast, including Whale Bay, and Port Waikato, as these were the areas with the highest density of development and future development opportunities. Detailed mapping was also carried out along the Whaanga Coast Maori Freehold Land (MFL) blocks as current and proposed District Plan rules allow for a higher density of development on MFL through papakainga development provisions. The landowners have current and future aspirations to develop within the development cells specified in the District Plan as well as in other areas.
- All other areas of the open coastline, Aotea Harbour, Whaingaroa Harbour and the Waikato River mouth were modelled using a broad-scale approach that took into account the diverse range of coastal hazards, including dynamic and erodible shoreline types, wave runup effects, stream mouths and high cliffs and applied a 100 metre wide strip along the estuary coastlines and a 200 metre wide strip along the open coastline, and widening around the northern harbour entrances to account for the large dynamic and sometimes highly mobile sand dunes. (See criteria in Appendix A of the Waikato District Coastal Hazards Assessment and Addendums in Appendices 5(f), 5(h) and 5(i).) As

Rules and other methods

Rules in Chapter 15.7 Coastal Sensitivity Area (Erosion) and Coastal Sensitivity Area (Open Coast) and Chapter 15.8 Coastal Sensitivity Area (Inundation).

Rules in Stage 1 PDP – Building setbacks from waterbodies

- Residential Zone - Rule 16.3.9.3
- Business Zone – Rule 17.3.4.2
- Business Town Centre Zone – Rule 18.3.7
- Industrial Zone – Rule 20.3.4.2
- Industrial Zone Heavy – Rule 21.3.4.2
- Rural Zone – Rule 22.3.7.5
- Country Living Zone – Rule 23.3.7.5
- Village Zone – Rule 24.3.6.3
- Reserve Zone – Rule 25.3.5.2
- Rangitahi Peninsula Zone – Rule 28.3.9.3

Note that Stage 1 PDP rules for building setback distances from the coast are not open for submissions under Stage 2 PDP.

Definitions

a result of the broad-scale mapping, some rural coastal sensitivity areas may be excessively conservative. These areas are not specified as hazard areas, but rather areas where further investigation is required at the time of development.

Effectiveness

- The policy framework is considered to be the most effective way to manage future uncertainty as a result of climate change (particularly sea level rise), where the level of uncertainty increases significantly in the longer term. Site specific coastal hazards assessments and development that is designed to adapt to future conditions will ensure that development maintains a comfortable level of resilience for at least the next 100 years.
- The policies and rules focus on specific land use, development and subdivision that are considered to be more vulnerable to coastal hazard risk such as buildings (minor additions to existing lawfully established buildings, buildings without floors and utilities excluded) and subdivision. It is this type of development that will be most at risk over time and which may be more difficult and costly to adapt if specific design considerations aren't implemented. For example, it is more costly to relocate or raise the floor level of a building that is constructed on a concrete slab foundation, and masonry cladding may need to be replaced, whereas buildings on pile foundations with more flexible cladding can be easily raised or relocated.

Efficiency

- Linking the policies and rules to the mapped coastal sensitivity areas spatially limits where the rules apply. Identifying specific hazard areas and applying rules for development that is considered to be vulnerable to coastal hazards is a more efficient way to manage the reduction of risk.
- The policies, rules and maps apply to the most up to date information sourced from recent expert assessments and modelling along with direction-setting policy in the NZCPS and WRPS, developed in collaboration with the WRC regional hazards team.
- Detailed mapping, along the entire rural coastline, was not carried out as it would be cost and time prohibitive and an inefficient use of council budget. There is not a high degree of development pressure in these areas and it is therefore more effective and efficient to identify a broad sensitivity area where detailed site-specific mapping is carried out as and when development is proposed.
- Rules require resource consents where future mitigation or adaptive processes and triggers can be included as conditions of consent. This will allow future land owners to be fully aware of the potential for changes to be made in the future and what the triggers are. For example, consent

<p>Planning maps</p> <p>Coastal Sensitivity Area (Erosion)</p> <p>Coastal Sensitivity Area (Open Coast)</p> <p>Coastal Sensitivity Area (Inundation)</p> <p>Policies 15.2.1.7, 15.2.1.8 and 15.2.1.9 also apply to the coastal sensitivity areas. However, these policies have been evaluated separately. See evaluations below.</p>	<p>conditions may require a building to be relocated back from an erosion scarp when the edge of the scarp is within a specified distance of the building. The specified distance will be based on the clearance required for machinery to access the building and safely remove it.</p> <ul style="list-style-type: none"> • Rules allow for the maintenance and repair of existing, legally established coastal protection structures, but new structures will need a discretionary resource consent. Policies relating to coastal hazard mitigation works has been carried out separately (see hazard mitigation works for coastal hazards below). • The ongoing maintenance and repair of protection structures placed in a highly dynamic environment is costly and inefficient when compared to ensuring new development is located outside of at-risk areas where demand for protection will not be necessary. <p><u>Benefits</u></p> <ul style="list-style-type: none"> • The policies, rules and detailed maps provide clear guidance for addressing uncertainty around future risk. • Future risk and/or the need for protection works are avoided by ensuring new subdivision, use and development are appropriately assessed and designed to mitigate future risk through adaptive design methods. Risk avoidance and mitigation of risk will ensure development is resilient over time. Restrictions on the design of development can be more costly, but can potentially prevent costly remediation or relocation of less appropriately designed development in the future. • Mitigating or avoiding adverse effects of natural hazards through an effective and efficient policy framework increases certainty for land owners, infrastructure providers, the community and insurers. • It is considered that the overall long term community benefits of the proposed adaptive approach ensures that resilience is maintained over time by providing clear adaptive pathways and procedures through specific assessments, building design, and triggers outlined in resource consent conditions. Although there are added upfront costs to implementation this approach, the long term benefits outweigh the potential increase in costs. <p><u>Costs</u></p> <ul style="list-style-type: none"> • There will be costs associated with resource consent applications and, where relevant, the increased additional costs for geotechnical and other site-specific technical information required to investigate future risk and to identify appropriate mitigation and adaptation methods and triggers. In some instances, this cost may be passed on to future property owners as they may need to deal
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with future adaptation procedures.

- Potential impacts on insurance premiums or insurance excesses.
- Council (rate payers) bear the cost of technical advice, modelling, mapping, consultation with various agencies, updating policy documents with more up to date and technically robust natural hazards information. The more detailed the hazard modelling, the higher the costs.
- The proposed policies and rules (and maps) provide a level of detail that is sufficient to manage risk. Detailed mapping in rural areas within the Aotea and Whaingaroa harbours and along the open coastline was not carried out as this would be cost and time prohibitive. As a result, individual property owners will need to pick up the cost of site-specific investigations to determine the actual extent of the coastal sensitivity area.
- The implementation, administration, monitoring and enforcement costs incurred as part of development proposals are, to a large extent, passed on to developers and property owners. Some costs cannot be passed on and are carried by council (ratepayers).
- Ongoing monitoring costs often passed on to developers/property owners through conditions of resource consent.
- Possible reduction in land values as a result of hazard mapping, compliance costs and construction costs.
- Possible loss in development opportunities.
- Potential increase in insurance premiums over time.

Opportunities for economic growth and employment

- The requirement for technical assessments and mitigation of risk is likely to increase employment opportunities with regards to engineering and coastal science and building design. There is potential for this to contribute to economic growth related to these specialised areas.
- Additional building designs may open up a new industry in design and construction of housing/buildings that are easily relocatable and adaptable.
- Land within coastal sensitivity areas can continue to be developed over the short to medium term depending on the scale and timing of future climate impacts.

Risks of acting or not acting

The coastal sensitivity areas identify land that may be impacted by coastal hazards over a period to 2120. Areas are based on the projected effects of climate change and current government guidelines. As the future effects of climate change are inherently difficult to predict, there is a large degree of uncertainty, especially over longer periods of time. Even with detailed investigation, the uncertainty may preclude accurate modelling of hazard areas.

The risks of not acting due to insufficient information or uncertainty may be significant with possible injury to people and future damage to property. Uncertainty can be addressed through adaptable measures included in the design of new development and the resource consent conditions, where the site may be vulnerable over the next 100 years. This ensures that development can continue to be resilient over a longer timeframe and unacceptable costs are not transferred to future generations.

Hazard mitigation works for coastal hazards

Policy 15.2.1.7 - Protection from risks of coastal hazards

- (a) Recognise the importance of natural features and buffers, and soft hazard protection works, and prefer them wherever practicable over hard protection structures, where new hazard mitigation measures and/or works are required to protect people, property infrastructure and the environment from the risks of coastal hazards.

Policy 15.2.1.8 - Limitations on hard protection works for coastal hazard mitigation

- (a) Ensure that where new hard protection structures and works are necessary to protect existing development on public or privately-owned land from coastal hazards, they are appropriately assessed and

Overall Approach

- Policies 15.2.1.7 and 15.2.1.8 refer to hazard protection and specifically to soft and hard coastal protection works. The policies work together to support the discretionary activity rules regulating the construction of new coastal protection structures.
- Soft coastal protection works such as beach nourishment or dune protection, while hard protection structures may include sea walls, groynes or rock revetments.
- These policies recognise that hard protection structures can interfere with coastal processes and can impact severely on coastal character and amenity and public values and use of shorelines and can place a financial burden on current and future landowners and communities to maintain.
- These policies also reflect national (NZCPS) and regional (WRPS) policy direction that recognises that in some cases, hard protection structures may be appropriate.

Effectiveness and Efficiency

- The policies refer to the coastal margins and provide guidance for proposals to construct hard protection structures, including under what conditions they may be considered appropriate. These policies incorporate national and regional policy direction and provide a much more efficient approach to assessing both beneficial and adverse effects.
- Policies also allow for investigation of alternatives such as soft protection works or the consideration of natural features and buffers to provide protection

controlled and:

- (i) have primarily a public and/or environmental benefit when located on public land;
 - (ii) are effective;
 - (iii) the economic, social and environmental benefits outweigh costs; and
 - (iv) do not transfer or increase risk to other people, property, infrastructure, the natural environment, historic heritage, or Maaori Sites and Areas of Significance.
- (b) Ensure that when new hard protection structures are to be located in an area where an adaptive management strategy has been prepared to manage coastal hazards, they are consistent with that strategy.

Rules in Coastal Sensitivity Areas - Erosion and Inundation and Open Coast; High Risk Coastal Hazard Areas - Erosion and Inundation

- **Rule 15.7.3 D1** - Construction of a new coastal protection structure.
- **Rule 15.8.3 D1** - Construction of a new coastal protection structure.
- **Rule 15.9.2 D4** - Construction of a new coastal protection structure.
- **Rule 15.10.2 D3** - Construction of a new coastal protection structure.

Benefits

- The policies provide efficiencies in terms of assessing any proposal to construct hazard protection works. This ensures that information and assessments can be targeted towards the matters that are important and provide clear guidance for land owners, the community and regulatory authorities.
- Policies ensure that when hard coastal protection structures are approved, they must primarily have a public and/or environmental benefit and that the benefits outweigh the cost.

Costs

- Costs of consents and supporting technical information.
- Costs of monitoring and compliance.
- Effects on land values where protection structures are not supported.
- It is considered the overall long term community benefits of the proposed risk-based approach outweigh the potential increase in costs of implementation.

Opportunities for economic growth and employment

- The requirement for technical assessments and mitigation of risk are likely to increase employment opportunities with regards to engineering and coastal science and structural design specialists.

Policy 15.2.1.9 - Natural features and buffers providing natural hazard protection (see 5.2.4 below)	
Risks of acting or not acting	
There is sufficient information and high level guidance from which to base the development of the proposed policies.	
Appropriateness	
The bundle of policies relating to high risk coastal hazards, coastal sensitivity areas and coastal protection works, provide a comprehensive policy framework for managing coastal hazard risk and increase the resilience of new land use and development and current and future communities, land owners, infrastructure providers and the natural environment. The effectiveness and efficiency and benefits and costs have been assessed and, on balance, the proposed policies to manage coastal hazard risk are considered to be the most appropriate way to achieve Objective 15.2.1.	

5.2.4 Natural Features and Buffers

Provisions most appropriate	Effectiveness and Efficiency
Policies relating to Natural Features and Buffers	
Policy 15.2.1.9 - Natural features and buffers providing natural hazard protection (a) Protect, maintain and, where appropriate, enhance the integrity of natural features and buffers which provide a natural defence against the effects of natural hazards and sea level rise, including natural ponding areas, coastal dunes, intertidal areas, wetlands, waterbody margins, riparian/coastal vegetation and floodways. Rules in Flood Plain Management Area and Flood Ponding Areas; High Risk Coastal Hazard Areas – Erosion and	Overall Approach <ul style="list-style-type: none"> The purpose of Policy 15.2.1.9 recognises the role of natural features and buffers to provide natural hazards protection. The rules giving effect to this policy place limits on earthworks in the Flood Plain Management Area (including the High Risk Flood Area) and Flood Ponding Areas; High Risk Coastal Hazard Areas – Erosion and Inundation as well as requiring buildings to be set back a specified distance from waterbodies (Stage 1 PDP rules). Effectiveness <ul style="list-style-type: none"> The protection and maintenance and, where appropriate, enhancement of

Inundation

- **Rule 15.4.1 P6 - P8** – Earthworks (minimising the quantity of filling and excavation in the floodplain)
- **Rule 15.4.2 RD1** – Earthworks not permitted
- **Rule 15.9.1 P4** – Earthworks associated with Permitted Activities up to 10m³ and 0.5m excavation or filling above or below ground
- **Rule 15.9.2 DI** – Earthworks that do not comply with permitted activity conditions
- **Rule 15.10.1 P4** – Earthworks associated with Permitted Activities up to 10m³ and 0.5m excavation or filling above or below ground
- **Rule 15.10.2 DI** – Earthworks that do not comply with conditions for permitted activity

In addition to earthworks rules, restrictions on development in high risk areas helps to ensure natural features on river and coastal margins have minimal disturbance from development.

Rules in Stage 1 PDP – Building setbacks from waterbodies

- Residential Zone - Rule 16.3.9.3
- Business Zone – Rule 17.3.4.2
- Business Town Centre Zone – Rule 18.3.7
- Industrial Zone – Rule 20.3.4.2
- Industrial Zone Heavy – Rule 21.3.4.2
- Rural Zone – Rule 22.3.7.5

natural defence systems helps to maintain resilience to natural hazards in a cost-effective and more efficient manner. This can reduce the need for costly and often ineffective hard hazard mitigation works.

Efficiency

- The policy and rules protecting natural features, through limits on earthworks filling and excavation and buffers, can be provided through building setbacks from waterbodies. In the absence of assessing all natural features and buffers that provide natural protection and identifying these on the planning maps, providing limits on earthworks and restrictions on the location of development is the most efficient way to provide for the protection of these features.

Benefits

- Protecting and maintaining natural features and buffers is cost effective.
- These features often play other roles in providing other ecosystem services, habitat and natural character and amenity.

Costs

- Costs of resource consents and any technical reports required to assess non-compliance with earthworks and building setback rules.
- Compliance and monitoring costs.
- Costs of enhancement works and protection through covenants (costs associated with optional methods).

<ul style="list-style-type: none"> Country Living Zone – Rule 23.3.7.5 Village Zone – Rule 24.3.6.3 Reserve Zone – Rule 25.3.5.2 Rangitahi Peninsula Zone – Rule 28.3.9.3 <p><u>Note</u> that Stage 1 PDP rules for building setback distances from the coast are not open for submissions under Stage 2 PDP.</p>	
Risks of acting or not acting	
There is sufficient information from which to base the policies.	
Appropriateness	
The effectiveness and efficiency and benefits and costs of implementing this policy have been assessed and on balance it is considered that the implementation of the provisions relating to natural features and buffers are the most appropriate way to achieve Objective 15.2.1.	

5.2.5 Fire Risk, Land Instability and Subsidence and Mine Subsidence

Policies relating to Fire Risk, Land Instability and Subsidence and Mine Subsidence	
Provisions most appropriate	Effectiveness, Efficiency, Costs & Benefits
<p><u>Fire Risk</u></p> <p>Policy 15.2.1.18 – Residential development potentially subject to fire risk</p> <p>(a) In areas assessed or identified as being potentially subject to elevated fire risk, ensure that an appropriate buffer area or setback is provided around new residential subdivision and development.</p>	<p><u>Effectiveness</u></p> <ul style="list-style-type: none"> Policy 15.2.1.18 provides guidance for an assessment of the risk of fire damage to residential development (including the location of a building platform identified during subdivision). This matter is important where residential development is located in close proximity to plantation and indigenous forestry. The policy supports the matters that discretion is restricted to, which have been introduced to Stage 1 PDP subdivision rules.

<p>See Variation to Stage I PDP additional matters of discretion for Subdivision rules:</p> <p>16.4.1 RD1, 22.4.1.2 RD1, Rule 23.4.2 RD1, 24.4.1 RD1, 24.4.1 RD2, 24.4.2 RD1 and 24.4.2 RD2</p> <ul style="list-style-type: none"> • Avoidance and mitigation of natural hazards, including fire risk • Natural hazard risk including fire risk • Subdivision Te Kowhai and Tuakau – Rule 24.4.2 RD1(b) (ix) and RD2 (b) (ix) 	<p><u>Efficiency, costs and benefits</u></p> <ul style="list-style-type: none"> • The matters that discretion is restricted to ensure that this risk is considered when assessing a subdivision proposal. The policy ensures that any proposed building platform is located to reduce risk. This situation is more likely to occur in rural areas where water supply is not as plentiful and potentially inefficient for fighting fires. Reducing the risk can be achieved through subdivision design rather than technical expertise and can provide security for future land owners and insurance providers. • The policy is considered an effective and efficient way to assess and ensure new development is resilient in areas that have the potential to increase fire risk. <p><u>Opportunities for economic growth and employment</u></p> <ul style="list-style-type: none"> • The requirement for technical assessments and mitigation of risk are likely to increase employment opportunities with regards to engineering and coastal science and building design. There is potential for this to contribute to economic growth related to these specialised areas. <p>It is considered the overall long term community benefits of the proposed risk-based approach outweigh the potential increase in the likely costs of implementation.</p>
<p>Risks of acting or not acting</p>	
<p>Elevated fire risk from wild fires is a matter that can be assessed and addressed through mitigation at the time of subdivision. Assessing the location of all potentially at-risk areas across the district is not required.</p> <p>The risks of not acting may be significant with possible injury to people and damage to property if the risk is not reduced.</p>	
<p>Land instability generally</p>	
<p>Policy 15.2.1.19 - Development on land subject to instability or subsidence</p> <p>(a) Avoid locating new subdivision, use and development, including rezoning, on land assessed as being subject to, or likely to be</p>	<p><u>Overall Approach</u></p> <ul style="list-style-type: none"> • Policies 15.2.1.19 and 15.2.1.21 along with matters of discretion for earthworks and subdivision in RDA rules in Stage I PDP and rule 14.11.1 and 14.11.2 regulating stormwater disposal systems in Chapter 14 Stage I PDP (introduced

subject to, instability or subsidence, unless appropriate mitigation is provided and the activity does not increase the risk to people, property or infrastructure.

Policy 15.2.1.21 - Stormwater management in areas subject to risk of land instability or subsidence

- (a) Avoid discharge of stormwater directly to ground on land that is potentially at risk of land instability or subsidence unless:
 - (i) an assessment has been undertaken by an appropriately-qualified geotechnical specialist, indicating that the site is suitable for the proposed discharges; and
 - (ii) any adverse effects on the site and receiving environment can be appropriately mitigated.

Rules and other methods

Rules in Chapter 14 – Infrastructure and Energy

- **Rule 14.11.1 PI – Stormwater systems for new development or subdivision - 14.11.1.1(vi) Activity specific conditions** – Stormwater discharge on land subject to instability only where the ground conditions have been identified as suitable to absorb discharge without causing, accelerating or contributing to land instability.

Rule 14.11.2 RD1 – Stormwater systems for new development or subdivision that do not comply with 14.11.1.PI

Matters of discretion for earthworks and subdivision rules, included into Stage 1 through Variation 2

- **Earthworks General** - Matters of discretion for RDA rules in

to Stage 1 by way of Variation 2 to Stage 1 PDP - Appendix 4).

Effectiveness

- The proposed policies and matters of discretion are assessed during the geotechnical assessments required at the time of either subdivision application or restricted discretionary earthworks applications.
- The policies provide policy support and clear guidance for assessments of resource consent applications.

Efficiency, and

- These policies and matter that discretion is restricted to apply where subdivision and earthworks activities are proposed.
- They apply where resource consent is already required.

Benefits

- The policy framework ensures that new lots and in particular, proposed building platforms are geotechnically suitable for future development.
- The policy framework ensures that future development is resilient and that land instability risk is not passed on to future land owners.

Costs

- Cost of technical assessment and mitigation measures where applicable.

Opportunities for economic growth and employment

- The requirement for technical assessments and mitigation of risk are likely to increase employment opportunities with regards to engineering and coastal science and building design. There is potential for this to contribute to economic growth related to these specialised areas.

<p>Chapters 16 – 24, includes land instability and geotechnical stability.</p> <ul style="list-style-type: none"> • Subdivision General - Matters of discretion for RDA rules in Chapters 16, 17, 18, 20, 21, 22, 23 and 24, includes land instability, geotechnical stability and/or avoidance and mitigation of natural hazards. • Subdivision – Multi-unit development – Matters of discretion for RDA rules in Chapters 16, 17 and 18 includes geotechnical suitability for buildings. • Subdivision – Building Platform – Matters of discretion for RDA rules in Chapters 16, 22, 23 and 24, include geotechnical suitability for buildings. • Subdivision of land containing mapped off-road walkways – Matters of discretion for RDA rules in Chapters 16, 23 and 24, include natural hazard risk including land stability. • Subdivision – Te Kauwhata West Residential Area - Matters of discretion for RDA rules in Chapters 16, including geotechnical suitability for building. • Subdivision Lakeside General – Matters of discretion for RDA rules in Chapters 16 and 17, including geotechnical suitability for building. 	
Risks of acting or not acting	
<p>Land instability and subsidence is a matter that can be assessed and addressed through mitigation at the time of subdivision. Assessing the location of all potentially at-risk areas across the district is not required.</p> <p>The risks of not acting may be significant with possible injury to people and damage to property if the risk is not reduced.</p>	
<u>Mine Subsidence</u>	<u>Effectiveness</u>

Policy 15.2.1.20 - Development of land in the Mine Subsidence Risk Area

- (a) On land identified within the Mine Subsidence Risk Area, ensure that:
- (i) an assessment by an appropriately-qualified engineer occurs before subdivision, use or development takes place to confirm that the land is suitable for development; and
 - (ii) buildings are designed and constructed, and uses appropriate materials, to effectively minimise the risk of damage to the building from ground subsidence.

Corresponding Policies

Policy 15.2.1.19 - Development on land subject to instability or subsidence

- (a) Avoid locating new subdivision, use and development, including rezoning, on land assessed as being subject to, or likely to be subject to, instability or subsidence, unless appropriate mitigation is provided and the activity does not increase the risk to people, property or infrastructure.

Policy 15.2.1.21 - Stormwater management in areas subject to risk of land instability or subsidence

- (a) Avoid discharge of stormwater directly to ground on land that is potentially at risk of land instability or subsidence unless:
- (i) an assessment has been undertaken by an appropriately-qualified geotechnical specialist, indicating that the site is suitable for the proposed discharges; and
 - (ii) any adverse effects on the site and receiving environment

- Policy 15.2.1.20 provides guidance for assessments of discretionary activity resource consents and provides a consistent approach to assessments as well as ensuring that the appropriate information is provided with development proposals. This is an effective way to ensure that proposals for subdivision, use and development are appropriately assessed for subsidence risks before development occurs.
- Policy 15.2.1.20 works together with Policy 15.2.1.19 to ensure that development doesn't occur if risk is not assessed and/or appropriate mitigation is not provided.
- In addition Policy 15.2.1.21 and Rules 14.11.1 P1 and 14.11.1 RD2 ensure that the ground conditions are assessed and it is determined that any discharge of stormwater will not increase the risk of land instability or subsidence.

Efficiency

- Development in the Huntly mine subsidence area (currently 125 hectares of land in north east Huntly) has been regulated through the District Plan since the 1990s following the collapse of underground mine workings in the Southern Headings of the Huntly East Mine in the late 1980s (Appendix 5(c)).
- This area has been reassessed as part of Stage 2 of the District Plan Review, to ascertain whether further subsidence could occur as a result of the closure of the Huntly East Mine and subsequent flooding of the mine workings, and if so, what the extent of that hazard area would be. This assessment was followed up with a risk assessment to determine the likelihood and consequence of further subsidence and to investigate possible acceptable methods to mitigate risk (Appendix 5(e)).
- The reassessment of this area has resulted in updated hazard information including a new mapped hazard area that has increased the current subsidence area by 12 hectares and has provided some effective mitigation measures that can be included as conditions for permitted activities and therefore enable a slightly more permissive regulatory framework for development.
- Existing development has existing use rights.
- The rules in chapter 15.11 are for new development and allow for some minor

can be appropriately mitigated.

Rules and other methods

Rule 15.11.1 Permitted Activities

Subject to activity-specific conditions:

- Additions to an existing building.
- Standalone garage
- Construction, replacement, repair, minor upgrading, upgrading or maintenance of utilities.
- Earthworks

Rule 15.11.2 Restricted Discretionary Activities

- Earthworks larger than the permitted levels.

Rule 15.11.3 Discretionary Activities

- Buildings exceeding permitted standards
- Subdivision to create additional lots (with exceptions for utility, access and reserve allotments)

Hazard mapping

Rules in Chapter 14 – Infrastructure and Energy

Rule 14.11.1 PI – Stormwater systems for new development or subdivision - 14.11.1(vi) Activity

development as a permitted activity including minor additions to existing buildings and standalone garages so long as no exterior wall exceeds 20m in length. Minor earthworks and utilities are also permitted. This gives a level of certainty for minor development proposals. Providing for permitted activities is more efficient as it avoids unnecessary applications for resource consent for low risk activities and developments.

- Where the permitted standards are exceeded, consent is required and Policy 15.2.1.20 and (if relevant) the matters for which discretion is restricted to in Rule 15.11.2 RD1, provide guidance for assessments of applications for consent. This is considered an efficient way to approach applications for consent, as the current situation under the OPD does not provide any guidance as to what information is required and what information might be considered appropriate.
- Assessments through the resource consent process ensure that subdivision, use and development can proceed only where risk has been appropriately assessed and can either be avoided, remedied or mitigated.

Costs

- There will be additional costs for obtaining technical expertise to assess development proposals for buildings, earthworks and subdivision. For buildings, this may include costs to assess the most appropriate building design and materials to mitigate the potential for differential subsidence through foundation design and the ability to re-level the building without it sustaining substantial damage.
- However, currently subdivision, earthworks and building development in the area require input from technical experts, but without any guidance on appropriate expertise and little to no confidence that development will be approved. This situation has stalled any opportunities for development and has resulted in costs to land owners and developers.

Benefits

- There is a lot more certainty with regards to the type and level of detail of assessments required to assess a development proposal.

specific conditions – Stormwater discharge on land subject to instability only where the ground conditions have been identified as suitable to absorb discharge without causing, accelerating or contributing to land instability.

Rule 14.11.2 RD1 – Stormwater systems for new development or subdivision that do not comply with 14.11.1.PI

Matters of Restricted Discretion

- The likely effectiveness of the system to avoid flooding, nuisance or damage to other buildings and sites
- The capacity of the system and suitability to manage stormwater

- Decision makers will benefit from better information and guidance on appropriate technical information to inform their decisions.
- Permits low-risk activities to proceed without resource consent, including utilities conferring benefits on the community.
- Updated information and maps communicate the existence and extent of the risk to the community, prospective purchasers and developers.
- New buildings and stormwater systems that have been designed and constructed specifically for their site to ensure that risk of damage from ground subsidence is minimised, provide more certainty for current and future land owners and insurance providers. This will increase community resilience to the risk of future subsidence.

Opportunities for economic growth and employment

- The requirement for technical assessments and mitigation of risk are likely to increase employment opportunities with regards to engineering and coastal science and building design. There is potential for this to contribute to economic growth related to these specialised areas.
- It is considered that the overall long term community benefits of the proposed risk-based approach outweigh the potential increase in the likely costs of implementation.

Risks of acting or not acting

There is a moderate degree of uncertainty about subsidence risks in this area as there is never any way to categorically confirm a future subsidence scenario, such as where it may occur and to what degree the land will subside.

Expert analysis has identified that within the risk area there will be broad areas where subsidence is less likely to occur due to depth of mine workings and the size of the pillars that resist the pressure of the ground above the tunnels. Conversely, there are other broad areas where subsidence has occurred in the past and where further subsidence is considered more plausible as the mine workings are not as deep, the pillars narrow and the tunnels are more extensive (Appendix 5(c) and 5(e)).

However, it is considered that there is sufficient information from which to develop the policy and rule framework for regulating subdivision, use and development.

The risks of not acting due to not having a high degree of certainty of the risk may be significant with possible injury to people and damage to property

and infrastructure if the risk is not reduced. The vulnerability of that community may increase over time where there is no regulation to ensure risk to new development is reduced.

Appropriateness

The effectiveness and efficiency and benefits and costs of implementing the policies for managing fire risk, land instability and subsidence and mine subsidence have been assessed and on balance it is considered that the implementation of the provisions relating to natural features and buffers are the most appropriate way to achieve Objective 15.2.1.

5.2.6 Liquefaction Risk

Policies relating to Liquefaction Risk	
Provisions most appropriate	Effectiveness and Efficiency
<p>Policy 15.2.1.22 – Liquefaction-prone land risk assessment</p> <p>(a) On land potentially prone to liquefaction, ensure that:</p> <ul style="list-style-type: none"> (i) an assessment by a geotechnical specialist occurs before new subdivision, use or development takes place; and (ii) the level of assessment reflects the type and scale of the subdivision, use or development and the overall vulnerability of the activity to the effects of liquefaction. <p>Policy 15.2.1.23 – Control activities on land susceptible to damage from liquefaction</p> <p>(a) Control subdivision, use and development on land assessed as being susceptible to liquefaction-induced ground damage, to ensure appropriate mitigation is provided so that the level of risk to people, property, infrastructure and the environment is acceptable.</p>	<ul style="list-style-type: none"> • It is noted that there are no specific provisions in the Operative Plan (Option 1) in either the Franklin or Waikato Sections in relation to liquefaction. In terms of Option 3, information and guidelines are considered to be an effective means of addressing liquefaction hazards. MBIE has produced guidelines for addressing the Building Code requirements in dealing with liquefaction risks. These originally applied to the Canterbury Region after the Canterbury Earthquake sequence (2010-2011) but are now being extended to all of New Zealand. • The proposed provisions (Option 2) include policies and matters of discretion that the council will consider in subdivision applications and some land uses (e.g. multi-unit development). No mapping is provided and no specific rules. The rules that apply already exist in Stage 1. This approach is considered to be an effective way to clarify the requirements for assessment of land prone to liquefaction in the district. The provisions are considered appropriate to achieve a more resilient community as required by Objective 15.2.1. The proposed policy and assessment matter framework, works together with the information guidelines provided by MBIE and MfE. The WRPS also requires

General natural hazard policy also applies:

Policy 15.2.1.6 - Managing natural hazard risk generally

- (a) Provide for rezoning, subdivision, use and development outside High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) Areas where natural hazard risk has been appropriately identified and assessed and can be adequately avoided, remedied or mitigated and does not transfer or exacerbate risk to adjoining properties.

Variation to Stage 1

The matters below work with Variation 2 to Stage 1 where liquefaction risk was added for specified rules relating to subdivision and multi-unit development etc. in the Zone provisions (see list of relevant rules in the Cascade Table in Appendix 1).

Relevant Rules—Matters of discretion

15.12.2 Additional matters of restricted discretion for subdivision to create one or more additional vacant lots – liquefaction risk

- (1) Where potential liquefaction risk is identified as a matter...the Council restricts its discretion to the following additional matters:
- (a) Geotechnical assessment and/or investigation of any potential liquefaction hazard...
 - (b) Measures proposed to mitigate the effects of liquefaction hazard, if present, including:

consideration be given in district plans to liquefaction. Implementation Method 13.2.8 requires control of subdivision, use and development for other natural hazards and associated risk not already specifically mentioned by other policies and methods. The explanation makes it clear that this includes liquefaction:

*“The methods of this policy are predominantly focused towards identified hazard areas, including Primary Hazard Zones, Flood Risk Zones, areas at high risk of coastal hazards and Residual Risk Zones. Method 13.2.8 recognises that there are other natural hazards that may be relevant in particular areas e.g. coastal erosion, coastal flooding or **liquefaction risk**, and that development in these areas needs to be managed to ensure that the risk from these natural hazards does not exceed an acceptable level.” [WRPS, page 13-6] [bold underline, our emphasis].*

- The lower level of control through policies and additional matters of discretion provide for assessment of liquefaction-prone land. The provisions take into consideration the risk-based approach (probability of occurrence and consequences) and also the level of information available. Liquefaction risk has not been mapped in the district at this time.
- This work is progressing with recent changes to the Building Code requiring liquefaction-prone ground within districts to be mapped.⁷

“The current Building Code solutions to ‘good ground’ in B1/AS1 will continue to comply until 28 November 2021. This change requires councils and territorial authorities to complete liquefaction mapping within the two years.

Benefits

- It is considered that the liquefaction risk assessment required will result in

⁷ https://www.building.govt.nz/building-code-compliance/biannual-building-code-updates/november-2019-building-code-update/#jump-to-liquefaction__002dprone-ground

- (i) Location, size and layout of allotments, structures and building platforms...
- (ii) Location, timing and scale and nature of earthworks;
- (iii) Provision of ground strengthening...
- (iv) Provision of resilient services...
- (v) Setbacks...
- (vi) Effects on adjoining properties

15.12.3 Additional matters of restricted discretion for new land use (e.g. multi-unit development) – liquefaction risk

- (1) Where potential liquefaction risk is identified as a matter...the Council restricts its discretion to the following additional matters:
- (a) Geotechnical assessment and/or investigation of any potential liquefaction hazard...
 - (b) Measures proposed to mitigate the effects of liquefaction hazard, if present, including:
 - (i) Location, size and layout and design of buildings, structures, carparking...
 - (ii) Location, timing and scale and nature of earthworks;
 - (iii) Provision of ground strengthening...
 - (iv) Setbacks...
 - (v) Consideration given to ease of repair...
 - (vi) Effects on adjoining properties

mitigation being proposed for subdivision and developments such as ground improvement and building techniques (e.g. rib-raft, lighter structures etc). Better engineering design will reduce the likelihood and consequences of liquefaction and hence reduce risk. This will give effect to Policy 3.24 of the VWRPS, and also assist in achieving a more resilient community and appropriate mitigation of liquefaction risk (Objective 15.2.1).

- It is considered that the proposed policies and assessment matters will provide a more formalised and comprehensive approach to geotechnical assessment than the status quo.
- The proposed provisions better reflect current thinking and best practice in this field and reflect well-established and accepted general approaches to defining hazard risk and managing it.
- The provisions also have regard to the Royal Commission of Inquiry into the Canterbury Earthquake Reports (Vol 5, Summary and Recommendations), which recommended that the potential effect of earthquakes, liquefaction and lateral spread be taken into account in zoning and in land use and subdivision consents. This explicit recognition of liquefaction in the proposed provisions compared with the status quo in the Operative Plan is therefore considered appropriate.
- Further benefits include potentially increased employment opportunities for geoscientists in the region and potentially increased education and training needs locally and regionally.

Costs

- The level of intervention required by the proposed provisions is greater than in the Operative Plan (Option 1) (where the word liquefaction is difficult to find).
- Costs to prepare geotechnical reports may be higher and proposed mitigation may also be costly. However, it is understood that most of the assessments and mitigation are already being required for subdivision under s106 of the RMA in areas of the district where liquefaction is suspected.
- Costs to the council and the community for liquefaction information and

	advice will increase, but this is considered to be greatly outweighed by the benefits of appropriate awareness, mitigation and robust regulatory planning for liquefaction hazards.
Risk of acting or not acting	
It is considered that there is enough information on which to base the proposed policies and matters of discretion. The risk of not acting, could be significant in terms of allowing development of land subject to liquefaction without proper assessment, including significant damage to property should an earthquake occur causing liquefaction in the district. The community would be more vulnerable (less resilient) and would not effectively avoid or mitigate risks of liquefaction and therefore would not meet proposed Objective 5.2.1 or Policy 3.24 and method 13.2.8 of the WRPS. However, it is considered that at this time, further information in the form of mapping of the liquefaction risk areas of the district would provide for a more complete level of information on which to provide a comprehensive set of provisions for the District Plan.	
Appropriateness	
The proposed policies and assessment matters will require the most up to date geotechnical information from a wide range of sources including WRC, MfE, MBIE, NZ Geotechnical Society, GNS and Risk Management literature to provide robust liquefaction risk assessment on land before it is rezoned or developed. The approach is considered appropriate to give effect to Policy 3.24 and Implementation Method 13.2.8 of the WRPS and to achieve Objective 15.2.1.	

5.2.7 Natural Hazard Awareness

Provisions (Policies, Rules, Methods) most appropriate way to achieve the objective
<p>Objective 15.2.2: A well-informed community that:</p> <ul style="list-style-type: none"> (a) is aware of, and understands, which natural hazards affect the district; and (b) is able to effectively and efficiently respond to, and recover from, natural hazard events.

Evaluation of Option 2: Provide natural hazard information to strengthen and reflect new information and updated statutory directions.

Provisions (Policies, Rules, Methods) most appropriate way to achieve the objective	
Objective 15.2.2 - A well-informed community that: (a) is aware of, and understands, which natural hazards affect the district; and (b) is able to effectively and efficiently respond to, and recover from, natural hazard events.	
Policies relating to Awareness of Natural Hazard Risk	
Provisions most appropriate	Effectiveness, Efficiency, Benefits and Costs
Policy 15.2.2.1 - Natural hazard risk information (a) Enable people to be informed and have access to information on the natural hazards affecting their properties and surrounding area, including through: <ul style="list-style-type: none"> (i) provision of Land Information Memoranda; (ii) natural hazard technical information, risk registers and mapping on the Council's website, the Waikato Regional Council Hazards Portal, this district plan and accompanying planning maps; (iii) education, provision of information and community engagement; and (iv) alignment with the work of other agencies including iwi and the Waikato Regional Council. Policy 15.2.2.2 - Awareness of Civil Defence plans Improve response to and recovery from natural hazard events by encouraging community awareness and use of information and methods contained in Community Response Plans.	Effectiveness and Efficiency <ul style="list-style-type: none"> • Policy 15.2.2.1 directs council to make natural hazard information publically available through methods and processes such as LIM reports, the hazards register, Stormwater Catchment Management Plans, district planning maps, Regional Hazards Portal, signage, education, and community engagement. This policy also promotes alignment with other agencies and is consistent with the policy direction in Policy 13.1 and Implementation Method 13.1.5 of the WRPS. • In addition, Policy 15.2.2.2 provides for better community awareness of CDEM Community Response Plans to improve response to and recovery from natural hazard events, which gives effect to Policy 13.1(f) of the WRPS. • Together, the proposed policies provide an efficient and effective way to achieve Objective 15.2.2 through contributing to community knowledge of natural hazards and assisting with an efficient means to access a consistent body of information to the community, individual land owners, future property purchasers and land developers. • Making information that the council collects through numerous processes available to the public is efficient in that the information is available to all and can provide the broad bases for site-specific assessments for specific development proposals and may reduce the

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need for duplication.

- It is more efficient and cost effective for council and the community when council carry out hazard and stormwater modelling; collect and store hazard information; develop community response plans and make all information available to the public so all parties have access to the same information.

Costs

- Making information available will likely be acceptable to all stakeholders. While LIM reports can be controversial, it is important for anyone wishing to purchase property to have access to information that council holds.
- Engagement with communities on the district planning maps will assist to increase knowledge about hazards and risk.
- There may be short-term costs in developing land where hazards exist, or where risk is significant, the land may not be able to be developed. Awareness of natural hazard risks increases may result in market correction of property values in some cases, with loss to existing landowners, offset by future landowners avoiding any such losses (Appendix 5(j)).
- There may be difficult adjustments to be made, including in cases where sites of significance to Maaori are found to be subject to natural hazards, including new risks due to climate change.

Benefits

- The main benefits from the implementation of the proposed policies are that they ensure the community has access to information and is then better informed about the nature and extent of natural hazards. They will be in a better position to make rational decisions about their future investment and development activities. Increasing awareness of natural hazards can contribute to the health and safety of the community.
- Improved community information has economic advantages long term, in that development and long-term investment decisions will be rationally

	<p>influenced to mitigate risks arising from natural hazards.</p> <ul style="list-style-type: none"> Increased knowledge of the extent of future natural hazards impacted by climate change will assist communities to be aware of and prepare for possible future scenarios.
Risk of acting or not acting	
<p>There are inherent uncertainties and information gaps around the risks of natural hazards, in particular, the evolving risks due to climate change. District plan rules may lag in this context, and ongoing public education is the best way to ensure new risks can be responded to and addressed efficiently.</p>	
Appropriateness	
<p>It is considered that the recommended policies 15.2.2.1 and 15.2.2.2 and methods outlined above are the most appropriate way for achieving Objective 15.2.2, having considered:</p> <ul style="list-style-type: none"> other reasonably practicable options for achieving the objectives; evaluating the preferred option (option 2) in terms of assessing the efficiency and effectiveness of the provisions in achieving the objective as well as assessing the benefits and costs and opportunities for economic growth and employment; <p>These policies provide effective and efficient opportunities to improve community knowledge of natural hazards through provision of information sharing.</p> <p>Option 1 ("Status Quo") was discarded as being an ineffective approach to creating a well-informed community.</p>	

5.2.8 Climate Change

Provisions (Policies, Rules, Methods) most appropriate way to achieve the objective
<p>Objective 15.2.3 - Climate change</p> <p>A well-prepared community that:</p> <ul style="list-style-type: none"> (a) is able to adapt to the effects of climate change; and (b) has transitioned to development that prioritises lower greenhouse gas emissions.

Evaluation of Option 2: Provide natural hazard information to strengthen and reflect new information and updated statutory directions.

Policies relating to Climate Change	
Provisions most appropriate	Effectiveness and Efficiency
<p>Policy 15.2.3.1 - Effects of climate change on new subdivision and development</p> <p>(a) Ensure that adequate allowances are made for the projected effects of climate change in the design and location of new subdivision and development throughout the district, including undertaking assessments where relevant that provide for:</p> <ul style="list-style-type: none"> (i) the projected increase in rainfall intensity, as determined by national guidance, but being not less than 2.3°C by 2120; (ii) the projected increase in sea level, where relevant, as determined by national guidance, but being not less than 1m by 2120; (iii) stress testing under the RCP 8.5 scenario for rainfall⁸ and RCP 8.5H+ for sea level rise⁹; and (iv) in respect to the coastal environment, increases in storm surge, waves and wind. <p>Policy 15.2.3.2 - Future land use planning and climate change</p> <p>(a) Increase the ability of the community to adapt to the effects of climate change when undertaking future land use planning by:</p> <ul style="list-style-type: none"> (i) taking into consideration the potential environmental and social 	<p>Overall Approach</p> <ul style="list-style-type: none"> • Policies 15.2.3.1; 15.2.3.2; 15.2.3.3; 15.2.3.4 and 15.2.3.5 work together to provide guidance with regards to appropriate climate change mitigation measures and adaptation as well as guidance for assessments that are required to take into account the projected effects of climate change. • Policies 15.2.3.1 and 15.2.3.5 specify the requirements for assessing the projected effects of climate change. The allowances stipulated in Policy 15.2.3.1(a)(i)-(iii) are based on the latest available national and regional guidance. • Policy 15.2.3.5(a)-(c) provides guidance for assessments and when they are required. • Policy 15.2.3.2 provides guidance when assessing the impacts of climate change on future land use planning including consideration of adaptation measures including facilitation of discussions with communities on adaptive pathway planning. • Policy 15.2.3.3 supports a precautionary approach when dealing with the uncertainty of the projected effects of climate change. • Policy 15.2.3.4 ensures consideration of appropriate building setbacks to protect people and property from the adverse effects of climate

⁸ Ministry for the Environment, 2018: Climate Change Projections for New Zealand. September 2018. Publication No. MFE 1385.

⁹ Ministry for the Environment, 2017: Coastal Hazards and Climate Change – Guidance for Local Government. December 2017. Publication No. ME 1341.

costs of climate change, including effects on indigenous biodiversity (inland migration), historic heritage, mahinga kai, public health and safety, public access to the coast and waterway margins, and the built environment.

- (ii) encouraging the incorporation of sustainable design measures within new subdivision, landuse and development, including:
 - (A) low impact, stormwater management, urban design and green infrastructure;
 - (B) use of relocatable buildings and structures in areas potentially at risk due to sea level rise or increased flood levels;
 - (C) efficient water storage;
 - (D) provision of renewable energy generation; and
 - (E) transferring to activities with lower greenhouse gas emissions.
- (iii) providing on-going monitoring of changes to the environment due to climate change; and
- (iv) facilitating community discussion on adaptive pathways to manage the risks associated with climate change and incorporating them, where appropriate, into the District Plan through plan changes.

Policy 15.2.3.3 - Precautionary approach for dealing with uncertainty

- (a) In areas throughout the district likely to be affected by climate change over the next 100 years, adopt a precautionary approach towards new subdivision, use and development which may have potentially significant or irreversible adverse effects, but for which there is incomplete or uncertain information.

Policy 15.2.3.4 - Provide sufficient setbacks for new development

- (a) Protect people, property and the environment from the projected

change, including sea level rise, while at the same time, considering matters such as natural ecosystems and provision for the inland migration of coastal habitats, natural defences and public access to the coast.

Effectiveness

- Climate change poses challenges, especially for development along the coast where impacts such as sea level rise will likely require complex adaptive management processes such as adaptive pathways planning and other mitigation measures to address risk to both existing and future development. These measures will provide for continued use of coastal land while ensuring that new development is reasonably able to adapt to any future sea level rise scenario.
- Where existing development becomes increasingly vulnerable to coastal inundation and/or erosion, adaptive measures will need to be considered. Where a number of properties or a large segment of a community become increasingly vulnerable, community adaptive management strategies will be required to investigate possible pathways to reduce risk.
- An adaptive pathways approach could include any number of adaptive measures including interim mitigation measures, coastal retreat or coastal protection works where appropriate.
- Adaptive planning is a process that operates outside of the district plan processes. However, it is important to note that the proposed policies and rules support adaptive planning processes by allowing for interim measures and adaptive pathways to be considered through resource consent applications and conditions. Consent conditions can document adaptive pathways such as specifying triggers to prompt a condition stipulated in the consent. For example, requiring removal or relocation of a building when an erosion scarp, or coastal flooding is within a specified distance from the building.
- The uncertainty around future climatic conditions and the degree of sea level rise that will occur make adaptive planning the most effective

adverse effects of climate change, including sea level rise, by providing sufficient setbacks from water bodies and the coast when assessing new development.

- (b) Ensure that, in establishing development setbacks, adequate consideration is given to:
- (i) the protection of natural ecosystems, including opportunities for the inland migration of coastal habitats;
 - (ii) the vulnerability of the community;
 - (iii) the maintenance and enhancement of public access to the coast and public open space;
 - (iv) the requirements of infrastructure; and
 - (v) natural hazard mitigation provision, including the protection of natural defences.

Policy 15.2.3.5 - Assess the impact of climate change on the level of natural hazard risks

- (a) For all new subdivision, use and development requiring rezoning or a resource consent, ensure that account is taken of the projected effects of climate change over the next 100 years when assessing any identified risks from natural hazards, and their effects on people, property, infrastructure and the environment.
- (b) Ensure that, when assessing the effects of climate change on the level of natural hazard risk in accordance with Policy 15.2.3.5(a) above, the allowances in Policy 15.2.3.1(a)(i)-(iv) are applied.
- (c) Where the assessment required by Policy 15.2.3.5(a) and Policy 15.2.3.5(b) above indicates that natural hazards are likely to be exacerbated by climate change, ensure that subdivision and development are designed and located to avoid, or appropriately mitigate, any increased and cumulative risk, including increased risk of flooding, liquefaction, coastal inundation, coastal erosion, slope

management option.

- Where new subdivision occurs such as greenfields development that could result in significant or irreversible adverse effects from climate-related hazards, but for which there is insufficient or uncertain information, a precautionary approach should be taken.
- Factoring in the projected effects of climate change, based on national guidance, into flood and coastal hazard modelling will be the most effective method for understanding future impacts of climate change.
- Potential mitigation measures for other climate change impacts such as elevated fire risk, the inland migration of coastal habitats, public access to the coast and public open space can be considered, where applicable, at the time of subdivision and developments that require resource consent.

Efficiency

- Considering the effects of climate change when undertaking development that requires resource consent provides for an efficient process that can stipulate either one-off or ongoing conditions that are then attached to the property file. This allows for more transparency and accessibility of information with regards to any future adaptive measures required by consent conditions that future owners may be responsible for.
- Adaptive planning pathways contained in resource consent conditions are easier to monitor.
- Flood and coastal hazard modelling provided for at a scale suitable for land use planning and included in the district planning maps is a more efficient way to provide information to the community and increase awareness of natural hazards.
- Applying a regulatory method to mapped hazard areas that focusses on risk reduction through avoidance, mitigation or remediation is more efficient than not identifying hazard areas and requiring hazard modelling to be carried out in an ad hoc manner. This is especially the

instability, fire, and drought.

Supporting Policy

Policy 15.2.1.8 - Limitations on hard protection works for coastal hazard mitigation

- (a) Ensure that where new hard protection structures and works are necessary to protect existing development on public or privately-owned land from coastal hazards, they are appropriately assessed and controlled and:
- (i) have primarily a public and/or environmental benefit when located on public land;
 - (ii) are effective;
 - (iii) the economic, social and environmental benefits outweigh costs; and
 - (iv) do not transfer or increase risk to other people, property, infrastructure, the natural environment, historic heritage, or Māori Sites and Areas of Significance.
- (b) Ensure that when new hard protection structures are to be located in an area where an adaptive management strategy has been prepared to manage coastal hazards, they are consistent with that strategy.

Policy 15.2.1.18 - Residential development potentially subject to fire risk

- (a) In areas assessed or identified as being potentially subject to elevated fire risk, ensure that an appropriate buffer area or setback is provided around new residential subdivision and development.

Rules and other methods

Rules in Flood Plain Management Area and Flood Ponding Areas; High Risk

case with flood modelling that takes into account the wider catchment and would be particularly cost inefficient for property owners to carry out individually.

Costs

- Additional upfront costs for assessing hazard risk, impacts of climate change, engineering and structural design, and raised floor levels.
- Costs to future land owners to apply adaptive measures.
- Cost to council (rate payers) to develop adaptive management strategies for vulnerable communities.
- Costs associated with monitoring, hazard modelling, hazard assessments and future plan changes.

Benefits

- The overall long term community benefits of an adaptive pathways approach ensures that resilience is maintained over time by providing clear information and procedures through specific assessments, building design, and triggers outlined in resource consent conditions. Although there are added upfront costs to implement this approach, the long term benefits are considered to outweigh any increase in costs.
- Community safety and wellbeing.
- Reduced disruptions to economic activity and services over time due to increasing risk of natural hazards.
- Adaptive planning provides communities with knowledge/awareness of possible future scenarios and adaptive pathways to reduce risk.
- More resilient communities.
- Resilient development safeguards insurability over the long term.

Opportunities for economic growth and employment

The requirement for technical assessments and mitigation of risk are likely

<p>Flood Area; Coastal Sensitivity Areas – Erosion and Inundation.</p> <ul style="list-style-type: none"> • Rule 15.4.3 • Rule 15.5.3 • Rule 15.5.4 • Rule 15.7.2 • Rule 15.7.3 • Rule 15.8.2 • Rule 15.8.3 • Rule 15.9.2 • Rule 15.9.3 • Rule 15.10.2 • Rule 15.10.3 <p>Stage 1 PDP Zone Chapter rules</p> <p>Rules in Stage 1 PDP – Building setbacks from waterbodies</p> <ul style="list-style-type: none"> • Residential Zone - Rule 16.3.9.3 • Business Zone – Rule 17.3.4.2 • Business Town Centre Zone – Rule 18.3.7 • Industrial Zone – Rule 20.3.4.2 • Industrial Zone Heavy – Rule 21.3.4.2 • Rural Zone – Rule 22.3.7.5 • Country Living Zone – Rule 23.3.7.5 • Village Zone – Rule 24.3.6.3 • Reserve Zone – Rule 25.3.5.2 	<p>to increase employment opportunities with regards to engineering and coastal science and building design. There is potential for this to contribute to economic growth related to these specialised areas.</p> <p>It is considered the overall long term community benefits of the proposed risk-based approach outweigh the potential increase in the likely costs of implementation.</p>
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<ul style="list-style-type: none"> • Rangitahi Peninsular Zone – Rule 28.3.9.3 • Flood modelling from Horotiu - Huntly - Ohinewai incorporate climate change 2.3 degrees increase in temperature and shown on planning maps as Floodplain, High Risk Flood Area and Ponding area. • Mapping for coastal erosion/inundation sensitivity overlay areas include 1m sea level rise to 2120, allowance. • Adaptive management planning and development of adaptive management strategies for vulnerable communities, including identifying adaptive pathways • This policy is relevant to any proposed rezoning and any subdivision proposals in any of the natural hazard overlays i.e greenfields development, • Policy 15.2.3.2(1)(a) and (b) will be relevant to any discretionary or non-complying activities and also some RDA's which have climate change as a consideration. <p>See Variation 2 to Stage 1 PDP additional matters of discretion for Subdivision:</p> <p>16.4.1 RD1, 22.4.1.2 RD1, Rule 23.4.2 RD1, 24.4.1 RD1, 24.4.1 RD2, 24.4.2 RD1 and 24.4.2 RD2</p> <ul style="list-style-type: none"> • Avoidance and mitigation of natural hazards, including fire risk • Natural hazard risk including fire risk • Subdivision Te Kowhai and Tuakau – Rule 24.4.2 RD1(b) (ix) and RD2 (b) (ix) 	
Risks of acting or not acting	
<p>There are inherent uncertainties and information gaps around the risks of natural hazards, in particular, the evolving risks due to climate change.</p> <p>Hazard modelling, including the projected effects of climate change, are based on current government guidelines. As the future effects of climate change</p>	

are inherently difficult to predict, there is a large degree of uncertainty, especially over longer periods of time. Even with detailed investigation, the uncertainty may preclude accurate modelling of hazard areas.

The risks of not acting due to insufficient information or uncertainty may be significant with possible injury to people and future damage to development in at-risk areas. Uncertainty can be addressed through adaptable measures included in the design new development and the resource consent conditions where the site may be vulnerable over the next 100 years. This ensures that development can continue to be resilient over a longer timeframe and unacceptable costs are not transferred to future generations.

Appropriateness

It is considered that the recommended policies 15.2.3.1 - 15.2.3.5 and methods outlined above are the most appropriate way to achieve Objective 15.2.3, having considered:

- other reasonably practicable options for achieving the objectives;
- evaluating the preferred option (option 2) in terms of assessing the efficiency and effectiveness of the provisions in achieving the objective as well as assessing the benefits and costs and opportunities for economic growth and employment;

These policies provide effective and efficient means to address the projected effects of climate change, given the level of uncertainty of the scale and timing of future effects.

Option 1 ("Status Quo") was discarded as being an ineffective approach as the provisions in the Franklin Section and the Waikato Section of the ODP are largely silent on climate change and do not include effective provisions for managing increasing risk over time. The current Operative District Plan does not include coastal hazard modelling or flood modelling that incorporates climate change scenarios.

APPENDICES

Released to open (WDC2007/05)

Appendix I Provision Cascade

Issue to be addressed	Objective (what we want to achieve)	Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
Land use, subdivision and development on land that is prone to natural hazards can increase risks to people, property, infrastructure and the environment and reduces the resilience of the community to natural hazards.	<p>Objective 15.2.1</p> <p>Resilience to natural hazard risk</p> <p>A resilient community where the risks from natural hazards to people, property, infrastructure and the environment from subdivision, use and development of land are avoided or appropriately mitigated.</p>	<p>Policy 15.2.1.1 - New development in areas at significant risk from natural hazards</p> <p>(b) Avoid new subdivision, use and development where it will increase the risk to people's safety, well-being and property in the following areas identified as being at significant risk from natural hazards:</p> <p>(i) High Risk Flood Area;</p> <p>(ii) High Risk Coastal Hazard (Inundation) Area;</p> <p>(iii) High Risk Coastal Hazard (Erosion) Area.</p> <p>Policy 15.2.1.2 – Changes to existing land use and development in areas at significant risk from natural hazards</p> <p>(b) In areas of High Risk Flood, High Risk Coastal Hazard (Erosion) and High Risk Coastal Hazard (Inundation), ensure that when changes to existing land use activities and development occur, a range of risk reduction options are assessed, and development that would increase risk to people's safety, well-being and property is avoided.</p> <p>Policy 15.2.1.3 – New emergency services and hospitals in areas at significant risk from natural hazards</p> <p>(b) Avoid locating new emergency service facilities and hospitals in areas which are at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion), unless, considering engineering and technical constraints or functional and operational requirements, they cannot be reasonably located elsewhere and will not increase the risk to or vulnerability of people or communities.</p> <p>Policy 15.2.1.4 – New infrastructure and utilities in areas subject to high risk natural hazards</p>	<p>Rules in High Flood Risk Area (PA)</p> <ul style="list-style-type: none"> Rule 15.5.1 P1 - Operation, repair, maintenance or minor upgrading of existing utilities and new telecommunication lines, poles, cabinets and masts/ poles supporting antennas Rule 15.5.1 P2 - Construction of an accessory building or farm building without a floor <p>Rules in High Flood Risk Area (RDA)</p> <ul style="list-style-type: none"> Rule 15.5.2 RD1 - New utilities and more than minor upgrading of existing utilities Rule 15.5.2 RD2 - One addition to an existing lawfully established building where the ground floor area of the addition does not exceed 15m² <p>Rules in High Flood Risk Area (DA) (also see policy 15.2.1.11)</p> <ul style="list-style-type: none"> Rule 15.5.3 DI - Subdivision to create additional lot(s) where the additional lot(s) are located entirely outside the HFRA or the additional lot(s) are partially inside the HFRA but the building platform is entirely outside the HFRA <p>Rules in High Flood Risk Area (NCA) (also see policy 15.2.1.11)</p> <ul style="list-style-type: none"> Rule 15.5.4 NC1 - Buildings or additions not meeting conditions for PA or RDA Rule 15.5.4 NC2 - Subdivision not meeting the conditions for a DA Rule 15.5.4 NC3 - Emergency service facilities and hospitals <p>Rules in High Risk Coastal Hazard Areas (PA)</p> <ul style="list-style-type: none"> Rule 15.9.1 P1 - Construction of an accessory building or a farm building without a floor up to 40m² Rule 15.9.1 P2 - Operation, repair, maintenance or minor upgrading of existing utilities and new telecommunication lines, poles, cabinets and masts/ poles supporting antennas Rule 15.9.1 P3 - Maintenance or repair of an existing lawfully established coastal protection structure Rule 15.9.1 P4 - Earthworks associated with Permitted Activities up to 10m³ and 0.5m excavation or filling above or below ground Rule 15.10.1 P1 - Construction of an accessory building or a farm building without a floor up to 40m² Rule 15.10.1 P2 - Operation, repair, maintenance or minor upgrading of existing utilities and new telecommunication lines, poles, cabinets and masts/ poles supporting antennas Rule 15.10.1 P3 - Maintenance or repair of an existing lawfully 	<p>Rule 15.5.2 RD1 – new utilities</p> <ul style="list-style-type: none"> Functional and operational requirements adverse effects on people and property potential for the development to transfer/increase flood risk alternative locations projected effects of climate change any mitigation measures to reduce the risk <p>Rule 15.5.2 RD2 - additions to existing building</p> <ul style="list-style-type: none"> building materials, structural or design work or other engineering solutions appropriate floor level for the addition mitigation measures to reduce the risk

		<p>(b) Enable the construction of new infrastructure and utilities in areas at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) areas only where:</p> <p>(iv) the infrastructure and utilities are technically, functionally or operationally required to locate in areas subject to natural hazards, or it is not reasonably practicable to be located elsewhere; and</p> <p>(v) any increased risks to people, property and the environment are mitigated to the extent practicable; and</p> <p>(vi) the infrastructure and utilities are designed, maintained and managed, including provision of hazard mitigation works where appropriate, to function to the extent practicable during and after natural hazard events.</p> <p>Policy 15.2.1.11 - New development that creates demand for new protection structures and works</p> <p>(b) Avoid locating new subdivision, use and development in high risk areas where a demand or need for new structural protection works will be required to reduce the risk from natural hazards to acceptable levels.</p>	<p>established coastal protection structure</p> <p>73. Rule 15.10.1 P4 - Earthworks associated with Permitted Activities up to 10m3 and 0.5m excavation or filling above or below ground</p> <p>Rules in High Risk Coastal Hazard Areas (DA) (also see policy 15.2.1.11)</p> <ul style="list-style-type: none"> • Rule 15.9.2 D1 - Earthworks not meeting permitted conditions • Rule 15.9.2 D2 - Relocation of an existing building on the same site located landward of the existing building (High Risk Erosion Area only) • Rule 15.9.2 D3 - Replacement of an existing building within the same site that is no larger than the existing building (High Risk Inundation Area only) • D3 - Replacement of an existing building on the same site that is transportable and no larger than the existing building (High Risk Erosion Area only) • Rule 15.9.2 D4 - New coastal protection structure (also see policy 15.2.1.11) • Rule 15.9.2 D5 - New utilities and more than minor upgrading of existing utilities • Rule 15.9.2 D6 - Subdivision where additional lot(s) are entirely outside the HRCHA or the building platform(s) are located entirely outside the HRCHA • Rule 15.10.2 D1 - Earthworks not meeting permitted conditions • Rule 15.10.2 D2 - Replacement and relocation of an existing building on the same site that is no larger than the existing building • Rule 15.10.2 D3 - New coastal protection structure (also see policy 15.2.1.11) • Rule 15.10.2 D4 - New utilities and more than minor upgrading of existing utilities • Rule 15.10.2 D5 - Subdivision where additional lot(s) are entirely outside the HRCHA or the building platform(s) are located entirely outside the HRCHA <p>Rules in High Risk Coastal Hazard Areas (NCA) (also see policy 15.2.1.11)</p> <ul style="list-style-type: none"> • Rule 15.9.3 NC1 - New buildings or additions to existing buildings not provided for as permitted or discretionary activities • Rule 15.9.3 NC2 - Subdivision that cannot meet the conditions for a discretionary activity • Rule 15.9.3 NC3 - Emergency service facilities and hospitals • Rule 15.10.3 NC1 - New buildings or additions to existing buildings not provided for as permitted or discretionary activities • Rule 15.10.3 NC2 - Subdivision that cannot meet the conditions for a discretionary activity • Rule 15.10.3 NC3 - Emergency service facilities and hospitals 	
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion

				or Control
		<p>Policy 15.2.1.5 – Existing infrastructure and utilities in all areas subject to natural hazards</p> <p>(a) Provide for the operation, maintenance and minor upgrading of existing infrastructure and utilities in all areas subject to natural hazards.</p> <p>Corresponding policy</p> <p>Policy 15.2.1.4 – New infrastructure and utilities in areas subject to high risk natural hazards</p> <p>(a) Enable the construction of new infrastructure and utilities in areas at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) areas only where:</p> <p>(i) the infrastructure and utilities are technically, functionally or operationally required to locate in areas subject to natural hazards, or it is not reasonably practicable to be located elsewhere; and</p> <p>(ii) any increased risks to people, property and the environment are mitigated to the extent practicable; and</p> <p>(iii) the infrastructure and utilities are designed, maintained and managed, including provision of hazard mitigation works where appropriate, to function to the extent practicable during and after natural hazard events.</p>	<p>Rules in Flood Plain Management Area and Flood Ponding Areas; High Risk Flood Area; Defended Area; Coastal Sensitivity Areas; High Risk Coastal Hazard Areas and Mine Subsidence Risk Area</p> <ul style="list-style-type: none"> • Rule 15.4.1 P5 - Establishment, replacement, repair, maintenance or upgrading of utilities • Rule 15.5.1 P1 - Operation, repair, maintenance or minor upgrading of existing utilities and new telecommunication lines, poles, cabinets and masts/ poles supporting antennas • Rule 15.5.2 RDI – New utilities and more than minor upgrading of existing utilities • Rule 15.6.1 Permitted activities – Utilities permitted unless captured under Rule 15.6.3 DI • Rule 15.7.1 P3 - Establishment, operation, upgrading, replacement, repair or maintenance of utilities • Rule 15.8.1 P3 - Establishment, operation, upgrading, replacement, repair or maintenance of utilities • Rule 15.9.1 P2 - Operation, repair, maintenance or minor upgrading of existing utilities and new telecommunication lines, poles, cabinets and masts/ poles supporting antennas • Rule 15.9.2 D5 – New utilities and more than minor upgrading of existing utilities • Rule 15.10.1 P2 - Operation, repair, maintenance or minor upgrading of existing utilities and new telecommunication lines, poles, cabinets and masts/ poles supporting antennas • Rule 15.10.2 D4 – New utilities and more than minor upgrading of existing utilities • Rule 15.11.1 P3 - Establishment, operation, replacement, repair, upgrading or maintenance of utilities 	<p>Rule 15.5.2 RDI – new utilities</p> <ul style="list-style-type: none"> • Functional and operational requirements • adverse effects on people and property • potential for the development to transfer/increase flood risk • alternative locations • projected effects of climate change • any mitigation measures to reduce the risk
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.6 - Managing natural hazard risk generally</p> <p>(b) Provide for rezoning, subdivision, use and development outside High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) Areas where natural hazard risk has been appropriately identified and assessed and can be adequately avoided, remedied or mitigated and does not transfer or exacerbate risk to adjoining properties.</p>	<p>Rules in Flood Plain Management Area and Flood Ponding Areas (15.4)</p> <ul style="list-style-type: none"> • Rule 15.4.1 P1 – Construction of new and additions to existing building with minimum floor level at least 0.5m above 1% AEP flood level. (Policy 15.2.1.12 specific policy for building in the flood plain) • Rule 15.4.1 P2 – Additions to existing building up to 15m² with no minimum floor level required. (Policy 15.2.1.12 specific policy for building in the flood plain) • Rule 15.4.1 P3 – Standalone garage not exceeding 40m² GFA. (Policy 15.2.1.12 specific policy for building in the flood plain) 	<p>Rule 15.4.2 RDI - earthworks</p> <ul style="list-style-type: none"> • Timing, location and scale of earthworks; • Adverse effects on overland flow paths and surface drainage patterns; flood storage capacity; runoff volumes; adjoining properties, including the transfer of risk; infrastructure and flood protection works; • soil types and potential for erosion;

		<p>Corresponding policies</p> <p>Policy 15.2.1.12 - Reduce potential for flood damage to buildings located on the Waikato and Waipa River floodplains and flood ponding areas</p> <p>(a) Reduce the potential for flood damage to buildings located on the Waikato and Waipa River floodplains and flood ponding areas by ensuring that the minimum floor level of building development is above the design flood levels / ponding levels in a 1% AEP flood event, plus an allowance for freeboard, unless:</p> <p>(i) the building development is of a type that is not likely to suffer material damage during a flood; or</p> <p>(ii) the building is a small-scale addition to an existing building; or</p> <p>(iii) the risk from flooding is otherwise avoided, remedied or mitigated.</p> <p>Policy 15.2.1.13 - Control filling of land within the 1% AEP floodplain and flood ponding areas</p> <p>(a) Control filling of land within the 1% AEP floodplain and flood ponding areas to ensure that the potential adverse effects on flood storage capacity, overland flows, run-off volumes on surrounding properties or infrastructure, are avoided or mitigated.</p> <p>Policy 15.2.1.14 - Hazardous substances located within floodplain and flood ponding areas</p> <p>(a) Ensure that the location and storage of hazardous substances within the 1% AEP floodplain and flood ponding areas do not create an unacceptable hazard to people, property or the environment.</p> <p>Policy 15.2.1.15 - Flood ponding areas and overland flow paths</p> <p>(a) Manage stormwater hazards by requiring new subdivision and development within flood ponding areas and overland flow paths to adopt integrated catchment plan-based stormwater management methods which:</p> <p>(i) maintain the flood storage capacity of</p>	<ul style="list-style-type: none"> • Rule 15.4.1 P4 – Construction of accessory building or farm building without a floor. (Policy 15.2.1.12 specific policy for building in the flood plain) • Rule 15.4.1 P5 – Establishment, replacement, repair, maintenance or upgrading of utilities. (Policy 15.2.1.12 specific policy for building in the flood plain) • Rule 15.4.1 P6 – Earthworks associated with Rule 15.4.1 P5. (Policies 15.2.1.13 and 1.15 specific corresponding policy for filling in the flood plain) • Rule 15.4.1 P7 – Earthworks for building platform for residential purposes to the extent required to comply with Rule 15.4.1 P1. (Policies 15.2.1.13 and 15.2.1.15 specific corresponding policy for filling in the flood plain) • Rule 15.4.1 P8 – Earthworks filling and excavation not provided for in Rules 15.4.1 P6 or P7. Various maximum quantities and heights specified for each zone. (Policies 15.2.1.13 and 15.2.1.15 specific corresponding policy for filling in the flood plain) • Rule 15.4.2 RDI – Earthworks that doesn't comply with permitted standards in Rule 15.4.1. (Policies 15.2.1.13 and 15.2.1.15 specific corresponding policy for filling in the flood plain) • Rule 15.4.3 D1 – Construction of a new building and additions to an existing building that doesn't comply with permitted standards in Rule 15.4.1 P1 – P5. (Policy 15.2.1.12 specific policy for building in the flood plain) • Rule 15.4.3 D2 – Subdivision to create 1 or more additional lots. • Rule 15.4.3 D3 – A hazardous facility. (policy 15.2.1.14 specific corresponding policy for hazardous substances located within the floodplain or flood ponding areas) <p>Rules in Coastal Sensitivity Area (Erosion) (Also see policy 15.2.1.16)</p> <ul style="list-style-type: none"> • Rule 15.7.1 P1 – Additions to an existing building up to 15m2. • Rule 15.7.1 P2 – Construction of accessory building or farm building without a floor. • Rule 15.7.1 P3 – Establishment, operation, upgrading, replacement, repair or maintenance of utilities. • Rule 15.7.1 P4 – Maintenance or repair of an existing lawfully established coastal protection structure. • Rule 15.7.2 RDI – Construction of a new building or additions to an existing building not provided for under Rule 15.7.1 P1 – P3 and not listed in 15.7.3 D1. • Rule 15.7.3 D1 – Construction of a new coastal protection structure. • Rule 15.7.3 D2 – Subdivision to create one or more additional lots. 	<ul style="list-style-type: none"> • compensatory storage, or other proposed flood management measures <p>Rule 15.7.2 RDI - new building</p> <ul style="list-style-type: none"> • Ability to manage risk through building materials, structural or design work, engineering solution or other appropriate measures including the ability to relocate the building • Mitigation through natural features and buffers where appropriate • Triggers to require the building to be removed or relocated • Assessment of risk from coastal hazards including climate change over 100 year period • Site suitability including servicing • Adverse effects on people and property and overall vulnerability • Mitigation measures to reduce risk • Alternative location within the site • For the CSA (Open Coast) the setting of minimum floor levels in areas subject to inundation <p>Rule 15.8.2 RDI – new building</p> <ul style="list-style-type: none"> • Ability to manage risk through building materials, structural or design work, engineering solution or other appropriate measures including the ability to relocate the building and setting minimum floor levels • Mitigation through natural features and buffers where appropriate • Triggers to require the building to be removed or relocated • Assessment of risk from coastal hazards including climate change over 100 year period • Site suitability including servicing • Adverse effects on people and property and overall vulnerability • Mitigation measures to reduce risk • Alternative location within the site <p>Rule 14.11.2 RDI - stormwater</p>
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		<p>natural floodplains, wetlands and ponding areas; and</p> <ul style="list-style-type: none"> (ii) retain the function and capacity of overland flow paths to convey stormwater run-off; and (iii) do not transfer or increase risk elsewhere; and (iv) promote low impact stormwater management practices with reference to the Waikato Stormwater Management Guideline and the Regional Infrastructure Technical Specifications (RITS); and (v) minimise impervious surfaces. <p>Policy 15.2.1.16 - Development in the Coastal Sensitivity Areas</p> <ul style="list-style-type: none"> (a) In Coastal Sensitive Areas identified on the planning maps, control subdivision, use and development by ensuring that the subdivision, use or development is: <ul style="list-style-type: none"> (i) supported by a detailed site-specific risk assessment, which includes measures to address the effects of climate change; and (ii) designed, constructed and located to minimise the level of risk to people, property and the environment. 	<p>Rules in Coastal Sensitivity Area (Inundation) (Also see policy 15.2.1.16)</p> <ul style="list-style-type: none"> • Rule 15.8.1 P1 – Additions to an existing building up to 15m². • Rule 15.8.1 P2 - Construction of accessory building or farm building without a floor. • Rule 15.8.1 P3 - Establishment, operation, upgrading, replacement, repair or maintenance of utilities. • Rule 15.8.1 P4 – Maintenance or repair of an existing lawfully established coastal protection structure. • Rule 15.8.2 RDI – Construction of a new building or additions to an existing building not provided for under Rule 15.7.1 P1 – P3 or 15.7.3 DI. • Rule 15.8.3 DI – Construction of a new coastal protection structure. • Rule 15.8.3 D2 – Subdivision to create one or more additional lots. <p>Stage 1 PDP Chapter 14 Infrastructure and Energy</p> <ul style="list-style-type: none"> • Rule 14.11.1 P1 – Stormwater systems for new development or subdivision • Rule 14.11.2 RDI – Stormwater systems that do not comply with permitted conditions <p>Stage 1 PDP Zone Chapters</p> <ul style="list-style-type: none"> • All Earthworks General Rules PA and RDA – Require that earthworks do not divert or change the nature of natural water flows, water bodies or established drainage paths. • All Subdivision Building Platform Rules RDI - Discretion restricted to - Avoidance or mitigation of natural hazards and Ponding areas and primary overland flow paths 	<ul style="list-style-type: none"> • Site design, layout and amenity • The risk of flooding, nuisance or damage to the site or other buildings or sites
Mi		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.7 - Protection from risks of coastal hazards</p> <ul style="list-style-type: none"> (a) Recognise the importance of natural features and buffers, and soft hazard protection works, and prefer them wherever practicable over hard protection structures, where new hazard mitigation measures and/or works are required to protect people, property infrastructure and the environment from the risks of coastal hazards. <p>Policy 15.2.1.8 - Limitations on hard protection works for coastal hazard mitigation</p> <ul style="list-style-type: none"> (c) Ensure that where new hard protection structures and works are necessary to protect existing development on public or 	<p>Rules in Coastal Sensitivity Areas - Erosion and Inundation and Open Coast; High Risk Coastal Hazard Areas - Erosion and Inundation</p> <ul style="list-style-type: none"> • Rule 15.7.3 DI - Construction of a new coastal protection structure. • Rule 15.8.3 DI - Construction of a new coastal protection structure. • Rule 15.9.2 D4 - Construction of a new coastal protection structure. • Rule 15.10.2 D3 - Construction of a new coastal protection structure. 	

		<p>privately-owned land from coastal hazards, they are appropriately assessed and controlled and:</p> <ul style="list-style-type: none"> (v) have primarily a public and/or environmental benefit when located on public land; (vi) are effective; (vii) the economic, social and environmental benefits outweigh costs; and (viii) do not transfer or increase risk to other people, property, infrastructure, the natural environment, historic heritage, or Maaori Sites and Areas or Significance. <p>Ensure that when new hard protection structures are to be located in an area where an adaptive management strategy has been prepared to manage coastal hazards, they are consistent with that strategy.</p>		
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.9 - Natural features and buffers providing natural hazard protection</p> <p>(a) Protect, maintain and, where appropriate, enhance the integrity of natural features and buffers which provide a natural defence against the effects of natural hazards and sea level rise, including natural ponding areas, coastal dunes, intertidal areas, wetlands, waterbody margins, riparian/coastal vegetation and floodways.</p>	<p>Rules in Flood Plain Management Area and Flood Ponding Areas; High Risk Coastal Hazard Areas – Erosion and Inundation</p> <ul style="list-style-type: none"> • Rule 15.4.1 P6 - P8 – Earthworks (minimising the quantity of filling and excavation in the floodplain) • Rule 15.4.2 RDI – Earthworks not permitted • Rule 15.9.1 P4 – Earthworks associated with Permitted Activities up to 10m³ and 0.5m excavation or filling above or below ground • Rule 15.9.2 DI – Earthworks that do not comply with permitted activity conditions • Rule 15.10.1 P4 – Earthworks associated with Permitted Activities up to 10m³ and 0.5m excavation or filling above or below ground • Rule 15.10.2 DI – Earthworks that do not comply with conditions for permitted activity <p>Rules in Stage 1 PDP – Building setbacks from waterbodies</p> <ul style="list-style-type: none"> • Residential Zone - Rule 16.3.9.3 • Business Zone – Rule 17.3.4.2 • Business Town Centre Zone – Rule 18.3.7 • Industrial Zone – Rule 20.3.4.2 • Industrial Zone Heavy – Rule 21.3.4.2 • Rural Zone – Rule 22.3.7.5 • Country Living Zone – Rule 23.3.7.5 • Village Zone – Rule 24.3.6.3 • Reserve Zone – Rule 25.3.5.2 • Rangitahi Peninsula Zone – Rule 28.3.9.3 <p>Note that Stage 1 PDP rules for building setback distances from</p>	<p>Rule 15.4.2 RDI - earthworks</p> <ul style="list-style-type: none"> • Timing, location and scale of earthworks; • Adverse effects on overland flow paths and surface drainage patterns; flood storage capacity; runoff volumes; adjoining properties, including the transfer of risk; infrastructure and flood protection works; • soil types and potential for erosion; • compensatory storage, or other proposed flood management measures

			the coast are not open for submissions under Stage 2 PDP.	
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.10 – Areas defended by stopbanks adjacent to the Waikato River</p> <p>(c) Control subdivision, use and development in areas identified as Defended Areas adjacent to the Waikato River by:</p> <ul style="list-style-type: none"> (iv) assessing the potential risk of overtopping or structural failure of the stopbanks, and overwhelming of associated flood protection structures, before subdivision and development occurs; and (v) requiring that consideration be given to appropriate mitigation to reduce any residual risk identified; and (vi) ensuring that any residual risk is not transferred to neighbouring sites. <p>(d) Specify minimum setbacks for buildings and earthworks from stopbanks to:</p> <ul style="list-style-type: none"> (iii) protect the structural integrity of the stopbanks; and (iv) provide a buffer to reduce the potential risk to life and damage to property from deep and fast-flowing flood waters in the event of a breach. 	<p>Rules in Defended Area</p> <ul style="list-style-type: none"> • Rule 15.6.2 RDI – Subdivision to create additional lot(s). • Rule 15.6.3 DI – Construction of a new buildings or new accessory building located within 50m of a stop bank under the responsibility of WDC, WRC or the Crown. • Rule 15.6.3 D2 - Earthworks located within 50m of a stop bank under the responsibility of WDC, WRC or the Crown. • Section 15.13.4 – Defended Areas – risk assessment to identify the nature and level of residual risk and methods to reduce risk 	<p>Rule 15.6.2 RDI - subdivision</p> <ul style="list-style-type: none"> • level of service provided by the structural defence and associated flood protection works, • the impact of any planned improvements, maintenance or upgrading on the residual risk; • stop-bank security at and adjacent to the site; • the location of the subdivision, including services such as wastewater, water supply and roading/access, in relation to potential breakout points (failure zone) and likely depth and duration of flood events; • the adverse effects and vulnerability to people and property from potential failure or overwhelming of the structural defences; • potential for the development to transfer/increase flood risk/residual risk; • any additional mitigation measures
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.11 - New development that creates demand for new protection structures and works</p> <p>(a) Avoid locating new subdivision, use and development in High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) Areas where a demand or need for new structural protection works will be required to reduce the risk from natural hazards to acceptable levels.</p>	<p>See bundle above under Policies 15.2.1.1, 15.2.1.2, 15.2.1.3 and 15.2.1.4</p> <p>Rules in High Risk Flood Area; High Risk Coastal Hazard Areas – Erosion and Inundation</p> <ul style="list-style-type: none"> • 15.5.3 DI, 15.5.4 NC1, 15.5.4 NC2, 15.5.4 NC3, 15.9.2 D2 and D3, 15.9.2 D6, 15.9.3 NC1, 15.9.3 NC2, 15.9.3 NC3. 15.10.2 D2, 15.10.2 D5, 15.10.3 NC1, 15.10.3 NC2, 15.10.3 NC3 	
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		Policy 15.2.1.12 - Reduce potential for flood damage to buildings located on the	See bundle of policies under policy 15.2.1.6 above	

		Waikato and Waipa River floodplains and flood ponding areas (b) Reduce the potential for flood damage to buildings located on the Waikato and Waipa River floodplains and flood ponding areas by ensuring that the minimum floor level of building development is above the design flood levels / ponding levels in a 1% AEP flood event, plus an allowance for freeboard, unless: (iv) the building development is of a type that is not likely to suffer material damage during a flood; or (v) the building is a small-scale addition to an existing building; or (vi) the risk from flooding is otherwise avoided, remedied or mitigated.	Rules in Flood Plain Management Area and Flood Ponding Areas • Rules 15.4.1 P1, 15.4.1 P2, 15.4.1 P3, 15.4.1 P4, 15.4.1 and 15.4.3 DI	
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		Policy 15.2.1.13 - Control filling of land within the 1% AEP floodplain and flood ponding areas (a) Control filling of land within the 1% AEP floodplain and flood ponding areas to ensure that the potential adverse effects on flood storage capacity, overland flows, run-off volumes on surrounding properties or infrastructure, are avoided or mitigated.	See bundle of policies under policy 15.2.1.6 above Rules in Flood Plain Management Area and Flood Ponding Areas • Rules 15.4.1 P6 - P8 and 15.4.2 RDI	See above under policy 15.2.1.6 Rule 15.4.2 RDI
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		Policy 15.2.1.14 - Hazardous substances located within floodplain and flood ponding areas (a) Ensure that the location and storage of hazardous substances within the 1% AEP floodplain and flood ponding areas do not create an unacceptable hazard to people, property or the environment.	Rule Rules in Flood Plain Management Area and Flood Ponding Areas • Rule 15.4.3 D3 – Hazardous facilities	
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		Policy 15.2.1.15 - Flood ponding areas and overland flow paths (b) Manage stormwater hazards by requiring new subdivision and development within flood ponding areas and overland flow paths to adopt integrated catchment plan-based stormwater management methods which: (vi) maintain the flood storage capacity of natural floodplains, wetlands and ponding	See bundle of policies under policy 15.2.1.6 above Rules in Flood Plain Management Area and Flood Ponding Areas • Rules 15.4.1 P6 – P8, 15.4.2 RDI, Rule 15.4.3 D2 74. • Stage 1 PDP Chapter 14 Infrastructure and Energy • Rule 14.11.1 P1, Rule 14.11.2 RDI	See above under policy 15.2.1.6 Rules 15.4.2 RDI and 14.11.2 RDI

		<p>areas; and</p> <p>(vii) retain the function and capacity of overland flow paths to convey stormwater run-off; and</p> <p>(viii) do not transfer or increase risk elsewhere; and</p> <p>(ix) promote low impact stormwater management practices with reference to the Waikato Stormwater Management Guideline and the Regional Infrastructure Technical Specifications (RITS); and</p> <p>(x) minimise impervious surfaces.</p>	<p>75.</p> <ul style="list-style-type: none"> • Stage I PDP Zone Chapters • All Earthworks General Rules PA and RDA • All Subdivision Building Platform Rules RD1 	
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.16 - Development in the Coastal Sensitivity Areas</p> <p>(b) In Coastal Sensitive Areas identified on the planning maps, control subdivision, use and development by ensuring that the subdivision, use or development is:</p> <p>(iii) supported by a detailed site-specific risk assessment, which includes measures to address the effects of climate change; and</p> <p>(iv) designed, constructed and located to minimise the level of risk to people, property and the environment.</p>	<p>See bundle of policies under policy 15.2.1.6</p> <p>Rules for building and subdivision in Coastal Sensitivity Areas – Erosion and Inundation and Open Coast</p> <ul style="list-style-type: none"> • Rules 15.7.2, 15.7.3 D1, 15.7.3 D2, 15.8.2 RD1, 15.8.3 D1 and 15.8.3 D2 	<p>See above under policy 15.2.1.6</p> <p>Rules 15.7.2 RD1 and 15.8.2 RD1</p>
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.17- Setbacks from the coast</p> <p>(c) Avoid increasing the risk from coastal hazards by requiring new built development to be setback from the coastal edge, unless there is a functional or operational need for facilities to be located at or near the coast.</p>	<p>Rules for building and subdivision in Coastal Sensitivity Areas – Erosion and Inundation and Open Coast, and High Risk Coastal Hazard Areas – Erosion and Inundation</p> <ul style="list-style-type: none"> • Rule 15.7.2 RD1 – Construction of a new building or additions to an existing building • Rule 15.7.3 D2 – Subdivision to create additional lots • Rule 15.8.2 RD1 – Construction of a new building or additions to an existing building • Rule 15.8.3 D2 – Subdivision to create additional lots • Rule 15.9.2 D2 – Relocation of existing building • Rule 15.9.2 D3 – Replacement of existing building • Rule 15.9.2 D5 – New utilities and upgrading of existing utilities • Rule 15.9.2 D6 – Subdivision that creates additional lots • Rule 15.9.3 NC1 – New buildings and additions to existing buildings • Rule 15.9.3 NC2 – Subdivision to create additional lots • Rule 15.9.3 NC3 – Emergency services facilities and hospitals • Rule 15.10.2 D2 – Replacement and relocation of existing buildings • Rule 15.10.2 D4 – New utilities and upgrading of existing utilities 	<p>Rules 15.7.2 RD1 and 15.8.2 RD1</p> <p>– new building</p> <ul style="list-style-type: none"> • Mitigation through appropriate building materials, structural or design work, engineering solutions or other appropriate measures including the ability to relocate the <u>building</u> and through appropriate setbacks; • Mitigation through natural features and buffers where appropriate; • Triggers to require the <u>building</u> to be removed or relocated; • The degree to which coastal hazard risk, including the effects of climate change over a period to 2120, has been assessed in a site specific coastal hazard risk assessment;

			<ul style="list-style-type: none"> • Rule 15.10.2 D5 – Subdivision that creates additional lots • Rule 15.10.3 NC1 – New buildings and additions to existing buildings • Rule 15.10.3 NC2 – Subdivision to create additional lots • Rule 15.10.3 NC3 – Emergency services facilities and hospitals <p>Stage I PDP Zone Chapter rules</p> <ul style="list-style-type: none"> • All Subdivision Building Platform Rules RD1- Discretion restricted to <p>76. - Avoidance and /or mitigation of natural hazards and</p> <p>- Geotechnical suitability for building, including liquefaction risk</p> <ul style="list-style-type: none"> • All Building setbacks from waterbodies (setback from Mean High Water Springs) 	<ul style="list-style-type: none"> • Suitability of the <u>site</u> for the proposed use, including the provision for servicing such as access, wastewater, water supply; • Adverse effects to people and property and overall vulnerability from the establishment of the <u>building</u> in the <u>Coastal Sensitivity Area (Erosion)</u> and any mitigation measures to reduce risk; • Alternative locations
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.18 – Residential development potentially subject to fire risk</p> <p>(b) In areas assessed or identified as being potentially subject to elevated fire risk, ensure that an appropriate buffer area or setback is provided around new residential subdivision and development.</p>	<p>See Variation to Stage I PDP additional matters of discretion in Subdivision rules:</p> <ul style="list-style-type: none"> • Subdivision General - Rule 16.4.1 RD1(b)(v) • Subdivision - Rule 22.4.1.2 RD1(b)(vi) • General Subdivision - Rule 23.4.2 RD1(b) (iii) • Subdivision General - Rule 24.4.1 RD1(b) (viii) and RD2(b) (ix) • Subdivision Te Kowhai and Tuakau – Rule 24.4.2 RD1(b) (ix) and RD2 (b) (ix) 	<p>Rules 16.4.1 RD1, 22.4.1.2 RD1, Rule 23.4.2 RD1, 24.4.1 RD1, 24.4.1 RD2, 24.4.2 RD1 and 24.4.2 RD2</p> <ul style="list-style-type: none"> • Avoidance and mitigation of natural hazards, including fire risk • Natural hazard risk including fire risk
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.19 - Development on land subject to instability or subsidence</p> <p>(b) Avoid locating new subdivision, use and development, including rezoning, on land assessed as being subject to, or likely to be subject to, instability or subsidence, unless appropriate mitigation is provided and the activity does not increase the risk to people, property or infrastructure.</p>	<p>Matters of discretion for earthworks and subdivision rules, included into Stage I through Variation 2</p>	<p>Earthworks and Subdivision -</p> <ul style="list-style-type: none"> • Earthworks General - Matters of discretion for RDA rules in Chapters 16 – 24, includes land instability and geotechnical stability. • Subdivision General - Matters of discretion for RDA rules in Chapters 16, 17, 18, 20, 21, 22, 23 and 24, includes land instability, geotechnical stability and/or avoidance and mitigation of natural hazards. • Subdivision – Multi-unit development – Matters of discretion for RDA rules in Chapters 16, 17 and 18 includes geotechnical suitability for buildings. • Subdivision – Building Platform – Matters of discretion

				<p>for RDA rules in Chapters 16, 22, 23 and 24, include geotechnical suitability for buildings.</p> <ul style="list-style-type: none"> • Subdivision of land containing mapped off-road walkways – Matters of discretion for RDA rules in Chapters 16, 23 and 24, include natural hazard risk including land stability. • Subdivision – Te Kauwhata West Residential Area - Matters of discretion for RDA rules in Chapters 16, including geotechnical suitability for building. • Subdivision Lakeside General – Matters of discretion for RDA rules in Chapters 16 and 17, including geotechnical suitability for building.
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.20 - Development of land in the Mine Subsidence Risk Area</p> <p>(b) On land identified within the Mine Subsidence Risk Area, ensure that:</p> <p>(iii) an assessment by an appropriately-qualified engineer occurs before subdivision, use or development takes place to confirm that the land is suitable for development; and</p> <p>(iv) buildings are designed and constructed, and uses appropriate materials, to effectively minimise the risk of damage to the building from ground subsidence.</p> <p>Corresponding Policy</p> <p>Policy 15.2.1.19 - Development on land subject to instability or subsidence</p> <p>(a) Avoid locating new subdivision, use and development, including rezoning, on land assessed as being subject to, or likely to be subject to, instability or subsidence, unless appropriate mitigation is provided and the activity does not increase the risk to people, property or infrastructure.</p>	<p>Rules in Mine Subsidence Risk Area</p> <ul style="list-style-type: none"> • Rule 15.11.1 P1 – Additions to an existing building that do not increase the GFA by more than 15m² and do not result in any length of any wall exceeding 20m. • Rule 15.11.1 P2 – Standalone garage not exceeding 55m² GFA. • Rule 15.11.1 P3 – Establishment, operation, replacement, repair, upgrading or maintenance of utilities. • Rule 15.11.1 P4 – Earthworks filling not exceeding 20m³ per site and excavation or filling not exceeding a maximum depth of 1m above or below ground. • Rule 15.11.2 RDI – Earthworks not provided for as a permitted activity under Rule 15.11.1. P4. • Rule 15.11.3 DI – Construction of a building or additions to an existing building not provided for under Rule 15.11.1 P1 and P3. • Rule 15.11.3 D2 – Subdivision to create one or more additional lots. 	<p>Rule 15.11.2 RDI – Earthworks</p> <ul style="list-style-type: none"> • Location and scale of earthworks • Geotechnical and geological stability of site after completion of earthworks • Risk to people and property • Other risk reduction measures <p>77.</p> <p>78.</p>

		<p>Policy 15.2.1.21 - Stormwater management in areas subject to risk of land instability or subsidence</p> <p>(b) Avoid discharge of stormwater directly to ground on land that is potentially at risk of land instability or subsidence unless:</p> <p>(iii) an assessment has been undertaken by an appropriately-qualified geotechnical specialist, indicating that the site is suitable for the proposed discharges; and</p> <p>(iv) any adverse effects on the site and receiving environment can be appropriately mitigated.</p>		
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.21 - Stormwater management in areas subject to risk of land instability or subsidence</p> <p>(c) Avoid discharge of stormwater directly to ground on land that is potentially at risk of land instability or subsidence unless:</p> <p>(v) an assessment has been undertaken by an appropriately-qualified geotechnical specialist, indicating that the site is suitable for the proposed discharges; and</p> <p>(vi) any adverse effects on the site and receiving environment can be appropriately mitigated.</p>	<p>Chapter 14.11 – Infrastructure and Energy</p> <ul style="list-style-type: none"> Rule 14.11.1 PI – Stormwater systems for new development or subdivision - 14.11.1.1(vi) Activity specific conditions – Stormwater discharge on land subject to instability only where the ground conditions have been identified as suitable to absorb discharge without causing, accelerating or contributing to land instability. Rule 14.11.2 RDI – Stormwater systems for new development or subdivision that do not comply with 14.11.1.PI 	<p>Rule 14.11.2 RDI - stormwater</p> <ul style="list-style-type: none"> The likely effectiveness of the system to avoid flooding, nuisance or damage to other buildings and sites The capacity of the system and suitability to manage stormwater
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.1.22 - Liquefaction-prone land risk assessment</p> <p>(b) On land potentially prone to liquefaction, ensure that:</p> <p>(iii) an assessment by a geotechnical specialist occurs before new subdivision, use or development takes place; and</p> <p>(iv) the level of assessment reflects the type and scale of the subdivision, use or development and the overall vulnerability of the activity to the effects of liquefaction.</p> <p>Policy 15.2.1.23 – Control activities on land susceptible to damage from liquefaction</p> <p>(a) Control subdivision, use and development on</p>	<p>Section 15.12 Liquefaction matters apply to the following rules amended by way of Variation 2 to stage 1</p> <p>Rules:</p> <ul style="list-style-type: none"> 16.1.3 RDI - Multi-unit development 16.4.1 RDI – Subdivision general 16.4.2 RDI – Subdivision TK Ecological Residential Area 16.4.3 RDI – Subdivision TK West Residential Area 16.4.4 RDI – Multi-unit development (subdivision) 16.4.12 RDI – Subdivision – Building platform 16.5.3 RDI – Comprehensive land development consent 16.5.9.1 CI – Subdivision Lakeside – general 16.5.9.2 RDI – Lakeside Comprehensive Subdivision 16.5.9.3 RDI – Subdivision – sites less than 5ha 17.1.3 RDI - Multi-unit development 17.4.1 RDI - General subdivision 	<p>Matters of discretion for stage 1 rules</p> <ul style="list-style-type: none"> Geotechnical suitability for building, including liquefaction risk (refer to Chapter 15) Avoidance or mitigation of natural hazards, including liquefaction risk (refer to Chapter 15) Effects of natural hazards, geotechnical (including liquefaction risk, refer chapter 15) <p>Chapter 15 Additional matters of restricted discretion for liquefaction risk</p> <ul style="list-style-type: none"> Chapter 15.12.2 - for subdivision

		land assessed as being susceptible to liquefaction-induced ground damage, to ensure appropriate mitigation is provided so that the level of risk to people, property, infrastructure and the environment is acceptable.	<ul style="list-style-type: none"> • 17.4.1.1 RDI - Subdivision – Multi-unit development • 17.5.2 RDI - Comprehensive land development consent • 17.5.9 RDI – Subdivision • 18.1.3 RDI - Multi-unit development • 18.4.1 RDI - Subdivision – general • 18.4.2 RDI - Subdivision – Multi-unit subdivision • 20.4.1 RDI - Subdivision – General • 21.4.1 RD2 - Subdivision - General • 22.4.1.2 RDI - General subdivision • 22.4.1.5 RDI - Rural Hamlet Subdivision • 22.4.9 RDI - Subdivision – Building platform • 22.8.8 RDI - Lakeside Comprehensive Subdivision • 23.4.2 RDI - General Subdivision • 23.4.8 RDI - Subdivision – Building Platform • 24.4.1 RDI - Subdivision - General • 24.4.2 RDI and RD2 - Subdivision Te Kowhai & Tuakau • 24.4.10 RDI - Subdivision – Building Platform • 27.4.6 RDI - Building platform • 28.1.3 RD2 – Comprehensive Residential Development • 28.4.1 RDI - Subdivision - General • 28.4.6 RDI - Subdivision – Building platform <p>Information Requirements</p> <ul style="list-style-type: none"> • Section 15.13 – Information requirements for all resource consent applications addressing natural hazards • 15.13.1 General – geotech and liquefaction assessments • 15.13.2 Liquefaction Potential – Information requirements where RDA rules for land use include liquefaction 	<p>to create one or more additional vacant lots</p> <ul style="list-style-type: none"> • Chapter 15.12.3 - for new land use (e.g. multi-unit development)
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Issue to be addressed	Objective (what we want to achieve)	Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
Lack of community knowledge and understanding of natural hazards and related risks is a contributing factor in increasing community exposure to the risks and reduced	<p>Objective 15.2.2 - A well-informed community that:</p> <p>(c) is aware of, and understands, which natural hazards affect the district; and</p> <p>(c) is able to effectively and efficiently respond to, and recover from, natural hazard events.</p>	<p>Policy 15.2.2.1 - Natural hazard risk information</p> <p>(a) Enable people to be informed and have access to information on the natural hazards affecting their properties and surrounding area, including through:</p> <p>(i) provision of Land Information Memoranda</p> <p>(ii) natural hazard technical information, risk registers and mapping on the Council's website, the Waikato Regional Council Hazards Portal, this district plan and accompanying planning maps;</p> <p>(iii) education, provision of information and community engagement; and</p>	<p>Council Information and Process including Methods:</p> <ul style="list-style-type: none"> • LIM Reports • Maintaining a Hazard Register – WDC and WRC • Hazard maps • Technical information such as publically available stormwater catchment management plans • District plan provisions and hazard overlay areas • Public education, Council website, locational signage and community engagement • Regional Hazards Portal • CDEM <p>Method:</p>	

resilience and ability to respond.		<p>(iv) alignment with the work of other agencies including iwi and the Waikato Regional Council.</p> <p>Policy 15.2.2.2 - Awareness of Civil Defence plans</p> <p>(a) Improve response to and recovery from natural hazard events by encouraging community awareness and use of information and methods contained in Community Response Plans.</p>	<ul style="list-style-type: none"> • CDEM process working with communities to develop Community Response Plans 	
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Issue to be addressed	Objective (what we want to achieve)	Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
The effects of climate change (including climate variability) will have a wide range of impacts the district, including exacerbating weather related natural hazards, increasing mean sea level, inland migration of coastal habitats and biodiversity. This may have adverse impacts on people (including their health and safety), land use, development,	<p>Objective 15.2.3 - Climate change</p> <p>A well-prepared community that:</p> <p>(a) is able to adapt to the effects of climate change; and</p> <p>(b) has transitioned to development that prioritises lower greenhouse gas emissions.</p>	<p>Policy 15.2.3.1 - Effects of climate change on new subdivision and development</p> <p>(b) Ensure that adequate allowances are made for the projected effects of climate change in the design and location of new subdivision and development throughout the district, including undertaking assessments where relevant that provide for:</p> <p>(v) the projected increase in rainfall intensity, as determined by national guidance, but being not less than 2.3°C by 2120;</p> <p>(vi) the projected increase in sea level, where relevant, as determined by national guidance, but being not less than 1m by 2120;</p> <p>(vii) stress testing under the RCP 8.5 scenario for rainfall¹⁰ and RCP 8.5H+ for sea level rise¹¹; and</p> <p>(viii) in respect to the coastal environment, increases in storm surge, waves and wind.</p>	<p>Rules in Flood Plain Management Area and Flood Ponding Areas; High Risk Flood Area; Coastal Sensitivity Areas – Erosion and Inundation.</p> <ul style="list-style-type: none"> • Rule 15.4.3 D1 – Construction of a new building and additions to an existing building that doesn't comply with permitted standards in Rule 15.4.1 P1 – P5. • Rule 15.4.3 D2 – Subdivision to create 1 or more additional lots. • Rule 15.4.3 D3 – A hazardous facility. • Rule 15.5.3 D1 – Subdivision in a High Risk Flood Area where additional lot(s) are either entirely outside HRFA or are partially in but building platform(s) are entirely outside the HRFA • Rule 15.5.4 NC2 – Subdivision in High Risk Flood Area that cannot comply with conditions under 15.5.3 D1 • Rule 15.5.4 NC1 – New buildings and additions to existing buildings in High Risk Flood Area • Rule 15.5.4 NC3 – Emergency services facilities and hospitals • Rule 15.7.2 RDI – Construction of a new building or additions to an existing building. • Rule 15.7.3 D1 – New coastal protection structure. • Rule 15.7.3 D2 – Subdivision to create additional lots. • Rule 15.8.2 RDI – Construction of a new building or additions to an existing building. • Rule 15.8.3 D1 – New coastal protection structure. • Rule 15.8.3 D2 – Subdivision to create additional lots. • Flood modelling from Horotiu - Huntly - Ohinewai incorporate climate change 2.3 degrees increase in temperature and shown on planning maps as Floodplain, High Risk Flood Area and Ponding area. • Mapping for coastal erosion/inundation sensitivity overlay areas include 1m sea level rise to 2120, allowance. 	<p>Rules 15.7.2 RDI and 15.8.2 RDI – new building</p> <ul style="list-style-type: none"> • Mitigation through appropriate building materials, structural or design work, engineering solutions or other appropriate measures including the ability to relocate the <u>building</u>; • Mitigation through natural features and buffers where appropriate; • Triggers to require the <u>building</u> to be removed or relocated; • The degree to which coastal hazard risk, including the effects of climate change over a period to 2120, has been assessed in a site specific coastal hazard risk assessment; • Suitability of the <u>site</u> for the proposed use, including the provision for servicing such as access, wastewater, water supply; • Adverse effects to people and property and overall vulnerability from the establishment of the <u>building</u> in the <u>Coastal Sensitivity Area (Erosion)</u> and any mitigation measures to reduce risk; • Alternative locations

¹⁰ Ministry for the Environment, 2018: Climate Change Projections for New Zealand. September 2018. Publication No. MFE 1385.

¹¹ Ministry for the Environment, 2017: Coastal Hazards and Climate Change – Guidance for Local Government. December 2017. Publication No. ME 1341.

infrastructure and the natural environment.				
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.3.2 - Future land use planning and climate change</p> <p>(b) Increase the ability of the community to adapt to the effects of climate change when undertaking future land use planning by:</p> <p>(v) Ensuring the potential environmental and social costs of climate change, including effects on indigenous biodiversity (inland migration), historic heritage, Maaori Sites and Areas of Significance, mahinga kai, public health and safety, public access to the coast and waterway margins, and the built environment are addressed.</p> <p>(vi) encouraging the incorporation of sustainable design measures within new subdivision, landuse and development, including:</p> <p>(A) low impact, stormwater management, urban design and green infrastructure;</p> <p>(B) use of relocatable buildings and structures in areas potentially at risk due to sea level rise or increased flood levels;</p> <p>(C) efficient water storage;</p> <p>(D) provision of renewable energy generation; and</p> <p>(E) transferring to activities with lower greenhouse gas emissions.</p> <p>(vii) providing on-going monitoring of changes to the environment due to climate change; and</p> <p>(viii) facilitating community discussion on adaptive pathways to manage the risks associated with climate change and incorporating them, where appropriate, into the District Plan through plan changes.</p>	<p>Methods:</p> <ul style="list-style-type: none"> Adaptive management planning and development of adaptive management strategies for vulnerable communities, including identifying adaptive pathways This policy is relevant to any proposed rezoning and any subdivision proposals in any of the natural hazard overlays i.e greenfields development, Policy 15.2.3.2(1)(a) and (b) will be relevant to any discretionary or non-complying activities and also some RDA's which have climate change as a consideration. Rule 15.7.2 RDI – Construction of a new building or additions to an existing building. Rule 15.7.3 DI – New coastal protection structure. Rule 15.7.3 D2 – Subdivision to create additional lots. Rule 15.8.2 RDI – Construction of a new building or additions to an existing building. Rule 15.8.3 DI – New coastal protection structure. Rule 15.8.3 D2 – Subdivision to create additional lots. 	<p>Rules 15.7.2 RDI and 15.8.2 RDI – new building</p> <ul style="list-style-type: none"> Mitigation through appropriate building materials, structural or design work, engineering solutions or other appropriate measures including the ability to relocate the <u>building</u>; Mitigation through natural features and buffers where appropriate; Triggers to require the <u>building</u> to be removed or relocated; The degree to which coastal hazard risk, including the effects of climate change over a period to 2120, has been assessed in a site specific coastal hazard risk assessment; Suitability of the <u>site</u> for the proposed use, including the provision for servicing such as access, wastewater, water supply; Adverse effects to people and property and overall vulnerability from the establishment of the <u>building</u> in the <u>Coastal Sensitivity Area (Erosion)</u> and any mitigation measures to reduce risk; Alternative locations
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		Policy 15.2.3.3 - Precautionary approach for dealing with uncertainty	Rules for building and subdivision in Coastal Sensitivity Areas – Erosion and Inundation and High Risk Coastal Hazard Areas –	<p>Rules 15.7.2 RDI and 15.8.2 RDI</p> <ul style="list-style-type: none"> Mitigation through appropriate

		<p>(b) In areas throughout the district likely to be affected by climate change over the next 100 years, adopt a precautionary approach towards new subdivision, use and development which may have potentially significant or irreversible adverse effects, but for which there is incomplete or uncertain information.</p> <p>Policy 15.2.3.4 - Provide sufficient setbacks for new development</p> <p>(c) Protect people, property and the environment from the projected adverse effects of climate change, including sea level rise, by providing sufficient setbacks from water bodies and the coast when assessing new development.</p> <p>(d) Ensure that, in establishing development setbacks, adequate consideration is given to:</p> <ul style="list-style-type: none"> (vi) the protection of natural ecosystems, including opportunities for the inland migration of coastal habitats; (vii) the vulnerability of the community; (viii) the maintenance and enhancement of public access to the coast and public open space; (ix) the requirements of infrastructure; and (x) natural hazard mitigation provision, including the protection of natural defences. 	<p>Erosion and Inundation</p> <ul style="list-style-type: none"> • Rule 15.7.2 RDI – Construction of a new building or additions to an existing building. • Rule 15.7.3 DI – New coastal protection structure. • Rule 15.7.3 D2 – Subdivision to create additional lots. • Rule 15.8.2 RDI – Construction of a new building or additions to an existing building. • Rule 15.8.3 D2 – Subdivision to create additional lots. • Rule 15.9.2 D2 and D3 – Relocation of an existing building or replacement of an existing building in the High Risk Coastal Erosion Area located landward of existing building • Rule 15.9.2 D5 – New utilities and upgrading of existing utilities • Rule 15.9.2 D6 – Subdivision to create additional lot(s) where additional lot(s) are either entirely outside High Risk Coastal Erosion Area or are partially in but building platform(s) are entirely outside the High Risk Coastal Erosion Area • Rule 15.9.3 NCI – New buildings and additions to existing buildings not provided for as permitted or discretionary activities • Rule 15.9.3 NC2 – Subdivision that cannot comply with conditions for a discretionary activity • Rule 15.9.3 NC3 – Emergency services and hospitals • Rule 15.10.2 D2 – Relocation or replacement of an existing building in the High Risk Coastal Inundation Area where the ground floor area is no greater than the existing building • Rule 15.10.2 D4 – New utilities and upgrading of existing utilities • Rule 15.10.2 D5 – Subdivision to create additional lot(s) where additional lot(s) are either entirely outside High Risk Coastal Erosion Area or are partially in but building platform(s) are entirely outside the High Risk Coastal Erosion Area • Rule 15.10.3 NCI – New buildings and additions to existing buildings not provided for as permitted or discretionary activities • Rule 15.10.3 NC2 – Subdivision that cannot comply with conditions for a discretionary activity • Rule 15.10.3 NC3 – Emergency services and hospitals <p>Stage I PDP Zone Chapter rules (Also for Policy 15.2.3.4)</p> <p>Rules in Stage I PDP – Building setbacks from waterbodies</p> <ul style="list-style-type: none"> • Residential Zone - Rule 16.3.9.3 • Business Zone – Rule 17.3.4.2 • Business Town Centre Zone – Rule 18.3.7 • Industrial Zone – Rule 20.3.4.2 • Industrial Zone Heavy – Rule 21.3.4.2 • Rural Zone – Rule 22.3.7.5 • Country Living Zone – Rule 23.3.7.5 • Village Zone – Rule 24.3.6.3 • Reserve Zone – Rule 25.3.5.2 	<p>building materials, structural or design work, engineering solutions or other appropriate measures including the ability to relocate the <u>building</u>;</p> <ul style="list-style-type: none"> • Mitigation through natural features and buffers where appropriate; • Triggers to require the <u>building</u> to be removed or relocated; • The degree to which coastal hazard risk, including the effects of climate change over a period to 2120, has been assessed in a site specific coastal hazard risk assessment; • Suitability of the <u>site</u> for the proposed use, including the provision for servicing such as access, wastewater, water supply; • Adverse effects to people and property and overall vulnerability from the establishment of the <u>building</u> in the <u>Coastal Sensitivity Area (Erosion)</u> and any mitigation measures to reduce risk; • Alternative locations
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			<ul style="list-style-type: none"> • Rangitahi Peninsular Zone – Rule 28.3.9.3 	
		Policies (how to achieve the objective)	Rules/ Methods (to give effect to the policies)	Matters of Restricted Discretion or Control
		<p>Policy 15.2.3.5 - Assess the impact of climate change on the level of natural hazard risks</p> <p>(d) For all new subdivision, use and development requiring rezoning or a resource consent, ensure that account is taken of the projected effects of climate change over the next 100 years when assessing any identified risks from natural hazards, and their effects on people, property, infrastructure and the environment.</p> <p>(e) Ensure that, when assessing the effects of climate change on the level of natural hazard risk in accordance with Policy 15.2.3.5(a) above, the allowances in Policy 15.2.3.1(a)(i)-(iii) are applied.</p> <p>(f) Where the assessment required by Policy 15.2.3.5(a) and Policy 15.2.3.5(b) above indicates that natural hazards are likely to be exacerbated by climate change, ensure that subdivision and development are designed and located to avoid, or appropriately mitigate, any increased and cumulative risk, including increased risk of flooding, liquefaction, coastal inundation, coastal erosion, slope instability, fire, and drought.</p>	<p>Rules in Flood Plain Management Area and Flood Ponding Area; High Risk Flood Area; Coastal Sensitivity Areas – Erosion and Inundation; High Risk Coastal Hazard Areas – Erosion and Inundation where built development and subdivision either RDA, DA or NCA may require site specific hazard reports that incorporate the projected effects of climate change.</p> <p>79.</p> <ul style="list-style-type: none"> • Rule 15.4.3 D1 – Construction of a new building and additions to an existing building that doesn't comply with permitted standards in Rule 15.4.1 P1 – P5. • Rule 15.4.3 D2 – Subdivision to create 1 or more additional lots. • Rule 15.4.3 D3 – A hazardous facility. • Rule 15.5.3 D1 – Subdivision in a High Risk Flood Area where additional lot(s) are either entirely outside HRFA or are partially in but building platform(s) are entirely outside the HRFA • Rule 15.5.4 NC2 – Subdivision in High Risk Flood Area that cannot comply with conditions under 15.5.3 D1 • Rule 15.5.4 NC1 – New buildings and additions to existing buildings in High Risk Flood Area • Rule 15.5.4 NC3 – Emergency services facilities and hospitals • Rule 15.7.2 RDI – Construction of a new building or additions to an existing building. • Rule 15.7.3 D1 – New coastal protection structure. • Rule 15.7.3 D2 – Subdivision to create additional lots. • Rule 15.8.2 RDI – Construction of a new building or additions to an existing building. • Rule 15.8.3 D1 – New coastal protection structure. • Rule 15.8.3 D2 – Subdivision to create additional lots. • Rule 15.9.2 D2 and D3 – Relocation of an existing building or replacement of an existing building in the High Risk Coastal Erosion Area located landward of existing building • Rule 15.9.2 D6 – Subdivision to create additional lot(s) where additional lot(s) are either entirely outside High Risk Coastal Erosion Area or are partially in but building platform(s) are entirely outside the High Risk Coastal Erosion Area • Rule 15.9.3 NC1 – New buildings and additions to existing buildings not provided for as permitted or discretionary activities • Rule 15.9.3 NC2 – Subdivision that cannot comply with conditions for a discretionary activity • Rule 15.9.3 NC3 – Emergency services and hospitals • Rule 15.10.2 D2 – Relocation or replacement of an existing building in the High Risk Coastal Inundation Area where the ground floor area is no 	<p>Rules 15.7.2 RDI and 15.8.2 RDI</p> <ul style="list-style-type: none"> • Mitigation through appropriate building materials, structural or design work, engineering solutions or other appropriate measures including the ability to relocate the <u>building</u>; • Mitigation through natural features and buffers where appropriate; • Triggers to require the <u>building</u> to be removed or relocated; • The degree to which coastal hazard risk, including the effects of climate change over a period to 2120, has been assessed in a site specific coastal hazard risk assessment; • Suitability of the <u>site</u> for the proposed use, including the provision for servicing such as access, wastewater, water supply; • Adverse effects to people and property and overall vulnerability from the establishment of the <u>building</u> in the <u>Coastal Sensitivity Area (Erosion)</u> and any mitigation measures to reduce risk; • Alternative locations

			<p>greater than the existing building</p> <ul style="list-style-type: none">• Rule 15.10.2 D5 – Subdivision to create additional lot(s) where additional lot(s) are either entirely outside High Risk Coastal Erosion Area or are partially in but building platform(s) are entirely outside the High Risk Coastal Erosion Area• Rule 15.10.3 NCI – New buildings and additions to existing buildings not provided for as permitted or discretionary activities	
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Appendix 2 Key Strategic Documents and Directions

Resource Management Act 1991	
Section 2	<p>climate change means a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods;</p> <p>natural hazard means any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment</p>
Section 5	<p>Purpose</p> <p>(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.</p> <p>(2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—</p> <ol style="list-style-type: none"> sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and avoiding, remedying, or mitigating any adverse effects of activities on the environment.
Section 6	<p>Matter of national importance</p> <p>In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:</p> <ol style="list-style-type: none"> the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development; the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development; the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna; the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers; the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga; the protection of historic heritage from inappropriate subdivision, use, and development; the protection of protected customary rights; the management of significant risks from natural hazards.
Section 7	<p>Other matters</p> <p>In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—</p>

	<p>(a) <i>kaitiakitanga</i>: (aa) the ethic of stewardship: (b) the efficient use and development of natural and physical resources: (ba) the efficiency of the end use of energy: (c) the maintenance and enhancement of amenity values: (d) intrinsic values of ecosystems: (e) [Repealed] (f) maintenance and enhancement of the quality of the environment: (g) any finite characteristics of natural and physical resources: (h) the protection of the habitat of trout and salmon: (i) the effects of climate change: (j) the benefits to be derived from the use and development of renewable energy.</p>
Section 8	<p>Treaty of Waitangi In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the <u>Treaty of Waitangi</u> (Te Tiriti o Waitangi).</p>
Section 31	<p>Functions of territorial authorities under this Act (1) Every territorial authority shall have the following functions for the purpose of giving effect to this Act in its district: (a) the establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district: (aa) the establishment, implementation, and review of objectives, policies, and methods to ensure that there is sufficient development capacity in respect of housing and business land to meet the expected demands of the district: (b) the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of— (i) the avoidance or mitigation of natural hazards; and (ii) [Repealed] (iia) the prevention or mitigation of any adverse effects of the development, subdivision, or use of contaminated land: (iii) the maintenance of indigenous biological diversity: (c) [Repealed] (d) the control of the emission of noise and the mitigation of the effects of noise: (e) the control of any actual or potential effects of activities in relation to the surface of water in rivers and lakes: (f) any other functions specified in this Act. (2) The methods used to carry out any functions under subsection (1) may include the control of subdivision.</p>
Section 35	<p>Duty to gather information, monitor, and keep records (1) Every local authority shall gather such information, and undertake or commission such research, as is necessary to carry out effectively its functions under this Act or regulations under this Act. (2) Every local authority shall monitor—</p>

- (a) the state of the whole or any part of the environment of its region or district—
 - (i) to the extent that is appropriate to enable the local authority to effectively carry out its functions under this Act; and
 - (ii) in addition, by reference to any indicators or other matters prescribed by regulations made under this Act, and in accordance with the regulations; and
 - (b) the efficiency and effectiveness of policies, rules, or other methods in its policy statement or its plan; and
 - (c) the exercise of any functions, powers, or duties delegated or transferred by it; and
 - (ca) the efficiency and effectiveness of processes used by the local authority in exercising its powers or performing its functions or duties (including those delegated or transferred by it), including matters such as timeliness, cost, and the overall satisfaction of those persons or bodies in respect of whom the powers, functions, or duties are exercised or performed; and
 - (d) the exercise of the resource consents that have effect in its region or district, as the case may be; and
 - (e) in the case of a regional council, the exercise of a protected customary right in its region, including any controls imposed on the exercise of that right under Part 3 of the Marine and Coastal Area (Takutai Moana) Act 2011— and take appropriate action (having regard to the methods available to it under this Act) where this is shown to be necessary.
- (2AA) Monitoring required by subsection (2) must be undertaken in accordance with any regulations.
- (2A) Every local authority must, at intervals of not more than 5 years, compile and make available to the public a review of the results of its monitoring under subsection (2)(b).
- (3) Every local authority shall keep reasonably available at its principal office, information which is relevant to the administration of policy statements and plans, the monitoring of resource consents, and current issues relating to the environment of the area, to enable the public—
- (a) to be better informed of their duties and of the functions, powers, and duties of the local authority; and
 - (b) to participate effectively under this Act.
- (4) Every local authority shall keep reasonably available at each of the offices in its region or district such of the information referred to in subsection (3) as relates to that part of the region or district.
- (5) The information to be kept by a local authority under subsection (3) shall include—
- (a) (copies of its operative and any proposed policy statements and plans including all requirements for designations and heritage orders, and all operative and proposed changes to those policy statements and plans; and
 - (aa) copies of all material incorporated by reference in any plan or proposed plan under Part 3 of Schedule 1; and
 - (b) all its decisions relating to submissions on any proposed policy statements and plans which have not yet become operative; and
 - (c) in the case of a territorial authority, copies of every operative and proposed regional policy statement and regional plan for the region of which its district forms part; and
 - (d) in the case of a regional council, copies of every operative and proposed district plan for every territorial authority in its region; and
 - (e) in the case of a regional council, a copy of every Order in Council served on it under section 154(a); and
 - (f) copies of any national environmental standard or national policy statement or New Zealand coastal policy statement; and
 - (g) records of all applications for resource consents received by it; and
 - (ga) records of all decisions under any of sections 37, 87BA, 87BB, 87E, 95 to 95G, 198C, and 198H; and
 - (gb) records of all resource consents granted within the local authority's region or district; and

	<p>(gc) records of the transfer of any resource consent; and</p> <p>(h) [Repealed]</p> <p>(i) a summary of all written complaints received by it during the preceding 5 years concerning alleged breaches of the Act or a plan, and information on how it dealt with each such complaint; and</p> <p>(j) records of natural hazards to the extent that the local authority considers appropriate for the effective discharge of its functions; and</p> <p>(ja) in the case of a territorial authority, the location and area of all esplanade reserves, esplanade strips, and access strips in the district; and</p> <p>(jb) in the case of a regional council, records of every protected customary rights order or agreement relating to a part of the common marine and coastal area within its region; and</p> <p>(k) any other information gathered under subsections (1) and (2).</p> <p>(6) In subsections (2)(e) and (5)(jb), regional council includes the Chatham Islands Council.</p>
Section 75	<p>Contents of district plans</p> <p>(1) A district plan must state—</p> <p>(a) the objectives for the district; and</p> <p>(b) the policies to implement the objectives; and</p> <p>(c) the rules (if any) to implement the policies.</p> <p>(2) A district plan may state—</p> <p>(a) the significant resource management issues for the district; and</p> <p>(b) the methods, other than rules, for implementing the policies for the district; and</p> <p>(c) the principal reasons for adopting the policies and methods; and</p> <p>(d) the environmental results expected from the policies and methods; and</p> <p>(e) the procedures for monitoring the efficiency and effectiveness of the policies and methods; and</p> <p>(f) the processes for dealing with issues that cross territorial authority boundaries; and</p> <p>(g) the information to be included with an application for a resource consent; and</p> <p>(h) any other information required for the purpose of the territorial authority's functions, powers, and duties under this Act.</p> <p>(3) A district plan must give effect to—</p> <p>(a) any national policy statement; and</p> <p>(b) any New Zealand coastal policy statement; and</p> <p>(ba) a national planning standard; and</p> <p>(c) any regional policy statement.</p> <p>(4) A district plan must not be inconsistent with—</p> <p>(a) a water conservation order; or</p> <p>(b) a regional plan for any matter specified in section 30(1).</p> <p>(5) A district plan may incorporate material by reference under Part 3 of Schedule 1.</p>
Section 106	<p>Consent authority may refuse subdivision consent in certain circumstances</p>

	<p>(1) A consent authority may refuse to grant a subdivision consent, or may grant a subdivision consent subject to conditions, if it considers that—</p> <p>(a) there is a significant risk from natural hazards; or</p> <p>(b) [Repealed]</p> <p>(c) sufficient provision has not been made for legal and physical access to each allotment to be created by the subdivision.</p> <p>(1A) For the purpose of subsection (1)(a), an assessment of the risk from natural hazards requires a combined assessment of—</p> <p>(a) the likelihood of natural hazards occurring (whether individually or in combination); and</p> <p>(b) the material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and</p> <p>(c) any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).</p> <p>(2) Conditions under subsection (1) must be—</p> <p>(a) for the purposes of avoiding, remedying, or mitigating the effects referred to in subsection (1); and</p> <p>(b) of a type that could be imposed under section 108.</p>
Schedule 1 clause 4A	<p>Further pre-notification requirements concerning iwi authorities</p> <p>(1) Before notifying a proposed policy statement or plan, a local authority must—</p> <p>(a) provide a copy of the relevant draft proposed policy statement or plan to the iwi authorities consulted under <u>clause 3(1)(d)</u>; and</p> <p>(b) have particular regard to any advice received on a draft proposed policy statement or plan from those iwi authorities.</p> <p>(2) When a local authority provides a copy of the relevant draft proposed policy statement or plan in accordance with subclause (1), it must allow adequate time and opportunity for the iwi authorities to consider the draft and provide advice on it.</p>
Schedule 4 clauses (2)(3)(b) and (c) and (7)(1)(f)	<p>2 – Information required in all applications</p> <p>(3) An application must also include an assessment of the activity's effects on the environment that—</p> <p>(b) addresses the matters specified in <u>clause 7</u>; and</p> <p>(c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.</p> <p>7 - Matters that must be addressed by assessment of environmental effects</p> <p>(1) An assessment of the activity's effects on the environment must address the following matters:</p> <p>(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations.</p>
Local Government Act 2002	
Section 10	<p>Purpose of local government</p> <p>(1) The purpose of local government is—</p> <p>(a) to enable democratic local decision-making and action by, and on behalf of, communities; and</p> <p>(b) to promote the social, economic, environmental, and cultural well-being of communities in the present and for the future.</p>
Section 101B	<p>Infrastructure strategy</p> <p>(1) A local authority must, as part of its long-term plan, prepare and adopt an infrastructure strategy for a period of at least 30 consecutive</p>

- financial years.
- (2) The purpose of the infrastructure strategy is to—
 - (a) identify significant infrastructure issues for the local authority over the period covered by the strategy; and
 - (b) identify the principal options for managing those issues and the implications of those options.
 - (3) The infrastructure strategy must outline how the local authority intends to manage its infrastructure assets, taking into account the need to—
 - (a) renew or replace existing assets; and
 - (b) respond to growth or decline in the demand for services reliant on those assets; and
 - (c) allow for planned increases or decreases in levels of service provided through those assets; and
 - (d) maintain or improve public health and environmental outcomes or mitigate adverse effects on them; and
 - (e) provide for the resilience of infrastructure assets by identifying and managing risks relating to natural hazards and by making appropriate financial provision for those risks.
 - (4) The infrastructure strategy must outline the most likely scenario for the management of the local authority's infrastructure assets over the period of the strategy and, in that context, must—
 - (a) show indicative estimates of the projected capital and operating expenditure associated with the management of those assets—
 - (i) in each of the first 10 years covered by the strategy; and
 - (ii) in each subsequent period of 5 years covered by the strategy; and
 - (b) identify—
 - (i) the significant decisions about capital expenditure the local authority expects it will be required to make; and
 - (ii) when the local authority expects those decisions will be required; and
 - (iii) for each decision, the principal options the local authority expects to have to consider; and
 - (iv) the approximate scale or extent of the costs associated with each decision; and
 - (c) include the following assumptions on which the scenario is based:
 - (i) the assumptions of the local authority about the life cycle of significant infrastructure assets;
 - (ii) the assumptions of the local authority about growth or decline in the demand for relevant services;
 - (iii) the assumptions of the local authority about increases or decreases in relevant levels of service; and
 - (d) if assumptions referred to in paragraph (c) involve a high level of uncertainty,—
 - (i) identify the nature of that uncertainty; and
 - (ii) include an outline of the potential effects of that uncertainty.
 - (5) A local authority may meet the requirements of section 101A and this section by adopting a single financial and infrastructure strategy document as part of its long-term plan.
 - (6) In this section, infrastructure assets includes—
 - (a) existing or proposed assets to be used to provide services by or on behalf of the local authority in relation to the following groups of activities:
 - (i) water supply;
 - (ii) sewerage and the treatment and disposal of sewage;

	<ul style="list-style-type: none"> (iii) stormwater drainage: (iv) flood protection and control works: (v) the provision of roads and footpaths; and <p>(b) any other assets that the local authority, in its discretion, wishes to include in the strategy.</p>
Building Act, 2004	
Section 71	<p><i>Building on land subject to natural hazards</i></p> <p>(1) A building consent authority must refuse to grant a building consent for construction of a building, or major alterations to a building, if—</p> <ul style="list-style-type: none"> (a) the land on which the building work is to be carried out is subject or is likely to be subject to 1 or more natural hazards; or (b) the building work is likely to accelerate, worsen, or result in a natural hazard on that land or any other property. <p>(2) Subsection (1) does not apply if the building consent authority is satisfied that adequate provision has been or will be made to—</p> <ul style="list-style-type: none"> (a) protect the land, building work, or other property referred to in that subsection from the natural hazard or hazards; or (b) restore any damage to that land or other property as a result of the building work. <p>(3) In this section and sections 72 to 74, natural hazard means any of the following:</p> <ul style="list-style-type: none"> (a) erosion (including coastal erosion, bank erosion, and sheet erosion): (b) falling debris (including soil, rock, snow, and ice): (c) subsidence: (d) inundation (including flooding, overland flow, storm surge, tidal effects, and ponding): (e) slippage.
Section 72	<p><i>Building consent for building on land subject to natural hazards must be granted in certain cases</i></p> <p>Despite section 71, a building consent authority that is a territorial authority must grant a building consent if the building consent authority considers that—</p> <ul style="list-style-type: none"> (a) the building work to which an application for a building consent relates will not accelerate, worsen, or result in a natural hazard on the land on which the building work is to be carried out or any other property; and (b) the land is subject or is likely to be subject to 1 or more natural hazards; and (c) it is reasonable to grant a waiver or modification of the building code in respect of the natural hazard concerned
Section 73	<p><i>Conditions on building consents granted under section 72</i></p> <p>(1) A building consent authority that is a territorial authority that grants a building consent under section 72 must include, as a condition of the consent, that the building consent authority will, on issuing the consent, notify the consent to,—</p> <ul style="list-style-type: none"> (a) in the case of an application made by, or on behalf of, the Crown, the appropriate Minister and the Surveyor-General; and (b) in the case of an application made by, or on behalf of, the owners of Māori land, the Registrar of the Maori Land Court; and (c) in any other case, the Registrar-General of Land. <p>(2) The notification under subsection (1)(a) or (b) must be accompanied by a copy of any project information memorandum that has been issued and that relates to the building consent in question.</p> <p>(3) The notification under subsection (1)(c) must identify the natural hazard concerned.</p>

Section 74	<p><i>Steps after notification</i></p> <p>(1) On receiving a notification under section 73,—</p> <ul style="list-style-type: none"> (a) the Surveyor-General or the Registrar of the Maori Land Court, as the case may be, must enter in his or her records the particulars of the notification together with a copy of any project information memorandum that accompanied the notification; (b) the Registrar-General of Land must record, as an entry on the record of title to the land on which the building work is carried out,— <ul style="list-style-type: none"> (i) that a building consent has been granted under section 72; and (ii) particulars that identify the natural hazard concerned. <p>(2) If an entry has been recorded on a duplicate of the record of title referred to in subsection (1)(b) under section 641A of the Local Government Act 1974 or section 36 of the former Act, the Registrar-General of Land does not need to record another entry on the duplicate.</p> <p>(3) Subsection (4) applies if a building consent authority determines that any of the following entries is no longer required:</p> <ul style="list-style-type: none"> (a) an entry referred to in subsection (1)(b); (b) an entry under section 641A of the Local Government Act 1974; (c) an entry under section 36 of the former Act. <p>(4) The building consent authority must notify the Surveyor-General, the Registrar of the Maori Land Court, or the Registrar-General of Land, as the case may be, who must amend his or her records or remove the entry from the record of title.</p>
Civil Defence and Emergency Management Act (CDEM) 2002	
Section 17(3))	<p><i>Functions of Civil Defence Emergency Management Groups</i></p> <p>(1) The functions of a Civil Defence Emergency Management Group, and of each member, are to—</p> <ul style="list-style-type: none"> (a) in relation to relevant hazards and risks,— <ul style="list-style-type: none"> (i) identify, assess, and manage those hazards and risks; (ii) consult and communicate about risks; (iii) identify and implement cost-effective risk reduction; (b) take all steps necessary on an ongoing basis to maintain and provide, or to arrange the provision of, or to otherwise make available suitably trained and competent personnel, including volunteers, and an appropriate organisational structure for those personnel, for effective civil defence emergency management in its area; (c) take all steps necessary on an ongoing basis to maintain and provide, or to arrange the provision of, or otherwise to make available material, services, information, and any other resources for effective civil defence emergency management in its area; (d) respond to and manage the adverse effects of emergencies in its area; (e) plan and carry out recovery activities; (f) when requested, assist other Groups in the implementation of civil defence emergency management in their areas (having regard to the competing civil defence emergency management demands within the Group's own area and any other requests for assistance from other Groups); (g) within its area, promote and raise public awareness of, and compliance with, this Act and legislative provisions relevant to the purpose of this Act; (h) monitor and report on compliance within its area with this Act and legislative provisions relevant to the purpose of this Act:

	<p>(i) develop, approve, implement, and monitor a civil defence emergency management group plan and regularly review the plan;</p> <p>(j) participate in the development of the national civil defence emergency management strategy and the national civil defence emergency management plan;</p> <p>(k) promote civil defence emergency management in its area that is consistent with the purpose of this Act.</p> <p>(2) A Group also has any other functions that are conferred or imposed by or under this Act or any other enactment.</p> <p>(3) For the purposes of subsection (1)(g) and (h), legislative provisions relevant to the purpose of this Act include, but are not limited to, the provisions in the following Acts that may be relevant to civil defence emergency management:</p> <p>(a) Biosecurity Act 1993:</p> <p>(b) Building Act 2004:</p> <p>(c) Fire and Emergency New Zealand Act 2017:</p> <p>(d) [Repealed]</p> <p>(e) Hazardous Substances and New Organisms Act 1996:</p> <p>(f) Health Act 1956:</p> <p>(g) Health and Safety at Work Act 2015:</p> <p>(h) Local Government Act 1974:</p> <p>(ha) Local Government Act 2002:</p> <p>(i) Maritime Transport Act 1994:</p> <p>(j) Resource Management Act 1991:</p> <p>(k) any enactment passed in substitution for any of the Acts in paragraphs (a) to (j).</p>
Soil Conservation and Rivers Control Act 1941 (SCRCA)	
Section 10	<p>Objects of Act</p> <p>The objects of this Act are—</p> <p>(a) the promotion of soil conservation:</p> <p>(b) the prevention and mitigation of soil erosion:</p> <p>(c) the prevention of damage by floods:</p> <p>(d) the utilisation of lands in such a manner as will tend towards the attainment of the said objects.</p>
Section 10A	Notwithstanding section 10, nothing in this Act shall derogate from the provisions of sections 176 to 182 of the Harbours Act 1950 or the Resource Management Act 1991.
Local Government Official Information and Meetings Act (LGOIMA) 1987	
Section 4	<p>Purposes</p> <p>The purposes of this Act are—</p> <p>(a) to increase progressively the availability to the public of official information held by local authorities, and to promote the open and public transaction of business at meetings of local authorities, in order—</p> <p>(i) to enable more effective participation by the public in the actions and decisions of local authorities; and</p>

	<p>(ii) to promote the accountability of local authority members and officials,—</p> <p>(b) and thereby to enhance respect for the law and to promote good local government in New Zealand:</p> <p>(c) to provide for proper access by each person to official information relating to that person:</p> <p>(d) to protect official information and the deliberations of local authorities to the extent consistent with the public interest and the preservation of personal privacy.</p>
National Policy Statement: The New Zealand Coastal Policy Statement 2010	
Objective 3	<p>To take account of the principles of the Treaty of Waitangi, recognise the role of tangata whenua as kaitiaki and provide for tangata whenua involvement in management of the coastal environment by:</p> <ul style="list-style-type: none"> • recognising the ongoing and enduring relationship of tangata whenua over their lands, rohe and resources; • promoting meaningful relationships and interactions between tangata whenua and persons exercising functions and powers under the Act; • incorporating mātauranga Māori into sustainable management practices; and • recognising and protecting characteristics of the coastal environment that are of special value to tangata whenua.
Objective 4	<p>To maintain and enhance the public open space qualities and recreation opportunities of the coastal environment by:</p> <ul style="list-style-type: none"> • recognising that the coastal marine area is an extensive area of public space for the public to use and enjoy; • maintaining and enhancing public walking access to and along the coastal marine area without charge, and where there are exceptional reasons that mean this is not practicable providing alternative linking access close to the coastal marine area; and • recognising the potential for coastal processes, including those likely to be affected by climate change, to restrict access to the coastal environment and the need to ensure that public access is maintained even when the coastal marine area advances inland.
Objective 5	<p>To ensure that coastal hazard risks taking account of climate change, are managed by:</p> <ul style="list-style-type: none"> • locating new development away from areas prone to such risks; • considering responses, including managed retreat, for existing development in this situation; and • protecting or restoring natural defences to coastal hazards.
Policy 2	<p>The Treaty of Waitangi, tangata whenua and Māori</p> <p>In taking account of the principles of the Treaty of Waitangi (Te Tiriti o Waitangi), and kaitiakitanga, in relation to the coastal environment:</p> <p>(a) recognise that tangata whenua have traditional and continuing cultural relationships with areas of the coastal environment, including places where they have lived and fished for generations;</p> <p>(b) involve iwi authorities or hapū on behalf of tangata whenua in the preparation of regional policy statements, and plans, by undertaking effective consultation with tangata whenua; with such consultation to be early, meaningful, and as far as practicable in accordance with tikanga Māori;</p> <p>(c) with the consent of tangata whenua and as far as practicable in accordance with tikanga Māori, incorporate mātauranga Māori¹ in regional policy statements, in plans, and in the consideration of applications for resource consents, notices of requirement for designation and private plan changes;</p> <p>(d) provide opportunities in appropriate circumstances for Māori involvement in decision making, for example when a consent application or notice of requirement is dealing with cultural localities or issues of cultural significance, and Māori experts, including pūkenga², may have</p>

	<p>knowledge not otherwise available;</p> <p>(e) take into account any relevant iwi resource management plan and any other relevant planning document recognised by the appropriate iwi authority or hapū and lodged with the council, to the extent that its content has a bearing on resource management issues in the region or district; and</p> <p>(i) where appropriate incorporate references to, or material from, iwi resource management plans in regional policy statements and in plans; and</p> <p>(ii) consider providing practical assistance to iwi or hapū who have indicated a wish to develop iwi resource management plans;</p> <p>(f) provide for opportunities for tangata whenua to exercise kaitiakitanga over waters, forests, lands, and fisheries in the coastal environment through such measures as:</p> <p>(i) bringing cultural understanding to monitoring of natural resources;</p> <p>(ii) providing appropriate methods for the management, maintenance and protection of the taonga of tangata whenua;</p> <p>(iii) having regard to regulations, rules or bylaws relating to ensuring sustainability of fisheries resources such as taiāpure, mahinga mātaītai or other non commercial Māori customary fishing;</p> <p>(g) in consultation and collaboration with tangata whenua, working as far as practicable in accordance with tikanga Māori, and recognising that tangata whenua have the right to choose not to identify places or values of historic, cultural or spiritual significance or special value:</p> <p>(i) recognise the importance of Māori cultural and heritage values through such methods as historic heritage, landscape and cultural impact assessments; and</p> <p>(ii) provide for the identification, assessment, protection and management of areas or sites of significance or special value to Māori, including by historic analysis and archaeological survey and the development of methods such as alert layers and predictive methodologies for identifying areas of high potential for undiscovered Māori heritage, for example coastal pā or fishing villages.</p>
Policy 3	<p>Precautionary Approach</p> <p>(1) Adopt a precautionary approach towards proposed activities whose effects on the coastal environment are uncertain, unknown, or little understood, but potentially significantly adverse.</p> <p>(2) In particular, adopt a precautionary approach to use and management of coastal resources potentially vulnerable to effects from climate change, so that:</p> <p>(a) avoidable social and economic loss and harm to communities does not occur;</p> <p>(b) natural adjustments for coastal processes, natural defences, ecosystems, habitat and species are allowed to occur; and</p> <p>(c) the natural character, public access, amenity and other values of the coastal environment meet the needs of future generations.</p>
Policy 7	<p>Strategic Planning</p> <p>(1) In preparing regional policy statements, and plans:</p> <p>(a) consider where, how and when to provide for future residential, rural residential, settlement, urban development and other activities in the coastal environment at a regional and district level; and</p> <p>(b) identify areas of the coastal environment where particular activities and forms of subdivision, use, and development:</p> <p>(i) are inappropriate; and</p> <p>(ii) may be inappropriate without the consideration of effects through a resource consent application, notice of requirement for designation</p>

	<p>or Schedule 1 of the Resource Management Act process; and provide protection from inappropriate subdivision, use, and development in these areas through objectives, policies and rules.</p> <p>(2) Identify in regional policy statements, and plans, coastal processes, resources or values that are under threat or at significant risk from adverse cumulative effects. Include provisions in plans to manage these effects. Where practicable, in plans, set thresholds (including zones, standards or targets), or specify acceptable limits to change, to assist in determining when activities causing adverse cumulative effects are to be avoided.</p>
Policy 18	<p>Public Open Space</p> <p>Recognise the need for public open space within and adjacent to the coastal marine area, for public use and appreciation including active and passive recreation, and provide for such public open space, including by:</p> <ul style="list-style-type: none"> (a) ensuring that the location and treatment of public open space is compatible with the natural character, natural features and landscapes, and amenity values of the coastal environment; (b) taking account of future need for public open space within and adjacent to the coastal marine area, including in and close to cities, towns and other settlements; (c) maintaining and enhancing walking access linkages between public open space areas in the coastal environment; (d) considering the likely impact of coastal processes and climate change so as not to compromise the ability of future generations to have access to public open space; and (e) recognising the important role that esplanade reserves and strips can have in contributing to meeting public open space needs.
Policy 24	<p>Identification of coastal hazards</p> <p>(1) Identify areas in the coastal environment that are potentially affected by coastal hazards (including tsunamis), giving priority to the identification of areas at high risk of being affected. Hazard risks, over at least 100 years, are to be assessed having regard to:</p> <ul style="list-style-type: none"> (a) physical drivers and processes that cause coastal change including sea level rise; (b) short-term and long-term natural dynamic fluctuations of erosion and accretion; (c) geomorphological character; (d) the potential for inundation of the coastal environment, taking into account potential sources, inundation pathways and overland extent; (e) cumulative effects of sea level rise, storm surge and wave height under storm conditions; (f) influences that humans have had or are having on the coast; (g) the extent and permanence of built development; and (h) the effects of climate change on: <ul style="list-style-type: none"> (i) matters (a) to (g) above; (ii) storm frequency, intensity and surges; and (iii) coastal sediment dynamics; <p>taking into account national guidance and the best available information on the likely effects of climate change on the region or district.</p>
Policy 25	<p>In areas potentially affected by coastal hazards over at least the next 100 years:</p> <ul style="list-style-type: none"> (a) avoid increasing the risk¹⁰ of social, environmental and economic harm from coastal hazards; (b) avoid redevelopment, or change in land use, that would increase the risk of adverse effects from coastal hazards; (c) encourage redevelopment, or change in land use, where that would reduce the risk of adverse effects from coastal hazards, including managed

	<p>retreat by relocation or removal of existing structures or their abandonment in extreme circumstances, and designing for relocatability or recoverability from hazard events;</p> <p>(d) encourage the location of infrastructure away from areas of hazard risk where practicable;</p> <p>(e) discourage hard protection structures and promote the use of alternatives to them, including natural defences; and</p> <p>(f) consider the potential effects of tsunami and how to avoid or mitigate them.</p>
Policy 26	<p>(1) Provide where appropriate for the protection, restoration or enhancement of natural defences that protect coastal land uses, or sites of significant biodiversity, cultural or historic heritage or geological value, from coastal hazards.</p> <p>(2) Recognise that such natural defences include beaches, estuaries, wetlands, intertidal areas, coastal vegetation, dunes and barrier islands.</p>
Policy 27	<p>(1) In areas of significant existing development likely to be affected by coastal hazards, the range of options for reducing coastal hazard risk that should be assessed includes:</p> <p>(a) promoting and identifying long-term sustainable risk reduction approaches including the relocation or removal of existing development or structures at risk;</p> <p>(b) identifying the consequences of potential strategic options relative to the option of “do-nothing”;</p> <p>(c) recognising that hard protection structures may be the only practical means to protect existing infrastructure of national or regional importance, to sustain the potential of built physical resources to meet the reasonably foreseeable needs of future generations;</p> <p>(d) recognising and considering the environmental and social costs of permitting hard protection structures to protect private property; and</p> <p>(e) identifying and planning for transition mechanisms and timeframes for moving to more sustainable approaches.</p> <p>(2) In evaluating options under (1):</p> <p>(a) focus on approaches to risk management that reduce the need for hard protection structures and similar engineering interventions;</p> <p>(b) take into account the nature of the coastal hazard risk and how it might change over at least a 100-year timeframe, including the expected effects of climate change; and</p> <p>(c) evaluate the likely costs and benefits of any proposed coastal hazard risk reduction options.</p> <p>(3) Where hard protection structures are considered to be necessary, ensure that the form and location of any structures are designed to minimise adverse effects on the coastal environment.</p> <p>(4) Hard protection structures, where considered necessary to protect private assets, should not be located on public land if there is no significant public or environmental benefit in doing so.</p>
Waikato Regional Policy Statement 2016	
Issue 1.2	<p>Effects of climate change</p> <p>The effects of climate change (including climate variability) may impact our ability to provide for our wellbeing, including health and safety. While addressing this issue generally, specific focus should be directed to the following matters:</p> <p>(a) increased potential for storm damage and weather-related natural hazards; and</p> <p>(b) long-term risks of sea level rise to settlements and infrastructure such as through increased coastal flooding and erosion.</p>
Issue 1.4	<p>Managing the built environment</p> <p>Development of the built environment including infrastructure has the potential to positively or negatively impact on our ability to sustainably</p>

	<p>manage natural and physical resources and provide for our wellbeing.</p> <p>While addressing this issue generally, specific focus should be directed to the following matters:</p> <ul style="list-style-type: none"> (a) high pressure for development in Hamilton City, Waipa District, Waikato District, around Lake Taupō, along the Waikato River and in the coastal environment; (b) increasing potential for natural hazards; (c) increasing conflict with, and demands for, new infrastructure; (d) the need to use existing infrastructure efficiently and to maintain and enhance that infrastructure; (e) protecting domestic and municipal water supply sources from the adverse effects of land use; (f) the effect of development on access to mineral resources (particularly aggregates), high class soils, and future energy development sites; (g) increasing impacts on and conflicts with existing resource users; (h) the underperformance of some elements of Hamilton's central business district and consequential effects on its function, amenity and vitality as a result of unplanned dispersal of retail and office development; (i) the integrated relationship between land use and development, and the transport infrastructure network; (j) the contribution of regionally significant industry and primary production to economic, social and cultural wellbeing, and the need for those industries to access natural and physical resources, having regard to catchment specific situations; (k) increased need for the future provision of infrastructure to respond to resource demands from within and outside the region and the need to enable efficient installation of that infrastructure; and (l) the availability of water to meet existing, and reasonably justifiable and foreseeable domestic or municipal supply requirements to support planned urban growth, including promoting the integration of land use and water planning.
Objective 3.6	<p>Adapting to climate change</p> <p>Land use is managed to avoid the potential adverse effects of climate change induced weather variability and sea level rise on:</p> <ul style="list-style-type: none"> (a) amenity; (b) the built environment, including infrastructure; (c) indigenous biodiversity; (d) natural character; (e) public health and safety; and (f) public access.
Objective 3.7	<p>Coastal environment</p> <p>The coastal environment is managed in an integrated way that:</p> <ul style="list-style-type: none"> (a) preserves natural character and protects natural features and landscape values of the coastal environment; (b) avoids conflicts between uses and values; (c) recognises the interconnections between marine-based and land-based activities; and (d) recognises the dynamic, complex and interdependent nature of natural biological and physical processes in the coastal environment.
Objective 3.23	<p>Public access</p> <p>Public access to and along the coastal marine area, lakes and rivers is maintained and enhanced.</p>

Objective 3.24	<p><i>Natural hazards</i></p> <p><i>The effects of natural hazards on people, property and the environment are managed by:</i></p> <ul style="list-style-type: none"> <i>(a) increasing community resilience to hazard risks;</i> <i>(b) reducing the risks from hazards to acceptable or tolerable levels; and</i> <i>(c) enabling the effective and efficient response and recovery from natural hazard events.</i>
Policy 4.1	<p><i>Integrated approach</i></p> <p><i>An integrated approach to resource management will be adopted that:</i></p> <ul style="list-style-type: none"> <i>(a) recognises the inter-connected nature of natural and physical resources (including spatially and temporally) and the benefits of aligning the decisions of relevant management agencies across boundaries;</i> <i>(b) maximises the benefits and efficiencies of working together ;</i> <i>(c) recognises the multiple values of natural and physical resources including ecosystem services;</i> <i>(d) responds to the nature and values of the resource and the diversity of effects (including cumulative effects) that can occur;</i> <i>(e) maximises opportunities to achieve multiple objectives;</i> <i>(f) takes a long-term strategic approach which recognises the changing environment and changing resource use pressures and trends;</i> <i>(g) applies consistent and best practice standards and processes to decision making; and</i> <i>(h) establishes, where appropriate, a planning framework which sets clear limits and thresholds for resource use.</i>
Policy 6.1	<p><i>Planned and co-ordinated subdivision, use and development</i></p> <p><i>Subdivision, use and development of the built environment, including transport, occurs in a planned and co-ordinated manner which:</i></p> <ul style="list-style-type: none"> <i>(a) has regard to the principles in section 6A;</i> <i>(b) recognises and addresses potential cumulative effects of subdivision, use and development;</i> <i>(c) is based on sufficient information to allow assessment of the potential long-term effects of subdivision, use and development; and</i> <i>(d) has regard to the existing built environment.</i>
Policy 6.2	<p><i>Planning for development in the coastal environment</i></p> <p><i>Development of the built environment in the coastal environment occurs in a way that:</i></p> <ul style="list-style-type: none"> <i>(a) ensures sufficient development setbacks to protect coastal natural character, public access, indigenous biodiversity, natural physical processes, amenity and natural hazard mitigation functions of the coast;</i> <i>(b) protects hydrological processes and natural functions of back dune areas;</i> <i>(c) avoids the adverse effects of activities on areas with outstanding natural character, and outstanding natural features and landscapes;</i> <i>(d) ensures that in areas other than those identified in (c) above, activities are appropriate in relation to the level of natural character or natural feature and landscape;</i> <i>(e) has regard to local coastal character;</i> <i>(f) allows for the potential effects of sea level rise, including allowing for sufficient coastal habitat inland migration opportunities;</i> <i>(g) protects the valued characteristics of remaining undeveloped, or largely undeveloped coastal environments;</i> <i>(h) ensures adequate water, stormwater and wastewater services will be provided for the development;</i> <i>(i) avoids increasing natural hazard risk associated with coastal erosion and inundation;</i>

	<ul style="list-style-type: none"> (j) has regard to the potential effects of a tsunami event, and takes appropriate steps to avoid, remedy or mitigate that risk; (k) avoids ribbon development along coastal margins; (l) does not compromise the function or operation of existing or planned coastal infrastructure; (m) provides for safe and efficient connectivity between activities occurring in the coastal marine area and associated land-based infrastructure; (n) manages adverse effects to maintain or enhance water quality; and (o) maintains and enhances public access.
Development Principles 6A	<p>General development principles</p> <p>New development should:</p> <ul style="list-style-type: none"> (a) support existing urban areas in preference to creating new ones; (b) occur in a manner that provides clear delineation between urban areas and rural areas; (c) make use of opportunities for urban intensification and redevelopment to minimise the need for urban development in greenfield areas; (d) not compromise the safe, efficient and effective operation and use of existing and planned infrastructure, including transport infrastructure, and should allow for future infrastructure needs, including maintenance and upgrading, where these can be anticipated; (e) connect well with existing and planned development and infrastructure; (f) identify water requirements necessary to support development and ensure the availability of the volumes required; (g) be planned and designed to achieve the efficient use of water; (h) be directed away from identified significant mineral resources and their access routes, natural hazard areas, energy and transmission corridors, locations identified as likely renewable energy generation sites and their associated energy resources, regionally significant industry, high class soils, and primary production activities on those high class soils; (i) promote compact urban form, design and location to: <ul style="list-style-type: none"> (i) minimise energy and carbon use; (ii) minimise the need for private motor vehicle use; (iii) maximise opportunities to support and take advantage of public transport in particular by encouraging employment activities in locations that are or can in the future be served efficiently by public transport; (iv) encourage walking, cycling and multi-modal transport connections; and (v) maximise opportunities for people to live, work and play within their local area; (j) maintain or enhance landscape values and provide for the protection of historic and cultural heritage; (k) promote positive indigenous biodiversity outcomes and protect significant indigenous vegetation and significant habitats of indigenous fauna. Development which can enhance ecological integrity, such as by improving the maintenance, enhancement or development of ecological corridors, should be encouraged; (l) maintain and enhance public access to and along the coastal marine area, lakes, and rivers; (m) avoid as far as practicable adverse effects on natural hydrological characteristics and processes (including aquifer recharge and flooding patterns), soil stability, water quality and aquatic ecosystems including through methods such as low impact urban design and development (LIUDD); (n) adopt sustainable design technologies, such as the incorporation of energy efficient (including passive solar) design, low-energy street lighting,

	<p>rain gardens, renewable energy technologies, rainwater harvesting and grey water recycling techniques where appropriate;</p> <ul style="list-style-type: none"> (o) not result in incompatible adjacent land uses (including those that may result in reverse sensitivity effects), such as industry, rural activities and existing or planned infrastructure; (p) be appropriate with respect to projected effects of climate change and be designed to allow adaptation to these changes; (q) consider effects on the unique <i>tāngata whenua</i> relationships, values, aspirations, roles and responsibilities with respect to an area. Where appropriate, opportunities to visually recognise <i>tāngata whenua</i> connections within an area should be considered; (r) support the Vision and Strategy for the Waikato River in the Waikato River catchment; (s) encourage waste minimisation and efficient use of resources (such as through resource-efficient design and construction methods); and (t) recognise and maintain or enhance ecosystem services
Policy 12.4	<p>Maintain and enhance public access</p> <p>Public access to and along the coastal marine area, lakes, and rivers will be maintained and enhanced by:</p> <ul style="list-style-type: none"> (a) providing direction about where and when additional access should be established; (b) ensuring that subdivision, use and development do not constrain the ability of the land/water edge to adjust over time in response to natural processes, including the effects of climate change; and (c) ensuring subdivision, use and development do not result in inappropriate loss of existing public access.
Policy 13.1	<p>Natural hazard risk management approach</p> <p>Natural hazard risks are managed using an integrated and holistic approach that:</p> <ul style="list-style-type: none"> (a) ensures the risk from natural hazards does not exceed an acceptable level; (b) protects health and safety; (c) avoids the creation of new intolerable risk; (d) Reduces intolerable risk to tolerable or acceptable levels; (e) enhances community resilience; (f) is aligned with civil defence approaches; (g) prefers the use of natural features over man-made structures as defences against natural hazards; (h) recognises natural systems and takes a 'whole of system' approach; and (i) seeks to use the best available information/best practice.
Policy 13.2	<p>Manage activities to reduce the risk from natural hazards</p> <p>Subdivision, use and development are managed to reduce the risks from natural hazards to an acceptable or tolerable level including by:</p> <ul style="list-style-type: none"> (a) ensuring risk is assessed for proposed activities on land subject to natural hazards; (b) reducing the risks associated with existing use and development where these risks are intolerable; (c) avoiding intolerable risk in any new use or development in areas subject to natural hazards; (d) minimising any increase in vulnerability due to residual risk; (e) avoiding the need or demand for new structural protection works; and (f) discouraging hard protection structures and promoting the use of alternatives to them, including natural defences in the coastal environment.
Policy 13.3	<p>High impact, low probability natural hazard events</p>

	<p>The risks associated with high impact, low probability natural hazard events such as tsunami, volcanic eruptions, earthquakes and debris flows are considered, having particular regard to:</p> <ul style="list-style-type: none"> (a) personal health and safety; (b) damage and/or disruption to essential community services; (c) the ability of a community to respond and recover; and (d) civil defence readiness, response and recovery planning.
Waikato Regional Plan 2012	
Objective 5.1.2	<p>A net reduction of accelerated erosion across the Region so that:</p> <ul style="list-style-type: none"> (a) soil productivity, versatility and capability is maintained (b) there are no adverse effects on water quality, aquatic ecosystems and wetlands that are inconsistent with Water Management Objective 3.1.2 (c) there is no increase in the adverse effects of flooding or land instability hazards (d) accelerated infilling of lakes, estuaries, rivers, wetlands and cave systems is avoided and the rate of infilling of artificial watercourses, excluding structures designed to trap sediment, is minimised (e) significant adverse effects on the relationship tangata whenua as Kaitiaki have with their identified ancestral taonga such as ancestral lands, water and waahi tapu are avoided (f) cumulative adverse effects on the relationship tangata whenua as Kaitiaki have with their identified taonga such as ancestral lands, water, waahi tapu are remedied or mitigated. (g) significant adverse effects on natural character and ecological values associated with land and the coastal environment including dune systems is avoided (h) there are no adverse effects on air quality that are inconsistent with Air Quality Objective 6.1.2, Objectives 2 and 3 <ul style="list-style-type: none"> (i) damage to property and infrastructure is avoided in particular in High Risk Erosion Areas together with: (ii) Catchments of estuaries that are areas of significant conservation value on the Coromandel Peninsula (iii) Karst and cave systems.
Policy 5.1.3	<p>Managing Activities that Cause or Have the Potential to Cause Accelerated Erosion and Encouraging Appropriate Land Management Practices</p> <p>Through permitted activities and non-regulatory methods manage activities that cause or have the potential to cause accelerated erosion, with particular regard to:</p> <ul style="list-style-type: none"> (a) the potential for the activity to adversely affect the purpose of the water management classes as identified in the policies in Section 3.2.2, and the coastal marine area (b) the risk of downstream sedimentation leading to accelerated infilling of lakes, estuaries, artificial watercourses, rivers, wetlands and caves (c) the erosion potential of soil when it is disturbed or vegetation is cleared (d) the potential to increase the adverse effects of flooding (e) the potential to adversely affect waahi tapu and archaeological sites or other identified sites of importance to tangata whenua as Kaitiaki (f) the potential to adversely affect natural character of the coastal environment and the margins of rivers, lakes and wetlands and areas of significant indigenous vegetation and significant habitats of indigenous fauna (g) the potential to compromise air quality objectives as identified in Module 6 Air

	<i>(h) the potential to damage property and infrastructure.</i>
Waikato Regional Coastal Plan 2014	
Objective 8.1	<i>Coastal hazard risk to people and property avoided or mitigated.</i>
Policy 8.1.1	<i>Identify areas of coastal hazard risk and develop integrated hazard management strategies for these areas.</i>
Policy 8.1.2	<i>Adopt a precautionary approach in the assessment of coastal hazard risk and in the assessment of potential risks for coastal permit applications.</i>
Policy 8.1.3	<i>Promote the protection of natural features that provide a buffer against natural hazards.</i>
Policy 8.1.4	<i>Ensure that any use of structures to control coastal erosion is necessary and avoids or remedies any adverse effects on other coastal processes and on natural character.</i>
Waikato-Tainui Environmental Plan (Tai Tumu Tai Pari Tai Ao)	
Objective 17.3.1	<i>Land use and the construction of structures occurs in a way that does not increase the risk or magnitude of a natural hazard event, and that does not increase the risk or effects on human life or activity in the event that a natural hazard event occurs.</i>
Policy 17.3.1.1	<i>To ensure that land use and structures do not increase the risk or magnitude of a natural hazard event, and does not increase the risk or effects on human life or activity in the event that a natural hazard event occurs.</i>
Objective 17.3.2	<i>The risk of adverse effects on human, cultural, spiritual, or environmental wellbeing shall be prioritised over risks to individual properties when assessing natural hazard risks and/or the need for hazard protection structures.</i>
Policy 17.3.2.1	<i>To ensure that human, cultural, spiritual, or environmental wellbeing is appropriately considered when assessing natural hazard risks and/or the need for hazard protection structures.</i>
Objective 17.3.3	<i>The cause and effects of climate change are understood and prepared for within the Waikato-Tainui rohe.</i>
Policy 17.3.3.1	<i>To ensure that the causes and effects of climate change are understood and prepared for within the Waikato-Tainui rohe.</i>
Maniapoto Environmental Management Plan	
Objective 13.3.1	<i>To inform Maniapoto about the cause and effects of climate change to ensure adequate preparations are made throughout Maniapoto rohe.</i>
Policy 13.3.1.1	<i>Maniapoto are informed on the causes and effects of climate change and are prepared for the resulting impacts.</i> <i>(a) Maniapoto to be involved in the review, development and implementation of strategies and plans for climate change.</i> <i>(b) Promote and support urban planning to reduce transport emissions.</i> <i>(c) Promote and support the use of solar water heating and similar measures to reduce energy use.</i> <i>(d) Promote and support improved land use activities and practices to reduce emissions.</i> <i>(e) Promote and support initiatives that encourage and reward the protection and restoration of indigenous forests, biodiversity and natural heritage values significant to Maniapoto.</i>
Objective 13.3.2	<i>To minimise and avoid further adverse effects of natural hazards associated with climate change.</i>
Policy 13.3.2.1	<i>All aspects of subdivision, development, land use and activities recognise and provide for the need to avoid contributing further to climate change and associated natural hazards and their effects.</i> <i>(a) Encourage new subdivision design and location to make best use of renewable energy and transport and to provide for developments and land uses that are sustainable.</i> <i>(b) Encourage developments, land use and activities that provide for efficient resource requirements and transport provisions that enable</i>

	<i>sustainable communities to thrive.</i>
Objective 13.3.3	<i>To reduce greenhouse gas emissions to the level recommended by the Intergovernmental Panel on Climate Change or better.</i>
Policy 13.3.3.1	<p><i>Greenhouse gas emissions are reduced.</i></p> <ul style="list-style-type: none"> <i>(a) Promote and support targets and limits for the reduction of greenhouse gas emissions to meet international targets for effective avoidance of further human generated climate change in line with IPCC recommendations.</i> <i>(b) Encourage adoption of land management practices that reduce the net concentration of emissions into the air.</i> <i>(c) Encourage transport systems that provide the most efficient and effective use of resources and achieve reductions in emissions.</i> <i>(d) Encourage waste management practices that avoid methane and other greenhouse gases being lost to the atmosphere.</i>
Objective 15.3.2	<i>To enhance and protect natural wetlands to produce an overall net gain in wetland area in the rohe as wetlands are restored</i>
Policy 15.3.2.1	<p><i>The net area of wetlands increases with no loss of existing natural wetland area.</i></p> <ul style="list-style-type: none"> <i>(a) Recognise, preserve and protect all wetland and riparian areas that provide important cultural and environmental benefits, including:</i> <ul style="list-style-type: none"> <i>(i) mahinga kai habitat.</i> <i>(ii) provision of resources for cultural use.</i> <i>(iii) cultural wellbeing.</i> <i>(iv) filtration system to maintain and improve water quality.</i> <i>(v) natural flood protection.</i> <i>(b) Amend planning rules and policies to prevent further reduction in natural wetland area or wetland condition within the Maniapoto rohe.</i> <i>(c) Protect, restore and enhance existing wetlands.</i> <i>(d) Avoid drainage of existing wetlands and the destruction or modification of existing native riparian areas.</i> <i>(e) Install appropriate fencing, buffers and set back areas to protect wetlands and riparian areas from intensive land use, stock access and irrigation.</i> <i>(f) Support initiatives to restore wetlands, including:</i> <ul style="list-style-type: none"> <i>(i) maintaining a wetland inventory.</i> <i>(ii) identifying and mapping historic and existing wetlands.</i> <i>(iii) mapping existing riparian margins.</i> <i>(iv) promoting collaborative restoration projects.</i> <i>(v) supporting wetland vegetation fragments to grow in size.</i> <i>(vi) restoring historic water levels.</i> <i>(vii) identifying incentives to provide for restoration and implementing those incentives.</i> <i>(g) Recognise and enhance the natural infrastructure of wetlands as a major asset in combating and adapting to climate change.</i> <i>(h) Construct wetland areas, where appropriate, to assist with the management of onsite/site sourced stormwater, wastewater and for agricultural purposes to take advantage of the function of wetlands to filter contaminants.</i> <i>(i) Prevent use, in general, of natural wetlands for treatment or disposal of wastewater. Constructed wetlands may operate adjacent to natural wetlands to mitigate the impacts on natural systems.</i>
Objective 15.3.3	<i>To ensure planning and regulations for land use adjacent to wetlands restores and maintains wetland health.</i>

Policy 15.3.3.1	<p>Adjacent land-use practices do not impact negatively on wetlands.</p> <p>(a) As appropriate, establish, enhance and restore wetlands and riparian areas, as a measure to avoid, remedy or mitigate actual or potential adverse effects of land use and development activities on the cultural and environmental values of these areas.</p> <p>(b) Ensure best practice land use within wetland catchments with accompanying guidelines as necessary.</p> <p>(c) Identify wetland areas and puna within Maniapoto rohe, at the strategic and landscape scales, to define where activities must be avoided to protect the mauri of water.</p> <p>(d) Ensure management of wetlands and water resources occurs through holistic management at the river, lake or aquifer at catchment scale that is linked to coastal zone management for coastal and near-shore wetlands and takes into account water allocations for the ecosystems.</p> <p>(e) Restore flood plains, where appropriate land is available and it is feasible, to function as natural overflow areas along rivers and to link more naturally with adjacent wetlands.</p> <p>(f) Recognise the significance of and provide for wetlands in spatial planning.</p> <p>(g) Avoid direct discharge points that negatively affect the mauri of wetlands.</p>
Objective 20.3.1	To ensure land use activities are located to avoid significant risk of damage from natural hazards and to avoid the need for expensive natural hazard defence or mitigation infrastructure.
Policy 20.3.1.1	<p>Land use and activities avoid areas that may be at risk of significant damage from natural hazards.</p> <p>(a) Ensure district and regional plans restrict land use and activities in areas prone to natural hazards and/or areas that would create a demand for hard protective infrastructure.</p> <p>(b) Recognise and manage the risk and potential effects of climate change and natural hazards in land use planning.</p> <p>(c) Retire and appropriately revegetate erosion-prone lands, including riparian areas and steep slopes, to avoid accelerated erosion from extreme weather events.</p> <p>(d) Support change in existing land use and activities where structures have been built in natural hazards zones, including but not limited to shifting, abandoning or suitably modifying structures to withstand the potential effects of a natural hazard event.</p>
Objective 20.3.2	To manage natural hazard risks (e.g., defence structures) and events in a way that restores and maintains the mauri of the environment.
Policy 20.3.2.1	<p>Natural (or 'soft') defences that maintain the mauri of the environment are used when managing natural hazard risks and events.</p> <p>(a) Resource users and activities are located away from known high risk natural hazard areas where possible, to reduce the need for 'hard' intervention (structures).</p> <p>(b) Ensure the use of natural or 'soft' defences, such as vegetated dunes, wetlands and riparian areas and development setbacks, over hard structures and engineered interventions.</p>
Objective 20.3.3	To ensure Maniapoto are adequately prepared for and resilient to natural hazard events and not exposed to unacceptable risk.
Policy 20.3.3.1	<p>Investment, research and education is provided to ensure Maniapoto are not vulnerable to unacceptable risk from natural hazards.</p> <p>(a) Work with partners to identify and understand the risks within Maniapoto rohe, including identification of acceptable and unacceptable risk.</p> <p>(b) Ensure marae in Maniapoto rohe are appropriately resourced to act as civil defence posts for Maniapoto and the community in the event of a local natural hazard event (e.g., alternative energy sources, sufficient water supply, etc.).</p> <p>(c) Identify and maintain critical infrastructure (e.g., lifeline utilities) to minimise disruptions and ensure their repair is prioritised in the event of</p>

	<p><i>disruption.</i></p> <p>(d) <i>Assess the long term viability of structures that protect Maniapoto communities from natural hazards and maintain those structures where feasible.</i></p> <p>(e) <i>Ensure Maniapoto know how to prepare for natural hazard events and what to do in an emergency.</i></p>
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Appendix 3 Operative District Plan Hazard Provisions

Waikato Section: Chapter 5 - Natural hazards

5.2 Issue - Health, Safety and Property

Health, safety and property can be compromised by land use and development (including land protection works), particularly in areas subject to natural hazards.

OBJECTIVE	POLICIES
<p>5.2.1 Risks from natural hazards to health, safety and property, resulting from use, development or protection of land, are minimised.</p>	<p>5.2.2 Use or development of land subject to significant natural hazards should be avoided.</p> <p>5.2.2A Use or development of other land subject to natural hazards should be required to mitigate the related risks to health, safety and property.</p> <p>5.2.3 Use, development or protection of land should not increase the adverse effects of natural hazards, or compromise natural processes.</p> <p>5.2.4 Construction or alteration of a building should not take place on land that in the event of a 0.5 metre sea-level rise would be:</p> <ul style="list-style-type: none"> (a) below mean high water springs, or (b) subject to inundation by storm surges, or (c) subject to coastal erosion. <p>5.2.5 Development should minimise impervious surfaces, provide adequate stormwater drainage, and mitigate the off-site effects of stormwater drained from the site.</p> <p>5.2.6 Plantation forests should be provided with firebreaks and a source of water for fire fighting.</p> <p>5.2.7 Dwellings should be located where they will not be at abnormal risk from fire.</p> <p>5.2.8 Natural buffers against the effects of natural hazards should be used, maintained, or enhanced.</p>

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OBJECTIVE	POLICIES
	<p>5.2.9 Development should be designed and located to avoid or mitigate the predicted effects of global climate change on natural hazards, especially increased flooding, erosion, fire, and storms. Where there is incomplete information, a precautionary approach should be taken.</p>
<p>5.2.15 Risks from ponding of surface water and poor drainage are avoided.</p>	<p>5.2.16 Subdivision, use and development must not increase ponding hazards.</p> <p>5.2.17 Subdivision, use and development should avoid or mitigate the adverse effects of ponding of surface water.</p> <p>5.2.18 Stormwater management practices and devices should be in accordance with low impact design principles.</p>

Chapter 21 – Living Zone Rules

Landuse Effects	
ITEM	PERMITTED
<p>21.24 <u>Earthworks</u></p>	<p>21.24.1 Any activity is a permitted activity if <u>earthworks</u>:</p> <ul style="list-style-type: none"> (a) are not in the <u>Flood Risk Area</u> except for filling in accordance with rules 21.26 and, (aa) are not in the Huntly East Mine Subsidence Area, and f) do not adversely affect other land through changes in natural water flows or established drainage paths, and ...
<p>21.26 Filling Flood Risk Area</p>	<p>21.26.1 Any activity in a <u>Flood Risk Area</u> (excluding Huntly South Assessment Area 1) is a permitted activity if:</p> <ul style="list-style-type: none"> (a) filling is no more than is necessary to <ul style="list-style-type: none"> i. provide a foundation for building approved by a building consent, and access to that building, or ii. enable minor upgrading of existing electricity lines and does not exceed 50m³.
Landuse Building	

ITEM	PERMITTED
21.52 Building near a lake or river	21.52.1 Construction or alteration of a building is a permitted activity if: (a) the building is set back at least 23m from every lake, river or wetland, and (aa) the building is set back at least 28m from the Waikato River and the Waipa River, and (ab) the building is set back at least 50m from the river on sites to which the River Bank Stability Area applies.
21.53 Building near the coast	21.53.1 Construction or alteration of a building is a permitted activity if: (a) it is set back at least 23m from mean high water springs, and (b) the floor level of any <u>habitable room</u> is at least 3.7m above Moturiki Datum.
21.54 Building in <u>Flood Risk Area</u>	21.54.1 Construction or alteration of a building on land shown on the <u>Planning Map</u> as a <u>Flood Risk Area</u> or other land that is subject to flood hazards is a permitted activity if: (a) the floor level of any <u>habitable room</u> is at least 0.3m above the 1% design flood level, and (b) the floor level of any non- <u>habitable room</u> is at least the 1% design flood level, and (c) wastewater and stormwater disposal systems comply with <u>Appendix B</u> (Engineering Standards).
21.55 Huntly East Mine Subsidence Area	21.55.2 Construction or alteration of a building in Huntly East Mine Subsidence Area is a discretionary activity.
Subdivision	
ITEM	PERMITTED
21.70 Hazard risks policy areas	21.70.1 <u>Subdivision</u> is a controlled activity if: (a) the land is not in the Huntly South Assessment Area, Huntly East Mine Subsidence Area, <u>Flood Risk Area</u> . Control reserved over: • size and area of allotments • mitigation of hazards in other areas.

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Schedule 21A: Te Kauwhata Structure Plan Living Zone Rules Living Zone, Living Zone (New Residential), Living Zone (Te Kauwhata Ecological)

Landuse Effects	
ITEM	PERMITTED
21A.4 <u>Earthworks</u> (including filling using imported fill) - general	21A.4.1 Any activity is a permitted activity if: (a) <u>earthworks</u> are not in a <u>Flood Risk Area</u> except for filling in accordance with rule 21A.6 and, (e) <u>earthworks</u> do not adversely affect other land through changes in natural water flows or established drainage paths, and
21A.6 Filling <u>Flood Risk Area</u>	21A.6.1 Any activity in a <u>Flood Risk Area</u> is a permitted activity if filling: (a) is no more than is necessary to enable minor upgrading of existing electricity lines and does not exceed 50m ³ , and ...
Subdivision	
ITEM	PERMITTED
21A.24 Hazard risk Policy areas	21A.24.1 <u>Subdivision</u> is a controlled activity if: (a) no proposed building platforms are in i. a Flood Risk Area, or ii. any unmapped area where ponding may occur, or iii. a flow path. Control reserved over: <ul style="list-style-type: none"> • size and area of allotments • mitigation of hazards • location of building platforms.

Schedule 21B Te Kauwhata West Living Zone Rules

Landuse Effects	
ITEM	PERMITTED
21B.5 <u>Earthworks</u> (including filling using imported fill) - general	Any activity is a permitted activity if: (a) <u>earthworks</u> are not in a <u>Flood Risk Area</u> except for filling in accordance with rule 21B.6 and ... (e) <u>earthworks</u> do not adversely affect other land through changes in natural water flows or established drainage paths, and ...
Subdivision	
ITEM	PERMITTED
21B.25 Hazard risks Policy areas	21B.25.1 <u>Subdivision</u> is a controlled activity if: (a) no proposed building platforms are in i. a <u>Flood Risk Area</u> , or ii. any unmapped area where ponding may occur, or iii. a flow path. Control reserved over: • size and area of allotments • mitigation of hazards • location of building platforms.

Schedule 21C: Rangitahi Living Zone Rules, Structure Plan and Comprehensive Development Plan

Landuse Effects	
ITEM	PERMITTED
21C.13 <u>Earthworks</u>	21C.13.1 Any activity is a permitted activity if <u>earthworks</u> : (a) are not in the <u>Flood Risk Area</u> except for filling, in accordance with rule <u>21.26</u> , and ... (f) do not adversely affect other land through changes in natural water flows or established drainage paths, and

Chapter 22 – Pa Zone

Landuse Effects	
ITEM	PERMITTED
22.22 <u>Earthworks</u>	<p>22.22.1</p> <p>Any activity is a permitted activity if <u>earthworks</u>:</p> <p>(a) are not in the <u>Flood Risk Area</u> except for filling in accordance with rule 22.24, and</p> <p>(aa) are not in the Huntly East Mine Subsidence</p> <p>....</p> <p>(f) do not adversely affect other land through changes in natural water flows or established drainage paths, and</p> <p>....</p>
22.24 Filling • <u>Flood Risk Area</u>	<p>22.24.1</p> <p>Any activity in a <u>Flood Risk Area</u> (excluding Huntly South Assessment Area 1) is a permitted activity if:</p> <p>(a) filling is no more than is necessary to:</p> <p>i. provide a foundation for building approved by a building consent, and access to that building, or</p> <p>ii. enable minor upgrading of existing electricity lines and does not exceed 50m³.</p>
Landuse Building	
ITEM	PERMITTED
22.45 Building near a lake or river	<p>22.45.1</p> <p>Construction or alteration of a building is a permitted activity if:</p> <p>(a) the building is set back at least 27.5m from:</p> <p>i. the margin of any lake with a bed area of 8ha or more, and</p> <p>ii. the bank of any river whose bed has an average width of 3m or more, and</p> <p>iii. the building is set back at least 50m from the river on sites to which the River Bank Stability Area applies.</p>
22.46 Building near the coast	<p>22.46.1</p> <p>Construction or alteration of a building is a permitted activity if:</p> <p>(a) it is set back at least 23m from mean high water springs, and</p> <p>(b) the floor level of any <u>habitable room</u> is at least 3.7m above Moturiki Datum.</p>

22.47 Building in <u>Flood Risk Area</u>	<p>22.47.1 Construction or alteration of a building on land shown on the <u>Planning Map</u> as a <u>Flood Risk Area</u> or other land that is subject to flood hazards is a permitted activity if:</p> <p>(a) the floor level of any <u>habitable room</u> is at least 0.3m above the 1% design flood level, and</p> <p>(b) the floor level of any non-<u>habitable room</u> is at or above the 1% design flood level, and</p> <p>....</p>
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Chapter 23 – Business Zone

Landuse Effects	
ITEM	PERMITTED
23.26 <u>Earthworks</u>	<p>23.26.1 Any activity is a permitted activity if <u>earthworks</u>:</p> <p>(a) are not in the <u>Flood Risk Area</u> except for filling in accordance with rule 23.28, and</p> <p>(aa) are not in the Huntly East Mine Subsidence Area, and</p> <p>...</p> <p>(f) do not adversely affect other land through changes in natural water flows or established drainage patterns, and</p> <p>...</p>
23.28 Filling <ul style="list-style-type: none"> <u>Flood Risk Area</u> 	<p>23.28.1 Any activity in a <u>Flood Risk Area</u> (excluding Huntly South Assessment Area 1) is a permitted activity if:</p> <p>(a) filling is no more than is necessary to:</p> <p>i. provide a foundation for building approved by a building consent, and access to that building, or</p> <p>ia enable minor upgrading of existing electricity lines and does not exceed 50m³</p>
Landuse Building	
ITEM	PERMITTED
23.50 Building near a lake or river	<p>23.50.1 Construction or alteration of a building is a permitted activity if:</p> <p>(a) the building is set back at least 23m from</p> <p>i. the margin of any lake with a bed area of 8ha or more, and</p> <p>ii. the bank of any river whose bed has an average width of 3m or more and</p>

	<p>(aa) the building is set back at least 28m from the Waikato River and the Waipa River, and</p> <p>(ab) the building is set back at least 50m from the river on sites to which the River Bank Stability Area applies.</p>
<p>23.52 Building in <u>Flood Risk Area</u></p>	<p>23.52.1 Construction or alteration of a building on land shown on the <u>Planning Map</u> as a <u>Flood Risk Area</u> or other land that is subject to flood hazards is a permitted activity if:</p> <p>(a) the floor level of any <u>habitable room</u> is at least 0.3m above the 1% design flood level, and</p> <p>(b) the floor level of any non-<u>habitable room</u> is at or above the 1% design flood level, and</p> <p>...</p>
Subdivision	
ITEM	PERMITTED
<p>23.69 Hazard risks</p>	<p>23.69.1 <u>Subdivision</u> is a controlled activity if:</p> <p>1. the land is not in the Huntly South Assessment Area, Huntly East Mine Subsidence Area, or <u>Flood Risk Area</u>.</p> <p>Control reserved over:</p> <ul style="list-style-type: none"> • size and area of allotments • mitigation of hazards in other areas.

Chapter 24 – Industrial Zone

Landuse Effects	
ITEM	PERMITTED
<p>24.25 <u>Earthworks</u></p>	<p>24.25.1 Any activity is a permitted activity if <u>earthworks</u>:</p> <p>(a) are not in the <u>Flood Risk Area</u> except for filling in accordance with rules 24.27 and</p> <p>(aa) are not in the Huntly East Mine Subsidence Area, and</p> <p>...</p> <p>(f) do not adversely affect other land through changes in natural water flows or established drainage paths, and</p> <p>...</p>

24.27 Filling <ul style="list-style-type: none"> • <u>Flood Risk Area</u> 	24.27.1 Any activity in a <u>Flood Risk Area</u> (excluding Huntly South Assessment Area I) is a permitted activity if: (a) filling is no more than is necessary to i. provide a foundation for building approved by a building consent, and access to that building, or ia enable minor upgrading of existing electricity lines and does not exceed 50m ³ .
Landuse Building	
ITEM	PERMITTED
24.46 Building near a lake or river	24.46.1 Construction or alteration of a building is a permitted activity if: (a) the building is set back at least 30m from i. the margin of any lake with a bed area of 8ha or more, and ii. the bank of any river whose bed has an average width of 3m or more, and (b) the building is set back at least 50m from the bank of the Waikato River, and (ba) the building is set back at least 50m from the river on sites to which the River Bank Stability Area applies.
24.47 Building near the coast	24.48.1 Construction or alteration of a building on land shown on the <u>Planning Map</u> as a <u>Flood Risk Area</u> or other land that is subject to flood hazards is a permitted activity if: (a) the floor level of any <u>habitable room</u> is at least 0.3m above the 1% design flood level, and (b) the floor level of any non- <u>habitable room</u> is at or above the 1% design flood level, and ... Despite (b), any maintenance or alteration of a water take or discharge structure is a permitted activity if: (d) the maintenance or alteration does not cause an increase in water level on a neighbouring property with more than a minor effect, and (e) any alterations do not increase the size of the footprint of the original structure by more than 10%.
Subdivision	
ITEM	PERMITTED
24.76 Hazard risks	24.76.1 <u>Subdivision</u> is a controlled activity if: (a) the land is not in the Huntly South Assessment Area I Huntly East Mine Subsidence Area, <u>Flood Risk Area</u> .

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	Control reserved over: <ul style="list-style-type: none"> • size and area of allotments • mitigation of hazards in other areas.
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Schedule 24F - Nau Mai Business Park

Landuse Effects	
ITEM	PERMITTED
24F.25 <u>Earthworks</u>	<p>24F.25.1</p> <p>Any activity is a permitted activity if <u>earthworks</u>:</p> <p>...</p> <p>(e) do not adversely affect other land through changes in natural water flows or established drainage paths, and</p> <p>...</p>

Chapter 25 – Rural Zone

Landuse Effects	
ITEM	PERMITTED
25.25 <u>Earthworks</u>	<p>25.25.1</p> <p>Any activity is a permitted activity if <u>earthworks</u>:</p> <p>(a) are not in the <u>Flood Risk Area</u> or Land Stability <u>Policy Area</u> except for filling in accordance with rule 25.28 and,</p> <p>(aa) are not in the Huntly East Mine</p> <p>...</p> <p>(f) do not adversely affect other land through changes in natural water flows or established drainage paths, and</p> <p>...</p>
25.28 Filling <ul style="list-style-type: none"> • <u>Flood Risk Area</u> • Land Stability <u>Polic</u> 	<p>25.28.1</p> <p>Any activity in a <u>Flood Risk Area</u> or Land Stability <u>Policy Area</u> is a permitted activity if:</p> <p>(a) filling is no more than is necessary to:</p> <p>i. provide a foundation for building approved by a building consent, and access to that building, or</p> <p>ia enable minor upgrading of existing electricity lines and does not exceed 50m³.</p>

y Area	
Landuse Building	
ITEM	PERMITTED
25.59 Building near a lake or river	<p>25.59.1 Construction or alteration of a building is a permitted activity if:</p> <ul style="list-style-type: none"> (a) the building is set back at least 32m from <ul style="list-style-type: none"> i. the margin of any lake with a bed area of 8ha or more, and ii. the bank of any river whose bed has an average width of 3m or more, <u>and</u> iii. any wetland with an area greater than 1ha and (aa) the building is set back at least 37m from the Waikato River and the Waipa River, and (ab) the building is set back at least 50m from the river on sites to which the River Bank Stability Area applies.
25.60 Buildings near the coast	<p>25.60.1 Construction or alteration of a building is a permitted activity if:</p> <ul style="list-style-type: none"> (a) it is set back at least 32m from mean high water springs, and (b) the floor level of any <u>habitable room</u> is at least 3.7m above Moturiki Datum.
25.61 Building in <u>Flood Risk Area</u>	<p>25.61.1 Construction or alteration of a building on land shown on the <u>Planning Maps</u> as a <u>Flood Risk Area</u> or other land that is subject to flood hazards is a permitted activity if:</p> <ul style="list-style-type: none"> (a) the floor level of any <u>habitable room</u> is at least 0.3m above the 1% design flood level, and (b) the floor level of any non-<u>habitable room</u> is at or above the 1% design flood level, and <p>...</p>
25.69 Huntly East Mine Subsidence Area	<p>25.69.2 Construction or alteration of a building in Huntly East Mine Subsidence Area is a discretionary activity.</p>
25.69C Land Stability <u>Policy Area</u>	<p>25.69C.1 Construction or alteration of a building in the Land Stability <u>Policy Area</u> is a restricted discretionary activity if, after completion:</p> <ul style="list-style-type: none"> (a) there is only one <u>dwelling</u> (including a dependent person's <u>dwelling</u>) on the land contained in the Certificate of Title. <p>Discretion restricted to:</p>

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	<ul style="list-style-type: none"> geotechnical risks associated with the location, size and type of structure including extent to which the proposal would worsen the risk posed by the natural hazard or adversely affect nearby properties manner in which stormwater is disposed of extent of cutting, filling and retaining walls contemplated on site.
Subdivision	
ITEM	PERMITTED
25.80 Hazard risks	<p>25.80.1</p> <p><u>Subdivision</u> is a restricted discretionary activity if:</p> <p>(a) the land is not in the Huntly South Assessment Area, Huntly East Mine Subsidence Area or <u>Flood Risk Area</u>.</p> <p>Discretion restricted to:</p> <ul style="list-style-type: none"> avoidance and mitigation of hazard risk.

Chapter 26 – Coastal Zone

Landuse Effects	
ITEM	PERMITTED
26.25 <u>Earthworks</u>	<p>26.25.1</p> <p>Any activity is a permitted activity if <u>earthworks</u>:</p> <p>(a) are not in the <u>Flood Risk Area</u>, except for filling in accordance with rule 26.27, and</p> <p>(aa) are not in the Huntly East Mine Subsidence Area</p> <p>...</p> <p>(f) do not adversely affect other land through changes in natural water flows or established drainage paths, and</p> <p>...</p>
26.27 Filling <u>Flood Risk Area</u>	<p>26.27.1</p> <p>Any activity in a <u>Flood Risk Area</u> is a permitted activity if:</p> <p>(a) filling is no more than is necessary to</p> <ol style="list-style-type: none"> provide a foundation for building approved by a building consent, and access to that building, or enable minor upgrading of existing electricity lines and does not exceed 50m³.
Landuse Building	

ITEM	PERMITTED
26.44 Building height and bulk	26.44.1 Construction or alteration of a building is a controlled activity if: ... (e) the floor level of any <u>habitable room</u> is at least 3.7m above Moturiki Datum, and ... Control reserved over: ... <ul style="list-style-type: none"> natural hazards ...
26.49 Building setbacks	26.49.1 Construction or alteration of a building is a controlled activity if the building is set back at least: ... (f) (except for pump sheds, public amenities of up to 25m ² on esplanade reserves and public walkways) 32m from: 1. the margin of any lake with a bed area of 8ha or more, and 2. the bank of any river whose bed has an average width of 3m or more, and 3. any wetland with an area greater than 1 hectare. Control reserved over: ... <ul style="list-style-type: none"> natural hazards ...
26.49A Coastal building setbacks	26.49A.1 Construction of a building is a controlled activity if the building is set back at least: (a) 100m from mean high water springs, except as specified in (b), and (b) 32m from mean high water springs, in the case of a building on an allotment wholly within 100m of mean high water springs created under a <u>subdivision</u> consent granted by Council on or before 25 September 2004. Control reserved over: ... <ul style="list-style-type: none"> natural hazards ...

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26.57B Land Stability <u>Policy Area</u>	<p>26.57.B1 Construction or alteration of a building in the Land Stability <u>Policy Area</u> is a restricted discretionary activity if, after completion:</p> <p>(a) there is only one <u>dwelling</u> (including a dependent person's <u>dwelling</u>) on the land contained in the Certificate of Title.</p> <p>Discretion restricted to:</p> <ul style="list-style-type: none"> • geotechnical risks associated with the location, size and type of structure including extent to which the proposal would worsen the risk posed by the natural hazard or adversely affect nearby properties • manner in which stormwater is disposed of extent of cutting, filling and retaining walls contemplated on site.
Subdivision	
ITEM	PERMITTED
26.80 Hazard risks	<p>26.80.1 <u>Subdivision</u> is a restricted discretionary activity if:</p> <p>(a) the land is not in the <u>Flood Risk Area</u> and</p> <p>(aa) every allotment has an area of at least 1000m² not subject to inundation in a 2% probability storm or flood event.</p> <p>Discretion restricted to:</p> <ul style="list-style-type: none"> • size and area of allotments • avoidance or mitigation of natural hazards.

Schedule 26A – Whaanga Coast

Landuse Effects	
ITEM	PERMITTED
26A.25 <u>Earthworks</u>	<p>26A.25.1 Any activity is a permitted activity if <u>earthworks</u>:</p> <p>(a) are not in the <u>Flood Risk Area</u> except for filling in accordance with rule 26.27, and,</p> <p>...</p> <p>(f) do not adversely affect other land through changes in natural water flows or established drainage paths, and</p> <p>...</p>
Landuse Building	
ITEM	PERMITTED

26A.44 Building height and bulk	<p>26A.44.1</p> <p>Construction or alteration of a dwelling, accessory building or papakaainga building is a controlled activity if:</p> <p>...</p> <p>(d) the floor level of any <u>habitable room</u> is at least 3.7m above Moturiki Datum, and</p> <p>...</p> <p>Control reserved over:</p> <p>...</p> <ul style="list-style-type: none"> natural hazards
26A.49 Coastal building setbacks	<p>26A.49.1</p> <p>Construction or alteration of a dwelling, accessory building or papakaainga building is a controlled activity if ... it is set back at least:</p> <p>...</p> <p>(c) 100m from mean high water springs.</p> <p>Control reserved over:</p> <p>...</p> <ul style="list-style-type: none"> natural hazards <p>...</p>

Chapter 27 – Country Living Zone

Landuse Effects	
ITEM	PERMITTED
27.24 <u>Earthworks</u>	<p>27.24.1</p> <p>Any activity is a permitted activity if <u>earthworks</u>:</p> <p>(b) are not in the <u>Flood Risk Area</u> except for filling in accordance with rule 27.26, and,</p> <p>(aa) are not in the Huntly East Mine Subsidence Area</p> <p>...</p> <p>(g) do not adversely affect other land through changes in natural water flows or established drainage paths, and</p> <p>...</p>
27.26 Filling	<p>27.26.1</p> <p>Any activity in a <u>Flood Risk Area</u> is a permitted activity if:</p>

<u>Flood Risk Area</u>	<p>(a) filling is no more than is necessary to</p> <ul style="list-style-type: none"> i. provide a foundation for building approved by a building consent, and access to that building, or ia enable minor upgrading of existing electricity lines and does not exceed 50m³.
Landuse Building	
ITEM	PERMITTED
27.53 Building near a lake or river	27.53.1 Construction or alteration of a building is a permitted activity if: <ul style="list-style-type: none"> (a) the building is set back at least 27.5m from <ul style="list-style-type: none"> i. the margin of any lake with a bed area of 8ha or more, and ii. the bank of any river whose bed has an average width of 3m or more, and (aa) the building is set back at least 32.5m from the Waikato River and the Waipa River, and (ab) the building is set back at least 50m from the river on sites to which the River Bank Stability Area applies.
27.54 Buildings near the coast	27.54.1 Construction or alteration of a building is a permitted activity if: <ul style="list-style-type: none"> (a) it is set back at least 27.5m from mean high water springs, and (b) the floor level of any <u>habitable room</u> is at least 3.7m above Moturiki Datum.
27.54A Buildings near a gully	27.54A.1 Construction or alteration of a building or <u>building platform</u> is a permitted activity on any site containing a gully shown on the planning map if: <ul style="list-style-type: none"> (a) it is not located within the gully, and (b) it is set back at least 15m from the top contour of the gully.
27.55 Building in <u>Flood Risk Area</u>	27.55.1 Construction or alteration of a building on land shown on the <u>Planning Map</u> as a <u>Flood Risk Area</u> or other land that is subject to flood hazards is a permitted activity if: <ul style="list-style-type: none"> (a) the floor level of any <u>habitable room</u> is at least 0.3m above the 1% design flood level, and <ul style="list-style-type: none"> i. the floor level of any non-<u>habitable room</u> is at or above the 1% design flood level, and ...
Subdivision	
ITEM	PERMITTED

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27.69 Hazard risks	<p>27.69.1 <u>Subdivision</u> is a controlled activity if:</p> <p>(a) the land is not in the <u>Flood Risk Area</u>.</p> <p>Control reserved over:</p> <ul style="list-style-type: none"> • avoidance, mitigation or remedy of hazard risk.
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Chapter 28 – Recreation Zone

Landuse Effects	
ITEM	PERMITTED
28.22 <u>Earthworks</u>	<p>28.22.1 Any activity is a permitted activity if <u>earthworks</u>:</p> <p>(a) are not in the <u>Flood Risk Area</u>, except for filling in accordance with rule <u>28.24</u>, and,</p> <p>(aa) are not in the Huntly East Mine Subsidence Area, and</p> <p>...</p> <p>(f) do not adversely affect other land through changes in natural water flows or established drainage paths, and</p> <p>...</p>
28.24 Filling <u>Flood Risk Area</u>	<p>28.24.1 Any activity in a <u>Flood Risk Area</u> is a permitted activity if:</p> <p>(a) filling is no more than is necessary to:</p> <ol style="list-style-type: none"> provide a foundation for building approved by a building consent, and access to that building, <u>or</u> enable minor upgrading of existing electricity lines and does not exceed 50m³.
Landuse Building	
ITEM	PERMITTED
28.42 Building near a lake or river	<p>28.42.1 Construction or alteration of a building is a permitted activity if:</p> <p>(a) the building is set back at least 32m from</p> <ol style="list-style-type: none"> the margin of any lake with a bed area of 8ha or more, and the bank of any river whose bed has an average width of 3m or more and

	<p>(aa) the building is set back at least 37m from the Waikato River and the Waipa River, and</p> <p>(ab) the building is set back at least 50m from the river on sites to which the River Bank Stability Area applies.</p>
28.43 Buildings near the coast	<p>28.43.1</p> <p>Construction or alteration of a building is a permitted activity if:</p> <p>(a) it is set back at least 32m from mean high water springs, and</p> <p>(b) the floor level of any <u>habitable room</u> is at least 3.7m above Moturiki Datum.</p>
28.44 Building in <u>Flood Risk Area</u>	<p>28.44.1</p> <p>Construction or alteration of a building on land shown on the <u>Planning Map</u> as a <u>Flood Risk Area</u> or other land that is subject to flood hazards is a permitted activity if:</p> <p>(a) the floor level of any <u>habitable room</u> is at least 0.3m above the 1% design flood level, and</p> <p>(b) the floor level of any non-<u>habitable room</u> is at or above the 1% design flood level, and</p> <p>...</p>

Franklin Section: Part 7 - Natural hazards

7.2.1 Issues

1. Land use, subdivision and development in areas prone to natural hazards creates risks to people, property, infrastructure and the environment.
2. Human activities including land use, subdivision and development can exacerbate the risk from natural hazards.
3. Some natural hazard avoidance, remedial or mitigation measures have the potential to adversely affect natural character, public access and ecological values.
4. Lack of public awareness of natural hazards and factors that exacerbate natural hazards increases risks.
5. Measures to manage natural hazards have the potential to adversely affect historic heritage.

7.2.2 Objectives

Instability

1. To ensure activities on land subject to, or likely to be subject to, instability do not cause, increase or contribute to the risk from natural hazards.

Inundation

1. To ensure that the risk to property and the environment from flooding caused by watercourse, stormwater overflow and inundation by coastal waters are reduced.

Erosion

1. To ensure that the adverse effects to property and the environment from erosion including coastal erosion are avoided, remedied or mitigated.

General

1. To ensure that the public are informed about natural hazards in the district and understand why subdivision, land use and development activities must avoid, remedy, or mitigate the adverse effects from natural and land hazards.

7.2.3 Policies

Instability

1. Adverse effects arising from land use and development, including the creation of development rights through subdivision, shall be avoided, remedied or mitigated on land that is unstable and it shall be demonstrated that the activity will not accelerate, exacerbate, or cause damage to the land or property or neighbouring land or property or present a risk to human safety.
2. Stormwater discharges directly to ground shall be avoided on land that is potentially unstable unless it is identified by an appropriately qualified person as being suitable to receive and absorb such discharges without causing adverse effects on the land stability of the site or neighbouring land.
3. Activity and development shall not cause instability or erosion in the coastal or riparian margins and the need for hard protection works will be avoided where practicable.

Inundation

1. Land use and development including the creation of development rights through subdivision on land within the 1% ANNUAL EXCEEDANCE PROBABILITY floodplain shall be avoided unless the risk from flooding to land, buildings and structures is avoided, remedied or mitigated.
2. Stormwater management systems should include low impact design responses where possible or include both 'hard' options (piped systems, secondary flowpaths) and 'soft' options (planted riparian margins, low impact designs and open drains) as appropriate.
3. Adverse effects on flood protection works shall be avoided, remedied or mitigated.

Erosion

1. Land use and development including the creation of development rights through subdivision shall be avoided along the banks of streams, rivers, lakes and watercourses unless it can be demonstrated that this will not cause, accelerate or exacerbate erosion.
2. Land use and development including the creation of development rights through subdivision shall be located and designed to avoid, remedy or mitigate adverse effects on and from natural coastal and river processes and to avoid where practicable the need for protection works.
3. Land use and development including the creation of development rights through subdivision shall only occur if the activity maintains and enhances the natural buffering features of the coastal environment (including sand dunes and wetlands).

General

1. A precautionary approach to natural hazard management shall be used where limited information on the hazard risk exists.
2. A precautionary approach shall be used in avoiding or mitigating the adverse effects on people, property, infrastructure and the environment of earthquake, volcanic activity, sea level rise, tsunami and global climate change.
3. Steps should be taken to ensure that any adverse effects of natural hazard management on historic heritage are appropriately avoided, remedied, or mitigated.

7.3 Natural Hazard Avoidance and Mitigation

Notwithstanding the standards or controls contained in any other part of the Plan, the following standards shall be complied with. Where an activity does not comply with Rule 7.3.1, the activity shall be deemed to require consent as a Restricted Discretionary activity. Where an activity does not comply with any other rule in 7.3, then the activity will be assessed as a Discretionary Activity (unless a higher activity status applies in the specific zone rules). All applications shall be assessed against the objectives and policies of Part 7, the assessment criteria in Part 53 and any specific assessment criteria identified for the zone the activity is proposed to be undertaken in.

7.3.1

No BUILDING shall be sited within 30 metres of the edge of a river, lake, WETLAND or stream, unless this is specifically provided for or exempt in specific zone rules and exempt for the Aggregate Extraction and Processing Zone.

This rule does not apply to artificial water retention areas (e.g. ponds or sediment retention areas).

7.3.2

The minimum floor level for any new OCCUPIABLE FLOOR SPACE shall be 500 millimetres above the 1% Annual Exceedance Probability floodplain or ponding level OR 500 millimetres above the highest observed flood level, whichever is the greater.

Note: Areas subject to the 1% Annual Exceedance Probability floodplain or pond level under Rule 7.3.1 include, but are not limit to, all or part of the:

- Areas specifically identified within a Drainage District.
- Areas specifically identified on the Hazards Register.
- Areas specifically identified in a Catchment Management Plan.
- Areas specifically identified in the PLAN.
- Port Waikato Ponding Area where the minimum floor level is RL 3.0.
- Waikato River Management Area.

7.3.3

The minimum floor level for any new OCCUPIABLE FLOOR SPACE in the low lying areas adjoining the Firth of Thames and shown on the Hazards Register shall be RL 3.5m (Reduced Level 3.5 metres) in terms of the LINZ (Land Information New Zealand) Datum OR 500 millimetres above the highest observed flood level, whichever is the greater.

7.3.4

SPECIFIED BUILDING AREAS and BUILDINGS shall be located outside the 1% ANNUAL EXCEEDANCE PROBABILITY floodplain or ponding level plus any applicable freeboard.

7.3.5

Structures (not defined as BUILDINGS) within the 1% ANNUAL EXCEEDANCE PROBABILITY floodplain or ponding level shall not inhibit or divert overland flow paths onto neighbouring properties, exacerbate or accelerate the hazard.

7.3.6

Onsite wastewater disposal systems shall be outside the 5% ANNUAL EXCEEDANCE PROBABILITY floodplain or ponding level.

7.3.7

HAZARDOUS SUBSTANCES shall be stored outside the 1% ANNUAL EXCEEDANCE PROBABILITY floodplain or ponding level.

Part 11 - Recreation and Reserves

11.3 Esplanade Reserves and Esplanade Strips

Esplanade reserves and esplanade strips are pieces of land adjoining the coast, rivers (including streams), or lakes. Under the Act they have one or more of the following general purposes:

- Helping to protect ecological and conservation values - including water quality, aquatic habitats and the mitigation of natural hazards such as coastal erosion;

11.4.1 Objectives

1. To protect property and the environment from the adverse effects of natural hazards, in particular coastal erosion.

Policies:

3. Acquire esplanade reserves or strips for the purposes of mitigating the potential effects of natural hazards, in particular coastal erosion and inundation.

16.5.3 Management of Coastal Hazards

Issues:

Coastal hazards (including coastal erosion, coastal flooding and wind erosion) are naturally occurring processes that affect the Franklin coast. In addition, there is the potential impact of sea level rise from predicted climate change.

Erosion problems at some existing settlements have led to the placement of erosion protection works, which have seriously degraded the natural character, amenity values and public access along the coast at many sites (e.g. Glenbrook Beach and Clarks Beach). These adverse impacts are incompatible with relevant statutory provisions and the use of hard engineering structures to manage coastal erosion is becoming increasingly unacceptable to relevant consenting agencies.

Present best estimates suggest that mean sea level may rise by 0.3-0.5m over the next 100 years. That in turn has the potential to further increase coastal hazard risk.

Therefore, in order to avoid erosion hazard problems and adverse impacts on coastal values, future subdivision and development around the Franklin coast will need to allow a sufficient buffer zone to accommodate natural shoreline movements and erosion.

Consideration has been given to coastal hazards in the establishment of a 'Coastal Protection Setback'.

Adverse Effects of Coastal Hazard Structures:

1. Degradation of the natural character of the coast
2. Loss of amenity values
3. Loss of public access to and along the coast
4. Destruction of land-based assets by coastal hazards

Beneficial Effects of Coastal Protection Setback:

1. Enhanced natural character of the coast
2. Enhanced amenity values
3. Enhanced public access to and along the coast
4. Less damage to property including buildings and structures

17E.7 - Tasman Coast Management Area

17E.6.4 Waikato River Management Area Policies

1. Manage use and development in hazard prone areas to minimize the impacts of flooding and erosion.

17E.7.3 Tasman Coast Objectives

2. To recognise natural coastal processes by avoiding subdivision, use and development, which would create coastal hazards.

17E.7.4 Tasman Coast Policies

2. Avoid land modification and development along sandy coastal margins and seaward faces of the coastal escarpments or ridgelines.

.....

6. Promote community-based beach care initiatives and apply coastal protection setbacks for development.

....

Part 22B Activity Status, Performance Standards, Assessment Criteria for Subdivision in the Rural Zone, Coastal Zone, Wetland

Conservation Zone and Forest Conservation Zone

22B.7.1 General Performance Standards

Each subdivision (except pursuant to Rule 22B.2.1) shall meet the following Performance Standards:

7. Natural Hazards

Lots shall be sited so as to avoid or mitigate the potential effects of natural hazards.

22B.8 Matters over which Council will reserve its Control and exercise its Discretion

16. The avoidance or mitigation of the potential effects of natural hazards.

Part 22D Village Zone Subdivision

22D.8 Assessment of Restricted Discretionary Activities - Matters of Discretion and Conditions

(2) For subdivision consent applications provided for in Rule 22D.3 (except for concepts plans – refer Part 22D.9), the Council has restricted its discretion to the consideration of the following matters, and may impose conditions of consent in respect to:

(xv) The avoidance, remediation or mitigation of the potential effects of natural hazards.

(3) Applications for Restricted Discretionary Activity Resource Consent for subdivision will be assessed against the following criteria and the relevant objectives and policies of Part 17B.

(e) Natural Hazards

Whether the subdivision avoids, remedies or mitigates the potential effects of natural hazards.

Part 23A - Rural Zone

23A.2.1 All Permitted and Controlled Activities

All Permitted and Controlled Activities in the Rural Zone shall, unless otherwise stated, meet the following standards:

23A.2.1.9 Natural Hazards

BUILDINGS shall be sited so as to avoid or mitigate the potential effects of natural hazards.

23A.4.1 All Restricted Discretionary Activities

The Council will restrict its discretion to the following matters, those matters listed in Part 53 and the matters listed in 23A.4.1 when considering resource consent applications for Restricted Discretionary Activities.

9. DEVELOPMENT SETBACKS have the following purpose:

- Avoiding the effects of natural hazards.

23A.5 Assessment Criteria for Discretionary Activities - Rural Zone

7. Natural Hazards

The extent to which the potential adverse effects of natural hazards on the environment are avoided, remedied, or mitigated.

Part 23B - Coastal Zone

23B.2.1 All Permitted and Controlled Activities

All Permitted and Controlled Activities in the Coastal Zone shall, unless otherwise stated, meet the following standards.

9. Natural Hazards

BUILDINGS shall be sited so as to avoid or mitigate the potential effects of natural hazards including those unstable sandy areas within the Tasman Coast

Management Area.

23B.3 Controlled Activity Matters - Coastal Zone

All Permitted and Controlled Activities in the Coastal Zone shall, unless otherwise stated, meet the following standards.

9. Natural Hazards

BUILDINGS shall be sited so as to avoid or mitigate the potential effects of natural hazards including those unstable sandy areas within the Tasman Coast Management Area.

23B.4.1 For all Restricted Discretionary Activities

The Council will restrict its discretion to the following matters, those matters listed in Part 53 and the matters listed in 23B.4.1 when considering resource consent applications for Restricted Discretionary Activities.

9. DEVELOPMENT SETBACKS have the following purpose:

- Avoiding the effects of natural hazards.

Part 23C - Village Zone

23C.3 Controlled Activity Matters - Village Zone

All Controlled Activities shall comply with the applicable performance and DEVELOPMENT standards for Controlled Activities (Rule 23C.2) and in assessing and granting consent to a Controlled Activity, the Council may exercise control over those of the following matters that are relevant to the proposal:

17. Natural Hazards

The extent to which the BUILDINGS, EARTHWORKS or other modifications of the land or ECOSYSTEM proposed will be likely to add to or create a natural hazard, or be visually intrusive.

23C.4 Assessment Criteria for Restricted Discretionary Activities - Village Zone

1. The Council will restrict its discretion to the following matters, those matters listed in Part 53 and the matters listed in 23C.4.1 when considering resource consent applications for Restricted Discretionary Activities.

12. Ecology and Landform

(ii) The extent to which BUILDINGS, EARTHWORKS or other modifications of the land or ecosystems will add to or create a natural hazard, or increase the potential effects of a natural hazard.

Part 27 - Residential Zone

27.8 Assessment of Restricted Discretionary Activities

- The extent to which BUILDINGS, EARTHWORKS or other modifications of the land or ecosystems will add to or create a natural hazard, or increase the potential effects of a natural hazard.

Part 35 Aggregate Extraction and Processing Zone

35.8 Assessment of Restricted Discretionary Activities

In assessing applications for consent to Restricted Discretionary activities, the Council will, in making a decision, restrict the exercise of its discretion to the following matters and conditions of consent will only relate to these matters:

(e) Natural Hazards;

When assessing an application for a Restricted Discretionary activity resource consent, the Council is to have regard to the following assessment criteria and any relevant matters set out in section 104 of the Act.

(e) Natural Hazards:

The extent to which the potential adverse effects of natural hazards on the environment are avoided, remedied, or mitigated.

Part 38A Tuakau Industrial Services Zone (TISZ): Subdivision Provisions

38A.6 Assessment Criteria for Controlled Activities

Controlled activity subdivisions shall be assessed against the following criteria:

7. Hazards
8. Lots intended for private ownership shall not be located on land subject to natural hazards and subdivision must avoid worsening any known hazard affecting the site or surrounding land and where possible remedy any known hazard.

Part 41A Tuakau Industrial Zone (TIZ): Subdivision Provisions

41A.6 Assessment Criteria for Controlled Activities

Controlled activity subdivisions shall be assessed against the following criteria:

7. Hazards

Lots intended for private ownership should not be located on land subject to natural hazards and subdivision must avoid worsening any known hazard affecting the site or surrounding land and where possible remedy any known hazard.

**Proposed Waikato District Plan Stage 2 – Section 32 - Appendix
4 Proposed District Plan (Stage 2) Chapter 15 and Variation 2
to Stage 1**

Released to open (WDC2007/05)

PROPOSED WAIKATO DISTRICT PLAN



NATURAL HAZARDS & CLIMATE CHANGE

27 July 2020

Chapter 15: Natural Hazards and Climate Change

15.1 Introduction

Stage 2 Content

- (1) The Natural Hazards chapter manages land use in areas subject to the risk from natural hazards. It identifies areas where certain types of new development will be avoided because of the natural hazards present, but also recognises that there is existing development, including infrastructure and historic heritage, already located on land subject to natural hazards. These areas will require management through mitigation and adaptation to ensure that the risk of damage to property or injury or loss of lives is not increased.
- (2) Maaori freehold land has particular considerations when addressing the potential impact of natural hazards and climate change. This issue has been recognised in this chapter.
- (3) This district plan adopts a risk-based approach to natural hazard management. The risk that natural hazards pose to the Waikato District is made up of several factors including:
 - (a) the nature, magnitude and extent of the hazard;
 - (b) the anticipated frequency or probability of the hazard event occurring; and
 - (c) the exposure and vulnerability of the environment to the hazard, including the likely community losses/damages that could occur.
- (4) An understanding of both the scale and likelihood of the natural hazard event, and the likely consequences to the community, are central to the risk-based approach. From a district plan perspective, a risk-based approach requires identification and management of activities based on the level of risk to which they are exposed (e.g. farming may be acceptable in a high flood risk area, whereas residential development may not). The level of control over activities in the district plan is therefore related to the level of risk, and whether such risks are considered acceptable or not.
- (5) More frequently occurring natural hazards in the Waikato District include flooding, coastal erosion and land instability (land slips and subsidence). The Waikato and Waipa Rivers for instance, flow through the district and can carry large flood flows. The coastal margins are subject to storm events, and sandy areas are particularly vulnerable to erosion by such events. In addition, flood ponding often occurs after heavy rainfall in the Waikato basin.
- (6) New Zealand in general is a high earthquake hazard region and earthquake (and associated fault movement, ground shaking and liquefaction) considerations are integral to the design of the built environment [1]. Location of faults in Waikato District may be problematic, due to alluvial sediment and associated processes masking fault traces. While liquefiable soils are generally found within Holocene sediments in river valleys, more work is required within the Waikato District to determine areas where the liquefaction risk is high.
- (7) Less frequent natural hazards in the Waikato District, such as wild fires, tsunamis, extreme wind events and drought, may not need a district plan response. Emergency management by groups such as Civil Defence play a significant role, using hazard management tools such as education and advocacy, warning systems and emergency preparedness. There are also non-statutory instruments or processes, such as civil

defence recovery plans, and programmes to increase community preparedness, including contingency planning. Insurance and emergency services also play an important role.

- (8) High quality up-to-date information is important for natural hazard risk management. The district plan requires the use of the best information available to identify land that may be subject to natural hazards. This includes hazard maps, databases (such as the regional and district hazard registers) and technical reports held by the Council, and the interpretation of these by qualified and experienced professionals.
- (9) Climate change has the potential to increase risk through exacerbating natural hazards, but will also have effects on the environment beyond natural hazards. The Ministry for the Environment predicts the effects of climate change on the Waikato District to include overall warmer temperatures, fewer frosts, a decrease in spring rainfall, increased storm events (including extreme winds) and an average rise in mean sea level. This is likely to mean more frequent droughts leading to water shortages, more inland flooding and salt water intrusion in low-lying coastal areas and an increase in erosion and land instability. For this reason, an allowance for the projected effects of climate change has been included in the 2D flood modelling of key risk areas within this district plan (Horotiu - Huntly - Ohinewai). Specific provision has also been made within the Coastal Sensitivity Areas in respect to development that may be impacted by the projected effects of sea level rise over a 100 year timeframe.
- (10) The Floodplain Management Area is the 1% Annual Exceedance Probability (AEP) floodplain, and is identified through both 1D and 2D modelling, depending on the level of information available. Between Horotiu - Huntly – Ohinewai, where 2D modelling is available, High Flood Risk Areas have also been identified. These are areas within the flood plain where the depth of flood water in a 1% AEP flood event exceeds 1 metre and the speed of flood water exceeds 2 metres per second, which is considered to put the community at an unacceptable (or intolerable) level of risk in terms of the potential for loss of life, injury or serious damage to property. Subdivision and new activities within the High Flood Risk overlay are carefully regulated.
- (11) The planning maps identify only two flood ponding areas that experience floodwater ponding in a 1% AEP rainfall event. One of the areas is located in the southern part of Huntly adjacent to the river and the other is west of Huntly across the Waikato River adjacent to Lake Waahi and Lake Puketirini. The flood plain rules in this district plan apply to 1% AEP ponding areas including the two specifically identified in the district plan. Other 1% AEP ponding areas will be required to be identified by a suitably-qualified and experienced professional as part of an application for resource consent or a plan change.
- (12) Residual Risk Areas are areas of land that would be at risk from a natural hazard event if it were not for a structural defence such as a stopbank. In the district plan, these are areas of land protected by stopbanks with a design level of service of at least a 1% AEP flood event, and are generally located along the length of the Waikato River. For the purpose of the district plan, these areas have been called Defended Areas. The district plan includes provision for land protected by stopbanks to ensure that the residual risk is understood and considered as part of any subdivision or development proposals, or any proposal to rezone land to a more intensive land use.

- (13) The High Risk Coastal Hazard (Inundation) Area and High Risk Coastal Hazard (Erosion) Area overlays identify land where there is significant risk from either coastal inundation or coastal erosion with existing sea level and coastal processes. The Coastal Sensitivity Area (Erosion) and Coastal Sensitivity Area (Inundation) overlays identify land that is potentially vulnerable to either coastal erosion or coastal inundation over a 100 year period to 2120, assuming a sea level rise of 1.0 metre.
- (14) While liquefaction areas have not been identified on the planning maps, provisions in the district plan require this seismically-induced natural hazard to be assessed before new zonings or subdivision and development are undertaken. This will primarily be achieved through resource consent or plan change processes.
- (15) Areas of slope instability can occur within the district. To comprehensively identify these areas over the entire district is not practical, given the size of the district and the changing circumstances in which slope instability occurs (often after high rainfall or seismic events). Consequently, assessment matters are included in the subdivision rules that require a geotechnical investigation to confirm that a building platform is stable before subdivision or development takes place.
- (16) Subsidence has occurred at Huntly due to former underground coal mining and is identified as a Mine Subsidence Risk Area. Risk to new dwellings in this area is regulated through a discretionary activity resource consent process.
- (17) Wind and seismic loadings are controlled by the Council under the Building Act 2004. The risk of fire hazard is controlled by the Waikato Regional Council, the Department of Conservation and the Waikato District Council through legislation other than the RMA, using both regulation and by increasing public awareness through information.
- (18) Methods to increase resilience to projected changes in climatic conditions will increasingly be incorporated into all aspects of land use planning and natural hazard management. Further to this, there will be an increased focus on environmental protection and facilitating inland migration of biodiversity. Methods in this district plan will include promoting low impact urban design and green infrastructure, and increased coastal hazard setbacks to provide a more sustainable and adaptive approach to development.

[1] MBIE module 3: Identification, Assessment and Mitigation of Liquefaction Hazards May 2016 Rev 0

15.2 Objectives and policies

Objective 15.2.1 - Resilience to natural hazard risk

Stage 2 Content

A resilient community where the risks from natural hazards on people, property, infrastructure and the environment from subdivision, use and development of land are avoided or appropriately mitigated.

Policy 15.2.1.1 - New development in areas at significant risk from natural hazards

Stage 2 Content

- (a) Avoid new subdivision, use and development where they will increase the risk to people's safety, well-being and property in the following areas identified as being at significant risk from natural hazards:

- (i) High Risk Flood Area;
- (ii) High Risk Coastal Hazard (Inundation) Area;
- (iii) High Risk Coastal Hazard (Erosion) Area.

Policy 15.2.1.2 - Changes to existing land use activities and development in areas at significant risk from natural hazards

Stage 2 Content

- (a) In areas of High Risk Flood, High Risk Coastal Hazard (Erosion) and High Risk Coastal Hazard (Inundation), ensure that when changes to existing land use activities and development occur, a range of risk reduction options are assessed, and development that would increase risk to people's safety, well-being and property is avoided.

Policy 15.2.1.3 - New emergency services and hospitals in areas at significant risk from natural hazards

Stage 2 Content

- (a) Avoid locating new emergency service facilities and hospitals in areas which are at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion), unless, considering engineering and technical constraints or functional and operational requirements, they cannot be reasonably located elsewhere and will not increase the risk to or vulnerability of people or communities.

Policy 15.2.1.4 - New infrastructure and utilities in areas subject to significant risk from natural hazards

Stage 2 Content

- (a) Enable the construction of new infrastructure and utilities in areas at significant risk from natural hazards, including High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) areas only where:
 - (i) the infrastructure and utilities are technically, functionally or operationally required to locate in areas subject to natural hazards, or it is not reasonably practicable to be located elsewhere; and
 - (ii) any increased risks to people, property and the environment are mitigated to the extent practicable; and
 - (iii) the infrastructure and utilities are designed, maintained and managed, including provision of hazard mitigation works where appropriate, to function to the extent practicable during and after natural hazard events.

Policy 15.2.1.5 - Existing infrastructure and utilities in all areas subject to natural hazards

Stage 2 Content

- (a) Provide for the operation, maintenance and minor upgrading of existing infrastructure and utilities in all areas subject to natural hazards.

Policy 15.2.1.6 - Managing natural hazard risk generally

Stage 2 Content

- (a) Provide for rezoning, subdivision, use and development outside High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) Areas where natural hazard risk has been appropriately identified and assessed and can be adequately avoided, remedied or mitigated and does not transfer or exacerbate risk to adjoining properties.

Policy 15.2.1.7 - Protection from risks of coastal hazards

Stage 2 Content

- (a) Recognise the importance of natural features and buffers, and soft hazard protection works, and prefer them wherever practicable over hard protection structures, where new hazard mitigation measures and/or works are required to protect people, property infrastructure and the environment from the risks of coastal hazards.

Policy 15.2.1.8 - Limitations on hard protection works for coastal hazard mitigation

Stage 2 Content

- (a) Ensure that where new hard protection structures and works are necessary to protect existing development on public or privately-owned land from coastal hazards, they are appropriately assessed and controlled and:
 - (i) have primarily a public and/or environmental benefit when located on public land;
 - (ii) are effective;
 - (iii) the economic, social and environmental benefits outweigh costs; and
 - (iv) do not transfer or increase risk to other people, property, infrastructure, the natural environment, historic heritage or Maaori Sites and Areas of Significance.
- (b) Ensure that when new hard protection structures are to be located in an area where an adaptive management strategy has been prepared to manage coastal hazards, they are consistent with that strategy.

Policy 15.2.1.9 - Natural features and buffers providing natural hazard protection

Stage 2 Content

- (a) Protect, maintain and, where appropriate, enhance the integrity of natural features and buffers which provide a natural defence against the effects of natural hazards and sea level rise, including natural ponding areas, coastal dunes, intertidal areas, wetlands, waterbody margins, riparian/coastal vegetation and floodways.

Policy 15.2.1.10 – Areas defended by stopbanks adjacent to the Waikato River

Stage 2 Content

- (a) Control subdivision, use and development in areas identified as Defended Areas adjacent to the Waikato River by:
 - (i) assessing the potential risk of overtopping or structural failure of the stopbanks, and overwhelming of associated flood protection structures, before subdivision and development occurs; and
 - (ii) requiring that consideration be given to appropriate mitigation to reduce any residual risk

- identified; and
 - (iii) ensuring that any residual risk is not transferred to neighbouring sites.
- (b) Specify minimum setbacks for buildings and earthworks from stopbanks to:
- (i) protect the structural integrity of the stopbanks; and
 - (ii) provide a buffer to reduce the potential risk to life and damage to property from deep and fast-flowing flood waters in the event of a breach.

Policy 15.2.1.11 - New development that creates demand for new protection structures and works

Stage 2 Content

- (a) Avoid locating new subdivision, use and development in High Risk Flood, High Risk Coastal Hazard (Inundation) and High Risk Coastal Hazard (Erosion) Areas where a demand or need for new structural protection works will be required to reduce the risk from natural hazards to acceptable levels.

Policy 15.2.1.12 - Reduce potential for flood damage to buildings located on the Waikato and Waipa River floodplains and flood ponding areas

Stage 2 Content

- (a) Reduce the potential for flood damage to buildings located on the Waikato and Waipa River floodplains and flood ponding areas by ensuring that the minimum floor level of building development is above the design flood levels / ponding levels in a 1% AEP flood event, plus an allowance for freeboard, unless:
- (i) the building development is of a type that is not likely to suffer material damage during a flood; or
 - (ii) the building is a small-scale addition to an existing building; or
 - (iii) the risk from flooding is otherwise avoided, remedied or mitigated.

Policy 15.2.1.13 - Control filling of land within the 1% AEP floodplain and flood ponding areas

Stage 2 Content

- (a) Control filling of land within the 1% AEP floodplain and flood ponding areas to ensure that the potential adverse effects on flood storage capacity, overland flows, run-off volumes on surrounding properties on infrastructure, are avoided or mitigated.

Policy 15.2.1.14 – Hazardous substances located within floodplain and flood ponding areas

Stage 2 Content

- (a) Ensure that the location and storage of hazardous substances within the 1% AEP floodplain and flood ponding areas do not create an unacceptable hazard to people, property or the environment.

Policy 15.2.1.15 - Flood ponding areas and overland flow paths

Stage 2 Content

- (a) Manage stormwater hazards by requiring new subdivision and development within flood ponding areas and overland flow paths to adopt integrated catchment plan-based stormwater management methods which:

- (i) maintain the flood storage capacity of natural floodplains, wetlands and ponding areas; and
- (ii) retain the function and capacity of overland flow paths to convey stormwater run-off; and
- (iii) do not transfer or increase risk elsewhere; and
- (iv) promote low impact stormwater management practices with reference to the [Waikato Stormwater Management Guideline](#) and the [Regional Infrastructure Technical Specifications \(RITS\)](#); and
- (v) minimise impervious surfaces.

Policy 15.2.1.16 - Development in the Coastal Sensitivity Areas

Stage 2 Content

- (a) In Coastal Sensitive Areas identified on the planning maps, control subdivision, use and development by ensuring that the subdivision, use or development is:
 - (i) supported by a detailed site-specific risk assessment, which includes measures to address the effects of climate change; and
 - (ii) designed, constructed and located to minimise the level of risk to people, property and the environment.

Policy 15.2.1.17 - Setbacks from the coast

Stage 2 Content

- (a) Avoid increasing the risk from coastal hazards by requiring new built development to be set back from the coastal edge, unless there is a functional or operational need for facilities to be located at or near the coast.

Policy 15.2.1.18 - Residential development potentially subject to fire risk

Stage 2 Content

- (a) In areas assessed or identified as being potentially subject to elevated fire risk, ensure that an appropriate buffer area or setback is provided around new residential subdivision and development.

Policy 15.2.1.19 - Development on land subject to instability or subsidence

Stage 2 Content

- (a) Avoid locating new subdivision, use and development, including rezoning, on land assessed as being subject to, or likely to be subject to, instability or subsidence, unless appropriate mitigation is provided and the activity does not increase the risk to people, property or infrastructure.

Policy 15.2.1.20 - Development of land in the Mine Subsidence Risk Area

Stage 2 Content

- (a) On land identified within the Mine Subsidence Risk Area, ensure that:
 - (i) an assessment by an appropriately-qualified engineer occurs before subdivision, use or development takes place to confirm that the land is suitable for development; and
 - (ii) buildings are designed and constructed, and uses appropriate materials, to effectively minimise

the risk of damage to the buildings from ground subsidence.

Policy 15.2.1.21 - Stormwater management in areas subject to risk of land instability or subsidence

Stage 2 Content

- (a) Avoid discharge of stormwater directly to ground on land that is potentially at risk of land instability or subsidence unless:
 - (i) an assessment has been undertaken by an appropriately-qualified geotechnical specialist, indicating that the site is suitable for the proposed discharges; and
 - (ii) any adverse effects on the site and receiving environment can be appropriately mitigated.

Policy 15.2.1.22 - Liquefaction-prone land risk assessment

Stage 2 Content

- (a) On land potentially prone to liquefaction, ensure that:
 - (i) an assessment by a geotechnical specialist occurs before new subdivision, use or development takes place; and
 - (ii) the level of assessment reflects the type and scale of the subdivision, use or development and the overall vulnerability of the activity to the effects of liquefaction.

Policy 15.2.1.23 – Control activities on land susceptible to damage from liquefaction

Stage 2 Content

- (a) Control subdivision, use and development on land assessed as being susceptible to liquefaction-induced ground damage, to ensure that appropriate mitigation is provided so that the level of risk to people, property, infrastructure and the environment is acceptable.

Objective 15.2.2 - Awareness of natural hazard risks

Stage 2 Content

A well-informed community that:

- (a) is aware of, and understands, which natural hazards affect the district; and
- (b) is able to effectively and efficiently respond to, and recover from, natural hazard events.

Policy 15.2.2.1 - Natural hazard risk information

Stage 2 Content

- (a) Enable people to be informed and have access to information on the natural hazards affecting their properties and surrounding area, including through:
 - (i) provision of Land Information Memoranda;
 - (ii) natural hazard technical information, risk registers and mapping on the Council's website, the Waikato Regional Council Hazards Portal, this district plan and accompanying planning maps;
 - (iii) education, provision of information and community engagement; and

- (iv) alignment with the work of other agencies including iwi and the Waikato Regional Council.

Policy 15.2.2.2 - Awareness of Community Response Plans

Stage 2 Content

- (a) Improve response to and recovery from natural hazard events by encouraging community awareness and use of information and methods contained in Community Response Plans.

Objective 15.2.3 - Climate change

Stage 2 Content

A well-prepared community that:

- (a) is able to adapt to the effects of climate change; and
- (b) has transitioned to development that prioritises lower greenhouse gas emissions.

Policy 15.2.3.1 - Effects of climate change on new subdivision and development

Stage 2 Content

- (a) Ensure that adequate allowances are made for the projected effects of climate change in the design and location of new subdivision and development throughout the district, including undertaking assessments where relevant that provide for:
 - (i) the projected increase in rainfall intensity, as determined by national guidance, but being not less than 2.3°C by 2120;
 - (ii) the projected increase in sea level, where relevant, as determined by national guidance, but being not less than 1m by 2120;
 - (iii) in respect to new urban zoning, stress testing under the RCP 8.5 scenario for [rainfall](#) and RCP 8.5H+ for [sea level rise](#); and
 - (iv) in respect to the coastal environment, increases in storm surge, waves and wind.

Policy 15.2.3.2 - Future land use planning and climate change

Stage 2 Content

- (a) Increase the ability of the community to adapt to the effects of climate change when undertaking future land use planning by:
 - (i) ensuring the potential environmental and social costs of climate change, including effects on indigenous biodiversity (inland migration), historic heritage, Maaori Sites and Areas of Significance, mahinga kai, public health and safety, public access to the coast and waterway margins, and the built environment are addressed.
 - (ii) encouraging the incorporation of sustainable design measures within new subdivision, landuse and development, including:
 - (A) low impact, stormwater management, urban design and green infrastructure;
 - (B) of relocatable buildings and structures in areas potentially at risk due to sea level rise or increased flood levels;
 - (C) efficient water storage;

- (D) provision of renewable energy generation; and
- (E) transferring to activities with lower greenhouse gas emissions.

- (iii) providing ongoing monitoring of changes to the environment due to climate change; and
- (iv) facilitating community discussion on adaptive pathways to manage the risks associated with climate change and incorporating them, where appropriate, into the district plan through plan changes.

Policy 15.2.3.3 - Precautionary approach for dealing with uncertainty

Stage 2 Content

- (a) In areas throughout the district likely to be affected by climate change over the next 100 years, adopt a precautionary approach towards new subdivision, use and development which may have potentially significant or irreversible adverse effects, but for which there is incomplete or uncertain information.

Policy 15.2.3.4 - Provide sufficient setbacks for new development

Stage 2 Content

- (a) Protect people, property and the environment from the projected adverse effects of climate change, including sea level rise, by providing sufficient setbacks from water bodies and the coast when assessing new development.
- (b) Ensure that, in establishing development setbacks, adequate consideration is given to:
 - (i) the protection of natural ecosystems, including opportunities for the inland migration of coastal habitats;
 - (ii) the vulnerability of the community;
 - (iii) the maintenance and enhancement of public access to the coast and public open space;
 - (iv) the requirements of infrastructure; and
 - (v) natural hazard mitigation provision, including the protection of natural defences.

Policy 15.2.3.5 - Assess the impact of climate change on the level of natural hazard risks

Stage 2 Content

- (a) For all new subdivision, use and development requiring rezoning or a resource consent, ensure that account is taken of the projected effects of climate change over the next 100 years when assessing any identified risks from natural hazards, and their effects on people, property, infrastructure and the environment.
- (b) Ensure that, when assessing the effects of climate change on the level of natural hazard risk in accordance with Policy 15.2.3.5(a) above, the allowances in Policy 15.2.3.1(a)(i)-(iv) are applied.
- (c) Where the assessment required by Policy 15.2.3.5(a) and Policy 15.2.3.5(b) above indicates that natural hazards are likely to be exacerbated by climate change, ensure that subdivision and development are designed and located to avoid, or appropriately mitigate, any increased and cumulative risk, including increased risk of flooding, liquefaction, coastal inundation, coastal erosion, slope instability, fire, and drought.

15.3 How to use and interpret the rules

Stage 2 Content

- (a) The activities covered by the rules in this chapter are also subject to the rules in the relevant zone chapters

and the district-wide rules in Chapter 14 Infrastructure and Energy.

- (b) Where subdivision is specified, a subdivision consent is also required under the provisions of the relevant zone chapter, and the district-wide rules in Chapter 14 Infrastructure and Energy will also apply.
- (c) The rules in this chapter do not apply to:
 - (i) any activity which is a regulated activity under the National Environmental Standards for Telecommunication Facilities 2016 (NESTF);
 - (ii) plantation forestry activities regulated under the National Environmental Standards for Plantation Forestry (NesPF).
- (d) The information requirements for resource consent applications in respect to natural hazards are set out in Rule 15.13.

15.4 Flood Plain Management Area and Flood Ponding Areas

15.4.1 Permitted Activities

Stage 2 Content

- (a) The activities listed below are permitted activities within the Flood Plain Management Area shown on the Planning Maps or in a Flood Ponding Area, if they meet the activity-specific conditions set out in this table.
- (b) Activities may also be restricted discretionary or discretionary activities, as specified in Rules 15.4.2 and 15.4.3.

Activity		Activity-specific conditions
P1	Construction of a new <u>building</u> or an addition to an existing <u>building</u> , unless specified in P2 – P5 in Rule 15.4.1.	<ul style="list-style-type: none"> (a) The minimum floor level is at least 0.5m above the 1% AEP flood level; and (b) Compliance with condition (1) shall be demonstrated by a suitably qualified engineer with experience in hydrology.
P2	Additions to an existing <u>building</u> that does not increase the ground floor area of the <u>building</u> by more than 15m ² .	Nil
P3	<u>Standalone garage</u> with a <u>gross floor area</u> not exceeding 40m ² .	Nil
P4	<ul style="list-style-type: none"> (1) Construction of an <u>accessory building</u> without a floor; (2) Construction of a <u>farm building</u> without a floor. 	Nil
P5	Construction, replacement, repair, maintenance, <u>minor upgrading</u> or upgrading of <u>utilities</u> .	Nil

P6	<u>Earthworks</u> associated with construction, replacement, repair, maintenance, <u>minor upgrading</u> or upgrading of utilities, including the formation and maintenance of access tracks.	Nil
P7	<u>Earthworks</u> to create a building platform for residential purposes.	Filling height is only to the extent necessary to achieve compliance with Rule 15.4.1 P1(a).
P8	<u>Earthworks</u> not provided for under Rule 15.4.1 P6 or P7.	<p>(a) In the Residential, Village and Country Living Zones - a maximum volume of filling above natural ground level of 10m³ per <u>site</u>, and a maximum cumulative volume of filling and excavation of 20m³; or</p> <p>(b) In the Rural Zone - a maximum volume of filling above natural ground level of 100m³ per <u>site</u>, and a maximum cumulative volume of filling and excavation of 200m³ per site; or</p> <p>(c) All other zones - a maximum volume of filling above natural ground level of 20m³ per <u>site</u>, and a maximum cumulative volume of filling and excavation of 50m³ per site; and</p> <p>(d) Height and depth of earthworks in all zones</p> <p style="padding-left: 40px;">(i) a maximum height of 0.2m of filling above natural ground level; and</p> <p style="padding-left: 40px;">(ii) a maximum depth of excavation of 0.5m below natural ground level.</p>

15.4.2 Restricted Discretionary Activities

Stage 2 Content

- (a) The activities listed below are restricted discretionary activities within the Flood Plain Management Area shown on the Planning Maps or in a Flood Ponding Area.
- (b) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.
- (c) Any application arising from this rule shall not be limited or publicly notified.

Activity	Matters of Discretion
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RD1	Earthworks that are not a permitted activity under Rule 15.4.1 P6 or P7 or earthworks that exceed the activity specific conditions in Rule 15.4.1.P8.	<p>Discretion is restricted to:</p> <p>(a) Timing, location and scale of <u>earthworks</u>;</p> <p>(b) Adverse effects on:</p> <ul style="list-style-type: none"> (i) Existing overland flow paths and surface drainage patterns; (ii) flood storage capacity; (iii) runoff volumes; (iv) adjoining properties, including the transfer of risk; (v) <u>infrastructure</u> and flood protection works; (vi) consideration of soil types and potential for erosion; <p>(c) Mitigation including compensatory storage, or other flood management measures proposed.</p>
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15.4.3 Discretionary Activities

Stage 2 Content

- (a) The activities listed below are discretionary activities within the Flood Plain Management Area shown on the Planning Maps or in a Flood Ponding Area.

D1	Construction of a new <u>building</u> and additions to an existing <u>building</u> which are not permitted by Rule 15.4.1 P1 – P5.
D2	<u>Subdivision</u> to create one or more additional vacant lot(s) other than a <u>utility allotment</u> , <u>access allotment</u> or subdivision to create a reserve allotment.
D3	A <u>hazardous facility</u>

15.5 High Risk Flood Area

Stage 2 Content

The High Risk Flood Area is located within the Flood Plain Management Area. The rules in this section are to be read in conjunction with the rules for the Flood Plain Management Area and Flood Ponding Areas (Rule 15.4).

15.5.1 Permitted Activities

Stage 2 Content

- (a) The activities listed below are permitted activities within the High Flood Risk Area shown on the Planning Maps, if they meet the activity-specific conditions set out in this table.
- (b) Activities may also be restricted discretionary, discretionary or non-complying activities, as specified in Rules 15.5.2, 15.5.3 and 15.5.4.

Activity			Activity-specific conditions
P1	(1)	Repair, maintenance or <u>minor upgrading</u> of existing <u>utilities</u> .	Nil
	(2)	New telecommunication lines, poles, cabinets and masts/ poles supporting antennas.	
P2	(1)	Construction of an <u>accessory building</u> without a floor;	Nil
	(2)	Construction of a farm <u>building</u> without a floor.	

15.5.2 Restricted Discretionary Activities

Stage 2 Content

- (a) The activities listed below are restricted discretionary activities within the High Risk Flood Area.
- (b) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity			Activity-specific conditions
RD1	(1)	New <u>utilities</u> not provided for in Rule 15.5.1 P1(2).	Discretion is restricted to: <ul style="list-style-type: none"> (a) Functional and operational requirements to be located in the High Risk Flood Area; (b) The adverse effects on people and property from establishing or upgrading the utility in the High Risk Flood Area; (c) The potential for the development to transfer/increase flood risk to neighbouring properties; (d) Consideration of alternative locations; (e) Consideration of the projected effects of climate change; (f) Any mitigation measures to reduce the risk to people's safety, well-being and property.
	(2)	Upgrading of existing utilities not provided for in Rule 15.5.1 P1(1).	

RD2	One addition to a lawfully established building existing at <i>[the date this rule becomes operative]</i> , where the addition does not increase the ground floor area of the existing <u>building</u> by more than 15m ² , unless provided for in Rule 15.5.2 RD1.	Discretion is restricted to: <ul style="list-style-type: none"> (a) The ability to manage flood risk through appropriate <u>building</u> materials, structural or design work or other engineering solutions; (b) The setting of an appropriate floor level for the addition, taking into consideration the location of the addition and the floor level of the existing <u>building</u>; (c) Any mitigation measures to reduce the risk to people's safety, well-being and property.
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15.5.3 Discretionary Activities

Stage 2 Content

- (a) The activities listed below are discretionary activities in the High Risk Flood Area.

D1	<ul style="list-style-type: none"> (1) <u>Subdivision</u> that creates one or more additional vacant lot(s) where: <ul style="list-style-type: none"> (a) The additional lot(s) are located entirely outside the <u>High Risk Flood Area</u>; or (b) The additional lot(s) are partially within the <u>High Risk Flood Area</u> and each additional lot(s) contains a net site area capable of containing a complying <u>building platform</u> entirely outside the <u>High Risk flood Area</u>. (2) This rule does not apply to subdivision for a <u>utility allotment</u>, <u>access allotment</u> or subdivision to create a reserve allotment.
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15.5.4 Non-Complying Activities

Stage 2 Content

- (I) The activities listed below are non-complying activities in the High Risk Flood Area.

NC1	Construction of a new <u>building</u> or additions to an existing <u>building</u> , not provided for in Rule 15.5.1 P1 – P2 or Rule 15.5.2 RD1 and RD2.
NC2	<ul style="list-style-type: none"> (1) <u>Subdivision</u> that does not comply with Rule 15.5.3 D1. (2) This rule does not apply to subdivision for a <u>utility allotment</u>, <u>access allotment</u> or subdivision to create a reserve allotment.
NC3	<u>Emergency services facilities</u> and hospitals.

15.6 Defended Area (Residual Risk)

15.6.1 Permitted Activities

Stage 2 Content

- (a) Activities are permitted activities within the Defended Area identified on the planning maps, unless specified in Rules 15.6.2 or 15.6.3 below, or as otherwise specified in the relevant zone chapter or the district-wide rules in Chapter 14 Infrastructure and Energy.

15.6.2 Restricted Discretionary Activities

Stage 2 Content

- (a) The activities listed below are restricted discretionary activities within the Defended Area shown on the Planning Maps.
- (b) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.
- (c) Activities may also be discretionary activities, as specified in Rule 15.6.3.

Activity	Matters of Discretion
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Released to open (WDC2007/05)

RD1	<p>Subdivision that creates one or more additional vacant lot(s). Rule 15.6.2 RD1(1) does not apply to subdivision for a <u>utility allotment</u>, an <u>access allotment</u> or subdivision to create a reserve allotment.</p>	<p>Discretion is restricted to:</p> <ul style="list-style-type: none"> (a) The actual level of service provided by the structural defence and associated flood protection works, including any change in the level of service anticipated due to climate change and sea level rise; (b) The impact of any planned improvements, maintenance or upgrading on the residual risk; (c) The effect of groundwater levels and variability in ground conditions on stop-bank security at and adjacent to the site to be subdivided; (d) the likely depth and duration of flooding as a result of a breach or overtopping event or flood ponding; (e) the location of the subdivision, including services such as wastewater, water supply and roading/access (including escape routes), in relation to potential breakout points (failure zone); (f) The adverse effects to people and property and overall vulnerability from potential failure or overwhelming of the structural defences and associated flood protection works relevant to the proposed new lot(s); (g) Potential for the development to transfer/increase flood risk/residual risk to neighbouring properties; (h) Any additional mitigation measures proposed or site features which reduce residual risk (e.g. natural high ground; evacuation plan).
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15.6.3 Discretionary Activities

Stage 2 Content

- (a) The activities listed below are discretionary activities within the Defended Area.

D1	Construction of a new <u>building</u> or new <u>accessory building</u> , located within 50m of the toe of a stop-bank where the stop-bank is under the responsibility of the Council, the Waikato Regional Council or the Crown.
D2	<u>Earthworks</u> located within 50m of the toe of a stop-bank where the stop-bank is under the responsibility of the Council, the Waikato Regional Council or the Crown.

15.7 Coastal Sensitivity Area (Erosion) and Coastal Sensitivity Area (Open Coast)

15.7.1 Permitted Activities

Stage 2 Content

- (a) The activities listed below are permitted activities within the Coastal Sensitivity Area (Erosion) and Coastal Sensitivity Area (Open Coast) shown on the Planning Maps, if they meet the activity-specific conditions set out in this table.
- (b) Activities may also be restricted discretionary activities or discretionary activities, as specified in Rules 15.7.2 and 15.7.3.

Activity		Activity-specific conditions
P1	Additions to an existing lawfully established building.	(a) The gross floor area of all additions to the building from [date this rule becomes operative] do not exceed a total of 15m ² .
P2	(1) Construction of an accessory building without a floor; (2) Construction of a farm building without a floor.	Nil
P3	Construction, upgrading, minor upgrading, replacement, repair or maintenance of utilities.	Nil
P4	Maintenance or repair of an existing lawfully established coastal protection structure.	Nil

15.7.2 Restricted Discretionary Activities

Stage 2 Content

- (a) The activities listed below are restricted discretionary activities in the Coastal Sensitivity Area (Erosion).
- (b) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity	Matters of Discretion
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RD1	Construction of a new building or additions to an existing building not provided for in Rule 15.7.1 P1-P3 and not listed in Rule 15.7.3 D1.	<p>Discretion is restricted to:</p> <ul style="list-style-type: none"> (a) The ability to manage coastal hazard risk through appropriate building materials, structural or design work, engineering solutions or other appropriate mitigation measures, including the ability to relocate the building; (b) The application of mitigation through natural features and buffers where appropriate; (c) The ability to impose time limits or triggers to determine when the building and services to be removed or relocated; (d) The degree to which coastal hazard risk, including the effects of climate change over a period to 2120, has been assessed in a site specific coastal hazard risk assessment; (e) Suitability of the site for the proposed use, including the provision for servicing such as access, wastewater, stormwater, and water supply; (f) Adverse effects to people and property and overall vulnerability from the establishment of the new building or additions to an existing building and any mitigation measures to reduce risk; (g) Whether there is any suitable alternative location for the activity to locate within the site; (h) Coastal Sensitivity Area (Open Coast) only - the setting of minimum floor levels in areas subject to inundation.
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15.7.3 Discretionary Activities

Stage 2 Content

- (a) The activities listed below are discretionary activities in the Coastal Sensitivity Area (Erosion).

D1	Construction of a new coastal protection structure.
D2	Subdivision to create one or more additional vacant lot(s) other than a utility allotment, access allotment or subdivision to create a reserve allotment.

15.8 Coastal Sensitivity Area (Inundation)

15.8.1 Permitted Activities

Stage 2 Content

- (a) The activities listed below are permitted activities within the Coastal Sensitivity Area (Inundation) shown on the Planning Maps if they meet the activity-specific conditions set out in this table.
- (b) Activities may also be restricted discretionary activities or discretionary activities, as specified in Rules 15.8.2 and 15.8.3.

Activity		Activity-specific conditions
P1	Additions to an existing lawfully established building.	(a) The gross floor area of all additions to the building from [date this rule becomes operative] do not exceed a total of 15m ² .
P2	(1) Construction of an accessory building without a floor; (2) Construction of a farm building without a floor.	Nil
P3	Construction, upgrading, minor upgrading, replacement, repair or maintenance of utilities.	Nil
P4	Maintenance or repair of an existing lawfully established coastal protection structure.	Nil

15.8.2 Restricted Discretionary Activities

Stage 2 Content

- (a) The activities listed below are restricted discretionary activities in the Coastal Sensitivity Area (Inundation).
- (b) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity	Matters of Discretion
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RD1	Construction of a new building or addition to an existing building not provided for in Rule 15.8.1 P1- P3 and not listed in Rule 15.8.3 D1.	Discretion is restricted to: <ul style="list-style-type: none"> (a) The ability to manage coastal hazard risk through appropriate building materials, structural or design work, engineering solutions including the ability to relocate the building, or other appropriate mitigation measures, including the setting of minimum floor levels where appropriate; (b) The application of mitigation through natural features and buffers where appropriate; (c) The ability to impose time limits or triggers to determine when the building and services to be removed or relocated; (d) The degree to which coastal hazard risk, including the effects of climate change over the period to 2120, has been assessed in a site specific coastal hazard risk assessment; (e) Suitability of the site for the proposed use and the ability to, provide servicing such as access, wastewater, stormwater and water supply; (f) Adverse effects to people and property and overall vulnerability from the establishment of the new building or additions to existing building; (g) Whether there is any suitable alternative location for the activity to locate within the site.
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15.8.3 Discretionary Activities

Stage 2 Content

- (a) The activities listed below are discretionary activities in the Coastal Sensitivity Area (Inundation).

D1	Construction of a new coastal protection structure.
D2	Subdivision to create one or more additional vacant lot(s) other than a utility allotment, access allotment or subdivision creating a reserve allotment.

15.9 High Risk Coastal Hazard (Erosion) Area

15.9.1 Permitted Activities

Stage 2 Content

- (a) The activities listed below are permitted activities within the High Risk Coastal Hazard (Erosion) Area shown on the Planning Maps, if they meet the activity-specific conditions set out in this table.
- (b) Activities may also be discretionary or non-complying activities, as specified in Rules 15.9.2 and 15.9.3.

Activity	Activity-specific conditions
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P1	(1) Construction of an accessory building without a floor; and (2) Construction of a farm building without a floor.	(a) The gross floor area of the building does not exceed 40m ² .
P2	(1) Repair, maintenance or minor upgrading of existing utilities. (2) New telecommunication lines, poles, cabinets and masts/ poles supporting antennas.	Nil
P3	Maintenance or repair of an existing lawfully established coastal protection structure.	Nil
P4	Earthworks for an activity listed in Rule 15.9.1 P1 - P3, including the maintenance and repair of access tracks.	(a) The maximum volume of filling does not exceed 10m ³ per site; and (b) The maximum depth of any excavation or filling does not exceed 0.5m above or below ground level.

15.9.2 Discretionary Activities

Stage 2 Content

(a) The activities listed below are discretionary activities in the High Risk Coastal Hazard (Erosion) Area.

D1	Earthworks not provided for in Rule 15.9.1 P4.
D2	(I) Relocation of an existing building within the same site where: (a) The building is relocated landward of its existing position.
D3	(I) Replacement of an existing building within the same site where: (a) The replacement building is located landward of the existing building that it replaces; and (b) The replacement building is relocatable on a suspended timber floor; and (c) The gross floor area of the replacement building is no larger than the existing building that it replaces.
D4	Construction of a new coastal protection structure.
D5	Construction of new utilities not provided for in Rule 15.9.1 P2
D6	Upgrading of existing utilities not provided for in Rule 15.9.1 P2.

D7	<p>(1) Subdivision that creates one or more additional vacant lot(s) where:</p> <p style="margin-left: 40px;">(a) The additional vacant lot(s) are located entirely outside the High Risk Coastal Hazard (Erosion) Area; or</p> <p style="margin-left: 40px;">(b) The additional lot(s) are partially within the High Risk Coastal Hazard (Erosion) Area and each additional lot(s) contains a net site area capable of containing a complying building platform entirely outside the High Risk Coastal Hazard (Erosion) Area.</p> <p>(2) Rule 15.9.2 D7(1) does not apply to subdivision for a utility allotment, access allotment or subdivision to create a reserve allotment.</p>
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15.9.3 Non-Complying Activities

Stage 2 Content

- (a) The activities listed below are non-complying activities in the High Risk Coastal Hazard (Erosion) Area.

NC1	Construction of a new building or additions to an existing building, not provided for in Rule 15.9.1 P1 – P2 or Rule 15.9.2 D2- D6.
NC2	<p>(1) Subdivision to create one or more additional lot(s) that does not comply with Rule 15.9.2 D7.</p> <p>(2) Rule 15.9.3 NC2(1) does not apply to subdivision for a utility allotment, access allotment or subdivision to create a reserve allotment.</p>
NC3	Emergency services facilities and hospitals.

15.10 High Risk Coastal Hazard (Inundation) Area

15.10.1 Permitted Activities

Stage 2 Content

- (1) The activities listed below are permitted activities within the High Risk Coastal Hazard (Inundation) Area shown on the Planning Maps, if they meet the activity-specific conditions set out in this table.
- (2) Activities may also be discretionary or non-complying activities, as specified in Rules 15.10.2 and 15.10.3.

Activity	Activity-specific conditions
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Released to open (WDC2007/05)

P1	<p>(1) Construction of an accessory building without a floor;</p> <p>(2) Construction of a farm building without a floor.</p>	(a) The gross floor area of the building does not exceed 40m ² .
P2	<p>(1) Operation, repair, maintenance or minor upgrading of existing utilities.</p> <p>(2) New telecommunication lines, poles, cabinets and masts/poles supporting antennas.</p>	Nil
P3	Maintenance or repair of an existing lawfully established coastal protection structure.	Nil
P4	Earthworks for an activity listed in Rule 15.10.1 P1 - P3, including the maintenance and repair of access tracks.	<p>(a) The maximum volume of filling does not exceed 10m³ per site; and</p> <p>(b) The maximum depth of any excavation or filling does not exceed 0.5m above or below ground level.</p>

15.10.2 Discretionary Activities

Stage 2 Content

(1) The activities listed below are discretionary activities in the High Risk Coastal Hazard (Inundation) Area.	
D1	Earthworks not provided for in Rule 15.10.1 P4.
D2	<p>(1) Replacement and relocation of an existing building within the same site where:</p> <p>(a) There is no increase in the ground floor area of the building.</p>
D3	Construction of a new coastal protection structure.
D4	Construction of new utilities not provided for in Rule 15.10.1 P2.
D5	Upgrading of existing utilities not provided for in Rule 15.10.1 P2.

D6	<p>(1) Any subdivision which creates one or more additional vacant lot(s) where:</p> <p style="margin-left: 40px;">(a) The additional vacant lot(s) are located entirely outside the High Risk Coastal Hazard (Inundation) Area; or</p> <p style="margin-left: 40px;">(b) The additional lot(s) are partially within the High Risk Coastal Hazard (Inundation) Area and each additional lot(s) contains a net site area capable of containing a complying building platform entirely outside the High Risk Coastal Hazard (Inundation) Area.</p> <p>(2) Rule 15.10.2 D6(1) does not apply to subdivision for a utility allotment, access allotment or subdivision to create a reserve allotment.</p>
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15.10.3 Non-Complying Activities

Stage 2 Content

(1) The activities listed below are non-complying activities in the High Risk Coastal Hazard (Inundation) Area.	
NC1	Construction of a new building or additions to an existing building, not provided for in Rule 15.10.1 P1 – P2 or Rule 15.10.2 D2 - D5.
NC2	<p>(1) Subdivision to create one or more additional lot(s) that does not comply with Rule 15.10.2 D6.</p> <p>(2) Rule 15.10.3 NC2(1) does not apply to subdivision for a utility allotment, access allotment or subdivision to create a reserve allotment.</p>
NC3	Emergency service facilities and hospitals.

15.11 Mine Subsidence Risk Area

15.11.1 Permitted Activities

Stage 2 Content

<p>(1) The activities listed below are permitted activities within the Mine Subsidence Risk Area shown on the Planning Maps if they meet the activity-specific conditions set out in this table.</p> <p>(2) Activities may also be restricted discretionary activities or discretionary activities, as specified in Rules 15.11.2 and 15.11.3.</p>	
Activity	Activity-specific conditions
P1	<p>Additions to an existing building.</p> <p>(a) Additions do not increase the gross floor area of the building by more than 15m²; and</p> <p>(b) Additions do not result in the length of any wall of the building exceeding 20m.</p>

P2	Standalone garage	(a) The gross floor area of the building does not exceed 55m ² ; and (b) The maximum length of any wall does not exceed 20m.
P3	Construction, replacement, repair, minor upgrading, upgrading or maintenance of utilities.	Nil
P4	Earthworks	(a) The maximum volume of filling does not exceed 20m ³ per site; and (b) The maximum depth of any excavation or filling does not exceed 1m above or below ground level.

15.11.2 Restricted Discretionary Activities

Stage 2 Content

- (1) The activities listed below are restricted discretionary activities in the Mine Subsidence Risk Area.
- (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Matters of Discretion
RD1	Earthworks that do not comply with Rule 15.11.1 P4.	Discretion is restricted to: (a) Location and scale of earthworks; (b) Geotechnical and geological stability of the site following the completion of earthworks; (c) Risk to people and property from subsidence as a result of earthworks; (d) Any other mitigation measures to reduce risk.

15.11.3 Discretionary Activities

Stage 2 Content

- (1) The activities listed below are discretionary activities in the Mine Subsidence Risk Area.

D1	Construction of a building or additions to an existing building not provided for in Rule 15.11.1 P1 - P3.
D2	Subdivision to create one or more additional vacant lot(s) other than a utility allotment, access allotment or subdivision to create a reserve allotment.

15.12 Liquefaction

15.12.1 Overview of method

Stage 2 Content

- (1) Areas in the district susceptible to liquefaction have not been identified on the planning maps as a natural hazard overlay as is the case with the other natural hazards in this chapter. Where specific land uses have already been identified as restricted discretionary activities in the activity status tables in the relevant zone, liquefaction risk has been added as a matter over which the Council will reserve its discretion, where it is considered relevant for that activity. To satisfy the requirements of sections 104 and 106 of the RMA, identification of appropriate mitigation may be required where the site and proposed development are considered vulnerable to liquefaction based on site-specific characteristics. It is expected that best practice geotechnical and engineering methods will be used to ensure that the site is suitable for the intended use.
- (2) Where potential liquefaction risk is identified as a matter that the Council restricts its discretion to, the additional matters outlined in Rules 15.12.2 and 15.12.3 below apply where relevant.

15.12.2 Additional matters of restricted discretion for subdivision to create one or more additional vacant lots – liquefaction risk

Stage 2 Content

- (1) Where potential liquefaction risk is identified as a matter that the Council will restrict its discretion to in a subdivision rule elsewhere in this Plan, and where that proposal involves subdivision to create one or more additional vacant lots, the Council restricts its discretion to the following additional matters (note: these matters will also be relevant to the assessment of a discretionary or non-complying resource consent application where a potential liquefaction hazard has been identified on a site):
 - (a) Geotechnical assessment and/or investigation of any potential liquefaction hazard on the site at a level sufficient to confirm the level of risk and its suitability for the proposed activity (see information requirements in section 15.13);
 - (b) Measures proposed to mitigate the effects of liquefaction hazard if present including:
 - (i) Location, size, layout and design of allotments, structures, and building platforms, including consideration given to alternative siting away from where liquefaction risk is greatest;
 - (ii) Location, timing, scale and nature of earthworks;
 - (iii) Provision for ground strengthening and foundation design;
 - (iv) Provision for resilient services and infrastructure, including wastewater, water supply, roads and access;
 - (v) Setbacks in relation to waterways, waterbodies or any steep change in ground elevation, sloping ground or free face, or alternative geotechnical measures to address any identified potential for lateral spread;
 - (vi) Effects on adjoining properties.

15.12.3 Additional matters of restricted discretion for new land use (e.g. multi-unit development) – liquefaction risk

Stage 2 Content

- (I) Where potential liquefaction risk is identified as a matter that the Council will restrict its discretion to in a rule elsewhere in this Plan for new land use, the Council restricts its discretion to the following additional matters (note: these matters will also be relevant to the assessment of a discretionary or non-complying resource consent application where a potential liquefaction hazard has been identified on a site):
 - (a) Geotechnical assessment and/or investigation of any potential liquefaction hazard on the site at a level sufficient to confirm the level of risk and its suitability for the proposed activity (see information requirements in section 15.13);
 - (b) Measures proposed to mitigate the effects of liquefaction hazard, if present, including:
 - (i) Location, size, layout and design of buildings, structures, car parking areas, access and provision for resilient infrastructure and services, including wastewater, stormwater and water supply;
 - (ii) Location, timing, scale and nature of earthworks;
 - (iii) Provision for ground strengthening and foundation design;
 - (iv) Setbacks in relation to waterways, waterbodies or any steep change in ground elevation, sloping ground (or free face, or alternative geotechnical measures to address any identified potential for lateral spread);
 - (v) Consideration given to ease of repair (including access to repair damaged structures) of liquefaction-induced damage;
 - (vi) Effects on adjoining properties.

15.13 Information requirements for all resource consent applications addressing natural hazards

15.13.1 General

Stage 2 Content

- (I) The following documents, to the extent relevant to the proposal:
 - (a) Geotechnical assessment, including identification and assessment of any potentially liquefaction-prone land and land subject to slope instability;
 - (b) An assessment of natural hazard risk, including the type of natural hazards present, such as flooding, slope stability, liquefaction, subsidence and coastal hazards. The assessment shall include the level of risk and any increase in risk as a result of the proposal associated with each hazard. Where applicable, the projected effects of climate change over the period to 2120 must be included;
 - (c) Remediation and mitigation measures necessary to make the site and any proposed buildings suitable for the proposed use, such as minimum floor levels, foundation design for relocatability, and appropriate time limits and/or triggers for

the removal of any building and onsite wastewater disposal systems.

- (2) Plans identifying:
 - (a) Topographical features within the site and surrounding area;
 - (b) The location of natural hazards on all or part of the site.

15.13.2 Liquefaction Potential

Stage 2 Content

- (1) For land use resource consent applications where the additional matters the Council will restrict its discretion to include liquefaction, as per Rule 15.12.3, the following information is required:
 - (a) A preliminary geotechnical assessment in sufficient detail to determine:
 - (i) the liquefaction vulnerability category, being either “liquefaction damage is unlikely” or “liquefaction damage is possible”, as shown in Table 4.4 in “Preliminary Document: Planning and engineering guidance for potentially liquefaction-prone land – Resource Management Act and Building Act aspects. Pub MfE and MBIE, September 2017”; or
 - (ii) whether or not the site is susceptible to liquefaction using an alternative accepted method, observation, or desk-top study.
 - (b) Where a “liquefaction damage is possible” category has been identified for the site as per 15.13.2(1)(a)(i) above, or an alternative accepted method, observation or desktop study indicates that the site is susceptible to liquefaction as per 15.13.2(1)(a)(ii) above, the assessment will be required to determine the liquefaction vulnerability in more detail, and in proportion to the scale and significance of the liquefaction hazard, and must:
 - (i) Identify any areas which require particular ground strengthening or other mitigation measures, and recommendations for such mitigation; and
 - (ii) Identify areas to be excluded from built development, due to liquefaction hazard constraints (which includes lateral spread), or which require geotechnical setbacks; and
 - (iii) Indicate options and recommended locations for the proposed activities and infrastructure recommended by the geotechnical engineer.
 - (c) All geotechnical assessments in respect of liquefaction risk are to be prepared by a suitably-qualified and experienced engineer with experience in geotechnical engineering or a Professional Engineering Geologist (IPENZ registered).
- (2) For subdivision consent applications that create one or more additional vacant lots as per Rule 15.12.2:
 - (a) an assessment in accordance with 15.13.2(1)(a) above will be required to be provided.
 - (b) Where a “liquefaction damage is possible” category has been identified for the site as per 15.13.2(1)(a)(i) above, or an alternative accepted method, observation, or

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desktop study indicates that the site is susceptible to liquefaction as per 15.13.2(1)(a)(ii) above, the subdivision application will be required to include sufficient information and proposed measures to satisfy that liquefaction risk can be adequately avoided, remedied or mitigated, including the potential effects of lateral spread.

- (c) Subdivision plans shall show, to the extent relevant or appropriate to the scale and significance of the liquefaction hazard identified:
 - (i) any areas which require particular ground strengthening or other mitigation measures, and recommendations for such mitigation; and
 - (ii) any areas which should be excluded from built development due to geotechnical constraints, or which require geotechnical setbacks; and
 - (iii) any features of subdivision layout recommended by the geotechnical engineer, for example any recommended locations for proposed activities and other infrastructure as a result of geotechnical constraints.
- (d) All geotechnical reports in respect of liquefaction potential are to be prepared by a suitably-qualified and experienced engineer with experience in geotechnical engineering or a Professional Engineering Geologist (IPENZ registered).

15.13.3 Country Living Zone - Tamahere

Stage 2 Content

- (I) Any resource consent in relation to land located in the Country Living Zone in Tamahere will be required to include details of ponding of stormwater and overland flow paths as a result of a 1% AEP storm event (with rainfall events adjusted for climate change), as well as mitigation measures taking account of information that the Council holds in respect to the Tamahere stormwater catchment area.

15.13.4 Defended Areas

Stage 2 Content

- (I) For any Restricted Discretionary Activity land use and subdivision applications within the Defended Area, the following information is required to the extent relevant to the scale of the proposal:
 - (a) a risk assessment, carried out by a suitably-qualified and experienced risk assessment practitioner, which identifies the nature and level of residual risk, and details of appropriate methods to further reduce residual risk, where appropriate.

15.14 Definitions

Coastal Sensitivity Area (Erosion)

Coastal Sensitivity Area (Erosion)

Stage 2 Content

Means an area identified on the planning maps that is potentially vulnerable to coastal erosion over the period to 2120, assuming sea level rise of 1.0 m.

Coastal Sensitivity Area (Inundation)

Coastal Sensitivity Area (Inundation)

Stage 2 Content

Means an area identified on the planning maps that is potentially vulnerable to coastal inundation over the period to 2120, assuming sea level rise of 1.0 m.

Defended Area

Defended Area

Stage 2 Content

Means an area identified on the planning maps which could normally flood in a 1% AEP flood event but is protected from flooding by a flood protection scheme managed by the Waikato Regional Council, the Waikato District Council or the Crown.

Emergency service facility

Emergency service facility

Stage 2 Content

Means a fire station, ambulance station, police station or an emergency co-ordination facility.

Farm building

Farm building

Stage 2 Content

For the purposes of Chapter 15, means a building that supports the primary use of the site for farming. It excludes residential units.

Flood plain management area

Flood plain management area

Stage 2 Content

Means an area identified on the planning maps which is at risk of flooding in a 1% AEP flood event and is otherwise described as the 1% AEP floodplain.

Flood ponding area

Flood ponding area

Stage 2 Content

Means an area shown on the planning maps as an identified flood ponding area or an area that experiences floodwater ponding in a 1% AEP rainfall event.

High risk flood area

High risk flood area

Stage 2 Content

Means an area identified on the planning maps, located within the Flood Plain Management Area,

which is subject to river or surface flooding during an event with an annual exceedance probability of no more than 1%, and during such an event:

- (a) the depth of flood waters exceeds one metre; or
- (b) the speed of flood waters exceeds two metres per second; or
- (c) the flood depth multiplied by the flood speed exceeds one.

High Risk Coastal Hazard (Erosion) Area

High Risk Coastal Hazard (Erosion) Area

Stage 2 Content

Means an area identified on the planning maps which is currently at risk from coastal erosion with existing sea level and existing coastal processes.

High Risk Coastal Hazard (Inundation) Area

High Risk Coastal Hazard (Inundation) Area

Stage 2 Content

Means an area identified on the planning maps which is currently at risk from coastal inundation with existing sea level and coastal processes.

Mine Subsidence Risk Area

Mine Subsidence Risk Area

Stage 2 Content

Means an area identified on the planning maps which is currently at risk of surface subsidence as a result of historic underground coal mining operations.

Minor upgrading

Minor upgrading

Stage 2 Content

For the purposes of Chapter 15 means an increase in the capacity, efficiency or security of existing utilities where this utilises existing structures and networks and/or structures and networks of a similar scale and character.

Risk assessment

Risk assessment

Stage 2 Content

Means the overall process of risk identification, risk analysis and risk evaluation.

Standalone Garage

Standalone Garage

Stage 2 Content

Means a roofed and enclosed building which is detached from the main residential unit and designed to accommodate one or more motor vehicles.

Utility

Utility

Stage 2 Content

For the purpose of Chapter 15 Natural Hazards means:

- (1) Transformation, transmission, generation or distribution of electricity provided by network utility operators or requiring authorities, including:
 - (a) transmission lines and electricity distribution lines and associated equipment; and
 - (b) private connections to such utilities;
- (2) Telecommunication and radiocommunication facilities, including:
 - (a) transmitting/receiving devices such as aerials, antennas, dishes (including cables), insulators, castings, tunnels and associated equipment; and
 - (b) support structures such as towers, masts and poles, accessory buildings and private receiving dish antennas;
- (3) Storage tanks and pipes for the distribution or transmission of petroleum or natural or manufactured gas, including necessary incidental equipment provided by network utility operators or requiring authorities, and private connections to such utilities;
- (4) Reticulated water for supply or irrigation, stormwater management basins, swales or drainage systems, and reticulated sewerage, including:
 - (a) private stormwater facilities connecting to such utilities; and
 - (b) necessary incidental equipment, including water storage tanks and pumping facilities; and
- (5) Meteorological facilities, navigation aids and beacons, including approach control services within the meaning of the Civil Aviation Act 1990.
- (6) Flood management infrastructure including stopbanks and erosion protection structures associated with flood management where owned or operated by the Waikato Regional Council, the Waikato District Council or the Crown.
- (7) Public roads and railway lines.

PROPOSED WAIKATO DISTRICT PLAN

VARIATION 2 NATURAL HAZARDS & CLIMATE CHANGE

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1.4.2.3 Challenges

(a) Economic development challenges facing the district are as follows:

- (i) Growth across the district is uneven. Population and associated economic growth is occurring predominantly in the north (Tuakau, Pokeno, Te Kauwhata) and in the south around the Hamilton periphery.
- (ii) Industrial diversity and the level of knowledge-intensive employment are low. Most new jobs appear to be in the service (tertiary) sector, whereas many of the industries driving growth in the region are of a primary nature.
- (iii) There are skills constraints, with a relatively low level of people with tertiary qualifications and a high proportion of youth not in employment, education or training.
- (iv) There is a large variation in economic well-being and household income across the district that is likely to remain into the future.
- (v) The ability for the region to manage land and water changes/demands and environmental impacts of extraction across land-based industries may constrain further growth.
- (vi) Soil resources, including soil quality, are under threat due to subdivision and intensification of land use.
- (vii) Environmental limits on water, land, and soils and to a small extent marine space mean that growth in these primary industries will need to come from increasing the value of processed products and services.
- (viii) A decline in the mining sector, with coal resources in particular becoming increasingly difficult and expensive to access, as well as public concerns about the environmental impacts of coal and mineral mining in the region, are a concern, considering its share of the district's GDP.
- (ix) With growth pressure in both the Urban and Rural sectors, maintaining and enhancing the natural environment.
- (x) Natural hazards in certain locations in the district pose a constraint on land development and urban growth in terms of reduced opportunity or cost of mitigation.
- (xi) Climate change will increasingly impact existing settlements in the district, the location of new settlements and design choices will challenge currently understood expectations of environmental limits.

1.4.4 The urban environment

- (a) A key issue for the district is to maintain the productive capacity of the rural resource and ensure that population growth and associated built development is managed in a way that results in efficient and high-amenity urban areas. Development needs to be managed so that emphasis is placed on achieving high amenity standards, while retaining existing valued characteristics as far as practicable. In these areas, development can support local infrastructure, services, and other facilities, while at the same time minimising adverse effects on productive rural activities. Commercial activity should be of a size or function that does not compromise the vitality and viability of the primary commercial centres. It is also important that we take a 'centres-based' approach to retail as per the Waikato Regional Policy Statement (WRPS). A range of housing options should be provided for, with varying land values and amenities.
- (b) Costs and inefficiencies can increase significantly, where development patterns are dispersed. For example, unplanned development, which increases vehicle traffic, may reduce roading efficiency and road safety, compromise rail operations and result in unplanned roading upgrades. Costs can be minimised, and better performance of infrastructure and services achieved, where infrastructure provision is timely in relation to demand, and optimally-sized and located. This may mean that it is necessary to stage infrastructure provision relative to growth in demand as well as ensuring that the natural environment is maintained and enhanced through Low Impact Design infrastructure.
- (c) The district plan manages activities to reduce the risks from natural hazards. The emphasis is on ensuring that appropriate assessments of natural hazard risk are undertaken prior to rezoning and new subdivision and development taking place, and greenfield development and urban intensification are avoided in areas of known high flood risk or high coastal hazard risk as required by the Regional Policy Statement. For existing areas of urban development, such as Raglan, Port Waikato and river communities, natural hazard risk, particularly coastal hazards and flooding, will require management through appropriate mitigation and adaptation over time, taking into consideration projected sea level rise and other climate change factors.

1.5.2 Planning for urban growth and development

- (a) Defined growth areas have been zoned and their development will be guided through the application of objectives and policies and through processes such as the development of master plans, comprehensive structure plans, the district plan and any future changes to the district plan. The agreed Future Proof settlement pattern for urban growth and development is to avoid unplanned encroachment into rural land and is to be contained within defined urban areas to avoid rural residential fragmentation.
- (b) As per the Waikato Regional Policy Statement, the district plan ensures that before land is rezoned for urban development, urban development planning mechanisms such as master plans or structure plans are produced, that will facilitate proactive decisions about the future location of urban development. Development which occurs in accordance with a master plan developed in consultation with the local community is one way of ensuring that valued elements of local character are respected as growth occurs. Structure plans are to be used to guide the staged provision of additional urban land and infrastructure to support areas experiencing growth or sustaining population and business growth pressures. However, when preparing structure plans or spatial plans for developing urban land, consideration of the risk posed by natural hazards such as flooding, land instability, coastal hazards and liquefaction will be important to ensure that the land is suitable for the type of development proposed and avoids increased risk from natural hazards.

1.12.8 Strategic objectives

- (a) The matters set out in paragraphs 4.1.1 – 4.1.7 provide the overarching directions for the development of the objectives, policies and other provisions within the district plan.
- (b) In summary, the overarching directions include the following:
 - (i) Urban development takes place within areas identified for the purpose in a manner which utilises land and infrastructure most efficiently.
 - (ii) Promote safe, compact sustainable, good quality urban environments that respond positively to their local context.
 - (iii) Focus urban growth in existing urban communities that have capacity for expansion.
 - (iv) Plan for mixed-use development in suitable locations.
 - (v) Encourage community collaboration in urban growth decisions
 - (vi) Protect and enhance green open space, outstanding landscapes and areas of cultural, ecological, historic, and environmental significance.
- (c) The objectives and policies that implement the strategic directions are included within Part B of the district plan (where they are relevant) at the beginning of each section. They also assist in providing an objective that encompasses more than one zone (such as [Chapter 4](#) Urban Environment) or a range of matters (such as [Chapter 6](#) Infrastructure).
- (d) Objective - Natural Hazards and Climate Change
The choice, location and design of development in the district takes into account the risks from natural hazards and potential impacts of climate change.

DELETED - Chapter 11: Natural Hazards and Climate Change (Stage 2)

Stage 2 Content

Chapter 11 Natural Hazards and Climate Change is Stage 2 of the Proposed District Plan and will be notified early 2019.

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12.1 Introduction to rules

- (a) Section C of the district plan contains the rules. Rules are one of the methods of achieving the objectives and implementing the policies set out in Section B of the district plan.
- (b) Rules describe activities (land use and subdivision), the activity status and the conditions that must be complied with to meet the specified activity status. These terms are explained in this chapter.
- (c) The rules in Section C that are highlighted in green have immediate legal effect in accordance with s86B of the Resource Management Act 1991.
- (d) Chapter 13 contains all the definitions that are used in the rules within Section C. The definitions form part of the rules and are identified by underlining and are also hyperlinked in ePlan.
- (e) Chapter 14: Infrastructure and Energy and Chapter 15: Natural Hazards and Climate Change (Stage 2 of the district plan review) apply across the whole district.
- (f) There is a chapter of rules for each zone (Chapters 16 – 28). The order of text in each chapter is:
 - (i) Introduction (for some zones only);
 - (ii) Land Use – Activities Rules;
 - (iii) Land Use – Effects Rules;
 - (iv) Land Use – Building Rules; and
 - (v) Subdivision Rules.
- (g) The spatial area of each zone is shown on the planning maps. As well as zones, there are various policy areas (such as Landscape Policy Area), sites/features (such as Historic Heritage buildings) and designations marked on the planning maps. These are referred to where relevant in the rules in each zone chapter. Every part of the district (except for roads) is in one zone and the zones do not overlap.
- (h) Roads appear white on the planning maps and are not zoned. Rules relating to activities occurring in the road corridor are set out Chapter 14: Infrastructure and Energy.
- (i) Lakes and rivers appear with a blue shading to assist users with orientation. Although the rivers and lakes are not given a zone shading, they are in a zone. All waterbodies are zoned Rural, except for Lake Hakanoa and Lake Puketirini, both of which are zoned Reserve and have reserve management plans applying to them.
- (j) The district plan regulates activities on the surface of rivers, lakes and other waterbodies. Activities are subject to the zone rules that apply. The Waikato Regional Plan regulates any structures in, on, under or over the beds of lakes and rivers, and may also be required to obtain resource consent under the Waikato Regional Plan.
- (k) Natural hazards are managed throughout the district through a suite of natural hazard overlays identified on the planning maps and provisions contained in Chapter 15. Assessment matters related to natural hazards also occur in the zone chapters.

12.5 How to find out if a resource consent is needed

- (a) To determine if an activity is provided for by the plan, or is provided for in a certain area, users of the plan should take the following steps.
 - (i) Step 1 – Check the zone that applies
 - A. Begin with the planning maps. Locate the relevant property on the zone map and determine its zoning.
 - (ii) Step 2 – Confirm if any notation, overlay or designation applies
 - A. Use the planning maps to confirm whether the property has any special feature, **natural hazard overlay**, or designation applying to it. Make a note of map notations relevant to the land you are interested in.
 - (ii) Step 3 – Confirm the activity status
 - A. Go to the zone rules chapter for the zone your site or property is located in.
 - B. Determine whether the activity is a prohibited activity, by reading the prohibited activity rule at the start of the chapter. If it is prohibited, then the activity is not permitted and no resource consent application can be considered.
 - C. If the activity is not prohibited, read through the permitted activity rules to determine if your activity is permitted. Look at all the rules that are relevant, including rules on policy areas, **natural** hazards (**Chapter 15**), notable trees, heritage items or other special features, to see if one of these applies to your property. Note the contents of these, including any conditions.
 - D. If your activity complies with all conditions for permitted activities in activity table, and the Land Use – Effects and Land Use – Building rules, then your activity is permitted and may be undertaken without resource consent. To obtain council confirmation that your proposed development is a permitted activity, you may apply to the Council for a Certificate of Compliance.
 - (ii) Step 4 – Apply for resource consent
 - A. If any condition stated for a permitted activity is not complied with, you must obtain resource consent from the Council.
 - B. Look within the following activity tables, which state the category of resource consent required (controlled, restricted discretionary, discretionary or non-complying).
 - C. After each Land Use – Effects and Land Use – Building rule, look within the table to determine the category of resource consent required.
 - D. If you are not sure, contact the Council's planning staff, who are available to help you. If more than one condition is not complied with, the whole of the activity will be assessed against the highest activity category that applies.
 - E. Decide if you want to apply for resource consent. You may prefer to redesign your proposal to fit the permitted activity conditions.
 - F. If you want to apply for consent, consider whether you need professional advice to prepare your application. Council staff can assist by providing application forms and general advice on the requirements of the plan, but cannot write the application for you.

Annual exceedance probability (AEP)

Annual exceedance probability

Means the probability of an event of a specified size occurring or being exceeded in any one year.

The probability is expressed as a percentage and in respect to flooding generally refers to storm events of a particular magnitude occurring in any given year. For example: a large flood which may

be calculated to have a 1% chance to occur in any one year, is described as 1% AEP.

- A 1% AEP has a 1% chance of occurring in any one year, or is a 1 in 100-year flood event.
- A 2% AEP has a 2% chance of occurring in any one year, or is a 1 in 50-year flood event.
- A 5% AEP has a 5% chance of occurring in any one year, or is a 1 in 20-year flood event.

14.1 Introduction

- (1) The provisions within this Infrastructure and Energy chapter of the district plan shall apply across the district in all the zones and overlays in the district plan. The zone chapters and their associated overlays, objectives, policies and rules do not apply to infrastructure and energy activities unless specifically referred to within this Infrastructure and Energy chapter. The provisions of the Natural Hazards and Climate Change chapter (Chapter 15), and associated natural hazard overlays identified in the planning maps, apply to activities in the Infrastructure and Energy chapter.
- (2) This infrastructure topic includes the land transport networks, network utilities operations, and electricity generation (including renewable electricity sources) and transmission. It should be noted that this chapter also contains a number of rules (such as on-site car parking and stormwater management) relating to district-wide land development activities; and as such these particular rules should be read in conjunction with the relevant zone chapters where applicable.
- (3) The Identified areas within the activity tables below covers the following areas and items identified within this plan:
 - (a) Urban Expansion Area
 - (b) Significant Natural Area
 - (c) Outstanding Natural Feature
 - (d) Outstanding Natural Landscape
 - (e) Significant Amenity Landscape
 - (f) Outstanding Natural Character
 - (g) High Natural Character
 - (h) Heritage Precinct
 - (i) Heritage Items
 - (j) Māori Sites of Significance
 - (k) Māori Areas of Significance
 - (l) Notable Trees
- (4) In the activity tables within this chapter, the letters below mean the following:
 - (a) P = Permitted Activity
 - (b) C = Controlled Activity
 - (c) RD = Restricted Discretionary Activity
 - (d) D = Discretionary Activity
 - (e) NC = Non-Complying Activity
 - (f) N/A = Not Applicable
- (5) Where relevant, the requirements of the National Code of Practice for Utility Operators' Access to Transport Corridors will apply to the placement, maintenance, improvement and removal of utility structures in roads (or unformed roads).
- (6) The requirements of the Resource Management (National Environmental Standards for Electricity Transmission Activities) Regulations 2009 ("NESETA") apply directly to the operation, maintenance, upgrading, relocation or removal of transmission line(s) that were operating or able to be operated on or before 14 January 2010 and remain part of the National Grid. In the case of conflict with any other provision of this plan, including any provision in the activity table in this section, the NESETA

provisions shall prevail.

- (7) The [Resource Management \(National Environmental Standards for Telecommunication Facilities\) Regulations 2016](#) (“NESTF”) provides national consistency in the rules surrounding the deployment of telecommunications [infrastructure](#) across New Zealand. This means that many telecommunications facilities may potentially be deployed as a permitted activity. However, telecommunications facilities which do not comply with the conditions within the [NESTF](#), or are not covered by the regulations of the [NESTF](#), will have the activity status specified in this plan.

This chapter is organised into the following rule sections:

[14.2](#) Rules applying to all [infrastructure](#)

[14.3](#) General [infrastructure](#)

[14.4](#) National Grid

[14.5](#) Electrical distribution

[14.6](#) Electricity generation

[14.7](#) Liquid fuels and gas

[14.8](#) Meteorological

[14.9](#) Amateur radio

[14.10](#) Telecommunications and radiocommunications

[14.11](#) Water, wastewater and stormwater

[14.12](#) Transportation

14.3.2 Controlled Activities

(a) The activity listed below is a controlled activity.

Activity		Activity-specific conditions	Matters of control
CI	Subdivision to create a utility allotment for accommodating infrastructure	<p>14.3.2.1</p> <p>(1) Is undertaken by a network utility operator as defined by the Resource Management Act 1991; and</p> <p>(2) Is for infrastructure permitted under Chapter 14; or</p> <p>(3) Is for infrastructure that has all necessary resource consents granted or notices of requirement confirmed.</p>	<p>Control is reserved over:</p> <p>(a) The adequacy of the allotment for its intended use;</p> <p>(b) Whether any easement is required.</p> <p>(c) Measures to avoid or mitigate natural hazards, including liquefaction risk (refer to Chapter 15).</p>

Chapter 16: Residential Zone

- (1) The rules that apply to activities in the Residential Zone are contained in [Rule 16.1](#) Land Use – Activities, [Rule 16.2](#) Land Use – Effects and [Rule 16.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Residential Zone are contained in [Rule 16.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Residential Zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (5) The Residential Zone contains a Specific Area that is Lakeside Te Kauwhata Precinct. [Rule 16.5](#) manages all land use, building and subdivision in this location. [Rule 16.5.1](#) sets out how to apply rules to Lakeside Te Kauwhata Precinct that are either different from, or are in addition to, other rules that apply to the rest of the Resident Zone.
 - (1) The activities listed below are restricted discretionary activities.
 - (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Council's discretion shall be restricted to the following matters:
RDI	<p>A <u>Multi-Unit development</u> that meets all of the following conditions:</p> <p>(a) The Land Use – Effects rules in Rule 16.2;</p>	(a) Density of the development;

16.1.3 Restricted Discretionary Activities

- (1) The activities listed below are restricted discretionary activities.
- (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Council's discretion shall be restricted to the following matters:
RD1	<p>A Multi-Unit development that meets all of the following conditions:</p> <ol style="list-style-type: none"> (a) The Land Use – Effects rules in Rule 16.2; (b) The Land Use – Building rules in Rule 16.3, except the following rules do not apply: <ol style="list-style-type: none"> (i) Rule 16.3.1, Dwelling; (ii) Rule 16.3.8 Building coverage; (iii) Rule 16.3.9 Living court; (iv) Rule 16.3.10 Service court; (c) The minimum net site area per residential unit is 300m²; (d) The Multi-Unit development is connected to public wastewater and water reticulation; (e) Total building coverage of the site does not exceed 50%; (f) Each residential unit is designed and constructed to achieve the internal design sound level specified in Appendix I (Acoustic Insulation) – Table I4; (g) Service court areas are provided to meet the following minimum requirements for each residential unit: <ol style="list-style-type: none"> (i) At least 2.25m² with a minimum dimension of 1.5 metres of outdoor or indoor space at ground floor level for the dedicated storage of waste and recycling bins; (ii) At least 3m² with a minimum dimension of 1.5 metres of outdoor space at ground floor level for washing lines; and (iii) The required spaces in (g)(i) or 	<ol style="list-style-type: none"> (a) Density of the development; (b) The manner in which the provisions of the Multi-Unit Design contained in Appendix 3.4 have been incorporated; (c) Contribution of the development to and engagement with adjacent streets and public open space; (d) The visual quality and interest created through design such as the separation of buildings, variety in built form and architectural detailing, glazing, materials and colour; (e) The incorporation of energy efficiency measures such as passive solar principles; (f) Amenity values for occupants and neighbours in respect of outlook, privacy, noise, light spill, access to sunlight, living court orientation, site design and layout; (g) Staging needed to ensure that development is carried out in a coordinated and timely manner; (h) Avoidance or mitigation of natural hazards; (i) Geotechnical suitability for building, <u>including liquefaction risk (refer to Chapter 15);</u> (j) Provision of infrastructure to individual units

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(g)(ii) for each residential unit shall be provided individually, or as a dedicated communal service court.

- (h) Living court areas are provided to meet the following minimum requirements for each residential unit:

Duplex dwelling	Area	Minimum dimension
Studio unit or 1 bedroom	30m ²	4m
2 or more bedrooms	40m ²	4m

Apartment Building Ground Level Residential Unit	Area	Minimum dimension
Studio unit or 1 bedroom	20m ²	4m
2 or more bedrooms	30m ²	4m

Apartment Building Upper Levels Residential Unit	Area	Minimum dimension
Studio unit or 1 bedroom	10m ²	2m
2 or more bedrooms	15m ²	2m

16.4 Subdivision

- (1) Rule 16.4.1 provides for subdivision density and apply across the Residential Zone.
- (2) The following rules apply to specific areas and/or activities:
 - (a) Rule 16.4.2 - Subdivision - Te Kauwhata Ecological Residential Area;
 - (b) Rule 16.4.3 - Subdivision - Te Kauwhata West Residential Area); and
 - (c) Rule 16.4.4 (Subdivision – Multi-Unit development).
 - (d) Rules 16.4.1 to 16.4.4 are also subject to the following subdivision controls:
 - (i) Rule 16.4.5 – subdivision boundary adjustments;
 - (ii) Rule 16.4.6 – subdivision amendments and updates to cross lease flats plan and conversion to freehold;
 - (iii) Rule 16.4.7 – subdivision title boundaries ~~natural hazard area~~, contaminated land, Significant Amenity Landscape, notable trees, intensive farming and aggregate extraction areas;
 - (iv) Rule 16.4.8 – subdivision title boundaries Significant Natural Areas, heritage items, archaeological sites, sites of significance to Maaori;
 - (v) Rule 16.4.9 – Title boundaries – Maaori site and Maaori areas of significance
 - (vi) Rule 16.4.10 - subdivision of land containing heritage items;
 - (vii) Rule 16.4.11 – subdivision road frontage;
 - (viii) Rule 16.4.12 – subdivision building platform;
 - (ix) Rule 16.4.13 – subdivision reserves; and
 - (x) Rule 16.4.14 - subdivision esplanade reserves and esplanade strips.
- (3) Rules 16.4.14 and 16.4.15 apply to specific features or areas:
- (4) Rule 16.4.15 – subdivision of land containing mapped off-road walkways; and
- (5) Rule 16.4.16 – subdivision of land containing Environmental Protection Area.

16.4.1 Subdivision - General

16.4.1 Subdivision - General

RDI	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) Proposed <u>lots</u> must have a minimum <u>net site area</u> of 450m², except where the proposed <u>lot</u> is an <u>access allotment</u> or <u>utility allotment</u> or reserve to vest; (ii) Proposed <u>lots</u> must be able to connect to public-reticulated water supply and wastewater; (iii) Where roads are to be vested in Council, they must follow a <u>grid layout</u>; (iv) Where 4 or more proposed <u>lots</u> are proposed to be created, the number of rear <u>lots</u> do not exceed 15% of the total number of <u>lots</u> being created; (v) Where the <u>subdivision</u> is within a structure plan area, <u>neighbourhood centres</u> within the <u>site</u> are provided in accordance with that structure plan document. <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout; (ii) Shape of <u>lots</u> and variation in <u>lot</u> sizes; (iii) Ability of <u>lots</u> to accommodate a practical <u>building platform</u> including geotechnical stability for <u>building</u>; (iv) Likely location of future <u>buildings</u> and their potential effects on the environment; (v) Avoidance or mitigation of natural <u>hazards</u>, <u>including liquefaction risk and fire risk (refer to Chapter 15)</u>; (vi) Amenity values and streetscape landscaping; (vii) Consistency with the matters contained within <u>Appendix 3.1</u> (Residential Subdivision Guidelines); (viii) Vehicle and pedestrian networks; (ix) Consistency with any relevant structure plan or master plan including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; and (x) Provision of <u>infrastructure</u>.
DI	<u>Subdivision</u> that does not comply with a condition in Rule 16.4.1 RD1.

16.4.2 Subdivision - Te Kauwhata Ecological Residential Area

RDI	<p>(a) Proposed <u>lots</u> in the Te Kauwhata Ecological Residential Area identified on the planning maps must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) Have a minimum <u>net site area</u> of 750m²; (ii) Have a minimum average <u>net site area</u> of 875m²; (iii) Must be able to be connected to public-reticulated water supply and wastewater; (iv) Where roads are to be vested in Council, they must follow a <u>grid layout</u>; (v) Where 4 or more proposed <u>lots</u> are being created, rear <u>lots</u> must not exceed 15% of the total number of <u>lots</u> being created. <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision layout</u>; (ii) Shape of <u>lots</u> and variation in <u>lot sizes</u>; (iii) Ability of <u>lots</u> to accommodate a practical <u>building platform</u> including geotechnical stability for <u>building</u>; (iv) Likely location of future <u>buildings</u> and their potential effects on the environment; (v) Avoidance or mitigation of natural <u>hazards</u>, <u>including liquefaction risk and fire risk (Chapter 15)</u>; (vi) Amenity values and streetscape landscaping; (vii) Consistency with the matters contained within <u>Appendix 3.1</u> (Residential Subdivision Guidelines); (viii) Vehicle and pedestrian networks; (ix) Consistency with any relevant structure plan or master plan including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; and (x) Provision of <u>infrastructure</u>.
DI	<p><u>Subdivision</u> within the Te Kauwhata Ecological Residential Area that does not comply with Rule 16.4.2 RD1.</p>

16.4.3 Subdivision - Te Kauwhata West Residential Area

RDI	<p>(a) Proposed <u>lots</u> within the Te Kauwhata West Residential Area must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) Be a minimum <u>net site area</u> of 650m²; (ii) Have a minimum average <u>net site area</u> of 875m²; (iii) Be connected to public-reticulated water supply and wastewater; (iv) Where roads are to be vested in Council, they are to follow a <u>grid layout</u>; (v) Where more than 5 proposed <u>lots</u> are being created, rear <u>lots</u> must not exceed 15% of the total number of titles being created. <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision layout</u>; (ii) Shape of <u>lots</u> and variation in lot sizes; (iii) Ability of <u>lots</u> to accommodate a practical <u>building platform</u>, including geotechnical stability for <u>building</u>; (iv) Likely location of future <u>buildings</u> and their potential effects on the environment; (v) Avoidance or mitigation of natural <u>hazards</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; (vi) Amenity values and streetscape landscaping; (vii) Consistency with the matters contained within <u>Appendix 3.1</u> (Residential Subdivision Design Guidelines); (viii) Vehicle and pedestrian networks; (ix) Consistency with any relevant structure plan or master plan, including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; and (x) Provision of <u>infrastructure</u>.
DI	<p><u>Subdivision</u> within the Te Kauwhata West Residential Area that does not comply with Rule 16.4.3 RD1.</p>

16.4.4 Subdivision - Multi-unit development

RDI	<p>(a) <u>Multi-Unit development</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) An application for land use consent under Rule 16.1.3 (Multi-Unit Development) must accompany the <u>subdivision</u> or have been granted land use consent by Council; (ii) The <u>Multi-Unit development</u> is able to be connected to public wastewater and water reticulation; (iii) The minimum existing <u>lot</u> size where a new freehold (fee simple) <u>lot</u> is being created must be 300m² <u>net site area</u>. (iv) Where a <u>residential unit</u> is being created in accordance with the Unit Titles Act 2010 it must meet the following minimum <u>residential unit</u> size: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Unit of Multi-Unit</th><th>Minimum Unit Area</th></tr> </thead> <tbody> <tr> <td>Studio unit or 1 bedroom unit</td><td>60m²</td></tr> <tr> <td>2 bedroom unit</td><td>80m²</td></tr> <tr> <td>3 or more bedroom unit</td><td>100m²</td></tr> </tbody> </table>	Unit of Multi-Unit	Minimum Unit Area	Studio unit or 1 bedroom unit	60m ²	2 bedroom unit	80m ²	3 or more bedroom unit	100m ²
Unit of Multi-Unit	Minimum Unit Area								
Studio unit or 1 bedroom unit	60m ²								
2 bedroom unit	80m ²								
3 or more bedroom unit	100m ²								
	<p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout including common boundary and party walls for the <u>Multi-unit development</u>; (ii) Provision of common areas for shared spaces, access and services; (iii) Provision of <u>infrastructure</u> to individual <u>residential units</u>; (iv) Avoidance or mitigation of natural <u>hazards</u>; (v) Geotechnical suitability of <u>site</u> for <u>buildings</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; (vi) Amenity values and streetscape; (vii) Consistency with the matters contained, and outcomes sought, in Appendix 3.4 (Multi-Unit Development Guideline) (viii) Consistency with any relevant structure plan or master plan, including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; (ix) Vehicle, pedestrian and cycle networks; (x) Safety, function and efficiency of road network and any internal roads or accessways. 								
DI	<u>Subdivision</u> that does not comply with Rule 16.4.4 RD1.								

16.4.7 Title boundaries – contaminated land, notable trees, intensive farming and aggregate extraction areas

RDI	<p>(a) Subdivision of land containing <u>contaminated land</u>, notable trees, <u>intensive farming</u> and <u>Aggregate Extraction Area</u> must comply with all of the following conditions:</p> <p>(i) The boundaries of every proposed <u>lot</u> containing existing <u>buildings</u> must demonstrate compliance with the following <u>building</u> rules (other than where any non-compliance existed lawfully prior to the <u>subdivision</u>) relating to:</p> <p>A. daylight admission (<u>Rule 16.3.5</u>);</p> <p>B. building coverage (<u>Rule 16.3.6</u>);</p> <p>C. building setbacks (<u>Rule 16.3.9</u>);</p> <p>(ii) The boundaries of every proposed <u>lot</u> must not divide the following:</p> <p>A. <u>a natural hazard area</u>;</p> <p><u>A</u>. <u>contaminated land</u>;</p> <p><u>B</u>. <u>Significant Amenity Landscape</u>; or</p> <p><u>C</u>. <u>notable tree</u>.</p> <p>(iii) The boundaries of every proposed <u>lot</u> must provide the following setbacks:</p> <p>A. 300m from any <u>intensive farming</u> activity;</p> <p>B. 500m from the boundary of an <u>Aggregate Extraction Area</u> for rock extraction; and</p> <p>C. 200m from the boundary of an <u>Aggregate Extraction Area</u> for sand excavation.</p> <p>(b) Council's discretion shall be restricted to the following matters:</p> <p>(i) Landscape values;</p> <p>(ii) Amenity values and character;</p> <p>(iii) Reverse sensitivity effects;</p> <p>(iv) Effects on existing <u>buildings</u>;</p> <p><u>(v)</u> <u>Effects on natural hazard areas</u>;</p> <p><u>(vi)</u> <u>Effects on contaminated land</u>;</p> <p><u>(vii)</u> <u>Effects on any notable trees</u>; and</p> <p><u>(viii)</u> <u>Effects on an intensive farming activity</u>.</p>
NCI	<u>Subdivision that does not comply with Rule 16.4.7 RD1.</u>

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16.4.12 Subdivision - Building platform

RDI	<p>(a) Every proposed <u>lot</u>, other than one designed specifically for access, <u>utility allotment</u> must be capable of containing a <u>building platform</u> upon which a <u>dwelling</u> and <u>living court</u> could be sited as a permitted activity, with the <u>building platform</u> being contained within either of the following dimensions:</p> <ul style="list-style-type: none"> (i) a circle with a diameter of at least 18m exclusive of yards; or (ii) a rectangle of at least 200m² with a minimum dimension of 12m exclusive of yards. <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout; (ii) Shape of <u>allotment</u>; (iii) Ability of <u>allotment</u> to accommodate a practical <u>building platform</u>; (iv) Likely location of future <u>buildings</u> and their potential effects on the environment; (v) Avoidance or mitigation of natural <u>hazards</u>; (vi) Geotechnical suitability for <u>building</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; and (vii) Ponding areas and primary <u>overland flow paths</u>.
DI	<u>Subdivision</u> that does not comply with Rule 16.4.12 RD1.

16.5.1 Application of rules

16.5.1 Application of rules

(a) The activity status tables and standards in the following chapters also apply to activities in the Lakeside Te Kauwhata Precinct:

14 Infrastructure and Energy:

15 Natural Hazards and Climate Change.

(1) The rules that apply to a permitted activity in Rule 16.5.2 within the Lakeside Te Kauwhata Precinct as identified on the planning maps are as follows:

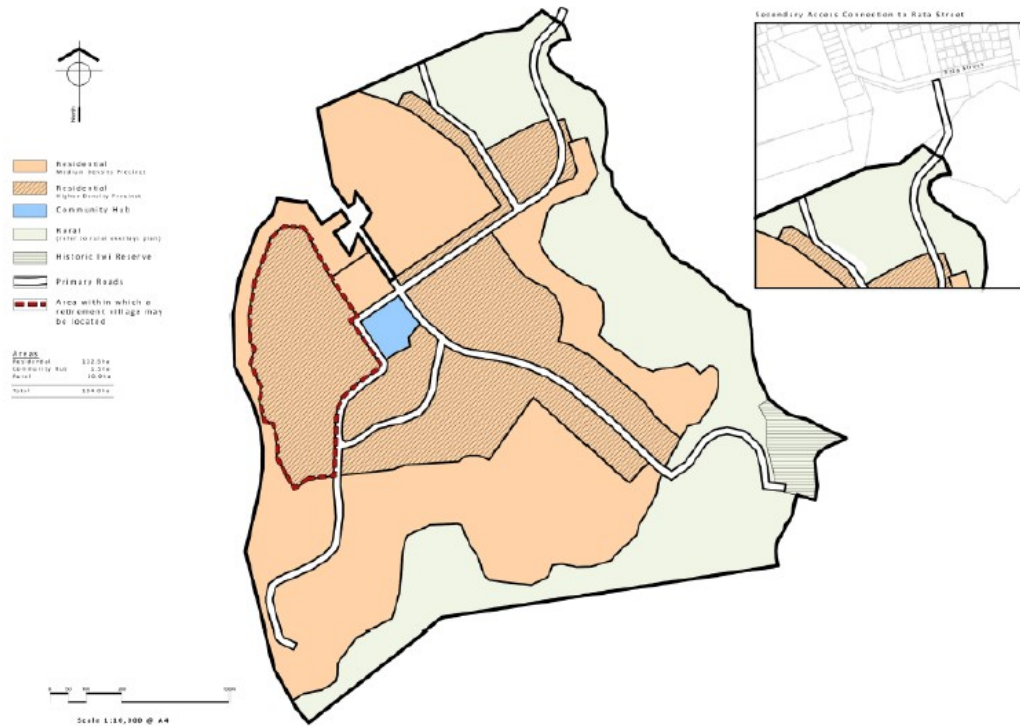
- (i) Rule 15.2 (Land Use – Effects) except:
 - A. Rule 16.2.4.1 (Earthworks – general) and Rule 16.2.4.2 (Earthworks – Maaori Sites and Maaori Areas of Significance) does not apply and Rule 16.5.7.2 applies instead
 - B. Rule 16.2.2 (Servicing hours of operation – Bankart Street and Wainui Road Business Overlay Area)
 - C. Rule 16.2.6 Notable trees
 - (i) Rule 16.5.7.1 Noise and Vibration – North Island Main Trunk Line (NIMT)
 - (ii) Rule 16.3 (Land Use – Building) does not apply, Rule 16.5.8 (Land Use – Building) applies instead.

(2) The rules that apply to subdivision within the Lakeside Te Kauwhata Precinct are:

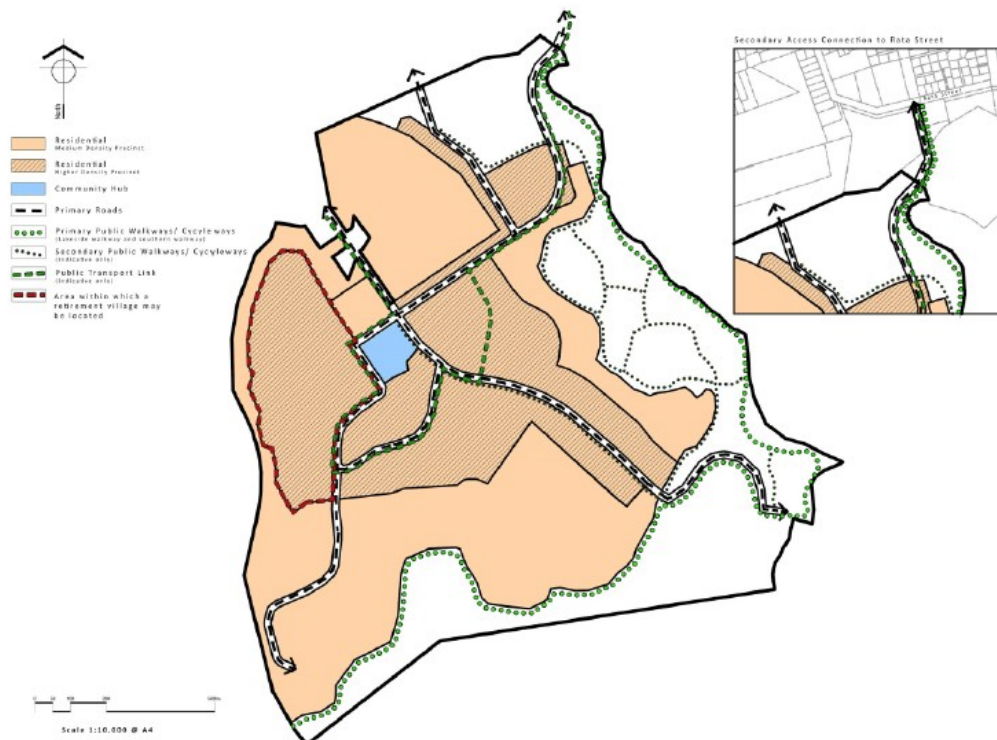
- (i) Rule 16.4 (Subdivision) except:
 - A. Rule 16.4.1 (Subdivision General) does not apply and Rule 16.5.9.1 (Subdivision Lakeside - General) applies instead
 - B. Rule 16.4.2 (Subdivision – Te Kauwhata Ecological Residential Area) does not apply
 - C. Rule 16.4.3 (Subdivision – Te Kauwhata West Residential Area) does not apply
 - D. Rule 16.4.4 (Subdivision – Multi-unit development) does not apply
 - E. Rule 16.4.6 (Subdivision – Amendments and updates to cross lease flats plans and conversion to freehold) does not apply
 - F. Rule 16.4.9 (Title boundaries – Maaori Sites and Maaori Areas of Significance) does not apply
 - G. Rule 16.4.10 (Subdivision of land containing heritage items) does not apply
 - H. Rule 16.4.11 (Subdivision – road frontage) does not apply
 - I. Rule 16.4.12 (Subdivision – Building platform) does not apply
 - J. Rule 16.4.15 (Subdivision of land containing mapped off-road walkways) does not apply
 - K. Rule 16.4.16 (Subdivision of land containing an Environmental Protection Area) does not apply
- (ii) Rule 16.5.9.2 (Lakeside Comprehensive Subdivision Consent)
- (iii) Rule 16.5.9.3 (Subdivisions less than 5ha)

(3) The following precinct plans apply in the Residential Zone within the Lakeside Te Kauwhata Precinct:

- (a) Plan I Lakeside Precinct Plan: Precinct Areas



(b) Plan 2 Lakeside Precinct Plan: Public Transport, Primary Road Network and Walkways/cycleways



(c) Plan 3 Lakeside Precinct Plan: Overlays and Open Space



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16.5.3 Restricted Discretionary Activities

- (1) The activities listed below are restricted discretionary activities.
- (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Council's discretion shall be restricted to the following matters:
RDI	<p>(a) A <u>comprehensive land development consent (CLDC)</u> that meets all of the following conditions:</p> <p>(i) is in accordance with the Te Kauwhata Lakeside Precinct Plan Rule 16.5.1(3)(a); the roading network, walkways and cycleways shown on Precinct Plan Rule 16.5.1(3)(b); and the open space shown on Precinct Plan Rule 16.5.1(3)(c) as set out in the precinct parameters below; and</p> <p>(ii) A <u>CLDC</u> is in accordance with the Lakeside Precinct Plans identified above if:</p> <p>A. Primary roads are within 50m of the location shown on Precinct Plan Rule 16.5.1(3)(b);</p>	<p>(a) Discretion is reserved over:</p> <p>(i) consistency with the Te Kauwhata Lakeside Precinct Plans in Rule 16.5.1(3)(a), 16.5.1(3)(b) and 16.5.1(3)(c),</p> <p>(ii) matters identified in the assessment criteria in X,</p> <p>(iii) managing the effects of</p>

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| <p>B. The bus route is either on the alignment shown on Precinct Plan Rule 16.5.1(3)(b) or a continuous alignment that achieves the same circulation;</p> <p>C. The external boundary of the high density area within the Residential Zone is within 10m of the location shown on Precinct Plan Rule 16.5.1(3)(a);</p> <p>D. Indicative walkways/cycle ways are within 100m of the location shown on Precinct Plan Rule 16.5.1(3)(b) provided connections are retained between the Lakeside Walkway and the residential development;</p> <p>E. Lakeside Walkway is within 10m of the location shown on Precinct Plan Rule 16.5.1(3)(c);</p> <p>F. <u>Retirement village</u> boundaries are within 50m of the location shown on Precinct Plan Rule 16.5.1(3)(a);</p> <p>G. Indicative areas of open space are within 200m of the location shown on Precinct Plan Rule 16.5.1(3)(c);</p> <p>(b) A secondary road access into the Lakeside Precinct Plan Area (as shown on Lakeside Precinct Plan Rule 16.5.1(3)(b)) must be opened for traffic before the number of residential <u>allotments</u> in the Lakeside Precinct Plan Area exceeds 400 provided that:</p> <p style="margin-left: 20px;">(i) each independent living unit in a <u>retirement village</u> shall count as one <u>allotment</u>;</p> <p style="margin-left: 20px;">(ii) for the purpose of this rule, exceedance of 400 residential <u>allotments</u> shall occur at the time of issue of 224C certificate under the Resource Management Act, and exceedance of independent living unit shall occur at the time of issue of <u>building</u> consent for that unit.</p> <p>(c) The following <u>infrastructure</u> requirements are met:</p> <p style="margin-left: 20px;">(i) Demonstrate that adequate capacity within the water, stormwater and wastewater networks will be available to accommodate the proposed <u>subdivision</u> including all necessary treatment required to meet water quality, quantity and disposal requirements; and</p> <p style="margin-left: 20px;">(ii) Any wastewater disposal into Lake Waikare shall be from a new membrane bioreactor treatment plant (or plant of equal or better functionality), provided that wastewater disposal from up to 400 residential <u>allotments</u> may be connected to the existing Te Kauwhata wastewater treatment</p> | <p>wastewater and stormwater,</p> <p>(iv) roading network (including the Te Kauwhata Road level crossing safety) and compliance with a Council approved roading standard,</p> <p>(v) protection, restoration or enhancement of ecological features,</p> <p>(vi) provision and location of existing and future utilities and connections,</p> <p>(vii) location of roads and their connections,</p> <p>(viii) provision for public access to Lake Waikare,</p> <p>(ix) provision of open space, including linkages between residential areas, open space and Lake Waikare,</p> <p>(x) effects of natural hazards (including flooding), geotechnical (including liquefaction risk, refer to Chapter 15) and land contamination,</p> <p>(xi) provision of the historic Iwi overlay area shown on Precinct Plan</p> |
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	<p>plant on a temporary basis until a long-term wastewater disposal system is implemented. Where a <u>retirement village</u> is included as part of the first 400 residential <u>allotments</u>, then each independent living unit shall count as one <u>allotment</u>; and</p> <p>(iii) Every <u>allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space <u>allotment</u>, must be able to demonstrate how it will connect to a reticulated water supply, and wastewater network that has adequate capacity as per <u>infrastructure</u> standard (i) above; and</p> <p>(iv) Every <u>allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space <u>allotment</u>, must be able to demonstrate how it will provide land drainage and stormwater disposal either through a reticulated network or in accordance with Chapter 14; and</p> <p>(v) Prior to the issue of any <u>building</u> consent for a <u>dwelling</u> or <u>retirement village</u>, the <u>infrastructure</u> requirements detailed in (c)(i)(iii) above shall be implemented and operational.</p> <p>(d) A <u>CLDC</u> can relate to the entire Te Kauwhata Lakeside Precinct Plan Area, or may be for an individual stage or stages, provided that an individual stage must be 5ha or more.</p> <p>(e) Applications for approval of a <u>CLDC</u> as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>(f) <u>CLDC</u> approval does not constitute authorisation by the Waikato District Council as road controlling authority in terms of Section 357 of the Local Government Act 1974. Written authorisation is required from the Waikato District Council prior to any works commencing that affect public roads.</p>	<p>Rule 16.5.1(3) (c).</p>
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16.5.7.2 Earthworks - general

P1	<p>(a) <u>Earthworks</u> (excluding the importation of fill, within a <u>flood-risk area</u> <u>Flood Ponding Area</u>, or a CLDC), including <u>earthworks</u> necessary for the construction and maintenance of existing public roads or for construction of new roads in accordance with the Te Kauwhata Lakeside Precinct Plan, must meet all the following conditions:</p> <ul style="list-style-type: none"> (i) do not disturb or move more than 200m² within an individual <u>site</u> in a single calendar year except where the maximum area at any one time shall not exceed 400m², and (ii) in relation to the <u>height</u> of any cut or batter face do not exceed 2m, or (iii) are necessary for <u>building</u> works authorised by a building consent and: <ul style="list-style-type: none"> A. the area of earthworks is no more than 150% of the area of those <u>building</u> works, or B. the <u>earthworks</u> occur on land with an average gradient no steeper than 1:8, or C. any trenching for network utilities, or on or offsite utilities within the Te Kauwhata Lakeside Precinct Plan Area are backfilled or reinstated to original ground level, or D. traffic associated with the works is managed in accordance with a Construction Traffic Management Plan approved by the Waikato District Council as the road controlling authority; E. Including any cut and batter faces or filled areas, are revegetated to achieve 80% ground cover within 12 months of the <u>earthworks</u> being commenced; and F. Retain sediment within the construction area through the implementation and maintenance of sediment controls. <p>Note: The Waikato Pest Management Plan addresses the management of identified pest species, including alligator weed. It includes enforceable controls relating to <u>subdivision</u> and land development in infected areas.</p>
P2	<p>(a) <u>Earthworks</u> involving imported <u>fill material</u> (other than <u>earthworks</u> approved as part of a <u>CLDC</u>) meets all of the following conditions:</p> <ul style="list-style-type: none"> (i) all material for filling is <u>cleanfill</u>, and (ii) filling that is not part of <u>building</u> work, or construction of roads, or installation of <u>infrastructure</u>: <ul style="list-style-type: none"> A. does not exceed a volume of 20m² and a depth of 1m, and B. does not include a <u>building platform</u>, and C. does not include placing fill into an area of significant <u>indigenous vegetation</u> or habitat, or (iii) is for minor upgrading of existing electricity lines and does not exceed 50m², and (iv) where traffic associated with the work uses public roads, is managed in accordance with an approved Construction Traffic Management Plan or authorised in writing by Waikato District Council as the road controlling authority. <p>Note: The Waikato Pest Management Plan addresses the management of identified pest species, including alligator weed. It includes enforceable controls relating to subdivision and land development in infected areas.</p>

P3	<p>(a) <u>Earthworks</u> in a Flood Risk Area Flood Ponding Area (other than <u>earthworks</u> approved as part of a <u>CLDC</u>) shall meet the following conditions:</p> <ul style="list-style-type: none"> (i) filling is no more than is necessary to: <ul style="list-style-type: none"> A. provide a foundation for <u>building</u> approved by a <u>building</u> consent, and access to that <u>building</u>, or B. enable minor upgrading of existing electricity lines and does not exceed 50m². <p>Note 1: The Waikato Pest Management Plan addresses the management of identified pest species, including Alligator Weed. It includes enforceable controls relating to subdivision and land development in infected areas.</p> <p>Note 2: Regional <u>earthworks</u> consents may also be needed for works in a high risk erosion area.</p>
C I	<p>(a) <u>Earthworks</u> that do not comply with Rule 16.5.7.2 P I are a controlled activity provided it meets the following conditions:</p> <ul style="list-style-type: none"> (i) do not exceed 5000m² in total area at any one time except a <u>retirement village</u> where the maximum area at any one time shall not exceed 1 ha; (ii) does not involve <u>contaminated land</u> unless that land has been remediated; (iii) have erosion and sediment controls in place which will retain sediment on the <u>site</u>; (iv) any cut and batter faces or filled areas, are revegetated to achieve 80% ground cover within 12 months of the <u>earthworks</u> being commenced, or in the cases where the filled area is to be (in part or whole) within a <u>building platform</u> or hard surface area, the base course has been laid and compacted within 12 months of the <u>earthworks</u> being commenced; (v) any surplus material is disposed of within the Te Kauwhata Lakeside Precinct Plan Area in 16.5.1(3)(a), and (vi) does not adversely affect other land through changes to natural water flows or established drainage paths.
RDI	<p>(a) <u>Earthworks</u> that do not comply with 16.5.7.2 C I.</p> <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) effects on amenity values; (ii) visual effects; (iii) mitigation measures including sediment control; (iv) effects on land utilization; (v) effects on erosion; (vi) effects on cultural values; (vii) effects on heritage values; (viii) effects on the Lake Waikare flood plain.

RD2	<p>(a) <u>Earthworks</u> that do not comply with Rule 16.5.7.2 P2.</p> <p>(b) Council discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) effects on amenity values; (ii) visual effects; (iii) effects on <u>indigenous vegetation</u> and habitat; (iv) mitigation measures including replacement planting where vegetation removal is involved; (v) effects on cultural values; (vi) effects on heritage values.
DI	<u>Earthworks</u> that do not comply with Rule 16.5.7.2 P3.

16.5.9.1 Subdivision Lakeside - general

C I	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> is for an existing or approved housing development. (ii) every <u>allotment</u>, other than a <u>utility allotment</u> or <u>access allotment</u>, has a <u>net site area</u> of at least: <ul style="list-style-type: none"> A. Medium Density Precinct – a minimum <u>site</u> size of 300m² with an average <u>site</u> size of 450m², subject to (B) below; B. Higher Density Precinct – a minimum <u>site</u> size of 225m², with a minimum average <u>site</u> size of 250m². Where a <u>site</u> has legal access to private communal open space, then the percentage of that open space related to the number of properties with legal rights to use the private communal open space, will count towards the average <u>site</u> size (but not minimum <u>site</u> size); or C. 2500m² in the case of any new <u>allotment</u> that is not connected to a reticulated wastewater system. For the avoidance of doubt this rule does not apply to any <u>allotment</u> created prior to 1 January 2017. (iii) No <u>allotment</u> adjoining Lot 2 DPS 83606 included in SA66B/985 and/or Lot 4 DPS 83606 included in SA66B/987 shall be smaller than 450m² <u>net site area</u>. (iv) every <u>allotment</u> with a road <u>boundary</u>, other than an <u>access allotment</u>, access leg or <u>utility allotment</u>, has a width along the road <u>boundary</u> of at least: <ul style="list-style-type: none"> A. 12m in the Medium Density Precinct shown on Plan Rule 16.5.1(3)(a) or B. 9m in the Higher Density Precinct shown on Plan Rule 16.5.1(3)(a) or (v) every <u>allotment</u>, other than a <u>utility</u> or <u>access allotment</u>, is capable of containing a <u>building platform</u>: <ul style="list-style-type: none"> A. Upon which a <u>dwelling</u> and <u>living court</u> could be sited as a permitted activity or, in the Higher Density Precinct, outdoor living space meets the communal open space Rule 16.5.8.6, or B. In the case of vacant <u>sites</u> with no associated <u>building</u> proposal: C. A rectangle of at least 200m² with a minimum dimension of 12m exclusive of yards, and D. No part of the rectangle is located in an area identified as a stream or flood plain. (vi) every <u>allotment</u> other than a <u>utility</u>, <u>access</u> or <u>open space allotment</u> meets the <u>infrastructure</u> requirements as below: <ul style="list-style-type: none"> A. Demonstrate that adequate capacity within the water, stormwater and wastewater networks will be available to accommodate the proposed <u>subdivision</u> including all necessary treatment required to meet water quality, quantity and disposal requirements; and B. Every <u>allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space allotment must be able to demonstrate how it will connect to a reticulated water supply, and wastewater network that has adequate capacity as per infrastructure standard (a) above; and C. Every <u>allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space allotment must be able to demonstrate how it will provide land drainage and stormwater disposal either through a reticulated network or in accordance with Chapter 14. (vii) any allotment that creates a walkway or cycle way or any walkway or cycle way
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	<p>forming part of a <u>subdivision</u> is:</p> <ul style="list-style-type: none"> A. at least 3 metres wide; B. designed for shared pedestrian and cycle use; C. for connections between roads, has unimpeded visibility along the entire length; D. generally in accordance with the walkway route shown on Precinct Plan <u>Rule 16.5.1(3)(c)</u> (recognising that the detailed alignment is indicative only). <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>subdivision</u> layout; (ii) shape and orientation of <u>allotment</u>; (iii) ability of <u>allotment</u> to accommodate a practical <u>building platform</u>; (iv) variation in <u>allotment</u> size; (v) likely location of future buildings and their potential effects on the environment; (vi) avoidance or mitigation of natural hazards, <u>including liquefaction risk (refer to Chapter 15) and</u> geotechnical suitability for <u>building</u>; (vii) road efficiency and safety; (viii) vehicle and pedestrian networks; (ix) connection to open spaces; (x) amenity and streetscape; (xi) drainage; (xii) land stability; (xiii) amenity matters including batter slopes; (xiv) health and safety; (xv) easements to facilitate development beyond the <u>site</u>.
RDI	<p>(a) <u>Subdivision</u> that does not comply with conditions in Rule 16.5.9.1 C1.</p> <p>(b) The Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>subdivision</u> layout; (ii) shape and orientation of <u>allotment</u>; (iii) ability of <u>allotment</u> to accommodate a practical building platform; (iv) variation in <u>allotment</u> size; (v) likely location of future <u>buildings</u> and their potential effects on the environment; (vi) avoidance or mitigation of natural hazards geotechnical suitability for <u>building</u>; (vii) road efficiency and safety; (viii) vehicle and pedestrian networks; (ix) connection to open spaces; (x) amenity and streetscape; (xi) drainage; (xii) land stability; (xiii) amenity matters including batter slopes; (xiv) health and safety; (xv) easements to facilitate development beyond the <u>site</u>.

16.5.9.2 Lakeside Comprehensive Subdivision Consent (CS)

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RDI	<p>(a) A Comprehensive Subdivision Consent (CS) that meets all of the following conditions:</p> <ul style="list-style-type: none"> (i) is in accordance with Te Kauwhata Lakeside Precinct Plan Rule 16.5.1(3)(a); the roading network, walkways and cycle ways shown on Precinct Plan Rule 16.5.1(3)(b); and the open space shown on Precinct Plan Rule 16.5.1(3)(c) as set out in the precinct parameters below; and (ii) A CS is in accordance with the Lakeside Precinct Plans identified above if: <ul style="list-style-type: none"> A. Primary roads are within 50m of the location shown on Precinct Plan Rule 16.5.1(3)(b); B. Bus route is either on the alignment shown on Precinct Plan Rule 16.5.1(3)(b) or a continuous alignment that achieves the same circulation; C. The external <u>boundary</u> of the high density area within the Residential Zone is within 10m of the location shown on Precinct Plan Rule 16.5.1(3)(a); (iii) Indicative walkways/cycle ways are within 100m of the location shown on Precinct Plan Rule 16.5.1(3)(c) provided connections are retained between the Lakeside Walkway and the residential development; (iv) The Lakeside Walkway is within 10m of the location shown on Precinct Plan Rule 16.5.1(3)(c); (v) <u>Retirement village boundaries</u> are within 50m of the location shown on Precinct Plan Rule 16.5.1(3)(b); and (vi) Indicative areas of open space are within 200m of the location shown on Precinct Plan Rule 16.5.1(3)(c). (vii) A secondary road access into the Lakeside Precinct Plan Area (as shown on Lakeside Precinct Plan Rule 16.5.1(3)(b)) must be opened for traffic before the number of residential <u>allotments</u> in the Lakeside Precinct Plan Area exceeds 400 provided that: <ul style="list-style-type: none"> A. each independent living unit in a <u>retirement village</u> shall count as one <u>allotment</u>; B. for the purpose of this rule, exceedance of 400 residential <u>allotments</u> shall occur at the time of issue of 224C certificate under the Resource Management Act, and exceedance of independent living unit shall occur at the time of issue of building consent for that unit. (viii) The following <u>infrastructure</u> requirements are met: <ul style="list-style-type: none"> A. Demonstrate that adequate capacity within the water, stormwater and wastewater networks will be available to accommodate the proposed subdivision including all necessary treatment required to meet water quality, quantity and disposal requirements; and B. Any wastewater disposal into Lake Waikare shall be from a new membrane bioreactor treatment plant (or plant of equal or better functionality), provided that wastewater disposal from up to 400 residential <u>allotments</u> may be connected to the existing Te Kauwhata wastewater treatment plant on a temporary basis until a long-term wastewater disposal system is implemented. Where a <u>retirement village</u> is included as part of the first 400 residential <u>allotments</u>, then each independent living unit shall count as one <u>allotment</u>; and C. Every <u>allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space
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- allotment, must be able to demonstrate how it will connect to a reticulated water supply, and wastewater network that has adequate capacity as per infrastructure standard (i) above; and
- D. Every allotment other than a utility allotment, access allotment or open space allotment, must be able to demonstrate how it will provide land drainage and stormwater disposal either through a reticulated network or in accordance with Chapter 14;
 - E. and prior to the issue of any 224C approval, the infrastructure requirements detailed in (viii) A-D above shall be implemented and operational.
- (ix) Individual site sizes shall not be less than the following for the identified areas on the Te Kauwhata Lakeside Precinct Plan Rule 16.5.1(3)(a).
- A. Medium Density– a minimum site size of 300m² with a minimum average site size of 450m², subject to E below.
 - B. Higher Density – a minimum site size of 225m² with a minimum average site size of 250m². Where a site has legal access to private communal open space, the percentage of that open space related to the number of properties with legal rights to use the private communal open space, will count towards average site size (but not minimum site size).
 - C. Retirement village – Medium Density precinct – a minimum exclusive area for an independent dwelling of 120m².
 - D. Retirement village – Higher Density precinct – no density limit.
 - E. No allotment adjoining Lot 2 DPS 83606 included in SA66B/985 and/or Lot 4 DPS 83606 included in SA66B/987 shall be smaller than 450m² net site area.
 - F. Where the averaging rule applies in A and B above this shall be calculated as the average of all sites zoned Residential, intended for residential purposes, and less than 2000m². Any allotment greater than 2000m² or any allotment primarily intended for roading or public infrastructure shall not be included within the average calculation.
- (x) A CS can relate to the entire Te Kauwhata Lakeside Precinct Plan Area, or may be for an individual stage or stages, provided that an individual stage must be 5ha or more.
- (b) Council's discretion shall be restricted to the following matters:
- (i) consistency with the Te Kauwhata Lakeside Precinct Plan in Rules 16.5.1(3)(a), 16.5.1(3)(b) and 16.5.1(3)(c);
 - (ii) matters identified in the assessment criteria in X;
 - (iii) managing the effects of wastewater and stormwater;
 - (iv) extent of any non-compliance with site density control;
 - (v) roading network (including the Te Kauwhata Road level crossing safety);
 - (vi) compliance with a Council-approved roading standard;
 - (vii) protection, restoration or enhancement of ecological features;
 - (viii) provision and location of existing and future utilities and connections;
 - (ix) location of roads and their connections;
 - (x) provision for public access to Lake Waikare;
 - (xi) provision of open space, including linkages between residential areas, open space and Lake Waikare;
 - (xii) effects of natural hazards (including flooding), geotechnical (including liquefaction

	<p>risk, refer to Chapter 15) and land contamination;</p> <p>(xiii) provision of the historic lwi overlay area shown on Precinct Plan Rule 3/7 16.5.1(3) (c).</p> <p>(c) Applications for approval of a Comprehensive Subdivision Consent as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>Note 1: CS approval does not constitute authorisation by the Waikato District Council as road controlling authority in terms of Section 357 of the Local Government Act 1974. Written authorisation is required from the Waikato District Council prior to any works commencing that affect public roads.</p>
DI	<p>(a) A CS that does not comply with Rule 16.5.9.2 RD1 and meets all of the following conditions and conditions 16.5.9.2 RD1 (i) and (ii) relating to secondary access and <u>infrastructure</u>:</p> <ul style="list-style-type: none"> (i) Primary roads are within 50m-100m of the location shown on Precinct Plan Rule 16.5.1(3)(b); (ii) Bus route is either on the alignment shown on Precinct Plan Rule 16.5.1(3)(b) or a continuous alignment that achieves the same circulation; (iii) The external <u>boundary</u> of the high density area within the Residential Zone is within 10m-20m of the location shown on Precinct Plan Rule 16.5.1(3)(a); (iv) Indicative walkways/cycleways are within 100m-200m of the location shown on Precinct Plan Rule 15.5.2.3 provided that connections are retained between the Lakeside Walkway and the residential development; (v) Lakeside Walkway is within 10m-20m of the location shown on Precinct Plan Rule 16.5.1(3)(c); (vi) <u>Retirement village boundaries</u> are within 50m-100m of the location shown on Precinct Plan 16.5.1(3)(a); (vii) Indicative areas of open space are within 200-400m of the location shown on Precinct Plan 16.5.1(3)(c). <p>(b) The matters over which Council reserves discretion shall be used for assessing discretionary activity applications under this rule.</p>
NC1	<p>A CS that does not meet the requirements of Rule 16.5.9.2 RD1 (vii) and (viii) relating to Secondary Road Access Control and/or the Infrastructure Requirements, shall be a non-complying activity.</p>
NC2	<p>A CS that does not meet any of the parameters for a discretionary activity outlined in Rule 16.5.9.2 DI (i) to (vii) is a non-complying activity.</p>

16.5.9.3 Subdivision – Sites less than 5ha

RDI	<p>(a) <u>Subdivision</u> on sites less than 5 ha that complies with the conditions as set out below:</p> <ul style="list-style-type: none"> (i) it is in accordance with the Te Kauwhata Lakeside Precinct Plan in 16.5.1(3)(a), 16.5.1(3)(b) and 16.5.1(3)(c), (ii) environmental improvements required by the Te Kauwhata Lakeside Precinct Plan (including, but not limited to landscaping and provision of walkways and cycleways shown on the Precinct Plan Rules 16.5.1(3)(c) have been implemented to the extent required, or (iii) the requisite environmental improvements in (ii) above are proposed to be implemented as a condition of <u>subdivision</u> consent to be completed or bonded prior to the issue of a section 224(c) certificate for the subdivision. <p>(b) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) consistency with the Te Kauwhata Lakeside Precinct Plans Rules 16.5.1(3)(a), 16.5.1(3)(b) and 16.5.1(3)(c), (ii) matters identified in the assessment criteria in X, (iii) managing the effects of wastewater and stormwater, (iv) extent of any non-compliance with <u>site</u> density control, (v) roading network and compliance with a Council approved roading standard, (vi) provision and location of existing and future utilities and connections, (vii) location of roads and their connections, (viii) effects of natural hazards (including flooding), geotechnical (including liquefaction risk, refer to Chapter 15) and land contamination.
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Chapter 17: Business Zone

- (1) The rules that apply to activities in the Business Zone are contained in [Rule 17.1](#) Land Use – Activities, [Rule 17.2](#) Land Use – Effects and [Rule 17.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Business zone are contained in [Rule 17.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Business Zone:
 - 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (5) The Business Zone contains a Specific Area that is Lakeside Te Kauwhata Precinct. [Rule 17.5](#) manages all land use, building and subdivision in this location. [Rule 17.5.1](#) sets out how to apply rules to the Lakeside Te Kauwhata Precinct that are either different from, or are in addition to, other rules that apply to the rest of the Business Zone.

17.1 Land Use – Activities

17.1.1 Prohibited Activities

- (1) The following activity is a prohibited activity. No application for resource consent for a prohibited activity can be made and a resource consent must not be granted.

PR I	Any <u>building</u> , structure, objects or vegetation that obscure the sight line of the Raglan navigation beacons for vessels entering Whaingaroa (Raglan Harbour) (refer to Appendix 8).
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17.1.2 Permitted Activities

- (1) The following activities are permitted activities if they comply with all of the:
 - (a) Land Use – Effects rules in [Rule 17.2](#) and Land Use – Building rules in [Rule 17.3](#) (unless the activity-specific rule and/or conditions identifies a condition(s) that does not apply); and
 - (b) Activity-specific conditions.

Activity		Activity-specific conditions
P1	<u>Commercial activity</u>	Nil
P2	<u>Commercial services</u>	Nil
P3	<u>Community activity</u>	Excluding a cemetery
P4	<u>Residential activity</u>	Located above ground floor level
P5	<u>Education facility</u>	Nil

17.1.3 Restricted Discretionary Activities

- (1) The activities listed below are restricted discretionary activities.
(2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Matters of Discretion
RDI	<p>(a) A <u>multi-unit development</u> that meets all of the following conditions:</p> <p>(i) Land Use – Effects rules in Rule 17.2;</p> <p>(ii) Land Use – Building rules in Rule 17.3, except the following rules do not apply:</p> <p>(i) Rule 17.3.8 Dwelling;</p> <p>(ii) Rule 17.3.9 Living court;</p> <p>(iii) The <u>multi-unit development</u> must be located above the ground floor level;</p> <p>(iv) A detailed <u>site plan</u> depicting the proposed <u>lot boundaries</u> for each <u>residential unit</u> and any common areas (including access and services) must be provided, ensuring that a freehold (fee simple) or unit title <u>subdivision</u> complies with Rule 17.4.2 (Subdivision of multi-unit housing developments);</p> <p>(v) Each <u>residential unit</u> must be designed and constructed to achieve the internal design sound levels specified in Appendix 1 (Acoustic Insulation), Table 14;</p> <p>(vi) A communal service court is provided comprising:</p> <p>A. a minimum of 20m²; and</p> <p>B. a minimum dimension of 3m;</p> <p>(vii) <u>Living court</u> areas are provided above ground floor level to meet the following minimum requirements for each <u>residential unit</u>:</p>	<p>(a) Council's discretion is limited to the following matters:</p> <p>(i) The extent to which the development is consistent with Town Centre Guidelines contained in Appendix 3.3;</p> <p>(ii) The extent to which the development is consistent with the Multi-unit design guidelines contained in Appendix 3.4;</p> <p>(iii) The extent to which the development contributes to and engages with adjacent streets and public open space;</p> <p>(iv) The extent to which the development creates visual quality and interest through the separation of <u>buildings</u>, variety in built form and architectural detailing, glazing, and materials;</p> <p>(v) The extent to which the design of the development incorporates energy</p>

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		<p>efficiency measures such as passive solar principles;</p> <p>(vi) Amenity values for occupants and neighbours in respect of outlook, privacy, noise, light spill, access to sunlight, <u>living court</u> orientation, <u>site</u> design and layout;</p> <p>(vii) The extent to which staging is necessary to ensure that development is carried out in a coordinated and timely manner;</p> <p>(viii) Avoidance or mitigation of natural hazards;</p> <p>(ix) Geotechnical suitability for building, including <u>liquefaction (refer to Chapter 15).</u></p>
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17.4.1 General subdivision

RDI	<p>(a) <u>Subdivision</u> of land must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) Proposed <u>lots</u> must have a minimum size of 225m² <u>net site area</u> with the exception of <u>access</u> or <u>utility allotments</u> or reserves to vest; (ii) Proposed <u>lots</u> must be connected to public-reticulated water supply and wastewater. <p>(b) The Council's discretion shall be limited to the following matters:</p> <ul style="list-style-type: none"> (i) amenity values; (ii) the extent to which a range of future business activities can be accommodated; <u>and</u> (iii) <u>avoidance and/or mitigation of natural hazards risk, including liquefaction (refer to Chapter 15).</u>
DI	<u>Subdivision</u> that does not comply with Rule 17.4.1 RDI.

17.4.1.1 Subdivision - Multi-unit development

RDI	<p>(a) <u>Subdivision</u> for <u>multi-unit development</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) An application for land use consent under Rule 17.1.4 (Multi-unit housing development) must either accompany the <u>subdivision</u> or been granted resource consent by Council; (ii) Be connected to public wastewater and water reticulation; and (iii) Where a <u>residential unit</u> is being created in accordance with the Unit Titles Act 2010, it meets the following minimum unit size: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Unit of Apartment</th><th>Minimum Unit Area</th></tr> </thead> <tbody> <tr> <td>Studio unit or 1 bedroom unit</td><td>60m²</td></tr> <tr> <td>2 bedroom unit</td><td>80m²</td></tr> <tr> <td>3 bedroom unit</td><td>100m²</td></tr> </tbody> </table>	Unit of Apartment	Minimum Unit Area	Studio unit or 1 bedroom unit	60m ²	2 bedroom unit	80m ²	3 bedroom unit	100m ²
Unit of Apartment	Minimum Unit Area								
Studio unit or 1 bedroom unit	60m ²								
2 bedroom unit	80m ²								
3 bedroom unit	100m ²								
	<p>(b) The Council's discretion shall be limited to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout including <u>notional boundaries</u> for the <u>multi-unit development</u>; (ii) Provision of common areas for shared spaces, access and services; (iii) Avoidance or mitigation of natural hazards; (iv) Geotechnical suitability of <u>site</u> for <u>buildings</u>, including liquefaction risk (refer to Chapter 15); (v) Amenity values and streetscape; (vi) Consistency with the matters contained, and outcomes sought, in Appendix 3.4 (Multi-unit development guideline); (vii) Consistency with any relevant structure plan or master plan, including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; (viii) Vehicle, pedestrian and cycle networks; (ix) Safety, function and efficiency of road network and any internal roads or accessways. 								
DI	<u>Subdivision</u> that does not comply with Rule 17.4.1.1 RDI.								

17.4.1.2 Subdivision – Boundary adjustments

17.5.1 Application of rules

- (1) Rules 17.5.2, 17.5.3 and 17.5.4 apply in the Lakeside Te Kauwhata Precinct in addition to the activity rules in 17.1.2 (Permitted Activities), 17.1.3 (Restricted Discretionary Activities), 17.1.4 (Discretionary Activities) and 17.1.5 (Non-Complying Activities).
- (2) The rules that apply to a permitted activity in Rule 17.5.2 PI-PI7 within the Lakeside Te Kauwhata Precinct as identified on the planning maps are as follows:
 - (a) Rule 17.2 (Land use – Effects), except:
 - (i) Rule 17.2.5.1 (Earthworks - General) does not apply where earthworks consent has been obtained under Rule 17.5.2 (Comprehensive Land Development Consent);
 - (b) Rule 17.3 (Land use – Building), except:
 - (i) Rule 17.3.2 (Daylight admission) does not apply and Rule 17.5.5 applies instead.
 - (ii) Rule 17.3.4 (Building setbacks) does not apply and Rule 17.5.8 applies instead.
 - (c) Rule 17.5.6 (Gross floor area);
 - (d) Rule 17.5.7 (Gross leasable floor area).
- (3) Rule 17.5.9 applies in addition to Rule 17.4 (Subdivision) for subdivision within the Lakeside Te Kauwhata Precinct.
- (4) Precinct Plans 1-3 are contained in Rule 16.5.1(3).
- (5) The activity status tables and standards in the following chapters also apply to activities in the Lakeside Te Kauwhata Precinct:
 - 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change.

17.5.2 Restricted Discretionary Activities

Activity		Council's discretion shall be restricted to the following matters:
RDI	<p>(a) A <u>comprehensive land development consent (CLDC)</u> that meets all of the following conditions:</p> <p>(i) is in accordance with Te Kauwhata Lakeside Precinct Plan 16.5.1 (3)(a); the roading network, walkways and cycle ways shown on Precinct Plan 16.5.1 (3)(b); and the open space shown on Precinct Plan 16.5.1 (3)(c) as set out in the precinct parameters below; and</p> <p>(b) A <u>CLDC</u> is in accordance with the Lakeside Precinct Plans identified above if:</p> <p>(i) Primary roads are within 50m of the location shown on Precinct Plan 16.5.1 (3)(b); and</p> <p>(ii) Bus route is either on the alignment shown on Precinct Plan 16.5(3)(b) or a continuous alignment that achieves the same circulation; and</p>	<p>(a) Council's discretion is reserved over:</p> <p>(i) consistency with the Te Kauwhata Lakeside Precinct Plans in 16.5.1 (3)(a), 16.5.1 (3)(b) and 16.5.1 (3)(c);</p> <p>(ii) matters identified in the assessment criteria in X;</p> <p>(iii) managing the effects of wastewater and stormwater;</p>

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<p>(iii) Indicative areas of open space are within 200m of the location shown on Precinct Plan 16.5 (3) (b).</p> <p>(c) The following <u>infrastructure</u> requirements are met:</p> <p>(i) Demonstrate that adequate capacity within the water, stormwater and wastewater networks will be available to accommodate the proposed <u>subdivision</u> including all necessary treatment required to meet water quality, quantity and disposal requirements; and</p> <p>(ii) Every <u>Allotment</u> other than a <u>utility Allotment</u>, <u>access allotment</u> or open space <u>Allotment</u> must be able to demonstrate how it will connect to a reticulated water supply, and wastewater network that has adequate capacity as per <u>infrastructure</u> standard (i) above; and</p> <p>(iii) Every <u>Allotment</u> other than a <u>utility allotment</u>, <u>access allotment</u> or open space <u>Allotment</u> must be able to demonstrate how it will provide land drainage and stormwater disposal, either through a reticulated network or in accordance with <u>Chapter 14</u>.</p> <p>(d) A <u>CLDC</u> can relate to the entire Te Kauwhata Lakeside Precinct Plan Area, or may be for an individual stage or stages beyond the Business Zone, provided that an individual stage is 5ha or more.</p> <p>(e) Applications for approval of a <u>CLDC</u> as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>(f) <u>LDC</u> approval does not constitute authorisation by the Waikato District Council as road controlling authority in terms of <u>section 357 of the Local Government Act 1974</u>. Written authorisation is required from the Waikato District Council prior to any works commencing that affect public roads.</p>	<p>(iv) roading network and compliance with a Council-approved roading standard;</p> <p>(v) provision and location of existing and future utilities and connections;</p> <p>(vi) location of roads and their connections;</p> <p>(vii) provision of open space, including linkages between residential areas, open space and Lake Waikare;</p> <p>(viii) effects of natural hazards (including flooding), geotechnical suitability <u>including liquefaction risk (refer to Chapter 15)</u> and land contamination.</p>
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17.5.9 Subdivision

RDI	<p>(a) A Comprehensive Subdivision Consent (CS) that meets all of the following conditions:</p> <ul style="list-style-type: none"> (i) is in accordance with Te Kauwhata Lakeside Precinct Plan 16.5.1(3)(a); the roading network, walkways and cycleways shown on Precinct Plan 16.5.1(3)(b); and the open space shown on Precinct Plan 15.5.2.3, as set out in the precinct parameters below; and (ii) A CS is in accordance with the Lakeside Precinct Plans identified above if: <ul style="list-style-type: none"> A. Primary roads are within 50m of the location shown on Precinct Plan 16.5.1(3)(b); and B. Bus route is either on the alignment shown on Precinct Plan 16.5.1(3)(b) or a continuous alignment that achieves the same circulation; and (i) Indicative areas of open space are within 200m of the location shown on Precinct Plan 16.5.1(3)(b). <p>(b) The following infrastructure requirements are met:</p> <ul style="list-style-type: none"> (i) Demonstrate that adequate capacity within the water, stormwater and wastewater networks will be available to accommodate the proposed subdivision including all necessary treatment required to meet water quality, quantity and disposal requirements; (ii) Every allotment other than a utility allotment, access allotment or open space allotment must be able to demonstrate how it will connect to a reticulated water supply, and wastewater network that has adequate capacity as per infrastructure standard (i) above; and (iii) Every allotment other than a utility allotment, access allotment or open space allotment must be able to demonstrate how it will provide land drainage and stormwater disposal either through a reticulated network or in accordance with Chapter 14. <p>(c) A CS can relate to the entire Te Kauwhata Lakeside Precinct Plan Area, or may be for an individual stage or stages beyond the business zone, provided that an individual stage is 5ha or more.</p> <p>(d) Applications for approval of a CLDC as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>(e) CLDC approval does not constitute authorisation by Waikato District Council as road controlling authority in terms of Section 357 of the Local Government Act 1974. Written authorisation is required from Waikato District Council prior to any works commencing that affect public roads.</p> <p>(f) Council's discretion is limited to the following matters:</p> <ul style="list-style-type: none"> (i) consistency with the Te Kauwhata Lakeside Precinct Plan in 16.5.1(3)(a),(b) and (c); (ii) matters identified in the assessment criteria in X; (iii) managing the effects of wastewater and stormwater; (iv) roading network and compliance with a Council approved roading standard; (v) provision and location of existing and future utilities and connections; (vi) location of roads and their connections; (vii) provision of open space, including linkages between residential areas, open space and Lake Waikare; (viii) effects of natural hazards (including flooding), geotechnical suitability including
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	<p>liquefaction risk (refer to Chapter 15) and land contamination;</p> <p>(ix) provision of the historic lwi overlay area shown on Precinct Plan 16.5.1.3(b).</p> <p>(g) Applications for approval of a CS as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>(h) CS approval does not constitute authorisation by Waikato District Council as road controlling authority in terms of Section 357 of the Local Government Act 1974. Written authorisation is required from Waikato District Council prior to any works commencing that affect public roads.</p>
DI	<p>(a) A CS that does not comply with Rule 17.5.9 RDI and meets all of the following conditions and condition 17.5.9 RDI(c) relating to <u>infrastructure</u>:</p> <p>(i) Primary roads are within 50m-100m of the location shown on Precinct Plan 16.5.1(3)(b);</p> <p>(ii) Bus route is either on the alignment shown on Precinct Plan 16.5.1(3)(b) or a continuous alignment that achieves the same circulation;</p> <p>(iii) Indicative areas of open space are within 200-400m of the location shown on Precinct Plan 16.5.1(3)(b).</p> <p>(b) The matters over which Council reserves discretion shall be used for assessing discretionary activity applications under this rule.</p>
NC1	A CS that does not meet the requirements of Rule 17.5.9 RDI(c) relating to Infrastructure Requirements, shall be a non-complying activity.
NC2	A CS that does not meet any of the parameters for a discretionary activity outlined in Rule 17.5.9 DI.

Chapter 18: Business Town Centre Zone

- (1) The rules that apply to activities in the Business Town Centre Zone are contained in [Rule 18.1](#) Land Use – Activities, [Rule 18.2](#) Land Use – Effects and [Rule 18.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Business Town Centre zone are contained in [Rule 18.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Business Town Centre Zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity.

18.1 Land Use - Activities

18.1.1 Prohibited Activities

- (i) The following activity is a prohibited activity. No application for resource consent for a prohibited activity can be made and resource consent must not be granted.

PRI	Any <u>building</u> , structure, objects or vegetation that obscure the sight line of the Raglan navigation beacons for vessels entering Whaingaroa (Raglan Harbour) (refer to Appendix 8).
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18.1.2 Permitted Activities

- (a) The following activities are permitted activities if they meet all the following:
 - (i) Land Use – Effects rules in [Rule 18.2](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (ii) Land Use – Building rules in [Rule 18.3](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (iii) Activity-specific conditions.

Activity		Activity-specific conditions
P1	<u>Commercial activity</u>	Nil
P2	<u>Residential activity</u>	Located above ground floor level
P3	<u>Commercial services</u>	Nil
P4	<u>Retail activity</u>	Nil
P5	<u>Travellers' accommodation</u>	Nil

18.1.3 Restricted Discretionary Activities

- (1) The activities listed below are restricted discretionary activities.
- (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		The Council's discretion shall be limited to the following matters:									
RDI	<p>(a) A <u>multi-unit development</u> that meets all of the following conditions:</p> <ol style="list-style-type: none"> (i) The Land Use – Effects in Rule 18.2; (ii) The Land Use – Building in Rule 18.3 except; <ol style="list-style-type: none"> A. Rule 18.3.9 (Dwellings) does not apply; B. Rule 18.3.10 (Living court) does not apply; <p>(b) The <u>multi-unit development</u> must be located above the ground floor level;</p> <p>(c) A detailed <u>site plan</u> depicting the proposed <u>title boundaries</u> for each <u>residential unit</u> and any common areas (including access and services) must be provided, ensuring that a freehold (fee simple) or unit title <u>subdivision</u> complies with Rule 18.4.2 (Subdivision of multi-unit developments);</p> <p>(d) Each <u>residential unit</u> must be designed and constructed to achieve the internal design sound levels specified in Appendix 1 (Acoustic Insulation), Table 14;</p> <p>(e) A communal service court is provided;</p> <p>(f) <u>Living court</u> areas are provided above ground floor level to meet the following minimum requirements for each <u>residential unit</u>:</p> <table border="1"> <thead> <tr> <th><u>Residential Unit</u></th><th><u>Minimum Living Court Area</u></th><th><u>Minimum Dimensions</u></th></tr> </thead> <tbody> <tr> <td>Studio unit or 1 bedroom</td><td>10m²</td><td>2m</td></tr> <tr> <td>2 or more bedrooms</td><td>15m²</td><td>2m</td></tr> </tbody> </table>	<u>Residential Unit</u>	<u>Minimum Living Court Area</u>	<u>Minimum Dimensions</u>	Studio unit or 1 bedroom	10m ²	2m	2 or more bedrooms	15m ²	2m	<p>(a) The extent to which the development is consistent with the Town Centre Guidelines contained in Appendix 3.3;</p> <p>(b) The extent to which the development is consistent with the Multi-unit design guidelines contained in Appendix 3.4;</p> <p>(c) The extent to which the development contributes to and engages with adjacent streets and public open space;</p> <p>(d) The extent to which the development creates visual quality and interest through the separation of <u>buildings</u>, variety in built form and architectural detailing, glazing, and materials;</p> <p>(e) The extent to which the design of the development incorporates energy efficiency measures such as passive solar principles;</p> <p>(f) Amenity values for occupants and neighbours in respect of outlook, privacy, noise, light spill, access to sunlight, living court orientation, <u>site design</u> and layout;</p> <p>(g) The extent to which staging is necessary to ensure that development is carried out in a coordinated and timely manner;</p>
<u>Residential Unit</u>	<u>Minimum Living Court Area</u>	<u>Minimum Dimensions</u>									
Studio unit or 1 bedroom	10m ²	2m									
2 or more bedrooms	15m ²	2m									

		<p>(h) Avoidance or mitigation of natural hazards;</p> <p>(i) Geotechnical suitability for building, including liquefaction risk (refer to Chapter 15);</p> <p>(j) Adequacy of the communal service court for the intended purpose.</p>
RD2	<p>(a) The construction of any new building that meets all of the following conditions:</p> <p>(i) The Land Use – Effects in Rule 18.2;</p> <p>(ii) The Land Use – Building in Rule 18.3 except;</p> <p>A. Rule 18.3.9 (Dwellings) does not apply;</p> <p>B. Rule 18.3.10 (Living court) does not apply.</p>	<p>(a) The Council's discretion shall be limited to the following matters:</p> <p>(i) The extent to which the building is consistent with the following matters listed in Appendix 3.3 (Town Centre Design Guidelines) including:</p> <p>A. A site and contextual analysis that identifies and addresses the matters listed in section 3.3;</p> <p>B. A connectivity and movement network analysis that addresses the matters listed in section 4.3;</p> <p>C. A neighbourhood character assessment that identifies and addresses the elements listed in section 5;</p> <p>D. Detailed design illustrating how the building will promote these character elements to</p>

		<p>achieve the outcomes sought in section 5.2 of the design guide;</p> <p>(ii) Consistency with the relevant Town Centre Character Statement contained within Appendix 10.1-10.6 (Town Centre Character Statements).</p>
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18.4.1 Subdivision - general

RDI	<p>(a) <u>Subdivision</u> shall comply with all of the following conditions:</p> <p>(i) Proposed <u>lots</u> shall have a minimum size of 225m² <u>net site area</u>, with the exception of <u>access</u> or <u>utility allotments</u> or reserves to vest;</p> <p>(ii) Proposed <u>lots</u> shall be connected to public-reticulated water supply and wastewater.</p> <p>(b) The Council's discretion shall be limited to the following matters:</p> <p>(i) Amenity values;</p> <p>(ii) The extent to which a range of future business activities can be accommodated;</p> <p style="text-align: center;"><u>and</u></p> <p>(iii) <u>Avoidance and/or mitigation of natural hazards risk, including liquefaction (refer to Chapter 15).</u></p>
DI	<u>Subdivision</u> that does not comply with Rule 18.4.1. RDI.

18.4.2 Subdivision - Multi-unit subdivision

RDI	<p>(a) <u>Subdivision for multi-unit development</u> shall comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) An application for land use consent under Rule 18.1.3 (Multi-Unit Development) must either accompany the <u>subdivision</u> or have been granted resource consent by Council; (ii) Be connected to public wastewater and water reticulation; (iii) Where a <u>residential unit</u> is being created in accordance with the Unit Titles Act 2010, it meets the following minimum unit size: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th><u>Unit of Apartment</u></th><th>Minimum Unit Area</th></tr> </thead> <tbody> <tr> <td>Studio unit or 1 bedroom unit</td><td>60m²</td></tr> <tr> <td>2 bedroom unit</td><td>80m²</td></tr> <tr> <td>3 bedroom unit</td><td>100m²</td></tr> </tbody> </table> <p>(b) The Council's discretion shall be limited to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout including <u>notional boundaries</u> for the <u>multi-unit development</u>; (ii) Provision of common areas for shared spaces, access and services; (iii) Avoidance or mitigation of natural hazards; (iv) Geotechnical suitability of <u>site for buildings</u>, including liquefaction risk (refer to Chapter 15); (v) Amenity values and streetscape; (vi) Consistency with the matters contained, and outcomes sought, in Appendix 3.4 (Multi-unit development guideline); (vii) Consistency with any relevant structure plan or master plan, including the provision of neighbourhood parks, reserves and <u>neighbourhood centres</u>; (viii) Vehicle, pedestrian and cycle networks; (ix) Safety, function and efficiency of road network and any internal roads or accessways. 	<u>Unit of Apartment</u>	Minimum Unit Area	Studio unit or 1 bedroom unit	60m ²	2 bedroom unit	80m ²	3 bedroom unit	100m ²
<u>Unit of Apartment</u>	Minimum Unit Area								
Studio unit or 1 bedroom unit	60m ²								
2 bedroom unit	80m ²								
3 bedroom unit	100m ²								
DI	<u>Subdivision</u> that does not comply with Rule 18.4.2 RDI.								

Chapter 19: Business Zone Tamahere

- (1) The rules that apply to activities in the Business Zone Tamahere are contained in [Rule 19.1](#) Land Use – Activities, [Rule 19.2](#) Land Use – Effects and [Rule 19.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Business Zone Tamahere are contained in [Rule 19.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Business Zone Tamahere:
 - 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) P Permitted activity
 - (b) C Controlled activity
 - (c) RD Restricted discretionary activity
 - (d) D Discretionary activity
 - (e) NC Non-complying activity

19.1 Land Use – Activities

19.1.1 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 19.2](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 19.3](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity		Activity specific conditions
P1	<u>Retail activity</u>	Nil
P2	<u>Office</u>	Located above ground floor level
P3	<u>Health facility</u>	Excluding day hospitals
P4	Commercial activity	Nil
P5	Community facility	Nil

Released to open (WDC2007/05)

Chapter 20: Industrial Zone

- (1) The rules that apply to activities in the Industrial Zone are contained in [Rule 20.1](#) Land Use – Activities, [Rule 20.2](#) Land Use – Effects and [Rule 20.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Industrial Zone are contained in [Rule 20.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Industrial Zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (5) The Industrial Zone contains a Specific Area that is Nau Mai Business Park. [Rule 20.5](#) manages all land use, building and subdivision in this location. [Rule 20.5.1](#) sets out how to apply rules to Nau Mai Business Park that are either different from, or are in addition to, other rules that apply to the rest of the Industrial Zone.

20.1 Land Use – Activities

20.1.1 Permitted Activities

- (a) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 20.2](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 20.3](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity		Activity specific conditions
P1	Industrial activity	Nil
P2	Trade and industry training activity	Nil
P3	Truck stop for refuelling	Nil
P4	Office ancillary to an industrial activity	(a) Less than 100m ² gfa; or (b) Does not exceed 30% of all buildings on the site.
P5	Food outlet	(a) Less than 200m ² gfa.
P6	Ancillary retail	Does not exceed 10% of all buildings on the site.

20.1.2 Discretionary Activities

- (a) The activities listed below are discretionary activities.

DI	Any permitted activity that does not comply with an activity specific condition in Rule 20.1.1 .
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20.4.1 Subdivision - General

RDI	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) proposed <u>lots</u> must have a minimum <u>net site area</u> of 1000m²; (ii) proposed <u>lots</u> must have an average area of at least 2000m²; and (iii) no more than 20% rear <u>lots</u> are created. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) the extent to which a range of future <u>industrial activities</u> can be accommodated; and (ii) amenity values <u>; and</u> (iii) <u>Avoidance and/or mitigation of natural hazards risk, including liquefaction (refer to Chapter 15).</u>
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20.5.1 Application of rules

- (a) The activity rules in [20.1.1](#) (Permitted Activities), [20.1.2](#) (Discretionary Activities) and [20.1.3](#) (Non-complying Activities) do not apply within the Nau Mai Business Park Specific Area and Rules [20.5.2](#), [20.5.3](#) and [20.5.4](#) apply instead.
- (b) The rules that apply to a permitted activity in Rule [20.5.2](#) P1-P13 within the Nau Mai Business Park Specific Area as identified on the planning maps are as follows:
- (i) [Rule 20.2](#) (Land Use – Effects), except:
 - A. [Rule 20.2.2](#) (Landscape Planting) does not apply and [Rule 20.5.5](#) applies instead;
 - B. [Rule 20.2.3.1](#) (Noise – General) does not apply and [Rule 20.5.6](#) applies instead;
 - C. [Rule 20.2.7.1](#) (Signs – General) does not apply and [Rule 20.5.7](#) applies instead;
 - D. [Rule 20.2.8](#) (Outdoor storage of goods and material) does not apply and [Rule 20.5.8](#) applies instead.
 - (ii) [Rule 20.3](#) (Land Use – Building), except:
 - A. [Rule 20.3.1](#) (Building Height) does not apply and [Rule 20.5.9](#) applies instead.
 - (iii) [Rule 20.5.10](#) (Construction Materials);
 - (iv) [Rule 20.5.11](#) (Building Coverage); and
 - (v) [Rule 20.5.12](#) (Gross Floor Area);
 - (vi) [Rule 20.5.13](#) (Building Location and Setbacks); and
 - (vii) [Rule 20.5.14](#) (Acoustic Insulation for Dwelling)
- (c) [Rule 20.4](#) (Subdivision) applies for subdivision within the Nau Mai Business Park Specific Area.
- (d) The activity status tables and standards in the following chapters also apply to activities in the Nau Mai Business Park:
- [14 Infrastructure and Energy;](#)
 - [15 Natural Hazards and Climate Change.](#)

Chapter 21: Industrial Zone Heavy

- (1) The rules that apply to activities in the Heavy Industrial Zone are contained in [Rule 21.1](#) Land Use – Activities, [Rule 21.2](#) Land Use – Effects and [Rule 21.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Industrial Zone Heavy are contained in [Rule 21.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Heavy Industrial Zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity

21.1 Land Use – Activities

21.1.1 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 21.2](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply); and
 - (b) Land Use – Building rules in [Rule 21.3](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply).

Activity		Activity specific conditions
P1	<u>Industrial activity</u>	Nil
P2	Trade and industry training activity	Nil
P3	Truck stop for refuelling	Nil
P4	<u>Office ancillary to an industrial activity</u>	less than 100m ² , or 30% of all <u>buildings</u> on the site.
P5	Food outlet	Less than 200m ² <u>gfa</u> .
P6	Ancillary retail	Does not exceed 10% of all <u>building</u> on the site.

21.1.2 Discretionary Activities

- (1) The activities listed below are discretionary activities.

D1	Any activity that does not comply with the Land Use – Effects Rule 21.1 or Land Use – Building Rule 21.3 unless the activity is specified as a controlled, restricted discretionary or non-complying activity.
D2	<u>A waste management facility</u>
D3	<u>Storage, processing or disposal of hazardous waste</u>
D4	<u>An extractive industry</u>
D5	<u>An office</u>
D6	A retail activity

21.4.1 Subdivision - General

RD1	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) proposed <u>lots</u> must have a minimum <u>net site area</u> of 1000m²; (ii) proposed <u>lots</u> must have an average <u>net site area</u> of at least 2000m²; and (iii) no more than 20% rear <u>lots</u> are created.
RD2	<p>(a) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) the extent to which a range of future activities can be accommodated; and (ii) amenity values and (iii) avoidance and/or mitigation of natural hazards risk, including liquefaction (refer to Chapter 15).

Chapter 22: Rural Zone

- (1) The rules that apply to activities in the Rural Zone are contained in [Rule 22.1](#) Land Use – Activities, [Rule 22.2](#) Land Use – Effects and [Rule 22.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Rural Zone are contained in [Rule 22.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Rural zone:
 - I 4 Infrastructure and Energy;
 - I 5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (5) The Rural Zone contains four Specific Areas listed below. These Specific Areas contain rules that are either in addition to, or different from, other rules that apply to the rest of the Rural Zone.
 - (a) [Rule 22.5](#) Agricultural Research Centre;
 - (b) [Rule 22.6](#) Huntly Power Station - Coal and Ash Water;
 - (c) [Rule 22.7](#) Whaanga Coast Development Areas
 - (d) [Rule 22.8](#) Lakeside Te Kauwhata Precinct

22.1 Land Use - Activities

22.1.1 Prohibited Activities

- (1) The following activity is a prohibited activity. No application for resource consent for a prohibited activity can be made and a resource consent cannot be granted.

PR I	Any <u>building</u> , structure, objects or vegetation that obscure the sight line of the Raglan navigation beacons for vessels entering Whaingaroa (Raglan Harbour) (refer to Appendix 7).
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22.1.2 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 22.2](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 22.3](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity	Activity specific conditions
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22.4.1

- (1) [Rule 22.4.1.1](#) lists prohibited subdivision activities in the Rural Zone
- (2) The following rules provide for various types of subdivision in the Rural Zone
 - (a) [Rule 22.4.1.2](#) - General Subdivision
 - (b) [Rule 22.4.1.3](#) – Subdivision of Maaori Freehold Land
 - (c) [Rule 22.4.1.4](#) - Boundary Relocation
 - (d) [Rule 22.4.1.5](#) - Rural Hamlet Subdivision
 - (e) [Rule 22.4.1.6](#) - Conservation Lot Subdivision
 - (f) [Rule 22.4.1.7](#) - Reserve Lot Subdivision
- (3) The following rules apply to the types of subdivision provided for in Rules 22.4.1.2 to 22.4.1.7
 - (a) [Rule 22.4.2](#) Title boundaries (~~natural hazard area~~ contaminated land, significant amenity landscape, notable trees, intensive farming and aggregate extraction areas)
 - (b) [Rule 22.4.3](#) Title boundaries, SNA's heritage items
 - (c) [Rule 22.4.4](#) Road frontage
 - (d) [Rule 22.4.5](#) Subdivision within identified area
 - (e) [Rule 22.4.6](#) Subdivision of land containing all or part of an Environmental Protection Area
 - (f) [Rule 22.4.7](#) Esplanade Reserve and Esplanade strips
 - (g) [Rule 22.4.8](#) Subdivision of land containing heritage items
 - (h) [Rule 22.4.9](#) Subdivision – building platform

22.4.1.1 Prohibited subdivision

The following activities are prohibited activities. No application for resource consent can be made for a prohibited activity and no resource consent can be granted:

PR1	Any subdivision within the Urban Expansion Area involving the creation of any additional lot.
PR2	<ol style="list-style-type: none"> (a) Subdivision of a Record of Title issued prior to 6 December 1997, which results in more than one additional lot being located on high class soil. (b) Exceptions to PR2(a) are where an additional lot is created by any of the following rules: <ol style="list-style-type: none"> (i) The conservation lot subdivision (Rule 22.4.1.6); (ii) Reserve lot subdivision (Rule 22.4.1.7); (iii) Access allotment or utility allotment using Rule 14.12 (Transportation); (iv) Subdivision of Maaori Freehold Land (Rule 22.4.1.3).

22.4.1.2 General subdivision

RDI	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) The <u>Record of Title</u> to be subdivided must have issued prior to 6 December 1997; (ii) The <u>Record of Title</u> to be subdivided must be at least 20 hectares in area; (iii) The proposed <u>subdivision</u> must create no more than one additional <u>lot</u>, excluding an <u>access allotment</u>. (iv) The additional <u>lot</u> must have a proposed area of between 8,000m² and 1.6 ha; (v) Land containing <u>high class soil</u> (as determined by a Land Use Capability Assessment prepared by a suitably qualified person) must be contained within the <u>boundaries</u> of only two <u>lots</u> as follows: <ul style="list-style-type: none"> A. one <u>lot</u> must contain a minimum of 80% of the <u>high class soil</u>; and B. the other <u>lot</u> may contain up to 20% of <u>high class soil</u>. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>subdivision</u> layout and design including dimensions, shape and orientation of the proposed <u>lot</u>; (ii) effects on rural character and amenity values; (iii) effects on landscape values; (iv) potential for reverse sensitivity effects; (v) extent of <u>earthworks</u> including <u>earthworks</u> for the location of <u>building platforms</u> and accessways ; (vi) <u>natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).</u>
NCI	General <u>subdivision</u> that does not comply with Rule 22.4.1.2. RDI.

Released to open (WDC2007/05)

22.4.1.5 Rural Hamlet Subdivision

RD I	<p>(a) <u>Subdivision</u> to create a Rural Hamlet must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) It results in 3 to 5 proposed <u>lots</u> being clustered together; (ii) All existing <u>Records of Title</u> form one <u>continuous landholding</u>; (iii) Each proposed <u>lot</u> has a minimum area of 8,000m². (iv) Each proposed <u>lot</u> has a maximum area of 1.6ha; (v) The proposed balance <u>lot</u> has a minimum area of 20ha; and (vi) It does not create any additional <u>lots</u> beyond the number of existing <u>Records of Title</u>. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>subdivision</u> layout and design including dimension, shape and orientation of the proposed <u>lots</u>; (ii) effects on rural character and amenity values; (iii) effects on landscape values; (iv) potential for reverse sensitivity effects; (v) extent of <u>earthworks</u> including <u>earthworks</u> for the location of <u>building platforms</u> and access ways. (vi) <u>natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).</u>
NC I	<u>Subdivision</u> that does not comply with Rule 22.4.1.5 RD I.

22.4.2 Title boundaries – ~~natural hazard area~~, contaminated land, Significant Amenity Landscape, notable trees, intensive farming activities, aggregate extraction areas

RDI	<p>(a) Subdivision of land containing any natural hazard area, contaminated land, Significant Amenity Landscape, notable trees, intensive farming activities or Aggregate Extraction Areas must comply with all of the following conditions:</p> <p>(i) The boundaries of every proposed lot containing existing buildings must demonstrate that existing buildings comply with the Land Use - Building rules in Rule 22.3 relating to:</p> <p>A. Rule 22.3.1 (Number of Dwellings within a Record of Title);</p> <p>B. Rule 22.3.5 (Daylight admission);</p> <p>C. Rule 22.3.6 (Building coverage);</p> <p>D. Rule 22.3.7 (Building setbacks);</p> <p>(ii) Rule 22.4.2 RDI (a)(i) does not apply to any non-compliance with the Land Use - Building rules in Rule 22.3 that existed lawfully prior to the subdivision.</p> <p>(iii) The boundaries of every proposed lot must not divide any of the following:</p> <p>A. A natural hazard area;</p> <p>A. Contaminated land;</p> <p>B. Significant Amenity Landscape;</p> <p>C. Notable trees.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <p>(i) landscape values;</p> <p>(ii) amenity values and character;</p> <p>(iii) reverse sensitivity effects;</p> <p>(iv) effects on existing buildings;</p> <p>(v) effects on natural hazard areas;</p> <p>(vi) effects on contaminated land;</p> <p>(vii) effects on any notable trees;</p> <p>(viii) effects on an intensive farming activity;</p> <p>(ix) effects on any Aggregate Extraction Area.</p>
DI	Subdivision that does not comply with Rule 22.4.2 RDI.

Released to open (WDC2007/05)

22.4.9 Subdivision - Building platform

RDI	<p>(a) <u>Subdivision</u>, other than an access or <u>utility allotment</u>, must provide a <u>building platform</u> on the proposed <u>lot</u> that:</p> <ul style="list-style-type: none"> (i) Has an area of 1,000m² exclusive of <u>boundary</u> setbacks; (ii) Has an average gradient not steeper than 1:8; (iii) Is certified by a geotechnical engineer as geotechnically stable; (iv) Has vehicular access in accordance with Rule 14.12.1 PI (Transportation) (v) Is not subject to inundation in a 2% <u>AEP</u> storm or flood event; (vi) a <u>dwelling</u> could be built on as a permitted activity in accordance with Land Use - Building Rules in Rule 22.3. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Earthworks</u> and <u>fill material</u> required for <u>building platforms</u> and access; (ii) Geotechnical suitability for <u>building</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; (iii) Likely location of future <u>buildings</u> and their potential effects on the environment; (iv) Avoidance <u>and/or mitigation</u> of natural <u>hazards</u>; (v) Effects on landscape and amenity; (vi) Measures to avoid storm or flood events.
DI	<u>Subdivision</u> that does not comply with Rule 22.4.9 RDI.

22.5.1 Application of Rules

- (a) The rules that apply to a permitted activity are set out in [Rule 22.5.2](#).
- (b) For any other activity not provided in Rule 22.5.2, the following rules in the Rural Zone apply:
 - (i) [Rule 22.1](#) Land Use – Activities
 - (ii) [Rule 22.2](#) Land Use – Effects
 - (iii) [Rule 22.3](#) Land Use – Building; and
 - (iv) [Rule 22.4](#) - Subdivision

(c) The activity status tables and standards in the following chapters also apply to activities in the Agriculture Research Centres:

14 Infrastructure and Energy;

15 Natural Hazards and Climate Change.

22.6.1 Application of Rules

(a) The rules that apply to a permitted activity are set out in [Rule 22.6.2](#) within the Huntly Power Station: Coal and Ash Water Specific Area as identified on the planning maps are as follows:

- (i) [Rule 22.2](#) Land Use – Effects
- (ii) [Rule 22.3](#) Land Use – Building, except:
 - A. [Rule 22.3.7](#) Building setbacks do not apply and [Rule 22.6.3](#) applies instead; and
 - B. [Rule 22.3.4](#) Height does not apply and [Rule 22.6.4](#) applies instead.
 - C. [Rule 22.6.5](#);
 - D. [Rule 22.6.6](#); and
 - E. [Rule 22.6.7](#)

(b) The rules that apply to any other activity that is not provided in [Rule 22.6.2](#) are those that apply to the Rural Zone as follows:

- (i) [Rule 22.1](#) Land Use – Activities
- (ii) [Rule 22.2](#) Land Use – Effects
- (iii) [Rule 22.3](#) Land Use – Building; and
- (iv) [Rule 22.4](#) Subdivision

(c) The activity status tables and standards in the following chapters also apply to activities in the Huntly Power Station – Coal and Ash Water:

14 Infrastructure and Energy;

15 Natural Hazards and Climate Change.

22.7.1 Application of Rules within a Whaanga Coast Development Area

- (1) The rules that apply to a permitted activity under [Rule 22.7.2](#) within a Whaanga Coast Development Area as identified on the planning maps are as follows:
- (a) [Rule 22.2](#) Land Use – Effects; except that:
 - A. [Rule 22.2.3.1](#) (Earthworks – General) does not apply and [Rule 22.7.1.3](#) applies instead.
 - (b) [Rule 22.3](#) Land Use – Building; except that:
 - A. [Rule 22.3.1](#) (Number of Dwellings within a Record of Title) does not apply;
 - B. [Rule 22.3.2](#) (Minor Dwelling) does not apply;
 - C. [Rule 22.3.3](#) (Building and structures in Landscape and Natural Character Areas) does not apply and [Rule 22.7.1.4](#) applies instead;
 - D. [Rule 22.3.4.1](#) (Height – Building General) does not apply and [Rule 22.7.1.4](#) applies instead;
 - E. [Rule 22.3.6](#) (Building Coverage) does not apply;
 - F. [Rule 22.3.7](#) (Building Setbacks) does not apply and [Rule 22.7.1.6](#) applies instead;
 - G. [Rule 22.7.1.5](#) applies;
 - H. [Rule 22.7.1.7](#) applies; and
 - I. [Rule 22.7.1.8](#) applies.
 - (c) [Rule 22.4](#) applies to subdivision within a Whaanga Coast Development Area.
- (2) The activity status tables and standards in the following chapters also apply to activities within any Whaanga Coast Development Area:
- 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change (Placeholder)
- (3) The following symbols are used in the tables below:
- PR Prohibited activity
 - P Permitted activity
 - C Controlled activity
 - RD Restricted discretionary activity
 - D Discretionary activity
 - NC Non-complying activity

22.7.1.1 Permitted Activities

- (1) The following activities are permitted activities within a Whaanga Coast Development Area if they meet all the following:
- (a) Land Use – Effects rules in Rule 22.7.1(1)(a) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in Rule 22.7.1(1)(b) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity	Activity specific conditions
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22.7.2 Application of Rules outside a Whaanga Coast Development Area

- (1) The activity status tables and standards in the following chapters also apply to activities outside a Whaanga Coast Development Area:
- I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (2) The following symbols are used in the table below:
- D Discretionary activity
 - NCI Non-complying activity

22.7.2.2 Discretionary Activities

- (1) The following activities are discretionary activities outside a Whaanga Coast Development Area

D1	Any land use activity or <u>building</u> located outside a <u>Whaanga Coast Development Area</u>
D2	<u>Subdivision</u> for a full partition of Maaori Freehold Land outside a <u>Whaanga Coast Development Area</u> under <u>Te Ture Whenua Act 1993</u> .

22.7.2.3 Non-complying Activities

- (1) The following activities are non-complying activities outside a Whaanga Coast Development Area

NCI	<u>Subdivision</u> of Maaori freehold land not provided for in Rule 22.7.2.2 D2.
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22.8.1 Application of rules

(a) Rules 22.8.2, 22.8.4 and 22.8.5 apply in the Lakeside Te Kauwhata Precinct, in addition to the activity rules in:

- (i) 22.1.2 (Permitted Activities);
- (ii) 22.1.3 (Restricted Discretionary Activities);
- (iii) 22.1.4 (Discretionary Activities); and
- (iv) 22.1.5 (Non-complying Activities).

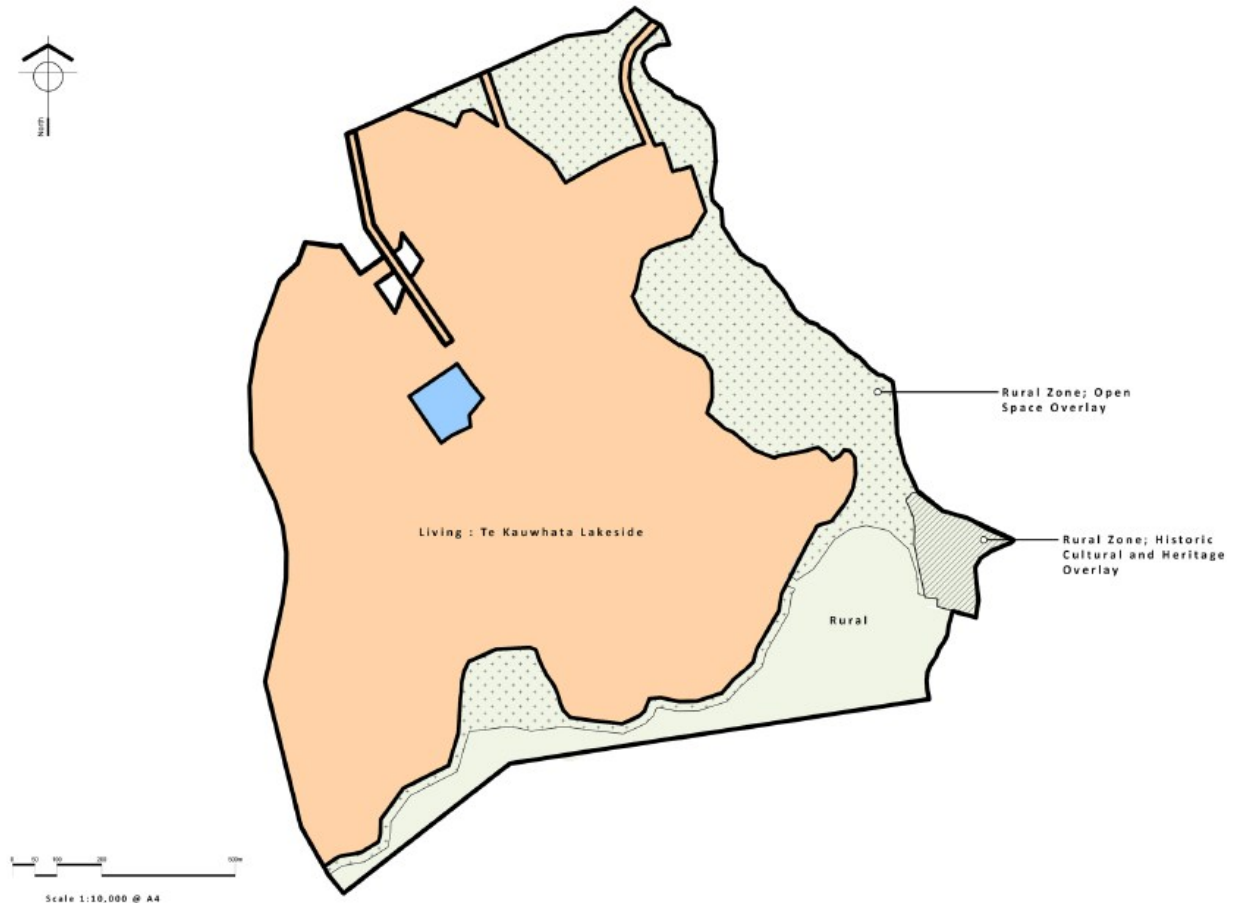
(b) The activity status tables and standards in the following chapters also apply to activities in the Lakeside Te Kauwhata Precinct:

14 Infrastructure and Energy;

15 Natural Hazards and Climate Change.

(c) The following precinct plan applies to the Rural Zone in the Lakeside Te Kauwhata Precinct as identified on the planning maps:

Lakeside Open Space and Lakeside Cultural and Heritage Overlay



22.8.6 Earthworks - General

PI	<p>(a) <u>Earthworks</u> in a Flood Risk Area Flood Ponding Area (other than earthworks approved as part of a <u>CLDC</u>) shall meet the following conditions:</p> <p>(i) filling is no more than is necessary to:</p> <p style="margin-left: 40px;">A. provide a foundation for <u>building</u> approved by a <u>building</u> consent, and access to that <u>building</u>, or</p> <p style="margin-left: 40px;">B. enable minor upgrading of existing electricity lines and does not exceed 50m².</p> <p>(b) The Waikato Pest Management Plan addresses the management of identified pest species, including alligator weed. It includes enforceable controls relating to <u>subdivision</u> and land development in infected areas.</p> <p>(c) Regional <u>earthworks</u> consents may also be needed for works in a high risk erosion area.</p>
RDI	<p>(a) <u>Earthworks</u> that do not comply with Rule 22.8.6 PI.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <p style="margin-left: 40px;">(i) effects on amenity values,</p> <p style="margin-left: 40px;">(ii) visual effects,</p> <p style="margin-left: 40px;">(iii) mitigation measures including sediment control,</p> <p style="margin-left: 40px;">(iv) effects on land utilisation,</p> <p style="margin-left: 40px;">(v) effects on erosion,</p> <p style="margin-left: 40px;">(vi) effects on cultural values,</p> <p style="margin-left: 40px;">(vii) effects on heritage values,</p> <p style="margin-left: 40px;">(viii) effects on the Lake Waikare flood plain.</p>

22.8.8 Lakeside Comprehensive Subdivision Consent

RDI	<p>(a) A Comprehensive Subdivision Consent (CS) that meets all of the following conditions:</p> <ul style="list-style-type: none"> (i) is in accordance with Te Kauwhata Lakeside Precinct Plan 16.5.1(3)(a); the roading network, walkways and cycleways shown on Precinct Plan 16.5.1(3)(b); and the open space shown on Precinct Plan 16.5.1(3)(c) as set out in the precinct parameters below; and (ii) A CS is in accordance with the Lakeside Precinct Plans identified above if: <ul style="list-style-type: none"> A. Primary roads are within 50m of the location shown on Precinct Plan 16.5.1(3)(b); and B. Bus route is either on the alignment shown on Precinct Plan 16.5.1(3)(b) or a continuous alignment that achieves the same circulation; and C. Indicative walkways/cycleways are within 100m of the location shown on Precinct Plan 16.5.1(3)(c) provided connections are retained between the Lakeside Walkway and the residential development; and D. Lakeside Walkway is within 10m of the location shown on Precinct Plan 16.5.1(3)(c). <p>(b) A CS can relate to the entire Te Kauwhata Lakeside Precinct Plan Area, or may be for an individual stage or stages, provided that an individual stage must be 5ha or more.</p> <p>(c) Council's discretion shall be restricted to the following matters:</p> <ul style="list-style-type: none"> (i) consistency with the Te Kauwhata Lakeside Precinct Plan in 16.5.1(3)(a), 16.5.1(3)(b) and 16.5.1(3)(c), (ii) matters identified in the assessment criteria in X, (iii) managing the effects of wastewater and stormwater, (iv) roading network (including the Te Kauwhata Road level crossing safety) and compliance with a Council approved roading standard, (v) protection, restoration or enhancement of ecological features, (vi) provision and location of existing and future utilities and connections, (vii) location of roads and their connections, (viii) provision for public access to Lake Waikare, (ix) provision of open space, including linkages between residential areas, open space and Lake Waikare, (x) effects of natural hazards (including flooding and liquefaction risk, refer to Chapter 15), geotechnical and land contamination, (xi) provision of the historic Iwi overlay area shown on Precinct Plan 16.5.1(3)(c). <p>(d) Applications for approval of a CS as a restricted discretionary activity will be considered without public notification and without the need to serve notice on or obtain the written approval of any affected persons.</p> <p>(e) CS approval does not constitute authorisation by the Waikato District Council as road controlling authority in terms of section 357 of the Local Government Act 1974. Written authorisation is required from the Waikato District Council prior to any works commencing that affect public roads.</p>
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DI	<p>(a) A CS that does not comply with Rule 21.8.7 RD1 and does not exceed conditions (i) to (iv) below:</p> <ul style="list-style-type: none"> (i) Primary roads are within 50m-100m of the location shown on Precinct Plan 16.5.1(3)(b); and (ii) Bus route is either on the alignment shown on Precinct Plan 16.5.1(3)(b) or a continuous alignment that achieves the same circulation; and (iii) Indicative walkways/cycleways are within 100m-200m of the location shown on Precinct Plan 16.5.1(3)(c) provided connections are retained between the Lakeside Walkway and the residential development; and (iv) Lakeside Walkway is within 10m-20m of the location shown on Precinct Plan 16.5.1(3)(b). <p>(b) The matters over which Council reserves discretion shall be used for assessing discretionary activity applications under this rule.</p>
NCI	A CS that does not meet the requirements of Rule 22.8.8 DI.

Chapter 23: Country Living Zone

- (1) The rules that apply to activities in the Country Living zone are contained in [Rule 23.1](#) Land Use – Activities, [Rule 23.2](#) Land Use – Effects and [Rule 23.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Country Living zone are contained in [Rule 23.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Country Living Zone:
 - [14 Infrastructure and Energy](#);
 - [15 Natural Hazards and Climate Change](#) (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity

23.1 Land Use – Activities

23.1.1 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 23.2](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 23.3](#) (unless the activity rule and/or activity specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity		Activity-specific conditions
P1	<u>Residential activity</u> , unless specified below.	Nil
P2	<u>Home stay</u>	Nil
P3	<u>A temporary event</u>	(a) The event occurs no more than 3 times per single 12 month period; (b) The duration of each event is less than 72 hours; (c) It may operate between 7.30am and 8.30pm Monday to Sunday; (d) Temporary structures are: <ol style="list-style-type: none"> (i) erected no more than 2 days before the event occurs, and (ii) removed no more than 3 days after the end of the event; (e) The <u>site</u> is returned to its original condition no more than 3 days after the end of the event; (f) There is no direct site access from a national route or regional arterial road.

23.4.2 General Subdivision

RD1	<p>(a) <u>Subdivision</u> must comply with all of the following conditions:</p> <ul style="list-style-type: none"> (i) All proposed <u>lots</u> must have a <u>net site area</u> of at least 5000m². (ii) Where the land being subdivided is inside the Airport Subdivision Control Boundary or inside the SEL 95 Boundary identified on the planning maps, the average <u>net site area</u> of all proposed <u>lots</u> must be at least 1.1ha; (iii) Where the land being subdivided straddles the Airport Subdivision Control Boundary, the maximum number of proposed titles must be the smallest nearest whole number calculated by the following formula: <p style="text-align: center;">Proposed Record of Titles = $\frac{\text{area (ha) outside*}}{0.5} + \frac{\text{area (ha) inside*}}{1.1}$</p> <p>* outside and inside Airport Subdivision Control Boundary</p> <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) Adverse effects on amenity values; (ii) Effects on the Airport Subdivision Control Boundary or the SEL 95 Boundary ; and (iii) <u>Avoidance and/or mitigation of natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).</u>
NC1	General <u>Subdivision</u> that does not comply with Rule 23.4.1 RD1.

23.4.4 Title boundaries – ~~natural hazard area~~, contaminated land, Significant Amenity Landscape, notable trees, intensive farming activities, aggregate extraction areas

Released to open (WDC2007/05)

RDI	<p>(a) Subdivision of land containing any natural hazard area, contaminated land, Significant Amenity Landscape, notable tree, intensive farming activity or Aggregate Extraction Area must comply with all of the following conditions:</p> <p>(i) The boundaries of every proposed lot containing an existing building must demonstrate compliance with the Land Use - Building rules in Rule 23.3 relating to:</p> <p>A. Rule 23.3.5 (Daylight admission);</p> <p>B. Rule 23.3.6 (Building coverage);</p> <p>C. Rule 23.3.7 (Building Setbacks);</p> <p>(ii) Rule 23.4.4 RD1 (a)(i) does not apply to any non-compliance with the Land Use – Building rules in Rule 23.3 that existed lawfully prior to the subdivision.</p> <p>(iii) Any boundary of a proposed lot must not divide the following:</p> <p>A. a natural hazard area;</p> <p>B. A. contaminated land;</p> <p>C. B. Significant Amenity Landscape;</p> <p>D. C. Notable tree.</p> <p>(iv) Any boundary of a proposed lot must provide the following setbacks:</p> <p>A. 300m from any intensive farming activity;</p> <p>B. 200m from an Aggregate Extraction Area for sand extraction;</p> <p>C. 500m from an Aggregate Extraction Area for rock extraction.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <p>(i) Landscape values;</p> <p>(ii) Amenity values and character;</p> <p>(iii) Reverse sensitivity effects;</p> <p>(iv) Effects on any existing building;</p> <p>(v) Effects on a natural hazard area;</p> <p>(vi) Effects on contaminated land;</p> <p>(vii) Effects on a notable tree;</p> <p>(viii) Effects on an intensive farming activity;</p> <p>(ix) Effects on an Aggregate Extraction Area.</p>
NCI	Subdivision that does not comply with Rule 23.4.4 RDI.

23.4.8 Subdivision - Building platform

RDI	<p>(a) <u>Subdivision</u>, other than an <u>access allotment</u> or <u>utility allotment</u>, must provide a <u>building platform</u> on the proposed <u>lot</u> that:</p> <ul style="list-style-type: none"> (i) has an area of 1000m² exclusive of <u>boundary</u> setbacks; (ii) has an average gradient no steeper than 1:8; (iii) has vehicular access in accordance with Rule 14.12.1 P 1 Infrastructure Chapter 14; (iv) is certified by a geotechnical engineer as geotechnically stable; (v) is not subject to inundation in a 2% <u>AEP</u> storm or flood event; (vi) a <u>dwelling</u> could be built on as a permitted activity in accordance with Rule 23.3. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Earthworks</u> and <u>fill material</u> required for <u>building platform</u> and access; (ii) Geotechnical suitability for a <u>building</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; (iii) Avoidance or mitigation of natural <u>hazards</u>; (iv) Effects on landscape and amenity; (v) Measures to avoid storm or flood events.
DI	<u>Subdivision</u> that does not comply with Rule 23.4.8 RD1.

Chapter 24: Village Zone

- (1) The rules that apply to activities in the Village Zone are contained in [Rule 24.1](#) Land Use – Activities, [Rule 24.2](#) Land Use – Effects, [Rule 24.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Village Zone are contained in [Rule 24.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Village zone:
 - 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity

24.1 Land Use - Activities

24.1.1 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (a) Land Use – Effects rules in [Rule 24.2](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 24.3](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (c) Activity specific conditions.

Activity		Activity-specific Conditions
PI	<u>Residential activity</u> , unless specified below.	Nil

24.4 Subdivision

- (1) Rule 24.4.1 provides for subdivision density and applies across the Village Zone.
- (2) The following rules apply to specific areas and/or activities:
 - (a) Rule 24.4.2 – Subdivision in Te Kowhai and Tuakau, applies to the Village Zone in these two areas.
 - (b) Rules 24.4.1 and 24.4.2 are also subject to the following subdivision controls:
 - (i) Rule 24.4.3 – Subdivision boundary adjustments;
 - (ii) Rule 24.4.4 – Subdivision amendments and updates to cross lease flats plans and conversions;
 - (iii) Rule 24.4.5 – Title boundaries **natural hazard area**, contaminated land, Significant Amenity Landscape Dune, notable trees and intensive farming activities, aggregate extraction areas;
 - (iv) Rule 24.4.6 – Title boundaries Significant Natural Areas, heritage items, archaeological sites, sites of significance to Maaori;
 - (v) Rule 24.4.7 – Title boundaries Maaori sites and Maaori areas of significance;
 - (vi) Rule 24.4.8 - Subdivision of land containing heritage items;
 - (vii) Rule 24.4.9 – Road frontage;
 - (viii) Rule 24.4.10 – Subdivision building platform;
 - (ix) Rule 24.4.11 – Subdivision Reserves; and
 - (x) Rule 24.4.12 - subdivision esplanade reserves and esplanade strips
 - (xi) Rule 24.4.13 – subdivision of land containing mapped off-road walkways.

24.4.1 Subdivision – General

RDI	<p>(a) Proposed <u>lots</u> must have a minimum <u>net site area</u> of 3000m², except where the proposed lot is an <u>access allotment, utility allotment or reserve to vest</u>.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <ol style="list-style-type: none"> (i) Shape, location and orientation of proposed <u>lots</u>; (ii) Matters referred to in the <u>Infrastructure chapter</u>; (iii) Consistency with the matters, and outcomes sought, in <u>Appendix 3.1</u> (Residential Subdivision Guidelines); (iv) Impacts on stormwater and wastewater disposal; (v) Impacts on <u>Significant Natural Areas</u>; (vi) Impacts on identified <u>Maaori Sites of Significance</u>; and (vii) Roads and pedestrian network; and (viii) Avoidance and/or mitigation of natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).
DI	<p><u>Subdivision</u> that does not comply with a condition of Rule 24.4.1 RDI.</p>

24.4.2 Subdivision – Te Kowhai and Tuakau

RD1	<p>(a) <u>Subdivision</u> in Te Kowhai and Tuakau must comply with all of the following conditions:</p> <p>(i) Proposed <u>lots</u> not connected to public water and wastewater <u>infrastructure</u> must have a minimum <u>net site area</u> of 3000m², except where the proposed <u>lot</u> is an <u>access allotment</u> or <u>reserve lot</u>.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <p>(i) Shape, location and orientation of proposed <u>lots</u>;</p> <p>(ii) Position of proposed <u>building platforms</u> and driveways to ensure future <u>subdivision</u> is not compromised;</p> <p>(iii) Matters referred to in the <u>Infrastructure chapter</u>;</p> <p>(iv) Consistency with the matters, and outcomes sought, in <u>Appendix 3.1</u> (Residential Subdivision Guidelines);</p> <p>(v) Impacts on stormwater and wastewater disposal;</p> <p>(vi) Impacts on <u>Significant Natural Areas</u>;</p> <p>(vii) Impacts on identified archaeological sites and <u>Maaori Sites of Significance</u>; and</p> <p>(viii) Roads and pedestrian networks; and</p> <p>(ix) Avoidance and/or mitigation of natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).</p>
RD2	<p>(a) <u>Subdivision</u> in Te Kowhai and Tuakau must comply with all of the following conditions:</p> <p>(i) Proposed lots connected to public water and wastewater <u>infrastructure</u> must have a minimum <u>net site area</u> of 1,000m², except where the proposed <u>lot</u> is an <u>access allotment</u> or <u>reserve lot</u>.</p> <p>(b) The Council's discretion shall be limited to the following matters:</p> <p>(i) Shape, location and orientation of proposed <u>lots</u>;</p> <p>(ii) Position of proposed <u>building platforms</u> and driveways to ensure future <u>subdivision</u> is not compromised;</p> <p>(iii) Matters referred to in the <u>Infrastructure chapter</u>;</p> <p>(iv) Consistency with the matters and outcomes sought in <u>Appendix 3.1</u> (Residential Subdivision Guidelines);</p> <p>(v) Impacts on stormwater and wastewater disposal;</p> <p>(vi) Impacts on <u>Significant Natural Areas</u>;</p> <p>(vii) Impacts on identified archaeological sites and <u>Maaori Sites of Significance</u>; and</p> <p>(viii) Roads and pedestrian networks; and</p> <p>(ix) Avoidance and/or mitigation of natural hazards risk, including liquefaction risk and fire risk (refer to Chapter 15).</p>
DI	<u>Subdivision</u> that does not comply with Rule 24.4.2 RD1 or RD2.

24.4.5 Title boundaries – ~~natural hazard area~~, Contaminated land, Significant Amenity Landscape - Dune, notable trees and intensive farming activities

RDI	<p>(a) <u>Subdivision</u> of land containing <u>contaminated land</u>, notable trees and <u>intensive farming</u> activities and <u>Aggregate Extraction Areas</u> must comply with all of the following conditions:</p> <p>(i) The <u>boundaries</u> of every proposed <u>lot</u> with existing <u>buildings</u> must demonstrate compliance with the following <u>building</u> rules (other than where any non-compliance existed lawfully prior to the <u>subdivision</u>) relating to:</p> <p style="margin-left: 20px;">A. Daylight admission (Rule 24.3.4);</p> <p style="margin-left: 20px;">B. Building coverage (Rule 24.3.5);</p> <p style="margin-left: 20px;">C. Building setbacks (Rule 24.3.6);</p> <p>(ii) The <u>boundaries</u> of every proposed <u>lot</u> must not divide the following:</p> <p style="margin-left: 20px;">A. A natural hazard area;</p> <p style="margin-left: 20px;">B.A. <u>Contaminated land;</u></p> <p style="margin-left: 20px;">B.B. <u>Significant Amenity Landscape; or</u></p> <p style="margin-left: 20px;">B.C. <u>Notable tree.</u></p> <p>(iii) The <u>boundaries</u> of every proposed <u>lot</u> must be setback by 300m from any area operating an <u>intensive farming</u> activity.</p> <p>(b) Council's discretion is restricted to the following matters:</p> <p style="margin-left: 20px;">(i) Landscape values;</p> <p style="margin-left: 20px;">(ii) Amenity values and character;</p> <p style="margin-left: 20px;">(iii) Reverse sensitivity;</p> <p style="margin-left: 20px;">(iv) Effects on existing <u>buildings</u>;</p> <p style="margin-left: 20px;">(v) Effects on natural hazard areas;</p> <p style="margin-left: 20px;">(v) <u>Effects on <u>contaminated land</u>;</u></p> <p style="margin-left: 20px;">(vi) <u>Effects on any notable tree;</u></p> <p style="margin-left: 20px;">(vii) <u>Effects on an intensive farming activity.</u></p>
DA	<u>Subdivision</u> that does not comply with Rule 24.4.5 RDI.

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24.4.10 Subdivision - Building platform

RD1	<p>(a) Every proposed <u>lot</u>, other than a new <u>lot</u> specifically for access, <u>utility allotment</u> and <u>access allotment</u> must be capable of containing a <u>building platform</u> upon which a <u>dwelling</u> could be sited as a permitted activity, with the <u>building platform</u> being contained within either of the following dimensions:</p> <ul style="list-style-type: none"> (i) A circle with a diameter of at least 18m exclusive of yards; or (ii) A rectangle of at least 200m² with a minimum dimension of 12m exclusive of yards. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> layout; (ii) Shape of <u>allotment</u>; (iii) Ability of <u>allotment</u> to accommodate a practical <u>building platform</u>; (iv) Likely location of future <u>buildings</u> and their potential effects on the environment; (v) Avoidance or mitigation of natural <u>hazards</u>; (vi) Geotechnical suitability for <u>building</u>, <u>including liquefaction risk (refer to Chapter 15)</u>; (vii) Ponding areas and primary <u>overland flow paths</u>.
DI	<u>Subdivision</u> that does not comply with Rule 24.4.10 RD1.

Chapter 25: Reserve Zone

- (1) The rules that apply to activities in the Reserve Zone are contained in [Rule 25.1](#) Land Use – Activities, [Rule 25.2](#) Land Use – Effects and [Rule 25.3](#) Land Use – Building.
- (2) The rules that apply to subdivision in the Reserve Zone are contained in [Rule 25.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Reserve Zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (5) The Reserve Zone contains a Specific Area listed below. This Specific Area contains rules that are either in addition to, or different from, other rules that apply to the rest of the Reserve Zone:
 - (a) [25.5](#) Tamahere Park and Tamahere Village Green

25.1 Land Use - Activities

25.1.1 Prohibited Activities

- (1) The following activity is a prohibited activity. No application for resource consent can be made for a prohibited activity and no resource consent can be granted:

PR I	Any building, structure, objects or vegetation that obscures the sight lines of the Raglan navigation beacons as identified in Appendix 7 (Raglan Navigation Beacon) for vessels entering Raglan Harbour (Whaingaroa).
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25.1.2 Permitted Activities

- (1) The activities listed below are permitted activities if they meet all the:
 - (a) Land Use – Effects rules in [Rule 25.2](#) (unless the activity-specific rule and/or conditions identify a condition(s) that does not apply);
 - (b) Land Use – Building rules in [Rule 25.3](#) (unless the activity-specific rule and/or conditions identify a condition(s) that does not apply);
 - (c) Activity-specific conditions.

Activity		Activity-specific conditions
PI	Any activity provided in a Reserve Management Plan approved under the Reserves Act 1977	Nil
P2	<u>Informal recreation</u>	Nil

25.5.1 Application of rules

The following rules of the Reserve Zone apply in the Tamahere Park and Tamahere Village Green:

- (a) [Rule 25.1.2](#) Permitted Activities
- (b) [Rule 25.1.3](#) Discretionary Activities
- (c) [Rule 25.1.4](#) Non-Complying Activities
- (d) The Land Use – Effects rules in [Rule 25.2](#) apply except:
 - (i) [Rule 25.5.2.1](#) applies instead of [Rule 25.2.7.1](#) Signs – General
- (e) The Land Use – Building rules in [Rule 25.3](#) apply except:
 - (i) [Rule 25.5.3.1](#) Building Coverage applies instead of [Rule 25.3.3](#) Building Coverage; and
 - (ii) [Rule 25.5.3.2](#) Building applies instead of [Rule 25.3.1](#) Height – General and [Rule 25.3.3](#) Building Coverage.
- (f) [Rule 25.4](#) Subdivision.

(g) The activity status tables and standards in the following chapters also apply to activities in the Tamahere Park and Tamahere Village Green:

14 Infrastructure and Energy;

15 Natural Hazards and Climate Change.

Chapter 26: Hampton Downs Motor Sport and Recreation Zone

- (1) The rules that apply to activities in the Hampton Downs Motor Sport and Recreation Zone are contained in Rule 26.1 Land Use – Activities, Rule 26.2 Land Use – Effects and Rule 26.3 Land Use – Building.
- (2) The rules relating to subdivision within the Motor Sport and Recreation Zone are contained in Rule 26.4.
- (3) The activity status tables and standards in the following chapters also apply to activities in the Motor Sport and Recreation Zone:
 - 14 Infrastructure and Energy;
 - 15 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) P Permitted activity
 - (b) C Controlled activity
 - (c) RD Restricted discretionary activity
 - (d) D Discretionary activity
 - (e) NC Non-complying activity.

26.1 Land Use - Activities

26.1.1 Permitted Activities

- (1) The following activities are permitted activities if they meet all the following:
 - (i) Land Use – Effects rules in [Rule 26.2](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (ii) Land Use – Building rules in [Rule 26.3](#) (unless the activity rule and/or activity-specific conditions identify a condition(s) that does not apply);
 - (iii) Activity-specific conditions.

26.1.1.1 Permitted Activities - Operational Motorsport Area - Precinct A Activity

Activity		Activity-specific conditions
P1	A motor sport and recreation facility	The activity is carried out in Precinct A (Operational Motor Sport Area)
P2	A day-to-day activity	The activity is carried out in Precinct A (Operational Motor Sport Area)

26.1.1.2 Permitted Activities– Business and Industrial Area - Precinct B Activity

Activity		Activity-specific conditions
P1	Automotive activities	The activity is carried out in Precinct B (Business and Industrial Area)
P2	Non-automotive activities	The activity is carried out in Precinct B (Business and Industrial Area)
P3	General warehousing	The activity is carried out in Precinct B (Business and Industrial Area)

Chapter 27: Te Kowhai Airpark Zone

- (1) The rules that apply to activities in the Te Kowhai Airpark Zone are contained in [Rule 27.2](#) Land Use – Effects and, [Rule 27.3](#) Land Use – Building.
- (2) The provision for subdivision in the Te Kowhai Airpark Zone are contained in [Rule 27.4](#).
- (3) The activity status tables and standards in the following chapters also apply to activities in the Te Kowhai Airpark Zone:
 - 14 Infrastructure and Energy as specified in [Rule 27.2](#);
 - 15 Natural Hazards and Climate Change (Placeholder).
- (4) The following symbols are used in the tables:
 - (a) P Permitted activity
 - (b) C Controlled activity
 - (c) RD Restricted discretionary activity
 - (d) D Discretionary activity
 - (e) NC Non-complying activity
- (5) The Te Kowhai Airpark comprises four separate precinct areas:
 - (a) Precinct A: Runway and Operations;
 - (b) Precinct B: Commercial;
 - (c) Precinct C: Medium Density Residential;
 - (d) Precinct D: Residential.
- (6) The Te Kowhai Airpark Zone is shown on the planning maps along with the location of the four precinct areas within the zone.
- (7) Rule Table [27.1.1](#) identifies Permitted activities (P), Controlled Activities (C), Discretionary activities (D) and Non-complying activities (NC) within each precinct.

27.1 Land Use - Activities

- (a) All Permitted and Controlled activities identified in Activity Status Table [27.1.1](#) must comply with all Land Use - Effects rules in [Rule 27.2](#) and Land Use - Building rules in [Rule 27.3](#).
- (b) With respect to controlled activities, Council reserves control over the following matters:
 - (i) the proposed site design and layout in relation to:
 - A. the sensitivity of the surrounding natural, human and physical environment,
 - B. potential hazards and exposure pathways arising from the proposed facility, including cumulative risks with other facilities, and
 - C. interaction with natural hazards (flooding, instability), as applicable,
 - (ii) proposed emergency management planning (spills, fire and other relevant hazards), and
 - (iii) proposed procedures for monitoring and reporting of incidents.
- (c) To reference the activity status use the following format:
 - (i) Rule
 - (ii) Activity status and number
 - (iii) Activity
 - (iv) Precinct

(for example 21.7 D I I Navigation Equipment Precinct B Commercial)

27.1.1 Activity Status Table

27.4.6 Building platform

RDI	<p>(a) In ALL PRECINCTS, every <u>allotment</u> must be capable of containing a <u>building platform</u>:</p> <p>(i) Upon which a <u>dwelling</u> could be sited as a permitted activity in accordance with Rule 27.3; and</p> <p>(ii) The <u>building platform</u> is able to accommodate either:</p> <p style="margin-left: 20px;">A. A circle with a diameter of at least 10m exclusive of <u>boundary</u> setbacks; or</p> <p style="margin-left: 20px;">B. A rectangle of at least 100 m², exclusive of <u>boundary</u> setbacks, of which each dimension is at least 8m.</p> <p>(b) Rule 27.4.6 RDI (a) does not apply to a <u>utility allotment</u> or an <u>access allotment</u>.</p> <p>(c) Council's discretion is restricted to the following matters:</p> <p style="margin-left: 20px;">(i) <u>Subdivision</u> layout;</p> <p style="margin-left: 20px;">(ii) Shape of <u>allotments</u>;</p> <p style="margin-left: 20px;">(iii) Ability of <u>allotments</u> to accommodate a practical <u>building platform</u>;</p> <p style="margin-left: 20px;">(iv) Likely location of future <u>buildings</u> and their potential effects on the environment;</p> <p style="margin-left: 20px;">(v) Geotechnical suitability for <u>building</u>, <u>including liquefaction risk if present (refer to Chapter 15)</u>;</p> <p style="margin-left: 20px;">(vi) <u>Avoidance and/or mitigation of natural hazards</u>.</p>
DI	<u>Subdivision</u> that does not comply with Rule 27.4.6 RDI.

Chapter 28: Rangitahi Peninsula Zone

- (1) The rules that apply to activities in the Rangitahi Peninsula zone are contained in [Rule 28.1](#) Land Use – Activities, [Rule 28.2](#) Land Use – Effects and [Rule 28.3](#) Land Use – Building.
- (2) The activity status tables and standards in the following chapters also apply to activities in the Rangitahi Peninsula zone:
 - I4 Infrastructure and Energy;
 - I5 Natural Hazards [and Climate Change](#) (Placeholder).
- (3) The following symbols are used in the tables:
 - (a) PR Prohibited activity
 - (b) P Permitted activity
 - (c) C Controlled activity
 - (d) RD Restricted discretionary activity
 - (e) D Discretionary activity
 - (f) NC Non-complying activity
- (4) The rules providing for subdivision in the Rangitahi Peninsula Zone are contained in [Rule 28.4](#).

28.1 Land Use – Activities

- (1) The following activities are permitted activities if they comply with all of the:
 - (a) Land Use - Effects rules in [Rule 28.2](#) (except for P7);
 - (b) Land Use – Building rules in [Rule 28.3](#) (except for P7);
 - (c) Activity specific conditions.

28.1.1 Specific Activities – Permitted Activities

- (1) The activities listed below are permitted activities.

Activity		Conditions
PI	<u>Residential activity</u>	<ol style="list-style-type: none"> (a) An activity that is in accordance with the Rangitahi Peninsula Structure Plan (Appendix 8); and (b) Is located within Plan I Structure Plan Area - Development Precincts shown on the Rangitahi Peninsula Structure Plan (Appendix 8).

28.1.3 Specific Activities - Restricted Discretionary Activities

- (1) The activities listed below are restricted discretionary activities.
- (2) Discretion to grant or decline consent and impose conditions is restricted to the matters of discretion set out in the following table.

Activity		Matters of Discretion
RD1	<p>(a) Any activity that does not comply with a condition for Rule 28.1.1 P5 or Rule 28.1.1 P6 is a restricted discretionary activity provided that:</p> <p>(i) For a <u>community activity</u>, the total <u>gross floor area</u> within the Rangitahi Peninsula Structure Plan Area does not exceed 300m² within the whole of the Structure Plan Area.</p> <p>(b) For <u>Rangitahi commercial activity</u>:</p> <p>(i) The total <u>gross floor area</u> does not exceed 600m² within any of the seven neighbourhoods shown on the Rangitahi Peninsula Structure Plan (Appendix 8), or</p> <p>(ii) The total <u>gross floor area</u> does not exceed 1000m² within the whole of the Structure Plan Area.</p>	<p>(a) Council discretion is restricted to the following matters:</p> <p>(i) Effects on the role, function, and vitality, of the Raglan town centre;</p> <p>(ii) Traffic impacts on the safety and efficiency of the road network;</p> <p>(iii) Consistency with the Rangitahi Peninsula Structure Plan (Appendix 8);</p> <p>(iv) Character and amenity of development within the Rangitahi Peninsula Structure Plan (Appendix 8).</p>
RD2	<p>(a) A Comprehensive Residential Development that meets the following conditions:</p> <p>(i) The Land Use – Effects in Rule 28.2; and</p>	<p>(a) Council discretion is restricted to the following matters:</p> <p>(i) Adequacy of the information provided to</p>

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- (ii) The Land Use – Building in [Rule 28.3](#); and
 - A. [Rule 28.3.3](#) (Building height) does not apply; and
 - B. [Rule 28.3.7](#) (Living court) does not apply; and
- (iii) The site is located within the Comprehensive Residential Development locations shown in Plan 5 of the Rangitahi Peninsula Structure Plan ([Appendix 8](#)); and
- (iv) Construction or alteration of a building does not exceed 11m height; and
- (v) A detailed site plan is provided that identifies proposed title boundaries for each residential unit and any common areas (including access and services), ensuring that a freehold (fee simple) or unit title subdivision could occur in accordance with [Appendix 8](#) - Rangitahi Peninsula Structure Plan; and
- (vi) The residential unit is designed and constructed to comply with Table 14 - Internal Sound Levels in [Appendix 1](#) (Acoustic Insulation); and
- (vii) A communal service court area is provided; and
- (viii) Outdoor living courts are provided to meet the following minimum requirements for each residential unit:

<u>Duplex Dwelling</u>	Living Court Area	Minimum Dimension
Studio unit or 1 bedroom	30m ²	4m
2 bedroom	40m ²	4m
3 bedroom	40m ²	4m
<u>Apartment Building</u> Ground Level Residential Unit	Living Court Area	Minimum Dimension
Studio unit or 1 bedroom	20m ²	4m

- address matters specified, and outcomes sought, within the Multi-Unit Design Guide ([Appendix 3.4](#));
- (ii) The extent to which the development contributes to and engages with adjacent streets and public open space;
- (iii) The extent to which the access, car parking and garaging is integrated into the development in a way that is safe for pedestrians and cyclists;
- (iv) The extent to which the development incorporates environmental efficiency measures such as passive solar principles;
- (v) Amenity values for occupants and neighbours in respect of outlook, privacy, noise, light spill, access to sunlight, outdoor living court orientation, site design and layout;
- (vi) The extent to which staging is necessary to ensure that development is carried out in a coordinated and timely manner;
- (vii) Avoidance or mitigation of natural hazards;
- (viii) The safety and efficiency of roads due to traffic associated with the development;
- (ix) Geotechnical stability for building, including liquefaction risk if present (refer to Chapter 15);

	<table> <tr> <td>2 bedroom</td><td>30m²</td><td>4m</td></tr> <tr> <td>3 bedroom</td><td>30m²</td><td>4m</td></tr> <tr> <td>Apartment Building Upper Level Residential Unit</td><td>Living Court Area</td><td>Minimum Dimension</td></tr> <tr> <td>Studio unit or 1 bedroom</td><td>10m²</td><td>2m</td></tr> <tr> <td>2 bedroom</td><td>15m²</td><td>2m</td></tr> <tr> <td>3 bedroom</td><td>15m²</td><td>2m</td></tr> </table>	2 bedroom	30m ²	4m	3 bedroom	30m ²	4m	Apartment Building Upper Level Residential Unit	Living Court Area	Minimum Dimension	Studio unit or 1 bedroom	10m ²	2m	2 bedroom	15m ²	2m	3 bedroom	15m ²	2m	(x) Consistency with (Appendix 8) Rangitahi Peninsula Structure Plan.
2 bedroom	30m ²	4m																		
3 bedroom	30m ²	4m																		
Apartment Building Upper Level Residential Unit	Living Court Area	Minimum Dimension																		
Studio unit or 1 bedroom	10m ²	2m																		
2 bedroom	15m ²	2m																		
3 bedroom	15m ²	2m																		
RD3	<p>(a) Any mixed use activity comprising of a comprehensive residential development and a Rangitahi commercial activity or a community facility is a restricted discretionary activity and shall meet the conditions in Rules 28.1.1 P5-P6 and 28.1.3 RD1 and RD2;</p> <p>(b) Mixed use activities provided for under Rule RD3(a) are exempt from the requirements of Rule 28.3.6 (Accessory buildings).</p>	Council's discretion is restricted to the matters of discretion of Rules 28.1.3 RD1 (b) and RD2 (b).																		

28.4.1 Subdivision - General

RDI	<p>(a) <u>Subdivision</u> must comply with the following conditions:</p> <ul style="list-style-type: none"> (i) <u>Subdivision</u> must be in accordance with the Rangitahi Peninsula Structure Plan (Appendix 8), including the density ranges specified therein for each neighbourhood in the Neighbourhood Outcomes Plans; and (ii) Compliance with the following variances will be determined to be in accordance with the Rangitahi Peninsula Structure Plan (Appendix 8) (the base figures and locations are as stated or shown in the Neighbourhood Outcome Plans that form part of the Rangitahi Peninsula Structure Plan): <ul style="list-style-type: none"> (i) Development Precinct areas (hectares) - variance up to and including 10%; (ii) Development Precinct boundaries - variance up to and including 100m; (iii) Development Precinct densities - variance up to and including 10% from the upper and lower end of the range specified; (iv) Collector Road locations - variance up to and including 50m movement outside of the road reserve; (v) Secondary access location - any variance and up to and including 30% variance in length; and (iii) Environmental improvements required by the Rangitahi Peninsula Structure Plan (Appendix 8) (including, but not limited to, restoration planting shown on the Indicative Open Space Framework Plan and provision of walkways and cycle ways shown on the Indicative Movement Network Plan) have been implemented to the extent required; (iv) The primary access to the Rangitahi Peninsula Structure Plan Area by way of an upgraded Opororu Road (inclusive of the Opororu Road/Wainui Road intersection and the bridge/causeway at each end) has been formed; and (v) There must be secondary legal access for all road users when the Opororu Road connection is not available for any reason. (vi) Council shall consider Tainui Hapuu as an affected party and require that its written approval be obtained or that notice be served on a limited notified basis. <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) Extent to which <u>subdivision</u> is consistent with the Rangitahi Peninsula Structure Plan (Appendix 8); (ii) Extent of variation in <u>allotment</u> sizes from provisions of the Rangitahi Peninsula Structure Plan (Appendix 8); (iii) Matters referred to in Chapter 14 Infrastructure and Energy; (iv) Amenity and streetscape; (v) Vehicle and pedestrian networks; (vi) Implementation of environmental improvements required by the Rangitahi Peninsula Structure Plan (Appendix 8); (vii) <u>Avoidance and/or mitigation of natural hazards risk, including liquefaction risk if present (refer to Chapter 15).</u>
DI	<u>Subdivision</u> that does not comply with one or more conditions in Rule 28.4.1 RDI.

28.4.6 Subdivision - Building platform

RDI	<p>(a) Every proposed <u>lot</u>, other than an <u>access</u> or <u>utility allotment</u>, must be capable of containing a <u>building platform</u> that meets all of the following conditions:</p> <ul style="list-style-type: none"> (i) Has, exclusive of <u>boundary</u> setbacks, a circle with a diameter of at least 18m or a rectangle of at least 200m² with a minimum dimension of 12m, except that this condition shall not apply to Comprehensive Residential Development Lots; (ii) Has an average gradient not steeper than 1:8; (iii) Has vehicular access in accordance with Rule 14.12.1.1 Infrastructure and Energy Chapter; (iv) Is geotechnically stable; (v) Is not subject to inundation in a 2% <u>AEP</u> storm or flood event; <p>(b) Council's discretion is restricted to the following matters:</p> <ul style="list-style-type: none"> (i) <u>Earthworks</u> and fill material required for subsequent <u>buildings</u>; (ii) Geotechnical suitability for <u>building</u>, <u>including liquefaction risk if present (refer to Chapter 15)</u>; (iii) Likely location of future <u>buildings</u> and their potential effects on the environment; (iv) Avoidance or mitigation of natural <u>hazards</u>; (v) Effects on landscape and amenity; (vi) Measures to avoid storm or flood events.
DI	<u>Subdivision</u> that does not comply with one or more condition in Rule 28.4.6 RDI.

Proposed Waikato District Plan Stage 2 – Section 32 - Appendix 5 Relevant Background Assessments and Reports

- 5(a) *Lower Waikato 2D Modelling – Huntly, Ohinewai and Horotiu Model Build*: DHI, 2020. DHI Project No. 44801126.
- 5(b) *Lower Waikato River Model Review*: Tonkin + Taylor Ltd, 2020. T+T Job No. 1005528.
- 5(c) *Report on hazards following mine closure, Huntly East*: IRBA Geological Engineering Consultants, October 2018. IRBA Project No. 1003.
- 5(d) *Peer Review of Ian R Brown Associates report titled Report on Hazards following mine closure, Huntly East, October 2018, IRBA Project 1003*: TerraFirma Mining Ltd, January 2019. TerraFirma Project No. TFM0096.
- 5(e) *Risk Assessment for Urban Areas above the Mine – Huntly East Mine Closure Assessment*: RDCL, October 2019. RDCL Report No. R-19357-01.
- 5(f) *Waikato District Hazard Assessment*: Focus Resource Management Group, 2020. Focus Report No. 20/130.
- 5(g) *Waikato District Hazard Assessment*: Focus Resource Management Group, 2020. Addendum to Report No 20/130.
- 5(h) *Waikato District Hazard Assessment*: Focus Resource Management Group, 2020. Response to Peer Review by Tonkin + Taylor Ltd, 2019.
- 5 (i) *Tonkin + Taylor Ltd, 2019: Review of Waikato District Coastal Hazard Assessment*. Prepared for Waikato District Council, December 2019. T+T Job No. 1012915.
- 5(j) *Waikato District Plan Review - Natural Hazards and Climate Change Economic Assessment*: M.E Consulting June 2020. M.E reference WKTO 006.20 DPR - Hazard

WRC Lower Waikato 2D Modelling

Huntly, Ohinewai and Horotiu Model Build

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Report

This report has been prepared under the DHI Business Management System certified by Bureau Veritas to comply with ISO 9001 (Quality Management)

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Huntly, Ohinewai and Horotiu Model Build

Prepared for Waikato Regional Council
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 and Environmental Compliance



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1 Introduction

Waikato Regional Council (WRC) engaged DHI via email on 26th September 2017 to extend the existing Lower Waikato-Waipā river model to include a two-dimensional (2D) representation of Huntly and surrounding areas. The initial focus was on the Huntly area, due to deadlines imposed by Waikato District Council (WDC), but as initially scoped, the model was eventually extended (2019) to cover Ohinewai and Horotiu. The purpose of the model is to produce maps of flood inundation for a variety of design events, including existing and future climate scenarios. This report summarises the model build process and the data used.

The final suite of models used to simulate validation and design events are based on WRC's pre-existing river model, which is designed for flood forecasting simulations. Four storms from July 1998, July 2002, March 2004 and April 2017 have been used for validation. For each flood scenario three simulations are carried out in series, firstly a 1 year-long rainfall-runoff simulation is carried out to warm-up the hydrological response from the catchments, secondly a 3 week-long hydrodynamic simulation of the main river and tributary channels is carried out, and finally the full flood model with flood plain representation is simulated using the results of the rainfall-runoff simulation as inflows and results of the river simulation as initial conditions. All simulations were carried out using MIKE Release 2017 SP2 and the flood simulations were computed on machines with dual GPU's.

2 Existing River Model

The existing river model is an amalgam of two previously separate models: the Lower Waikato and Waipa MIKE 11 models. Legacies of the merger can be found in the catchment naming conventions. The model extends from Karapiro Dam to Port Waikato on the coast where a tidal boundary condition is applied. There are 92 catchments covering 6476 km². Each of the two northeastern-most catchments, 1 and 2, contain lakes: the catchment area upstream of these lakes is neglected, so these lakes contribute zero flow to the river model.

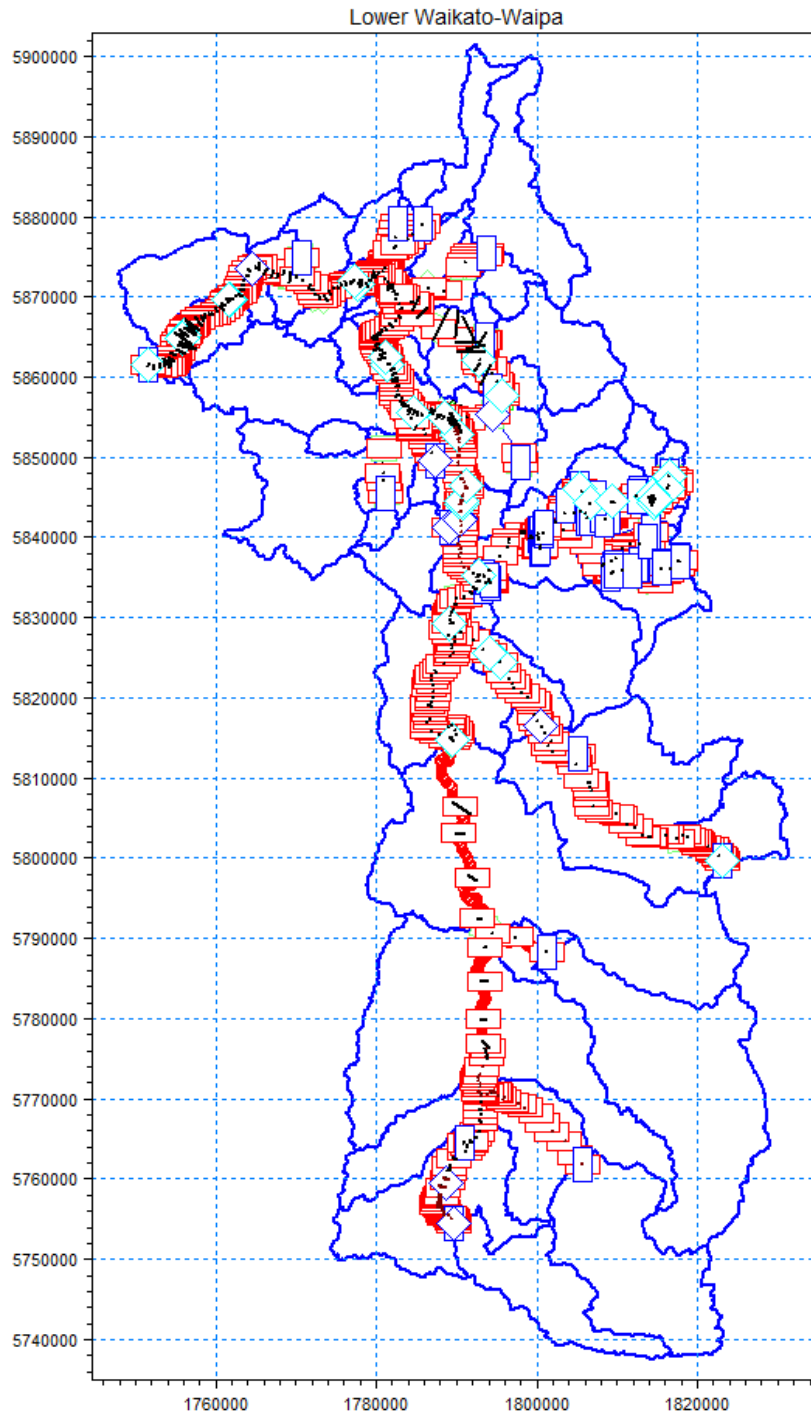


Figure 2-1 Pre-existing MIKE 11 model of the Lower Waikato River and Waipa River including river alignment and catchments.

Before the 2D floodplain was incorporated into the model, aspects of the river model were revised to better suit connection to the floodplain. These changes are listed below.

1. Survey marker coordinates and associated bank markers added to cross sections between cross sections 139 and 111. Survey marker locations estimated from Google Earth KMZ provided by WRC.
2. Alignment vertex locations and chainages were adjusted to coincide with cross section survey locations along a 38 km reach of the Waikato River branch between chainages 43270 and 81987. Vertices have also been aligned along the downstream 17 km reach of the Waipa River branch between chainages 112125 and 128900.
3. The entire Waahi Stream branch was realigned and the chainages reset. The length of the new branch is 2.1 km. The existing cross sections have been retained and additional cross sections required for flood-model linking purposes have been interpolated.
4. Lake Waahi is simulated in the overland flow model (MIKE 21 FM) in the flood model, but in the river model, used for initialising the flood model, the lake is represented as additional storage in the upper-most cross section so that the lake water level is correctly initialised. The additional storage curve used to represent Lake Waahi in the pre-existing model was fixed at 9580000.0 m² for all elevations; GIS analysis found that this overestimated storage for elevations less than 10.75 m RL, so based on the GIS analysis a new storage-elevation relationship was developed (see Figure 2-2).

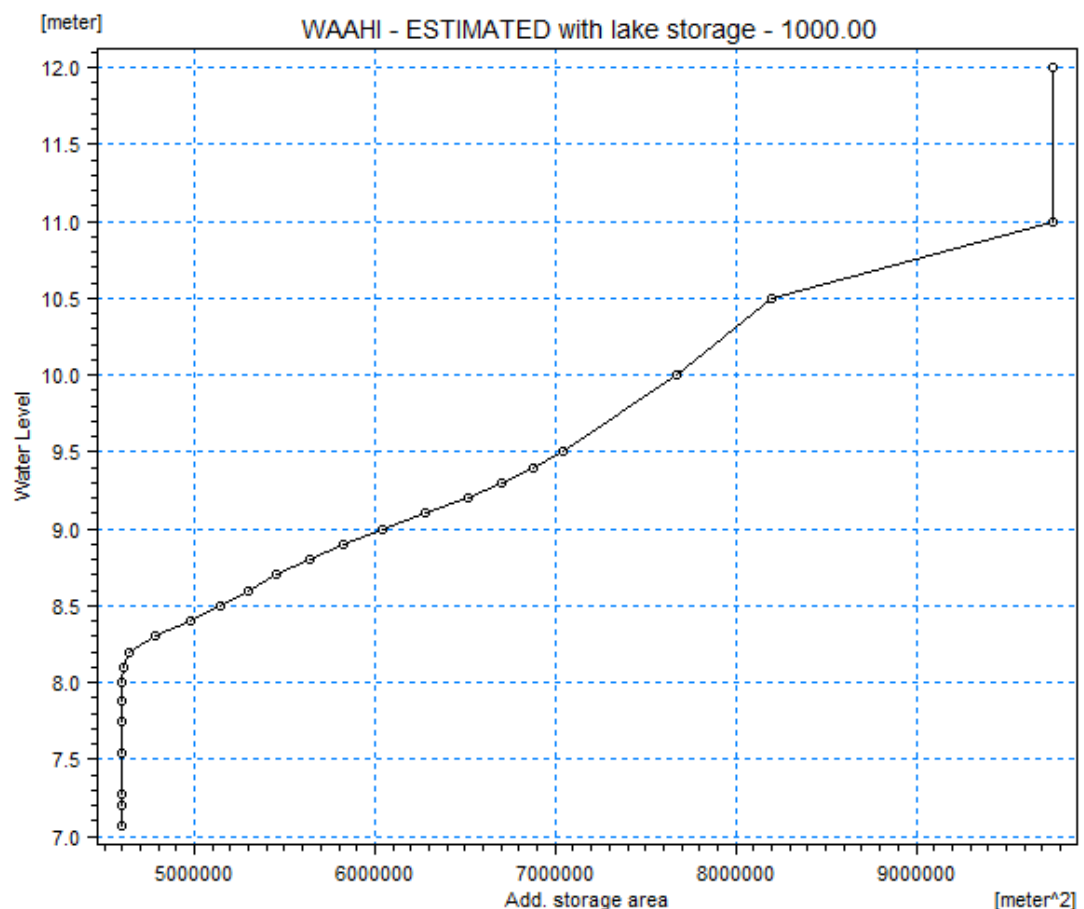


Figure 2-2 Storage-elevation relationship developed to represent Lake Waahi at the head of the Waahi Stream branch in the river model (MIKE 11), the results of which serve as the initialisation of the flood model.

5. The *Max dx* parameter, which controls grid point spacing, was reduced from 10000 m to 25 m for the Waikato River reach between chainages 53710 and 103703 and from 1000 m to 30 m for the Waahi Stream branch. These modifications are not vital for the river model, however, they facilitate appropriate linking between the river and flood plain in the flood model.
6. The pre-existing model was used in a live flood forecasting system, making use of measured and predicted precipitation timeseries for boundary conditions. In several cases rainfall timeseries from stations that have been decommissioned were still connected to the model, contributing zero rainfall. The rain gauge distribution across catchments has been completely revised to reflect the available data for the four validation events. Uniform Chicago-Temporal-Pattern based design storms have been used for design event simulation.

3 Data

3.1 Data source

Based on the data requirements specified in DHI's proposal, dated 13th September 2017, WRC staff sent all appropriate data available to them and directed DHI to other data sources where necessary. There are a number of sources of data and the licensing of this data varies. Table 3-1 summarises the data used in the model revision and upgrade process.

Table 3-1 Data used for model build.

Data description	Source	License
Flood forecasting MIKE 11 river model including associated GIS data such as catchment shapes, short range observed data, and rainfall and water level gauge locations.	WRC flood forecasting system maintained by DHI.	-
Hydrotel IDs spreadsheet providing WRC gauge locations, internal codes and gauge types.	WRC, provided to DHI on 15/4/2016.	-
Telemetry map providing associations between observation and prediction gauges.	WRC, undated.	-
Port Waikato tidal timeseries predictions based on calculated tidal constituents.	C-MAP.	Licensed via DHI MIKE C-MAP licensing agreement.
WDC stormwater asset GIS data. <i>(Note that this data was investigated but found to be incomplete and so was not incorporated in the final model)</i>	WDC care of WRC, provided to DHI on 2/10/2017, 13/11/2017 and 16/11/2017.	-
Drainage infrastructure asset GIS data.	WRC, provided to DHI on 5/10/2017.	WRC Data User Agreement (Doc #11168417, signed 4/10/2017).
Cross section survey data for 2006 and 2007 surveys, maps of aggradation and degradation, cross section locations in KMZ format, and report "River Bed Morphology Analysis - Huntly to Rangiriri, Waikato River (1468656).doc".	WRC, provided to DHI on 5/10/2017.	-
Building outlines (pilot) polygon GIS layers	Downloaded from LINZ website on 5/10/2017.	Creative Commons – Attribution 3.0 New Zealand (CC BY 3.0 NZ); creator: LINZ.
Stopbank design levels in GIS format.	WRC, provided to DHI on 6/10/2017.	-
Observed rainfall, discharge and water level gauge timeseries.	WRC, provided to DHI on 12/10/2017.	-
LiDAR flown in 2007/08 and 2010/11 for Lower Waikato region.	WRC, provided to DHI on 20/10/2017, 15/11/2017 and 21/11/2017.	WRC Data Use Agreement (Doc #3247537, signed 12/12/2014).

Data description	Source	License
Polygon shapefile of 1% AEP flood extent from Horotiu to Port Waikato.	WRC, provided to DHI on 20/10/2017.	WRC Data Use Agreement (Doc #11215581, signed 24/10/2017)
Observed discharge at Huntly gauge timeseries.	WRC, provided to DHI on 3/11/2017.	-
Design 1958 Model 100 year HEC-HMS Karapiro discharge timeseries.	WRC, provided to DHI on 16/11/2017.	-
Existing design 10 min-, 20 min-, 30 min-, 60 min-, 2 hour-, 6 hour-, 12 hour-, 24 hour-, 48 hour-, and 72 hour-duration rainfall depths for centroid locations of the 92 catchments.	Downloaded from NIWA's HIRDS website on 23/11/2018.	Creative Commons – Attribution 4.0 International (CC BY 4.0)
Lower Waikato River design flows and flood frequencies spreadsheet.	WRC, provided to DHI on 27/11/2017.	-
Road centre lines in GIS format.	Downloaded from LINZ website on 31/1/2018.	Creative Commons – Attribution 3.0 New Zealand (CC BY 3.0 NZ); creator: LINZ.
Property parcel polygons in GIS format.	Downloaded from LINZ website on 1/2/2018.	Creative Commons – Attribution 3.0 New Zealand (CC BY 3.0 NZ); creator: LINZ.
Ministry for the Environment LUCAS NZ land use map in GIS format.	Downloaded from LINZ website on 1/2/2018.	Creative Commons – Attribution 4.0 International (CC BY 4.0)
Mangawara detailed model	WRC provided to DHI on 05/07/2018	-
Stormwater structures (drainage points and bridges) in shapefile format. DHI's requested list is included in Appendix C.	Waikato District Alliance (WDA) provided to DHI on 26/11/2018	-
Stormwater assets	Link provided by WDC to DHI on 26/11/2018 https://data.waikatodistrict.govt.nz/search/?q=storm+water	Creative Commons – Attribution 4.0 International (CC BY 4.0)
Stormwater assets in MyMap format	Link provided by WDA to DHI on 27/11/2018 https://www.google.com/maps/d/u/0/viewer?mid=1j77bFWd4FIWGTal1018UkS0XDWQ&ll=-37.675500168758965%2C175.1522589038866&z=15	-
Stormwater as-builts for bridges and culverts	WDA provided to DHI on 27/11/2018	-
KiwiRail bridges and culverts, as-builts in pdf format	KiwiRail provided DHI on 6/12/2018	-

Data description	Source	License
WRC's floodgate and pumpstation data in GIS format	WRC provided DHI on 31/01/2019	-
Aerial Photography – Waipa River 2004 and Waikato River 1998	WRC provided DHI on 14/08/2019	Creative Commons – Attribution 4.0 International (CC BY 4.0)

3.2 Data Gap Analysis

3.2.1 Rainfall

We have received timeseries for the following rain gauges as listed in Table 3-2.

Table 3-2 Rain Gauges used in model

Gauge Name
RF_Puniu_818.2
RF_Te_Kuiti_414.49
RF_Otewa_1191.7
RF_Wharekiri_414.21
RF_Waintaguru_428.4
RF_Ngaroma_818.7
RF_Wairamarama_201.4
RF_Maukoro_Landing_749.12
RF_Hauturu_36.5
RF_Kararamu_1247.38
RF_ControlGate_1293.6
RF_Mangatangi_453.4
RF_Maungakawa_204.1
RF_Waingaro_1167.4
RF_Ruakaura_1131.168
RF_EW_Hamilton_1131.164
RF_Maungatautari_377.2

As mentioned in the meeting on 30/10/2017, in some of the rainfall timeseries there are "." and "---" entries. These entries have been read as 0.

3.2.2 Pump Stations and Flood Gates

One pump station and 3 floodgates have been added to the existing model. The positions of 13 other pump stations and 11 floodgates are available from the WRC GIS data, but the specifics of the structures are missing for:

- Flood gates: details of the shape, size and nature of the flow control;
- Pump stations: number of pumps, rising main specifications, Q-H/Q-dH pump curves, set-points (start and stop levels), pump type, wet well dimensions and levels, operations control information (duty/stand-by pumps, etc.) and associated storage.

The pump stations and floodgates present in the model are shown in Table 3-3 and Table 3-4. See Appendix C for a list of the excluded pump stations and floodgates.

Table 3-3 Pump stations modelled

Asset_ID	ASSET_DESCRIPTION	Owner	Easting NZTM	Northing NZTM
25872	Whangamaire Pumpstation	WRC	1794045	5835619

The Whangamaire pump station has been taken from the Mangawara model provided by WRC on 05/07/2018.

Table 3-4 Floodgates modelled

ASSET_ID	ASSET_DESC	Type
25586	Whangamaire Floodgate	
	Whangamaire Pump non-return valve	Non-return valve
26579	Waahi Stream Floodgate	Flap-gated culverts
27323	Okowhao Floodgate 1 (Culvert Te Ohaki road 3a)	Non-return valve
	Rotongaro Floodgate	Gate

The Rotongaro and Waahi Stream floodgates are legacies of the Lower Waikato model. The Whangamaire structures have been taken from the Mangawara model provided by WRC on 05/07/2018.

3.2.3 Pipe Network

A brief analysis of the data indicates the following are missing from the available node data. Table 3-5 below summarises point-based invert information and is the percentage of missing data from the set delivered to DHI on 13/11/2017.

Table 3-5 Percentage missing invert data

Nodes (sw_point_point)	Count	% without invert info
No. catchpits	125	90%
No. discharge points	84	0%
No. outlets (overlap with discharge points)	158	89%
No. inlets	21	71%
No. soakholes	4	50%
No. manholes	1044	58%
No. sumps	161	84%
No. pipes	1231	17%

In Figure 3-1 the yellow circles indicate networks that seem to be disconnected from downstream drainage and the red circles indicate locations where there appears to be missing drainage asset data.

For a rain-on-grid approach to work well in suburban areas, it is recommended that all stormwater inlets are explicitly represented for at least a basic level. This requires that stormwater inlets are located, even if the grate, sump and lead parameters are not available. The available catchpit locations are identified as orange circles with black crosses in the image below and it is clear that this asset information is not complete. Digitising these stormwater inlets could be performed manually using aerial photos and this would be sufficient for inclusion in the model so long as standard grate, sump and lead parameters can be agreed on, however the stormwater main data would have to be substantially complete.

As agreed with WRC, based on the time-constraints and quality of the GIS drainage information, it was decided to exclude the pipe networks, open channels and pumps from the model and simply simulate flooding from the river over the design-level stopbanks, as the number of questions it would raise will outweigh any benefit of high-resolution flood mapping.

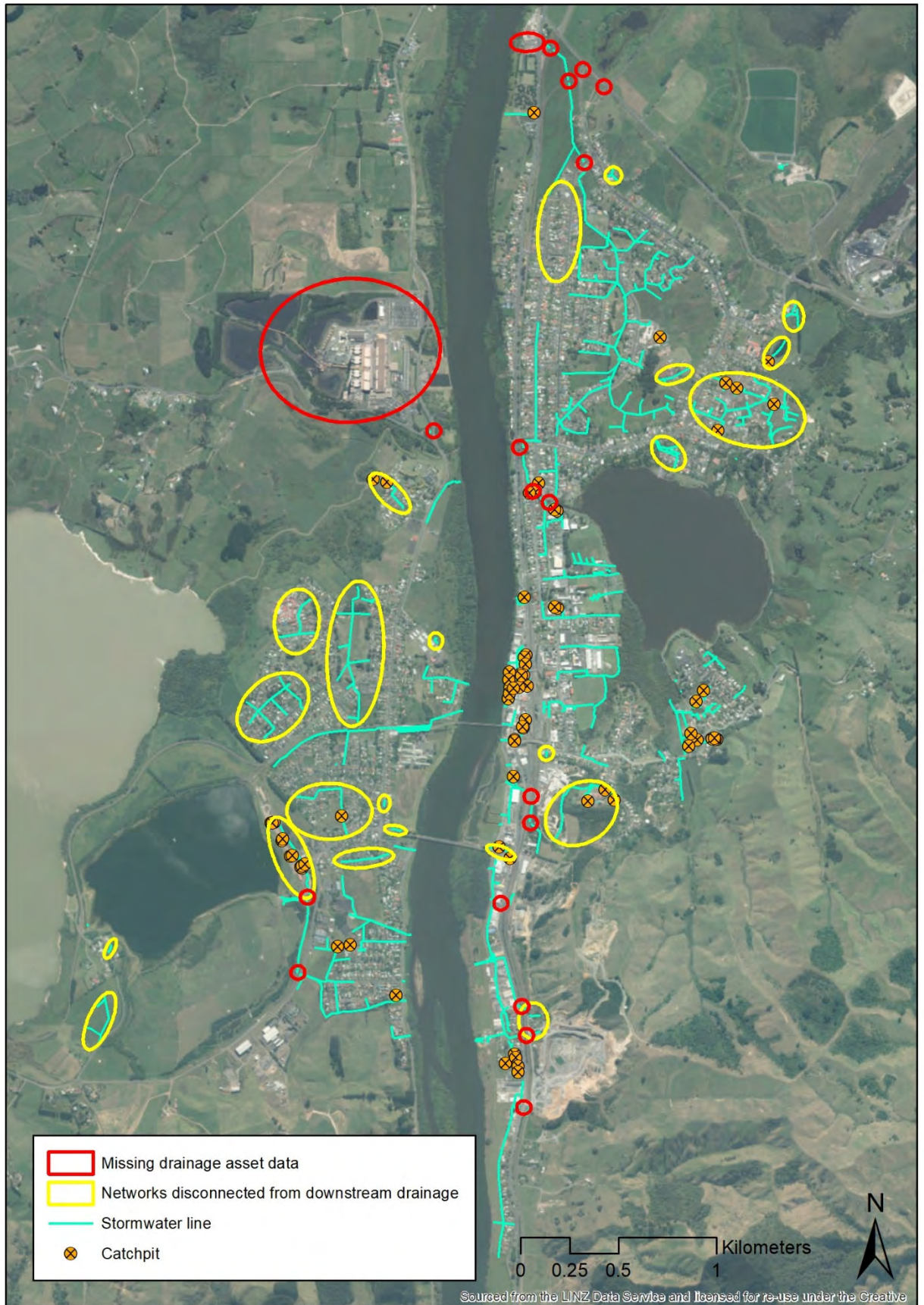


Figure 3-1 Data gap summary, showing areas where data appears incomplete

3.2.4 LiDAR

Two sets of LiDAR data have been provided by WRC to DHI, one collected in 2007-2008 and the other in 2010-2011. The extent of the data is shown in and the expected accuracy of the data is presented in Table 3-6.

Table 3-6 LiDAR Metadata

	Survey 2007-2008	Survey 2010-2011
Captured terrain model [m]	1.2	-
Vertical accuracy [m]	0.45	-
Horizontal accuracy [m]	0.15	0.11

The LiDAR data does not cover the upstream part of Firewood Creek, which becomes flooded during the simulations. An artificial wall is thus created, at the boundary of the model grid, resulting in a negligible backwater effect and skewing the existing storage capacity of Firewood Creek.

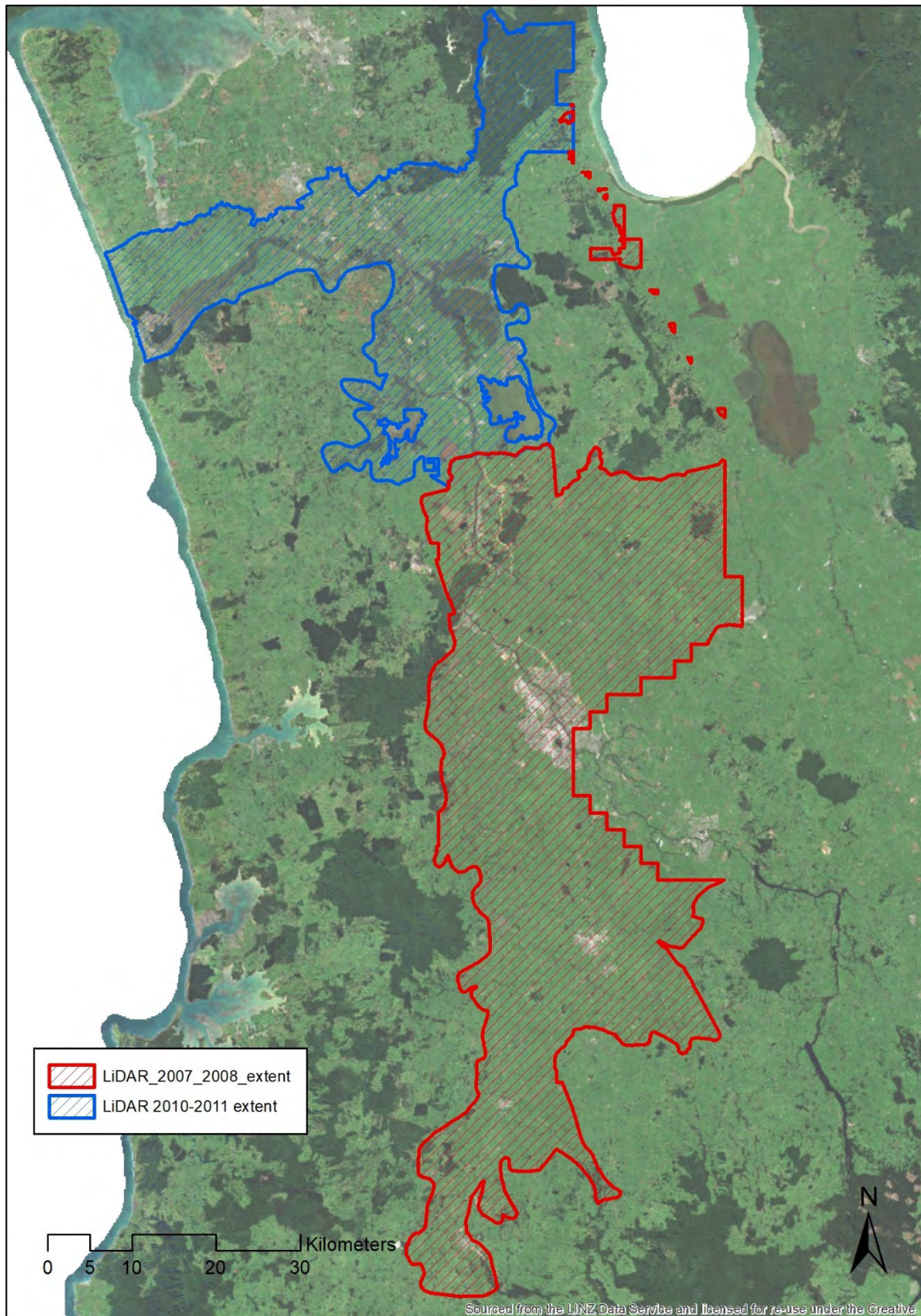


Figure 3-2 Extent of the LiDAR data provided by WRC

3.2.5 Floodplain Roughness

The building footprint, road centreline and land use GIS layers have been used to create the roughness map for the 2D model. Table 3-7 shows the roughness values used to represent the different land uses.

Table 3-7 Floodplain roughness values

Land use	Roughness (Manning's M)
Buildings	0.2
Urban areas	12.5
Rural areas	20.8
Roads	70

3.2.6 Stopbanks

All stopbank information was obtained, from WRC, on the 6/10/2017, with the following exceptions:

- Huntly college stopbanks levels are taken from LiDAR (email from Heather Craig 3/11/2017)
- South Highway 1 (SH1) upgrade represents the SH1 crossing over the Waikato near Hamilton, the stopbanks crest levels have been taken from the finished surface level on the bridge plans (Carl Johnson's email 09/03/2018)
- Lake Waahi Southwestern stopbank

Table 3-8 Stopbanks data used in the model

ASSET_ID	ASSET_DESCRIPTION	OWNERSHIP
22880	Huntly North Freeboard SB	Waikato Regional Council
22897	Wool Scourers to Fosters Landing SB	Waikato Regional Council
23456	Harris Street SB	Waikato Regional Council
23636	Huntly North SB	Waikato Regional Council
23656	Huntly West Section SB	Waikato Regional Council
25082	Hora Hora Section SB	Waikato Regional Council
25083	Okowhao Section SB	Waikato Regional Council
24360	Rangiriri Spillway to Wool Scourers SB	Waikato Regional Council
25816	Kimihia SB	Waikato Regional Council
27306	Hly Sth Tainui Bridge Up Stm SB	Waikato Regional Council
28014	Hly Sth Main Road: Between Tainui BR & Rail BR SB	Waikato Regional Council

ASSET_ID	ASSET_DESCRIPTION	OWNERSHIP
28029	Hills Section SB	Waikato Regional Council
28389	Parry Street SB	Waikato Regional Council
36456	Kimihia Internal SB	Waikato Regional Council
-	SH1 Upgrade	
-	Huntly College Stopbank	
	Lake Waahi Southwestern Stopbank	

3.2.7 Mesh Features

Roads and railways layers, created from aerial photography, have been used in the mesh generation to create detailed mesh elements around those features. Roads were defined using their centrelines in the first iteration of the mesh build, around the Huntly area, and then as polygons around Ohinewai, Taupiri and Ngaruawahia areas. Mesh elements adjacent to roads and railways have been generated with sides of 4m to ensure a high resolution of the grid along those preferential flow paths. All LiDAR points within the 2D model extent have been used for the interpolation of the mesh.

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4 Hydrology

The scope of the project did not include for the calibration of the hydrological models, because the original Flood Forecasting model was calibrated. Four validation events were chosen to test the model performance, before simulating design flows.

4.1 Flood Events

The selection of the events is based on analysis performed using WRC's Waikato River level recordings at Huntly¹. The analysis highlighted the flood events of 1998, 2002, 2004 and 2017, the largest four recorded events of the last two decades.

Mean Area Weighting (MAW) factors were generated with Thiessen polygons (Voronoi diagram), where a polygon is assigned to each rainfall gauge; any location within the polygon is closer to its associated rainfall gauge than any other gauge. Based on the catchment's area within the Thiessen polygon, a weighting factor is assigned to each time series in a list of rainfall time series to determine a mean areal rainfall for a sub-catchment.

As the rainfall gauges do not cover the same period, each event used a different weighting configuration based on the existence of valid stations (Figure 4-1). This analysis was performed over 17 rainfall stations. The Hamilton and Maungatautari stations, currently closed, were only used up to the 2004 event.

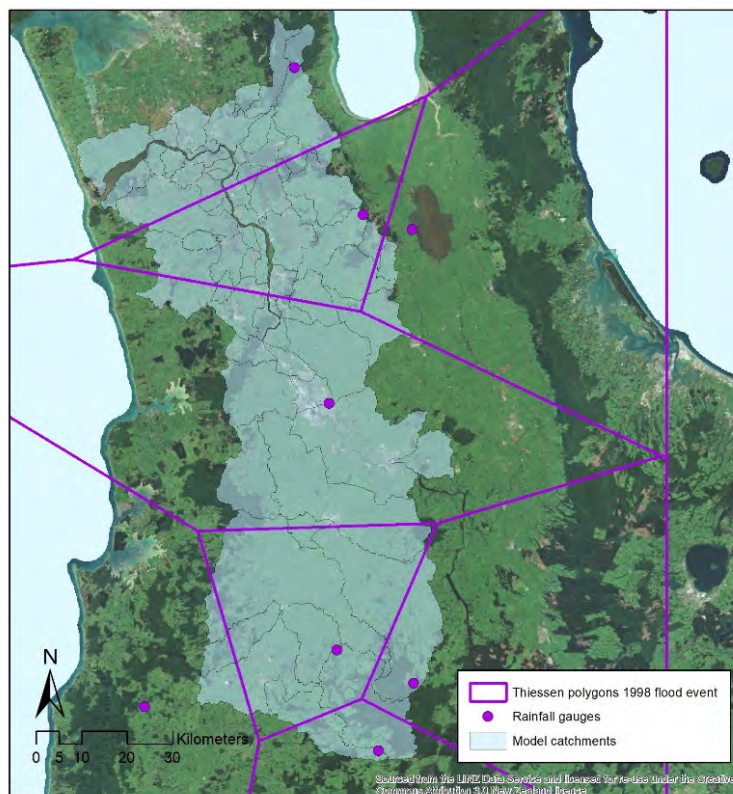


Figure 4-1 Rainfall gauges and Thiessen polygons used for the 1998 event

¹ <http://riverlevelsmap.waikatoregion.govt.nz/cgi-bin/hydwebserver.cgi/points/details?point=41&catchment=17&trType=1&trParam=0>

4.2 Design Events

The design rainfall timeseries was produced based on the antecedent moisture conditions of the 1998 event, NIWA's High Intensity Rainfall Design System (HIRDS) v4 rainfall depths and a Chicago Temporal pattern, which describes the distribution of the rainfall over time.

4.2.1 Drainage Analysis

A rainfall-on-grid approach was initially considered for the floodplain area that drains to Huntly, but the stormwater main data was not complete and the Waikato-Waipā Flood Forecast hydrological model approach, subcatchment-based, was maintained in the flood mapped area and adjusted for three sub-catchments, to enable the connection between the channel and floodplain:

- Mangawara subcatchment 70 (Chainage 28000 M11 model);
- Waikato subcatchment 34 (Chainage 42642 M11 model);
- Waipā subcatchment 33 (Chainage 123825 Waipalower M11 model).

The sub-catchment delineation were based on supplied LiDAR, 1:150 000 LINZ contours and the Hamilton City Council Otama-ngenge Integrated Catchment Management Plan².

Figure 4-2 shows the Waikato-Waipā subcatchment delineation and the areas where the rainfall-runoff component was split to allow for a higher discretisation of flow in overland flow areas. The original sub-catchment distribution is included in APPENDIX A.3.

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² <https://www.hamilton.govt.nz/our-council/strategiesandplans/Documents/Otama-ngenge%20ICMP%20-%20Version%201-0%20-%20FINAL%20-%20September%202015.PDF>

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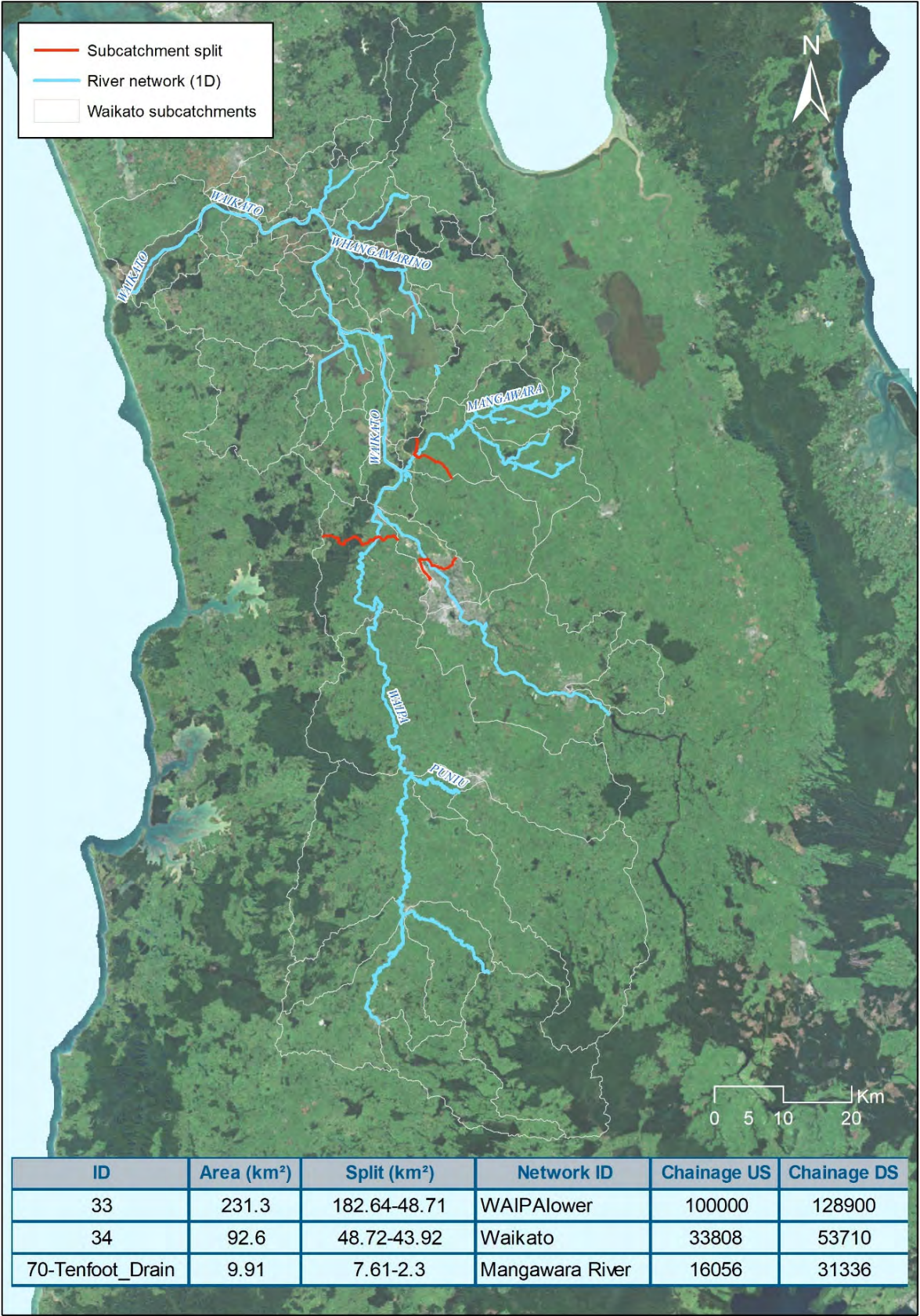


Figure 4-2 Waikato hydraulic model sub-catchment distribution

The extension of the pure 1D model to include overland flow required a more accurate representation of the river thalweg, where the floodplain is represented in 2D. The modified thalweg combined with the addition of bridge structures to the network and a more rigorous spatial discretisation of the drainage network, required the catchment loads to the network at sub-catchments 28, 31, 32 and 34 to be moved.

4.2.2 Storm Pattern

Raster files containing the rainfall depth were downloaded from NIWA's Open Geospatial Data website³.

Rainfall depth corresponding to the base storm event, the 1% AEP, was extracted from the raster files and then used to generate a nested storm event using Python scripts (see Appendix A.2).

The nested hyetograph has a duration of 72 hours and is non-symmetrical during a 1 hour period at the centre of the event. Table 4-1 and Figure 4-3 show the nested storm pattern used to create each sub-catchment's hyetograph.

Table 4-1 Nested storm pattern used to create the catchments hyetographs

Hyetograph time (h)	Critical duration depth formula
12	$(72h-48h) / 2$
24	$(48h-24h) / 2$
30	$(24h-12h) / 2$
33	$(12h-6h) / 2$
35	$(6h-2h) / 2$
35.5	$(2h-60m) / 2$
35.8	$(60m-30m) * 2 / 3$
36	20m-10m
36.2	10m
36.3	30m-20m
36.5	$(60m-30m) / 3$
37	$(2h-60m) / 2$
39	$(6h-2h) / 2$
42	$(12h-6h) / 2$
48	$(24h-12h) / 2$
60	$(48h-24h) / 2$
72	$(72h-48h) / 2$

³ <https://data-niwa.opendata.arcgis.com/datasets/edcbe0a99d7f4df59501ba55973648f5?geometry=-180%2C13.576%2C180%2C79.496>

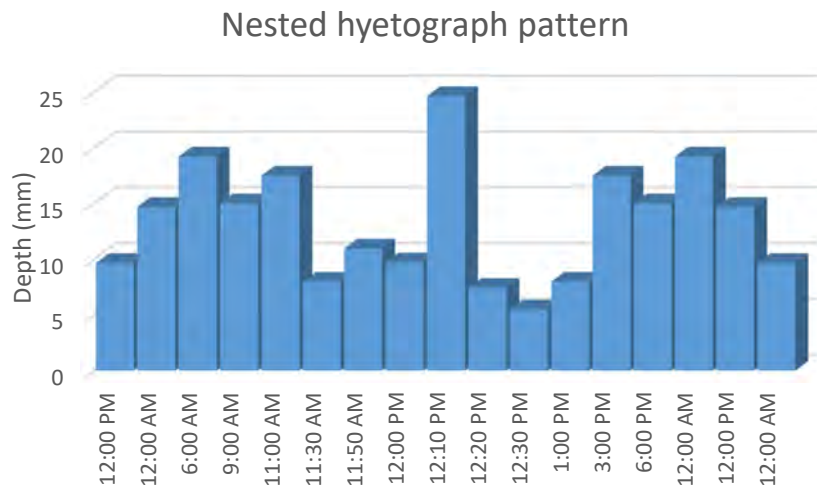


Figure 4-3 Design event nested hyetograph pattern

The choice of hyetograph shape and timing of the peak has a significant influence on the results. The hyetograph used the lead up to the 1998 event, positioning the 1% AEP design rainfall on the 8th of July, before the 1998 event occurred.

4.2.3 Karapiro Power Station Outflow

Mercury Energy (former Mighty River Power) controls the outflows from the Karapiro Dam through flow management rules. The Karapiro outflow represents the model upstream boundary condition for this Waikato River model.

The design events hydrograph, obtained from WRC, were generated in HEC-HMS (Jowett, 2009) and uses the February 1958 event temporal pattern with land use estimated from the New Zealand Land Cover Database (LCDB2, satellite imagery from 1996/97); the hydrograph takes into account the hydropower dam flood rules. The start of the design hydrograph coincides with the start of the design rainfall.

The hydrograph was not scaled for design events incorporating climate change.

4.2.4 Climate Change (CC)

In addition to the current climate change scenario (1%AEP), two climate change scenarios were modelled. The projected temperature increases are based on greenhouse gas concentration trajectories, i.e., the Representative Concentration Pathway (RCP) scenarios adopted by the Intergovernmental Panel on Climate Change (IPCC):

- Current climate (0°C temperature increase)
- Projected New Zealand land-average temperature increase between 1986–2005 and 2101–2120 for the scenario RCP6.0: 2.3°C⁴
- Projected Waikato region temperature increase between 1986–2005 and 2101–2120 for the scenario RCP8.5: 3.8°C⁵

For a specific temperature (T) increase, the projected rainfall depth is calculated using the following formula and percent changes factor taken from NIWA's HIRDS v4 Usage page⁶ (see Figure 4-4 for percent changes).

Projected rainfall depth =

$$\left(\frac{\text{temperature increase} * \text{percentage change factor}}{100} + 1 \right) * \text{current rainfall depth}$$

Duration/ARI	2 yr	5 yr	10 yr	20 yr	30 yr	40 yr	50 yr	60 yr	80 yr	100 yr
1 hour	12.2	12.8	13.1	13.3	13.4	13.4	13.5	13.5	13.6	13.6
2 hours	11.7	12.3	12.6	12.8	12.9	12.9	13.0	13.0	13.1	13.1
6 hours	9.8	10.5	10.8	11.1	11.2	11.3	11.3	11.4	11.4	11.5
12 hours	8.5	9.2	9.5	9.7	9.8	9.9	9.9	10.0	10.0	10.1
24 hours	7.2	7.8	8.1	8.2	8.3	8.4	8.4	8.5	8.5	8.6
48 hours	6.1	6.7	7.0	7.2	7.3	7.3	7.4	7.4	7.5	7.5
72 hours	5.5	6.2	6.5	6.6	6.7	6.8	6.8	6.9	6.9	6.9
96 hours	5.1	5.7	6.0	6.2	6.3	6.3	6.4	6.4	6.4	6.5
120 hours	4.8	5.4	5.7	5.8	5.9	6.0	6.0	6.0	6.1	6.1

Figure 4-4 Percentage change factors to project rainfall depths to a future climate 1 degree warmer

⁴ [www.mfe.govt.nz/sites/default/files/media/Climate Change/Climate-change-projections-2nd-edition-final.pdf#page=100](http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/Climate-change-projections-2nd-edition-final.pdf#page=100)

⁵ [www.mfe.govt.nz/sites/default/files/media/Climate Change/Climate-change-projections-2nd-edition-final.pdf#page=42](http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/Climate-change-projections-2nd-edition-final.pdf#page=42)

⁶ <https://www.niwa.co.nz/information-services/hirds/help>

5 Hydraulic Model

The hydraulic model is based on the Lower Waikato Flood Forecasting System model and it consists of a rainfall-runoff component, a MIKE 11 warm-up component and a MIKE FLOOD model, which all run one after the other. The warm-up model is 1D only and covers a duration of three weeks prior to the design event (24/06/1998 to 17/07/1998). The MIKE FLOOD model is a 2-way coupled model (MIKE 11 and MIKE 21) which uses a cropped version of the warm-up model for its 1D component.

5.1 MIKE 11

5.1.1 Model Domain

The MIKE 11 warm-up model consists of the Waikato River from the Karapiro dam down to its mouth at Port Waikato and its main tributaries Waipa and Mangawara Rivers. It is made up of 131 branches. The MIKE 11 component of the MIKE FLOOD model has a reduced extent, from the Claudelands Road bridge in Hamilton down to its junction with the Mangatawhiri River.

5.1.2 NAM Rainfall-Runoff

5.1.2.1 Validation

The simulations of the four validated events are comprised of:

- the MIKE 11 NAM rainfall-runoff module, warmed-up for one year to represent the contributing sub-catchments and generate lateral inflows to the river network. The relative soil moisture ratio (L/L_{max}) parameter was maintained from the Flood Forecast model to initialise the flood event model (0.5 for the Waipa and 0.3 for the remaining catchments). The upper level storage ratio (U/U_{max}) value of 0.5 was kept for most catchments (exception for catchment J0 and J1).
- the MIKE 11 HD module, with a simulation run time of one month, including the validation event.

The validation was performed prior to the development of the 2D component, at four gauges in the Waipa catchment. The Waikato gauge at Hamilton (upstream of the confluence between the Waipa and the Waikato rivers) was not considered since the flow follows the Karapiro dam discharge. The comparison of observed and simulated event flows (Appendix B1) showed a close agreement between the two.

5.1.2.2 Design Events

The design event construction followed a pragmatic approach agreed with WRC, involving the following steps:

- run the four validation scenarios to estimate the most appropriate initial conditions for the 100 year design event;
- analysis of the correlation of the AEP events with Antecedent Moisture Conditions;
- choice of hot-start parameters L/U to warm up the NAM (RR11);
- choice of Areal Reduction Factors;
- choice of hot-start period leading up to the event (purely 1D);
- assign calculated catchment runoff directly to the overland component;
- run the design event (1D+2D).

Mean Area Weighting

Initial consideration was performed on the impact of using different distributions of rainfall between the flood forecasting model, which was calibrated, and the current model. Different rainfall distributions were ultimately used since it was envisaged to update the model network (i.e. cross-sections) requiring a new calibration; also, the potential use of the model for flood forecasting required active stations.

Initial Conditions

The initiation of runoff from the MIKE-11 NAM model is largely influenced by the initial soil moisture in the root zone (L) and to a lesser extent the amount of moisture in the surface storage (U). The root-zone soil moisture fraction (L/Lmax) lead up to the flood events was analysed and the storage ratio indicated values higher than 0.7, for all events, in the majority of the subcatchments. Figure 5-1 shows the root-zone soil moisture fraction for the 1998 flood event; the remaining events are shown in ANNEX B.1.

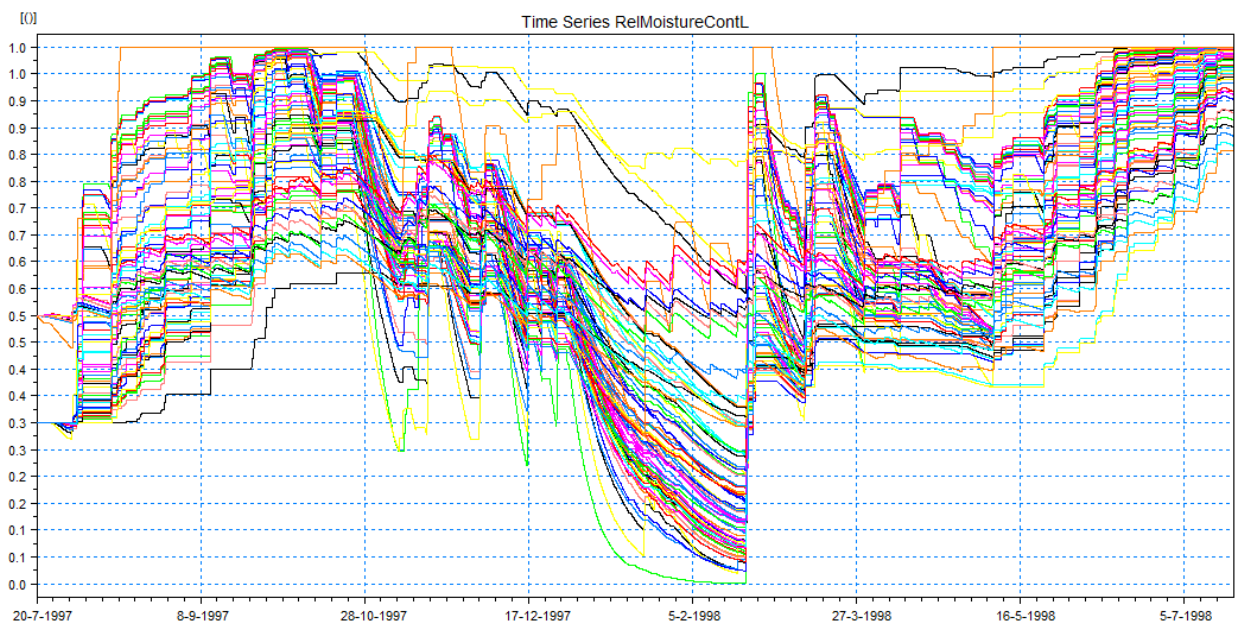


Figure 5-1 1998 event warm-up period (L/Lmax)

In order to identify a relationship to determine the 1%AEP initial conditions, for each sub-catchment, the variable of interest (i.e. L, GWL) was averaged over the month prior to each flood event and the four averaged values were plotted against the validation flood event AEP's.

The purpose of this analysis of the distribution of soil moisture and groundwater was to select appropriate initial conditions, which reflect realistic results in terms of observed flood frequencies.

The following figures (Figure 5-2 - Figure 5-4) are examples of the correlation between the moisture content and the AEP for each of the validation events. Timeseries data were extracted from the results of each validation RR simulation; across one month, a seven-day period was chosen as the most representative of the moisture conditions leading up to the event and the choice of sub-catchments represents the geographic variability of the Waikato catchment.

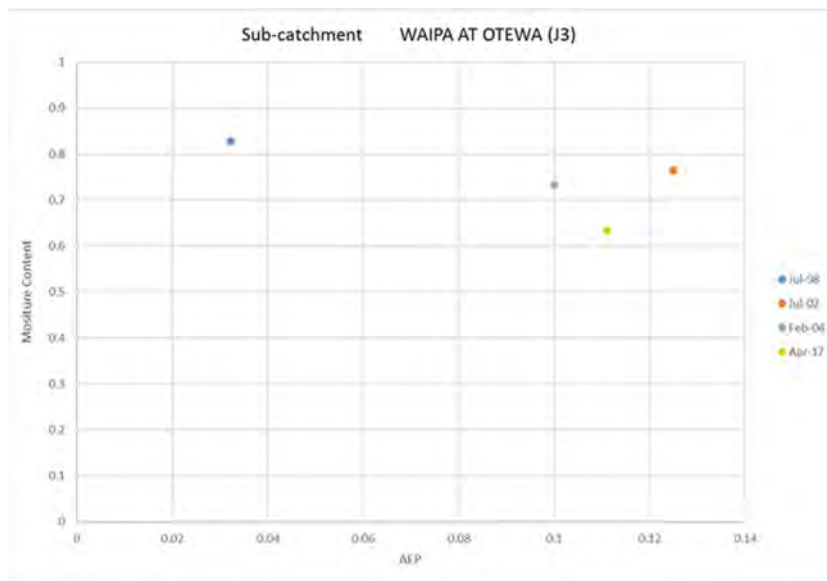


Figure 5-2 Moisture content vs AEP at sub-catchment J3

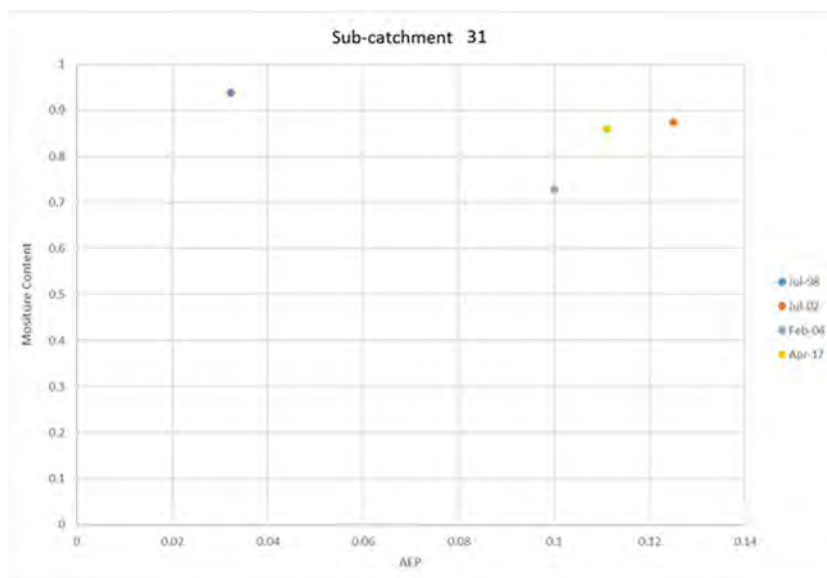


Figure 5-3 Moisture content vs AEP at sub-catchment 31

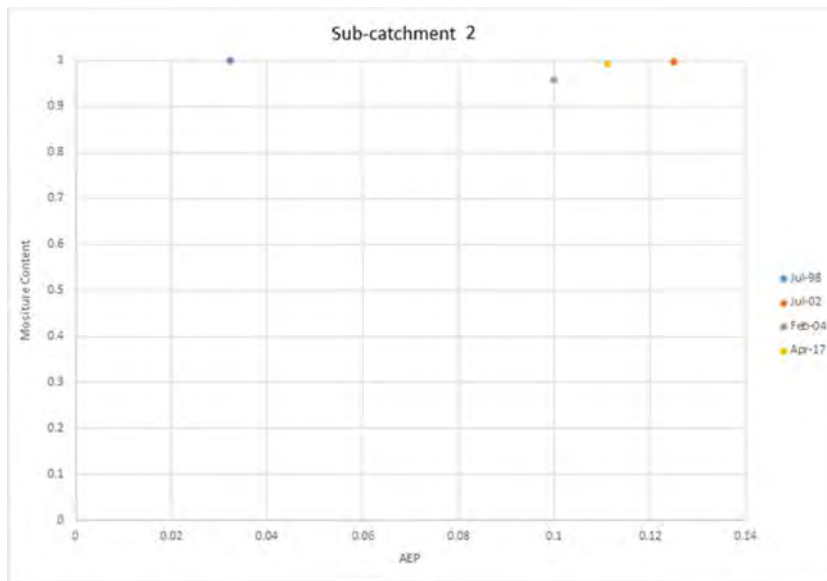


Figure 5-4 Moisture content vs AEP at sub-catchment 2

The correlation of the antecedent moisture conditions and the four estimated events, revealed a distinct behaviour between summer and winter months. The water stored before summer months shows a consistent pattern above the initially used L-value of 0.3-0.5.

Looking at the 1998 event, with a flood frequency less than a 1% AEP, if we were to include higher AEPs into the analysis we would obtain values of saturation close to 1, for this reason the 1998 initial conditions parameters were adopted by the 100 year design event, reflecting a realistic scenario across all sub-catchments, instead of approximating best fit lines (i.e. averaging) across the different validation events (i.e., different exceedance probabilities).

Areal Reduction Factor

An areal reduction factor (ARF) of 0.7 was used for all sub-catchments and all nested rainfall durations. The Auckland Council's TP108 (Section 2.3) was used as reference, acknowledging its limitation of only validating catchments below an area of 500 km². Figure 5-5 shows the extrapolation of the ARF to the Karapiro catchment and the whole Waikato catchment, considering a time of concentration of 2 days and 5 days, respectively.

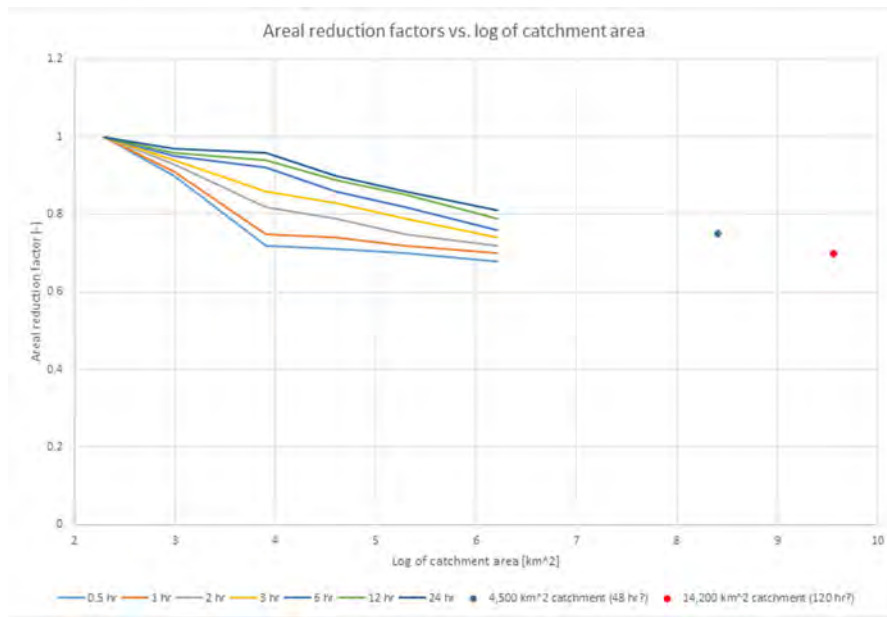


Figure 5-5 Areal Reduction Factor vs catchment area based on TP108

Hydrodynamic Simulation

A three week warm-up hydrodynamic 1D simulation was applied to the main river and tributary channels, which was necessary because it takes nearly two weeks to route a flood hydrograph along the whole river. The simulation incorporated the rainfall-runoff parameters from the previous year leading to the 1998 event.

Through a series of batch files which connect the different components of the model, the flood model with flood plain representation is simulated using the results of the rainfall-runoff simulation as inflows and results of the river simulation, from the 8th of July, as initial conditions.

5.1.3 Cross Sections

It was agreed with WRC to use existing Flood Forecast model cross-section data and re-assess with the expansion of the model beyond the Huntly area. The cross-section data for the Waikato upstream of Ngaruawahia is from 1987-1994 survey and downstream of Ngaruawahia and at the Waipa River is from 1998. The processed data levels and position of markers were adjusted where the channel conveyance was incorrectly calculated. The cross-section radius type was also adjusted to ensure consistency across the river reach.

5.1.4 Stormwater Network

Table 5-1 shows the number of 1D structures present in the warm-up and MIKE FLOOD models. The floodgates modelled are simple one-way flow gates without specific control.

Table 5-1 MIKE 11 structures

	MIKE 11 warm-up model	MIKE FLOOD model
Culverts	51 (including 5 floodgates)	47 (including 5 floodgates)
Pumps	1	1
Bridges	5	5
Weirs	14	8
Control structures	9	6

Details of these structures (branch, ID, dimensions) are provided in Appendix B.

Additional structures were identified for potentially influencing the stormwater flooding, however those structures have not been added for one of the following reasons:

- lack of information on their dimensions, or
- due to their small dimensions, it has been assumed that the structures would get blocked during the event thus having no influence. All structures with a diameter (or corresponding geometry) smaller than 450mm have been excluded from the model. A list of those structures can be found in Appendix C.

If available, the operation of most structures was retained from the original flood forecasting model, such as the Waikare canal gate.

The Mangawara River system within the overall Waikato-Waipā model differs from the standalone model used for the Mangawara Service Level Review. The overall Waikato Waipā Model has a simplified representation, with the Te Mimihiā, Tenfoot and Uapoto Outlets modelled as simple branches with additional storage. Each of these branches have control structures at the upstream end for stability purposes.

5.1.5 Boundary Conditions

The model upstream boundary condition, for all design events (Karapiro Dam discharge), was obtained from WRC, and was created by Jowett (2009). The hydrograph, generated in HEC-HMS, used the February 1958 event temporal pattern with land use estimated from the New Zealand Land Cover Database (LCDB2, satellite imagery from 1996/97) and it takes into account the hydropower dam flood rules.

The downstream boundary is a fixed tidal level of 1.69m for the Port Waikato.

The cropped model, designed to allow faster simulation times, has four boundary conditions that differ from the original model, three at the main branches with an overland flow component, Waikato (ch. 33806, the Waipā (ch. 100000) and the Mangawara (ch. 16056), and also a downstream boundary as a rating curve at the Waikato (ch. 110611).

5.1.6 Channel Resistance, Initial Conditions and other .HD11 File Parameters

The initial water level and discharge for the warm-up simulation was set to 0 in all branches of the model with the exceptions described in Table 5-2. The 1D bed roughness was left to the default constant value of 0.0333 with the exceptions described in Table 5-3. The improved representation of the river thalweg moved the location of the hydrodynamic points (roughness) in the order of meters; this fact is not relevant since the channel roughness is uniform across the network.

The 'delta' parameter was adjusted to 0.9 and the Nolder to 2, to ensure model stability.

Table 5-2 Warm-up simulation initial conditions

Branch	Chainage	Initial h	Initial Q
lake rotongaroiti	0	0.1	0.1
Lake_Waikere-Northern Spillway	0	5.5	0.1
WAIKATO	0	18	0.5
WAIKATO	35000	12	0.5
WAIKATO	70000	7	0.1
WAIKATO	130000	0	0.1
MANGAOKWEA	3543	48.5	0.1
MANGAOKWEA	12000	37.5	0.1
WAAHI	1000	8.77	0
WAAHI	3100	7	0
Firewood Creek	0	11.357	0.1
Firewood Creek trib	0	11.488	0.1
Whangamaire Stream	0	9	0.1

Table 5-3 MIKE 11 Bed roughness parameters

Branch	Chainage	Resistance (Manning n)
North Mangatea Stream	0	0.05
North Mangatea Stream	2731	0.05
Waiti Stream	0	0.05
Waiti Stream	1352	0.05
WAIPALOWER	100000	0.055556
WAIPALOWER	128875	0.055556
WAIPAlower_bridge	128875	0.055556
WAIPAlower_bridge	129210	0.055556

5.2 MIKE 21

5.2.1 Topography

The MIKE 21 topography was derived from the 2010/2011 LiDAR survey for the Ohinewai area and the 2007/2008 LiDAR survey for the rest of the model. The outline of the MIKE 21 Flexible Mesh (FM) model was determined primarily with drainage analysis. Water levels from the original 1D model and contour lines were used to refine the outline. The model was run and results used to refine areas where the outline had to be extended or could be reduced to improve model speed; Figure 5-6 shows the final adopted layout. It was agreed to exclude Lake Waikare to allow for faster simulation times.

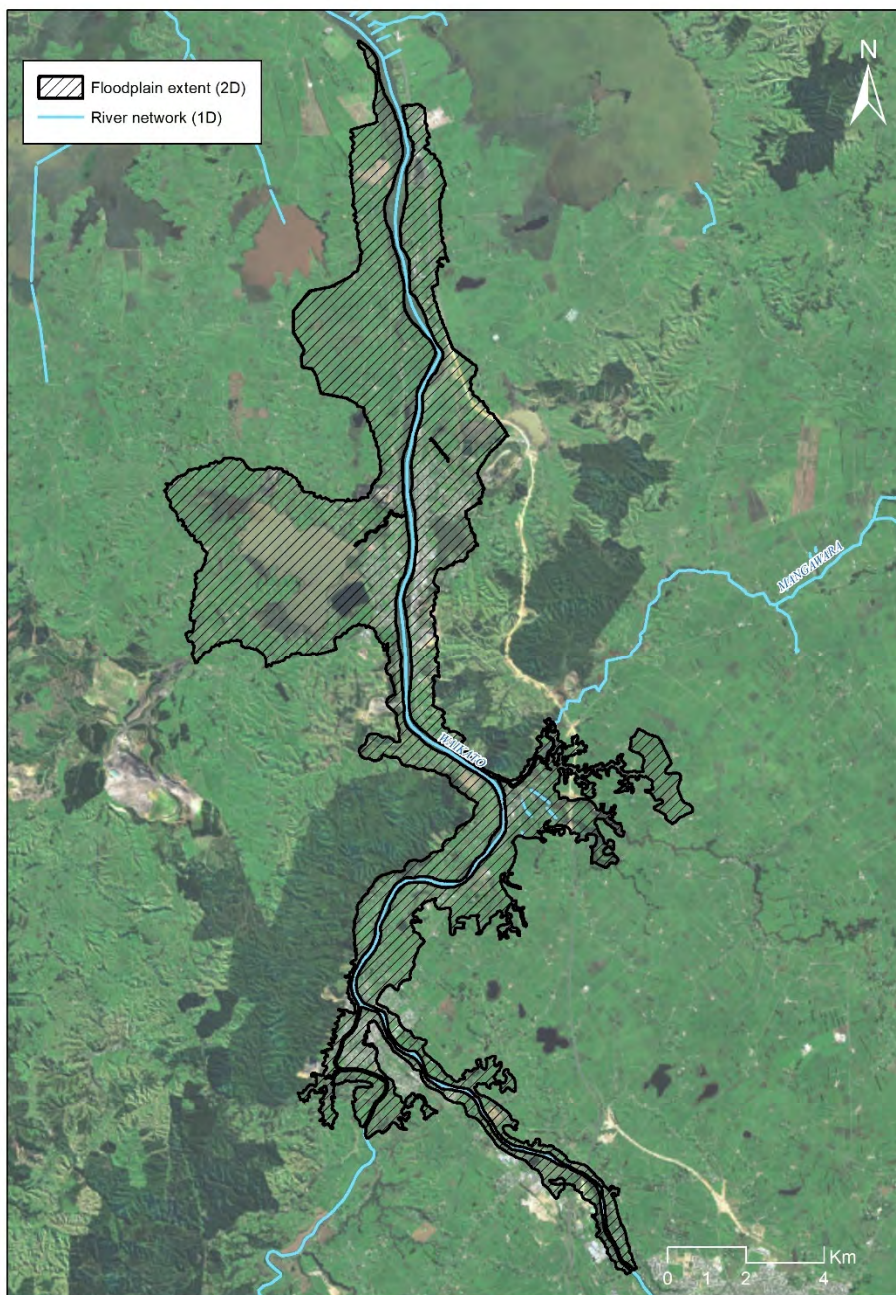


Figure 5-6 2D model extent

A depth correction file derived from the mesh was used to adapt individual cells elevation where the mesh interpolation creates unwanted smoothing. The depth correction is mainly used at standard links to ensure the invert level of the MIKE 11 and MIKE 21 components are matching (MIKE 11 cross section invert vs MIKE 21 cell elevation). The input mesh file is then only used to define the mesh resolution.

The MIKE 11 cross-sections, which represent the floodplain in the original FF model and the hydrodynamic warm-up, were trimmed to represent only the main channel in areas coupled with the 2D floodplain.

5.2.2 Structures

5.2.2.1 Culverts and Weirs

Where culverts were adjacent or included in the 1D network, they were represented within MIKE11; for two structures (Table 5-4), on the floodplain, where the 1D network was not contiguous, the representation was made directly in the MIKE 21 FM model, using a combination of culvert and weir. These are the cases of the Wright bridge at the junction of Riverview and Hakarimata roads and the railway bridge at Waikere.

Table 5-4 Structures included in 2D model

Description	Geometry	Bridge soffit	Length	X_NZTM	Y_NZTM
Wright Bridge	Irregular	11.28	5	1790425.596	5836613.103
Waikere Railway Bridge	Irregular	12.77	11	1792437.107	5833148.163

5.2.2.2 Stopbanks

Seventeen stopbanks were included in the model as dikes (Table 3-8) so that model resolution would not limit the accuracy of spilling levels. Crest levels were taken from the GIS layer WRC_STOPBANK_DESIGN_POINTS and interpolated along the GIS layers RACS_EMBANKMENT.

5.2.3 Initial Conditions

Initial conditions were automatically extracted from an initial 2D extent for the Huntly area and extended to Horotiu and Ohinewai using 1D water levels.

5.2.4 Hydraulic Parameters

- Solution technique: low order, fast algorithm. This solution replaces a second order (Runge Kutta) numerical method by a 1st order explicit method (Euler), for the approximate solutions of ordinary differential equations. No stability issues or flow retardation was observed by using this method.
- The explicit formulation divides the timestep into a series of substeps (down to 0.005) to ensure a Courant criteria of 0.8 (default value) is not exceeded, maintaining the model stable and accurate. The minimum timestep was achieved through an iterative process and best practice.
- The drying/flooding/wetting parameters differ in configuration between rainfall-on-grid hydrology and sub-catchment based. This model incorporates values of 0.001, 0.01 and 0.03, respectively, since the hydrology is sub-catchment based; allowing for higher parameter values without impacting on artificial retardation of shallow flow (and mass balance).

- The constant flux eddy viscosity is the recommended for flooding applications and the most stable of the available formulations. A value of 0.1m²/s was chosen based on experience, but a lower value would also be acceptable, with roughness parameters more determinant than viscosity in shallow depths.

5.2.5 Sources

MIKE 21 sources, Table 5-5, are limited to Lake Waahi and the Mangawara tributaries where the 1D network was replaced by the 2D storage, with the catchment runoff (RR) for each of these components directly assigned to the overland component.

Table 5-5 MIKE 21 Sources

Catchment	Description	X_NZTM	Y_NZTM
19	To lake Waahi	1788095	5840924
30	To Mangawara at Taupiri (33%)	1793099.612	5835059.619
30	To Mangawara at Komakorau (67%)	1793477.649	5835181.105

5.3 Results Discussion

Ideally, a calibration and sensitivity analysis should have been performed with the 1998 event flood extents, but aerial photography of the event was only obtained after the modelling exercise was complete. This calibration is particularly important at the Waipa river, since the Waikato is largely dominated by the Karapiro flows.

Validation of the model was performed with four events, exclusively with the 1D component. The analysis below compares the 1D and 2D components to evaluate the appropriateness of the validation and assess the need for a calibration of the MIKE FLOOD model.

Pre-2D refers to the model before development of the MIKE FLOOD model, which was validated with four events. The main differences between the pre- and post-2D are:

- the splitting of catchments 33, 34 and 70 (at the Waikato, Waipa and Mangawara branches), allowing the maximum dx to be smaller in the area coupled to the 2D without the need to interpolate cross-sections. The hydrograph at Huntly remains unchanged after the catchments were split/redistributed; the Ngaruawahia area (Waipa catchment) shows the biggest change, with the improved model showing a better agreement in terms of flood extents;
- changes to the cross sections radius and processed data levels. Only branches with inconsistent radius's were individually modified and all cross-sections adopted equidistant processed levels (50).
- the lateral links upstream Ngaruawahia have revised marker locations (1/3) and 2D connections (lateral links) to keep the entire active channel in the 1D component.

Figure 5-7 below shows the 1D comparison (warm-up, only 1D) of the two models, and the observed 1998 event. The Pre-2D corresponds to the combined legacy models with minimal changes and the Post-2D corresponds to the latest model.

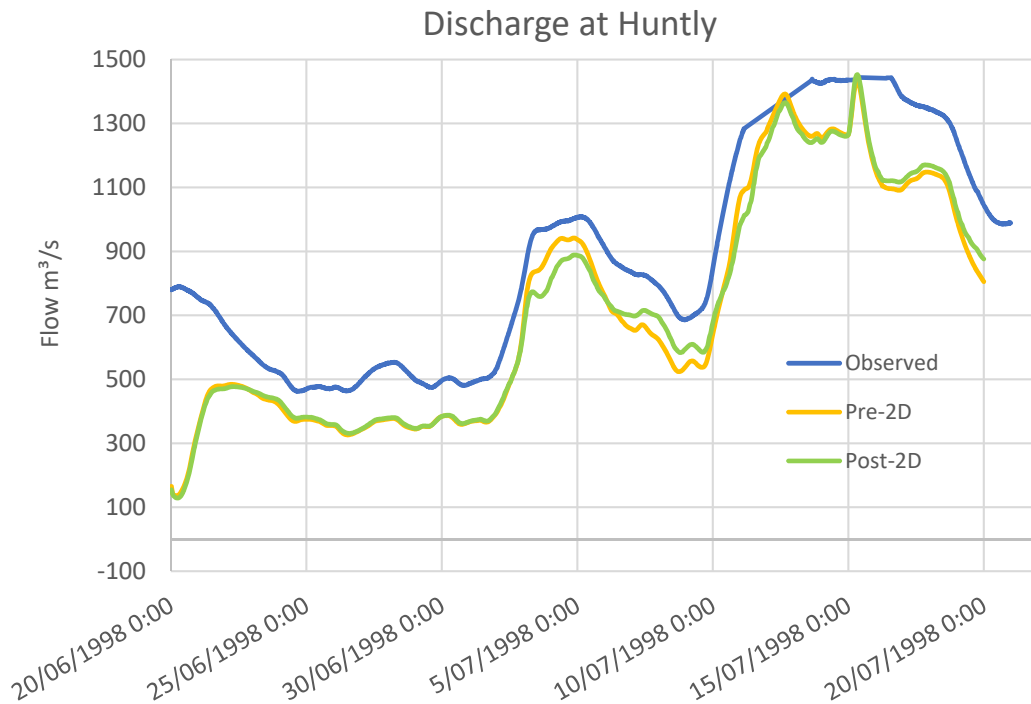


Figure 5-7 Discharge at Huntly, pre-2D, post-2D and observed data comparison

Table 5-6 Comparison between 1998 maximum flow, aerial photography and the 1% AEP event

1998 Maximum Flow m^3/s	1998 Aerial Flow m^3/s	Design Flow m^3/s	1998 Maximum Level	1998 Aerial Level	Design Level
820	685	783	19.56	18.48	20.33

An approximate validation between the design event and the 1998 event showed a good agreement of flood extents, corroborating the 1D validation at the four Waipa gauge stations. This evidence contrasts with the flow/levels figures at Whatawata, where the design event is currently underpredicting flows (Table 5-6); this difference is exacerbated by the fact that the aerial photo was taken approximately 2 days after the peak of the event (at Whatawata), with a peak flow of 685 m^3/s .

The design model predicts a peak flow at Huntly of 1520 m^3/s , which is 16% lower than the 1982 Scheme Review-old model (1820-1846 m^3/s), but it is consistent with the flood frequency analysis (1560 m^3/s) of the 1% AEP.

The frequency analysis was undertaken using the continuous series of annual maxima and the method of L-Moments, and the fit achieved with a Gumbel (EV1) distribution. The Huntly data used a combination of three sites (Huntly Rail Bridge, Huntly Power Station and Huntly North).

5.4 Future considerations

1. Taking into account the complexity of the model, using NAM, and four different components, a unified script could help future users to perform changes in each component without having to launch them individually;
2. The 2D calibration was not scoped under this project, but if the floodplain storage information is to be used for Flood Forecasting, then it should be performed. A sensitivity analysis could also be done, for example on vegetation roughness;
3. The inflow at the Karapiro could be adapted for climate change, using a nominal increase of flow adapted from the % increase obtained by HIRDS; or use the estimated AEP for the climate change scenarios of 2.3 and 3.8 degrees to scale the Karapiro design hydrograph; the 2009 study includes the 0.02% AEP hydrograph;
4. The testing of higher return periods, such as the 0.5% AEP or 0.2% AEP;
5. The investigation of breach points and the simulation of breach scenarios to identify Residual Risk Zones;
6. Simulate flood gates operation and/or emergency procedures (e.g. Parry Street and Huntly North stopbank);
7. Include joint-probability for tidal climate change.

This model is suited for the analysis of riverine flooding originated from the Waipa and Waikato rivers, this model should not be used to assess local runoff or to simulate other scenarios without further refinement within areas of interest.

6 References

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APPENDICES

A Hydrology

A.1 Sub-catchment centroid

The coordinates in the following table are in the New Zealand Map Grid coordinate system.

Sub-catchment name	No.	Easting	Northing
1	1	2708344	6444118
2	4	2701954.3	6451242
3	6	2683576.4	6438783
4	7	2678396.5	6437208.2
5	11	2666178.5	6433488.1
6	14	2669764.6	6426423.5
7	15	2676000.6	6431710.9
8	10	2679599.2	6431536.3
9	8	2686474.1	6434142.2
10	12	2688291.7	6432311.4
11	18	2683064.6	6428662.3
12	13	2690394.6	6430376.6
13	16	2689755.5	6428568.1
14	19	2687947.3	6424542.4
15	22	2690444.5	6421048.6
16	25	2679638.6	6420756
17	31	2681390.1	6406619.7
18	29	2696509.8	6414638.5
19	49	2694937.8	6399411.5
20	53	2700757.9	6424263
21	9	2706557.6	6432894.1
22	17	2703873.7	6429472.3
23	20	2712850.2	6424696.5
24	23	2708481.5	6420934.2
25	28	2704972.9	6414595.6
26	26	2714676.2	6413658.8
27	50	2703528.2	6404769.5
28	48	2701865.6	6399251.2
29-UPPER_MANGAWARA	32	2723614.1	6413350.5
30-KOMAKURU	43	2714558.5	6388812.9
31	44	2702756.6	6392810.6
32	46	2699754.1	6396387.7
33	41	2697691.6	6382455.5
34	42	2708055.9	6383305.4
57	2	2696089.8	6445741.3
58	5	2693654	6442638.8
59	3	2691992.6	6439178.2
60	21	2693732.8	6425083.7

61	24	2695790	6419488.3
62	27	2685559.9	6413900.3
63	36	2692117.8	6409996.6
64	37	2690805.5	6403298.7
65	30	2696510.3	6408937.9
66	35	2699127.3	6410023.8
67-ORINI	34	2719389	6406490.5
68-UPPER_PARANUI	33	2727030.2	6409165.5
69-MID&LOWER-TAUHEI	45	2723248.3	6396701.7
70-TENFOOT_DRAIN	47	2709613	6400347.5
71	40	2721210.5	6369070
72	39	2736298.6	6366376.7
75	54	2696253.2	6428249.2
76	55	2700629.5	6433909.7
77	56	2698537.2	6437640
78	57	2694400.1	6432718
69-JORDAN_DAM	45	2723248.3	6396701.7
67-LOWER_PARANUI	34	2719389	6406490.5
69-MAORI_AFFAIRS_DAM	45	2723248.3	6396701.7
67-MID_MANGAWARA	34	2719389	6406490.5
67-NORTH_MANGATEA	34	2719389	6406490.5
67-ORAKI_DAM	34	2719389	6406490.5
67-ORCHARD_DRAIN	34	2719389	6406490.5
69-SOUTH_MANGATEA	45	2723248.3	6396701.7
69-TRUBSHAW_DAM	45	2723248.3	6396701.7
69-UPPER_TAUHEI	45	2723248.3	6396701.7
68-WAITI_DAM	33	2727030.2	6409165.5
67-SLUDGE_CREEK	34	2719389	6406490.5
69-CRAWLEY_DAM	45	2723248.3	6396701.7
MANGAPU(J0)	63	2703212.6	6338528
J1	63	2703212.6	6338528
MANGAOKEWA AT TE KUITI (J2)	51	2710884.5	6308096
WAIPA AT OTEWA (J3)	58	2721969.3	6311707.7
J4	38	2710026.1	6326073.6
J5	62	2694116.2	6325899.8
J6	64	2697966.4	6318524.4
BARTONSC (J7)	59	2727434.1	6332992.6
J8	60	2715851.8	6357364.1
J9	52	2708926.8	6350282.4
J10	61	2696526.9	6361996.8
J11	63	2703212.6	6338528

A.2 Scripts extracting and processing data from HIRDS v4

Python script (partial) extracting rainfall depth from NIWA's raster files:

```

1. ### Import catchment name and coordinates from csv
2. print('Reading csv...')
3. csvIn = csv.reader(open(catchmentDataCSV, 'r'))
4. headers = csvIn.next()
5. X, Y, name = [], [], []
6. rowCount = 0
7. for row in csvIn:
8.     # Check coordinate system
9.     if rowCount == 0 and row[4] != 'NZMG':
10.         print('\n---> Warning!! Projection coordinate system not NZMG. <---\n')
11.     rowCount += 1
12.     # Get catchments name and coordinates
13.     name.append(row[0])
14.     X.append(float(row[2]))
15.     Y.append(float(row[3]))
16.
17. ### Rewrite points coordinates as string for GetCellValue
18. points = ['{0} {1}'.format(i,j) for i,j in zip(X,Y)]
19.
20. ### If not existing create directory for output csv files
21. if not os.path.exists('csvOutputs'):
22.     os.makedirs('csvOutputs')
23.
24. ### Extract values from raster
25. catchmentCount = 0
26. for i in points:
27.     minutes, seconds = divmod(time.time()-start_time, 60)
28.     print('Executing Get Values for catchment {0} ({1}/{2}) -
29.         {3:0>2}:{4:0>2}'.format(name[catchmentCount], catchmentCount+1, len(points), int(minutes)
30.         ,int(seconds)))
31.     catchmentValues = []
32.     # Loop through ARI
33.     for j in ARI:
34.         ARValues = []
35.         # Loop through rasters and extract values for all durations for current ARI
36.         for k in durations:
37.             inRaster = r'rasters\hirds_rainfalldepth_duration{0}_ARI{1}.tif'.format(k, str(
38.                 j))
39.             result = (arcpy.GetCellValue_management(inRaster, i))
40.             ARValues.append(float(result.getOutput(0)))
41.             # Store values for all durations for current ARI
42.             catchmentValues.append(ARValues)
43.
44.     # Create the csv for current catchment
45.     with open('csvOutputs\\' + name[catchmentCount] + '.csv', 'w') as f:
46.         f.write('ARI,AEP,10m,20m,30m,1h,2h,6h,12h,24h,48h,72h,96h,120h\n')
47.         for i in range(0, len(catchmentValues)):
48.             f.write('{0}, {1}, '.format(ARI[i], AEP[i]) + ', '.join(map(repr, catchmentValu
49.                 es[i]))+'\n')
50.         del f
51.     catchmentCount += 1

```

Python script (partial) generating nested storm event and creating time series:

```

1. # open relevant HIRDS data csv and use it to create a nested storm event
2. # and add it to the end of the boundary timeseries
3. with open(r'csvOutputs\{0}.csv'.format(name), 'r') as csvHIRDS:
4.     csvHIRDS = csv.reader(csvHIRDS)
5.     c = list(csvHIRDS)
6.
7. # find the existing depth table
8. headings = [s.strip() for s in c[0]]
9. AEPi = headings.index('AEP')
10. fAEP = float(AEPi)
11. table = c[1:13]
12. # CCfactors are percentage of increase corresponding to durations 10min, 20m, 30min, 1h, .
    .., 120h for the 100year ARI
13. CCfactors = [13.6, 13.6, 13.6, 13.6, 13.1, 11.5, 10.1, 8.6, 7.5, 6.9, 6.5, 6.1]
14.
15. for line in table:
16.     # allow the AEP decimal to be within about 5 % to account for rounding
17.     if abs(float(line[1].strip()) - fAEP) < (0.05 * fAEP):
18.         d = [float(i) for i in line[2:14]]
19.         # print("Values from HIRDS rasters: {}".format(d)) # for debug
20.         # apply effects of temperature increase
21.         if temperatureIncrease != 0:
22.             d = [(1+(i*temperatureIncrease)/100)*j for i,j in zip(CCfactors,d)]
23.         d = [s * ARF for s in d]
24.         break
25. # assume that the durations are 10m, 20m, 30m, 60m, 2h, 6h, 12h, 24h, 48h, 72h
26. # the time offsets are in seconds and the depths are in millimeters
27. designHyetograph = [(43200, (d[9]-d[8]) / 2.0),
28.                      (86400, (d[8]-d[7]) / 2.0),
29.                      (108000, (d[7]-d[6]) / 2.0),
30.                      (118800, (d[6]-d[5]) / 2.0),
31.                      (126000, (d[5]-d[4]) / 2.0),
32.                      (127800, (d[4]-d[3]) / 2.0),
33.                      (129000, (d[3]-d[2]) * 2.0 / 3.0),
34.                      (129600, d[1]-d[0]),
35.                      (130200, d[0]),
36.                      (130800, d[2]-d[1]),
37.                      (131400, (d[3]-d[2]) / 3.0),
38.                      (133200, (d[4]-d[3]) / 2.0),
39.                      (140400, (d[5]-d[4]) / 2.0),
40.                      (151200, (d[6]-d[5]) / 2.0),
41.                      (172800, (d[7]-d[6]) / 2.0),
42.                      (216000, (d[8]-d[7]) / 2.0),
43.                      (259200, (d[9]-d[8]) / 2.0)]
44.
45. data = Array[Single]([0])
46. t0 = TimeSpan(designStormStartDate.Ticks - timeseriesStartDate.Ticks)
47. for tOffset, value in designHyetograph:
48.     data[0] = value
49.     fOut.WriteItemTimeStepNext(t0.TotalSeconds + tOffset, data)
50.
51. # add a final depth 4 weeks after the last entry
52. data[0] = 0.0
53. fOut.WriteItemTimeStepNext(t0.TotalSeconds + designHyetograph[-
    1][0] + 4 * 7 * 24 * 60 * 60, data)

```


A.3 Sub-catchment distribution 1D network

Name	Area	Branch	Ch. US	Ch. DS
1	157.5	Mangatangi Stream	0	0
2	54.9	Mangatawhiri Upper	0	0
3	42.2	Whakapipi	0	0
4	21.2	Waikato	124126	128247
5	128.4	Waiksn	135017	142681
6	46.1	Waiksn	135017	142681
7	24.9	Waikato	125299	133477
8	22.3	Waikato	120038	125299
9	12.9	Waikato	110611	121450
10	19	Waikato	110611	118334
11	28.5	Waikato	118656	119306
12	13.2	Waikato	102960	106557
13	8.3	Waikato	100404	102145
14	36.3	Waikato	99339	100155
15	10.9	Waikato	92148	95900
16	216.2	Waikato	91517	91517
17	209.7	Lake Whangape us	100	100
18	15.4	Rotongaro	1000	5000
19	94.9	Lake Waahi	0	0
20	67.3	Whangamarino River	698	6903
21	38	Maramarua River	572	4525
22	11.3	Whangamarino River	698	6903
23	139.6	Whangamarino River	0	0
24	27.1	Waikare Canal	3868	3869
25	104.7	Lake_Waikere-Northern Spillway	0	0
26	103.3	Matahuru	0	0
27	7.5	Waikato	69656	69656
27	27.3	Waikato	73808	73808
28	6	Waikato	61550	66672
29-Upper_Mangawara	34.54	Mangawara River	0	0
30-KOMAKURU	142.29	Komakorau Pond Dummy	0	0
30-KOMAKURU	70	Freshfield Pond Dummy	0	0
31	23.2	Waikato	56964	61550
32	27.3	Waikato	52210	66672
33	231.3	WAIPAlower	100000	128900
34	92.6	Waikato	33808	53710
57	24.4	Mangatawhiri Upper	0	0
58	2.6	Mangatawhiri Trib	0	0
59	31.6	Mangatawhiri Upper	0	4357

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59	23.7	Mangatawhiri Trib	0	3932
59	19.4	Mangatawhiri	922	5488
60	30.3	Waikato	104278	106557
61	18	Waikato	84631	93290
62	26.7	Lake Whangape us	100	100
63	57.7	Lake Whangape us	100	100
64	20.5	Whangape	0	0
65	19.5	lake rotongaroiti	0	0
66	26.4	Waikato	70742	85020
67-Lower_Paranui	11.27	Paranui Drain	0	0
67-Mid_Mangawara	20.99	Mangawara River	0	9787
67-North_Mangatea	19.73	North Mangatea Stream	0	0
67-Oraki_Dam	10.32	Orakei Dam	380	380
67-Orchard_Drain	4.95	Orchard Drain	0	0
67-Orini	17.77	Northern Outlet Pond Dummy	0	0
67-Orini	15.61	Murchie Pond Dummy	0	0
67-Orini	10.2	Mangawara River	10393	15744
67-Sludge_Creek	8.77	Sludge Creek	0	0
68-Upper_Paranui	15.19	Paranui Stream	613	2914
68-Waiti_Dam	12.55	Waiti Stream	325	325
69-Crawley_Dam	1.27	Crawley	150	150
69-Jordan_Dam	2.49	Jordan	150	150
69-Maori_Affairs_Dam	3	Maori Affairs	1238	1238
69-Mid&Lower-Tauhei	34.55	Tauhei Stream	0	15145
69-Mid&Lower-Tauhei	31.07	Eastern Outlet Pond Dummy	0	0
69-South_Mangatea	24.3	South Mangatea Stream	0	0
69-Trubshaw_Dam	1.02	Trubshaw	150	150
69-Upper_Tauhei	43.58	Tauhei Stream	0	0
70-Tenfoot_Drain	26.23	Uapoto Pond Dummy	0	0
70-Tenfoot_Drain	41.75	Tenfoot Pond dummy	0	0
70-Tenfoot_Drain	26.39	Te Mimiha Pond Dummy	0	0
70-Tenfoot_Drain	9.91	Mangawara River	16056	31336
71	208	Mangaonua	0	0
71	96	Waikato	14328	14328
71	55	Waikato	21943	21943
71	75	Waikato	24280	31891
72	85.6	Waikato	7377	7377
75	22.2	Whangamarino River	6903	12077
76	42.6	Maramarua River	0	10352
77	37.6	Maramarua River	6800	6800
78	8	Whangamarino River	12077	14510
BARTONSC (J7)	517.38	PUNIU	0	0
J1	121.13	MANGAOKEWA	3543	32846
J10	185.21	WAIPA	78110	111107

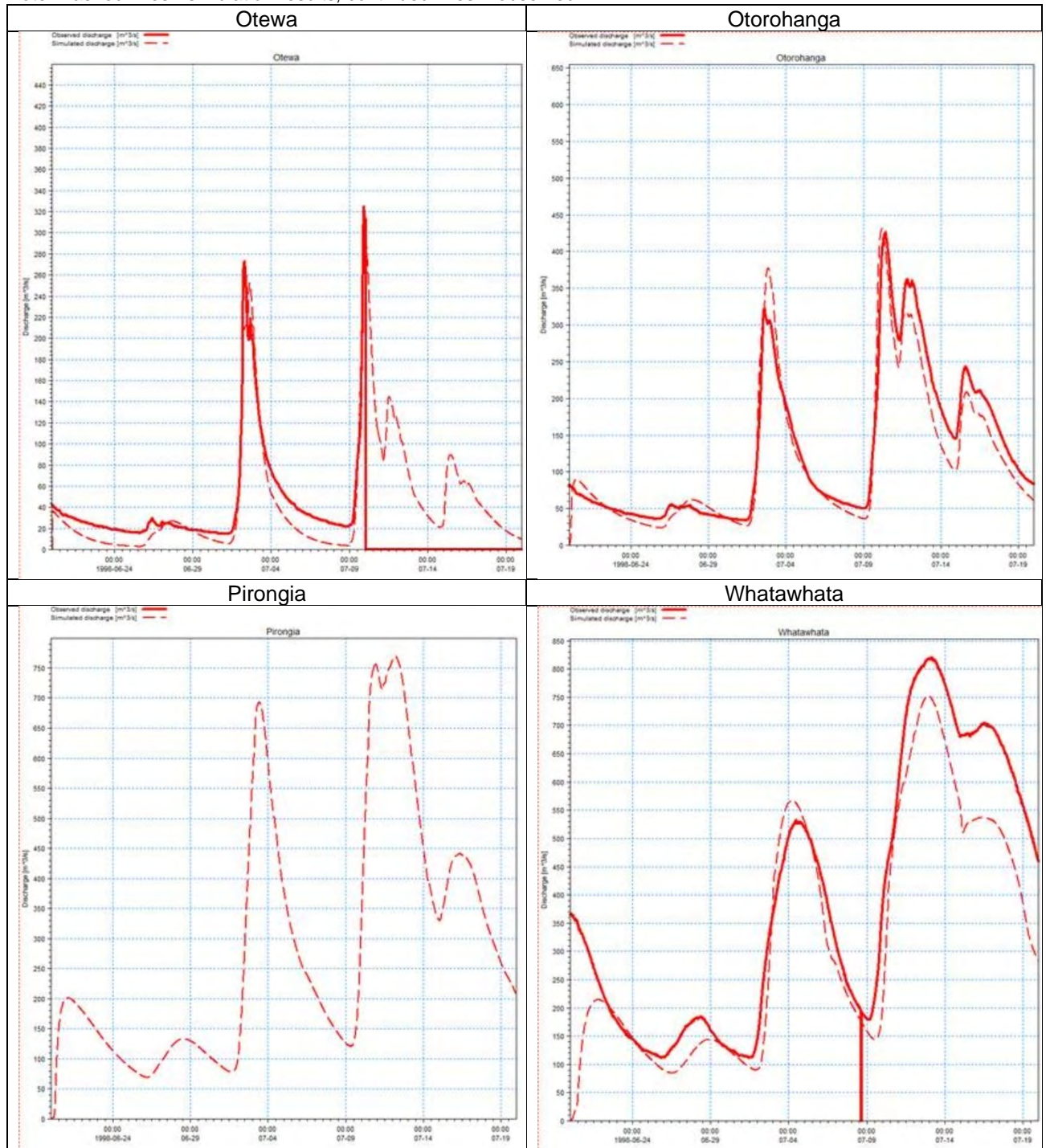
J11	338.24	WAIPA	45655	78100
J4	142.25	WAIPA	22389	42872
J5	109.88	WAIPA	43324	45655
J6	264.41	WAIPA	42872	76125
J8	487.5	WAIPA	76125	111107
J9	41.8	PUNIU	0	15665
MANGAOKEWA AT TE KUITI (J2)	173.37	MANGAOKEWA	3543	3543
MANGAPU(J0)	135.65	MANGAPU	0	0
WAIPA AT OTEWA (J3)	319.32	WAIPA	22389	22389

B Hydraulics

B.1 Validation

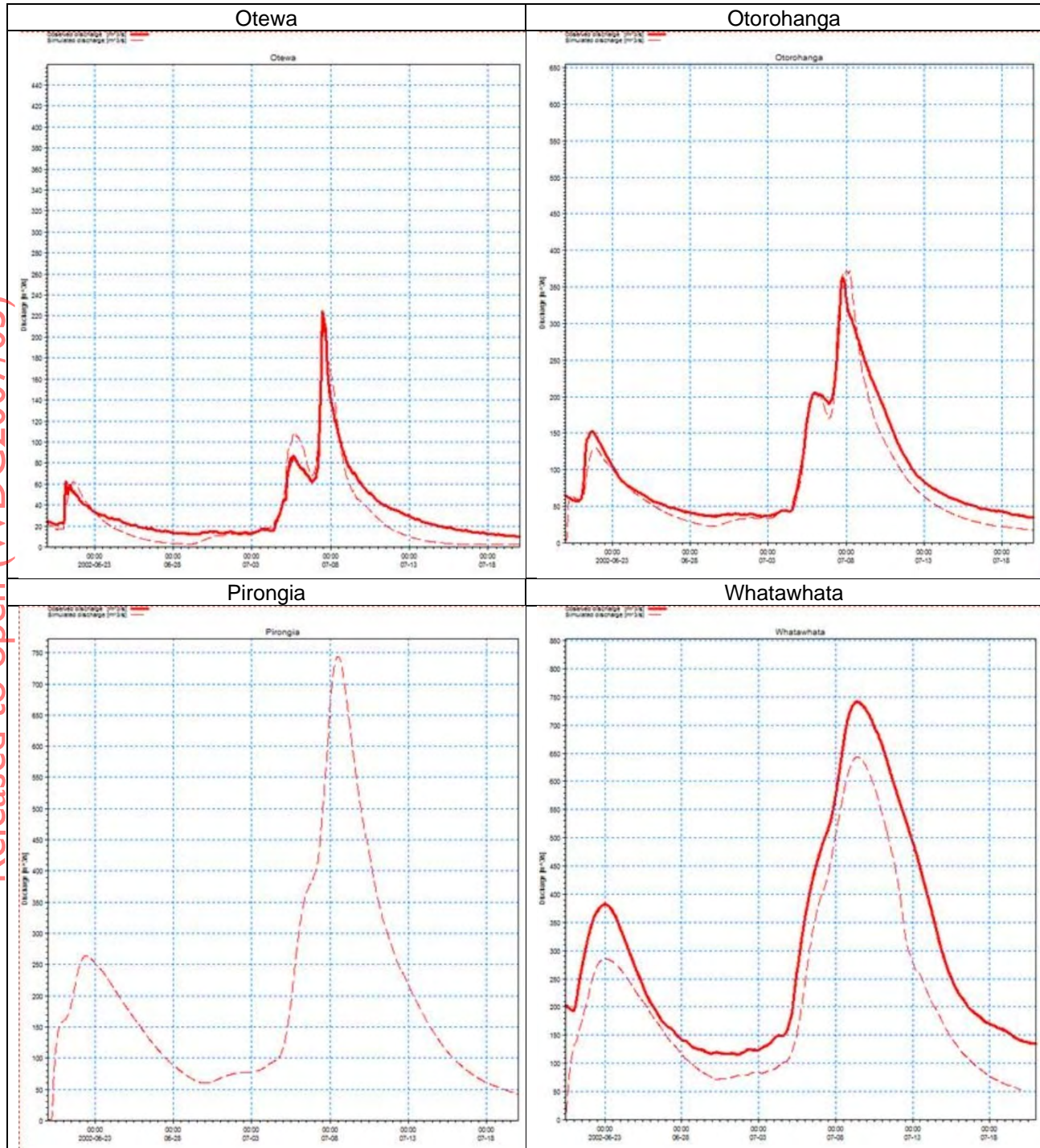
1998 event

Note: Dashed lines - simulation results, continued lines – observed



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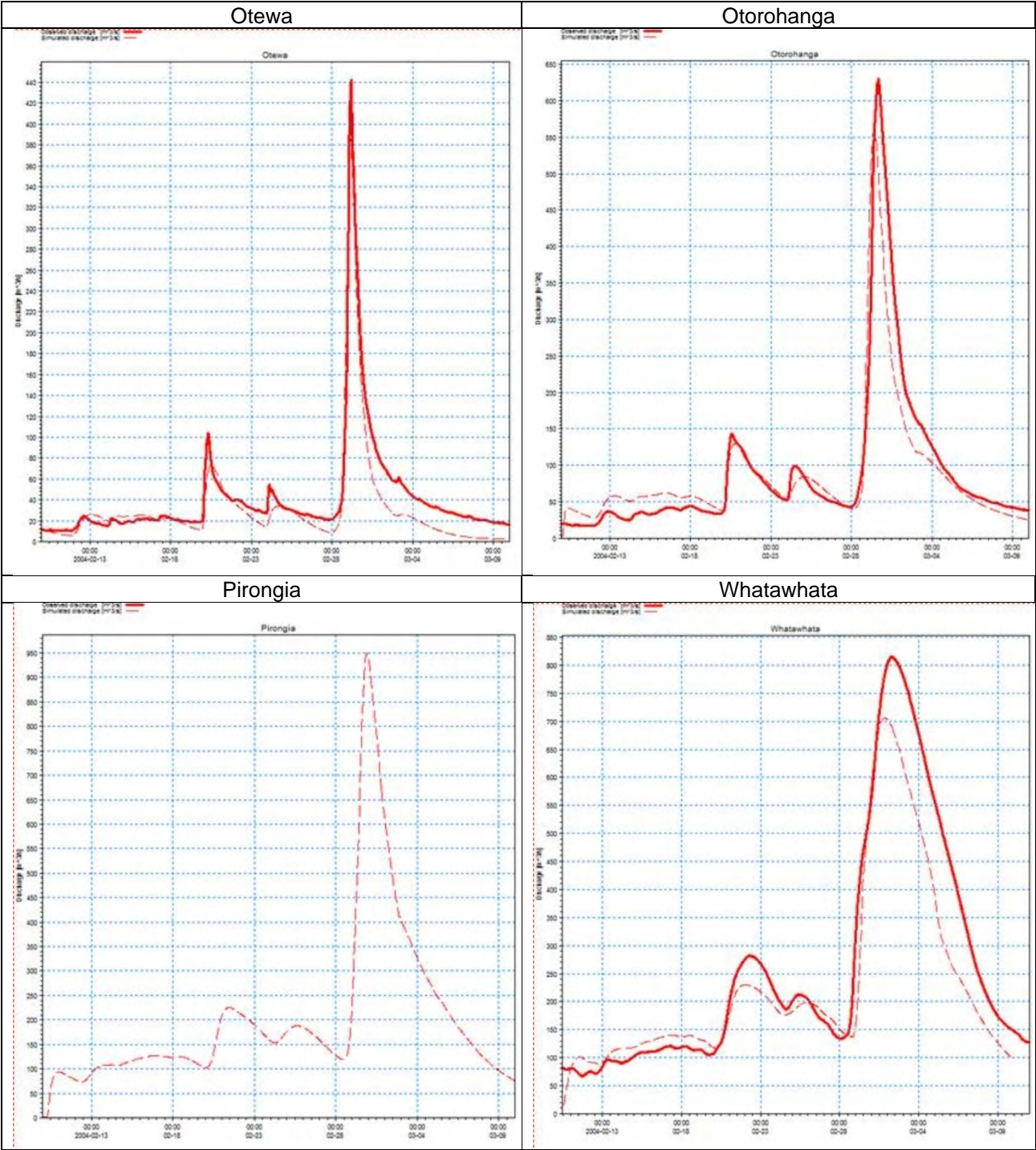
2002 event



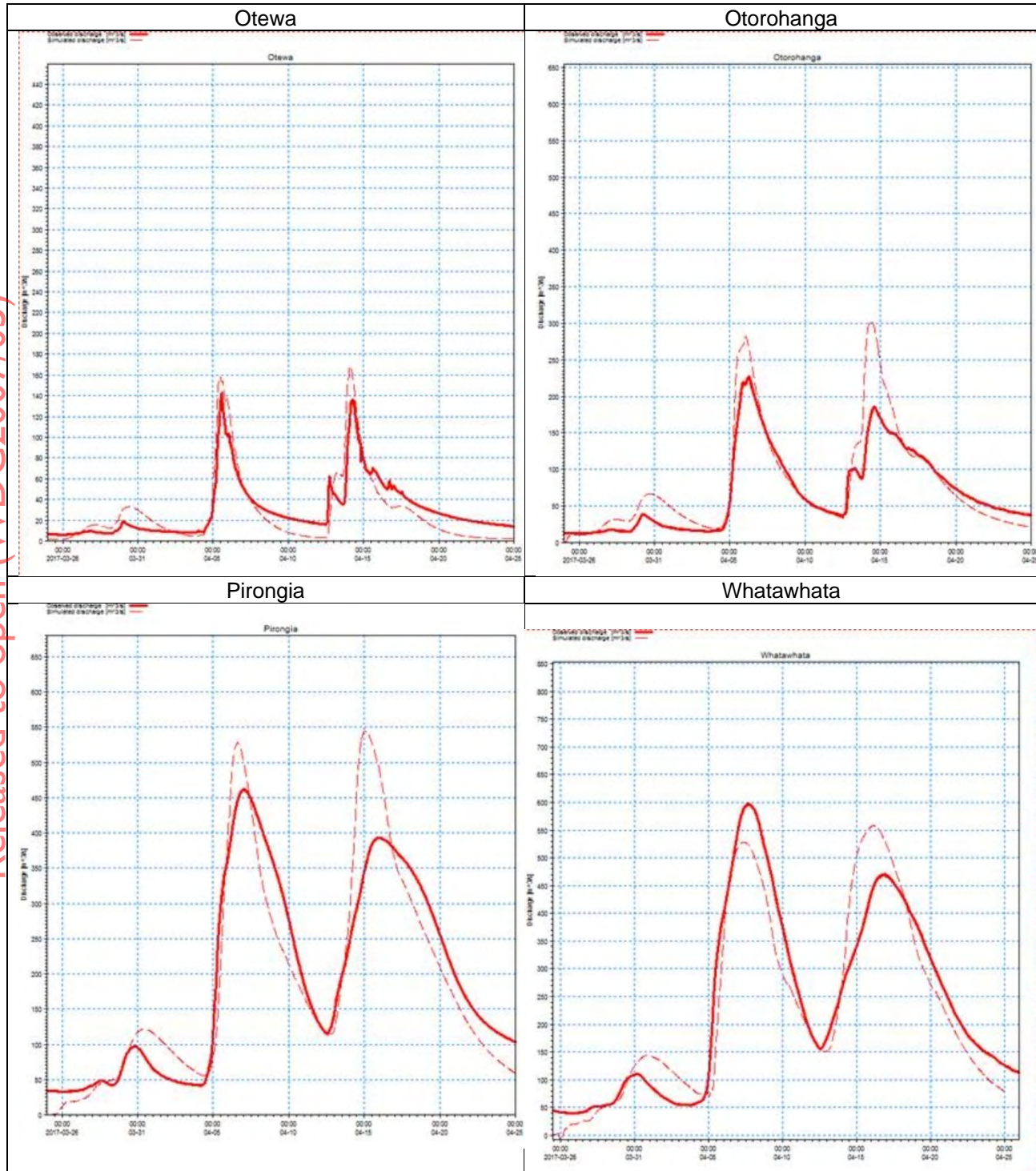
Released to open (WDC2007/05)

2004 event

Released to open (WDC2007/05)



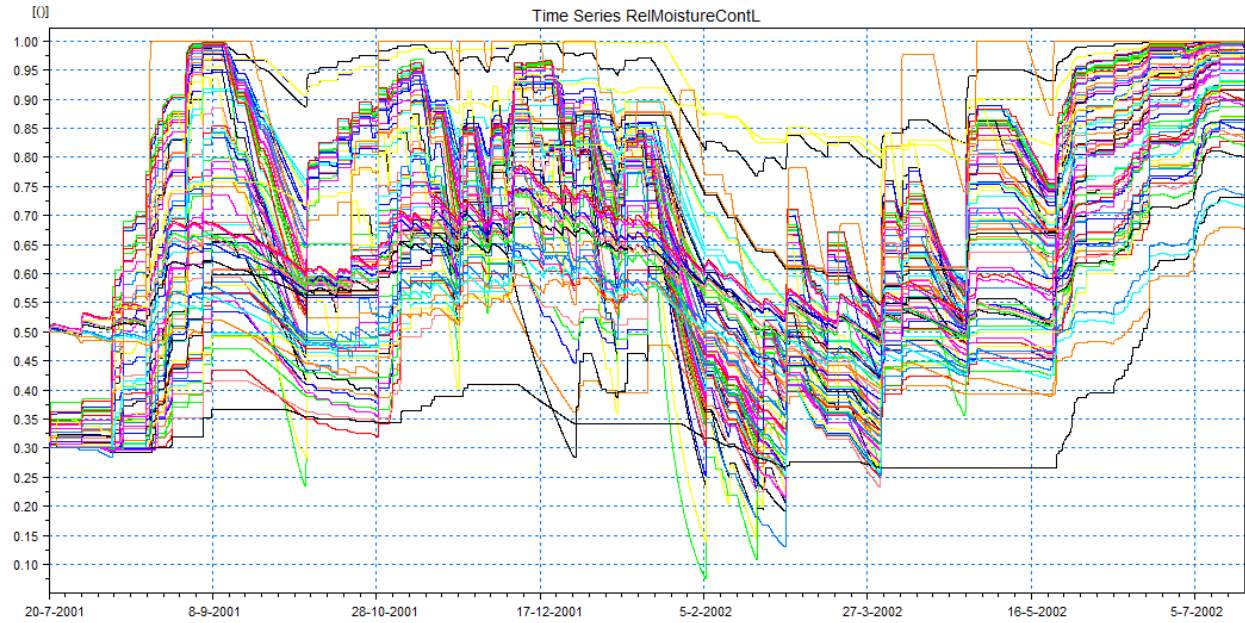
2017 event



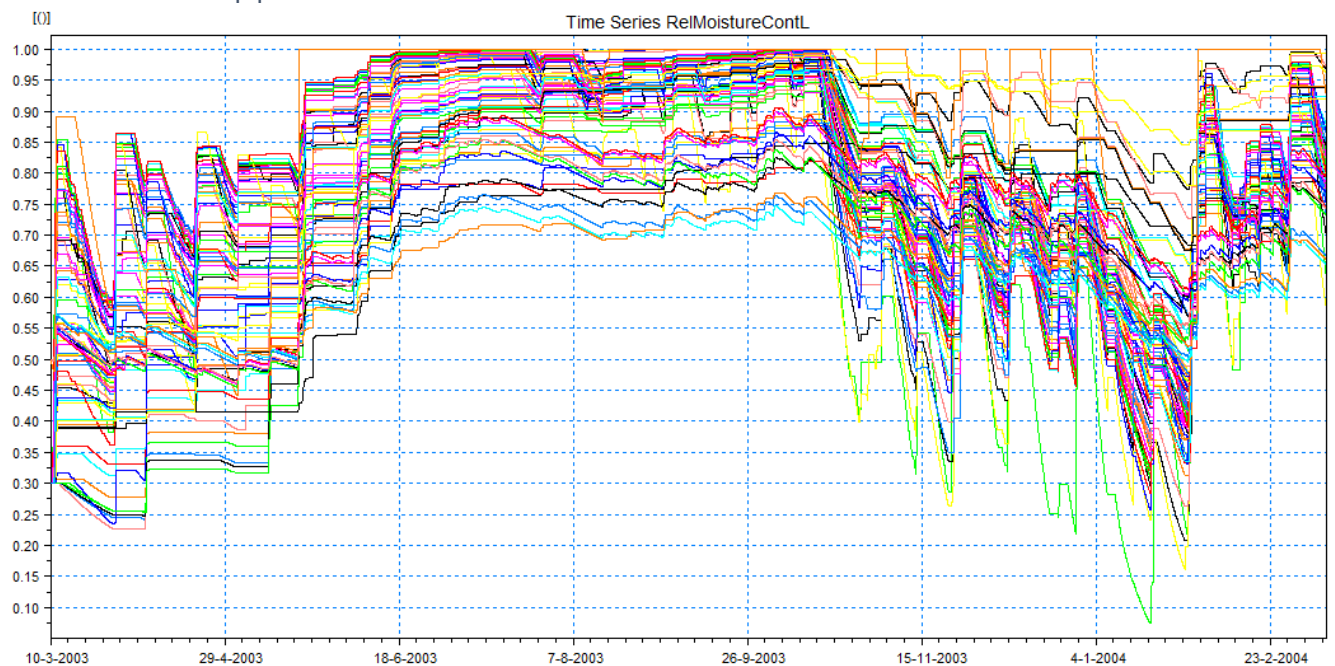
Released to open (WDC2007/05)

B.2 Initial Conditions

2002 event warm-up period

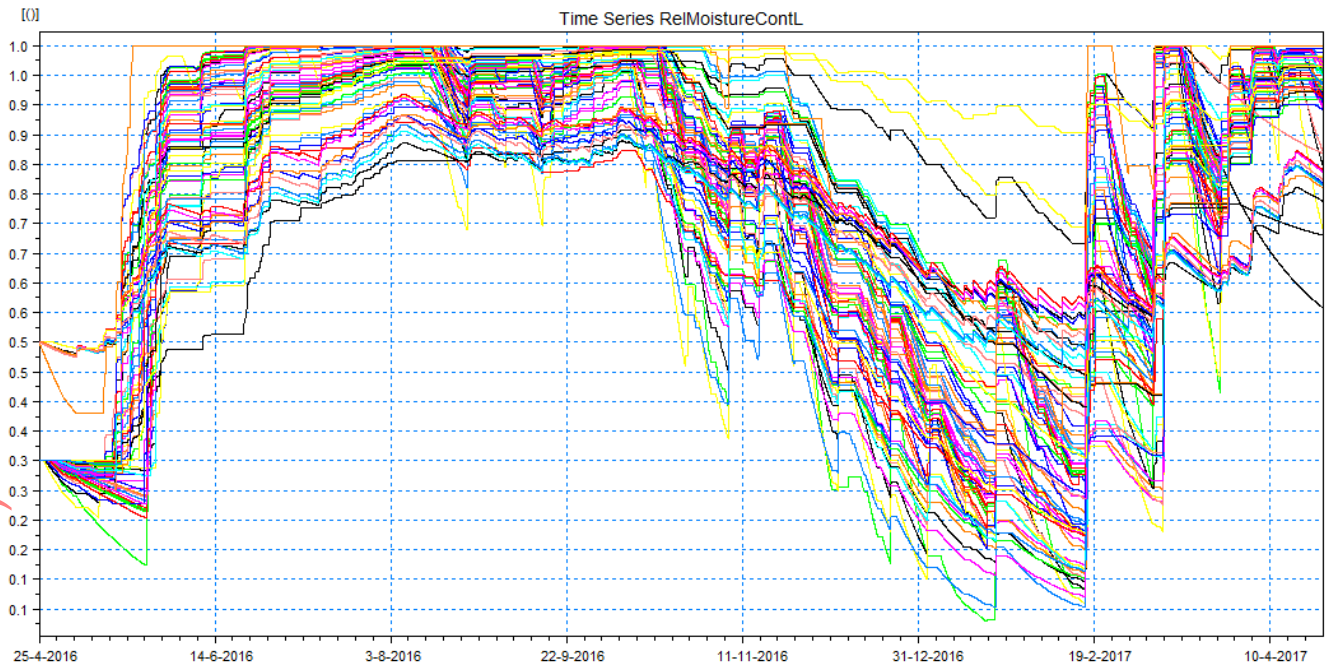


2004 event warm-up period



2017 event warm-up period

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B.3 MIKE 11 structures

Culverts

All modelled culverts are listed in Table 6-1. The rows highlighted in yellow indicate the floodgates and the rows highlighted in blue indicate the structures not included in the MIKE FLOOD model.

Table 6-1 MIKE11 Culverts parameters

Branch	chainage	ID	Geometry	Size	Length
crawley dam	75	\$LINK	Circular	0.45	10
Culvert_Bayley_Street	13.5	Clv_Bailey_Street	Circular	1.2	27
Culvert_Clark_road	12.5	Culvert_Clark_road	Circular	0.6	25
Culvert_Coal_HaulageRd	8.5	Clv_Coal_Haulage	Cross Section DB		17
Culvert_Great_S_road	25	Culvert_Great_S_road	Circular	0.45	50
Culvert_Great_S_road_rail	15	Culvert_Great_S_road_rail	Circular	0.5	30
Culvert_Hakarimata_road_1	6.5	Culvert_Hakarimata_road_1	Circular	2.7	13
Culvert_Hakarimata_road_2	12.782845	Culvert_Hakarimata_road_2	Circular	0.75	12.2
Culvert_Hakarimata_road_3	6.1	Culvert_Hakarimata_road_3	Circular	0.45	12.2
Culvert_Kainui_road	6	Culvert_Kainui_road	Circular	0.6	12
Culvert_Kauri_Ridge_drive	15	Culvert_Kauri_Ridge_drive	Circular	1.2	30
Culvert_Mangarata_ds	10	Culvert_Mangarata_ds	Circular	0.075	19.14
Culvert_Mangarata_us	8	Culvert_Mangarata_us	Circular	0.75	16.12
Culvert_Ngaruawahia_ds	16	Culvert_Ngaruawahia_ds	Circular	0.875	33

Culvert_Ngaruawahia_road_1	12.060468	Culvert_Ngaruawahia_road_1	Circular	0.9	25
Culvert_Ngaruawahia_road_2	12.5	Culvert_Ngaruawahia_road_2	Circular	1.5	25
Culvert_Ngaruawahia_us	20	Culvert_Ngaruawahia_us	Circular	0.75	35
Culvert_old_taupiri_road	12	Culvert_old_taupiri_road	Circular	3	18
Culvert_Parker_road	10	Culvert_Parker_road	Circular	0.9	15
Culvert_River_road_2	17.5	Culvert_River_road_2	Circular	2.4	37
Culvert_Riverview_road	7	Culvert_Riverview_road	Circular	1	21.96
Culvert_Riverview_road_2	5	Culvert_Riverview_road_2	Circular	0.45	10
Culvert_Rotowaro_railway_1	12.5	Culvert_Rotowaro_railway_1	Circular	0.45	25
Culvert_Rotowaro_railway_10	8	Culvert_Rotowaro_railway_10	Circular	0.6	16
Culvert_Rotowaro_railway_2	7.5	Culvert_Rotowaro_railway_2	Circular	0.45	12
Culvert_Rotowaro_railway_3	6	Culvert_Rotowaro_railway_3	Rectangular	0.5 x 0.45	12
Culvert_Rotowaro_railway_4	6	Culvert_Rotowaro_railway_4	Circular	0.6	12
Culvert_Rotowaro_railway_5	6	Culvert_Rotowaro_railway_5	Circular	1.2	12
Culvert_Rotowaro_railway_7	6	Culvert_Rotowaro_railway_7	Circular	0.8	12
Culvert_Rotowaro_railway_9	8	Culvert_Rotowaro_railway_9	Circular	0.45	16
Culvert_Rotowaro_road_1	10	Culvert_Rotowaro_road_1	Circular	0.6	20
Culvert_Rotowaro_road_2	12.5	Culvert_Rotowaro_road_2	Circular	1.2	25
Culvert_Rotowaro_road_4	10	Culvert_Rotowaro_road_4	Circular	1.2	20
Culvert_Tataekohia_ds	6.1	Culvert_Tataekohia_ds	Circular	1.5	12.2
Culvert_Tataekohia_ds_2	6.1	Culvert_Tataekohia_ds_2	Circular	0.9	12.2
Culvert_Te_Ohaki_road_1	8.4303634	Culvert_Te_Ohaki_road_1	Circular	2.4	20
Culvert_Te_Ohaki_road_2	8.2735253	Culvert_Te_Ohaki_road_2	Rectangular	3.1 x 3	20
Culvert_Te_Ohaki_road_3a	22.5	Culvert_Te_Ohaki_road_3	Circular	1.5	45
Culvert_Te_Ohaki_road_3b	22.5	Culvert_Te_Ohaki_road_3b	Circular	0.6	45
Culvert_Waikeri	20	Culvert_Waikeri	Rectangular	3 x 3	15
Culvert_Waingaro_road	11	Culvert_Waingaro_road	Circular	0.6	22.5
Culvert>Weavers_crossing_road	15	Culvert>Weavers_crossing_road	Circular	1.2	30
Firewood Creek trib	13	US	Circular	0.9	20
Jordan upper	75	\$LINK	Circular	0.45	10
Maori Affairs	3900		Rectangular	3 x 2.5	40
Maori Affairs Link	50	\$LINK	Circular	0.45	10
Orakei Dam up	120	\$link	Circular	0.9	31.2
Rotongaro	3601	Glen Murray Rd Bridge	Irregular, Depth-Width Table	N/A	20
Rotongaro	4970	Gate	Circular	1.25	54
trubshaw dam	75	\$link	Circular	0.45	10
Waahi	2971	1	Rectangular	2.25 x 2.25	27

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Waiti dam crest	243	\$link	Circular	1.2	30
Waiti Stream	450		Circular	1.2	20
Whangamaire Stream	230	Whangamaire Pump NRV	Circular	0.762	10
Whangamaire Stream	55	Whangamaire Floodgate	Rectangular	2.1336 x 2.1336	25

Bridges

Waingaro Rd 305 bridge (Waipa)

The Waingaro road 305 bridge is located at modelled chainage 128910 of the Waipalower branche.

Pier representation: The combined pier width is $3 \times 1.118 \text{ m} = 3.354 \text{ m}$, subtracted to the total channel opening (112.05 m) gives the modelled bridge opening of 108.696 m. This is equivalent to a 3% total blockage.

Soffit and deck representation: The bridge has a slight degree of curvature with a soffit level of 16.65 m (kerb 20.05 m) at the edge of the bridge and 16.79 m (kerb 20.19 m) in the centre of the bridge. A soffit level of 16.72 m and a kerb level of 20.12 m have been taken as representative for submergence and overflow respectively.

Waingaro Rd 2160 bridge (Firewood Creek)

The Waingaro road 2160 bridge is located at modelled chainage 41 of the Firewood Creek branch.

Pier representation: The bridge has 3 piers of varying dimensions and with a combined width of 1.828m. With a total channel opening of 33.25 m the percentage of blockage is 5.5%.

Soffit representation: The bridge is sloping downhill from the left bank to the right bank. An average soffit level of 13.81 m and an average deck level of 14.85 m have been used for submergence and overflow respectively.

Great South road bridge & North Island Main trunk rail bridge over Waikato river

The Great south road bridge is located at modelled chainage 53280 on the Waikato river.

The road bridge and rail bridge are very close to each other at that location and have been modelled as a combined structure to represent the most obstructive features of the combined bridges (worst-case scenario). With width of 10.19m (from plan) for the road bridge and 4.2m (measured from GIS) for rail bridge, the structure has a combined width of 14.39 m.

Pier representation: No information on piers width from the road bridge. On the rail bridge there are 2 central piers with protection structures whose width has been measured from aerial

photography and approximated to 5m. The total span of the bridge is 80m, thus the pier blockout is 6.25%.

Soffit and deck representation: The road under the bridge is at 14.4m RL (LiDAR) + 3.6m from road to soffit (using sign under the bridge, Google Earth) = 18m. The inspection report indicates 4.9m between rail level and ground level at the road location, thus deck thickness is $4.9 - 3.6 = 1.3$ m and deck level is 19.3m.

Tainui bridge over Waikato river

The Tainui bridge road is located at modelled chainage 67670 on the Waikato river.

Pier representation: There are 4 cylindrical piers, each 1.37m in width with a base 2.2m in width. Using an average of 1.55m to take into account the effect of the wider base, the total blockage width is $4 \times 1.55 = 6.2$ m. The total channel width being 183m, the blockage represents 3.4%.

Soffit and deck representation: The soffit and deck are curved, average values of 14.067 m and 15.82 m have been used, respectively.

Mangawara river rail bridge at Ngaruawahia - NIMT 272

The Mangawara railway bridge is modelled at chainage 30970 on the Mangawara river.

A new bridge appears to have been built between 2015 and 2016 with new piers (from Google Earth aerial photography), with the old bridge still in place. The bridge is 72m long, however, only 48 are represented in the 1D model due to overlap with the 2D component.

The bridge is 10m long (measure from GIS).

Pier representation: The bridge is modelled with 2 piers of width 1.8 m and a channel opening of 48 m, thus a pier blockout of 7.5 %.

Soffit representation: The rail level is taken from the LiDAR and is 14.8 on the north side and 14.5m on the south side, with an average of 14.65m. From the inspection report the deck thickness appears to be 1.3m, thus the soffit is taken as 13.35m.

Table 6-2 MIKE11 Bridges parameters

Name	Branch	Chainage	Waterway length
WAIPAlower_bridge	Waingaro road 305	128912.5	10.06
Firewood Creek	Waingaro road 2160	41	9.144
Waikato_bridges	Great South Road	53280	14.39
Waikato_bridges	Tainui bridge road	67670	15
Mangawara_river_bridges	Mangawara rail bridge	30970	10

Weirs

Table 6-3 MIKE11 Weirs parameters

Name	Branch	Chainage	Geometry
Weir to improve spillway performance	Mangawara River	850	Broad Crested Weir
	Smith	950	Broad Crested Weir
	Smith	10	Broad Crested Weir
	Southe	725	Broad Crested Weir
	Southe	10	Broad Crested Weir
steep	Waiti Dam	880	Broad Crested Weir
road overflow	ROTONGARO	3601	Broad Crested Weir
	Whangamarino River	12570	Broad Crested Weir
	Waahi	3010	Broad Crested Weir
	SPILLWAY1	1	Broad Crested Weir
	SPILLWAY2	1	Broad Crested Weir
	SPILLWAY3	1	Broad Crested Weir
	SPILLWAY4	1	Broad Crested Weir
	SPILLWAY5	1	Broad Crested Weir

Control structures

Table 6-4 MIKE 11 Control structures parameters

Name	Branch	Chainage	Type
Northern Outlet Drainage	Northern Outlet Pond	150	Discharge
Murchie Drainage	Murchie Pond	150	Discharge
Tenfoot Drainage	Tenfoot Pond	150	Discharge
Eastern Outlet Drainage	Eastern Outlet Pond	150	Discharge
Te Mimiha Drainage	Te Mimiha Pond	150	Discharge
Uapoto Drainage	Uapoto Pond	150	Discharge
Te Onetea Box Culvert	Te Onetea Stream	151	Underflow
Whangamarino CS	Whangamarino River	14535	Underflow
Waikare Canal Gate	Waikare Canal	2	Underflow

C Additional information

Figure 6-1 Culverts with potential impact on flooding, not modelled because of lack of information or to simulate blockage

Name	Easting NZTM	Northing NZTM	Reason why not included
Lake Waahi connection	1786349.665	5842297.913	Lack of dimensions information
Lake Waahi	1786564.716	5840695.410	Lack of dimensions information
Waikeri_rail	1792438.980	5833145.697	Lack of dimensions information
Firewood_creek_trib_ds	1788535.231	5827670.272	Lack of dimensions information
Tatahekoia_us	1789244.630	5831032.558	Lack of dimensions information
Culvert Rotowaro_railway_6	1787805.581	5839080.552	Lack of dimensions information
Culvert Rotowaro_railway_8	1786806.016	5839197.865	Lack of dimensions information
Rotowaro_road_3	1787082.276	5838809.648	Diameter under 450mm (300)

Table 6-5 Floodgates with unknown specifics

ASSET_ID	ASSET_DESC
22895	Rangiriri - Fosters #5 Floodgate
23637	Lake Hakanoa Floodgate
25075	Kimihia Downstream Floodgate
24346	Kimihia Upstream Floodgate
25084	Rangiriri - Fosters #3 Floodgate
24359	Rangiriri - Fosters #2 Floodgate
25828	Rangiriri - Fosters #4 Floodgate
27110	Kimihia Main Outlet Floodgate
27324	Okowhao Floodgate 2
27327	Rangiriri - Fosters #1 Floodgate
28542	Harris Street Floodgate

Table 6-6 Pumpstations with unknown specifics

Asset_ID	System_Nam	ASSET_DESCRIPTION	Owner	XNZTM	YNZTM
20020824143416	WRC Owned Stormwater		WDC	1791150	5842488

20170124100738	Parry Street SW Pump Station		WDC	1790377	5840952
26567		Huntly South Pumpstation/Floodgate 2	WRC	1790558	5839523
27305		Huntly South Pumpstation/Floodgate 1	WRC	1790652	5838772
28015		Huntly South Pumpstation/Floodgate 3	WRC	1790669	5840405
23659		Okowhao Pumpstation	WRC	1790289	5844942
25813		Huntly North Pumpstation	WRC	1790715	5844221
36114		Kimihia Internal Pumpstation	WRC	1791549	5845852
47458		Lake Hakanoa Pumpstation/Floodgate	WRC	1790708	5842128
22896		Higgins Pumpstation	WRC	1790543	5851774
22898		Tabenels Pumpstation	WRC	1790747	5847620
25829		Kitcheners Pumpstation	WRC		
26585		Halls Pumpstation	WRC	1790510	5850210
28030		Golf Course Pumpstation	WRC	1790183	5847204
22894		Hills Pumpstation	WRC	1789715	5849908

Okowhao pumpstation is present in the model with a no-flow regulation as the specifics of the pump are unknown.

Table 6-7 List of structures identified and requested by DHI

Description	easting NZTM	northing NZTM	Ranking
Waingaro road bridge	1789149.2	5829223	1
Railway bridge at Ngaruawahia	1789535.1	5829473.8	1
Great S. road bridge at Ngaruawahia	1789568.4	5829459.5	1
Horotiu Bridge road bridge	1794549	5825433.2	1
SH1 Bridge	1794909.3	5825248.3	1
Tainui Bridge road bridge	1790271.8	5840135.9	1
Bridge street railway bridge	1790483.9	5840725.2	1
Kauri ridge culvert	1789362	5827353.1	1
Clark road culvert	1789523.2	5827423	1
Clark road 23 culvert	1788506.1	5827545.2	1
Clark road 23 culvert	1788535.7	5827670.8	1
Waingaro 223 road culvert	1788366	5827721.7	1
Waipa Esplanade 35 culvert	1788904.9	5828681.6	1
Waingaro road 81 culvert	1788699.4	5828560.7	1
Thickpenny lane culvert	1789011.8	5829293.9	1
Hakarimata road 151 culvert	1789148.9	5830667.8	1
Hakarimata road 185 culvert	1789265	5830967.8	1
Hakarimata road 334 culvert	1789807.7	5832421.2	1
Railway culvert	1792439	5833145.7	1
Railway culvert	1792987.7	5833809.3	1

Riverside way culvert	1791808.4	5833629.9	1
Hakarimata road 698a culvert	1792652.1	5834549.1	1
Orini road 32 culvert	1793482.6	5835178.6	1
Parker road culvert	1790588.6	5836029.1	1
Riverview road culvert	1790421.4	5836614.5	1
Riverview road culvert	1790094.4	5839317.3	1
Fairfield avenue culvert	1789827.6	5841336.1	1
Rotowaro road 282 culvert	1788020.5	5838984.4	1
Rotowaro road 351 culvert	1787260.4	5838943.8	1
Mahuta rail culvert	1786806.3	5839199.2	1
Lake Waahi culvert	1786564.9	5840694.5	1
Coal Haulage road / Waahi culvert	1786350.1	5842298.1	1
Te Ohaki road culvert	1790320.2	5844919.7	1
Coal Haulage road / Awaroa stream culvert	1785683.9	5840640.9	1
Great S. road culvert	1790796.3	5844215.7	1
Te Ohaki road 515 culvert	1789995.4	5847122.9	1
Te Ohaki road 475 culvert	1790026	5846409.9	1
Bailey street culvert	1791023.8	5843589.8	1
Ngaruawahia road culvert	1789623.7	5826777.2	1
Ngaruawahia road culvert	1789967.3	5827563.3	1
Old Taupiri road culvert	1791023.4	5832478.6	1
Great S. road 5113 culvert	1792405.3	5833210.9	1
Great S. road 127 culvert	1792951.4	5833867	1
Weavers crossing road culvert	1788446.2	5839655.5	2
Lot 35 Te Puroa road culvert	1788396.2	5827244.5	2
Durham street 32 culvert	1789169.4	5828470.3	2
River road culvert	1792009.1	5827629.8	2
Hakarimata road 185 culvert	1789244.7	5831032.7	2
Wadham road culvert	1790007.9	5832641	2
Culvert	1792655.6	5832735.2	2
Gordonton road culvert	1793119.6	5834973.5	2
Riverview road culvert	1790236.6	5837946.3	2
Mahuta rail culvert	1786443.2	5839261.7	2
Mahuta rail culvert	1786217.2	5839305	2
Lake Waahi culvert	1787165.2	5840257.1	2
Rotowaro road 422 culvert	1787082.3	5838809.6	2
Rotowaro road 319 culvert	1787843.8	5839064.4	2
Railway culvert	1790851.1	5844174.1	2
Orini road 126 culvert	1794037.8	5835632.9	2
Russell road culvert	1790938.2	5844004.3	2
River road culvert	1795537.5	5824807	2
River road culvert	1795587.7	5824808.6	2
Lot 2 DPS 19658 culvert	1790010.5	5827427.4	2
Sullivan road culvert	1794113.5	5825968.9	3
Mahuta rail culvert	1786092.9	5839326.2	3

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Russell road culvert	1791008.9	5844058.2	3
Kainui road culvert	1793057	5833277.2	3
Okowhao road culvert	1788589.3	5843399.9	5

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Job No: 1005528
18 May 2020

Waikato Regional Council
Regional Hazards and Environmental Compliance
Private Bag 3038
Hamilton 3240

Attention: Rick Liewing

Dear Rick

Lower Waikato River Model Review

On 20 April 2018, Waikato Regional Council ("WRC") and Tonkin & Taylor Ltd ("T+T") entered into a Contract for Service, WRC2014-2017-447.61, Council document number #12378033. On 28 June 2018 and 30 June 2019, the Contract was varied by way of a Contract Addendum(s) WRC2014-2017-447.61.01 and WRC2014-2017-447.61.02 with Council document numbers #12703517 and #15003033. Purchase order number 119868 was provided for the current phase reported on in this document.

While T+T has been involved since 2018 in the review of and discussion on elements of the modelling process, the final review reported on in this document is focussed on the end product as described in the report by DHI (2019).

1 Project outcomes

T+T was engaged to undertake independent review of and technical comment on the modelling process that was being done, covering the lower Waikato River (from the downstream side of Karapiro Dam to the open coast at Port Waikato). T+T was not engaged to undertake a review of the actual model, with the review being focussed at a higher level and on principles and approaches applied.

The key outcome from this process was delivery of a model that was capable of results of a suitable degree of confidence for the purposes intended.

2 Services provided

The agreed review process encompassed the following elements:

1. Develop an understanding of model purpose and intended uses and outcomes.
2. Review model architecture in context of item 1 above. Will the proposed model structure be able to meet the requirements/intended purposes?
3. Modelling philosophy review. Review what is proposed in terms of calibration, validation and design event simulation.
4. Reporting, by email, telephone in person and by written document(s).

3 Model purpose

In 2017 WRC had a suitably calibrated 1D hydrodynamic model of the lower Waikato River that had been used for a range of purposes, including flood forecasting, prediction of extreme levels and assessments of flood scheme performance. An update to this model was seen to be required, largely to build in 2D representation of the river floodplain and adjacent areas in and around Huntly. This was largely driven by the need, from Waikato District Council, for this information to meet the requirements of the Regional Policy Statement.

The 2D parts of the model were expanded to include areas around Ohinewai and Horotiu.

The stated purpose of the model development was to enable suitably accurate estimation of peak flood levels in these 2D areas, to enable flood mapping (showing depths, extents and levels) for a range of different flood event scenarios. These scenarios include events of different likelihood and also different future climate horizon.

4 Modelling philosophy

The overall philosophy applied covers a standard approach consisting of model development, model testing and confirmation of accuracy and then model simulations for design event conditions. Specific comment on these stages is provided in the following sections of this report.

The development of the model has been done on the basis that it is an extension to an existing model. The existing model has previously been considered to have been adequately calibrated. The proposed extension was to include a 2D domain in certain specific areas of interest. In addition, the report (DHI, 2019) provides reference to several other improvements to the existing model, as well as updates to input parameters where current recommendations differ from previous (such as rainfall and the effects of climate change on rainfall).

5 Model architecture

We understand that the model is comprised of a hydrological model (rainfall-runoff) and a hydraulic model (1D and 2D elements). In simple terms, the following are key elements applied:

- Main river channel, represented by cross sections. This extends from the Karapiro spillway to the coast at Port Waikato, and includes tributaries. Also included are certain structures (bridges).
- Floodplain area adjacent to the main channel, extending from the Hamilton City boundary in the south (upstream end) to a location adjacent to Lake Waikare in the north (downstream end). This area has been included in the model as a digital elevation model ("DEM"), with elevations based on those obtained via two separate LiDAR surveys. The DEM is contained within the bounds shown in Figure 5.1.
- Boundaries, which include discharge at the Karapiro spillway, rainfall-runoff boundaries applied as inflows to the model, plus sea level boundary applied at the open coast.
- Hydrodynamic model parameters, which are used in the numeric solution scheme in the model computation engines.

We note that the model contains no piped stormwater network, with the following statement being made in the report (DHI, 2019):

"As agreed with WRC, based on the time-constraints and quality of the GIS drainage information, it was decided to exclude the pipe networks, open channels and pumps from the model and simply simulate flooding from the river over the design-level stopbanks, as the number of questions it would raise will outweigh any benefit of high-resolution flood mapping."

This statement represents a change from the initially stated model purpose, as no floodplain mapping will be available within the Huntly area where flooding is caused by a mechanism other than stopbank overtopping. It is often the case that flooding in urban areas adjacent to stopbanks is caused by impedance of flows against high river levels, and not by river flooding itself. If such flood mechanisms exist at Huntly, these have not been captured in the floodplain mapping undertaken to date. It is understood that this approach was established by agreement between WRC and DHI.

Further comment on the hydrological and hydraulic model components is provided in Sections 5.1 and 5.2 of this report respectively.

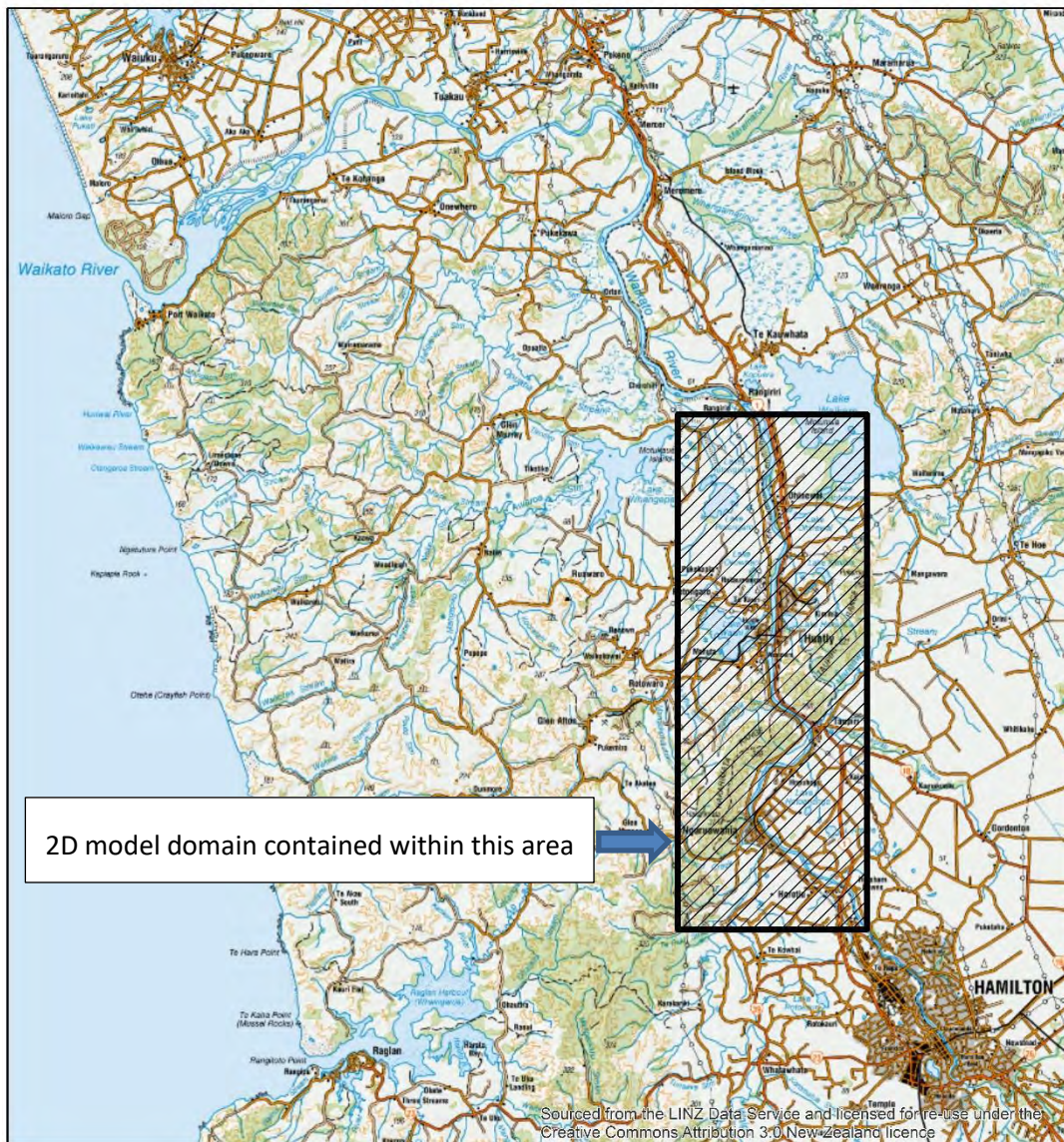


Figure 5.1: Bounds within which 2D model domain is located

5.1 Hydrological model

The hydrological model comprises a series of sub-catchments, with responses to rainfall simulated using Mike NAM software. The NAM model has been calibrated using long term time series (rainfall and resulting discharge) from a number of gauging locations. Calibrated parameters were then applied to the design rainfall event simulations. Model validation was also undertaken.

For design event simulation, the NAM models were pre-run to establish sensible start conditions – a standard and recognised approach.

Rainfall depths, temporal pattern and areal reduction applied to the model were taken from applicable sources.

The sub-catchment split applied to the model is reasonably coarse but is in proportion to the overall model coverage. If more detailed assessment is required at a localised scale, then the sub-catchment domain could be refined.

We note the comment in the report that *“The choice of hyetograph shape and timing of the peak has a significant influence on the results.”* (DHI, 2019). No sensitivity assessment was reported on for this, in spite of this being a potential source of uncertainty. This applies only to design event simulation, as for simulation of calibration events the applied rainfall is as recorded.

5.2 Hydraulic model

The hydraulic model, comprised of both 1D and 2D computational elements, was built using data from several different sources. As land use change and catchment works occur, ground elevations do change with time. From examination of the ground elevation data used for the model build, it is clear that the sources relate to capture that occurred at different points in time. Below are quotes from the report (DHI, 2019) that demonstrate this:

“It was agreed with WRC to use existing Flood Forecast model cross-section data and re-assess with the expansion of the model beyond the Huntly area. The cross-section data for the Waikato upstream of Ngaruawahia is from 1987-1994 survey and downstream of Ngaruawahia and at the Waipa River is from 1998. The processed data levels and position of markers were adjusted where the channel conveyance was incorrectly calculated. The cross-section radius type was also adjusted to ensure consistency across the river reach.”

“The MIKE 21 topography was derived from the 2010/2011 LiDAR survey for the Ohinewai area and the 2007/2008 LiDAR survey for the rest of the model.”

The different capture dates of the various components opens up the possibility of incompatibilities at the interface between different sources. In spite of this, the model has been shown to be able to run and produce results without obvious error.

Hydraulic parameters used in the model are provided in the report (DHI, 2019), but no justification for the selection of values was given. While standard values appear to have been applied, it would be useful to understand the appropriateness in this specific context.

5.3 Model boundaries

The downstream boundary condition applied at Port Waikato was stated to be “a fixed tidal level of 1.69 m...”. While hydrodynamic simulations lend themselves to dynamic tidal boundaries being applied, care needs to be exercised in the timing of high/low tides relative to flood peaks. Given that the points of interest (Huntly, Ohinewai, Horotiu) are located at least 70 km upstream of the open coast, application of a time-varying tidal boundary is unlikely to significantly affect model results, especially as the modelling has been focussed around the peaks of flood events. Should there be a focus on low flow conditions and levels, then tidal fluctuation may become more significant in terms of peak levels attained and general hydraulic performance in the areas of interest.

The boundary inflow time series applied at Lake Karapiro was developed (and approved) separately, and has not been reviewed.

Other inflow boundaries to the model were developed via rainfall-runoff simulation in the NAM model. These have been based on rainfall and on hydrological parameters obtained through calibration.

6 Flood event simulation

The report (DHI, 2019) states that a calibration and sensitivity analysis for the 1998 flood event should have been carried out but was not, with the reason given being that aerial photography was provided only *“after the modelling exercise was complete”*. The report goes on to state that such calibration was *“particularly important”* at the Waipa River. This represents a weakness in the modelling undertaken.

Flood event simulation was undertaken by application of design rainfall and inflow to the model against a sea level at the coast. Given that the catchment area of the lower Waikato River is large, areal reduction was applied to point rainfall estimates. However, the timing of rainfall applied was uniform across the entire catchment. This is a common approach to design event simulation in smaller catchments, where the size of the weather system causing the event is large compared with the catchment area. In a catchment as large as that of the lower Waikato River, weather systems that show rainfall differential across the area the size of this catchment are difficult to adequately represent. Without a comprehensive and detailed investigation into this potential effect, and in recognition of the intended purpose of the model, the approach adopted is reasonable.

7 Discussion

As described in Section 5 above, the model does not include any of the stormwater and local drainage network in and adjacent to the Huntly township. The report (DHI, 2019) states that this was agreed with WRC. In so doing, the results from the modelling undertaken are applicable only to estimation of flooding when derived by stopbank overtopping. However, the model results will be able to be used in any subsequent drainage analysis of localised areas in that these results provide for tailwater levels. Should further flood mapping be undertaken at a localised scale, then there should be no need to include the lower Waikato River in any modelling, as boundary tailwater level time series can be extracted from the work reported on in this document.

8 Suitability of the model for the intended purpose

It appears that the original purpose of the model has evolved during the modelling process, to the point that there is reported acceptance (DHI, 2019) that the model will not produce flood extents and depths from all flood mechanisms in the areas of interest. Rather, the model only produces estimates of flooding outside of the river channel under stopbank overtopping conditions. In this case, the model has been adequately set up and run for this intended purpose. Furthermore, the model results may be used by subsequent local drainage analysis for which tailwater levels are required.

9 References

DHI (2019), *WRC Lower Waikato 2D Modelling*, report prepared for WRC under project number 44801126, final draft 3 October 2019. An updated version was subsequently provided that was dated February 2020.

10 Applicability


This report has been prepared for the exclusive use of our client Waikato Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

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msh

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IRBA

**GEOLOGICAL
ENGINEERING
CONSULTANTS**

Report on hazards following mine closure, Huntly East

October 2018

**for
Waikato District Council**

Project 1003

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1. Introduction

Ian R Brown Associates Ltd (IRBA) were engaged by Waikato District Council to provide advice regarding potential hazards in an area of Huntly that is located over underground mine workings. The extent of the area we have investigated is shown on Figure 1 labelled Huntly AOI – Subsidence Study.

The entrance to Huntly East underground coal mine was established in the highwall of the Kimihia open cast mine by State Coal Mines in 1977. The three main access drives for men and materials, ventilation and conveyor were driven in a westerly direction. Initial extraction of coal was to the south, then to the north of these tunnels. Later, mine development continued to the west and north of the Waikato River (Figure 2).

In 1982 coal extraction commenced in the part of the mine known as the South Headings. Soon afterwards subsidence effects became apparent and damage occurred to overlying structures and infrastructure. Mining ceased in this area in the mid 1980s, with extraction continuing in the area to the north of the mine access drives.

IRBA has been involved in studies of subsidence around the Huntly East area since 2008. Two reports have been prepared and should be referred to for more detailed information on the ground conditions that have led to subsidence (IRBA 2010 and IRBA 2015).

2. Historical subsidence

IRBA's earlier work included supervision of two surveys where bench marks that were established in 1981 were releveled. For details refer to IRBA (2010) and IRBA (2015). The bench marks generally cover the area of the South Headings, however some of these are no longer available.

The area with greatest measured subsidence is to the south and east of the South Headings (Figure 3). This is where coal was closer to the ground surface, and small pillars were left supporting the workings. Maximum subsidence shown on Figure 3 is about 1 m.

Most of the subsidence occurred soon after mining progressed under the areas that were affected. Our recent survey data gives an indication of subsidence between 2009 and 2014. Although subsidence has continued the rate was low with a maximum of 0.013 m in the 2009 – 2014 period at two bench mark locations.

As part of the present study, we have searched for subsidence data over the extraction area to the north. The only reference we found was a report by Pilbrow (1988) where surface subsidence had been measured over Panel 1, on the eastern side of the workings, to the north of the main mine entry. Mine workings in this area were about 150 m below ground, and maximum subsidence measured was about 1 m. We have not been able to locate the data that were used in Pilbrow's analysis, so have not been able to verify the location of the survey bench marks.

Given the extraction plan and the size of pillars, subsidence of 1 m in this area would not be unusual. However, the mining took place under a rural area, and the only effect that might have been observed would have been disruption to surface drainage.

We have not been able to find any other useful information related to subsidence although we understand that bench marks were located above other parts of the northern mine workings.

3. Mine closure

In late 2015, Solid Energy New Zealand Ltd as operator of the Huntly East mine, announced that the mine would close with the asset being offered for sale as part of the liquidation of the company. Although some Solid Energy assets were purchased by mining companies, the Huntly East mine was not. As they could not sell the mine as a going concern, Solid Energy proceeded to abandon the mine. The last coal was produced in October 2015.

As part of planning for mine abandonment, Solid Energy engaged HMS Consultants Australia Pty Ltd (HMS) to facilitate a series of risk assessments to evaluate the final sealing and inertisation of the mine. Their recommendations for activities associated with mine sealing were reported to Solid Energy in March 2017 (HMS 2017).

The HMS report is mainly concerned with the potential for spontaneous combustion following mine closure, and the need to seal the workings from oxygen that would encourage spontaneous combustion. They did not consider the potential effects of mine flooding affecting pillar stability, or the effect of water infilling and trapping mine gases with subsequent pressure build up leading to migration of gas to the surface.

Subsequently each of the three entry drives were plugged with a concrete surface bulkhead at the portal with a seal 40 m further into the tunnels. A tube was placed through each of the three seals so that mine gases could be bled off and collected at the surface.

The seals are stated to be rated to 365 kPa and were designed to prevent leakage of oxygen into the mine. At the same time, they provide containment of mine gases so that pressure can build up as water flooding of the workings compresses the mine gas.

Following removal of the surface infrastructure at the mine portal area, the land was sold to a neighbour who is currently filling the old open pit mine with water to form a recreational lake. The current owner has undertaken to sample mine gasses on a regular basis. However, there may only be a few months before the lake will submerge the portals, and gas monitoring as presently undertaken will not be possible.

From what we can tell, there was minimal regulatory oversight of the mine closure. The work was outside of usual building consent processes; there were no producer statements provided. We have not been able to confirm whether the HMS recommendations were implemented, and there are no as built drawings showing the state of mine workings at closure.

4. Future subsidence

When mining ceased at the lowest part of Huntly East mine, pumps that had kept the workings drained were turned off. Over the period that the mine operated and expanded down dip to the west and north, groundwater was extracted from the main coal seam and surrounding rocks. Now that pumping has stopped, groundwater is able to progressively fill the voids left by mining.

Solid Energy estimated it would take 5 years to complete filling of mine workings. We have not sighted any documentation to show how this estimate was derived. It is not a simple calculation to estimate time to fill; it would involve some assumptions that are difficult to verify.

At the time of subsidence affecting the area above the Southern Headings, State Coal Mines engineers considered the effect of possible mine flooding. In 1983 P.J. McNally and D. Depledge independently reported on the potential for a reduction in bearing strength of up to 25% when the fireclay floor is flooded. They were concerned that "pillar punching could occur which would cause further surface subsidence". That is where the soft ground under the coal pillar is unable to support the load imposed by the pillar.

In March 2018 Solid Energy informed Waikato District Council that "the area (of the South Headings) was standing well, but access was limited due to the extensive flooding of the areas where bottom coal had been excavated". They also suggested that because many of the pillars are already partly flooded, then that would limit any effects of further flooding. However, they have not documented the timing or extent of partial flooding, expected to be due to water ponding behind roof falls, and in areas of local dip closure. It is not clear whether this might have contributed to the subsidence observed above the South Headings.

The present load carrying capacity of the pillars in the South Headings area is unknown, but given the past subsidence history of the area, we expect to see further subsidence as the mine voids are progressively flooded. This could be either due to pillar punching into the floor as State Coal Mines engineers suggested, or due to widespread pillar collapse as loads are redistributed following pillar punching.

Once the mine workings are filled with water, the hydrostatic pressures in the mine openings will assist pillar stability and limit the amount of future subsidence.

The area of mine workings to the north of the area under study have similar characteristics to the South Headings. However, the area of workings down dip from the main mine access drives has been flooded for some time and are not expected to cause further significant subsidence.

The area up dip and to the north east has been kept drained by pumping. Following from the discussion above, we would also expect there to be further subsidence in that area as the workings progressively flood. As with the South Headings, once all the northern workings are flooded, subsidence would be limited.

5. Gas trapping and migration

As coal is mined and dewatered, gas is expelled from the coal seam. The process of de-gasification is complicated, and the gas constituents and rate of emission can vary depending factors including geological structure, gas pressure gradient, and variations in coal composition.

During operation of the Huntly East mine, mine gases were controlled by the ventilation system which was designed to dilute hazardous gases to acceptable concentrations. At Huntly East, methane was released during mining, along with other gases such as carbon dioxide.

Solid Energy reported to Waikato District Council in a letter dated 14 March 2018 that methane levels in the South Headings were around 0.18%, with the atmosphere primarily nitrogen with small

amounts of CO₂. The date of the gas observation is unknown but would appear to reflect the gas composition at a time when the mine ventilation system was still in operation.

As discussed, the mine abandonment planning was focused on limiting ingress of oxygen to the workings. This appears to have succeeded as the mine gas composition is now around 30% methane (Craig Smith pers. comm.) with little or no oxygen hence the objective of suppressing spontaneous combustion appears to have been achieved. However there has been a significant increase in methane since the mine ventilation was stopped and the workings sealed. This atmosphere is assumed to be homogeneous across the open workings in the upper part of the mine.

The effective sealing of the underground workings from oxygen ingress has allowed the gas pressure within the workings to increase and was confirmed when the valve at the portal was opened recently (Craig Smith, pers. comm.). This is due to continued flow of methane from the exposed coal, and the effect of compression of the mine atmosphere as water levels rise.

Gas build up in abandoned workings was discussed in a United Nations report (United Nations, 2016). They state: *When an underground coal mine ceases coal production, methane gas continues to flow into the underground workings through the process of desorption from residual coal within strata disturbed by mining activity. For gassy mines this desorption process may continue for many years after closure but at a rapidly declining rate and, where a mine is flooded, can resume when flooded mine workings are dewatered. The coal mine owner may therefore face potential long-term liabilities including explosion risks on the surface and possible dangers to the public as well as continuing greenhouse gas emissions.*

We have been able to map out areas of the mine workings where gas can be trapped (Figure 4). This is based on the methodology used to predict where natural gas (and oil) can be found due to the configuration of confining strata. In this case we have used the structural contours on the Kupakupa coal seam floor to show where areas of potential closure are located. In the area of the Southern Headings, once water has built up past the intersection with the main mine entries, the gas in those workings is effectively trapped. This is like a stratigraphic trap in conventional oil and gas.

Once gas is trapped, pressure build up will occur until the seal is breached and gas is able to migrate. We know from previous work that methane has very low solubility at the temperature and pressures we are working with (Christenson, 1999), so it will not be absorbed into the water flooding the workings.

There are two possible pathways for gas to move to a low pressure (atmospheric) area. One path is along drill holes that are located around Huntly East. These were mainly drilled before mining as part of resource definition studies. At the end of drilling, they were backfilled without providing an effective seal to the coal seam that they penetrated. HMS recommended that some of the drill holes should be sealed to prevent ingress of oxygen, however we have not been able to verify that this work was completed.

The second pathway for gas to migrate is through the ground overlying the mine workings. In places this will have dilated due to mining disturbance and subsidence, and complex pathways for gas to migrate to the surface will be present.

Generally, methane that reaches the ground surface will dissipate without causing any problems. If there is a trap above the area of discharge, then methane can accumulate. Should this occur, and methane concentrations are in the 5% to 15% explosive limit then combined with an ignition source,

there is a potential for explosion. Unfortunately, this has happened in other countries where houses located above coal mines have inadvertently trapped methane.

6. Health and safety

During the period that the Huntly East underground mine was operating, matters of health and safety were under the control of Solid Energy New Zealand Ltd, with oversight from a specialist unit in WorkSafe New Zealand.

We have been informed by WorkSafe that as there is no longer an active mining operation, any health and safety matters that might arise from the abandoned mine workings are for the surface landowners and occupiers to manage.

7. Conclusions and recommendations

We expect that subsidence will continue above mine workings that have yet to be flooded as mine waters rise up dip towards the surface. It is very difficult to predict the amount of subsidence that could occur. In the worst-case scenario where there is widespread pillar collapse, there could be similar surface disruption to that experienced in the early 1980s.

Once the mine workings are filled with water, then we expect there would be only minor continuing subsidence. We do not have a reliable estimate of how long it will take to fill the workings, and without any monitoring in place, it will not be possible to know when water has displaced all the gas.

The objective of suppressing spontaneous combustion as part of the mine abandonment appears to have been achieved, based on the recent gas analysis from samples taken at the mine portal. This has resulted in the unintended consequence of allowing the build-up of methane in well-defined traps as water level rises in the mine workings.

We have identified a potential hazard caused by migration of methane to the ground surface should it be trapped in a place that is exposed to an ignition source. There does not appear to be a risk of underground explosion given the methane content as has been measured at the mine portal is higher than the explosive limit, and the lack of an ignition source due to suppression of spontaneous combustion.

Both subsidence and gas hazards are present in all areas where underground workings have yet to fill with water. There are likely to be variations in the subsidence hazard due to changes in depth of mining and pillar geometry, however that is difficult to quantify with the information that is currently available.

There are a few mitigation measures that could be carried out to minimise mine subsidence, and control gas build up. These could involve backfilling of mine workings from the surface, and drainage of gas using drill holes. The details of these operations are beyond the scope of this report.

We have taken both subsidence and gas hazard into account with our definition of a proposed hazard area (Figure 5). This covers the areas of mine workings that have not filled with water, and the areas where we have shown the presence of a gas trap.

Should Waikato District Council decide to take a precautionary approach to land use in this area, then it would be appropriate to not allow development in this area until all the mine workings have flooded, or mitigation measures have been put in place. However, without appropriate monitoring, it will not be possible to know when that has been achieved.

We understand that this report discharges our duty to inform the appropriate parties of hazards that might need to be considered as part of their ongoing health and safety obligations.

8. References

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9. Applicability

This report has been prepared for the benefit of Waikato District Council with respect to the brief given to Ian R Brown Associates Ltd. It may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Opinions and recommendations contained in this report have been derived from the information and data gathered during our investigations.

No liability is accepted by Ian R Brown Associates Ltd nor by any Director, or any other servant or agent of the company, in respect of the use of this report (or any information contained therein) by any person for any purpose other than that specified in the brief.



Figure 1. Location map

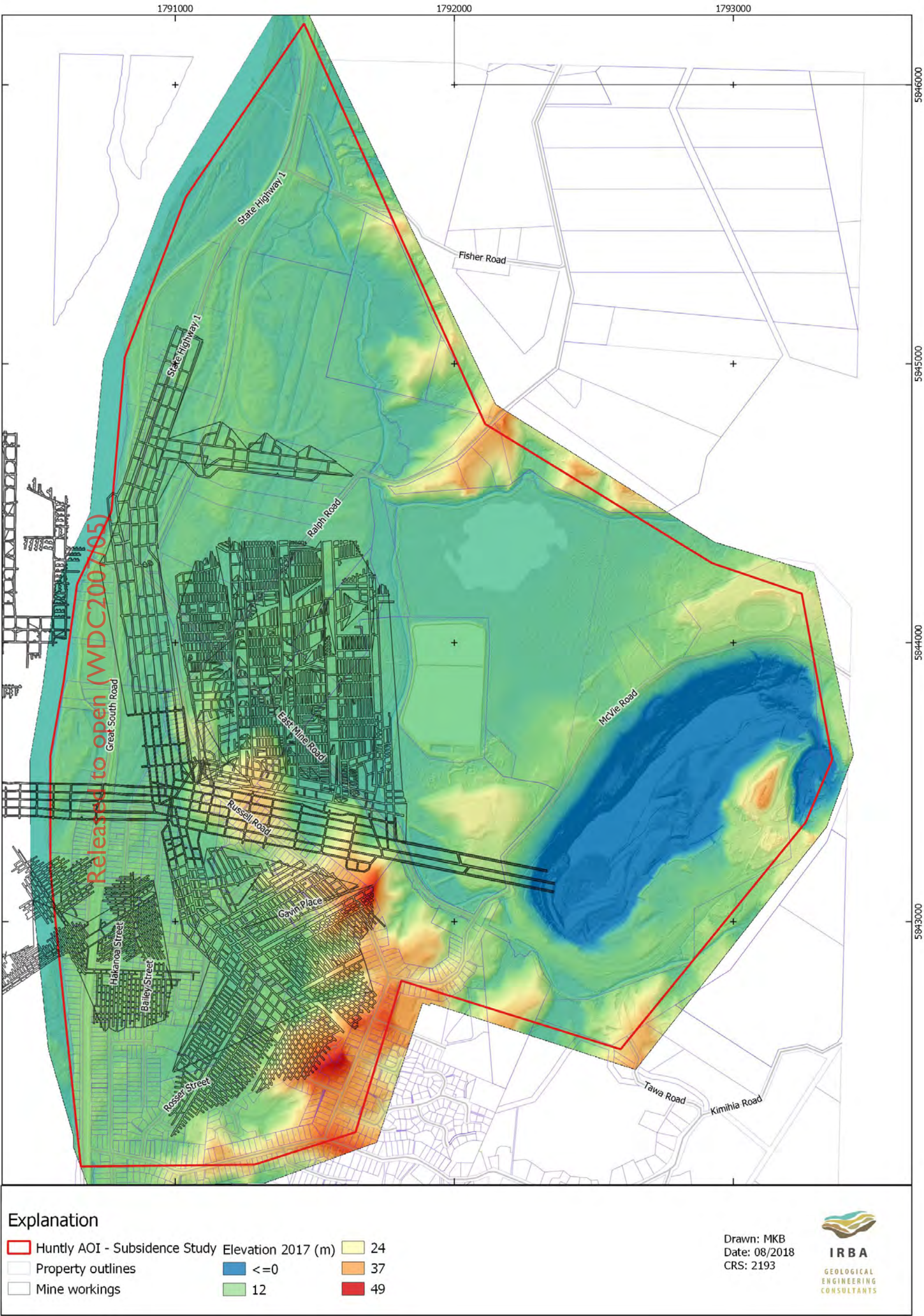


Figure 2 Topography and mine workings

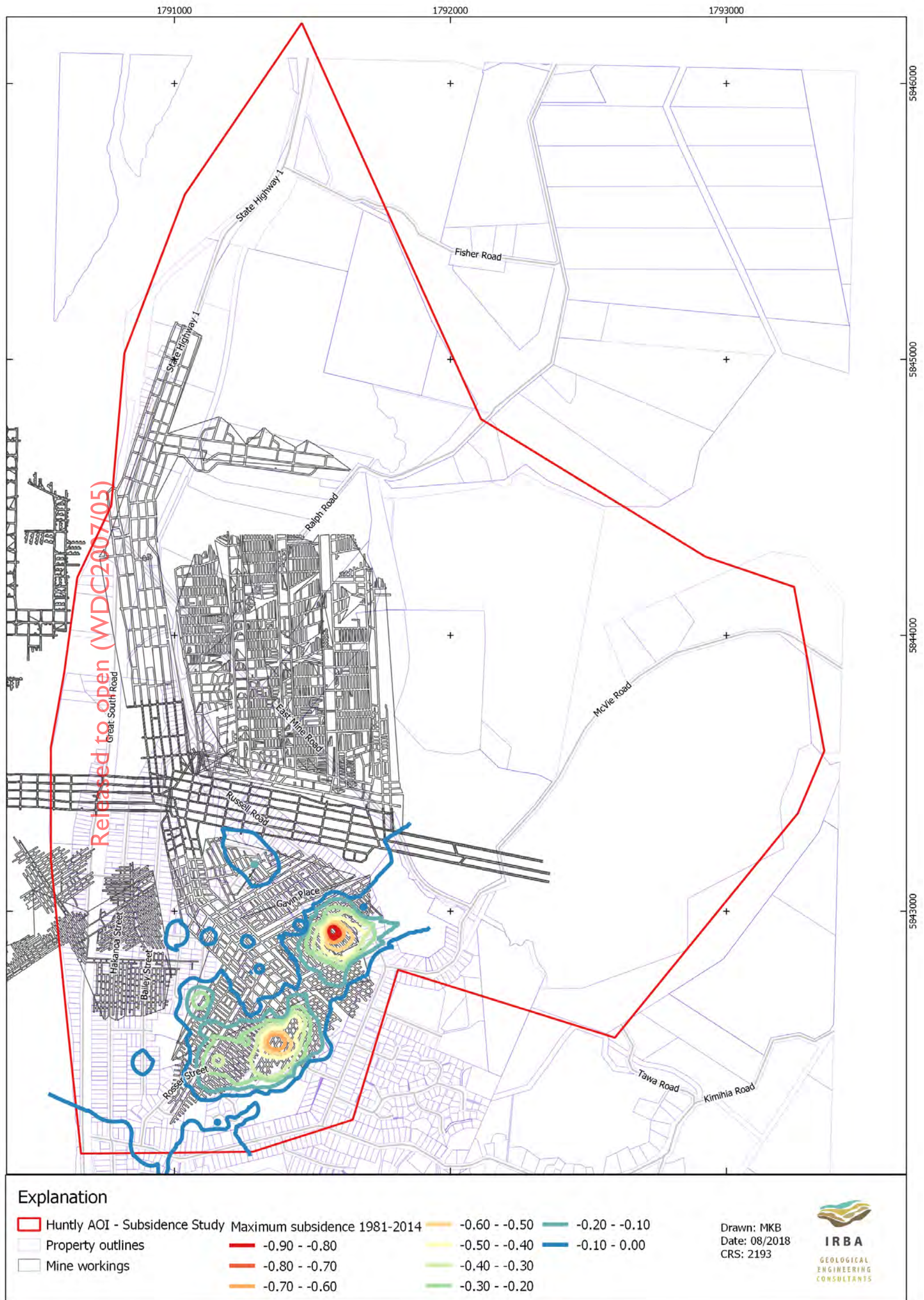


Figure 3 Maximum subsidence 1981 - 2014

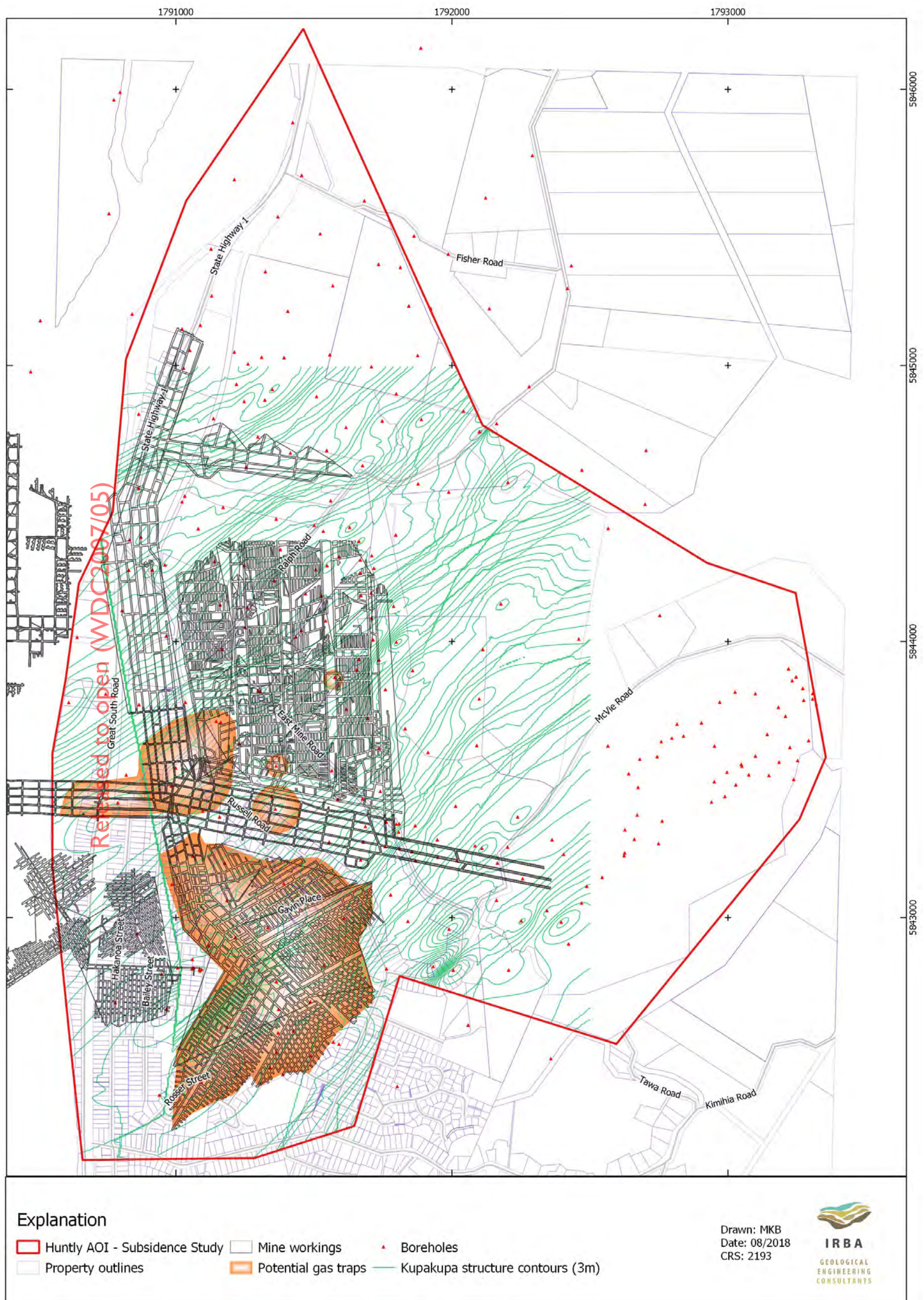


Figure 4 Areas of potential gas trap

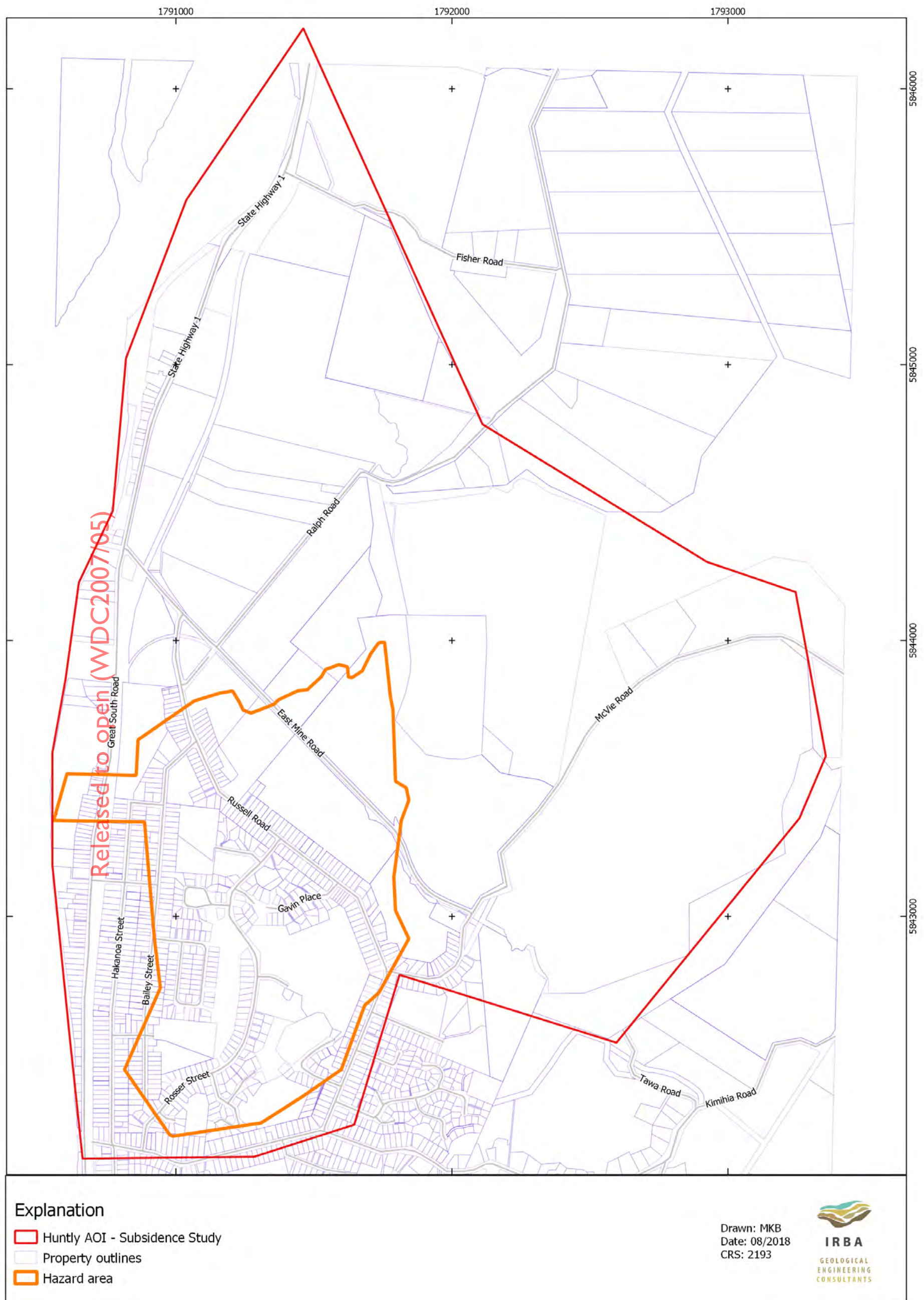


Figure 5 Proposed Hazard Area



Peer Review of Ian R Brown Associates report titled
“Report on hazards following mine closure, Huntly East,
October 2018, Project 1003”

8 January 2019

Date: 8 January 2019
Project No. TFM0096
Revision 1

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REPORT TO: Waikato District Council

PROJECT: Peer Review of Ian R Brown Associates report titled "Report on hazards following mine closure, Huntly East, October 2018, Project 1003"

PROJECT NO: TFM0096

PEER REVIEWERS: Craig Smith
(Mining Executive, TFM) Borys Poborowski
(Ventilation Engineer, TFM)

DATE: 8 January 2019



.....
Lincoln Smith
Managing Director



.....
Craig Smith
Mining Executive

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Released to open (WDC2007/05)

Introduction

Terra Firma Mining Ltd (Terra Firma) has been engaged by the Waikato District Council to peer review the report prepared by Ian R Brown Associates in October 2018.

The peer review will:

1. Review the final report and all referenced material;
2. Engage in dialogue with the author/s if required; and,
3. Prepare a report that includes the following:
 - Discussion on whether or not the assessment of the risk of future subsidence and gas trapping and gas migration follows a robust line of enquiry
 - Discussion on whether or not the information gathered and analysed is sufficient for its purpose and if not detail the gaps in the analysis/ evidence
 - Discussion on whether the assumptions, conclusions and the final recommendations are reasonable and able to be relied on to inform land use planning.
 - Discussion on any limitations of the peer review.

The peer review will not require a new assessment.

Background

As part of the District Plan Review (DPR) project, Council engaged Ian R Brown Associates Ltd to carry out a subsidence risk assessment to ascertain whether the land within the study area was at risk of further ground subsidence as a result of the closure of the East Mine and resulting flooding of the mine workings.

The study area covers the land within the existing Huntly East Mine Subsidence Area identified in the Operative Waikato District Plan as well as an area of land to the north of East Mine Road (study area shown in Figure 1 of the subject report).

This assessment is required to establish the suitability of land for future urban development within the study area. The recommendations will be relied on to inform any changes to provisions for development within the existing Huntly East Mine Subsidence Area and any decision to rezone an area of rural land to the north of Russell Road through the DPR project.

The final report titled '*Report on hazards following mine closure, Huntly East*' dated October 2018 was received by Council on 19 October 2018.

Discussion

1. Regulatory oversight

Under the Health and Safety at Work Act (Mining Operations and Quarrying Operations) Regulations 2016, Solid Energy New Zealand Ltd (SENZ) was required to advise WorkSafe of its decision to close and seal the mine. It would be expected that WorkSafe would require to be advised on the sealing methodology. Whilst WorkSafe would not be expected to approve the SENZ process, WorkSafe was able to issue improvement notices to SENZ if it was not satisfied with the risk treatment. The report does not reference any correspondence between SENZ and WorkSafe.

It appears that the HMS Consultants Australia Pty Ltd (HMS) risk assessment focussed on the risk of fire and explosion due to the expected accumulation of methane and the potential for the coal to spontaneously combust during the sealing process. It is not apparent that the sealing risk assessment considered the potential for gas to be trapped and pressurised in areas of the mine or whether the flooding of the mine could result in increased subsidence in the South and North Sections of the mine. It is understood that SENZ considered this potential hazard but there is no documentation available.

2. Seal design and construction

The installed seals are rated seals, designed to be essentially airtight. Changes in barometric pressure make it practically impossible to eliminate the movement of air between the mine and the outside atmosphere, but the design and construction of the seals minimises this air movement to best ensure the maintenance of an inert atmosphere within the mine. The seals are also designed to contain an explosion should this occur. From our recollection the seals were designed by a chartered engineer based on failure mode analysis. The construction steps were documented and signed off by the mine officials responsible and concrete samples from each seal were tested for compressive strength.

It should be noted, that the quality of the seals does not prevent the likely leakage of gas through the strata to the surface from the shallow roadways. This leakage is undetectable in an operating mine because the flow rate is very low and the gas composition is essentially the same as fresh air. The nature and rate of leakage can be estimated by observing trends in mine pressure and comparing the in-situ gas composition with the sealed-off area composition (e.g. a rising CO₂ level in a sealed-off area that is well above the seam gas level may indicate fresh air leakage into the mine). It is recommended that the gas monitoring data and the pressure trends underground gathered over several months post-sealing be reviewed. It may be possible to extend the outlets of the monitoring tubes and continue to determine the gas composition and pressure from behind the seals.

During sealing the period of greatest risk is during the transition from an oxygen rich and low methane atmosphere to a low oxygen and methane rich air mixture. This is also the period of greatest risk of accelerated spontaneous combustion. It is understood that SENZ minimised the risk of spontaneous combustion by inertising the atmosphere by injecting nitrogen. The most recent sighted sampling and analysis of the atmosphere behind the seals since the mine was sealed shows the atmosphere remains fuel-rich inert. It can become explosive by the introduction of fresh air to raise the oxygen level and reduce the methane concentration to within the explosive range of 5% to 15%.

Installed within the seals are small diameter tubes fitted with shut-off valves outside the seal that allow the atmosphere behind the seals to be sampled. Mine seals are typically also fitted with U-tubes that allows the water level on both sides of the seals to be maintained in an equalised state, to avoid imposing high hydrostatic pressure on the seals. Since the seals were apparently designed to

withstand the maximum potential water head of the future lake, it is assumed that the water traps in the portal seals were forgone to prevent uncontrolled discharge of the mine gas due to lack of maintenance on water traps or accidental pipe damage and workers' exposure to gas inrush during the mechanical filling of the drifts. It is noted that the portal seals do not contain bleeding arrangements to allow high gas pressures or high hydrostatic pressure to be relieved.

The sampling tubes are understood to extend some tens of metres into the mine but nevertheless the gas mixture that is able to be sampled and analysed is only representative of the atmosphere immediately behind the seal. There will undoubtedly be variation in the atmospheric make-up in different parts of the mine especially where there are barriers that limit complete mixing. Should the tubes become blocked due to a build-up of condensation it may be possible for the tubes to be cleared using compressed nitrogen to purge the tubes.

3. Gas content in the sealed-off areas

The coal within East Mine has a low to moderate methane content, however the coal seams are thick providing a comparatively large gas reserve. The gas desorption rate declines over time as the gas content within the coal diminishes.

The sealed-off areas at East Mine have shown a general long-term trend of diminishing methane levels relative to the age of the old workings and the distance to the mine portal. Gas composition prior to the sealing and during the sealing process (November 2016 – July 2017) was well documented.

4. Gas migration to the surface

There is potential for gas to migrate from within the mine through fractures within the overlying strata, particularly in parts of the mine where the strata immediately above the coal seam has collapsed following pillar extraction. Parts of the mine were naturally wet due to connection between the coal seam and the overlying sub-surface aquifers. It is understood that the permeability between the coal seam and the overlying aquifers increased as a result of pillaring. It was observed while the mine was operating that the rate of water in-flow to parts of the mine increased following periods of rainfall indicating a degree of permeability between the coal seam and the surface. There is no reason to suppose that gas will not tend to migrate through these same permeable pathways.

There is no apparent record of gas being measured or detected on the surface above the mine workings.

It was probably outside the scope of the original report, but it is considered important to attempt further hazard mapping - quantification of the hazard of potentially trapped gas (gas pressure, Standard Temperature and Pressure (STP) quantity and trapped area as a function of progressive flooding) plus a revision of the Hazard Area marked in *Figure 5*, for the following reasons:

1. It is likely that gas has been trapped in North64/North 6 roads. These panels are directly adjacent to the western border of the Huntly Area of Interest (AOI).
2. Gas volume reduces with rising pressure (e.g. 10m of water column will halve the gas volume). It is likely therefore that the risk area will shrink with progressive flooding.
3. Gas does not need to only migrate vertically. It is recommended that delineated surface hazard area should extend beyond the assumed underground area of assumed gas entrapment.

Boreholes have presented a particular hazard allowing connection between the mine and the surface. It is understood that SENZ made some effort to seal these boreholes while the mine was operational to minimise the potential for these boreholes to allow fresh air to enter sealed areas and increase the risk of spontaneous combustion.

Given the likelihood that pathways exist between the mine voids and the surface, there is the potential for gas flows to increase should there be an increase in gas pressure within the mine.

5. Gas composition in the South Section goaf

It is reported that the gas content within the South Section was predominantly nitrogen with a very low methane level. It is not certain that the South Section void will remain separate and sealed off from other pillared areas (goafs) within the mine that contain high levels of methane. There is some likelihood that the gases from different parts of the mine will migrate and mix over the longer term.

Since the quality of the old South seals was not high, it can be expected that some methane migrated to the area directly after mine sealing. This process was expected to stop several weeks after sealing when rising water levels in the natural ponding area in the main roadways directly adjacent to the South roads cut off interconnection to the seals.

6. As-built drawings of the mine workings

It is expected that historic mine plans are available that show to a reasonable level of accuracy the location and dimensions of all roadways and pillars in the primary workings. The accuracy of dimensions of remnant pillars and the dimensions of goafs is less certain, and precautions need to be taken when attempting to calculate the likely subsidence resulting from the mining activity.

7. Water level within the mine

There is no readily available means to monitor the rising water level within the mine. Water will eventually be detected when the water level in the mine entries reaches the gas sampling tubes immediately in-by the mine seals. It is suggested that the post-sealing reports on gas monitoring from the portal sampling tubes be obtained. These tubes are positioned at different locations and RL levels and they will become submerged at different times, which should allow for an estimation of the water level rise.

8. Effect of flooding on the remaining pillars

Following pillar extraction, a long-term stable condition will be achieved when the surrounding strata has failed and filled the roadway voids to an extent that the remaining pillars are confined and able to resist the imposed stresses. Surface subsidence is expected to decline following the long term stable conditions being achieved in the underground workings. It seems likely that flooding the mine will reduce the strength of some of the surrounding strata and that this will have the potential to cause further strata failure and weaken the coal floor to such an extent that the pillars will punch into the floor. Should this occur, there is the potential for further subsidence on the land surface. It is difficult to predict whether the hydrostatic load when the mine is completely flooded will have a significant positive effect in supporting the remaining standing pillars. It is therefore not apparent or certain that the mine will be more stable when flooded than in an unflooded state.

The latest subsidence monitoring results referred to in the Report are dated 2014. The gap in monitoring between 2014 and when the mine was sealed in 2017 makes it difficult to draw any conclusion on the impact of the sealing and flooding of the mine on surface subsidence. It is recommended that recent subsidence data be obtained and a programme of surface subsidence monitoring be initiated and maintained until the mine is proven to be flooded and stable.

9. Comments on Recommendations in Ian R Brown Associates' Report

- i. *We expect that subsidence will continue above mine workings that have yet to be flooded as mine waters rise up dip towards the surface. It is very difficult to predict the amount of subsidence that could occur. In the worst-case scenario where there is widespread pillar collapse, there could be similar surface disruption to that experienced in the early 1980s.*

The flooding of the mine is a changed condition and it is uncertain whether this change will have a destabilising effect on the subsidence in the area concerned. There is the potential for the increased hydrostatic pressure to provide support to the remaining pillars and therefore reduce the potential for further or increased subsidence. There is also the potential for the parts of the strata to be weakened by the ingress of water. It is reasonable to conclude that there is on-going potential for subsidence to occur and that a monitoring programme is implemented to track the subsidence over a period of time to better understand the risk.

- ii. *Once the mine workings are filled with water, then we expect there would be only minor continuing subsidence. We do not have a reliable estimate of how long it will take to fill the workings, and without any monitoring in place, it will not be possible to know when water has displaced all the gas.*

It is expected that post-flooding subsidence will decline. It is not possible to predict the time period over which this decline will occur without monitoring. In addition to monitoring the on-going subsidence it would be helpful to identify the means to determine when the mine workings are completely flooded. Drilling boreholes to intersect the goaf in the target area may be possible in addition to monitoring the water pressure behind the main seals.

- iii. *The objective of suppressing spontaneous combustion as part of the mine abandonment appears to have been achieved, based on the recent gas analysis from samples taken at the mine portal. This has resulted in the unintended consequence of allowing the build-up of methane in well-defined traps as water level rises in the mine workings.*

It is not known whether there are existing leakage paths from all parts of the mine to the surface allowing for gas release. Each particular strata has a degree of permeability which allows for a flow relative to the differential pressure. With a build-up of water causing a rise in gas pressure the gas will migrate and/or adsorb which in turn will reduce the pressure and be displaced by the rising water level. It may be possible that a borehole(s) drilled from the surface to intersect the target void will allow the mine gases to safely escape as the water level rises. The HMS/SENZ risk assessment does not address the potential hazard of a build-up of methane in gas traps so it is not known whether this is an unintended consequence.

- iv. *We have identified a potential hazard caused by migration of methane to the ground surface should it be trapped in a place that is exposed to an ignition source. There does not appear to be a risk of underground explosion given the methane content as has been measured at*

the mine portal is higher than the explosive limit, and the lack of an ignition source due to suppression of spontaneous combustion.

There does not appear to be a significant risk of spontaneous combustion or explosion. All reports are that the mine atmosphere is inert and there is no indication of an incipient heating. There remains the risk of methane escaping from the mine through poorly sealed boreholes and through breaks in the strata above the mine workings. The land above the target area is open to the public and various ignition sources are likely to be present. If methane does enter the outside atmosphere it will be readily diluted but the gas does have to pass through the explosive range. It is reasonable to assume that the gas quantities will be small, however this should be confirmed through the implementation of a monitoring programme. There is also a risk of irrespirable atmosphere, however, the likelihood of this occurring is low. There is the on-going risk of spontaneous combustion however this is also expected to be low. It is understood that there is no recent monitoring data available from inbye areas isolated from the atmosphere behind the seals, therefore it is not possible to determine whether leakages exist that potentially allow for oxygen access into low natural gas make areas. (These are areas in which the rate of gas produced from the coal is low).

- v. *Both subsidence and gas hazards are present in all areas where underground workings have yet to fill with water. There are likely to be variations in the subsidence hazard due to changes in depth of mining and pillar geometry, however that is difficult to quantify with the information that is currently available.*

Agreed.

- vi. *There are a few mitigation measures that could be carried out to minimise mine subsidence, and control gas build up. These could involve backfilling of mine workings from the surface, and drainage of gas using drill holes. The details of these operations are beyond the scope of this report.*

Partial back-filling of the mine may be technically feasible but would undoubtedly be expensive. There is the possibility that back-filling would lessen the scale and shorten the time of future subsidence but the gain may ultimately not be significant.

Positively draining gas from the mine to minimise the build-up of gas pressure that may present a fire and explosion risk may be an available risk mitigation control that warrants further consideration.

- vii. *We have taken both subsidence and gas hazard into account with our definition of a proposed hazard area (Figure 5). This covers the areas of mine workings that have not filled with water, and the areas where we have shown the presence of a gas trap.*

This determination seems reasonable. Further work may be carried out to identify natural gas trapping points and pressure as a function of the flooding progress. If emission monitoring is attempted, it would assist in hazard mapping and potentially reduce the area of concern.

- viii. *Should Waikato District Council decide to take a precautionary approach to land use in this area, then it would be appropriate to not allow development in this area until all the mine workings have flooded, or mitigation measures have been put in place. However, without appropriate monitoring, it will not be possible to know when that has been achieved.*

We understand that this report discharges our duty to inform the appropriate parties of hazards that might need to be considered as part of their ongoing health and safety obligations.

The flooding of the mine is a significant change that may compromise subsidence trends based on previous subsidence monitoring carried out by Solid Energy. It is not certain that subsidence will necessarily cease immediately upon the workings being flooded.

Recommendations

The following actions are recommended:

- Establish subsidence monitoring in the area using existing monitoring pegs if possible, to determine subsidence change after sealing/flooding commencement;
- Establish regular seal pressure monitoring;
- Extend (if possible) gas tube monitoring points at the seals (which are under the threat of surface flooding) to allow for inbye areas gas composition and pressure monitoring;
- Obtain records of post-sealing gas monitoring for trending and water level advance estimation;
- Continue gas monitoring the atmosphere behind the seals;
- Consider carrying out hazard mapping to determine the location and volume of gas traps and to estimate the gas pressure resulting from progressive flooding, based on the overburden strength and permeability. Plans of underground workings with roadway roof and floor RLs are necessary for determination;
- Investigate drilling boreholes to intersect gas traps to allow gas to be drawn off while maintaining an inert environment but minimising the hazard of high gas pressures; and,
- Implement a gas detection monitoring programme on the surface, especially during dropping barometric pressure periods.

Summary

- The Ian R Brown Associates' (IRBA) report highlights the potential risk of future subsidence, gas being trapped within the old mine workings and the possibility that gas will migrate.
- The IRBA report properly cautions the Waikato District Council to take a precautionary approach when considering future land use of the land above the mined-out areas of concern.
- The IRBA report highlights the current lack of sufficient knowledge to enable a definitive estimation to be made on when the risks of the identified hazards will fall to acceptable levels.
- The IRBA report raises the suggestion that further monitoring may be an available risk mitigation strategy to measure and track the flooding of the mine and subsidence trend.
- This peer review elaborates on the possible risk mitigation measures available and makes several recommendations.

REPORT ON:
RISK ASSESSMENT FOR URBAN AREAS
ABOVE THE MINE

PROJECT:
HUNTLY EAST MINE CLOSURE ASSESSMENT

CLIENT: WAIKATO DISTRICT COUNCIL

WAIKATO DISTRICT COUNCIL
15 GALILEO STREET
NGARUAWAHIA 3720

Released to open (WDC2007/05)

EXECUTIVE SUMMARY

The subsurface Huntly East Mine opened in 1978. The minimum depth of cover to the surface is approximately 100m, which is in the southern part of the mine. Throughout the period of active mining, coal seam gas was managed and extracted from the workings. In the same period the urban area of Huntly has developed on the surface above the mine. In early 1983 adverse surface subsidence was observed, and as a consequence mining practises were altered.

The mine was closed in 2015. The closure included the sealing of the mine entrances, which are to the east of the township. The monitoring of the seals to date suggest they have been effective in excluding the intrusion of air and promoting the increase of methane gas in the voids to a concentration that is not within an explosive limit. The approach taken in the design of the closure is to flood the mine, thereby equalising the pressures throughout the coal seams so that no further gas will be released from the coal matrix. However, there is a period between mine sealing and the eventual full flooding of the mine, which has been estimated to be in the order of 5 years (Solid Energy New Zealand, 2018).

Waikato District Council initiated this study to assess risk presented by the closed underground mine to the surface urban development over the coming years, relating particularly to:

- Surface settlement affecting the surface environment; and
- The migration of coal seam gas to the surface environment.

This study adopted the internationally recognised ISO 31000 approach to the assessment of risks. In developing this approach, the existing information relating to the mine was adopted as the basis of the assessment. Group workshops with participants who have diverse skills, experience, and direct knowledge of the circumstances of the Huntly area collectively undertook the assessment. The likelihood of various consequences to the surface environment were assessed in the context of a broad set of risks faced by modern urban environments.

The conclusions of the assessments are presented in two risk register matrices; one relates to new developments and the other addresses the circumstance of existing developments in the area. The assessment of risk suggests, in summary:

- The types of risks have been, and remain, those related to the effects of settlement and coal gas.
- The likelihood and possible consequences are influenced by the different mining methods used and the type of surface development.

- The risk to the surface environment of settlement is not materially altered from the time of mine operations. Ongoing surface settlement following closure of underground workings is a well-recognised phenomenon in other parts of the world.
- Physical mechanisms for transmitting coal gas from the closed mine to the surface environment were considered in workshops, but the likelihood of this occurring in the circumstances is considered to be very rare. Risks associated with gas migration from closed underground mines is not a phenomenon reported in commonly available statistics. In addition, instances of coal seam gas migration to surface environments have not been identified at Huntly or elsewhere.

In light of previous recommendations, the issue of monitoring for settlement and gas migration across the area was considered in the workshops. The conclusion is that currently there is frequent, but ad hoc, monitoring of the buried utility infrastructure in the area and this provides an extensive monitoring network for both:

- **Surface Settlement.** The condition of buried water pipes and sewerage pipes are an effective means of assessing settlement and differential settlement across a wide area. Condition assessments of these brittle long utilities are not currently identifying disproportionate damage or unusual settlement characteristics.
- **Gas migration to the surface across a wide area.** If methane gas (a component of coal seam gas) were to be hypothetically present in the near surface environment it would readily find its way into buried ducts and travel along the ducts. The utility operators always monitor voids for gas before entering them. To date the operators have not encountered elevated gas levels in the area. Nonetheless, should repeated instances of elevated methane gas levels occur in an area they would highlight a need for further investigation.

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1 INTRODUCTION

The Huntly East Mine opened in 1978 and closed in 2015. The seals across the mine entrances in the high wall of the abandoned Kimihia open cast mine have been monitored at intervals in the intervening period by Terra Firma. Since closure, two reports have been prepared by Ian R Brown Associates Ltd (IRBA) (2015 and 2018). The report in 2018 commented on possible further effects of the closed mine, in particular those associated with surface settlement and coal gas migration. IRBA (2018) in summary concludes that planning future developments in the area should consider:

- Solid Energy New Zealand (2018) suggested that flooding of the mine might take 2 to 5 years, but the flooding status of the mine cannot be monitored.
- Surface settlement is likely to continue but also likely to diminish as the mine floods. However, the magnitude of possible future settlement cannot be predicted.
- Coal gas will continue to desorb from the remaining coal seam into mine cavities until the mine is fully flooded. The two theoretical pathways for coal gas to migrate to the surface suggested by IRBA (2018) are through abandoned boreholes from the original mine investigations and the second through overlying geological strata.

Further investigation cannot eliminate uncertainty in the assessment of the consequences from the identified hazards. Consequently, this study takes the following approach:

- All available historical information and reports are adopted within the context with which it was prepared.
- Many activities have inherent uncertainty and those associated with the closed mine can be placed within the context of other risks mitigated or accepted by individuals, communities and the wider society.
- A risk-based approach provides a means of understanding and rationalising uncertainty. A risk assessment should be based on a robust methodology that is internationally recognised.
- The assessment process can be used to develop planning policies and rules for future developments and provide a basis for communication to the community where this might be necessary.

RDCL was engaged in June 2019 to manage the development of the risk assessment. The study developed in the following sequence:

- Define likelihood and consequences for review, comment and eventual adoption by Waikato District Council for this project.
- Develop a risk register and risk matrix structure from the system proposed for natural disaster events (GNS, 2016), which in turn is based on the approach of the AS / NZS ISO 31000.
- Undertake workshops to explore the settlement and gas hazards, mechanisms, risks and mitigation measures. These included a variety of attendees, primarily from the Waikato District Council, with extensive experience of the area and the requirements for urban developments.
- Population of a risk register; for the assessment of future development. These incorporate the assessment of risk and mitigation measures. The register is presented as a locked Excel spreadsheet.
- Undertake supplementary discussions to provide context when developing Policies and Rules for the Draft Waikato District Plan for future development in the Huntly East Mine area.
- The drafting of this report to record and summarise the risk assessment.

2 RISK ASSESSMENT METHODOLOGY

The risk assessment was planned and undertaken in accordance with the international standard AS/NZS ISO 31000 : 2018 Risk Management standard. This assessment approach was adopted because it is well recognised, and:

- Is structured and comprehensive.
- Can be customised to reflect particular circumstances.
- Is inclusive of many facets of a situation.

The methodology adopted in this assessment incorporates the steps for establishing the context, identifying risks, analysing risks, risk evaluation and mitigation as suggested by AS/NZS ISO 31000 (Figure 1).

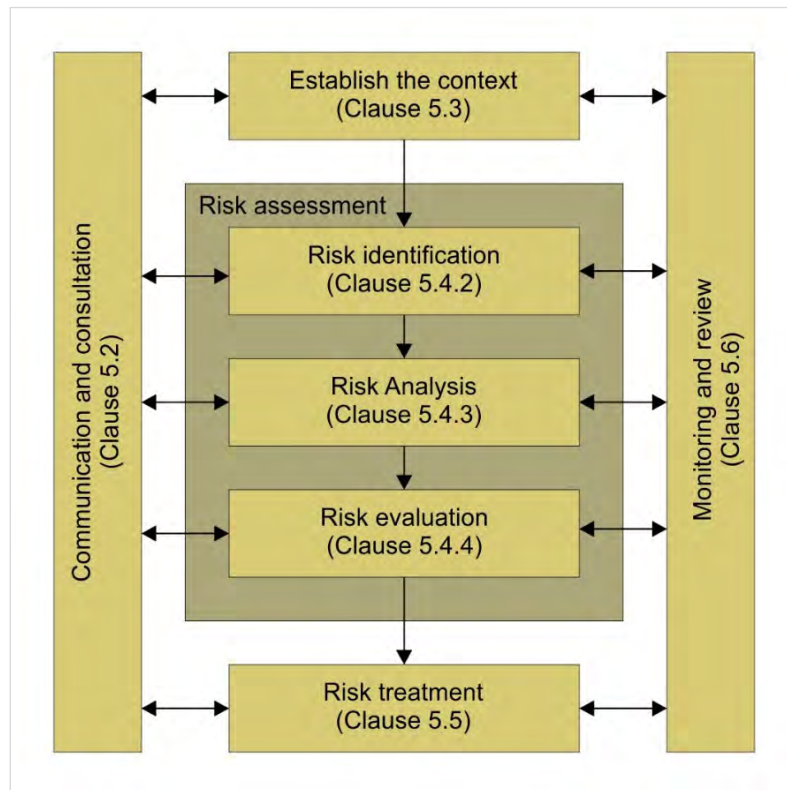


FIGURE 1 – ISO 31000 RISK ASSESSMENT PROCESS

The workshops adopted the Bow Tie process which is commonly used for assessing risks and their mitigation (Figure 2). The two causative events of interest are; settlement processes in the mine and the collection of coal seam gas in mine voids. The effects on the surface environment and the likelihood of their occurrence can be assessed from these events and the mechanisms involved.



FIGURE 2 – BOW TIE ASSESSMENT METHODOLOGY

The evaluation of risk adopts the scheme presented by GNS (2015), which is a 5 by 5 matrix of likelihood and consequence to assess the risk's severity (Figure 3).

Assessment Matrix Guidelines		Consequences				
		Negligible	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5
Likelihood	Almost Certain (5)					
	Likely (4)					
	Possible (3)					
	Unlikely (2)					
	Rare (1)					

FIGURE 3 – GNS (2015) EVALUATION AND ASSESSMENT OF RISK

Where mitigation measures are necessary and appropriate these are incorporated into the risk register and the risk is re-evaluated using the same assessment matrix.

3 WORKSHOPS

Workshops and telephone discussions supported the development of the risk assessment. The workshops covered different aspects and topics:

- 24th July 2019 – Huntly Power Station conference room. **Future developments** in the area. The large venue accommodated 12 participants, allowed for presentations and areas for discussion.
- 16th August 2019 – Telephone conference. **Existing urban environment**. This workshop took approximately two hours and followed roughly the same format as the initial workshop on possible future developments.

The attendees included a broad range of individuals from various groups in Waikato District council, including; Regulation management, District planning and policy, Consents, Resource management, Building control, Utility asset management and operation as well as communications. In addition to Waikato District Council representation, the workshop on 24th July was also attended by Ian Brown, an independent consultant from IRBA. The workshops were conducted by RDCL (Cam Wylie and Jeremy Eldridge) and focused on:

- Establishing the historical context of the mine development and the urban setting.
- Establishing risks and probabilities within the context of the recorded risks in other common activities and circumstances.
- Exploring possible mechanisms for the progression of the hazards from the mine to the surface environment.
- Exploring the qualitative understanding of likelihood that these mechanisms might occur.
- Developing possible measures to mitigate unacceptable risks.

4 LIKELIHOOD

The assessment of likelihood is set in the context of the hazards and risks encountered frequently and infrequently by the public, in different occupations and activities. In the 1990s The Health and Safety Executive (HSE) of the United Kingdom undertook an extensive study of the risks to the public as individuals and what risks are accepted by society.

HSE (1992) proposed the threshold for acceptability is a likelihood of occurrence in any one year of 1 : 10,000. If a serious event is more likely than this, then a society would mitigate the possibility or reduce the effects of an event. This threshold is now widely accepted across many developed countries in the governance of significant hazards.

In New Zealand this criterion is evident in determining the design criteria for large water retaining dams. This 1:10,000 Annual Exceedance Probability event is described as:

“The condition or event has not been observed, and no plausible scenario could be identified, even after considerable effort.” (ANCOLD 2003, after Barneich 1996)

The significance of the threshold in the context of other common activities is illustrated in Table 1. The data is taken from HSE (1992, 2001) and other sources. These statistics tend to change over time and from country to country. They are presented here to provide context for the discussion of likelihood. During compilation, no statistics were identified that specifically relate to risks from gas migration from abandoned underground coal mines. The absence of such statistics suggest that such risks are small or negligible when compared with other typical risks experienced by communities.

TABLE 1 – LIKELIHOOD OF COMMON ACTIVITIES

Activity	Likelihood (Probability in any year- AEP)
Fatality in mountain climbing 5 hours every weekend	1 : 100
Fatality in offshore oil; and gas industry	1 : 600
Fatality in deep sea fishing	1 : 750
Fatality in mineral extraction (mining)	1 : 3,900
Threshold – Theoretically possible but not at all expected	1 : 10,000
Fatality in gas incident (fire explosion, carbon dioxide poisoning averaged over UK population)	1 : 1.1 million
Fatality from a lighting strike	1 : 10 million

From Various sources since the 1990s

The definitions for understanding likelihood used in this risk assessment were developed in association with Waikato District Council (Figure 4).

Risk Assessment for Urban Development Areas – Huntly East Mine

Level and	Definition	Experience	Estimated Frequency
Likely 5	Expected to occur in most years.	An almost inevitable event	AEP 1 : 1
Possible 4	Expected to occur possibly in any one year.	Events that will probably happen in common circumstances	AEP 1 : 10
Unlikely 3	Expected to occur in period of a few years.	Events that could happen at some time	AEP 1 : 20
Rare 2	Expected to occur in a generation.	Conceivable but highly unlikely	AEP 1 : 200
Very Rare 1	It is an unlikely experience by an individual in a lifetime.	Theoretically possible but not at all expected	AEP 1 : 10,000

FIGURE 4 – LIKELIHOOD DEFINITION FOR THIS RISK ASSESSMENT

5 CONSEQUENCE

The list of consequences is focused on specific effects that might be observed in the surface environment. These are related to the different configurations of:

- Residential developments. Including; all residences where people may sleep, thus both individual homes, hostels, retirement homes and the like. This group includes considerations of associated buildings or facilities such as building extensions and swimming pools.
- Non-residential developments. Including; commercial buildings where people are not resident, such as offices, warehouses, and supermarkets. These buildings do not have people sleeping in them i.e. those locations where people are conscious while in occupation.
- Above ground infrastructure. Including; footpaths, roads, road furniture, retaining walls, power cables, telephone cables, earthworks and embankments.
- Below ground infrastructure. Including; water supply, wastewater, gas supply, buried telecommunications (including fibre optics cables).

The significance of an event is dependent on the impact severity of the possible effects in categories of Health and Safety, Monetary loss, Infrastructure damage, Legal or regulatory breach, Reputation and media coverage, Environment and sustainability consequence.

These categories generate a matrix with the severity of the impact of the consequence categories; Insignificant, Minor, Moderate, Major, and Catastrophic. The type of effects is related to key factors affecting individuals, communities or organisations (public and private) (Figure 5). To meet an impact category severity criterion only one of the effects needs to be met, not all.

Risk Assessment for Urban Development Areas – Huntly East Mine

Severity of impact	Hazard Types				
	Monetary loss	Health & Safety	Infrastructure	Legal / Regulatory Breach	Environmental / Sustainability
Catastrophic (5)	> NZ \$2 Million	Multiple fatalities or severe permanent disabilities / Loss of operational facility	Loss of a significant commercial or residential neighbourhood	Criminal convictions, financially material judgement, very serious litigation (including class actions)	Very serious, long term eco-system or social function impairment
Major (4)	NZ \$0.2 - 2 Million	Extensive or severe injuries that require hospitalization >48 hours / Significant damage of operational facility	Loss of: A commercial building A few houses	Temporary suspension, litigation, major judicial order or commercial dispute	Serious incident with medium term social or eco-system effects
Moderate (3)	NZ \$100k - 200k	Injuries requiring hospitalisation ≤48 hours / Extensive damage	Disruption to significant underground infrastructure Gas pipe lines Electrical power lines Telecommunications	Non compliance with Regulations, Codes or rules, significant judicial order or commercial dispute	Local event with short to medium term social or environmental effects
Minor (2)	NZ \$50K - 100K	Lost time injury (LTI) / Minor damage	Disruption to safety infrastructure requiring a rapid response - eg road signals	Non conformance with regulations, minor legal claims or commercial dispute	Localized incident, moderate, short term effects, non eco-system
Insignificant (1)	Up to NZ \$50K	First aid minor medical or no injury / No damage	Minor cracks in surface infrastructure - repairs can be delayed	Small claims legal or commercial dispute	Minor biological environmental & social events

FIGURE 5 – CONSEQUENCE DEFINITION FOR THIS RISK ASSESSMENT

6 CAUSATIVE MECHANISMS

The mechanism that lead to consequences are dependent on the root causes. The causes identified for the closed Huntly East Mine relate to:

- Surface settlement; and
- Coal gas migration.

6.1 SETTLEMENT - INITIATION AND PROPAGATION

The surface settlement over the mine is a consequence of the collapse of the void formed by coal extraction. However, the type and magnitude of settlement is depending on factors such as:

- The mining method; small pillars methods (Zone A) promote greater settlement than either large pillar method (Zone B) or the longwall method (Zone C). The areas over the mine roadways (Mine Roadways) are unlikely to exhibit any appreciable settlement due to their inherent cavern stability. (Figure 6)
- The geological structure over the mine. The brittle mudstone of the Te Kuiti Group (Figure 7) immediately above the mine workings did, at times, collapse into the workings. However, the deep soft, saturated soils above the mudstone has not permitted an open hole to develop to the ground surface (a crown hole). The presence of the soft alluvium of the Tauranga Group probably inhibits the development of crown holes.
- The depth of the coal workings below ground. Shallower mining working are likely to exhibit more pronounced settlement, with greater differential settlements. The shallowest mine workings are in the southern areas, where the depth of the workings is approximately 100m.

Historically the most significant settlement event occurred in the southern area early in the 1980s. This area is characterised by the small pillar mining method and is the area of the shallowest mine workings. Yet, even in these circumstances an open crown hole did not develop.

The longwall mining method promotes consistent settlement across the surface as the longwall advances. Differential settlement tends to advance as a slow wave at the same pace as the longwall mining. However, residual ongoing settlement after a mine is closed is not a characteristic of this mining method.

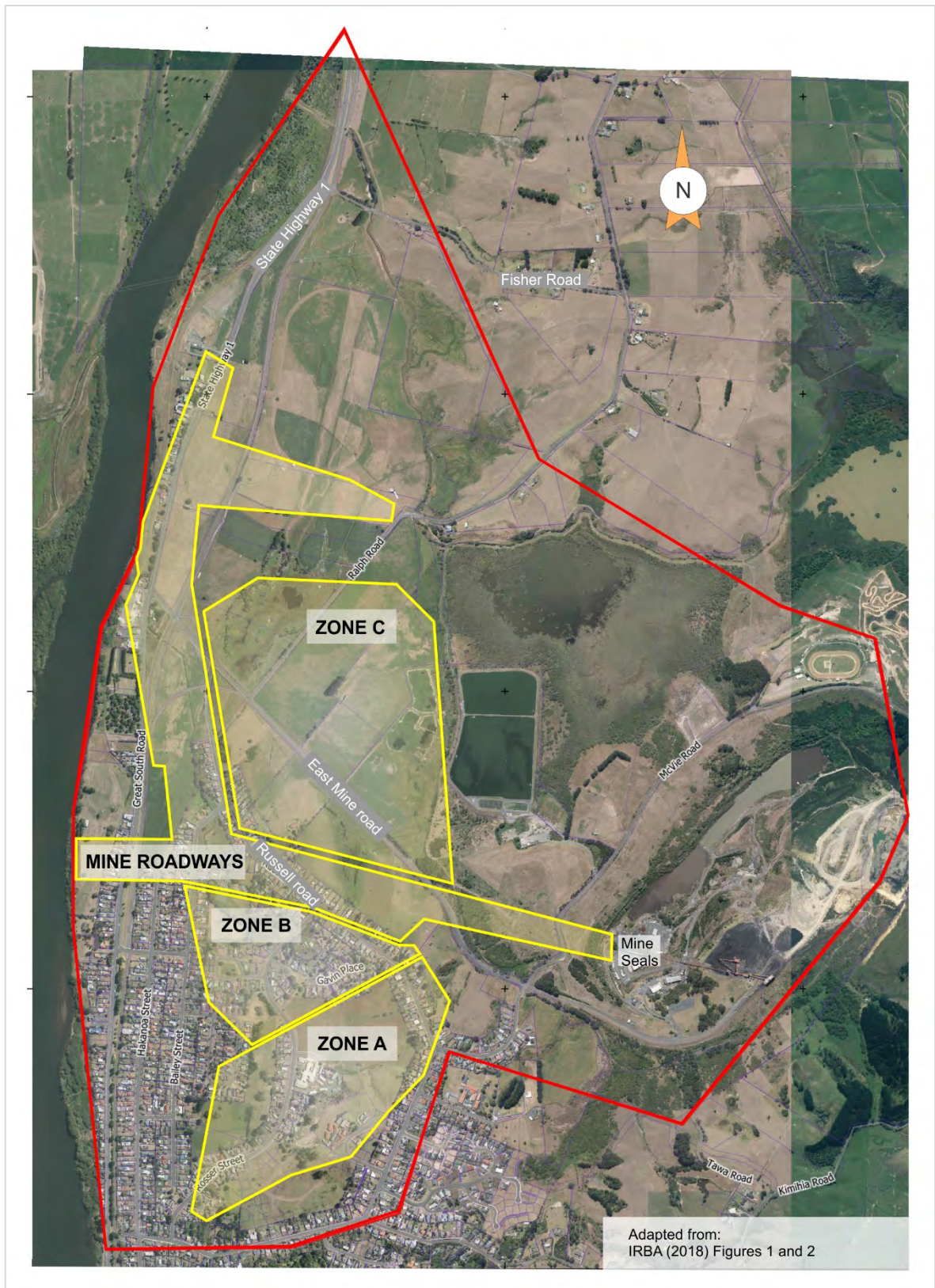


FIGURE 6 – ZONE LOCATIONS

6.2 GAS MIGRATION - INITIATION AND PROPAGATION

The constituents of consequence in coal seam gas is methane and when mixed with oxygen at specific concentrations can be ignited (between 5% and 15% by volume in air). Coal seam gas emerges from the remaining coal on the seam when there is less pressure in a void than in the coal measure. Likewise, the gas will theoretically move from a void with high pressure to another location of lower pressure. On closure the mine was sealed and the monitoring since indicates that, as intended, the methane concentration in the mine void is too high for combustion.

Once the mine is fully flooded, the pressure is equalised throughout the coal measure and is equal to the hydrostatic pressure of the groundwater above. At that time there is no further possibility of gas emerging from the coal. In the interim period, to be a credible risk to the surface environment, the gas must first reach the surface. Two mechanisms have been postulated (IRBA, 2018), but not proven:

- Gas travelling in water through the overlying groundwater regime to the near ground surface.
- Gas migrating up abandoned ground investigation boreholes installed as part of the initial mine investigations.

Regarding the first mechanism; methane is not very soluble in water at low pressures. However, elsewhere around the world it is detected in shallow groundwater (for example Bell 2017 and USGS 2006). The sources of methane in these groundwaters are various, including; near surface biogenic methane and methane of geological age. Edwards (1991) notes that methane is not very soluble at low pressure but become more soluble at high pressure. Edwards also notes that water can release methane if water containing methane travels from a location of high pressure to a low pressure environment, e.g. the ground surface. Methane can also be transported as a mixture with water in a high flow environment, for example flow in a sewerage pipe where water, air and methane mixtures flow in a turbulent environment.

However, the transport of both methane in solution or as a mixture require flow of water to transport the gas. There is no evidence nor a credible mechanism for water to flow from the mine workings to the ground surface through the overlying saturated low permeability alluvial deposits of the Tauranga Group (Figure 7).

The second of the postulated mechanisms is the travel of gas up an abandoned open site borehole which would have been drilled in the late 1970s as part of the investigation for the mine. Typically, diameter of this type of borehole would probably have been between 4" and 5" (96mm - 125mm). They would have required a steel casing to prevent the surrounding

soft alluvium from filling the advancing hole before reaching the sandstones and the coal measures of interest. Once the hole is completed and the necessary samples have been retrieved, the casing is withdrawn to be used on another investigation hole. The casing is used to keep the borehole open during an investigation. Following the withdrawal of the casing it is common and expected that the surrounding alluvium would move into the hole and fully close the hole. The hole's site would then act as a barrier to gas migration in a similar way to the surrounding alluvium.

Consequently, based on the discussions above, both mechanisms are considered by the workshops participants to be less likely than “theoretically possible but not at all expected”.

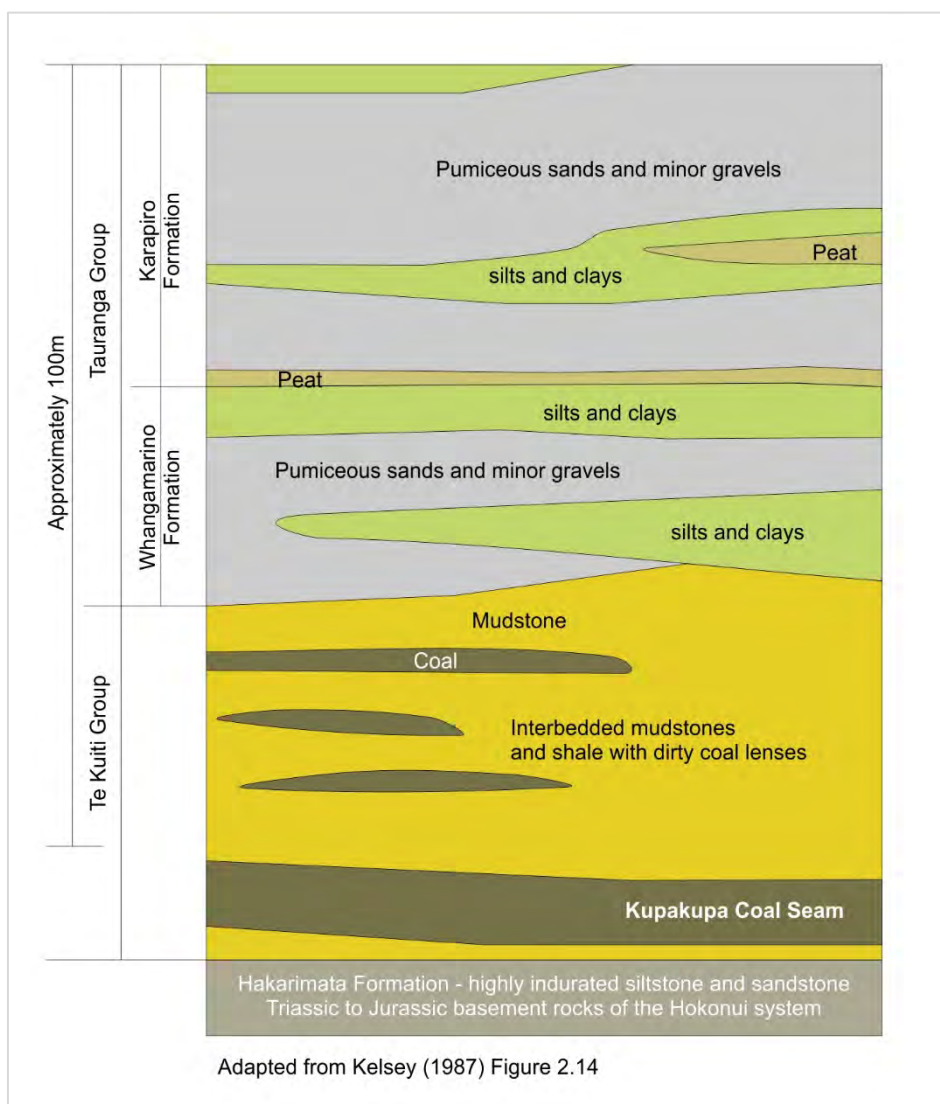


FIGURE 7 – SCHEMATIC ENGINEERING GEOLOGICAL PROFILE (KELSEY 1987)

7 FUTURE URBAN DEVELOPMENT

The area of interest has the potential for both commercial and residential development, with the attendant above and below ground infrastructure. In developing the risk assessment the following is assumed:

- The presence of the mine is acknowledged and appreciated in planning any development.
- The area is relatively flat requiring no large-scale earthworks to facilitate development, particularly deep excavations.
- The developments will not include high rise buildings and therefore no deep foundations, such as piles, are anticipated.

7.1 RISKS

The possibility of risks differs depending on the mining method and therefore the zone being considered. The risk is also influenced by the resilience of the structure being considered, and the damage that might occur to that structure under the same circumstances. The assessment of the risks for different types of development in each zone are recorded in the risk register (dated 2nd October 2019). The general points are:

Settlement occurrence:

- The development of crown holes in Zone A is likely to be **rare** and **very rare** across the other areas. No crown holes have developed in the area in the past.
- Differential settlement exceeding 25mm across 6m (MBIE (2014) B1/VM4 Appendix B Section B1.0.2) is **likely to possible** in Zones A and B. There have been similar experiences of settlement in area A in the past. In the other zones the possibility of settlement being more extreme than is otherwise expected in the Building Code is **rare to very rare**.

Gas migration occurrence:

- The likelihood that coal gas might migrate to the surface in the period from the closure of the mine working to the time when the mine is fully flooded was assessed as **very rare**. This assessment is based on the consideration that mechanisms for gas migration from the coal measures to the surface might be theoretically possible, but they are not expected. For this reason, consideration of gas migration to the surface are not considered further in this report.

7.2 MITIGATION

The primary effects to be mitigated relate to settlement and typically this is likely to occur in Zone A and possibly Zone B. The primary means of addressing differential settlement exceeding the threshold of 25mm across a distance of 6m depends on the type of structure planned or type of utility to be installed.

There are documents that can assist in defining suitable arrangements to mitigate moderate differential settlements exceeding the threshold for settlements. These include:

- Ministry of Works (1985) provides a draft of code of practice for construction of buildings in mining areas. Although some of the building practices might appear to be inconsistent with modern building practice, the considerations and factors to be evaluated remain relevant.
- MBIE (2012) provides technical guidance on the arrangements for ground slab foundations and other house elements to resist the effects of unstable ground.

7.2.1 RESIDENTIAL

The following factors warrant consideration for residential developments:

- Limiting the lateral extent of a building foundation in any direction.
- Adopt suitable foundations that can either accommodate differential settlement or span across differential settlement.
- Consider the use of flexible building frames and materials that accommodate settlement and distortion.
- Provide flexible connections for all utilities at the interface between the ground and the structure.
- Drainage and sewerage systems should be piped to a distance at least 20 m from the structure and preferably connects to the urban drainage systems.
- Limiting or preventing the construction of permanent or in-ground swimming pools.

7.2.2 NON RESIDENTIAL

The following factors warrant consideration for non-residential developments, such as warehouses, shopping malls and offices:

- Limit the structural dimensions of buildings.
- Limit the number of storeys in commercial buildings.
- Provide a minimum separation between buildings.
- Ensure that concrete slabs are reinforced with, at least, steel mesh.
- The detailing of any utilities penetrating a ground slab should provide for movement and allow for repair of the utilities below the slab if this occurs.

7.2.3 ABOVE GROUND INFRASTRUCTURE

The following factors warrant consideration for above ground infrastructure associated with roads and other liner infrastructure:

- Road pavements should be flexible and allow for settlement in the gradients to maintain drainage after settlement.
- Road furniture such as lamp post and traffic lights should have bases that can allow for vertical realignment.
- Retaining walls should have movement joints at frequent intervals.
- Embankments should not be of an excessive height.

7.2.4 BELOW GROUND INFRASTRUCTURE

The following factors warrants consideration for below ground infrastructure such as buried utilities in ducts, pipes and cables:

- Fibre optic cables are brittle and not tolerant of extension or tight bends. Suitable allowances should be made to accommodate settlement.
- Below ground utilities can be brittle and sensitive to settlement. Suitable flexible materials, jointing systems and gradients should be considered for utilities.
- Where utilities, such as cables, interface with buildings there should be sufficient provision for movement.
- No wells should be permitted in the area.

8 CURRENT URBAN ENVIRONMENT

The current urban development is primarily in Zones A and B. Much of the development in these zones is residential including the Kimihia Home & Hospital. The structures are typically:

- Single story homes some of these have garages below the main structure.
- Many of the houses have either brick or timber facades. Timber frames and facades for houses are typically more accommodating of settlement than other building materials.
- Most of the area in Zone A is open land. The Kimihia Home & Hospital is the most significant structure within this zone.
- Zone B is predominantly domestic housing.

Zone C, to the north of Russell Road, is primarily undeveloped farmland.

8.1 RISKS

The primary mechanisms for damage in the area is settlement, which is the same as the risk for future developments. The inherent flexibility in houses of timber frames and facades results in a greater tolerance of settlement than other building materials. By contrast settlement and distortion is particularly evident in brick structures.

8.2 MITIGATION

The existing urban environment is largely absent from Zone A and Zone C. The remaining area, Zone B, consists primarily of low-rise residential areas. The risk assessment suggests that mitigation against the possible effects of settlement on the existing houses in Zone B is not necessary in these circumstances.

9 MONITORING

Monitoring for both settlement and gas migration was considered in the workshops as a means of providing alerts to changing circumstances. Conceptually, the workshop participants considered adopting existing facilities and implementing new monitoring networks:

- There are no existing networks for the dedicated measurement of settlement or gas migration to the ground surface across any of the areas of interest.
- The design, development and implementation of a new monitoring network must be intermittent across the area (irrespective of the network density). In addition, critical thresholds for settlement and gas are not set as international standards.
- There is an extensive network of subsurface infrastructure across the urban area (Figure 8) and this will extend across future developments. These buried utilities are regularly monitored for deterioration (including settlement) and gas is monitored before entering the network. Workshop participants confirm that gas levels in excess of expected background levels have not been detected to date and there are no unusual settlement patterns across the area.

The monitoring of the condition of existing and future subsurface utility networks provides an extensive passive monitoring network. The regular monitoring will provide a means of identifying changes in both settlement and the presence of methane gas. If persistent high levels were to be identified (instead of the common spikes usually observed in sewerage systems) further investigations would be undertaken.

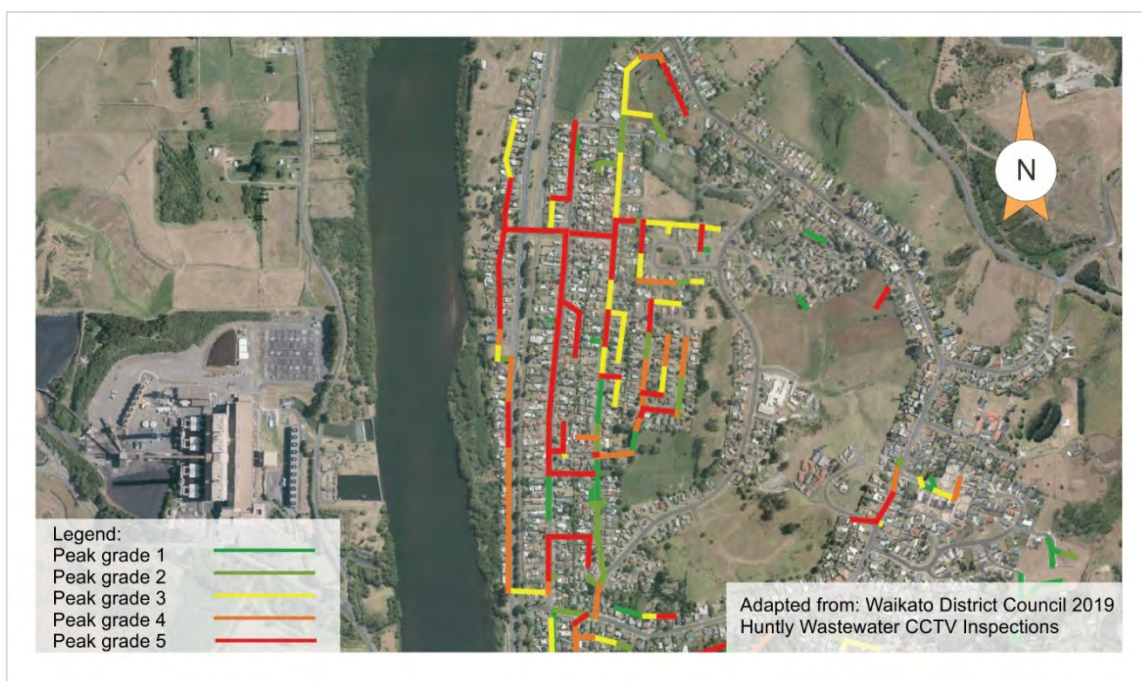


FIGURE 8 – WASTE WATER CCTV MONITORING

10 CONCLUSIONS

The risks to future development and to the existing environment are assessed within the AS/NZS ISO 31000 risk assessment framework. The assessment included:

- The context; based on historical reports and discussion in the workshops.
- Risk identification; the identification of causes and mechanics for settlement and coal gas migration to the surface environment. Possible consequences have been identified and the descriptive understanding of likelihood established.
- Risk analysis; the workshops elaborated on the consequences and the possible likelihood that these might occur.
- Risk evaluation; the risk register records the consequences and likelihood of occurrence in the future. In addition, these risk registers record possible mitigation measures where they are considered necessary.

The assessment has identified four separate areas that present different combinations of consequences and likelihood (Figure 6):

- Area A – Areas where the small pillar coal extraction methods were adopted.
- Area B – Areas where large pillar coal extraction methods were adopted.
- Area C – Area where long wall coal extraction methods were adopted.
- Mine road network - These areas have robust structure and are unlikely to manifest settlement or gas migration.

The outcomes of the risk assessment are presented in the risk registers. These registers record different risks depending on differences in mechanisms and possible near surface responses. The main summary points are:

- The most prominent ongoing settlement effects are likely to be in Area A where small pillar mining techniques were adopted.
- The likelihood of coal seam gas migrating to the surface by credible mechanisms is considered to be theoretically possible but **is not** expected. This threshold is consistent with a society implementing no additional measures to mitigate a risk.

Monitoring for both adverse settlement and gas migration to the surface can be effectively achieved by maintaining and observing the behaviours of the extensive subsurface utility networks across urban areas above the mine. Given the current monitoring of the networks for both damage and gas in the voids, these networks are likely to be more comprehensive than the implementation of dedicated monitoring networks.

11 LIMITATIONS

- This report has been prepared for the particular purpose outlined in the project brief and no responsibility is accepted for the use of any part in other contexts or for any other purpose.
- No responsibility is accepted by Resource Development Consultants Ltd for inaccuracies in data supplied by others. Where data has been supplied by others, it has been assumed that this information is correct.
- This report is provided for sole use by the client and is confidential to the client and their professional advisors. No responsibility whatsoever for the contents of this report shall be accepted for any person other than the client.

Approved by:



Cam Wylie

Managing Director

CPEng, CMEngNZ, MAusIMM, CP (Mine Geotech); CMIoD

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WAIKATO DISTRICT COUNCIL COASTAL HAZARDS

Released to open (WDC2007/05)



February 2020

Waikato District Coastal Hazard Assessment

FEBRUARY 2020

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EXECUTIVE SUMMARY

Background

The Waikato District Council (“the Council”) is currently reviewing and updating the Waikato District Plan (“the Plan”), including integration of the Waikato and Franklin Sections of the current Plan. The separate sections are the result of the dissolution of the former Franklin District Council and the subsequent amalgamation of the southern portion of the Franklin District into the Waikato District in 2010.

Focus Resource Management Group has been commissioned by the Council to define areas potentially vulnerable to coastal erosion and coastal flooding in the Waikato District. This study has included a District-wide broad scale coastal hazard assessment and management recommendations, and a more detailed assessment of hazards and management approaches for Raglan and Port Waikato. Identified hazard areas include areas of greatest risk with existing sea level, and additional areas that could be affected with projected sea level rise over the next 100 years.

Coastal Hazards in the Waikato District

The shoreline of the Waikato District is extensive and diverse. Key areas around Raglan and Port Waikato are characterised by open coast sandy beaches, estuarine intertidal sand flats and estuarine beaches, cliffed shorelines, and low-lying estuarine margins. While large areas of the District remain remote and essentially untouched, the Raglan Harbour shoreline is heavily developed and has been modified significantly. Existing residential development and some areas of public reserve are vulnerable to coastal erosion and coastal flooding in both Raglan and at Port Waikato. The extent and nature of the hazard varies depending on the physical characteristics of the local environment.

The coastal hazard assessment included a review of all available published and unpublished data available. Community consultation formed an important part of the information gathering and helped to guide the development of management recommendations. Key coastal communities were contacted early in the coastal hazard investigation to inform affected residents and gather any available local knowledge and unpublished information. Two rounds of community workshops were held at Raglan and Port Waikato, and these were well attended. Meetings were also held with local iwi at Port Waikato and Raglan to discuss the draft findings of the study and invite information and feedback.

Two coastal erosion hazard and two coastal flood areas have been defined for developed sites in Raglan and Port Waikato:

- **High risk coastal erosion/flood areas**, identifying the areas where there is significant risk from coastal erosion or flooding with existing sea level and coastal processes in the short term (within the lifespan of the District Plan).
- **Coastal erosion/flood sensitivity areas**, identifying the areas potentially vulnerable to coastal erosion/flooding over the period to 2120, assuming sea level rise of 1.0 m.

The high coastal erosion and flood risk areas are those areas which, in the absence of existing or future intervention, could be impacted by coastal erosion or flooding within the lifetime of the District Plan (approximately 10-15 years). This does not represent a “worst-case” potential coastal erosion or flooding area over this timeframe but identifies the areas at greatest risk and therefore of highest priority for coastal hazard management.

Coastal erosion and flooding hazard reduce with distance inland and elevation (respectively). As we project coastal hazards beyond the short term, the uncertainty increases very considerably. The coastal erosion and flooding sensitivity areas are identified to highlight the much larger areas of land that are potentially vulnerable to coastal hazards, including the effects of sea level rise over the next 100 years.

It is important to note that there is generally a high level of uncertainty around future coastal erosion, even for any given assumed sea level rise. The available information on both existing coastal processes and possible future changes is not adequate to reliably and accurately define the areas vulnerable to coastal erosion over the next 100 years; whether using either traditional deterministic approaches or a probabilistic approach. In regard to coastal erosion, the defined coastal sensitivity areas therefore represent the maximum area that we believe could potentially be affected by erosion with up to one metre of sea level rise. Further and more detailed investigation might reduce the sensitivity areas in some locations, and we recommend that Council provide for such adjustment on the basis of investigations undertaken by a suitably qualified and experienced coastal scientist or engineer. Notwithstanding this, a high level of uncertainty is likely to remain in most areas.

In the rural areas, we have identified a single coastal hazard sensitivity area that identifies areas of the coastal margin that could potentially be impacted by coastal flooding and/or coastal erosion, assuming sea level rise of 1.0 m to 2120. It is important to note that these are not defined hazard areas, but simply areas within which any future development (excluding non-habitable farm buildings) will require a site-specific coastal hazard assessment.

Coastal Hazard Management Recommendations

Management of coastal hazards is extremely complex. There are a wide range of stakeholders on the coastal margin, whose interests may not always align well. While national and regional coastal policy constrain what options may be acceptable in both the short and longer-term, the decision-making process is inherently political and requires involvement of all relevant stakeholders.

There are also huge uncertainties around the nature and scale of future coastal change over the next 100 years (the minimum planning timeframe Council is required to consider). Decision-making must take these uncertainties into account. Activities or management options that might be quite adequate and acceptable in the short-term could be quite inappropriate and have serious adverse effects and costs in the longer term.

Given these complexities, we strongly recommend that Council work with relevant communities and stakeholders to develop agreed adaptive management strategies for the defined high risk and coastal sensitivity areas. The advantage of an adaptive management approach is that it enables Councils, community stakeholders and relevant experts to work together to:

- Develop the most appropriate management responses/strategies for existing coastal hazards and for various future scenarios
- Agree triggers or thresholds to adjust existing strategies (or adopt new strategies) as coastal hazards and goals change.

This adaptive approach enables councils and communities to adopt the most appropriate and cost-effective strategies presently relevant, while also identifying how these strategies will be adjusted or changed if particular coastal change triggers are reached. This provides for a high level of transparency and resilience.

The role of relevant experts in adaptive management is not a decision-making role but rather to empower the Council and community stakeholders by providing a good understanding of the pros and cons of different options and how the costs and benefits of these options may alter with coastal change over time. To assist the Council and community stakeholders in the development of these adaptive management strategies, we have discussed the range of potential measures for sustainable management of coastal erosion and flood risk in the Waikato District, identifying those that are most likely to be applicable. This commentary is founded on a broad “hierarchy” of management approaches, implicit in national and regional coastal policy and developed to reflect the nature of the particular coastal environment, the likely responses of that environment to future climate change and the implications of different management responses. Adaptive management strategies for each location must be developed with relevant community stakeholders and our commentary is simply to assist in that process.

Council also has various statutory and other responsibilities and associated liabilities. This report therefore also provides recommendations for development controls to guide management of development in each area until an appropriate adaptive management strategy is developed and agreed. If these management recommendations prove to be a significant constraint on desired activities in some areas, then those areas should be priorities for the development of adaptive management strategies.

Risk avoidance is recommended as the preferred approach wherever practical in high coastal hazard risk and coastal sensitivity areas when:

- establishing major new infrastructure,
- undertaking major upgrades to existing infrastructure,
- considering applications for Greenfield development or any other significant intensification of land use

In areas of existing development, it is recommended that Council develop appropriate policies and rules to both avoid increasing and, where reasonably practicable to reduce the risk of adverse effects from coastal hazards within the identified high-risk hazard areas and the coastal sensitivity areas. Relevant risk reduction approaches include:

- Development controls to encourage dwellings to move landward within properties away from the high-risk coastal erosion areas
- Development controls that require adaptable design within sensitivity areas – to allow buildings to be moved landward or raised over time in response to changing hazard risk
- Minimum floor levels in low lying areas

We also recommend appropriate development controls within the District Plan to ensure that any intensification of existing development is avoided in high-risk flood and erosion areas. In coastal erosion and flood sensitivity areas, intensification should only occur where a site specific coastal hazard study demonstrates that there will be no increase in coastal hazard risk, and/or effective and sustainable management of the hazards is provided for in an agreed adaptive management strategy (that considers the full range of future sea level rise scenarios).

In all cases where development or activities are restricted by these identified hazard areas, we recommend that the Council allows for the consideration of further, more detailed information including site specific coastal hazard studies, data on sub-surface geology, land stability investigations or detailed surveying of land levels etc, as relevant to the potential hazard. Such data may provide for a better understanding of coastal hazard risk at a site-specific scale.

The adverse effects and long-term implications of hard engineering works have been increasingly recognised, and as such national policy now emphasises the use of alternative approaches. Notwithstanding this, there are cases where “hard” coastal engineering works are the only practicable option.

We recommend that Council broadly discourage the use of “hard” coastal protection structures. However there will be circumstances where hard engineering works are an appropriate solution, particularly where there is significant coastal hazard risk under current conditions or within short time frames, and where adverse effects of the works can either be mitigated or avoided, or are outweighed by the benefits (considering both public and private values).

Ideally, hard protection structures will only be used where they are part of an adaptive management plan that has been developed by the community that ensures a necessary balance between private and public values and long-term sustainability. Where hard engineering is the only practicable option, it should also be designed and located to avoid or minimise adverse effects on the coastline. It is very unlikely in our view that hard protection works will be a viable approach to coastal erosion management on open coast beaches of the Waikato District due to adverse environmental effects and significant engineering costs. Adverse effects will also be a significant issue with use of such structures on estuarine beaches.

There are also many areas of the District where coastal restoration and/or environmentally soft approaches can usefully contribute to effective coastal hazard management. We recommend that the Plan include measures to actively encourage such approaches.

INTRODUCTION

The Waikato District Council (“the Council”) is currently reviewing and updating the Waikato District Plan (“the Plan”), including integration of the Waikato and Franklin Sections of the WDP. The separate sections are the result of the dissolution of the former Franklin District Council and the subsequent amalgamation of the southern portion of the Franklin District into the Waikato District in 2010.

As a new matter of national importance set out in section 6(h) of the Resource Management Act 1991 (RMA), territorial authorities are now required to recognise and provide for the management of significant risk from natural hazards, while section 7(i) RMA requires territorial authorities to have regard to the effects of climate change. The District Plan must also give effect to policies within the NZ Coastal Policy Statement 2010 and the Waikato Regional Policy Statement 2016, including identifying areas of coastal hazard risk and regulating land use and development within identified areas to avoid or reduce the risk of adverse effects associated with coastal hazards and hazard responses.

The present study was commissioned by the Waikato District Council to define areas potentially affected by coastal hazards (excluding tsunami), including high coastal hazard risk areas, and to provide recommendations to inform and assist the development of management objectives and provisions for these areas.

This study also draws on the recently published national guidance document “*Coastal Hazards and Climate Change – Guidance for Local Government*” (MfE, 2017), including recommended sea level rise values and policy direction.

1.1 Purpose and Scope of the Study

Focus Resource Management Group was initially engaged to assess coastal hazards and provide management recommendations for the townships of Raglan (Figure 1) and Port Waikato (Figure 2). In particular, in consultation with the affected community and stakeholders, to:

1. Identify and map areas potentially affected by coastal hazards (excluding tsunami) over at least 100 years, including:
 - areas at risk of being affected with existing sea-level
 - additional areas which could be affected over the next 100 years with projected future sea level rise
2. Use a risk-based planning framework to develop broad recommendations for potential management approaches in the hazard areas, including:
 - recommendations for the management of both existing and future land use and development, including provision for use of the precautionary approach and the adaptive management approach
 - recommendations to provide for inland retreat of coastal habitats and continued access to the coast.

The study brief was subsequently extended to include a broad scale coastal hazard assessment and management recommendations for the remaining (largely undeveloped) western coastline of the District (Figure

3). This wider study does not include the small stretch of eastern coastline within the District. This area is presently being assessed through the Kaiaua Coast 2120 Community Plan lead by Hauraki District Council in collaboration with Waikato and Hauraki District Councils.

This report provides a summary of the District-wide hazard assessment and the detailed work undertaken at Raglan and Port Waikato. The report identifies current and future potential hazard areas.

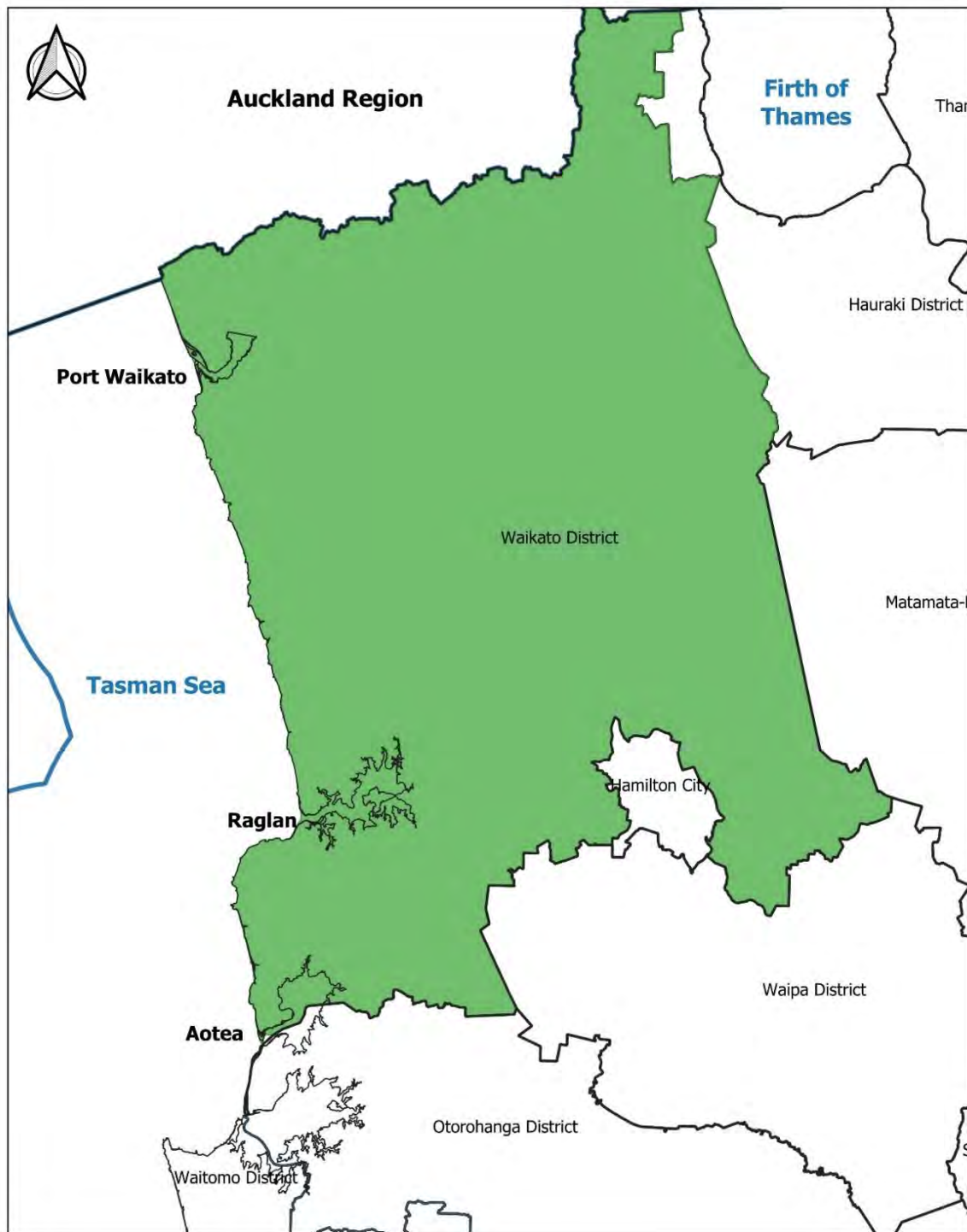
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Figure 1: Area of Raglan township covered by the more detailed Raglan study, including key sites.



Figure 2: Area of Port Waikato township covered by the more detailed Port Waikato study.



Waikato District Coastal Hazard Study
 Prepared by Focus Resource Management Group.
 Data sourced from Stats NZ <https://datafinder.stats.govt.nz/>
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0 10 20 30 km



Figure 3: Extent of the Waikato District (green).

1.2 Report Layout

Section 2 outlines the approach to the project including the information considered and the consultation undertaken.

Section 3 summarises the national and regional policy setting, and recently completed national guidance for planning for coastal hazards and climate change in New Zealand.

Section 4 outlines the methodology used to assess the areas potentially susceptible to coastal erosion and inundation hazard, including the approach to calculating hazards with future projected sea level rise.

In Section 5, the policy and guidance are translated into a broad hierarchy of preferred coastal hazard management actions and associated recommendations for the management of new and existing development within identified coastal hazard areas. This section also introduces the concept of adaptive management.

Sections 6 and 7 summarises the site-specific hazard assessments and recommended management approaches for Port Waikato and Raglan, respectively.

Section 8 provides a brief overview of coastal hazards and recommended management for the remaining (and largely undeveloped) areas of the Waikato District coastline.

2 PROJECT APPROACH

2.1 Information Used

A wide range of information was used to assess coastal erosion and coastal flooding hazard, including (though not limited to):

- community and iwi observations and information
- vertical aerial photography dating from the 1940s to the present (including that available via Retrolens, Google Earth and both the Regional and District Council web sites)
- mapping of historic shorelines from ortho-rectified aerial photography undertaken by the Waikato Regional Council for much of the coast of the District using photos dating from 1942 to 2017.
- a wide range of historic photographs and surveys obtained from the National Library, historic survey databases, community members and other sources (some sites dating from the late 1800s and early 1900s)
- early descriptions and maps of the area available from the National Library, community sources, survey databases, local history books and other sources
- available topographic (LiDAR) data and bathymetric information
- geological maps
- existing reports on coastal erosion and other relevant published resources (e.g. local history books and a range of technical reports and studies)
- storm surge modelling and sea level reports as well as tide gauge and coastal flooding data (including reports from historic events)
- physical and geomorphic characteristics of the coast
- field observations around the entire developed coast of Raglan and Port Waikato townships
- most recent central government guidelines in respect to potential sea level rise (MfE, 2017)
- appropriate conceptual geomorphic models (e.g. to assess the potential future impact of projected sea level rise - see Section 4.3 for more detail).

2.2 Community and Stakeholder Consultation

An initial round of four-hour community workshops was held in December 2017. These workshops aimed to inform the communities of the work and to seek relevant community information and knowledge. A wide range of community observations and other information (e.g. photos) was obtained, with further information also provided by some follow-up contacts.

A second round of four-hour workshops was held in November 2018, which presented initial findings and recommendations for community and stakeholder feedback and comment. These meetings also led to further discussion and feedback, including subsequent meetings and field inspection with some stakeholders at Whale Bay and Lorenzen Bay.

In addition, separate meetings (including wide-ranging discussions and field inspections) were held with local iwi at both Raglan and Port Waikato in March 2019 and May 2019 respectively.

Presentations were also given to Waikato District Council staff and councillors, with associated feedback and discussion.

These various meetings provided a wide range of useful information and feedback to help refine the hazard assessments and recommendations. Further opportunity for community and stakeholder feedback will occur with issue of the draft proposed District Plan prior to formal notification.

2.3 Analysis and Reporting

The information from the community and other sources was analysed and synthesised to assess the areas potentially vulnerable to coastal hazards and associated management issues. Various management options were then considered, and recommendations developed, guided by existing national and regional policy and by community and Council feedback from the initial consultation. Useful feedback was also obtained from review of initial drafts of this report by Council staff and consultants.

The hazard analysis indicates that the Waikato District coastline is very complex and there are a wide range of significant uncertainties in respect to both existing and potential future hazard areas. The analysis also indicates that these uncertainties, together with much historic coastal development within existing and potential future coastal hazard areas, combine to present some very significant management challenges (discussed in Chapters 6 and 7). As discussed later in the report, these complex management issues cannot be fully addressed through the proposed District Plan alone and additional measures will be required in many areas.

In particular, at some existing developed sites (e.g. Wallis Street and Lorenzen Bay within Raglan, and the Port Waikato ocean foreshore), the complexities of the existing and potential future management issues are likely to require complex adaptive management strategies, developed in active partnership with affected stakeholders and the wider community. We have attempted where possible to provide some useful discussion of the possible content of such strategies but emphasise that considerable further work with the stakeholders and wider community will be required to develop agreed strategies. It is also very likely that management of these complex issues will require incremental change over a long period of time and the use of triggers.

In order to address the Council's statutory and other duties and associated liabilities, we have provided recommendations for management of coastal hazards until agreed adaptive management strategies have been developed.

3 POLICY SETTING

Councils are directed by National and Regional policy to identify and manage coastal hazards, considering a planning timeframe of at least 100 years and the potential effects of projected climate change. National Policy directs Councils to manage hazard prone land and associated development in such a way that over time builds community resilience and preserves the values of natural processes and ecosystems. The Regional Policy Statement also requires District Councils to identify areas at risk from coastal hazards, with priority on high risk areas.

Council also needs to consider and provide for other coastal values when planning development near the coast, including providing adequate setbacks for natural character, public access, biodiversity, physical processes and amenity. We have provided here a brief overview of the policies most relevant to our assessment of coastal hazards and the associated management recommendations. This aims to set the scene for the management recommendations provided in later sections of the report, but is not intended as a comprehensive policy analysis, which is outside the scope of the current study.

3.1 National Policy

The New Zealand Coastal Policy Statement (NZCPS) 2010 directs Councils in New Zealand to manage coastal hazards by identifying hazard areas and implementing management approaches that mitigate future coastal hazard risk. This statement contains a number of objectives and policies directed at coastal hazard management.

Objective 5 of the NZCPS provides a foundation to coastal hazard risk management by outlining the key aspects of sustainable coastal hazard management:

“To ensure that coastal hazard risks taking account of climate change, are managed by:

- *locating new development away from areas prone to such risks;*
- *considering responses, including managed retreat, for existing development in this situation; and*
- *protecting or restoring natural defences to coastal hazards.”*

Objective 5 is implemented through a number of policies within the NZCPS, most specifically through Policies 24-27, which are summarised below.

Policy 24 requires Councils to identify the areas potentially at risk from coastal hazards (erosion, flooding and tsunami) over at least the next 100 years, prioritising areas of high risk. To do this, the Council must examine the physical processes and drivers, the geomorphic characteristics of the coast, the short- and long-term natural fluctuations, the human impacts, and the likely impact of climate change.

Policy 25 addresses the management of these hazard areas and directs Councils to avoid redevelopment or land use change that increases the risk of adverse effects from coastal hazards, and to encourage management decisions that reduce the risk of adverse effects over time (e.g. managed retreat or relocatable buildings). This policy discourages the use of hard protection structures.

Policy 26 highlights the importance of natural defences such as beaches, estuaries, coastal vegetation and dunes in providing protection from coastal hazards.

Policy 27 addresses the most challenging aspect of coastal hazard management, where there is significant existing development in areas at risk from coastal hazards. This policy provides guidance for working through the range of potential management options. The focus is on long term sustainable risk reduction approaches, which may include the removal or relocation of development or structures.

Historically, coastal erosion management has been dominated by the use of hard engineering structures to “hold the line” and prevent the erosion of both private and public land and assets. The adverse environmental, social and economic impacts of these approaches are now well recognised globally. “Hard” coastal protection structures interfere with natural coastal processes, can impact severely on the public values of shorelines and often tie communities into a perpetual cycle of ever-increasing financial investment.

National policy therefore now directs Councils to work with communities to manage coastal hazards in a way that over time decreases risk and increases the long-term resilience of coastal environments and communities given the likely impacts of projected sea level rise in coming decades. To achieve this, Councils are now required to emphasise risk avoidance and reduction and discourage the use of engineering works that control natural processes. Specifically, Policy 27.2. directs that when evaluating options for reducing coastal hazard risk, “focus on approaches to risk management that reduce the need for hard protection structures and similar engineering interventions;”.

The NZCPS does recognise that in some cases, hard protection structures may be the only practical option for protecting infrastructure of national or regional importance, but that the social and environmental costs of such an approach must be acknowledged and that planning should identify transition mechanisms for moving to a more sustainable approach in the longer term. Policy 27 (4) states that hard protection structures designed to protect private property should not be located on public land unless there is a significant public benefit.

3.2 Waikato Regional Policy

The Waikato Regional Policy Statement (RPS) must give effect to the NZCPS. The RPS contains policies relating to the coastal environment, and specifically to natural hazards, and highlights the need to increase community resilience by mitigating the risk from natural hazards (including coastal hazards) over time.

Policy 6.2 of the RPS sets the framework for managing development in the coastal environment. Among other things, this policy requires that development is sufficiently set back and designed in such a way as to provide for the full range of environmental and public values and allow for future sea level rise effects including landward migration of habitats. This policy also reflects the NZCPS and requires that development avoids increasing coastal hazard risk and maintains and enhances public access.

Policy 12.3.2 directs Councils to ensure that the amenity values of the coastal environment are maintained or enhanced. As part of this relates to providing suitable development setbacks along the coastal edge and “avoiding forms and location of development that effectively privatise the coastal edge and which discourage or prevent public access to and use of the coast...” and encouraging structure and development design that enhances amenity and maximises public benefits.

Policy 12.3.3 directs District Councils to incorporate the enhancement of public values in the coastal environment in public works and in plans and other planning documents.

Policy 13.1 requires that natural hazard risks are managed using an integrated and holistic approach that limits the risk from natural hazards while enhancing community resilience and recognises and prefers the use of natural features over man-made structures for defences against natural hazards.

There are a range of implementation methods relating to Policy 13.1, including 13.1.1, which states that Regional and District Plans shall incorporate a risk-based approach into the management of subdivision, use and development in relation to natural hazards.

Method 13.1.3 also states that the “Waikato Regional Council will collaborate with territorial authorities, tāngata whenua and other agencies to undertake assessments of coastal and other communities at risk or potentially at risk from natural hazards, and develop long-term strategies for these communities...”

These strategies will identify areas at risk, may include recommendations for hazard areas and will identify and evaluate options for reducing the risk to communities while preserving public access, amenity values and natural character where possible.

3.3 National Guidance on Planning for Sea Level Rise

In the longer term, projected sea level rise associated with global warming is expected to exacerbate both coastal erosion and coastal flooding hazard along much of the New Zealand coast. There are many ways that future climate change may influence coastal hazards, including:

- an increase in sea level and direct impact on coastal flood levels¹
- potential shoreline retreat in response to a rise in mean sea level and increased wave effects
- an increase in nearshore tidal currents due to a possible increase in tidal prism²
- a possible increase in the frequency and/or duration of storm events
- potential loss of sediment to flood and ebb tide deltas due to these features increasing in volume with potential increased tidal prism².

National guidance recommends that coastal hazard planning must consider the likely impact of projected sea level rise over the next 100 years and beyond. In the future, accelerated sea level rise is anticipated in response to global warming and so it is not appropriate to simply extrapolate past trends to predict the future.

Unfortunately, the impact of these factors and other uncertainties accompanying climate change are very difficult to predict. While scientists believe that sea level rise is inevitable, there is great uncertainty about how long it will take for this to happen. It is not possible to simply extrapolate past trends to predict the future, or to predict one “most likely” future.

¹ As well as increasing the severity and impact of rare and severe events, just a small amount sea level rise will greatly increase the frequency of events that are very rare with current sea level.

² The tidal prism is the volume of water in an estuary or inlet between mean high tide and mean low tide, or the volume of water leaving an estuary at ebb tide.

MfE (2017) therefore recommends that Councils consider the likely impacts of a number of plausible scenarios (using lower, intermediate and higher sea level rise projections), and from these develop adaptive management plans that can respond to sea level rise as it occurs (see discussion of adaptive management in Section 5.7). The recommended projections are based on future global emission scenarios developed by the Intergovernmental Panel for Climate Change (IPCC, 2013 & 2014). The establishment of dynamic adaptive plans for at risk settlements will take time. The MfE (2017) document also provides recommendations for the application of “minimum transitional sea level rise allowances” for coastal hazard planning where an adaptive plan is not yet in place (summarised in Table 1).

Table 1: Summary of sea level rise scenarios for coastal management in New Zealand (MfE national guidance note 2017).

Scenario	2070	2120	Transitional Application in Coastal Planning
Low (RCP 2.6) Lower bound “surprise”	0.32 m	0.55 m	
Intermediate (RCP 4.5)	0.36 m	0.67 m	Low-risk non-habitable works and activities, particularly those with a functional need to be near the coast.
Transitional		1.00 m	Recommended sea level rise value for planning in areas of existing development until a dynamic adaptive planning process has been completed.
High+ (RCP8.5) (85th percentile)	0.61 m	1.36 m	Greenfields development and major new infrastructure.

In terms of planning for intensification of land use (including subdivision in areas of existing development), there is no transitional sea level rise value recommended but MfE (2017) advises that a full dynamic adaptive pathways planning approach is required using the four sea level rise scenarios (at the scale appropriate to the scale of the intensification).

We believe that the guidelines for low-risk non-habitable uses are too broad and appropriate sea level rise values will vary considerably according to the nature of the works proposed. Appropriate sea level rise values are therefore best determined on a case by case basis to reflect the permanence of the proposed development or structure and the consequences of future hazard impacts.

Our approach to the identification of coastal areas and our recommendations for coastal hazard management in Sections 5-8 reflect this national guidance, the principles of the NZCPS and RPS and the knowledge gathered during this study.

4 IDENTIFYING COASTAL HAZARD AREAS

4.1 Coastal Erosion

4.1.1 Beaches

Beaches are typically highly used and valued and, particularly in areas with road access are often the chosen location for coastal development. They are also often very dynamic areas and highly susceptible to impact from future sea level rise. The values of these areas can also be severely affected by the impacts associated with hard coastal protection works, particularly with structures placed well seaward or on retreating shorelines. For these reasons, beaches (particularly highly dynamic sandy beaches) are often the most challenging and complex areas to manage.

There are a number of components to be considered when estimating the width of coastal erosion hazard areas for any planning period (“t”) in a beach setting, including:

- any long-term trends for permanent erosion or accretion (“LT”)
- maximum likely dynamic shoreline fluctuations over the planning period (“ST”)
- slope instability associated with collapse of over steepened erosion scarps (“S”)
- potential effect of climate change over the planning period, particularly sea level rise (“X”)

Typically, these components are summed to provide a total width of hazard area (Coastal Hazard Erosion Zone or “CHEZ”):

$$\text{CHEZ} = (\text{LT} \times t) + \text{ST} + \text{S} + \text{X}$$

In areas where sea walls currently (and historically) constrain erosion an allowance must be included for the effect of the sea wall. These effects include the long-term erosion or dynamic fluctuations that would have occurred if the sea wall were not present and any artificial fill that may have been added. Where seawalls have been confirmed as the long-term management approach, coastal erosion hazard areas would need to allow for short term erosion associated with failure of the structure, provided ongoing repair and maintenance was suitably guaranteed.

We have estimated these components for each site where necessary using the available information discussed in Section 2, with particular emphasis on field observations and geomorphology, historic aerial photographs and surveys, historic shoreline mapping and community information. The following sections briefly outline the methods used to assess each component. The derivation of the erosion hazard areas at each site are also discussed in more detail in Sections 6 and Section 7.

Long Term Trends for Shoreline Change

Long term trends for permanent shoreline advance or erosion were assessed using historic aerial and other photography, historic surveys, field observations, geomorphology and community information. Large dynamic shoreline changes occur over many decades on this coast, and it is very difficult to separate these from long-term trends with certainty. For instance, on this coast, large-scale fluctuations can occur on both multi-decadal and even century timeframes, particularly on the open coast and near estuary and river entrances. Centuries of

data would therefore be required in many areas to reliably discriminate dynamic shoreline fluctuations from permanent long-term trends.

Our assessment of long-term trends versus dynamic shoreline movements has therefore placed a heavy emphasis on geomorphic considerations; relevant considerations for each site being discussed in Section 6 and Section 7. In general terms, while erosion has sometimes dominated for many decades on some beaches, the weight of existing data and geomorphic considerations suggests that most beach changes in the Waikato District are likely to be dynamic over multi-decadal and century timeframes.

Dynamic Shoreline Fluctuations

Sandy beaches are naturally dynamic and respond rapidly to changes in local coastal processes. Natural functioning of sandy beaches relies on the presence of an intact sand dune, which is part of the natural beach system, and is critical to processes of natural erosion and recovery. Sand dunes are formed when wind blows sand inland from the beach, where it is “caught” by sand trapping grasses and accumulates. This sand is stored in the dune until there is a storm event that erodes the beach and the face of the dune. During storms, sand eroded from the beach and dune is moved offshore to form offshore bars (Figure 4). In calmer conditions, sand from these nearshore bars is worked back onto the beach and beach levels recover over time (Figure 5). Natural dune recovery is slower and depends on suitable sand trapping vegetation on the dune (e.g. spinifex and pingao).

Sandy beaches can also experience dynamic shoreline fluctuations with extended periods of erosion and accretion due to causes such as climate cycles that alter weather patterns (e.g. affect the frequency of storms). On the west coast there is also evidence that longshore transport often occurs in fluxes or “clumps”, giving rise to extended periods of accretion when a volume of sand accumulates, and extended periods of erosion when a this “clump” of sand moves away. Areas adjacent to flood- and ebb-tide deltas can also experience periods (often lasting years or even decades) of alternate erosion and accretion; associated with complex sand transfers and bar and channel changes.

The maximum scale of the dynamic shoreline fluctuations (often referred to as the dynamic envelope) is therefore typically only evident over long periods of time (generally many decades and probably even centuries in some areas); particularly along the open coast of the district and the lower regions of tidal estuaries. These changes can be particularly complex and dramatic near the mouths of rivers and estuaries. Within the Waikato District, the main settlements at Port Waikato and Raglan are both at least partly located on sandy beach and dune systems and are adjacent to major estuary or river mouths.

Careful interpretation of coastal geomorphology and long-term records is therefore required to adequately assess the maximum likely dynamic shoreline fluctuations. In some cases, even with such considerations, the available information is not adequate to reliably define existing erosion hazard areas and we have had to adopt a precautionary approach. This is particularly the case in open coast and lower estuarine areas associated with tidal and river entrances.

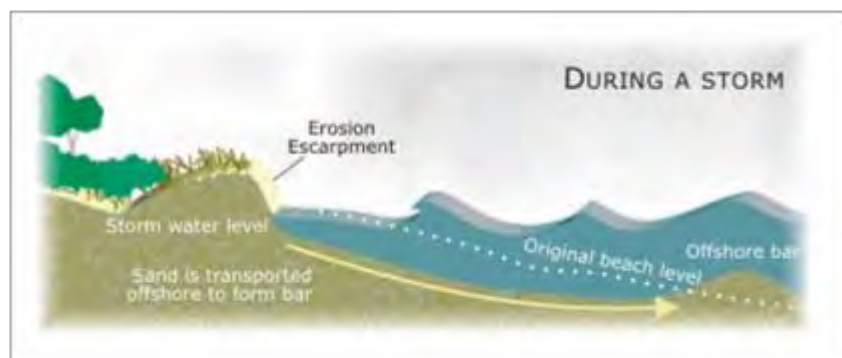


Figure 4: During storms, sand is eroded from the dune and forms bars offshore that absorb wave energy.

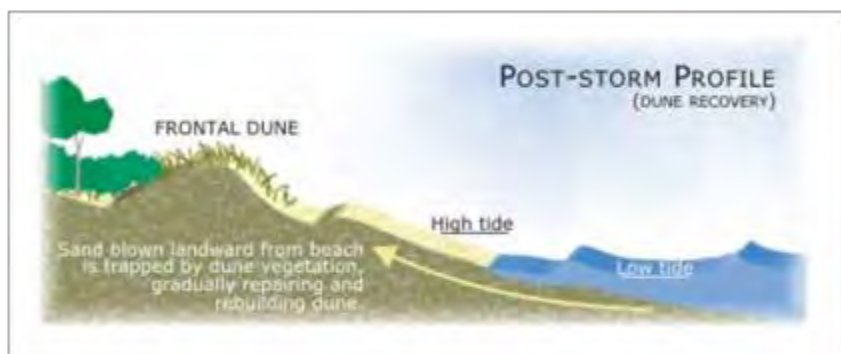


Figure 5: During calmer wave conditions, sand from the offshore bars makes its way to the beach and over time the dunes rebuild (source: Waikato Regional Council, 2011)

In general, the complexities associated with this coast preclude the use of the simple deterministic or probabilistic methods commonly used for erosion hazard assessment in New Zealand and geomorphic considerations play a larger role. The relevant considerations for each area are discussed in more detail in Sections 6 and 7.

Collapse of Erosion Scarps

Following severe storms, dune erosion and beach lowering typically form near vertical erosion scarps. These scarps can collapse to a more stable slope at a later date, generally in the order of 26 degrees (1V:2H slope) in unconsolidated sands. In identifying erosion hazard areas, it has been assumed that the dune face will collapse to this stable slope. In practice, the value of this parameter is generally close to the height of the dune above the dune toe, as material collapsing from the top of the dune face will form a slope at the base of the scarp, stabilizing the slope.

This factor is a relatively minor consideration in the more dynamic open coast and lower estuarine beaches of the Waikato District; considerably dwarfed in these areas by the uncertainties associated with multi-decadal and century scale shoreline change.

4.1.2 Cliffs

Coastal erosion of cliffs typically occurs slowly and unlike beaches is essentially a one-way process. Cliff erosion mechanisms relate to coastal erosion at the toe, and to slope instability processes higher up. Coastal processes work to erode the base of the slope, until over steepening causes slope failure to a stable slope as shown schematically in Figure 6.

There are many cliff shorelines in the Waikato District, including much of the open ocean coastline, and a large proportion of the Raglan Township shoreline. The mechanisms of slope failure and potential for erosion vary greatly depending on cliff geology, height and physical setting.

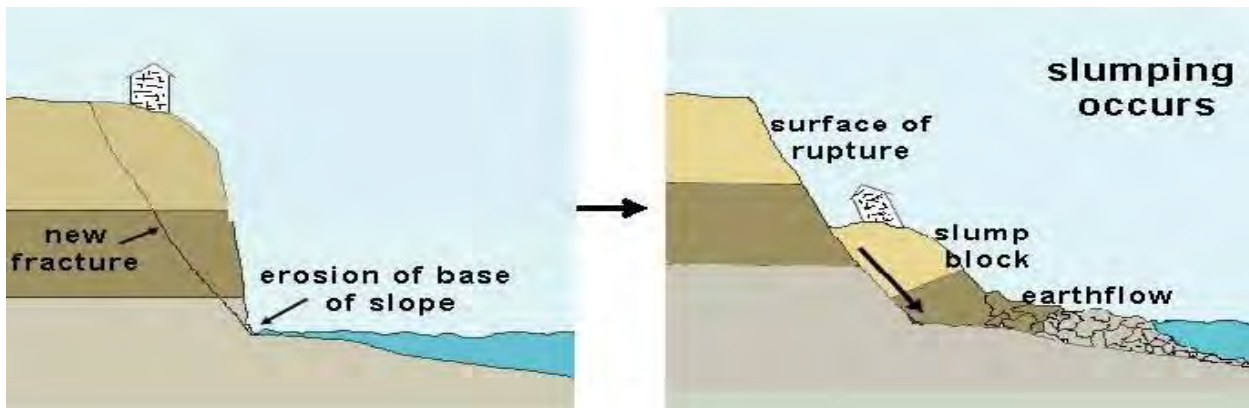


Figure 6: Processes of cliff erosion.

The key factors that need to be considered in erosion hazard assessment for cliff sites are:

- historic long term (i.e. time-averaged) rate of toe erosion
- slope instability arising from the toe erosion (typically assuming failure to a stable slope)
- the potential effect of sea level rise on the above factors (i.e. particularly toe erosion)

A range of data and methods have been used to estimate coastal erosion hazard areas for cliff environments along the Waikato coast including:

- geological, geomorphic and field observations to estimate very long-term erosion rates (e.g. shore platform width) and likely stable slope.
- historical aerial and other photography
- historic shoreline surveys
- empirical techniques to estimate the potential impact of projected sea level rise (discussed further in Section 4.3).

In general, toe erosion rates are slow in the Waikato District and the more significant component of cliff erosion hazard relates to rare, periodic slope adjustment. In general, we have adopted a precautionary approach to slope stability in this first pass assessment; based primarily on the minimum slopes prevailing in any particular

area. Accordingly, we recommend that Council provide for the identified hazard areas to be modified by detailed site-specific investigations of slope instability by an appropriately qualified and experienced professional (e.g. an engineering geologist or a geotechnical engineer).

4.2 Coastal Flooding

The key components contributing to coastal flood hazard over the next 100 years comprise:

- astronomical tides
- storm surge (elevation of sea level by barometric and wind effects)
- wave effects, including wave set-up and wave run-up
- rise in relative sea level due to climatic and tectonic changes

These various components are illustrated in Figure 7 and discussed further below.

The Waikato Regional Council has maintained a tide gauge at Kawhia since 2008. A study was commissioned by the Regional Council to analyse tide gauge data from the Waikato Region (including Kawhia) to better understand the components that contribute to storm surges and to estimate storm tide levels and associated probabilities (Stephens et al., 2015). The analysis of the Kawhia tide data and associated tide and storm surge assessment is currently the best data on which base identification of coastal flood hazard areas on the western Waikato District coastal margin.

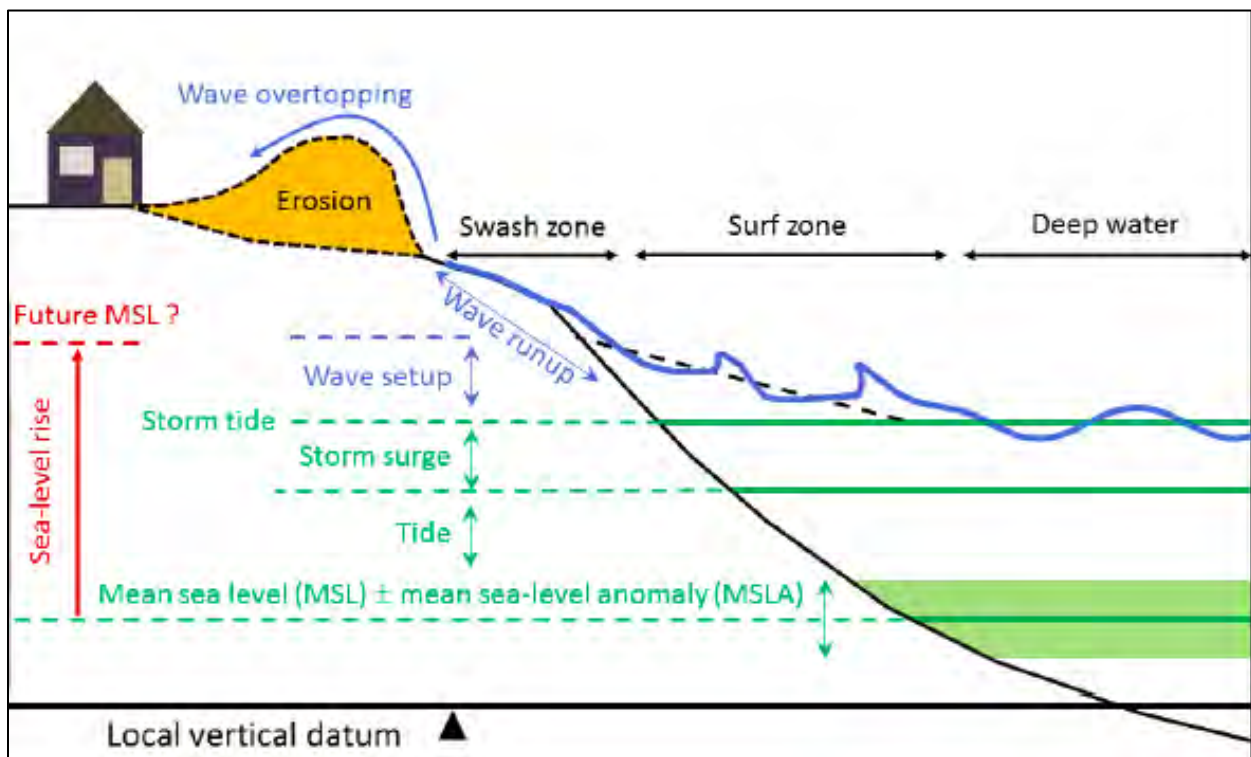


Figure 7: Summary diagram showing the various components that contribute to coastal storm inundation (source: Figure 30 from MfE, 2017)

4.2.1 Astronomical Tides

The total storm tide height during an event is influenced greatly by the state of tide at the peak of the storm surge. Even a very large storm surge may not cause flooding if it peaks during low tide. The relatively large tidal range on the West Coast of the North Island means that the tidal component of any storm water level tends to dominate over other factors. As part of the work completed by Stephens et al. (2015), NIWA provided tide levels for the Waikato Region based on a national tide model, which have been adjusted where possible using local tide data. Mean high water spring and maximum tide levels are given in Table 2. The mean high-water definition given in Table 2 is “MHWS10”, which is the level that is exceeded by 10% of all tides. The maximum tide refers to the maximum tide level predicted by the tide model over a 100-year period (not including sea level rise).

Table 2: Elevation of Mean High-Water Spring (MHWS) and Maximum High-Water levels at Raglan and Port Waikato (from Stephens et al. 2015 and Waikato Regional Council <http://coastalinundation.waikatoregion.govt.nz/>).

	MHWS (MVD)	Max High Water (MVD)
Raglan	1.7 m	2.1 m
Port Waikato	1.7 m	2.0 m

4.2.2 Storm Surge and Storm Tide

Storm surge is the combination of barometric set-up and wind set-up which elevate water level above the predicted tide. The barometric set-up effect occurs when low atmospheric pressure over the ocean drives an increase in water level. A 1 hPa fall in atmospheric pressure drives an increase in water level of 10 mm. The inverse barometric effect driven by low pressure systems typically contributes 100-150 mm of the observed storm surge on the West Coast of the Waikato Region.

Wave breaking processes generate an increase in the average elevation of sea level (wave set-up) during storm events due to the release of wave energy in the surf zone as waves break. When offshore waves are large, wave set-up can raise the water level at the beach substantially. Most weather systems approach the Waikato Region from the west of New Zealand and therefore propagate towards the Waikato coast, generating wind waves and swells that affect the study area. The wave effects are therefore generated by the same events that drive barometric and wind set-up.

During storms, onshore wind and waves can drive water up against the shore, increasing water levels. The tide data analysis undertaken by Stephens et al. (2015) revealed that the sea level at Kawhia seems to be highly influenced by wind. It is thought this is most likely due to wind-set up against the coast further influenced by Coriolis forces. The study revealed that storm surges at Kawhia were dominated by the effects of wind stress associated with persistently strong north-westerly winds from weather fronts blowing over several hours to days.

These conditions drive surges almost double those experienced on the eastern Coromandel Peninsula. This effect is likely to be still somewhat relevant at Port Waikato and Raglan, but it is difficult to ascertain whether the magnitude of effect will be as significant. WRC analysis of Raglan tide gauge data during subsequent severe

storm events (e.g. January 2018) indicate that storm surge behaviour at Raglan closely follows that at Kawhia (Hunt, *pers. comm.* 2019).

The sea-level ‘anomaly’ describes the longer-term variation of the sea level that does not relate to tides. The sea level variations occur at time periods over a year (seasonal changes), several years (El Niño and La Nina Climate Cycles) and over decades (Pacific Decadal Oscillation). Therefore, while tide levels can be accurately predicted, the actual sea level at any given location is likely to differ from the predicted tide. The range of this sea level anomaly is generally up to ± 0.2 m (Stephens et al., 2015) and is included in the storm tide predictions.

The report by Stephens et al. (2015) examined the components that made up the largest observed storm tides in the tide gauge record at Kawhia. In all cases, the dominant component of storm surge was tide. The relative magnitude of storm surge was small in relation to tide. The overall storm surge height is heavily dependent therefore on the stage of tide (high/low and spring/neap) when the storm is at its peak. Extreme storm-tide (total sea-level) analysis was undertaken to determine the storm tide frequency–magnitude distribution using the Monte Carlo joint-probability technique.

Table 3 presents elevations for the median storm surge at Kawhia, based on the joint-probability analysis of sea level data at Kawhia Harbour (Stephens et al. 2015). The storm tide elevations presented are given relative to a zero MSL and to Moturiki Vertical Datum 1953 (‘MVD ’53).

1% AEP storm surge values were calculated using joint probability analysis techniques, which factor the likelihood that extreme spring high tide levels will coincide with a peak in storm surge. Analysis of the relatively short (six year) record at Kawhia, Stephens et al. (2015) revealed that of the largest recorded events, none occurred due to a coincidence of high storm surge and a high spring tide. This means there is potential for even larger storm surge events to occur in the future, though it is difficult to accurately determine their probability.

More extreme storm surge components are also likely to be measured as the record lengths increase. In the very short Kawhia record, three surges greater than 0.7 m were observed. Stephens et al. (2015) comment that it appears that Kawhia Harbour (and likely other west-coast estuaries) are subject to large wind-driven storm surges that could conceivably reach well over 1.0 m in magnitude.

Table 3: Storm tide elevations for Kawhia Harbour (Stephens et al. 2015).

AEP (%)	ARI (years)	Median (MSL)	Median (MVD '53)
10	10	2.33 m	2.46 m
5	20	2.42 m	2.55 m
2	50	2.54 m	2.57 m
1	100	2.63 m	2.76 m
0.5	200	2.73 m	2.86 m

In light of this uncertainty, Stephens et al. (2015) also provided the maximum observed tide, maximum storm surge and maximum sea-level anomaly, during the sea-level measurement period; which when combined yield a possible storm-elevated sea level of about RL 3.13m relative to Moturiki Datum (Table 4). Within the record, these maxima occurred at different times so there has not been a storm-elevated sea-level measured to this

elevation. This approach does however give an indication of the potential sea-level elevation expected if a very high tide combined with a very large storm surge and a very high sea-level anomaly, all at the same time. The probability of occurrence of the summed sea-level components is unknown due to the short record, but is likely to be very low; having an annual exceedance probability of less than 0.5% AEP based on the 2015 NIWA analysis of existing data shown in Table 4.

Table 4: Maximum measured storm surge components at Kawhia.

Storm Surge Component (Maximum) Relative to MSL	Level (MSL)	Level (MVD '53)
Maximum Tide Level	1.94 m	2.07 m
Storm Surge	0.90 m	0.90 m
Sea Level Anomaly	0.16 m	0.16 m
TOTAL:	3.00 m	3.13 m

As noted above, the 1% AEP level calculated by Stephens et al. (2015) (Table 3) was based on just six years of data and the authors acknowledged the limitations of such a short data record and the likelihood that larger surges would be recorded in a longer record. Accordingly, at this time we believe it is more prudent to estimate the maximum storm tide by summing the various maximum storm surge components.

The maximum storm tide elevations for Port Waikato and Raglan were therefore estimated by combining the maximum tide at each location (Section 4.2.1) with the maximum storm surge components measured at Kawhia as shown in Table 5. As noted above, there is likely to be some conservatism in this estimate, it represents the best available information.

Table 5: Maximum storm tide values for Raglan and Port Waikato (Moturiki Vertical Datum 1953).

	Max Tide MVD '53	Max Storm Surge (m)	Max SL Anomaly (m)	Max Storm Tide (MVD)
Raglan	2.10 m	0.90 m	0.16m	3.16 m
Port Waikato	2.00 m	0.90 m	0.16 m	3.06 m

Table 6: Maximum storm tide values for Raglan and Port Waikato (corrected to New Zealand Vertical Datum (NZVD) 2016).

	Max Storm Tide (MVD)	MVD – NZVD Correction	Max storm (NZVD)
Raglan	3.16 m	0.26 m	2.90 m
Port Waikato	3.06 m	0.29 m	2.87 m

4.2.3 Wave Run-up

“Wave run-up” is the maximum vertical extent of wave “up-rush” on a beach or structure above the still water level (that would occur without waves), and is therefore only a short-term fluctuation in water level relative to wave set-up, tidal and storm-surge time scales. Swash can reach to considerably higher levels than the average water level and can cause ponding if sufficient to overtop dunes or seawalls to reach lower lying areas inland.

The magnitude of wave run-up depends on the angle of the shore to the approaching waves, the nearshore water depth, wave height and period, beach slope and the nature of the shoreline (beach, dunes, vertical or sloping seawalls etc.). Wave run-up is therefore more significant on exposed open coasts and less so on sheltered estuarine shorelines. Wave run-up is not part of the calculations made by Stephens et al. (2015) as it is only a short-term fluctuation in water level and is not measured by tide gauges.

Wave run-up during storms can reach considerably higher levels than the storm surge water level and can aggravate inundation and cause physical damage to structures in nearshore areas. While we have not included an allowance for these wave effects in the above figures, we recommend that the Council include a “freeboard” in minimum floor levels, particularly very close to the coast. This freeboard is also important to provide for known (observed) infragravity wave effects that are seen in Raglan Harbour as surges that amplify total coastal storm surge levels further.

4.3 Sea Level Rise

4.3.1 Effect of Sea Level Rise on Coastal Erosion

Beaches

Observations of historic surveys and photographs indicate that the open coast and estuarine beaches of Waikato District are in most places in dynamic equilibrium or slowly eroding. On such beach systems, sea level rise is expected to drive an overall trend for shoreline retreat; with the beach profile adjusting landwards and upwards in response to the higher water level.

Shand et al. (2013) present a useful summary of the methods commonly used to provide indicative estimates of the erosion likely to arise from any given sea level rise. As they note, the most commonly used method for sandy beaches are simple geometric models which simply consider two-dimensional (cross-shore) changes, such as the standard Bruun Rule (Bruun, 1962 & 1988) used on sandy beaches (Figure 8).

On sandy beaches, the standard Bruun Rule assumes that the equilibrium cross-shore profile of the beach (out to the seaward edge, known as the closure depth) is moved upward and landward conserving mass and original shape. This change results in the upper areas of the beach being eroded with this volume balanced by equivalent deposition offshore (see top diagram in Figure 8). With this simple model, indicative estimates of erosion can be obtained using the following basic relationship:

$$\text{Erosion} = (\text{SLR} \times L^*)/h$$

Where:

SLR = sea-level rise (m)

L^* = distance between the landward and seaward edges of the beach system

h = elevation difference between seaward and landward edges of the active beach system (being the sum of $B + h^*$ in Figure 8).

In simple terms, the model simple calculates the average gradient over the entire beach system and extrapolates this slope landward by the amount of sea-level rise to estimate erosion.

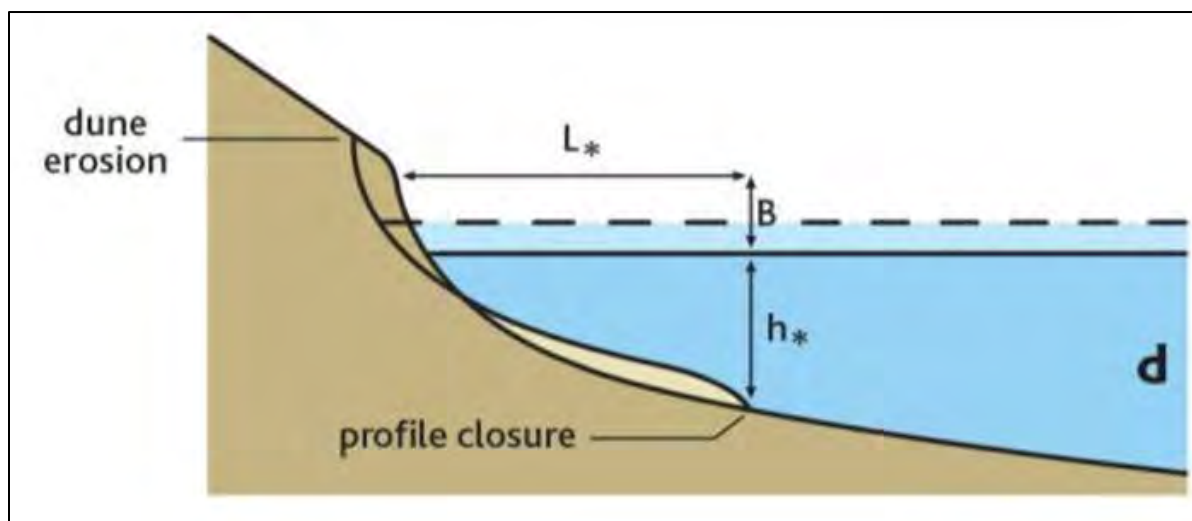


Figure 8: Schematic diagrams showing the standard Bruun Rule (modified from Figure 1 in Shand et al. 2013).

The model is simple and indicative only and there are numerous complications. For example, strictly speaking, the interconnected beaches of the open west coast and lower estuarine regions do not meet the conditions for the Bruun Rule; being complicated by longshore sand inputs and outputs. Wave climate changes could also change shoreline alignment giving rise to quite complex patterns of shoreline response including severe erosion in places and possibly accretion in others. Loss of sediment to ebb and flood tide deltas could be a further complication.

Application of the Bruun Rule on the open coast is also complicated by lack of information on the seaward edge of the beach system (i.e. depth of closure) and variation in average cross-shore slope and dune height. In near entrance areas, ebb tide deltas also complicate offshore bathymetry. However, using available bathymetric and topographic data for the open coast of the Waikato District in areas removed from harbour entrances and adopting a closure depth of 6-8m below Chart Datum suggests that erosion of approximately 75 m might occur for every 1.0 m of sea level rise. If the seaward edge of the beach system lies further offshore (e.g. about 10 m below Chart Datum) the erosion associated with 1 m sea-level rise would be higher (about 120 m). For this first pass assessment, a value of 75 m has been adopted but there is considerable uncertainty and the estimate is indicative only.

The full extent of this erosion will also only occur if there is a sufficient width of sand backing the shoreline. If erosion extends back to a cliff constructed of harder geology (for example), the Bruun Rule will no longer apply, and the rate of erosion will change.

On more sheltered sand beaches within estuaries, the average beach slope (typically 1V:15H-1V:20H) has been used in erosion calculations. In our view, this method is likely to provide lower order estimates in lower estuary areas adjacent to flood tide deltas (e.g. Waimanu Beach at Te Kopua, Raglan). In these areas, the beaches are part of an integrated sediment system which includes the flood- and ebb-tide delta systems. There are

significant uncertainties in estimating the likely response of these beaches to sea level rise as there is potential for sediment to be lost not only to cross-shore adjustment of the beach profile (as per the Bruun Rule assumptions) but also to growth of the flood- and ebb-tide delta systems with sea level rise.

The simple two-dimensional geometric models assume that neither the cross-shore shape of the beach profile nor the plan shape of the beach system are otherwise significantly modified; as might occur if climate change affects other key drivers additional (e.g. wave climate; sediment supply/budget). Obviously, this is an area of considerable uncertainty, one of many relating to potential climate change effects. It is our view that any such changes on the Waikato coast are more likely to aggravate rather than offset or mitigate erosion. We therefore believe that the use of these simple geometric models to provide indicative estimates of erosion is not likely to significantly overestimate future erosional response. It is important to appreciate that (regardless of the assessment model used), estimates of shoreline response to sea level rise are always indicative only. Future monitoring and the use of adaptive management approaches are therefore critical to successful long-term management.

Cliffs

Projected future sea level rise is also likely to increase erosion of cliffs and banks; particularly in areas where wave action influences existing toe erosion rates. As sea level rises, the frequency and severity of wave attack increase at the toe of the banks/cliffs.

The influence of sea level rise on bank and cliff erosion rates is still an active area of research and while various methods have been proposed to estimate these effects the methods have significant challenges. Ideally, as Le Cozannet et al. (2014) argue, it is necessary to rely on local observations and models applicable in the local geomorphological context.

At this point in time, there are no models developed in the local Waikato context that can be used to predict the potential influence of future sea level rise on bank/cliff erosion. However, Ashton et al. (2011) propose the following generic cliff retreat framework/equation for the response of a wide range of cliffed shores to sea level rise:

$$R_2 = R_1(S_2/S_1)^m$$

Where R_2 is the future rate of toe erosion, R_1 is the historic (and presumed present) rate, S_2 is the projected future rate of sea level rise and S_1 is the historic rate of sea level rise. The constant m ranges from -0.5 (inverse feedback – damped erosion), through 0 (no effect) to 1 (instant response). This model is the best available approach for estimating the effect of sea level rise on future cliff erosion rates where wave erosion is the principal mechanism acting on the cliff face. However, the difficulty lies in choosing an appropriate value of the power function m .

On open coast sites with high rates of bank or cliff recession, the SCAPE (Soft Cliff and Platform Erosion) predictive model ($m = 0.5$) has provided reasonable estimates when tested against the known record of sea level rise and cliff retreat for various open coast soft cliffs in the UK; including The Naze, Essex (Walkden and Hall, 2005), NE Norfolk (Dickson et al., 2007) and the Suffolk Coast (Brooks and Spencer, 2010). However, a value of

$m=0.5$ is probably too high for the Waikato coast where rates of cliff recession are slow on both open and estuarine coasts. Accordingly, a value of $m = 0.4$ has been adopted for this study.

Given an effective sea level rise of 1.0 m to 2120 and an historic rate of sea level rise of 0.2 m over the last century, this yields a multiplier of approximately 2 – suggesting that existing erosion rates could be doubled. In identifying the coastal erosion sensitivity areas, we have therefore assumed that the existing toe erosion rates will double in response to 1.0 m sea level rise. In reality, this may only likely to occur in areas with relatively soft and erodible banks, but nonetheless with the limited available data we feel it is prudent to acknowledge this possible increase in erosion rates on all cliffs and banks.

In defining the slope stability component of cliff erosion, we have adjusted the elevation of the toe of the bank by the relevant sea level rise. For instance, in estuarine areas the existing toe of bank is typically about RL 2.0 m and therefore in areas where 1.0 m of sea level rise has been considered, the stable slope has been calculated from RL 3.0 m.

4.3.2 Effect of Sea Level Rise on Coastal Flooding

Sea level rise is expected to greatly exacerbate the frequency and severity of coastal flooding over the next 50-100 years. Severe coastal inundation events that are currently very rare will become common with even relatively small sea level rise. The extent and severity of flooding during rare storm events will also be much greater in areas where coastal land is low lying; with areas not presently subject to coastal inundation likely to be affected.

4.4 Coastal Erosion and Flooding Hazard Areas

We have identified two coastal erosion and coastal flood hazard areas in areas of existing development:

- High risk coastal erosion/flooding areas, identifying the areas where there is significant risk from coastal erosion or flooding with existing sea level and coastal processes in the short term (within the lifespan of the District Plan).
- Coastal erosion/flooding sensitivity areas, identifying the areas potentially vulnerable to coastal erosion/flooding over the period to 2120, assuming sea level rise of 1.0 m.

The high-risk coastal erosion and coastal flooding areas are those areas which, in the absence of existing of future intervention, could reasonably be impacted by coastal erosion or flooding within the lifetime of the District Plan. This does not represent a “worst-case” potential coastal erosion or flooding area over this timeframe but identifies the areas at greatest risk and therefore of greatest priority for coastal hazard management.

Coastal erosion and flooding hazard reduce with distance inland and elevation (respectively). As we project coastal hazard beyond the short term, the uncertainty increases very considerably. The coastal erosion and flooding sensitivity areas are identified to highlight the much larger areas of land that may be vulnerable to coastal hazards over the next 100 years. These sensitivity areas reflect areas with uncertainty in regard to future coastal hazard vulnerability. It is important to note that these areas are not areas where coastal hazard has been identified with any certainty but are simply areas where further detailed investigation of coastal hazard is

recommended prior to any future intensification of land use. In many of these areas, the uncertainty may preclude definitive identification of hazard areas even with more detailed investigation. Accordingly, adaptive approaches to land use and development will typically be required in most of these areas.

It is important to note here that (unless otherwise stated) we have generally calculated coastal erosion hazard areas as if coastal protection works such as seawalls were not present. This approach acknowledges the residual risk landward of the structure. In the development of adaptive management plans, the management of these hazard areas may reflect the presence of structures, but until such a plan is agreed, we cannot assume that the existing structures provide long term protection.

In the rural areas, we have only identified coastal hazard sensitivity areas. These sensitivity areas simply define the areas within which any future development (excluding non-habitable farm buildings) will require a site-specific coastal hazard assessment and potentially adaptable design.

The criteria for identifying these hazard risk and sensitivity areas is summarised in Appendix A.

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5 BROAD MANAGEMENT RECOMMENDATIONS

This report recommends a range of measures for sustainable management of coastal erosion and flood risk in the Waikato District until relevant site-specific adaptive management strategies are developed. In discussing individual sites within the townships of Raglan and Port Waikato, we also provide commentary on possible measures that could be relevant to adaptive management strategies for these locations; to assist Council and community stakeholders in the development of site-specific adaptive management strategies.

These various management recommendations are based on a broad “hierarchy” of management approaches, implicit in national and regional coastal policy and developed to reflect the nature of the coastal environment, the likely responses of that environment to future climate change and the implications of different coastal hazard responses.

5.1 Risk Avoidance

Risk avoidance is an “ideal” approach to coastal hazard management to ensure long term sustainability and resilience. This approach is generally most relevant to the management of proposed new development.

In areas of existing development, there are still opportunities in some cases to relocate infrastructure outside of hazard areas, particularly where land parcels are large and/or where the existing hazard is not severe.

In the context of the Waikato District, a risk avoidance approach should be applied as the preferred approach wherever practical when:

- establishing major new infrastructure,
- undertaking major upgrades to existing infrastructure,
- considering applications for Greenfield development or any other significant intensification of land use

In the case of major new infrastructure or Greenfield development within the identified coastal erosion and flooding sensitivity areas, Council should ensure that any such proposal considers the impacts of coastal hazards over at least the next 100 years, including consideration of the RCP 8.5+ sea level rise scenario, to ensure that there will be no increase in the risk of adverse effects associated with coastal hazards in the future.

As discussed in Section 4.1.1, beaches are often a target for development, and historically this has occurred with insufficient allowance for natural coastal dynamics. Beaches are also particularly susceptible to the significant adverse effects of hard engineering works placed over time to protect the development. Public recreational and access values along the beach can be degraded when coastal protection structures are used to protect private property or other assets on land. These effects could become very severe with the aggravation of erosion expected to accompany projected sea level rise (4.3.1). It is therefore particularly important that Council takes a hazard “avoidance” approach to subdivision or development in currently undeveloped beach and wetland areas.

5.2 Risk reduction

Land use and development should be managed over time in high risk areas to implement approaches that reduce the risk from coastal hazards and the adverse effects of human responses to coastal hazard management.

In areas of existing development, it is recommended that Council develop appropriate policies and rules to reduce existing and future coastal hazard risk over time within the identified high-risk coastal erosion and flooding areas and to manage future hazard risk and associated effects in the coastal erosion and flooding sensitivity areas. Relevant risk reduction approaches include:

- development controls within identified coastal hazard areas to encourage dwellings and infrastructure to move landward away from high risk coastal erosion areas
- development controls that require adaptable design within coastal erosion sensitivity areas on beach shorelines and in coastal flooding sensitivity areas, to allow buildings to be moved landward or raised over time in response to changing hazard risk
- controls that require a site-specific geotechnical report in coastal erosion sensitivity areas on cliff shorelines to ensure future development is not at risk from slope failure.
- minimum floor levels in low-lying areas

In all cases where development or activities are restricted by these identified hazard areas, we recommend that the Council provides for the consideration of further, more detailed information including site specific coastal hazard studies, data on sub-surface geology, land stability investigations or detailed surveying of land levels etc., as relevant to the potential hazard. Such data may provide for a better understanding of coastal hazard risk at a site-specific scale.

In areas where existing development is located within the high-risk coastal erosion area, and there is insufficient space to relocate assets landward of these areas, a more detailed site specific plan is likely to be necessary to determine the most appropriate course of action, as described in Section 6 and Section 7.

It is relevant to note here that in terms of implementing minimum floor levels, where design provides for the house to be readily and practicably lifted at some future date, a lesser standard (than 100 years with sea level rise) can be adopted, though ideally minimum floor levels should be adequate for at least 50 years, including sea level rise of 0.4 m. Triggers tied to future sea level rise could be included in resource consent conditions and/or timeframes and appropriately recorded (e.g. on LIM data for the property) to ensure the dwelling will be further lifted if required in the future. Minimum floor levels should be sufficiently elevated above predicted flood levels to provide for water level fluctuations and wave effects ("freeboard"). This freeboard would vary depending on the setting but should not be less than 0.25 m.

Adaptability (e.g. buildings that can be practicably relocated and/or lifted if required) is a key consideration in reducing existing and future coastal hazard vulnerability. As such, we recommend that Council work with appropriate local professionals (e.g. architects, civil or structural engineers) to help develop and promote guidelines to encourage increased use of more adaptable design.

Ground levels will very likely need to be raised in coastal inundation hazard areas over time; in response to both significantly increased frequency and severity of flooding as sea level rises and complications from potential groundwater level changes (which are often strongly influenced by sea level in coastal settings). However, this a very complex consideration as ad hoc raising of ground levels can also aggravate existing and future coastal flood hazard for adjacent areas. Appropriate guidelines can therefore only be devised as detailed adaptive

management strategies are developed and will need to consider coastal flooding, stream/river flooding (including overland flow paths) and stormwater flooding.

We also recommend appropriate development controls within the District Plan to ensure that any intensification of existing development is avoided in high-risk coastal erosion and flooding areas. In coastal erosion and flooding sensitivity areas, intensification should ideally only occur where a site-specific coastal hazard study demonstrates that there will be no increase in coastal hazard risk, and/or effective and sustainable management of the risk is provided for in an agreed adaptive management strategy that considers the full range of future sea level rise scenarios.

Risk reduction is rarely a standalone management approach, but the outcome of many other actions that may be taken within this hierarchy. Risk reduction over time is generally central to any long-term adaptive management plan.

5.3 Living with hazards

In some cases where avoidance of coastal hazard areas is not practicable, it may be acceptable to live with a coastal erosion or flooding hazard. This approach is potentially viable where:

- coastal hazards only affect the area periodically and do not prevent ongoing use of the area (e.g. land may be affected but not dwellings or infrastructure, coastal erosion associated with dynamic fluctuations rather than permanent retreat)
- where the environmental/social/economic impacts of protection measures are unacceptable due to the sensitivity or values of the natural coastline (i.e. high value beach, ecologically significant wetland) and these values outweigh the impacts of the hazard
- the affected area is not developed, or development is of low intensity and/or is resilient to the hazard.

Living with coastal hazards can often form part of a longer term dynamic adaptive plan, with associated triggers to move to an alternative approach when the extent or frequency of the hazard impact is considered no longer acceptable.

5.4 Enhancing natural buffers

Natural coastal systems such as beaches, dunes and wetlands provide considerable protection against coastal hazards. National Policy promotes the protection and enhancement of these buffers to aid in the management of long-term coastal hazards.

Maintaining, restoring and/or enhancing natural coastal features and buffers can be a valuable tool to preserve, preserve the natural and amenity values of the shoreline over time. These natural features/buffers could include:

- naturally vegetated riparian margins
- naturally vegetated dunes
- storm ridges on gravel shorelines

- beaches or cheniers
- saltmarsh and other coastal wetlands
- combinations of the above

Enhancing natural buffers such as beaches, dunes and wetlands can be viable and bring significant benefits where:

- natural buffers are already present or have been previously degraded (i.e. they used to exist)
- coastal erosion is dynamic and therefore natural dunes are required for shoreline recovery
- wetlands can provide protection from wave action and flooding on estuarine shorelines.

It is important to recognize that natural buffers are natural coastal systems and are only sustainable in an environment that is geomorphologically suited. That is, there is little value in constructing a buffer such as a wetland or dune in a setting where the coastal processes are not compatible with that feature (i.e. where that buffer would not naturally exist). While naturally functioning dunes provide a buffer for erosion and are critical to dune recovery between periods of erosion, they will not prevent erosion from occurring.

In the Waikato context, Council should manage future development in low-lying areas provide for restoration of coastal wetlands where these features have been lost historically and for landward expansion and migration of wetland habitats in response to sea level rise of at least 1.36 m (i.e. RCP8.5+). These habitats provide critical ecosystem services including protection against coastal flooding and erosion.

We recommend therefore that infilling of these areas be strongly discouraged within the coastal flooding sensitivity areas. However, it is also important that controls do not impact on existing farming activities, which are often very reliant of existing measures such as drains, bunding and flap-gated culverts. The adverse effects of these measures can be relatively readily reversed when and if opportunity for wetland restoration occurs. A co-operative approach is strongly recommended in working with farmers to avoid future wetland loss and, where practical, encourage wetland restoration. It is also recommended that policy development examine potential incentive mechanisms to encourage appropriate wetland restoration within these areas.

5.5 Soft engineering

Soft engineering approaches work with nature and aim to provide protection from coastal hazards while avoiding the adverse effects associated with hard engineering works. In many cases, soft engineering approaches will provide amenity and/or ecological benefits as well as hazard protection. Soft engineering approaches are most likely to be a viable approach where:

- the local wave environment is low to moderate (i.e. estuarine or sheltered coastal setting)
- the coastal setting is part of a relatively discrete, enclosed sediment transport system (for beach nourishment)
- there are important land-based assets that require protection (that cannot be relocated), but the shoreline is also highly valued for recreation/amenity/ecology

Soft engineering approaches in high energy open coast environments can be applicable if the value of assets to be protected are sufficiently high but are often prohibitively expensive and performance can be uncertain.

Approaches such as beach scraping and beach nourishment require ongoing maintenance and can only be applied in suitable circumstances.

Soft engineering approaches in sheltered environments can be cost effective and generate very positive outcomes. It is critical that soft engineering approaches are designed and implemented based on principles of coastal geomorphology and hydrodynamics and a clear understanding of the local coastal system. In some cases, it may be appropriate to combine soft engineering with “hard” approaches such as sand retention structures.

5.6 Hard engineering structures

“Hard engineering” refers to structures that act as barriers to natural processes in order to prevent erosion or flooding of the land. These approaches have historically been the first line of action in response to coastal erosion. These approaches include sea walls, rock revetments, breakwaters, groynes and offshore reefs.

The most applied hard engineering structures are seawalls such as vertical walls or sloping rock revetments. Unfortunately, seawalls have severe adverse effects on eroding beaches (Pilkey & Wright, 1988; Wright & Pilkey, 1989). By way of example, Figure 9 and the associated text illustrates the impact of a seawall placed on an eroding beach. It is very unlikely that hard protection works will be a viable approach to coastal erosion management on the open coast beaches of the Waikato District due to such adverse effects and the significant engineering cost. They are also unlikely to be appropriate on estuarine beaches within the district unless the adverse effects can be avoided or mitigated (e.g. by beach nourishment).

Over time, the adverse effects and long-term implications of hard engineering works have been increasingly recognised, and as such National Policy now emphasises the use of alternative approaches. This shift in emphasis in coastal planning and management is occurring globally. The current national policy broadly discourages the use of hard engineering structures for coastal erosion management due to the now well understood adverse effects that these structures can have on wider coastal values and the potential for these adverse effects to be increased significantly with future sea-level rise.

We therefore recommend the District Plan broadly discourages the use of “hard” coastal protection structures.

There will, however be circumstances where hard engineering works are an appropriate solution, particularly where there is significant coastal hazard risk under current conditions or within short time frames, and where adverse effects of the works can either be mitigated or avoided, or are outweighed by the benefits (considering both public and private values)

In the context of the Waikato District, these structures may be appropriate as a temporary or permanent part of a chosen management approach where they are part of an adaptive management plan that has been developed with the community. Such a plan would need to ensure long term sustainability and that an appropriate balance is achieved between private and public values.

Where hard engineering is judged to be the best practicable option, measures to avoid risk/damage should include:

- locating the structure as far landward as reasonably practicable

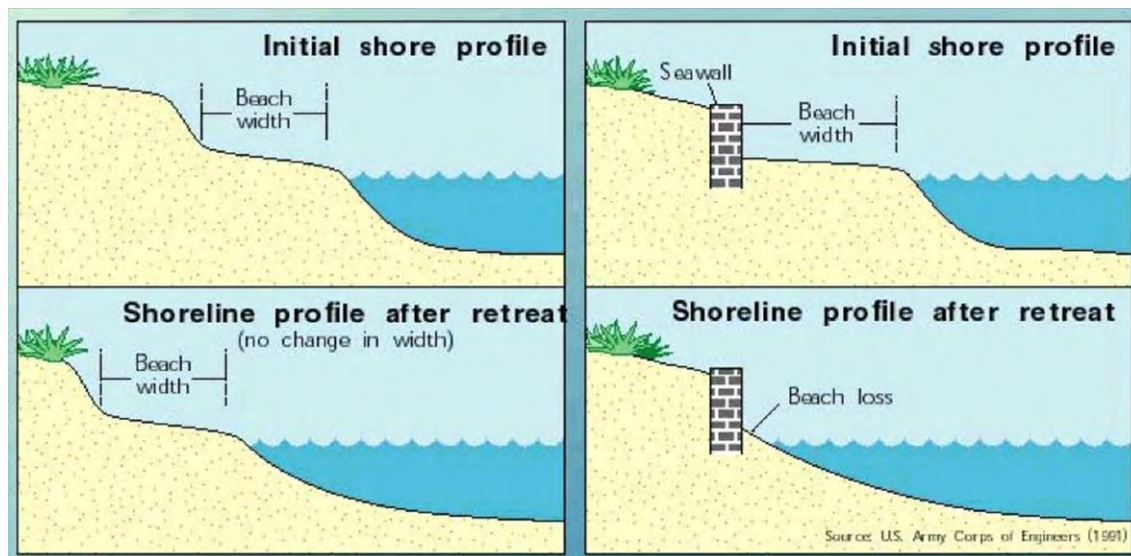
- using vertical structures where appropriate in preference to sloping structures to minimise seaward encroachment
- designing hard structures to resemble natural shorelines (e.g. in cliff settings) where possible to reduce natural character impacts
- minimising the length of the structure required
- ensuring environmental impacts are given sufficient weighting in location and design of the structure
- planning appropriately and using other measures to reduce the need for the structure over time.

Impact of Seawalls on Beaches

On a natural beach, the shoreline adjusts in response to a phase of erosion. The dune and high tide beach re-establish to landward and the recreational and ecological and amenity values of the beach and dunes are unchanged. Where the erosion is part of a natural cycle, over time the dune and beach will build slowly seaward and the erosion will be reversed.

If a seawall is constructed to protect the land from erosion, the seawall does not change the natural coastal processes driving the erosion. The seawall simply prevents landward movement of the dune. The erosion of the beach will continue, and with the profile unable to move landward, useable beach is lost.

A seawall separates the beach from the dune and interrupts the natural processes of beach recovery. Without a functioning dune, it is more difficult for the shoreline to recover from short term erosion. Loss of beach impacts on the recreational value of the beach as well as on natural character and ecological values.



As the beach level drops in front of the seawall, wave and tidal impacts on the seawall also increase. Larger waves can impact the structure, requiring more robust engineering to avoid wall failure. Beach lowering can also expose seawall foundations, or cause slumping of sloping rock structures. Seawalls often also cause increased “end effect” erosion of unprotected shorelines nearby.

Figure 9: The effect of placing a seawall on an eroding beach.

5.7 Adaptive Management Plans

Along some stretches of coastline within the established communities of Port Waikato and Raglan, extensive development and infrastructure already exists within identified coastal hazard areas. To prevent an ongoing increase in the level of risk and associated adverse effects, management approaches are likely to conflict with private use of the affected properties or with public values of the coast.

There is also much uncertainty about the long-term hazard, particularly with regard to the future effects of sea level rise. The issues are very complex and difficult, and it is not possible to simply avoid all coastal hazard risk in the short to medium term. In the past there has been a tendency to plan for either the “worst-case” or “most likely” scenario. While this approach is intuitively sensible, the huge uncertainties and long timeframes involved mean it can place unduly severe restrictions on current use of coastal properties and assets.

Reducing risk over time requires difficult decisions to be made about the long-term sustainability of development and structures in the risk areas and to establish a balance between public and private benefits and costs. In this context, the District Plan cannot alone provide the necessary outcomes and coastal hazards are best managed using an adaptive management approach. Adaptive management is a flexible approach to managing development, which can adjust in response to changes over time.

The aim of adaptive management is to transition over time to a more sustainable management approach while allowing for ongoing use in areas of existing development as the transition occurs. The intention is to develop a plan of actions that can respond to events as they occur (e.g. rates of sea level rise) without requiring unnecessarily drastic changes in the short term based on the worst-case scenario.

Adaptive management aims to be sensitive to the community and its aspirations, and local variations in aspirations and sensitivities to increasing risk. It also helps to cope with uncertainty by establishing trigger or decision points with the community and making a plan to implement these in both the short and long term.

There are five key stages to adaptive management:

1. building a shared understanding (processes, hazards, community resilience)
2. exploring the future and how communities are affected and identifying objectives
3. building adaptive pathways manage risk sustainably over time
4. implementing the strategy in practice
5. monitoring the strategy using early signals and triggers (decision points) for adjusting between pathways.

Where existing development is located in an area at risk from coastal hazards, there is often a conflict between the preservation of private and public assets. The development of such a plan requires the community and stakeholders to agree on long term outcomes and to identify appropriate signals and triggers to initiate the staged integration of the plan. Establishing an adaptive management strategy at sites such as the ocean beach at Port Waikato and the most developed sites in Raglan will be challenging and will take time and requires patience and open dialogue. Ongoing commitment is also required to keep the strategy live and relevant over the planning timeframe.

6 PORT WAIKATO

Port Waikato township is primarily located on a large sand spit on the southern side of the Waikato River entrance, with parts of the settlement and Cobourne Reserve also located on Putataka (a large headland extending into the river just north of the present wharf) (Figure 10).

For the purposes of hazard assessment and reporting, we have divided Port Waikato Township into three broad compartments:

1. Port Waikato Township – including both the ocean and river foreshore of the township.
2. Maraetai Bay – a sheltered estuarine embayment
3. Putataka Headland (Cobourne Reserve).



Figure 10: Port Waikato Township

6.1 Port Waikato Township

6.1.1 Coastal Erosion Hazard

The Port Waikato sand spit is known to be a very dynamic feature and has extended northwards considerably since the earliest available survey of 1863 (Dahm, 1999; Earthtech, 2006; Tonkin and Taylor, 2007 & 2009; ASR, 2007). The present main river entrance is located over 3,200 m north of the entrance position surveyed in 1863 (Figure 11). There is also evidence of significant earlier changes. For instance, Smith (1878) reports being informed by local Maori that the coastline between Manukau Heads and Port Waikato once extended much further seaward, projecting in a curved line and composed of low sand country with numerous sand dunes, freshwater lakes and clumps of tall manuka. There is also evidence that the river entrance channel was once hard against the hills on the southern side of the township, field inspections indicating wetlands and low-lying areas that appear to have been a former channel. Similar evidence was noted by ASR (2007).

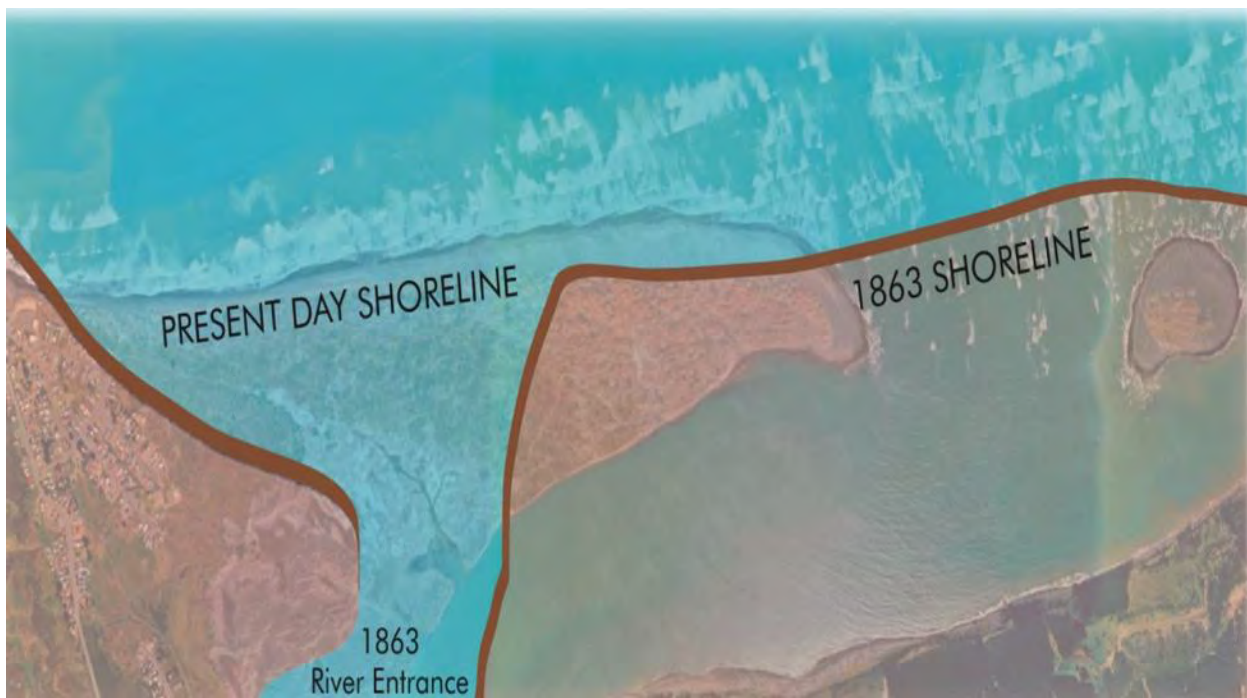


Figure 11: Overlay of the 1863 and a relatively recent (1990s) shoreline. Note the severe erosion of the 1863 shoreline that has accompanied the northward growth of the spit. Source – Waikato Regional Council

Tonkin and Taylor (2009) note that spits are dynamic features by nature with a cycle generally following a sequence of:

- growth in the direction of longshore transport
- potential breach at a relatively narrow or low-lying section
- post breach spit extension in the direction of net longshore transport.

Accordingly, over very long periods of time, much or all of the spit may be periodically eroded and rebuilt. Tonkin and Taylor (2009) argue that the risk of a breach affecting the township is low, with any future breach likely to be further north. One factor supporting this argument was the control on river channel position exerted

by the Putataka headland. They also note that carbon dating of a single shell from a shallow core indicates that the township area has been relatively stable over approximately the last 6000 years.

Nonetheless, given the significant changes to the spit over the period since 1863, the large-scale changes in the area in earlier human history reported to Smith (1878) and the old river channel along parts of the southern margin of the township, we believe caution is warranted until further investigation has more firmly established the dynamics of the spit over century and longer timeframes. We must therefore assume the township could be affected by future large-scale changes to the spit.

In the period since the earliest vertical aerial photography of 1942, large-scale changes have continued and the spit at Port Waikato has changed in size and shape and extended northwards; now approximately 1,200 m longer than it was in 1943 (Figure 12). An equivalent amount of erosion has occurred on the northern shore of the river mouth. This location of the river mouth appears to have largely stabilised since 2002 and there have been relatively small changes in the length of the spit in the last 15 years.

Over this same period (1942-2002), the overall width of the spit increased by up to 300 m in some areas, including accretion on the ocean beach near the township in the order of 100 m between 1943 and 2002 (Figure 14). Over the last 10 years however, this trend for accretion has reversed and since 2007, there has been erosion of approximately 50 m fronting the township (i.e. the houses and Surf Club on Sunset Beach). A broadly similar pattern of erosion has occurred along the length of the Port Waikato spit.

At present (2019), the erosion along the ocean shoreline of the township appears to be continuing (Figure 13); with WRC shoreline mapping data indicating the average rate of shoreline retreat over the last 10 years being just over 5 m/yr. The landward edge of the spit has also experienced severe erosion in places, particularly near the apex of meander bend on the landward edge of the spit; the erosion in this vicinity over the last decade varying alongshore but commonly averaging at least 5-10 m/yr.

However, the ocean shoreline of the township is still seaward of the 1942 shoreline (Figure 14) and so the recent erosion might simply be associated with multi-decadal shoreline fluctuations; in which case it would likely eventually slow or stop and may even be followed by a period of shoreline recovery

On the basis of the available information and the present relatively poor understanding of the dynamics of the spit over multi-decadal and multi-century timeframes, it is not yet possible to reliably predict future shoreline trends and associated coastal erosion hazard.

The uncertainty in regard to future erosion is illustrated in Figure 15 which shows (by way of example only) various potential future scenarios with different erosion rates and timeframes. It can be seen that even with average erosion rates as low as 1.5 metres per year, erosion could extend considerably landward into the township over the next century. Obviously, if the much higher erosion rate experienced over the last decade (5 m/yr) were to persist longer term, much more severe erosion would be experienced. Equally, if the erosion is simply part of a multi-decadal shoreline fluctuation, much lesser erosion might occur and eventually some recovery.



Figure 12: Recent aerial photograph of Port Waikato Township and spit. The yellow line illustrates the position of the shoreline in 1942. The scale of shoreline change over many decades is clearly evident.



Figure 13: Erosion fronting the car park and private properties at the southern end of Sunset Beach.

Potential future sea level rise adds additional uncertainty to long term projections of shoreline change. As discussed in Section 4.3.1, the complex and interconnected nature of open west coast beaches such as Sunset Beach at Port Waikato makes it very difficult to predict long term response to sea level but it is reasonable to assume that quite significant aggravation of erosion may occur. This erosion is likely to be in the order of 75 m erosion for every 1 m of sea level rise.

Overall, the uncertainty precludes any reasonable prediction of future erosion and accordingly any reliable or accurate mapping of erosion hazard areas. However, a cautious approach is sensible given the large-scale changes which have characterised this area historically, the very high rates of erosion that have occurred since the early 2000s (on both the landward and seaward sides of the spit) and the potential for aggravation of erosion by projected future sea level rise.

The **high risk coastal erosion hazard area**, the area that could potentially be impacted within timeline assumed for a District Plan, has therefore assumed an average erosion rate of 5 m/yr over the next 10 years (i.e. the average erosion rate of the last decade). In terms of the 100 year planning timeframe and a sea level rise scenario of 1.0 m, consideration has to be given not just to current erosion rates along the ocean shoreline and parts of the river shoreline but also potential large scale changes (e.g. possible spit breaches) and the potential sea level rise. Accordingly, we recommend that the entire spit be defined as a **coastal erosion sensitivity area** for this planning timeline. It is very important to emphasise that this is not a prediction that the entire spit may be eroded but simply an indication of the high level of long-term uncertainty.



Waikato District Coastal Hazard
 Prepared by Focus Resource Management Group
 © Waikato Regional Council 2018. Aerial Photography -
 Historic Aerial Photographs Data Sourced from <http://retrolens.nz> and licensed by LINZ CC-BY 3.0

0 100 200 m



Figure 14: Shoreline change at Port Waikato Township. The current shoreline is still seaward of the 1942 shoreline location.



Port Waikato Shoreline Change Scenarios
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0 50 100 m



Figure 15: Potential future shorelines at Port Waikato. These shorelines are based on historical shoreline change rates and illustrate a range of possible futures.

6.1.2 Coastal Flooding Hazard

The frontal dunes at Port Waikato Township are sufficiently elevated to be at little or no risk from coastal inundation with current sea level and following 1.0 m of sea level rise. Further landward however, there are large areas of the Township that could experience coastal inundation during an extreme storm event; via hydraulic linkages though low-lying areas on the landward margin of the spit (Figure 16). Currently such flooding events would be very uncommon, but even with minor sea level rise these impacts could become relatively frequent. Observations by residents suggests that during periods of high storm surge with very large ocean swells, wave run-up can affect lower areas of the carpark. These effects are currently minor and occasional but may become more severe with future erosion of the shoreline, and by future sea level rise, causing additional flooding hazard to lower lying areas to landward (Figure 17).



Waikato District Coastal Hazards - Coastal Inundation in extreme event with current sea level. Prepared by Focus Resource Management Group.

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0 100 200 300 400 m



Figure 16: Areas of land below the elevation of coastal inundation in an extreme storm surge event (3.1 m MVD '53). For discussion of levels see Section 4.2.



Waikato District Coastal Hazards - Coastal Inundation in extreme event with 1.0 m Sea Level Rise. Prepared by Focus Resource Management Group.

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0 100 200 300 400 m



Figure 17: Areas of land below the elevation of coastal inundation in an extreme event with 1.0 m of sea level rise (4.1 m MVD '53). For discussion of levels see Section 4.2.

6.1.3 Management Options and Recommendations

The erosion hazard analysis highlights that there is great uncertainty about whether existing erosion will continue and, if so, at what rate. There are many plausible future scenarios for Port Waikato. It is not possible (or reasonable) to predict one most likely future shoreline position for any given timeline.

The analysis also indicates that if the current erosion trend were to continue over the next 100 years, significant areas of the township could be affected. The more seaward assets (e.g. the car park at the southern end, hall, surf lifesaving club and the private properties seaward of Ocean View Road) could be severely impacted or lost within the 10-20 year timeframe assumed for the proposed District Plan; even if erosion rates slow to only half those observed over the last decade. If recent erosion rates continue these assets could be threatened in the very near future.

The options available to stop erosion along the ocean shoreline are very limited and are not likely to be practicable at this site. For instance, use of hard protection (e.g. a rock wall) would be very expensive (probably >\$10,000/m, possibly significantly more) and would impact severely on public values of the popular public beach with ongoing erosion, due to effects such as those illustrated and discussed in Section 5.

Soft protection (e.g. beach nourishment held in place by shore perpendicular groynes or by offshore reefs) would likely be prohibitively expensive relative to the assets most at risk. Beach nourishment would require vast volumes of sediment at this low gradient dissipative beach, and would come with huge capital cost, great uncertainty and ongoing maintenance costs even if a local sediment source could be found. The high energy, interconnected nature of the local environment would mean that any placed sediment would be rapidly lost alongshore unless held in place by groynes and/or offshore reefs; which structures would be extremely expensive in this high energy environment. Even if practicable, the total cost of protecting the approximately 400 m ocean foreshore of the township would likely be in the order of at least \$40-50 million and possibly considerably more; likely disproportionate to the value of the assets to be protected and the ability of the local community and/or Council to support.

It is therefore unlikely to be practicable to hold the line if the erosion trend continues, and assets will have to be progressively retreated over time as they are threatened. As part of the District Plan review, community meetings at Port Waikato were well attended, by both beachfront residents and the wider community. Many landowners acknowledged that some Port Waikato properties may not be viable in the long term if erosion continues. However, it was emphasised that they wish to continue to use their properties for as long as possible.

Landward adaptation is likely to be most effectively achieved by way of an adaptive management strategy developed with the affected landowners, iwi and other relevant stakeholders. This strategy will likely have to address:

- thresholds and triggers for relocation of assets as required
- provisions to provide for reasonable use of the properties while practicable, without incurring liability for the wider community
- whether there is compensation and/or alternatives for affected landowners.

In the interim, we recommend that the Council limits ongoing risk by including provisions in the District Plan that:

- **Prevent any further subdivision or intensification anywhere on the sand spit** (e.g. non-complying or possibly even prohibited activity status). If applications for such activity are provided for in the proposed District Plan, it is important to require a legally enforceable adaptive management strategy (or other suitable legal instrument) prepared at the applicant's expense requiring relocation of dwellings and (if required) abandonment of properties in the event that the dwelling(s) and/or practical use of the property is threatened by erosion, with mandatory trigger requirements specified. These various requirements should be noted on LIMs and elsewhere as required to ensure that prospective purchasers are aware of the risks.
- **Promote adaptable dwellings:** Given the existing and potential future issues with both coastal erosion and (longer term) coastal inundation, it is important that the proposed District Plan include measures that promote dwellings and other assets that are readily able to be both moved and/or lifted if required at some time in the future. These requirements are relevant over the entire area of the spit.

- **In the high-risk coastal erosion area**, it is recommended that these requirements are mandatory for any upgrade or replacement of existing dwellings and other buildings, together with clear triggers that specify when the building must be relocated further landward. While relocatability triggers may vary with property and dwelling, it is recommended that a minimum mandatory trigger be imposed (e.g. 10 m from the top edge of an erosion scarp) unless a lesser trigger is supported by advice from a suitably qualified expert (e.g. an engineer, architect or building removal specialist). Damage waivers to exempt Council from any liability (e.g. in the event the owner fails to move the dwelling in time) are also recommended.
 - **In the coastal erosion sensitivity area** (remainder of the spit), adaptable buildings should be actively encouraged and non-adaptable buildings (i.e. buildings not able to be readily relocated or lifted) subject to specification of action that will be taken in the event the dwelling is ever threatened by erosion (e.g. removal at owner's expense). Ideally, non-adaptable dwellings should also be subject to a mandatory s72 hazard notification.
- **Provide minimum floor levels for any new dwellings or renovation in identified coastal flood hazard areas.** If the dwelling is not able to be practicably/readily lifted, the minimum floor level should provide protection from extreme storm events including allowance for 1.0 m sea level rise and a suitable freeboard (the latter likely to vary with location but not <0.25 m). A lesser minimum standard could be adopted if the dwelling is able to be practicably and readily lifted as discussed in Section 5.2.
 - **Encourage the development of an adaptive management strategy.** For instance, the proposed District Plan could provide for the above controls, where appropriate, to be waived in favour of the provisions of any future agreed and Council-approved adaptive management strategy; as it is likely that such a strategy will provide far more effective and flexible management of coastal hazard risk.
 - **Dune restoration be actively encouraged.** Appropriate dune restoration is likely to play a useful role in any adaptive management strategy developed at this site to assist in the management of coastal hazards. For instance, dune restoration within Maraetai Bay and other low-lying areas along the river side of the spit could potentially assist in reducing coastal flood hazard risk by reducing hydraulic connectivity. If the present erosion trend along the ocean foreshore ceases at some future date, then dune restoration in this area will also encourage more rapid dune repair. It is therefore recommended that all activities associated with Council supported dune restoration (e.g. Coastcare) be a permitted activity in the proposed District plan, including earthworks where required. Earthworks are commonly required to fix damaged dunes and these earthworks present no significant issues in properly managed dune restoration.

6.2 Maraetai Bay

6.2.1 Coastal Erosion Hazard

Coastal erosion may have occasionally been experienced within Maraetai Bay but currently presents no significant hazard and is simply part of normal shoreline dynamic fluctuations. Historical data contains no clear evidence of significant fluctuations (i.e. periods of erosion and subsequent shoreline recovery) indicating any such changes in the past have been less than 5 m. There has been no long-term trend for erosion observed.

With future sea level rise of 1.0 m, erosion may be aggravated – probably by up to approximately 15 m (see Section 4.3.1).

In addition, eastwards migrating dunes are slowly infilling the bay on the western side and have narrowed it considerably since 1942 (Figure 18). The river shoreline immediately west of Maraetai Bay has also significantly accreted since 1942, which tends to suggest some movement of the river channel away from the shoreline in this area.

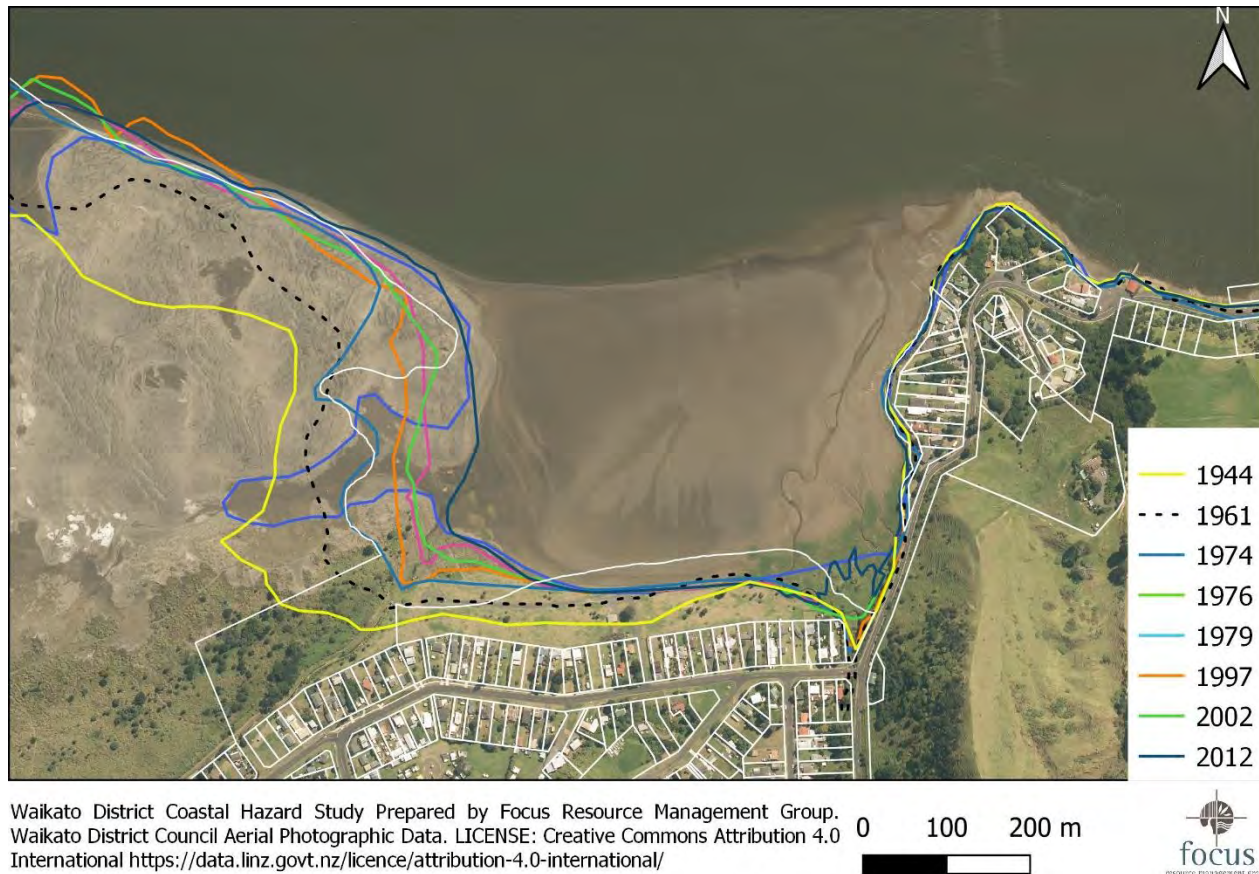


Figure 18: Historical shoreline change at Maraetai Bay at Port Waikato.

6.2.2 Coastal Flooding Hazard

The coastal margin around Maraetai Bay is very low-lying in many areas, particularly along the western side and the head of the bay. These low-lying areas provide a hydraulic conduit between the bay and the township.

With existing sea level, the risk from an extreme coastal flooding event is limited to localised areas (Figure 16). However, with 1.0 m of future sea level rise, flooding through the low-lying areas around the bay could affect much of the township (Figure 17). Accordingly, flooding through these low-lying areas are likely to become an increasingly significant issue with future sea level rise.

6.2.3 Management Options and Recommendations

Coastal erosion hazard presently poses no significant threat to the wide reserve and we strongly recommend that it should be lived with to maintain the amenity and natural character of the beach. In the longer term, there is potential for sea level to aggravate erosion. However, in this setting, any such aggravation of erosion could be relatively easily and cost-effectively managed using beach nourishment with local dunes as a sand source. For these reasons we have not recommended the implementation of coastal erosion hazard areas at the present time.

The migrating dunes progressively infilling the bay along the western margin may over time effect the recreational value of the Bay but also provide increased protection from coastal erosion processes.

The low-lying coastal margins provide a hydraulic conduit through which significant areas of the township could be exposed to increasing coastal flood hazard at the township with projected sea level rise.

We believe the various issues around Maraetai Bay are most effectively addressed as part of the adaptive management strategy, developed with the Council and local community and other stakeholders. Dune restoration and improved dune management is likely to be a particularly useful activity in this area; to assist in arresting migrating dunes along the western margin and lifting the coastal margin over time to reduce hydraulic conduits for coastal flooding.

Obviously, there are also important local hydraulic conduits which will need to be maintained (e.g. small natural waterways discharging to the bay). In the longer term with projected sea level rise, additional measures may eventually be required on some of these natural waterways to prevent or reduce ingress of coastal flooding.

Recommendations in respect to managing land use on the spit are as discussed in Section 6.1.3 above.

6.3 Putataka Headland

Various private properties and the Cobourne Reserve are located on a small headland extending out into the river from Putataka, a locally and culturally very significant hill. The Cobourne Reserve occupies the seaward end of the headland and there is a wide public reserve around the coastal margin (Figure 19).



Figure 19: Aerial view of the Putataka Headland with property boundaries overlaid.

6.3.1 Coastal Erosion Hazard

Historical shoreline mapping data indicates that there has been very little change in shoreline position since the 1940s (Figure 18). Field inspection indicates that the headland appears to be composed of relatively erosion resistant material and is eroding only very slowly. Steep erosion escarpments do however occur in many places around the coastal margin, indicating that some erosion does occur from time to time, with the more active erosion occurring in the more exposed areas of the headland extending into the river, including the margin of Cobourne Reserve. Judging from available data and field inspections, we believe existing natural toe erosion rates probably average in the order of 1-2 m per century and believe a figure of 2.5 m per century is likely to be adequately conservative for natural unprotected areas for planning purposes.

There are a number of ad hoc coastal protection structures around the base of the headland. It is not entirely clear how important these structures are in preventing erosion. In many cases, these structures are also related to significant private encroachment onto public reserve land. Detailed site-specific assessment would be required to estimate the likely erosion that would occur if these structures were removed as some may be backed by placed fill that could erode more rapidly than the natural banks.

In the interim, when identifying the **high-risk coastal erosion area**, we have adopted 2.0 m of toe erosion to allow for sea wall effects and a steep stable slope of 1V:1.5H for natural unprotected banks.

Future sea level rise will increase the frequency that the bank is exposed to coastal processes and may stimulate a trend for more active coastal erosion around the margin of the reserve. For projected sea level rise of 1.0 m, we have assumed a doubling of existing erosion rates as per earlier discussion (see discussion of potential effect of sea level rise on cliff erosion in Section 4.3.1). The **coastal erosion sensitivity area** therefore is defined by an average rate of erosion of 5 m per century, and an allowance for a stable slope of 1V:2H.



Figure 20: Pututaka Headland.

6.3.2 Coastal Flooding Hazard

Most existing development on Pututaka Headland is sufficiently elevated to be above the level of likely storm surge with current sea level (Figure 16). Low lying areas are generally located within marginal reserves, and while currently privatised in many places, do not indicate risk to private property or dwellings.

While the current risk is low, there are several properties that may be at risk from coastal inundation during storms with 1.0 m or more of sea level rise (Figure 17).

6.3.3 Management Options and Recommendations

With current sea level, it is likely that erosion would continue to be completely contained within the existing public reserve even over a period of up to 100 years. With projected sea level rise of 1.0 m over the next 100 years, erosion could extend slightly within some properties, but would not be sufficient to preclude reasonable

use of the property. Accordingly, it is likely that erosion can be managed without the need for hard engineering works and Council may wish to work with affected landowners to remove existing structures over time. If landowners wish their structures to remain, they should over time be moved landward onto private property except where Council considers the structures usefully contribute to public access and use of the reserve and foreshore. There is potential to greatly improve public access to this area over time through management of these effects.

In the Cobourne Reserve, it is recommended that existing shrub and tree plantings close to the edge which are presently being undermined by erosion be replaced with plantings further landward where it is desired to maintain shelter along the coastal margin. The existing residential sections are sufficiently deep to make living with erosion a viable option in the foreseeable future in most cases. Accordingly, we believe development controls discussed in Section 5 are adequate for management of erosion risk to private development within the hazard areas.

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7 RAGLAN

Figure 21 provides a broad overview of the Raglan township area, including areas of existing and future urban development.

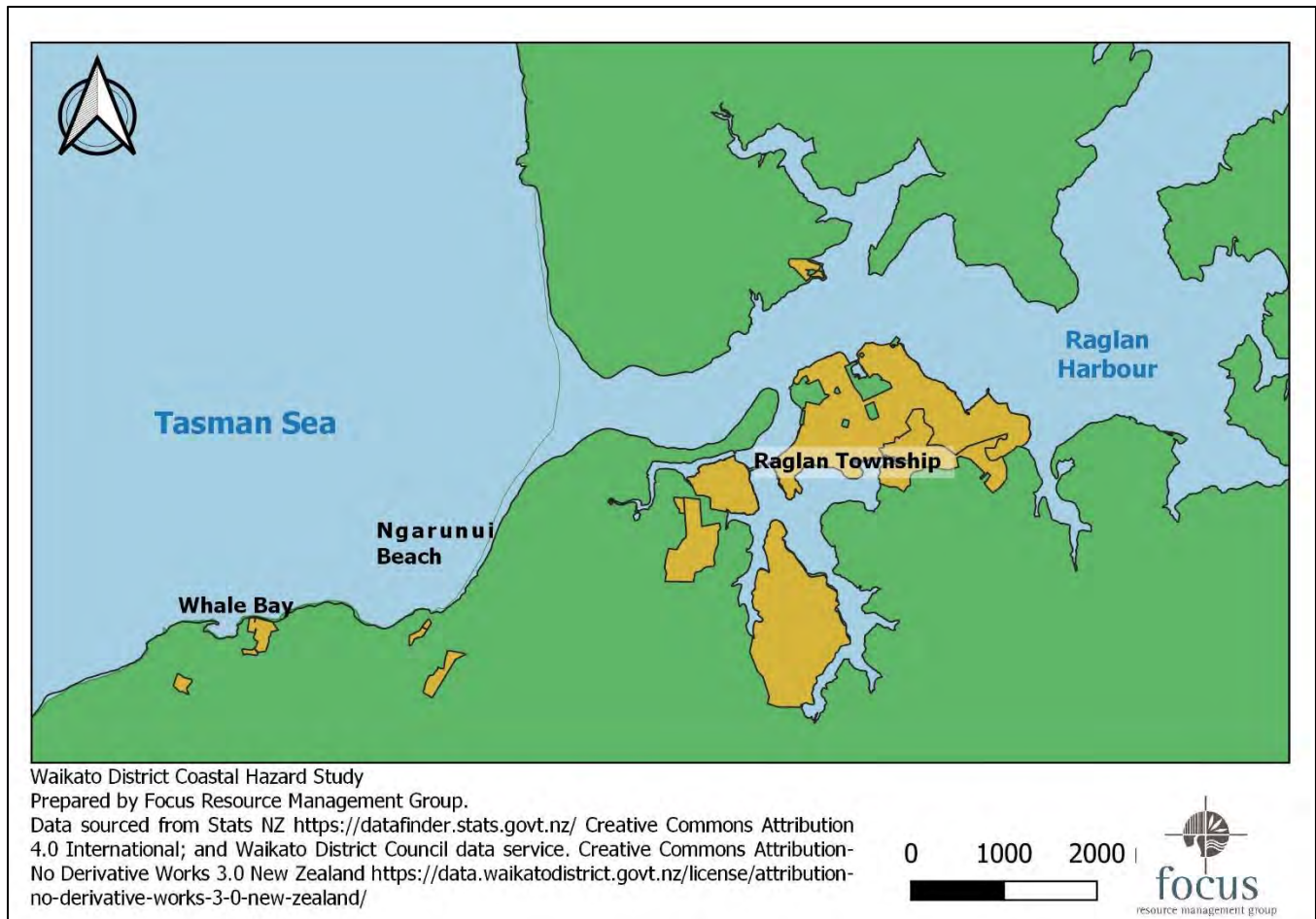


Figure 21: Overview of Raglan township area showing areas of existing and future development (orange) and areas generally zoned for rural or conservation land use (green)

The coastal environment in the township and surrounding area is diverse and complex. For the purposes of hazard assessment and reporting, we have divided the area into the following broad management areas (see Figure 21 and Figure 22):

1. **Whale Bay and Manu Bay:** exposed open coast backed by residential development on a steeply sloping bank.
2. **Harbour Entrance:** sandy open coast beach and dynamic harbour entrance area backed by sand dunes. Low intensity development and reserve.
3. **Te Kopua:** low lying sand spit backed by low intensity development, including airfield and campground. Recreationally important area currently experiencing erosion in some areas.
4. **Wainui Stream – Nihinihi Avenue:** area of residential development fronted by a steeply sloping bank with many coastal protection structures. Sheltered estuarine environment.
5. **Cliff Street:** important coastal reserve in the town centre. Steep low bank with ongoing slow erosion in unprotected areas.
6. **Aro Aro Bay and Inlet:** highly modified (drained) coastal wetland with extensive low-lying areas including some used for sports grounds. Small low lying and potentially erodible recreational reserve at the mouth of the inlet.
7. **Wallis Street:** residential development with narrow reserve and many historical coastal protection structures.
8. **Cox Bay:** residential development on elevated cliffs, fronted by shore platform.
9. **Lorenzen Bay:** existing residential development on low lying flats backed by coastal cliffs. Many historical structures and difficulties with coastal flooding and access.
10. **Greenslade Road:** narrow beaches backed by steep slopes and residential development on cliff top.

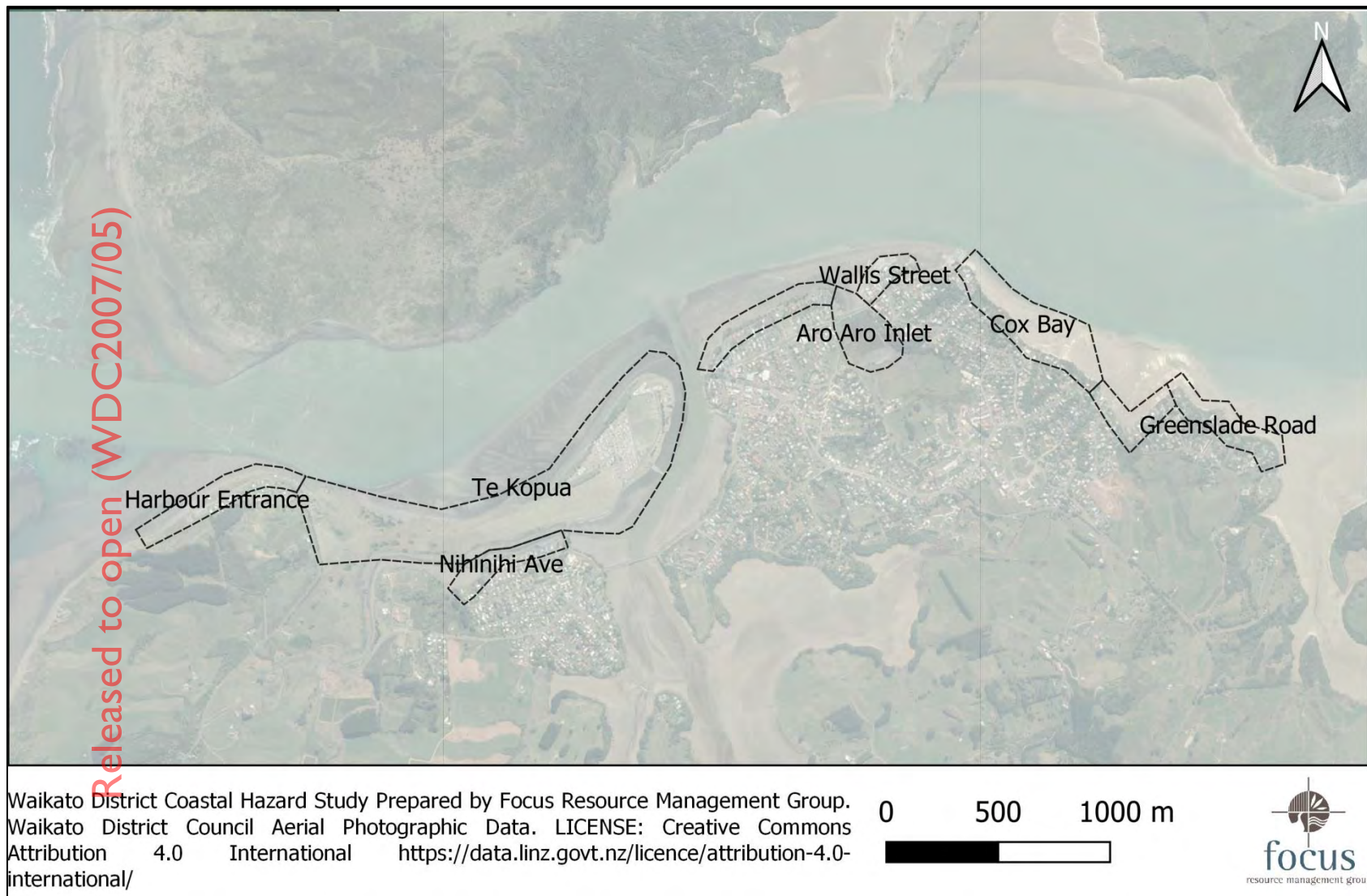


Figure 22: Broad coastal management areas in Raglan Harbour.

7.1 Whale Bay

This area includes the short length of shoreline fronting the small community at Whale Bay but excludes the area of the boulder spit and sand flats at 108c Whanga Road which has its own site-specific coastal hazard provisions approved by the Environment Court.

7.1.1 Coastal Erosion Hazard

Detailed evaluation of shoreline change at Whale Bay is difficult due to the limited features available for orthorectification of old historic aerial photographs. Shorelines digitised from these photographs therefore contain considerable error and cannot be used to calculate erosion rates. However, qualitative analysis using photographs dating from the 1940s indicate that the shoreline at Whale Bay has experienced very slow rates of shoreline erosion over the historical record. Erosion-induced slope instability appears to be very rare and banks along the shoreline are generally steep.

Field inspections and community information indicate that the coastal margin is subject to periodic bank erosion during severe storms, with a steep scarped bank along the edge of the grassed reserve fronting much of the developed area. The bank, composed largely of natural materials including colluvium (though there is also evidence of fill placement in some areas), appears from available evidence to be eroding relatively slowly.



Figure 23: View of vegetated erosion scarp fronting the grassed reserve in Whale Bay township

The average rate of toe retreat is estimated to be less than 5 m per century, though community advice indicates that localised erosion can be severe after rare and major storms. Accordingly, in identifying the **high-risk coastal erosion area** we have allowed for up to 2.0 m toe erosion over the short period (up to 20 years), together with failure to a relatively steep stable slope (1V:1.5H). This suggests erosion is unlikely to extend more than 5-7 m landward of the existing toe of bank in the short term and we have adopted the upper end value in plotting the high-risk area.

In defining the **coastal erosion sensitivity area**, considering projected sea level rise of up to 1.0 m over the next 100 years, we have allowed for a doubling of the existing toe erosion rate (i.e. up to 10 m per century) and failure to a more gentle stable slope (1V:2H). In the steeper and higher areas of Whale Bay, this gives an erosion sensitivity area of up to 30 m width, with this higher value has been adopted for mapping.

7.1.2 Coastal Flooding Hazard

Coastal inundation is not a significant hazard to private properties at Whale Bay (apart from 108c Whanga Road, which is covered by existing provisions), the properties are sufficiently elevated to be at low risk from coastal flooding from an extreme coastal storm event for both existing sea level and future sea level rise of up to 1.0 m. At this open coast setting, wave set-up and run-up would significantly increase the level of flooding impact, and this has been considered as part of the site-specific provisions at 108c Whanga Road. These calculations relate directly to the unique geomorphic setting of the specific site and cannot be directly applied to the rest of Whale Bay. The other existing residential properties are elevated approximately 10 m above mean sea level, so are unlikely to be affected by wave effects.

7.1.3 Management Options and Recommendations

Erosion rates at Whale Bay appear to be slow and pose little immediate threat to existing dwellings with current sea level, any erosion likely to be limited to within 5-10 m of the shore (including toe erosion and the worst likely slope adjustment).

Over the next 100 years, there is potential for much or even all the grassed reserve to be lost to erosion and for erosion to extend significantly into adjacent private properties. However, this will depend on actual toe erosion and associated slope adjustment and total erosion could be much less, particularly if hard rock materials underlie the properties. Moreover, even with severe erosion, the existing residential sections are sufficiently deep to make living with erosion a viable option in the foreseeable future in most cases. Accordingly, we believe development controls discussed in Section 5 are adequate for management of erosion risk to private development within the hazard areas.

7.2 Harbour Entrance

This area includes the seaward end of Riria Kereopa Memorial Drive and the car park area to the immediate south (Figure 24).

7.2.1 Coastal Erosion Hazard

In the southern parts of this area, just south of the car park, the dune toe has fluctuated by up to about 60 m in the historical record (Figure 24). However, the scale of the dynamic fluctuations decreases markedly nearer the entrance, the maximum fluctuation being approximately 40 m along this section of Riria Kereopa Memorial Drive and decreasing markedly in the entrance area near the toilet block. During the community consultation, local residents observed that during periods of erosion the beach level can drop dramatically, revealing large rocks. This may indicate that sub-surface geology plays a role in the greater shoreline stability noted near the entrance and toilet block, though sub-surface investigations would be required to confirm this.

In this area, we have adopted the 2017 shoreline, which is also the landward edge of the shoreline fluctuations (i.e. the most eroded line) as the baseline for the hazard areas. In the area fronting the southern areas of Riria

Kereopa Memorial Drive and the car park, we have defined the **high-risk coastal erosion area** assuming toe erosion of 15 m and a stable slope of 1V:2H. In the entrance area where lesser shoreline fluctuations have occurred historically, toe erosion of 10 m has been adopted and a stable slope of 1V:2H.

The response of ocean beaches along the west coast to sea level rise is very uncertain, but there is potential for significant permanent erosion. Estimates based on nearshore beach slopes suggest potential for up to 75 m permanent erosion for every 1.0 m of sea level rise (as discussed in Section 4.3.1) This erosion is additional to that associated with dynamic shoreline fluctuations. The response of the shoreline in this entrance area to sea level rise could also be severely complicated by effects related to changes to the flood and ebb-tide deltas, tidal prism and other factors. With future shoreline change so highly unpredictable, we have assumed that all areas on sand could potentially be affected by erosion when defining the **coastal erosion sensitivity area**. While the historic shoreline data indicates that erosion of properties landward of the road is unlikely with existing sea level and processes, it is not possible to definitively rule this out without further, more detailed investigation, including information on sub-surface geology.



Waikato District Coastal Hazard Study Prepared by Focus Resource Management Group. © Waikato Regional Aerial Photography Service (WRAPS) 2017. Imagery sourced from Waikato Regional Council. Licensed under CC BY 4.0

0 50 100 150 m



Figure 24: Shoreline change at the Raglan Harbour Entrance.

7.2.2 Coastal Flooding Hazard

The car park and private properties have existing ground elevations above RL 5.0 m and in most areas at least RL 6.0-8.0 m; above the elevations likely to be affected by coastal storm inundation over the next 100 years even with 1.0 m of sea level rise.

7.2.3 Management Options and Recommendations

The high-risk coastal erosion area indicates short term risk to the single private dwelling and the public toilet block seaward of Riria Kereopa Memorial Drive. It is important to note that this is not certain, and these assets would not have been affected by historic shoreline changes since 1944. With minor erosion hazard, it may be possible to protect these assets using relatively cost-effective options. However, with serious erosion it may not be practicable or appropriate to defend these assets and the best approach may be to relocate or remove them. It would be useful to agree appropriate triggers for this action with relevant stakeholders prior to erosion threatening the assets. Given the importance of the toilet block to local recreational use, it would also be useful to start considering alternative locations for this facility, in the event that the trigger for relocation or removal is reached.

In the medium-longer term, parts of Riria Kereopa Memorial Drive may also become vulnerable to erosion and possibly even the properties landward of the road. Accordingly, it would be useful to work with relevant stakeholders to develop an appropriate long-term adaptive management strategy for this area, including triggers for relocation of assets and infrastructure if required.

In the interim, it is recommended that land use and development within the potential hazard areas be managed as discussed in Section 5.

7.3 Te Kopua Spit (incl. Wainamu Beach)

The Te Kopua Spit, as discussed in this report, refers to the low spit-like landform located between Wainui Stream and Wainamu Beach. The northern shoreline (Wainamu Beach, Figure 25) is located in the lower harbour adjacent to the flood-tide delta; a very dynamic area of the harbour subject to strong tidal currents, very active sediment transport and dynamic (and largely subtidal) channels and banks. Refracted ocean waves migrate through the entrance and further influence patterns of erosion and accretion here. The spit is very low lying and all available information suggests the spit is entirely composed of sand (i.e. erodible), making it very vulnerable to both coastal erosion and coastal flooding now and in the future.

The feature is shown on geological maps as a late Pleistocene (Haweran) age terrace (Waterhouse and White, 1994), but field inspections indicate a considerable width (>100 m in places) of Holocene dunes along the northern side backing Wainamu Beach. Any original dune landforms further landward were destroyed by earthworks prior to the earliest (1940s) aerial photographs of the site. More detailed field investigations would be required to assess whether the entire feature seaward of Wainui Stream is composed of Holocene dunes and is a Holocene sand spit; or whether older (and potentially less erodible) Pleistocene sediments exist in more landward areas. For the purposes of this study, we must assume that the feature is a spit composed largely of loose erodible Holocene sands.



Figure 25: Shoreline at Te Kopua, looking toward the Raglan Harbour Entrance.

7.3.1 Coastal Erosion Hazard

Dahm and Gibberd (2010) completed a review of shoreline change and coastal hazards at Wainamu Beach and Te Kopua Spit and provided recommendations for a coastal development setback based on historical photography and cadastral survey data (going back to 1885) and field investigations. The data and outcomes from this study have been combined with the high quality orthorectified photography that has since become available in the area. Some of the mapped shorelines are shown over an aerial photograph of the area in Figure 26.

Shoreline change has varied greatly along the Te Kopua shoreline since records began. At the western end fronting the Te Kopua Whanau Camping Ground, there has been accretion of up to 100 m since the earliest survey records began, with a general pattern of accretion suggesting slow eastward migration of a large slug of sand. While there has been a recent trend for some erosion along this area (since about 2003), the shoreline is still well seaward of its 1940s location (Figure 26). While this erosion has continued slowly through to the present, it is still too early to ascertain if the erosion signals the beginning of multi-decadal erosion.

Further east, in central areas adjacent to the airfield, there have been dynamic fluctuations in the position of the shoreline by up to 75 m. The pattern of dynamic shoreline fluctuations in this area is also consistent with pulses of sediment migrating eastward alongshore into the harbour.



Figure 26: Historical shorelines at Te Kopua (Dahm & Gibberd, 2010; Waikato Regional Council, 2019).

There have also been significant shoreline fluctuations on the shoreline of the campground, further east. Historical records show multi-decadal fluctuations of up to 60 m and a 50 m increase in the length of the spit since the 1940s. This is consistent with net eastwards sediment transport along this coastline, probably under refracted ocean waves migrating through the entrance into the harbour. Tidal currents in the Opoturu arm of the estuary provide an eastern limit to longshore extension of the spit. Sediments transported into this channel are likely swept out into the ebb-dominated main channel and then seaward into the lower harbour. The sediment transport eastwards along the Wainamu Beach shoreline and subsequent subtidal transport back through the lower harbour are likely part of a slow, complex sediment transport pathway, by which pulses of sediment arriving at the harbour entrance are bypassed.

Shoreline changes on the landward side of the seaward end of the spit are generally small and dynamic; though there does appear to be slow net accretion over time as the 1924 and 1941 shorelines lie up to 50 m inland of the present toe of vegetation. This sediment input likely reflects, transport around the end of the spit by low refracted waves and surges. The southern shoreline of the Te Kopua Spit, adjacent to the Wainui Stream Estuary, has remained either stable or in an accretionary phase over the period of the record, with this shoreline largely fronted by intertidal wetlands. However, field observations indicate evidence of very slow erosion towards the western end on the outside of a bend in the tidal channel (Wainui Stream). However, most

shoreline changes observed from the historic surveys and aerial photography are within the known error of the data.

Overall, the data suggests that the Wainamu Beach shoreline experiences multi-decadal to century scale dynamic shoreline fluctuations; these fluctuations (periods of erosion and accretion) exceeding 100 m at the western end, decreasing eastwards to at least 50-60 m towards the eastern end. It is important however to note that the “snapshots” provided by available aerial photography and historic surveys probably do not adequately define the maximum scale of shoreline fluctuations over multi-decadal to century timeframes. The distal end of the spit appears to be slowly accreting over time, gradually extending further to the northeast. The landward margin adjacent to Wainui Stream is largely stable, apart isolated areas of very minor erosion on the outside of bends in tidal channel.

It is difficult to reliably define a high-risk erosion hazard area for the next 10-15 years as the shoreline trends at any location during that period will depend on whether the particular area of shoreline is in a multi-decadal erosion or accretion phase. While shoreline fluctuations of at least 50-60 m (eastern end) to >100 m (western areas) can be experienced over periods of 50-100 years, lesser changes will generally be experienced over 10-15 years. We have simply adopted a constant 12 m **high-risk coastal erosion area** along the northern shoreline of the spit, incorporating 10 m of toe erosion and allowance for slope instability. We emphasise however that it is still possible that erosion may exceed this over 10-15 years in localised areas experiencing an erosion cycle. On the more sheltered southern shoreline bordering the Wainui Stream estuary, we recommend the high-risk coastal erosion area can be reduced to a total width of 7 m, including 5 m of toe erosion and allowance for slope adjustment.

The effect of sea level rise in the medium to long term is highly uncertain. Future sea level rise could impact the Wainamu Beach shoreline in a number of ways due to the geomorphic setting. Erosion could be aggravated not just by a simple rise in water level, but also by increases in the velocity of nearshore tidal currents associated with a possible increase in tidal prism. There also could be a loss of sediment to the nearby flood and ebb tide deltas due to these features increasing in volume with increasing tidal prism. It is clear from existing data that shoreline fluctuations of at least 100 m can be experienced towards the western end over a period of a century and at least 50-60 m in eastern areas of the shoreline. Giving the existing beach slope and other effects that may accompany sea level rise, we believe that sea level rise of 1.0 m could potentially increase erosion by at least 15-20 m, but possibly more. Given the uncertainties around both the scale of existing shoreline fluctuations over multi-decadal and century timeframes, and the effects of projected sea level rise, we recommend that the entire spit presently be defined as a **coastal erosion sensitivity area** over the period to 2120 including the effects of 1.0 m sea level rise. We note that this extent of erosion may not occur, and that this assumption assumes the entire spit is composed of loose erodible Holocene sands which is not yet confirmed. However, more detailed investigations (including subsurface investigations and dating as well as modelling of potential sea level rise effects) would be required to reliably refine the erosion sensitivity area.

The more upstream margins of Wainui stream (west of Nihinihi and Te Kopua) are relatively low lying, particularly on the northern side of the stream. While this area is currently undeveloped, the land is in Maori ownership and there is potential for Papakaianga development. Although exposed banks in this area appear to suggest long term erosion, historical photography suggests this rate of erosion is very slow.

We recommend a **coastal erosion sensitivity area** of 15 m width be identified along this shoreline to provide for potential shoreline fluctuations and the effects of future sea level rise. We believe more detailed investigation may reduce this width over some of the area. In much of this area, coastal flooding will be a much more serious hazard than coastal erosion.

7.3.2 Coastal Flooding Hazard

Te Kopua Spit is low lying and potentially vulnerable to coastal inundation. With existing sea level, large areas of the campground could be inundated in an extreme storm surge event (Figure 27). With 1.0 m of sea level rise, the entire spit could potentially be inundated during an extreme storm event (Figure 28).

Sea level rise might also cause problems with high groundwater levels, particularly in lower-lying areas.



Figure 27: Illustration of the areas likely to be inundated (coloured) in a severe storm. Waikato Regional Council Coastal Inundation Tool <http://coastalinundation.waikatoregion.govt.nz/>.

There are also extensive areas upstream adjacent to the Wainui Stream that are vulnerable to flooding during extreme events with current sea level and these areas would become more frequently and severely impacted with any future sea level rise. These areas include the Wainui Road shops and the road to Whale Bay.



Figure 28: Broad area potentially at risk from coastal inundation in an extreme event after 1.0 m of sea level rise. Waikato Regional Council Coastal Inundation Tool <http://coastalinundation.waikatoregion.govt.nz/>.

7.3.3 Management Options and Recommendations

Wainamu Beach is a high value beach for recreational use and is easily accessible and heavily utilised by the public. Hard engineering structures (i.e. various kinds of sea wall) would be likely to impact on public values of the beach including beach loss and associated effects (e.g. impacts on public access, recreational use and visual/landscape values).

While soft options such as beach nourishment can sometimes be useful and practicable in harbour settings, the high energy and very dynamic nature of this shoreline means they are unlikely to be cost-effective, with significant longshore losses and ongoing maintenance requirements. Given the strong net eastwards longshore transport, groynes and beach nourishment might be effective in the short term. However, effective structures would be costly, and the potential adverse effects on natural character, public access along the beach and landscape values would be added considerations.

Dune restoration is useful to assist dune recovery once the beach is in an accretion phase. It is however important to appreciate dunes do not stop erosion. A naturally functioning dune around the coastal margin can also help to provide protection against coastal inundation.

Overall, erosion cycles will likely have to be lived with along the Wainamu Beach shoreline. Accordingly, the considerable uncertainty around the maximum likely erosion over the next 100 years (and the potential for increased inundation hazard) means that any future development in this area needs to be carefully managed.

The uncertainty around future shoreline change means that this area is not well suited to permanent (e.g. freehold) subdivision with fixed boundaries and significant permanent roading and other infrastructure. However, the spit is quite suitable for readily adaptable uses, including buildings that can be readily relocated or raised if required. Any development will therefore likely require an adaptive management strategy with suitable triggers to ensure assets are relocated and/or lifted in the longer term if required

Despite the entire area being identified as a coastal hazard sensitivity area, it is likely that more detailed investigation will identify some areas that are at low risk from coastal hazards, particularly erosion. We therefore recommend that the shoreline analysis undertaken as part of this work be complemented by detailed sub-surface investigations to establish the landward boundary of more erodible materials such as loose Holocene sands.

Discussions with the Maori landowners indicate that any permanent development at the western end (e.g. Papakainga housing) would likely be located well inland of the spit. This area is not likely to be affected by erosion but is potentially vulnerable to coastal flooding (Figure 27 and Figure 28). Accordingly, this aspect would need to be addressed in any such development (e.g. by minimum floor levels and possible raising of ground levels).

7.4 Wainui Stream - Nihinihi Avenue

Nihinihi Avenue is located upstream from Te Kopua adjacent to the Wainui Stream. Residential development is located on a raised terrace fronted by sloping banks (Figure 29).



Figure 29: Properties on Nihinihi Avenue.

7.4.1 Coastal Erosion Hazard

The bank appears to be experiencing periodic erosion, but data from historical surveys suggests that the average rate of any such erosion is very slow (no more than 2.5 m per century and possibly <1m/century). There is a relatively wide (10-15 m) coastal reserve in this area and so erosion alone would not pose a significant risk to the reserve. In many locations, private coastal erosion protection structures have also been placed to enhance the reserve for private use (Figure 29). These various ad hoc structures are not consented as a long-term solution to erosion and have therefore have not been considered in defining erosion hazard areas.

The toe erosion has the potential to give rise to occasional slope instability and a previous study (Blair, 1998) identified slope failure as a possible concern in this area. However, historic aerial and other photographs provide no evidence of significant slope failure, suggesting any such occurrence is rare. Nonetheless, we believe a precautionary approach to slope instability is warranted until more detailed information is available.

Given the very low rate of toe erosion, we have assumed no significant toe erosion in defining the **high-risk coastal erosion area**, but have adopted a precautionary approach to potential slope instability by assuming a stable slope of 1V:2H measured from RL 3.0 m (Table 7). We recommend that Council provide for adjustment of the high-risk area where justified by more detailed investigations of slope instability by an appropriately experienced geotechnical engineer or engineering geologist.

Over the period to 2120 with 1.0 m sea level rise, we have defined a **coastal erosion sensitivity area** based on toe erosion of up to 5.0 m (including landward movement of the shoreline with sea level rise and some possible erosion associated with removal of sea walls) and potential for significant localised slope failure to a slope of 1V:2H (Table 7).

We recommend that coastal erosion hazard areas can be similarly defined for the shoreline fronting Marine Parade (south of the bridge to Te Kopua), Oputuru Road, Goodare Road, Smith Street, Karioi Crescent and Wainui Road from the one lane bridge to Raglan Town Centre.

Table 7: Coastal erosion hazard areas at Nihinihi Avenue (Wainui Stream).

Sea Level Scenario	Toe Erosion	Stable Slope (V:H)	Total Erosion
Current	0.0 m	1:2	6.0-7.5 m
1.0 m	5.0 m	1:2	16.0-19.0 m

7.4.2 Coastal Flooding Hazard

The residential sections along most of Nihinihi Avenue are approximately 8.0 m above mean sea level so there is no foreseeable risk from coastal inundation. However, several sections at the western end of the road are low lying and may be vulnerable (Figure 30). There is also an area on the corner of Nihinihi Avenue and Marine Parade (around 12 Marine Parade) that is very low lying and is potentially at risk from coastal inundation during extreme events even with current sea level.

With 1.0 m of sea level rise to 2120, these areas will be impacted more frequently and extensively (Figure 31).



Figure 30: Broad area currently at risk from coastal inundation in an extreme event. Waikato Regional Council Coastal Inundation Tool <http://coastalinundation.waikatoregion.govt.nz/>.



Figure 31: Broad area currently at risk from coastal inundation in an extreme storm surge event following 1.0 m of sea level rise. Waikato Regional Council Coastal Inundation Tool <http://coastalinundation.waikatoregion.govt.nz/>.

7.4.3 Management Options and Recommendations

The defined high-risk coastal erosion area is likely to be limited to the reserve seaward of the private properties. In the longer term, the identified coastal erosion sensitivity area indicates there is potential for properties to be affected by erosion. However, it is important to appreciate that as most of the defined hazard is associated with potential slope instability any severe impacts are likely to be localised rather than widespread. Moreover, in all areas potentially impacted, the properties are deep with large areas landward of the defined hazard areas. Accordingly, even with localised worst-case effects, reasonable use of the properties will not be precluded.

We recommend that the risk from coastal erosion to private development can be primarily managed using appropriate development controls within the defined hazard areas, as discussed in Section 5. Coastal flood hazard fronting Marine Parade may require action in the medium to long term to ensure safe access is retained to adjacent properties and to Te Kopua.

Coastal flooding risk will increase significantly with sea level rise of 1.0 m for a few low-lying properties and land use in these areas will need to be managed using development controls (including minimum floor levels and/or adaptable foundations) and other measures as discussed in Section 5.

Management of the reserve is also a relevant consideration. The reserve areas are currently privatised by adjacent landowners (Figure 29) and there appears to be little or no public use in most areas. However, despite the potential for localised (and probably rare) impact by slope instability in both the short and longer term, it is our view that the reserve is likely to remain largely intact in the near future (i.e. next 20-30 years) and probably

also most of the next 100 years. Accordingly, it is important for Council to appreciate the nature of the potential hazard and recognise that the reserve could still be developed for public use. In developing the reserve in this way, an appropriate adaptive management strategy would be important to provide for the long-term low risk from erosion and localised slope instability.

7.5 Cliff Street

7.5.1 Coastal Erosion Hazard

Cliff Street is located on a Pleistocene terrace fronted by a slowly eroding bank. Historical shoreline change analysis indicates that the average rate of erosion along the bank has been generally less 5.0 m since 1944 (Figure 32 and Figure 33), with localised areas of slightly greater erosion particularly towards the western end more exposed to longer period refracted ocean waves and surges migrating through the entrance.

Sea level may aggravate the current rate of erosion as the bank is exposed to wave action for a higher proportion of the tide (see Section 4.3.1).

The **high-risk coastal erosion area** (area at risk in the immediate future - i.e. next 20-25 years) has been identified assuming 2 m toe erosion and a relatively steep stable slope of 1V:1.5H, giving a high-risk area of 5.5-8.0 m wide, varying slightly with bank height (Table 8). It is emphasised that erosion of this magnitude is only likely to occur in very isolated areas if at all, but the hazard width applies along the entire bank because it is not possible to reliably predict the location where such erosion may occur. In most areas we would expect erosion to average less than 1.0 m and be characterised by steep, near vertical erosion scarps, totalling only 1-2 m bank width at most.



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0 50 100 150 m

focus
landscape management group

Figure 32: Cliff Street showing 1944 shoreline (yellow) over a modern photograph.



Figure 33: Cliff Street in 1951. Whites Aviation Collection, Alexander Turnbull Library.
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It is difficult to reliably predict the response to sea level rise, but based on the considerations outlined in Section 4.3.1 we have assumed that sea level rise of 1.0 m over the period to 2020 could double the existing average rate of cliff toe erosion (<5 m per century); therefore adopting up to 10 m of toe erosion and a stable slope of 1V: 1.5H in defining the **coastal erosion sensitivity area**. The width of the potential coastal erosion hazard areas is summarised in Table 8.

Table 8: Coastal erosion hazard areas at Cliff Street.

Sea Level Scenario	Timeframe	Future erosion	Slope stability	Total Erosion
Current	n/a	2.0 m	6.0 m	8.0 m
1.0 m	100	10.0 m	4.5 m	14.5 m

7.5.2 Coastal Flooding Hazard

The reserve at Cliff Street is typically 5-6 m RL there is little risk from coastal storm inundation under current conditions and risk will still be low even following 1.0 m of sea level rise.



Figure 34: Broad area at risk from coastal inundation with current sea level (left) and with 1.0 m of sea level rise (right). Waikato Regional Council Coastal Inundation Tool (<http://coastalinundation.waikatoregion.govt.nz/>).

7.5.3 Management Options and Recommendations

Cliff Street is located in the heart of Raglan Township and is a very important reserve for public use and amenity. While it may be possible to live with slow erosion in some places at least in the short to medium term, increased erosion is likely to occur with future sea-level rise.

Decisions about future management of coastal erosion along the margin of this popular reserve are best addressed by way of an adaptive management plan developed in consultation with the community. If engineering protection is deemed necessary, a plan would include triggers for protection of unprotected areas and a low impact structure design that mitigates impacts on amenity, natural character and public access.

Ideally, any structure adopted for this high use amenity area should attempt to maintain the visual appearance of the natural cliff sediments, with modern design increasingly able to replicate such materials (e.g. recent work at Kohimarama). Given the good foundation provided by the shore platform at this location, it should be possible to construct a vertical or steep seawall built in a way that imitates the natural cliff feature and materials.

7.6 Aro Aro Bay and Inlet

The Aro Aro inlet was originally an estuarine arm with an extensive wetland (Figure 35). The upper reaches of this arm are now reclaimed (Figure 36). The road causeway currently restricts water flow to the remaining estuarine wetland. The reserve adjacent to Puriri Street an important recreational area.

7.6.1 Coastal Erosion Hazard

The Aro Aro inlet is very sheltered and coastal erosion processes are not particularly active. Coastal erosion has however been an issue at the reserve seaward of Puriri Street, adjacent to the toilet blocks; though the structures in this area probably relate more to seaward encroachment rather than a genuine trend for erosion. Sea level rise is likely to aggravate these issues.



Figure 35: Aro Aro Inlet in 1951. Whites Aviation Collection, Alexander Turnbull Library. Attribution 4.0 International (CC BY 4.0). The upper reaches of the estuarine arm (not shown) had already been reclaimed from the sea at this time.



Figure 36: Aro Aro Inlet showing 1944 shoreline (white), clearly illustrating the extent of drainage and reclamation.

7.6.2 Coastal Flooding Hazard

This area is very low-lying (<3 m RL), including significant areas of existing residential development. These areas are very vulnerable to coastal inundation even with current sea level (Figure 37, left), though mitigated by various existing measures. The frequency and severity of flooding will increase significantly with 1.0 m sea level rise (Figure 37, right).



Figure 37: Broad area currently at risk from coastal inundation in an extreme event with current sea level (left) and following 1.0 m of sea level rise (right) (Waikato Regional Council Coastal inundation tool, <http://coastalinundation.waikatoregion.govt.nz/>).

7.6.3 Management Options and Recommendations

Sports fields and associated facilities have historically been developed in this low-lying former wetland, as well as some private properties and dwellings and there are already existing issues with flooding and drainage. These issues will be severely complicated by projected future sea level rise.

Detailed investigations and development of an adaptive management strategy with key stakeholders and the community will be required to identify the best short-, medium- and long-term options for management of existing sports fields and associated facilities, appropriate protection of private properties and restoration of ecological values. With future sea level rise, it is possible that some existing uses may not be sustainable in the longer term and may need to be progressively retreated or removed over time, but this would need to be assessed by detailed investigation and costing of management options.

In the existing absence of an appropriate adaptive management strategy, it is recommended that Council manage land use and development within the defined coastal inundation hazard areas as outlined in Section 5. In particular, adaptable buildings (i.e. able to be lifted or relocated, as required) and minimum floor levels will be critical requirements.

The reserve at Puriri Street has significant recreational amenity value, and future management should therefore provide for protection of reserve while enhancing amenity. As the current structures are replaced, it is likely that beach nourishment (with retaining structures if required) will best provide both erosion protection and

enhanced amenity. The reserve is relatively low-lying and will likely require lifting in the longer term with projected sea level rise. The management of this reserve will influence the flood vulnerability of properties to landward, so these decisions are best made in collaboration with the local community.

7.7 Wallis Street

Wallis Street is a heavily developed Pleistocene age terrace fronted by slowly eroding banks (Figure 38). Most of the shoreline is armoured but geological maps (Waterhouse and White, 1994) and field inspection of limited remaining bank exposures indicate it is composed of moderately cemented sands similar to Cliff Street. The coastal protection structures are of varying age and state of repair.



Figure 38: Wallis Street shoreline.

7.7.1 Coastal Erosion Hazard

Natural rates of bank erosion are hard to ascertain as shoreline protection works have been in place for a long time and typically pre-date the earliest aerial photos. It is likely however that average bank erosion rates were similar to Cliff Street, less than 5 m per century. Fill may also have been placed in some areas as or before the sea walls were constructed and so if the current structures were removed at some future date, reasonably rapid erosion of such materials could occur in any areas it exists, followed by a resumption of natural slow erosion rates once the original bank was exposed.

In defining the **high-risk coastal erosion area**, we have assumed short-term erosion of up to 4 m (including 2-3 m allowance for any rapid erosion of fill behind existing sea walls) and a stable slope of 1:1.5, giving a typical high risk erosion hazard width of up to 7.0 m in the absence of effective protection (Table 9). The **coastal erosion sensitivity area** for 1.0 m sea level rise and the period to 2120 has assumed potential for toe erosion of up to 10 m and a stable slope of 1:1.5. This is the same approach as that adopted for Cliff Street.

Table 9: Coastal erosion hazard areas at Wallis Street.

Sea Level Scenario	Timeframe	Future erosion	Slope stability	Total Erosion
Current	n/a	4.0 m	3.0 m	7.0 m
1.0 m	100	10.0 m	1.5 m	11.5 m

7.7.2 Coastal Flooding Hazard

Ground elevations at Wallis Street are typically 3-4 m above current mean sea level. While this is above the level of vulnerability with current sea level, these areas may become at risk in the longer term with future sea level rise (Figure 39). These areas may also be vulnerable to wave effects.



Figure 39: Broad area at risk from coastal inundation with current sea level (left) and with 1.0 m of sea level rise (right). Waikato Regional Council Coastal Inundation Tool (<http://coastalinundation.waikatoregion.govt.nz/>).

7.7.3 Management Options and Recommendations

There is a very long history of coastal armoured structures at Wallis St. Designs are varied and many of the structures will require maintenance or replacement in coming years/decades. Although natural erosion rates are slow, existing use is located very close to the coast with little space to adapt and would be severely impacted by removal of the current structures.

Given the intensity of existing development with the defined hazard areas (including some within the narrow high-risk coastal erosion area), it is strongly recommended that a site-specific adaptive management plan be developed for this area. There are two broad approaches for ongoing management of coastal erosion hazard in this area which could be considered, though also variations (e.g. mixes of the two options):

Option 1: Remove ad hoc structures over time and live with erosion:

This option would simply manage erosion through development controls in identified hazard areas to avoid and reduce risk over time. The option would restore a natural shoreline over time as houses were replaced further landward. This option would reduce section size over time, the rate of loss dependent on future erosion rates. Future subdivision and intensification of use would likely be precluded unless appropriate provision were made to avoid erosion risk.

Option 2: Accept shoreline protection and upgrade over time:

This option would involve replacement of the existing structures with a well-engineered seawall capable of providing long term protection. Ideally, any seawall built to provide long term protection would be designed to recover some of the natural character lost with construction of the structures built in the past. For instance, with present technology, it should be possible to construct a structure with visual properties similar to the original natural shoreline, similar to the option briefly discussed above in regard to future management of erosion in Cliff Street.

If located on public land, a “new” seawall would ideally also provide public benefit, probably including public access. A new seawall would be relatively expensive but would provide some long-term certainty for owners and less restriction on land use.

Until an agreed adaptive management strategy is developed for this area, we recommend that the Council implements coastal development controls in the identified coastal hazard areas to manage risk over time – as discussed in Section 5. These measures would avoid any further development in the high-risk coastal erosion area and would progressively retreat existing development from this area as it was upgraded or replaced. Development in the coastal erosion sensitivity area would be provided for, but subject to standard relocatability requirements. Minimum floor levels would also be required within the coastal flooding areas.

7.8 Cox Bay

The coastal cliffs at Cox Bay extend from the Wharf to Lorenzen Bay; being typically 10-15 m high near the wharf and reaching elevations up to 30 m east of Lily Street (Figure 40).

7.8.1 Coastal Erosion Hazard

Existing data suggests that the toe of the cliff is eroding only very slowly; with an average rate of erosion of less than 2.5 metres per century and possibly even less than 1.0 m per century. The average slope of these cliffs varies between 1V:1H and 1V:1.5H.

Slope instability is known to have occurred in the area, but we were not able to obtain useful information about these historic events. Field observations and historic aerial photography suggest that most slip features are relatively shallow, but a precautionary approach is required in the present absence of detailed information.



Figure 40: Cluffed shoreline at Cox Bay.

Accordingly, we have defined the **high-risk coastal erosion area** based on a stable slope of 1V:2H. The actual area of high erosion vulnerability is likely to be less in many (possibly even most) areas and so we recommend that Council provide for adjustment of this high-risk area where justified by site-specific investigations by an appropriately experienced geotechnical engineer or engineering geologist. Toe erosion has been ignored in defining the high-risk erosion area as the rate of toe erosion is very slow and we believe there is sufficient conservatism in definition of this area given the stable slope of 1V:2H assumed.

The **coastal erosion sensitivity area** to 2120 (including 1.0 m sea level rise) has assumed existing rates of toe erosion may be doubled (i.e. up to 5 m per century) (see Section 4.3.1) and also assumes potential for deeper-seated slope failure by adopting a stable slope of 1V:2H.

The width of these high risk and sensitivity areas vary greatly depending on the elevation of the coastal margin.

7.8.2 Coastal Flooding Hazard

This area is elevated above any current or future coastal inundation events.

7.8.3 Management Options and Recommendations

It is recommended that coastal development within the defined hazard areas be managed using development controls as outlined in Section 5; with new development avoided in the high-risk coastal erosion area and requirement for a report from suitable experienced geotechnical expert for any development within the coastal erosion sensitivity area.

Current coastal erosion protection structures at the toe of the bank are of little value in this area as the rate of toe erosion is extremely slow, and the primary cause of erosion risk to the properties above is slope instability. Seawalls detract from the natural character of the shoreline and would also be buried or destroyed by periodic slope failure.

7.9 Lorenzen Bay

Field inspections and geomorphic considerations suggest the original shoreline at Lorenzen Bay was an estuarine beach backed by a narrow coastal and/or flood plain; composed of sands and gravels deposited by the two small streams which discharge into the bay. The narrow plain, widest near the stream entrances and of very limited width in other areas, is backed by higher topography.

The earliest subdivision in Lorenzen Bay, in eastern areas of the bay, was formed in 1918-19 (Deeds 589). No foreshore reserve was taken, and the seaward property boundaries were located at Mean High Water Mark (MHW) (Deeds 589), likely seaward of the vegetated shoreline at the time. In some cases, a narrow reserve has since been taken upon later subdivision of some of the original lots. Early subdivision in more western area dates from surveys in 1936 and 1941, where the seaward boundary of the narrow reserve was also fixed at MHW (DP 31092). The shoreline is now largely fronted by coastal protection works (Figure 41 and Figure 42).



Figure 41: Eastern shore of Lorenzen Bay, at the end of Lorenzen Bay Road.



Figure 42: Western shoreline of Lorenzen Bay (accessed from Greenslade Road).

7.9.1 Coastal Erosion Hazard

Shoreline armouring works have been widespread since the date of the earliest aerial photographs, likely reflecting the proximity of the properties to the coastline (in some cases, seaward of the natural coast) and the narrow reserves (e.g. as owners attempted to hold or reclaim out to their seaward boundaries).

These structures mean it is very difficult to assess natural erosion rates. The only information we were able to locate was a short section of shoreline change shown on DPS38349; indicating erosion averaging 6.0-6.5 m (and up to about 8.0 m) between 1919-1985 along part of the eastern side of the bay. If part of a long-term trend for erosion, this would equate to an erosion rate of approximately 10 m per century. However, we believe it is more likely that the changes were simply dynamic as the relevant shoreline is close to a stream entrance.

An additional complication is that many properties have been reclaimed and so seawalls may be backed by readily erodible fill rather than a natural shoreline. There is evidence for instance that some properties in the eastern areas of the bay were reclaimed out to the original boundaries. One property in this area has more recently (in the late 1950s or early 1960s) even been reclaimed well seaward of the legal property boundary (Figure 43).

It is therefore very difficult to reliably assess the erosion that could occur in the absence of the existing erosion protection works. In the original natural environment, the coastal areas around the stream entrances were likely very dynamic, experiencing periods of severe erosion with changes in stream channels and entrances; particularly during stream floods and coastal storms. However, with the present confined stream entrance, there is less potential for severe erosion associated with stream changes. As an interim measure, we have defined a **high-risk coastal erosion area** of 10 m relative to our adopted baseline. More detailed investigations, including subsurface investigations, would be required to improve definition of this area.

With sea level rise of 1.0 m, the estuarine beaches may retreat approximately 15 m (in the absence of shoreline protection); based on other estuarine beach slopes (Section 4.3.1). Accordingly, the **coastal erosion sensitivity area** has assumed a total erosion of 25 m. In some cases, this exceeds the width of the coastal plain and we have cut-off the landward edge of this area at the base of the adjacent hills.

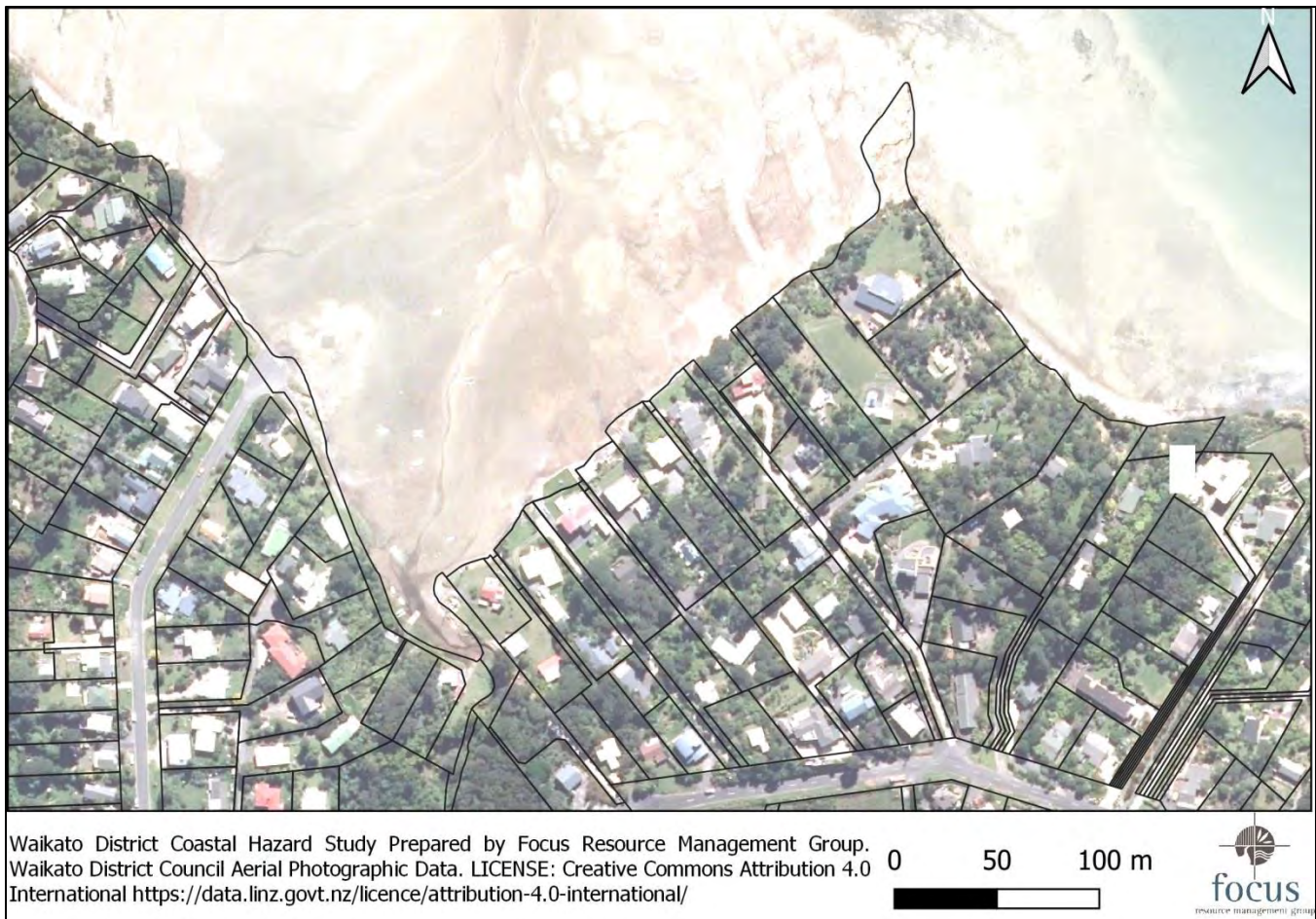


Figure 43: Property boundaries at Lorenzen Bay, showing the variation in seaward boundary location associated with different title dates, and illustrating localised reclamation.

7.9.2 Coastal Flooding Hazard

The low-lying properties on the narrow coastal plain have typical existing elevations of 2-3 m above MSL and are presently vulnerable to coastal flooding during storm surge events (Figure 44 and Figure 45). With 1.0 m of sea level rise, this flooding would become more frequent and severe, and also more widespread (Figure 45).



Figure 44: Flooding at the end of Lorenzen Bay Road in 2018.



Figure 45: Broad area at risk from coastal inundation with current sea level (left) and with 1.0 m of sea level rise (right). Waikato Regional Council Coastal Inundation Tool (<http://coastalinundation.waikatoregion.govt.nz/>).

7.9.3 Management Options and Recommendations

The hazard assessments indicate that there are significant coastal erosion and coastal flood hazard vulnerability with existing sea level and that these problems will become very severe with sea level rise of 1.0 m.

In the absence of protection works, coastal erosion is likely to severely impact a number of private properties, including some dwellings, even in the short term; particularly properties on the western side of the bay. The popular public access path along the western foreshore of the bay would also likely be completely lost in the relatively short term. Erosion hazard also has the potential to significantly complicate existing vehicle access problems for a few properties. As such, it is unlikely to be practicable to simply live with erosion at Lorenzen Bay, given the established development and infrastructure and the high level of hazard risk. However, existing ad hoc structures have a number of serious deficiencies and are unlikely to be consented as long term solutions.

Most of the low-lying properties and roads are presently vulnerable to coastal flooding during severe events. With existing land elevations, low-lying properties would likely be subject to flooding every tide following 1.0 m of sea level rise; and during extreme events would be flooded to depths of about 1.0 m over a wide area, with wave effects likely superimposed. These issues would be compounded by stream and stormwater flooding.

In our opinion, the coastal hazard problems at Lorenzen Bay are very complex and difficult and can only be resolved through a comprehensive adaptive management strategy. It is also likely that appropriately located and designed sea walls will be required, particularly in western areas of the bay. In the longer term, land elevations will also need to be substantially raised if ongoing use was to continue in many areas. Raising ground levels comes with associated complications (e.g. avoiding exacerbation of flooding in neighbouring properties; existing in-ground infrastructure).

In the absence of an agreed adaptive management strategy, we recommend that the Council manage land use in the identified hazard areas using the various development controls discussed in Section 5. Minimum floor levels will be particularly important in this area, together with avoiding any further subdivision or intensification that is likely to increase risk over time.

7.10 Greenslade Road

The shoreline at Greenslade Road is hard and rocky, backed by a steeply sloping shoreline, rising to 15-20 m elevation (Figure 46 and Figure 47). In places, the steeply sloping shoreline is also fronted by narrow and shallow beaches. Original subdivision occurred in 1918-19, with titles extending down to MHWM (Deed 589), likely seaward of the original vegetated shoreline. No foreshore reserve was taken at the time of the original subdivision, but a useful width of reserve has subsequently been taken in some areas as part of further subdivision.



Figure 46: Coastline fronting the eastern section of Greenslade Road.



Figure 47: Coastline fronting the western section of Greenslade Road.

7.10.1 Coastal Erosion Hazard

Field observations in the western portion of the shoreline at Greenslade Road indicate some areas of active erosion scarps, but historic mapped shorelines and other data indicate that the rate of shoreline erosion is very slow. In many places, the seaward property and/or reserve boundaries extend seaward of the current vegetated shoreline. However, this appears to be primarily a function of the original title surveys which extended to MHW, quite often seaward of the vegetated shoreline of the time.

The steeply sloping banks further landward typically have a gradient between 1V:1H and 1V:2H. Historic photographs do not provide any record of significant slope failures. However, there has been a recent slip in the Council reserve fronting 104c Greenslade Road. Concerned property owners have undertaken planting efforts to stabilise the slope where possible. Lidar data indicates that this slope failure occurred in an area that was previously particularly steep compared to the adjacent shoreline (1V:1H slope) but the community member who alerted us to the site believes that uncontrolled stormwater also played a role in causing the slope failure. Overall, there is clearly potential for shallow slope failures, particularly in steeper areas. The risk of more significant or deeper-seated slope failure is unknown and though there is no evidence of such features in the available historic aerial photography, a precautionary approach until further, more detailed investigation confirms site specific land stability.

As with Cox Bay, a **high-risk coastal erosion area** has been defined on the basis of a slope of 1V:2H, reflecting a precautionary approach to any erosion-induced slope instability until more detailed investigations are undertaken. The same approach as Cox Bay has also been adopted in identifying the **coastal erosion sensitivity area** to 2120, including the effect of 1.0 m sea level rise; assuming potential for a doubling of existing toe erosion rates up to 5.0 m per century and a stable slope of 1V:2H. The horizontal distance from the base of the cliff will vary greatly depending on the elevation of each property.

7.10.2 Coastal Flooding Hazard

Properties at Greenslade Road are well elevated and not at risk from coastal flooding.

Management Options and Recommendations

The primary erosion risk in this area arises from potential slope instability, albeit rare, associated with very slow rates of toe erosion. Accordingly, seawalls will not greatly influence hazard risk and would be buried or severely damaged when and if slope instability events occur.

We recommend that the identified erosion hazard areas are managed using development controls (as outlined in Section 5) to avoid and reduce risk. Given the limited site-specific information available on slope instability, we recommend that the plan provide for adjustment of the development controls where a property-specific assessment of slope instability (by a qualified geotechnical engineer or engineering geologist) indicates this is appropriate.

8 WIDER WAIKATO COASTLINE

8.1 Coastal Compartments

The coast outside of the townships of Raglan and Port Waikato is predominantly rural, and in many areas has only limited road access or none at all. We have broadly divided this coastline into the following coastal compartments based on geomorphology and coastal process considerations:

- Open coast sandy shorelines (including stream entrances)
- Open coast cliffs
- Major river/estuary entrances
- Estuarine banks and cliffs
- Estuarine beaches and low-lying coastal margins

The following sections provide a brief description of each of these compartments and the coastal processes relating to coastal erosion and coastal storm inundation hazard, followed by recommendations for the identification of coastal hazard areas and management approaches.

8.2 Open Coast Sandy Shorelines

8.2.1 Description

Beaches are backed by dunes at a number of locations along the open coast, but in many areas the dunes are relatively narrow and backed by sea cliffs (e.g. the areas of Pleistocene sand cliffs discussed above). As noted above, cliff erosion may be reactivated by erosion associated with projected sea level rise and therefore cliff erosion hazard becomes relevant.

This compartment includes several very dynamic stream entrances long the sandy coast, often including dunes, actively migrating sands and extensive low-lying areas.

8.2.2 Erosion Hazard

Historical shorelines mapped from historic aerial photography indicate that West Coast beaches can undergo significant multi-decadal dynamic shoreline fluctuations over long periods of time; including lengthy periods of erosion followed by lengthy periods of accretion. For instance, the location of the dune toe along the main area of at Ngarunui Beach has fluctuated by up to 65 m since the 1940s, except towards the northern end where erosion is limited by geological control (Figure 48). Erosion of up to 60 m occurred between 1943 and 1974. Since then the shoreline has recovered by approximately 25 m. A longer record may indicate even larger fluctuations.

As discussed in Section 4.3.1, while the response of west coast ocean beaches to sea level rise is uncertain, there is potential for these beaches to erode significantly; in the order of 75 m of beach retreat for every 1.0 m of sea level rise. In many areas, this will exceed the width of dunes indicating potential for the dunes to be (at least periodically) completely lost.

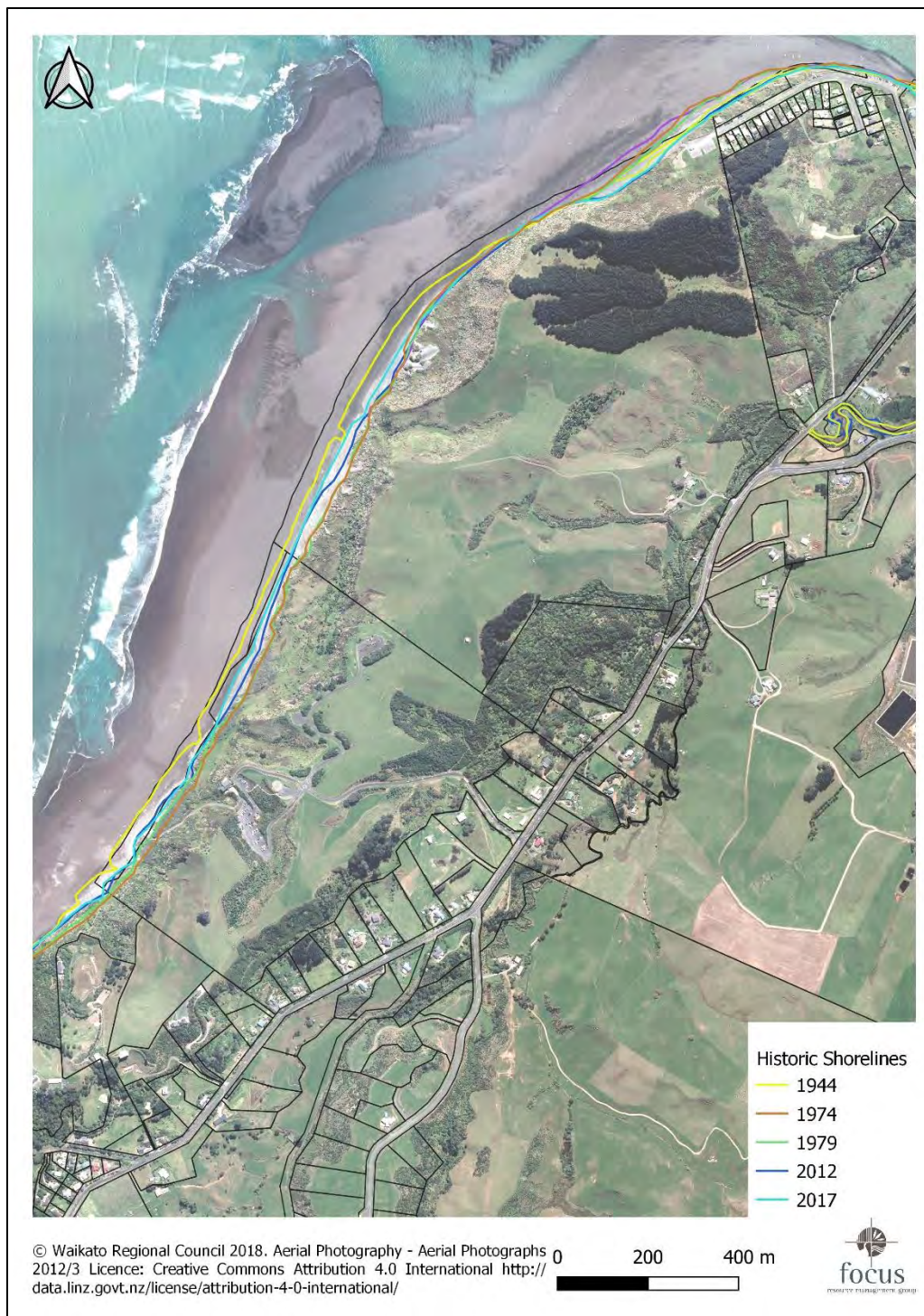


Figure 48: Historical shoreline positions at Ngarunui Beach.

Stream entrances are vulnerable to a number of hazards including coastal erosion, wind erosion, coastal storm inundation, tsunami hazard and stream flooding, and these areas are subject to significant fluctuations in shoreline position (Figure 49). Fluvial processes (and interactions between fluvial and coastal processes) may also cause erosion further inland. The low-lying areas can be vulnerable to coastal storm inundation (including

wave effects) for some distance inland; as well as complex interactions between coastal inundation and stream flooding. These potential hazard areas are very complex to define, particularly where significant coastal streams intersect the coast (e.g. Kaawa, Waikaretu, Waikorea, Waimai, Ruapuke and Torepara Streams) and are backed by low-lying flood plains and wetlands.

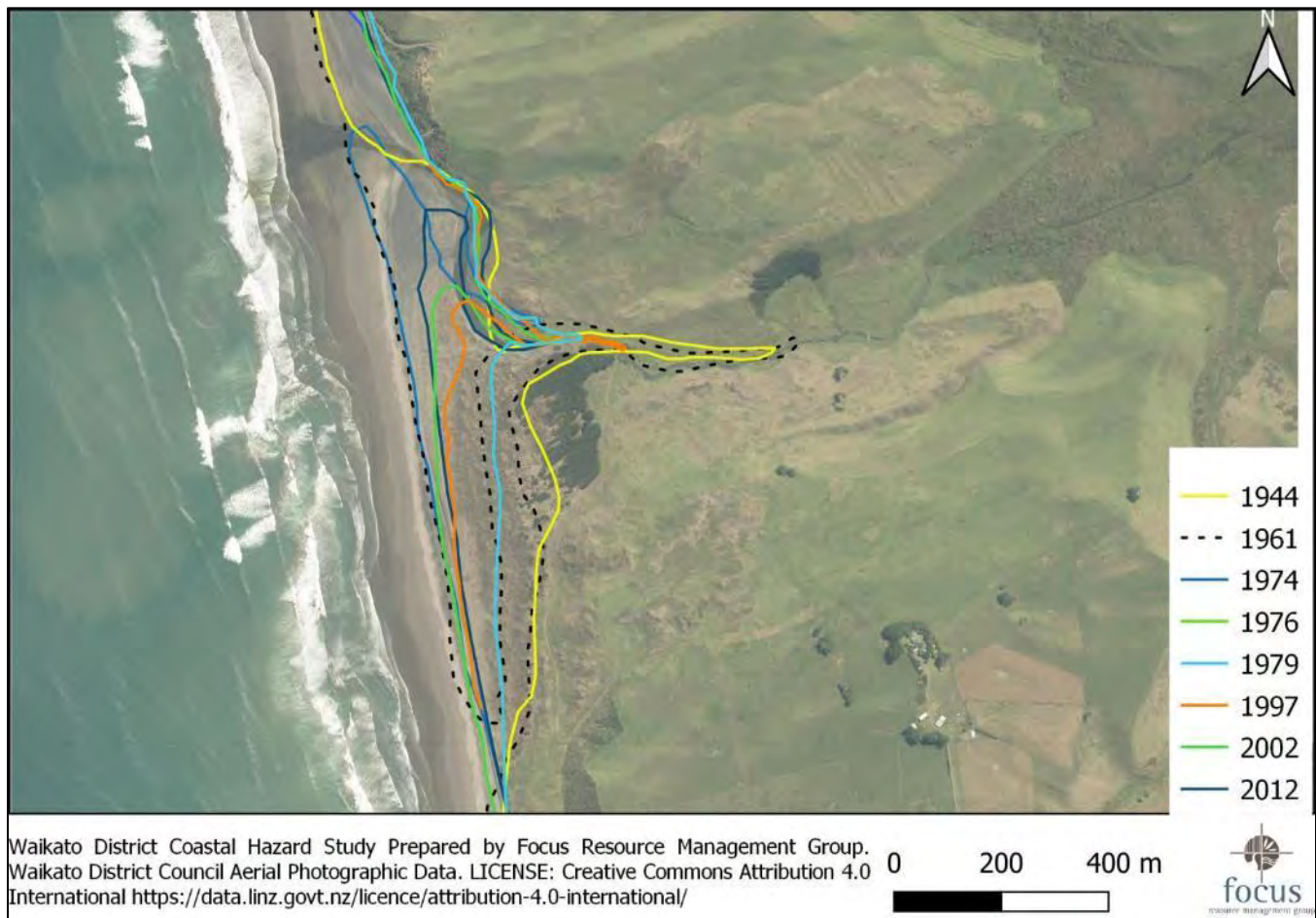


Figure 49: Historical shoreline change at Toreparu Stream, south of Raglan.

8.3 Open Coast Cliffs

8.3.1 Description

The open coast of the District is bordered by hill country over the full length and in many areas this high topography directly abuts the coast. Accordingly, cliffed and bluffed coastlines are common over the full length of the coast and are probably the predominant landform on this coast.

North of the Waikato River entrance, the cliffs are generally formed in cemented or weakly cemented Pleistocene sands. The cliffs are fronted by a sandy high tide beach and in many areas also by dunes, being only periodically subject to wave attack. In some cases, (e.g. immediately north of the Waikato River entrance), the cliffs are therefore protected from waves for long periods (in some cases many decades) (Figure 50).



Figure 50: Shoreline north of Port Waikato. Old sea cliffs are protected from wave attack by dunes.

Tertiary (and, in northern areas, sometimes older) sedimentary rocks dominate the cliffs between Port Waikato and Raglan. In some areas, the cliffs outcrop seaward of the beach and are subject to wave action most of the tide (Figure 51). In other areas, the cliffs are fronted by a sandy beach, but the beaches are most commonly narrow and sometimes intertidal; with the cliffs subject to wave attack at high stages of the tide, or during periods of significant waves. Accordingly, most of the cliffs along this coast are active.

South of Raglan Harbour, the cliffs around the base of Mount Karioi are formed of hard basaltic and andesitic volcanic rocks which outcrop seaward of the coast (Figure 52). Further south towards Aotea Harbour, the cliffs are primarily composed of cemented Pleistocene dune sands and, like similar cliffs north of Port Waikato, are typically fronted by a high tide beach and dunes (e.g. Ruapuke Beach). A short section of cliffs outcrop seaward of the beach near the centre of Ruapuke Beach at Matawha point; but this outcrop is composed of harder and more erosion resistant volcanic rocks which geological maps indicate are of similar age and geology to Mount Karioi (Waterhouse and White, 1994). Further south from Schnackenberg Bay to Taranaki Point, hard Tertiary aged limestones of the Te Kuiti Group outcrop seaward of the coast (Figure 53).



Figure 51: Cliffs between Port Waikato and Raglan (photo Waikato District Council).



Figure 52: Hard basaltic cliffs at the base of Mt Karioi (photo Waikato District Council).



Figure 53: Tertiary aged limestones of the Te Kuiti Group north of Aotea Harbour (photo Waikato District Council).

8.3.2 Toe Erosion Rates

The pattern of the cliffs along the Waikato District coast indicates that the cliffs composed of Tertiary age sedimentary rocks or of andesitic and basaltic volcanics are relatively erosion resistant, quite often outcropping seaward of the coast and subject to wave attack at most stages of the tide. It is difficult to reliably estimate the erosion rates of these cliffs, but the shoreline mapping data and geomorphic considerations suggest the erosion rates are very slow (less than 5 m per century). The toe erosion rates of these cliffs may increase with projected sea level rise, driven by increased water depths and therefore higher wave energy, but the increase is likely to be relatively modest, with future cliff erosion rates probably less than 10 m per century.

In contrast, the cliffs composed of weakly cemented Pleistocene sands (e.g. north of Port Waikato and landward of Ruapuke Beach) are likely to be much more erodible. Historically these cliffs have eroded, creating embayments that over time develop significant beach and dune widths directly seaward of the cliff. These beaches and dunes protect the cliffs from wave attack on most occasions. Accordingly, these cliffs could experience significant erosion if the beaches and dunes to seaward are lost due to the effects of future sea level rise. As discussed in Section 4.3.1, while the response of west coast ocean beaches to sea level rise is uncertain, there is potential for these beaches to erode significantly; in the order of 75 m of beach retreat for every 1.0 m of sea level rise. The weakly cemented Pleistocene sands may not erode as rapidly as the loose Holocene sands, but nonetheless significant cliff erosion rates could occur, and it would seem unlikely that this accelerated erosion would cease until a useful width of high tide beach and dunes was re-established. It is important therefore to allow for this potential for significant cliff erosion in these areas. We have assumed that cliff

erosion in these areas is likely to follow a similar pattern to the beaches to seaward (i.e. of up to 75 m erosion per 1.0 m of sea level); even though the rate of erosion is uncertain (i.e. the cliffs will likely erode more slowly than the beaches to seaward, but the long term outcome would be similar).

8.3.3 Slope Stability

Examination of LiDAR data indicates that the cliffs and seaward escarpments along the coast are steep, with typical slopes steeper than 1V: 2H with only localised exceptions. This is similar to the conclusions of earlier work (Tonkin and Taylor, 2007).

Caution is required however as local variations can occur. As an example, Tonkin and Taylor (2007) noted evidence of active earthflows that extend inland with slopes of 1V:6H or less in the area between Kaawa Stream and Otangaroa Stream (the central-northern part of the coastline between Raglan and Port Waikato). The main hazard identified was regression of the head scarp associated with each earthflow and the earthflow mass becoming a rapid debris flow following a heavy rainfall event. It is not clear if these features are wholly or partly related to coastal processes. There is also evidence of other slope instability types in many areas just inland of the coast (Figure 54).

Cliff height is typically less than 50 m but can reach up to 100 m in some areas.



Figure 54: Land instability between Port Waikato and Raglan.

8.4 Major River/Estuary Entrances

There are some locations where beaches are backed by wide dune fields, most notably on the northern coasts of the Waikato River, Raglan Harbour and Aotea Harbour entrances. These areas are subject to very large shoreline fluctuations driven by complex coastal and fluvial processes.

8.4.1 Waikato River

As the Port Waikato Spit has extended northwards, the harbour entrance has migrated approximately 3200 m over the last 150 years (i.e. an average of about 20 m per year) and about 2000 m since 1944 (i.e. an average of about 28 m per year); this change has coincided severe erosion on the northern side of the river (Figure 55). In places, the existing shoreline lies up to 1200-1300 m landward of the 1863 and 1944 shorelines (for a full discussion of shoreline change at Port Waikato spit, refer to Section 6.1). It is unlikely that the spit will continue to extend northwards indefinitely. As noted in Section 6, the spit is likely to eventually become unstable and breach. Nonetheless, it is not possible to predict how far northwards the spit will continue to extend before this occurs. A precautionary approach to future development is therefore required on the northern side of the river entrance.

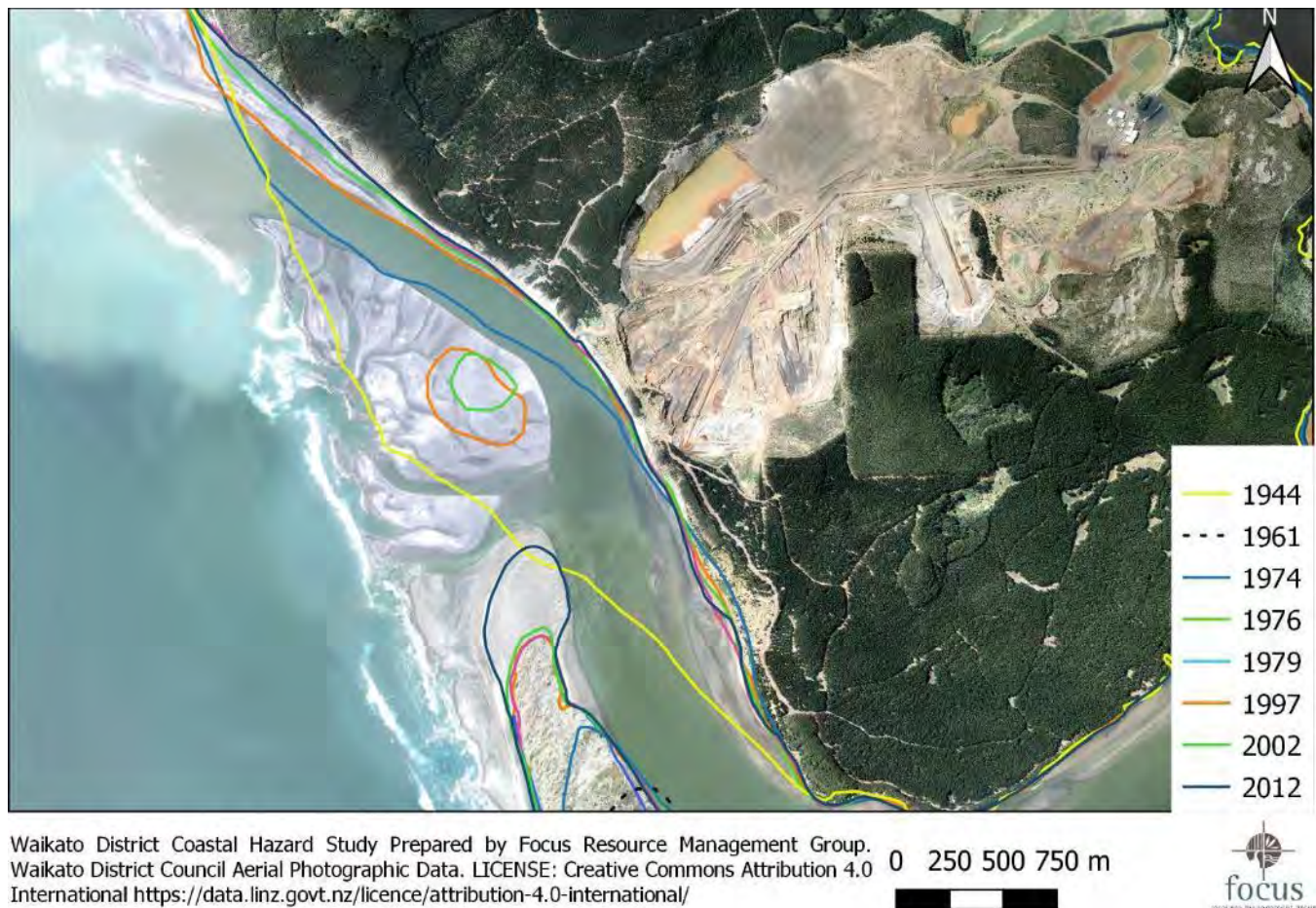


Figure 55: Historical shoreline change north of the Waikato River mouth.

8.4.2 Raglan

On the northern side of the Raglan entrance, extensive dune fields variously extend at least 350-950 m inland. The widest dune areas occur near the entrance and decrease in width northwards. The Raglan entrance has shown no trend for northwards migration and therefore the predominant erosion risk is likely to arise from dynamic shoreline fluctuations and the potential effects of future sea level rise. Since 1943, dynamic fluctuations of up to 100 m have been recorded (Figure 56). However, this is a relatively short record and larger fluctuations may occur over longer timeframes.

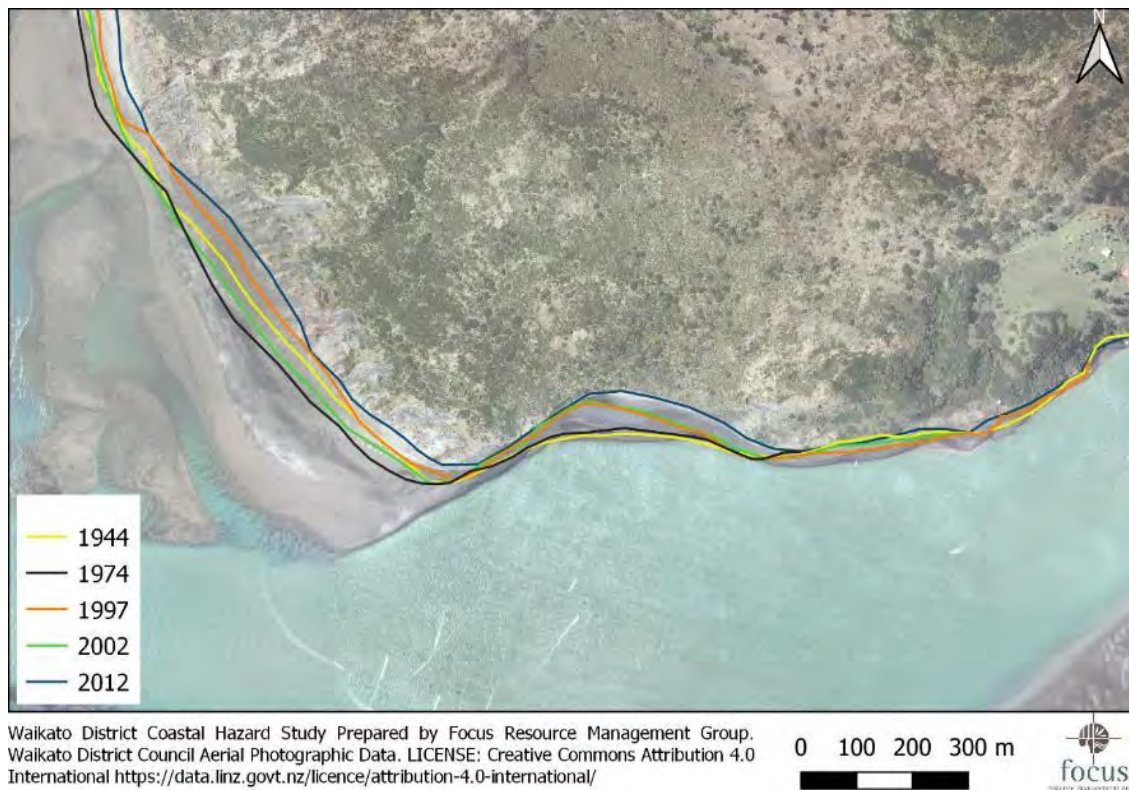


Figure 56: Shoreline change on northern shore of Raglan Harbour entrance.

8.4.3 Aotea

A large dune field occurs on the northern side of Aotea Harbour. The end of this sand spit forms the northern bank of the Aotea harbour entrance and has been subject to major dynamic fluctuations (>500 m) since records began (Figure 57). This area, known as Oioroa, is culturally very significant to relevant tangata whenua and much of the area is also a DoC scientific reserve. The migrating sand sheets also pose a significant hazard. Accordingly, it is unlikely that subdivision and development will ever occur in this area.

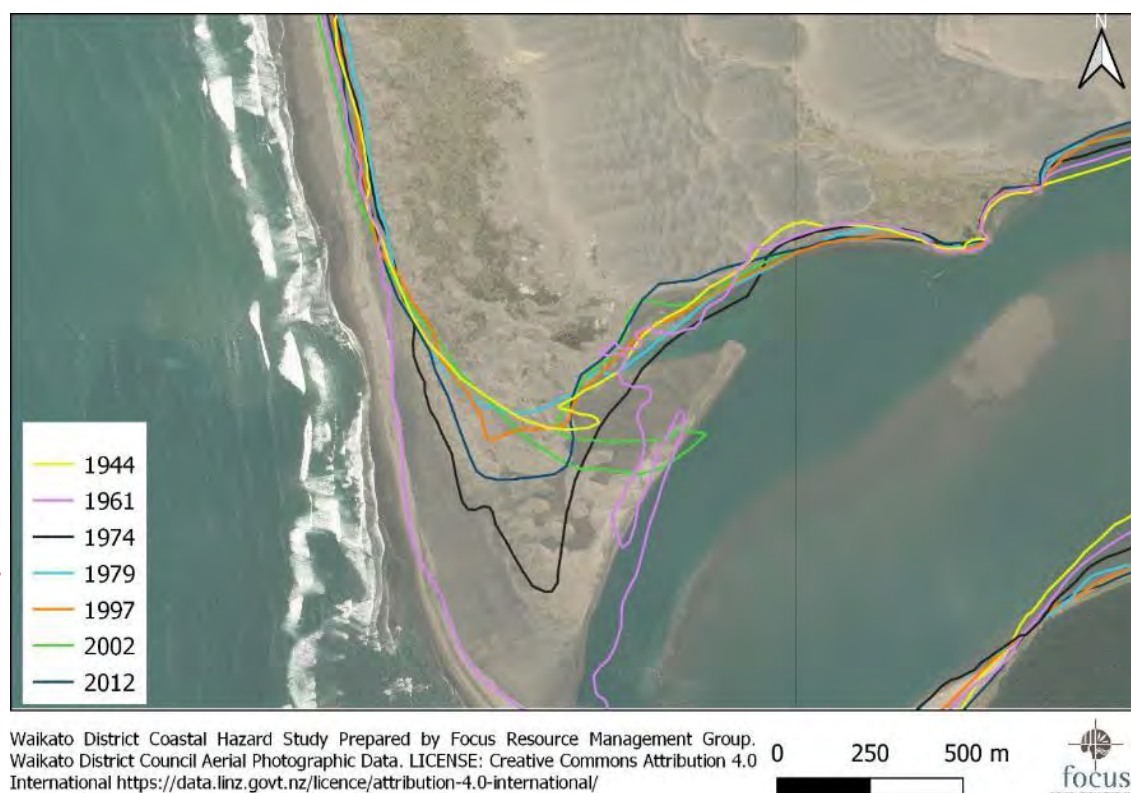


Figure 57: Shoreline change north of Aotea Harbour entrance.

8.1 Estuarine Banks and Cliffs

8.1.1 Description

The original cliffs and bluffs in the Waikato River estuary lie along the southern side of the estuary and are primarily composed of Jurassic sedimentary rocks. However, these cliffs and bluffs are now separated from the estuary by the road into the township, and no longer subject to active wave erosion.

The estuarine coast of Raglan Harbour is primarily composed of Tertiary sedimentary rocks, with volcanics also outcropping in a number of areas along the southern margin. However, there are also various areas where the more erodible, weakly cemented Pleistocene sands are exposed, particularly around the southern side of the harbour (e.g. much of the shoreline of Haroto Bay and the peninsula on the seaward side of Okete Bay).

The southern coastline of Aotea Harbour coastline is largely composed of Holocene mobile sand dunes near the entrance, Pleistocene weakly cemented sands on the western harbour shoreline and Tertiary aged limestone and calcareous sandstone along the eastern shoreline (Waterhouse and White, 1994).

8.1.2 Toe Erosion

Available data including historic aerial photographs, mapped shorelines and field inspections indicate that the existing rates of toe erosion are very slow (probably <2.5 metres per century for the volcanic rocks and Tertiary sedimentary materials and <5.0 m per century for the Pleistocene sediments). While the Pleistocene cliffs on the high wave energy open coast could potentially be very vulnerable to increased sea level rise (Section 8.3), we

believe this is less likely within the much lower energy harbour; based on the relatively low historic rates towards the eastern end of Cliff Street (i.e. the end that is less subject to higher energy refracted ocean waves); despite frequent local wind wave action against this bank. Accordingly, while time-averaged erosion rates are likely to be increased by projected sea level rise, it is our view that they are unlikely to be more than 5 m per century for the Tertiary limestones and volcanics, and 10 m per century for the Pleistocene cliffs.

8.1.3 Slope Stability

Aerial photography does not reveal any obvious areas of major instability and so any severe slope failure appears to be very infrequent at most sites. However, we understand there have been claims lodged with the Earthquake Commission for land slippage on the old sea cliff behind Aotea Township (Waitomo District). These landslips occurred within the fixed Pleistocene weakly cemented dune sands. These Pleistocene sands are likely to be much more erodible than the Tertiary sedimentary rocks (as discussed in Section 8.3). For instance, there has been active wave erosion of the bluffed foreshore fronting Te Papatapu Marae (composed of Pleistocene sediments and located in the north-eastern area of the upper harbour) over the past few decades – though the exact retreat in this area has not yet been quantified.

Cliff and bluff slopes around the harbours are highly varied, but the actively eroding banks are typically relatively steep (generally steeper than 1V:1.5H). Accordingly, a slope of 1V:2H has been adopted in defining the coastal sensitivity area for estuarine banks and cliffs.

8.2 Estuarine Beaches and Low-Lying Coastal Margins

Estuarine beaches and low-lying areas occur in a number of areas of Raglan and Aotea Harbour, with low-lying areas also common adjacent to the Waikato River estuary.

Estuarine beaches with dunes tend to be limited to the lower areas of the harbours (e.g. Te Kopua in Raglan), which are dynamically interlinked to the open coast by sediment transport, including longshore transport and intertidal and subtidal sediment transfers between the flood and ebb tide delta systems either side of the entrance. The shorelines in these areas are often very dynamic and are addressed in Section 6 and 7.

Narrow shallow beaches have formed perched over intertidal shore platform in some embayments in both Raglan and Aotea; such as the large seaward facing embayment on the southwestern side of Paritata Peninsula in Raglan Harbour (Figure 58). These beaches are typically very narrow and often just a thin veneer of sand over rock, with the beaches often backed by steeply rising topography, though also narrow widths of coastal plains in very rare areas. The sand appears to be largely derived from very slow onshore migration of low sand and shell ridges; the sand probably reworked onshore by waves from sediments deposited in the harbour by local rivers and streams during floods, together with shell from marine sources.

Chenier beaches formed by onshore migration of sand and shell ridges (cheniers) appear to be the most common beach types in central and upper harbour areas. In some cases, the cheniers are backed by low-lying areas, including existing and/or drained wetlands and some limited chenier plains. A notable example is the shoreline at the seaward end of the large peninsula between Bridal Creek and Okete Bay on the southern side of Raglan Harbour (Figure 59). In this area, chenier ridges migrate onshore and alongshore, accumulating on a low coastal plain located at the end of Wallis Road. A number of small cheniers and wetland areas also occur within

and near the Pakoka River estuary in Aotea Harbour, including a significant chenier spit feature formed near Mowhiti Point (Figure 60).

There are very extensive low-lying areas, largely drained wetlands, adjacent to the estuarine areas of the Waikato River; including the northern (e.g. Aka Aka area) and southern sides of the river. These areas are extensively used for agriculture and many are now currently fully or partly protected from flooding by the Lower Waikato Waipa Flood Control Scheme (LWWFCS). There are also some low-lying, drained wetland areas around both Raglan and Aotea Harbour. Remnant areas of estuarine wetlands are now relatively uncommon in these harbours but do occur in limited areas near the mouths of some of the larger catchment streams; including the Waitetuna and Waingaro Rivers in Raglan Harbour and the Pakoko River in Aotea Harbour, with very small areas also in some upper embayment areas near other stream entrances.

Estuarine beaches and low-lying areas are high risk areas for both coastal erosion and coastal inundation. For example, cheniers are wave formed landforms and are regularly overtopped by waves during storms. As such, they can be very dynamic features migrating onshore and alongshore over time. The erosion problems experienced with the early subdivision at the end of Wallis Road in Raglan Harbour are good example of the issues that can arise in these areas. The low-lying nature of these landforms means they are also vulnerable to coastal inundation even with existing sea level.



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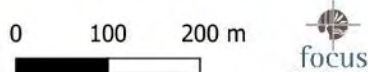


Figure 58: Narrow estuarine beach in an embayment on the southwestern side of Paritata Peninsula (Raglan).



Figure 59: Chenier ridge on the southern shore of Raglan Harbour.



Figure 60: Chenier feature in Aotea Harbour.

Estuarine beaches in central and upper harbour areas also typically have very limited sediment reserves and as such are extremely vulnerable to erosion with sea level rise; with many beaches likely to be either lost or reduced to intertidal beaches by future sea level rise. Low-lying areas, including chenier beaches and existing or drained wetlands will be frequently and severely flooded with projected sea level rise.

8.3 Management Recommendations

The wider Waikato District coastline outside Port and Raglan Townships has been broadly divided into coastal compartments that reflect geomorphological characteristics of the coastline. We have provided broad recommendations for defining a **coastal hazard sensitivity area** for each of these compartments, which identifies the area that is potentially vulnerable to coastal erosion and/or flooding over the next 100 years, including the effect of future sea level rise. The identified sensitivity areas are designed to be conservative and serve as a trigger or “flag” to indicate areas where further site-specific investigation is required prior to further development.

Current land use along this coastline is almost entirely rural or conservation land, and as such our recommendations here reflect the guidelines proposed in Section 5.1.

Any proposed significant development within any of the rural coastal sensitivity areas should be subject to a detailed coastal erosion and inundation hazard assessment conducted by an appropriately qualified specialist (e.g. coastal scientist, geotechnical engineer or engineering geologist). This assessment should consider local geology (including potential geological controls underneath sand features) and the potential impact of natural coastal hazard processes that may impact the area over the next 100 years, including the potential impact of future sea level rise. The provisions for this area should not however apply to non-habitable farm buildings (e.g. hay sheds or implement sheds) or relocatable structures associated with the adjacent sand mining operations.

Where it is deemed that there is any potential coastal hazard, development should only occur with an approved site-specific management plan to manage these potential impacts in the future in a way that avoids adverse effects on the coastal environment (including avoiding the use of hard engineering works to address hazard risk).

It is important to note that the sensitivity areas address only coastal processes and will not be sufficient to address other unrelated slope instability issues that may also be relevant in some areas. Waikato District Council staff advise that a slope stability assessment is generally required for any development on sloping land and it is our opinion that this requirement should continue.

As discussed in Section 5.4., we recommend that the Council plan for future land use in low lying coastal margins to provide for long term landward migration and restoration of coastal and estuarine wetlands and their riparian vegetation in response to future projected sea level rise. It is recommended that the Plan also include strong provisions to preclude filling or raising of land levels in areas likely to be required to provide for landward migration of these ecosystems in response to future sea level rise, considering sea level rise of at least 1.4 m (i.e. the RCP 8.5+ sea level rise scenario discussed in Section 3.3). Council should also consider developing incentive provisions to encourage landowners to set these areas aside and to protect and restore existing coastal wetlands.

8.3.1 Open Coast Cliffs and Beaches

As described above, the open coast of the Waikato District is diverse. The coast is backed in many areas by high coastal cliff outcrops of erosion resistant rock. In other areas, cliffs are formed from “softer” Pleistocene sands that are currently protected at the base by beaches and dunes. If these beaches and dunes are lost in the long term due to the effects of sea level rise, these Pleistocene cliffs may also retreat.

On the basis of the above considerations, the area potentially vulnerable to coastal erosion and associated slope instability (including the effects of sea level rise) can be broadly identified as:

- 10 m toe erosion + 1V:2H slope for tertiary sedimentary rocks on the open coast
- 75 m of erosion (per 1.0 m of SLR) + 1V:2H slope for Pleistocene sands on the open coast
- 200 m at stream mouths on the open coast

8.3.2 Major Harbour and River Entrances

The northern shores of the Waikato River, Raglan Harbour and Aotea Harbour are currently undeveloped, but potentially vulnerable to significant fluctuations in shoreline position typical of such areas. The 200 m sensitivity area described above for stream mouths is unlikely to be adequately precautionary in these areas. We have therefore developed site-specific recommendations to define the coastal hazard sensitivity area on the northern (undeveloped) shoreline of these three entrances.

There are significant complications and uncertainties with regard to future shoreline change north of the Waikato River. As discussed in Section 6.1, the Waikato River entrance migrated approximately 3200 m northwards between 1863 and the present, which is equivalent to an average annual northwards movement of about 20 m per year or 2000 m per century. The northwards extension of the spit and associated erosion of the northern shoreline is unlikely to continue indefinitely. It is more likely that the spit will eventually breach. However, there is no way to be certain when this northwards migration will cease. As a precaution, we have tentatively identified a coastal erosion sensitivity area of 1500 m width (relative to the toe of dune on the ocean coast) on the northern side of the river. This area assumes a further northward migration of the river entrance by 2000 m, with a similar level of landward erosion to that observed in association with past entrance migration. However, this sensitivity area encompasses a very large area of land, and we believe further discussions with relevant stakeholders is appropriate to best determine ongoing management of this area to reflect the considerable uncertainty.

Dynamic shoreline fluctuations of up to 100 m have been observed on the northern side of the Raglan Harbour entrance, and even larger fluctuations (up to 500 m) on the northern side of Aotea Harbour entrance. These fluctuations have been observed using the limited available “snapshots” provided by historical aerial photography from the 1940s. However, it is well known that near-entrance areas of this nature can be extremely dynamic over long periods of time, for a wide range of reasons. In the longer term, sea level rise is likely to be a further major complication. Accordingly, there is considerably uncertainty around potential future change in this area, which will need to be addressed by detailed site-specific investigations.

A precautionary approach is therefore appropriate, and we recommend a 400 m wide erosion sensitivity area on the northern side of Raglan and Aotea Harbour entrance, extending 1.5 km northwards from the harbour

entrances. Appropriate detailed investigations may reduce these areas, but a precautionary approach is appropriate with limited existing information. For instance, it is possible that the dunes are underlain by much harder and less erodible materials as extensive areas of landward migrating dunes occurred along this coast in the early-mid 1900s.

8.3.3 Estuary Shorelines

In identifying coastal hazard sensitivity areas within Raglan and Aotea Harbours, we recommend providing for a long-term toe erosion of 10 m per century for all cliffs and bluffs around the estuary shorelines, as well as an allowance for stable slope angle (1V:2H). While the rate of toe erosion will vary significantly (particularly with geology and with wave exposure), this provides for the potential long-term effects of sea level rise and identifies an appropriate trigger for further investigation of these site-specific influences.

Estuarine beaches and low-lying estuary margins with ground elevation below 5.0 m RL may be vulnerable to coastal inundation in the long term with projected sea level rise. Sea level rise also poses a significant potential threat to the small areas of estuarine wetlands left in the various harbours. Unless these systems are able to migrate landward in response to sea level rise, many of these ecologically critical ecosystems may be lost to coastal squeeze effects. These same low-lying environments are typically formed from mobile sediments (as opposed to erosion resistant cliffs) and are also potentially vulnerable to erosion. Accordingly, the coastal hazard sensitivity area for these features is defined by the 5.0 m contour.

8.3.4 Recommended Sensitivity Areas

The above sections provide broad criteria for the identification of areas potentially subject to coastal hazards over the next 100 years. However, there are a number of potential complications associated with local factors and considerable uncertainties in relation to these and future sea level rise. Accordingly, we recommend use of a single, conservative sensitivity area within which more detailed site-specific investigation of coastal hazard should be required to support any future development.

Initial plotting of the recommended sensitivity areas based on the above criteria suggest that on the open coast the sensitivity area would be typically be 150-200 m wide. On estuarine shorelines the recommended sensitivity area is typically up to 50-100 m wide based on the criteria described in the above sections. Accordingly, to simplify mapping, generic sensitivity areas of 200 m wide and 100 m wide could be adopted on the open and estuarine coast, respectively. However these generic areas are potentially not adequate for the northern entrances of Waikato River, Raglan Harbour and Aotea Harbour, where the wider sensitivity areas identified in Section 8.3.2 should apply. Similarly, the sensitivity area for Port Waikato Spit is defined in Section 6.1.

There may be isolated high cliff areas where these generic widths are not adequate. However, WDC have a general policy of requiring a report on slope instability on steeply sloping sites (K. Nicolson, pers. comm). As long as this requirement is maintained, we believe that generic sensitivity areas will be adequately conservative to highlight areas where site-specific investigation of coastal hazards is warranted.

In terms of coastal flooding, the generic 200 m coastal sensitivity area recommended for the open coast will adequately encompass areas likely to be vulnerable to coastal flooding. However, in estuarine areas where there

are more widespread low-lying areas with road access, we recommend a coastal flooding sensitivity area be defined as all areas below 5.0 m above MSL.

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9 APPENDIX A: SUMMARY OF RECOMMENDED HAZARD AREAS

Location	Shoreline Type	High Risk Hazard Area	Coastal Sensitivity Area	Notes
Open West Coast (Rural) Erosion	All	n/a	200 m	<p>Provides for diverse range of coastal hazards on the open west coast, which could be otherwise estimated by:</p> <p>10 m toe erosion + 1:2 slope for tertiary sedimentary rocks</p> <p>75 m of erosion (per 1.0 m of SLR) + 1:2 slope for Pleistocene sands</p> <p>200 m at stream mouths on the open coast</p> <p>Also provides for long term potential sensitivity to coastal flooding, including the effects of wave run-up.</p> <p>Measured from 2012 shoreline baseline.</p>
Estuary Shorelines (Rural) Erosion	All	n/a	100 m	<p>Flags the area that may be dynamic/erodible for further investigation. Coastal erosion hazard could be estimated by:</p> <p>10 m toe erosion + 1:2 slope.</p> <p><u>Measured from 2012 shoreline.</u></p>
Estuary Shorelines (Rural) Flooding	All	n/a	<5.0 m elevation	Provides for long term coastal inundation risk including effects of sea level rise.
Port Waikato Northern Coast	Major River Entrance	n/a	1,500 m	<p>Reflects very large historic changes in entrance location.</p> <p>Provides for large dynamic fluctuations and future sea level rise. Reflects uncertainty.</p> <p><u>Measured from 2012 shoreline (ocean shoreline alignment)</u></p>
Raglan Harbour Entrance Northern coast	Major Estuary Entrance	n/a	400 m	<p>Provides for dynamic shoreline fluctuations and future sea level rise.</p> <p><u>Measured from 2012 shoreline</u></p>
Aotea Harbour	Major Estuary	n/a	400 m	Provides for dynamic shoreline fluctuations and future sea level rise.

Northern Coast	Entrance			<u>Measured from 2012 shoreline</u>
Estuary Shorelines (Developed)	Banks/Cliffs	1:2 slope	5 m toe erosion + 1:2 slope	Includes Nihinihi, Cox, Greenslade. Also extend to cover the shoreline fronting Marine Parade (south of the Te Kopua Bridge), Oputuru Road, Goodare Road, Smith Street, Karioi Crescent and Wainui Road from the one lane bridge to Raglan Town Centre. <u>High risk measured from 2.0 m RL contour (MVD '53)</u> <u>Sensitivity measured from 3.0 m contour (MVD '53).</u>
Estuary Shorelines (Developed)	Beaches	10 m	25 m	Applies to Lorenzen Bay. Uses site specific baseline. Limited to landward by 5.0 m contour at Lorenzen.
Port Waikato Sunset Beach	Beach	60 m		Provides for 10 years of erosion + stable dune slope. <u>Measured from 2019 shoreline</u>
Port Waikato Spit	Wider spit	n/a	Entire spit.	Flagging entire spit as sensitivity area due to extreme uncertainty and long-term potential for spit breach.
Port Waikato Upstream	Putataka Headland	2 m + 1:1.5 slope	5 m + 1:2 slope	Consistent with developed estuary sensitivity area with small allowance for seawall effects. <u>Measured from 2017 shoreline</u>
Whale Bay	Bank/cliff	7 m	30 m	Allowance for 2 m toe erosion and stable slope. Sensitivity: toe erosion increased based on SLR effects – 10 m + 1:2 slope. <u>High risk measured from 2.0 m RL contour (MVD '53)</u> <u>Sensitivity measured from 3.0 m contour (MVD '53).</u>
Raglan Entrance Area	Beach	24 m on open coast, reducing to 16 m at toilet block continuing at 16 m around to Te Kopua	All areas on sand	Allowance for 15 m dune fluctuations in short term on open coast, 10 m at toilet block, plus stable dune slope. Sensitivity area reflects harbour entrance setting and lack of knowledge about subsurface geology. <u>Measured from 2017 shoreline.</u>
Te Kopua	Estuarine beach/entrance	Northern shore: 12 m, Southern	All areas on sand	Provides for 10 m short term fluctuations plus stable dune slope. 5 m plus stable slope on southern Te Kopua shoreline. <u>Measured from 2012 shoreline baseline</u>

		shore: 7 m		
Cliff Street	Low Estuary Bank	5.5-8.0 m	14.5 m	2 m toe erosion + stable slope (1V:1.5H). Sensitivity 10 m toe erosion + stable slope (1V:1.5H). <u>High risk measured from 2.0 m RL baseline (MVD '53)</u> <u>Sensitivity measured from 3.0 m contour (MVD '53).</u>
Wallis Street	Low Estuary Bank	7.0 m	11.5 m	High risk provides for seawall effect and minor erosion + stable slope (1V:1.5H) Sensitivity: 10 m toe erosion + stable slope (1V:1.5H). <u>High risk measured from 2.0 m RL contour (MVD '53)</u> <u>Sensitivity measured from 3.0 m contour (MVD '53).</u>
Estuary Coastal Flooding (developed)	All	3.1 m RL (MVD)	4.1 m (MVD)	These include no allowance for wave effects or freeboard.

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10 APPENDIX B: KEY NZCPS POLICIES

Policy 24: Identification of coastal hazards

- (1) *Identify areas in the coastal environment that are potentially affected by coastal hazards (including tsunami), giving priority to the identification of areas at high risk of being affected. Hazard risks, over at least 100 years, are to be assessed having regard to:*
- (a) *physical drivers and processes that cause coastal change including sea level rise;*
 - (b) *short-term and long-term natural dynamic fluctuations of erosion and accretion;*
 - (c) *geomorphological character;*
 - (d) *the potential for inundation of the coastal environment, taking into account potential sources, inundation pathways and overland extent;*
 - (e) *cumulative effects of sea level rise, storm surge and wave height under storm conditions;*
 - (f) *influences that humans have had or are having on the coast;*
 - (g) *the extent and permanence of built development; and*
 - (h) *the effects of climate change on:*
 - (i) *matters (a) to (g) above;*
 - (ii) *storm frequency, intensity and surges; and*
 - (iii) *coastal sediment dynamics;*
- taking into account national guidance and the best available information on the likely effects of climate change on the region or district.*

Policy 27: Strategies for protecting significant existing development from coastal hazard risk

- (1) *In areas of significant existing development likely to be affected by coastal hazards, the range of options for reducing coastal hazard risk that should be assessed includes:*
 - (a) *promoting and identifying long-term sustainable risk reduction approaches including the relocation or removal of existing development or structures at risk;*
 - (b) *identifying the consequences of potential strategic options relative to the option of 'do-nothing';*
 - (c) *recognising that hard protection structures may be the only practical means to protect existing infrastructure of national or regional importance, to sustain the potential of built physical resources to meet the reasonably foreseeable needs of future generations;*
 - (d) *recognising and considering the environmental and social costs of permitting hard protection structures to protect private property; and*
 - (e) *identifying and planning for transition mechanisms and timeframes for moving to more sustainable approaches.*
- (2) *In evaluating options under (1):*
 - (a) *focus on approaches to risk management that reduce the need for hard protection structures and similar engineering interventions;*
 - (b) *take into account the nature of the coastal hazard risk and how it might change over at least a 100-year timeframe, including the expected effects of climate change; and*
 - (c) *evaluate the likely costs and benefits of any proposed coastal hazard risk reduction options.*
- (3) *Where hard protection structures are considered to be necessary, ensure that the form and location of any structures are designed to minimise adverse effects on the coastal environment.*
- (4) *Hard protection structures, where considered necessary to protect private assets, should not be located on public land if there is no significant public or environmental benefit in doing so.*

Policy 25: Subdivision, use, and development in areas of coastal hazard risk

In areas potentially affected by coastal hazards over at least the next 100 years:

- (a) avoid increasing the **risk** of social, environmental and economic harm from coastal hazards;*
- (b) avoid redevelopment, or change in land use, that would increase the risk of adverse effects from coastal hazards;*
- (c) encourage redevelopment, or change in land use, where that would reduce the risk of adverse effects from coastal hazards, including managed retreat by relocation or removal of existing structures or their abandonment in extreme circumstances, and designing for relocatability or recoverability from hazard events;*
- (d) encourage the location of infrastructure away from areas of hazard risk where practicable;*
- (e) discourage hard protection structures and promote the use of alternatives to them, including natural defences; and*
- (f) consider the potential effects of tsunami and how to avoid or mitigate them.*

[The NZCPS 2010 glossary states that ‘Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence (AS/NZ ISO 31000:2009 Risk management—Principles and guidelines, November 2009)’.]

Policy 26: Natural defences against coastal hazards

- (1) Provide where appropriate for the protection, restoration or enhancement of natural defences that protect coastal land uses, or sites of significant biodiversity, cultural or historic heritage or geological value, from coastal hazards.*
- (2) Recognise that such natural defences include beaches, estuaries, wetlands, intertidal areas, coastal vegetation, dunes and barrier islands.*

11 APPENDIX C: REGIONAL POLICY STATEMENT

11.1 POLICY 6.2 PLANNING FOR DEVELOPMENT IN THE COASTAL ENVIRONMENT

Development of the built environment in the coastal environment occurs in a way that:

- a) ensures sufficient development setbacks to protect coastal natural character, public access, indigenous biodiversity, natural physical processes, amenity and natural hazard mitigation functions of the coast;
- b) protects hydrological processes and natural functions of back dune areas;
- c) avoids the adverse effects of activities on areas with outstanding natural character, and outstanding natural features and landscapes;
- d) ensures that in areas other than those identified in (c) above, activities are appropriate in relation to the level of natural character or natural feature and landscape;
- e) has regard to local coastal character;
- f) allows for the potential effects of sea level rise, including allowing for sufficient coastal habitat inland migration opportunities;
- g) protects the valued characteristics of remaining undeveloped, or largely undeveloped coastal environments;
- h) ensures adequate water, stormwater and wastewater services will be provided for the development;
- i) avoids increasing natural hazard risk associated with coastal erosion and inundation;
- j) has regard to the potential effects of a tsunami event, and takes appropriate steps to avoid, remedy or mitigate that risk;
- k) avoids ribbon development along coastal margins;
- l) does not compromise the function or operation of existing or planned coastal infrastructure;
- m) provides for safe and efficient connectivity between activities occurring in the coastal marine area and associated land-based infrastructure;
- n) manages adverse effects to maintain or enhance water quality; and
- o) maintains and enhances public access.

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11.2 POLICY 12.3.2 AMENITY VALUE OF THE COASTAL ENVIRONMENT

Regional and district plans shall ensure that the amenity values of the coastal environment are maintained or enhanced, including by:

- a) recognising the contribution that open space makes to amenity values and providing appropriate protection to areas of open space;
- b) maintaining or enhancing natural sites or areas of particular value for outdoor recreation;
- c) employing suitable development setbacks to avoid a sense of encroachment or domination of built form, particularly on areas of public open space and along the coastal edge;
- d) avoiding forms and location of development that effectively privatise the coastal edge and which discourage or prevent public access to and use of the coast;
- e) recognising that some areas derive their particular character and amenity value from a predominance of structures, modifications or activities, and providing for their appropriate management;
- f) ensuring the removal of derelict or unnecessary structures within the coastal marine area;
- g) encouraging appropriate design of new structures and other development to enhance existing amenity values;
- h) maximising the public benefits to be derived from developments;
- i) ensuring public access to public areas is enhanced where practicable; and
- j) recognising the role of esplanade reserves and strips in contributing to public open space needs.

11.3 POLICY 12.3.3 ENHANCE PUBLIC VALUES IN THE COASTAL ENVIRONMENT

Local authorities should seek to incorporate the enhancement of public amenity values, including when undertaking works and services or preparing or reviewing growth strategies, structure plans, or regional and district plans.

11.4 POLICY 13.1 NATURAL HAZARD RISK MANAGEMENT APPROACH

Natural hazard risks are managed using an integrated and holistic approach that:

- a) ensures the risk from natural hazards does not exceed an acceptable level;
- b) protects health and safety;
- c) avoids the creation of new intolerable risk;

- d) Reduces intolerable risk to tolerable or acceptable levels;
- e) enhances community resilience;
- f) is aligned with civil defence approaches;
- g) prefers the use of natural features over man-made structures as defences against natural hazards;
- h) recognises natural systems and takes a 'whole of system' approach; and
- i) seeks to use the best available information/best practice.

11.5 POLICY 13.1.1 RISK MANAGEMENT FRAMEWORK

Regional and district plans shall incorporate a risk-based approach into the management of subdivision, use and development in relation to natural hazards. This should be in accordance with relevant standards, strategies and plans, and ensure that:

- a) new development is managed so that natural hazard risks do not exceed acceptable levels;
- b) intolerable risk is reduced to tolerable or acceptable levels
- c) the creation of new intolerable risk is avoided;
- d) any intolerable risk as a result of existing use and development is as low as reasonably achievable; and
- e) where intolerable risk remains, the risks will be managed until an acceptable level is achieved.

11.6 POLICY 13.1.3 ASSESS NATURAL HAZARD RISK TO COMMUNITIES

Waikato Regional Council will collaborate with territorial authorities, tāngata whenua and other agencies to undertake assessments of coastal and other communities at risk or potentially at risk from natural hazards and develop long-term strategies for these communities. The strategies will, as a minimum:

- a) include recommendations for any hazard areas that should be applied, including primary hazard areas;
- b) identify risks to the community and existing infrastructure from natural hazards; and
- c) identify options for reducing the risks to the community to an acceptable level and the relative benefits and costs of those options, including taking into account any effects on:
 - d) public access;
 - e) amenity values; or
 - f) natural character (including natural physical processes, indigenous biodiversity, landscape and water quality).

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ADDENDUM 1: REVIEW OF COASTAL HAZARD MAPPING - WHAANGA COAST, RAGLAN SOUTH

BACKGROUND

This addendum describes additional coastal hazard mapping undertaken to further refine the coastal hazard mapping areas described in Focus (2020).

In Focus (2020) we recommended that the Council adopt a single **coastal sensitivity area (CSA)** for undeveloped (rural zone) areas, which identifies the area that is potentially vulnerable to coastal erosion and/or flooding over the next 100 years, including the effect of future sea level rise. The identified sensitivity areas are designed to be conservative and serve simply as a trigger or “flag” to indicate areas where further site-specific investigation is required prior to further development. We defined a range of criteria that could be applied to this coastline, which reflect the different geological and geomorphic shoreline types within the District.

There are many potential complications and uncertainties associated with local factors and future sea level rise on this coastline. Detailed mapping using site-specific criteria is complex and time consuming. Our report therefore recommended application of a single, conservative sensitivity area within which more detailed site-specific investigation of coastal hazard should be required to support any future development. This sensitivity area is 200 m wide along the open rural coast of the District.

Following feedback from affected parties, Waikato District Council has commissioned a more detailed approach to coastal sensitivity mapping on the Whaanga coast south of Raglan (Figure 1). This addendum describes the methodology adopted and summarises the results.



Figure 1: “Whaanga Coast” area for revised coastal sensitivity assessment (blue indicates current 200 m sensitivity area).

COASTAL SENSITIVITY MAPPING APPROACH

The Whaanga Coast is predominantly a rocky shoreline constructed of hard volcanic substrates (Karioi volcanic formation), which are resistant to coastal erosion. Exposed rock shore platforms and sloping boulder beaches are backed by dense established vegetation in most areas of Whale Bay (e.g. Figure 2 & Figure 3) and Manu Bay (Figure 4 & Figure 5). There is little evidence of active erosion, except in exposed areas west of Whale Bay where bare, steep rocky cliffs occur (Figure 6).



Figure 2: View of boulder beach and heavily vegetated slopes typical around Whale Bay.



Figure 3: Typical view of boulder beaches backed by steep vegetated slopes west of Whale Bay



Figure 4: Rocky shore platform at Manu Bay.



Figure 5: Mixture of sand beach and rocky shore platforms backed by steep heavily vegetated slopes at Manu Bay.



Figure 6: View of exposed coast west and south of Whale Bay showing hard, steeply cliffed shoreline

Shoreline change data has been collected by the Waikato Regional Council from historical aerial photography as part of a region-wide project. Orthorectified photography from 1944 confirms that the Whaanga coast shoreline has been largely stable since that time, with no measurable net retreat.

The coastal sensitivity area has been revised to reflect the geological and geomorphic nature of this coastline. Approaches used to identify the revised coastal sensitivity areas are outlined in the following sections and summarised in Table 1.

Cliffs

Much of the Whaanga Coast is backed by steep vegetated slopes (Figure 3 and Figure 5). Existing coastal cliff slope angles vary from near vertical exposed cliffs west of Whale Bay to the vegetated slopes (1:1 to 1:1.5) between Whale and Manu Bays. In most areas these cliffs are fronted by wide boulder beaches and/or hard volcanic rock outcrops and platforms/reefs (Figure 3 & Figure 4).

We do not expect significant erosion at the toe of these cliffs over planning timeframes due to the hard geology. While there are erosion scarps evident along the base of the slopes, the rate of retreat appears to be very slow (probably <0.01 m/yr). Where steep slopes directly intercept the coast, we have therefore defined the coastal sensitivity area using a stable land slope (Figure 7) to allow for potential but rare slope failure involving weathered surface substrates overlying the hard volcanic rock. We expect that any slope instability events will be shallow slip events rather than deep-seated slope failures. Accordingly, where necessary we have limited the landward extent of the likely coastal sensitivity to 5 m back from the top edge of slope (e.g. Figure 8), with a minimum CSA width of 20 m from the toe of cliff. This provides for these potential shallow failures while not overstating the likely vulnerability with the stable slope method.

The coastal sensitivity area is therefore defined as the 1:1.5 slope taken landward from the toe of the cliff, limited to a maximum width of 5 m landward of the top of the seaward slope.

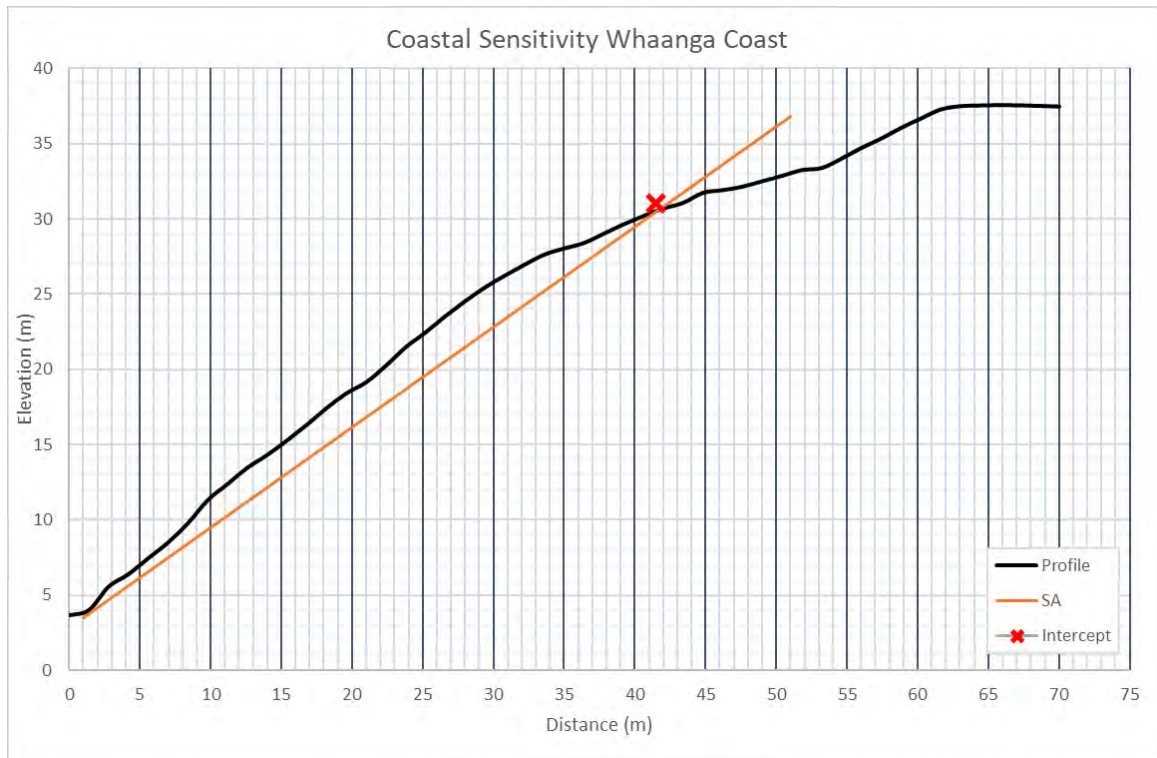


Figure 7: Example of slope based coastal sensitivity area on cliff coastline.

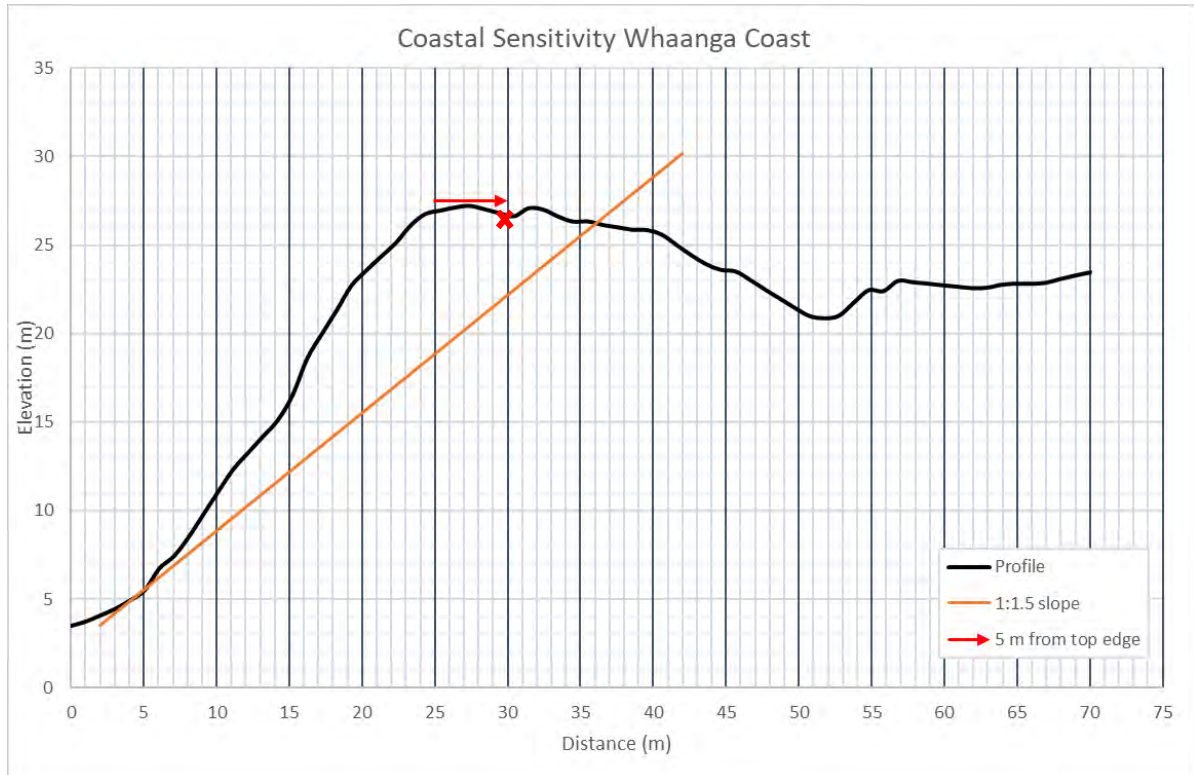


Figure 8: Identification of coastal sensitivity boundary 5 m from the top of slope.

Embayments and Beaches

Lower terraces or slopes exist near Whale Bay and Manu Bay, fronted mostly by boulder beaches and rock platforms (Figure 9). Isolated sand beaches exist at Manu Bay (Figure 5) and in the lagoon at Whale Bay. There are no active sand dune systems evident in the study area. Where sand or boulder beaches are present, we have made allowance for some landward and upward migration of the beach slope in response to sea level and a stable slope (e.g. Figure 10).

At Whale Bay we have revisited the coastal sensitivity mapping throughout the settlement and extended this approach to the adjacent areas. We have applied a minimum width of 20 m to the coastal sensitivity area. This 20 m coastal sensitivity area was also applied to the low-lying western side of the Whale Bay lagoon. This area is sheltered by the spit and is not exposed to wave action like exposed areas of shoreline nearby. This is evidenced by field and data observations, which indicate with current sea level coastal processes are limited to approximately RL 3.5 m (NZVD, 2016). We are comfortable that the 20 m sensitivity area will provide for coastal inundation hazard with 1 m of sea level rise.



Figure 9: Boulder beach at Whale Bay.

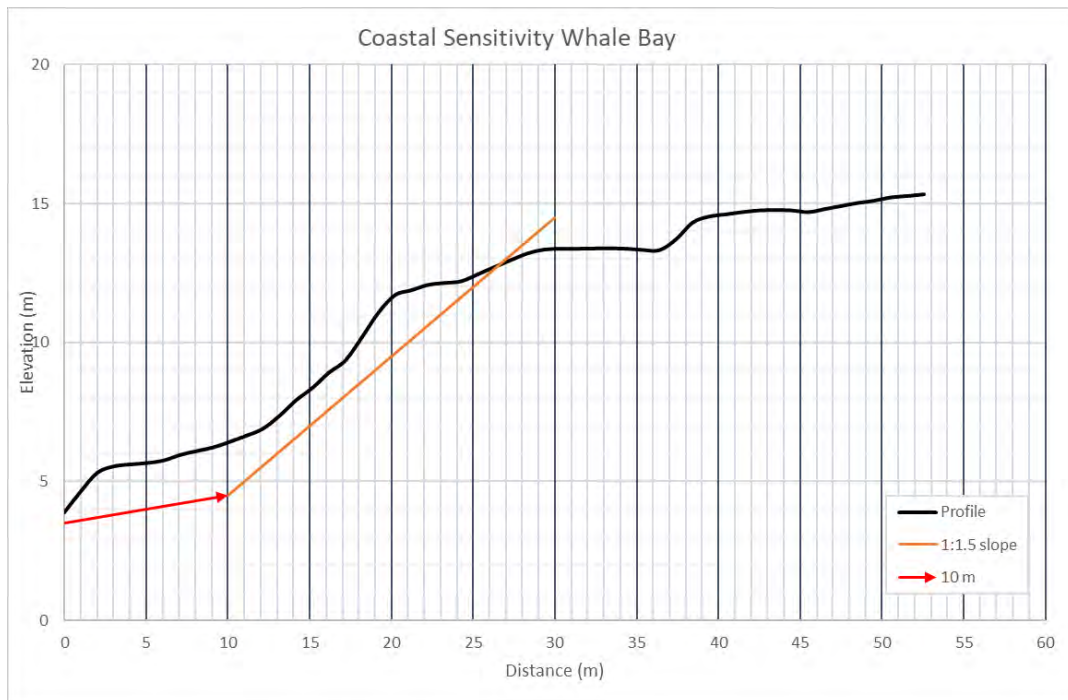


Figure 10: Coastal sensitivity example profile, Whale Bay.

Coastal Inundation

The current (200 m) rural coastal sensitivity zone covers the area of coastal margin likely to be impacted by coastal inundation as well as erosion. There is no separate coastal inundation sensitivity zone applied on this open coast. We have therefore included likely coastal inundation within this revised sensitivity zone. Coastal inundation hazard is not widespread on this mostly cliff shoreline.

Aerial photography, field observations and DEM data indicates that in the most exposed open coast areas, wave effects are currently limited to elevations below RL 5 m elevation (NZVD, 2016). We have therefore included land with elevations below RL 6 m within coastal sensitivity areas in exposed areas to accommodate 1 m sea level rise. There may be occasional wave run-up effects to higher level, but we believe this will be adequately provided for by the minimum 20 m width of the CSA. The most affected area is the Manu Bay boat ramp and car park where parts of the reserve and car park are identified within the CSA, well landward of the area likely to be impacted by erosion. Elsewhere on this coast, most areas potentially susceptible to inundation following 1 m of sea level rise are captured within the zones also potentially vulnerable to erosion.

DATA

This analysis has utilised the Waikato - West Coast and Hauraki Plains LiDAR 1 m DEM (2015) for land elevation information. Elevations referred to here are NZVD 2016. Transects were collected across this DEM (10-20 m spacing) to evaluate land slope and elevation. From these transects, points were collected to represent the appropriate width for the sensitivity area. Additional transects or analysis techniques were used where necessary to further refine the mapping. In some areas, elevation contours or set distances were used to supplement the profile-based approach.

All slope analysis used the toe of slope as the baseline for the analysis. On this open coast this is approximated by the 3.5 m contour (NZVD, 2016), but adjustments were made at each site to ensure the analysis utilised the toe of cliff. The geomorphic feature is considered more important here than the absolute elevation.

REVISED COASTAL SENSITIVITY AREAS

The revised coastal sensitivity areas are available through the Waikato District Council's online maps. The figures below provide an overview of key areas.

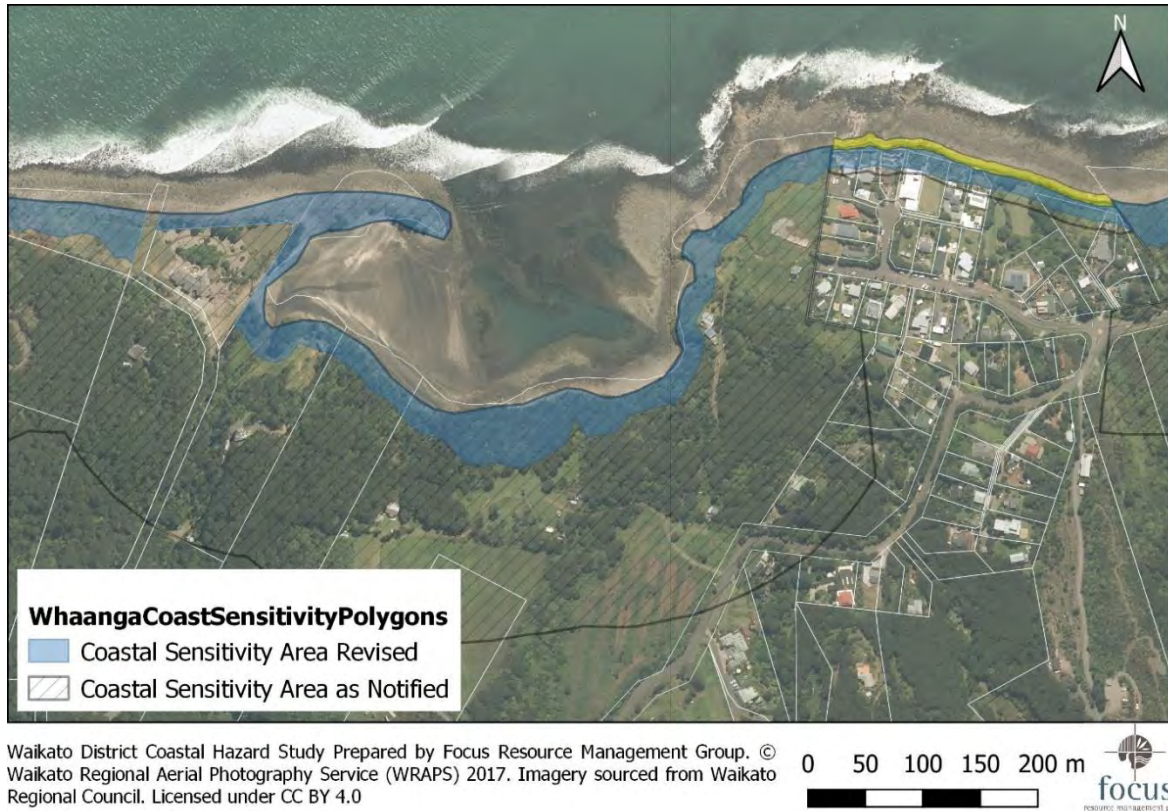


Figure 11: Revised coastal sensitivity area at Whale Bay. The previous 200 m sensitivity area from the draft District Plan is also shown.

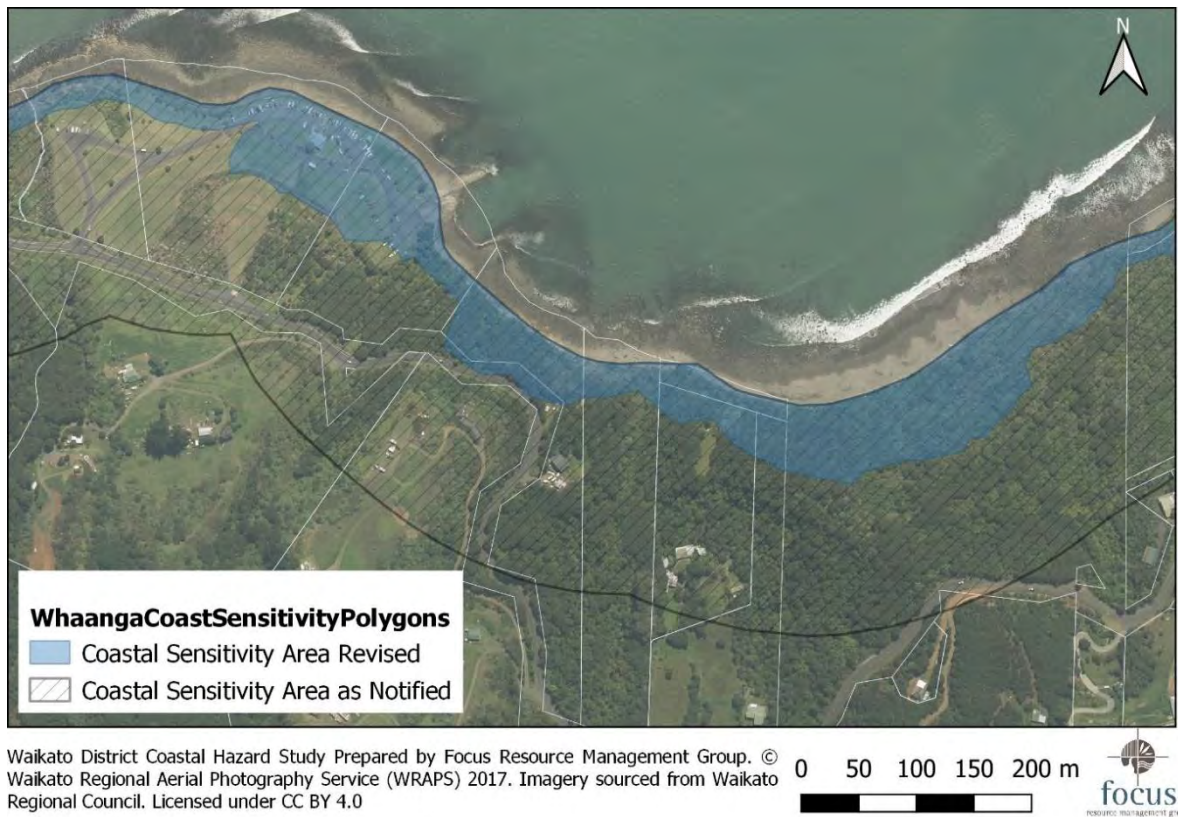


Figure 12: Revised coastal sensitivity area at Manu Bay. The previous 200 m sensitivity area from the draft District Plan is also shown.

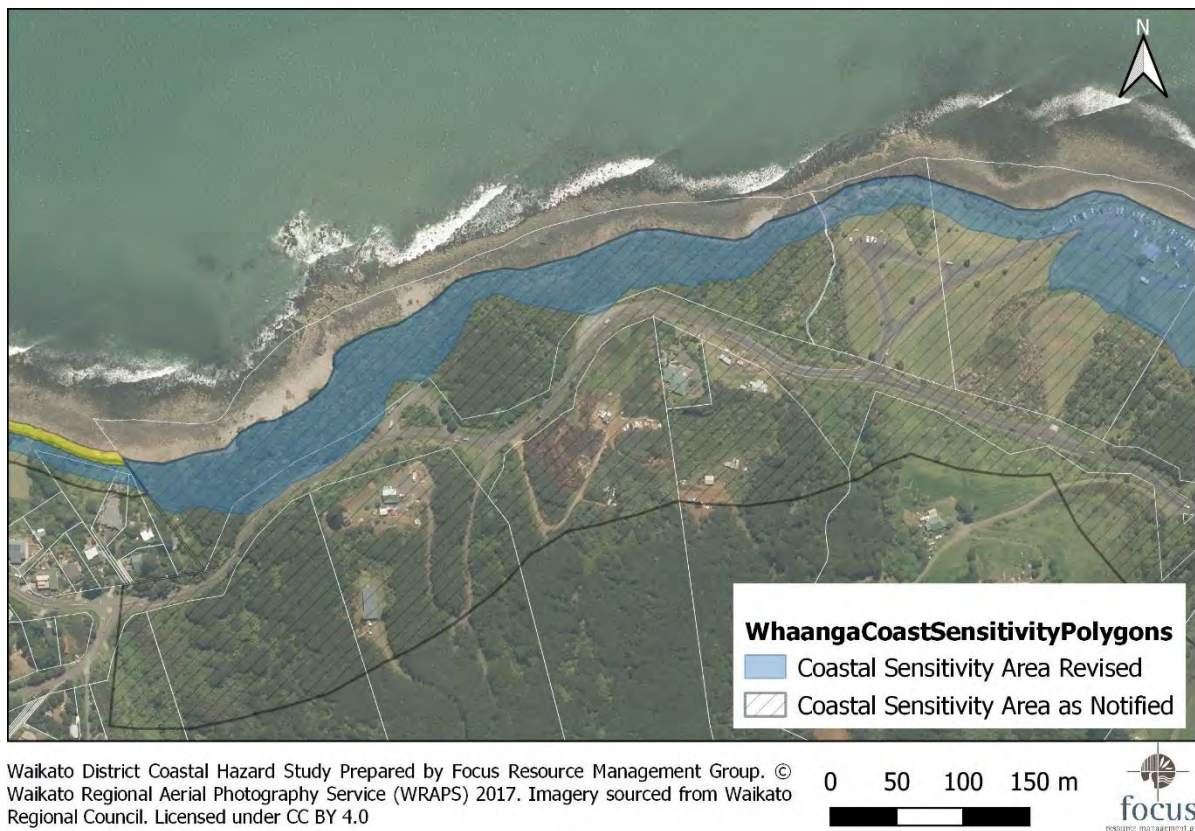


Figure 13: Revised coastal sensitivity area between Whale Bay and Manu Bay. The previous 200 m sensitivity area from the draft District Plan is also shown.

SUMMARY OF METHODOLOGY AND OUTCOMES

Table 1: Coastal sensitivity mapping approaches for Whaanga Coast.

Sensitivity Area	Shoreline	Criteria for Mapping	Notes
Open West Coast (Rural) Erosion and Inundation	All rural open coast outside current study area.	200 m	Provides for diverse range of coastal hazards on the open west coast, which could be otherwise estimated by: 10 m toe erosion + 1:2 slope for tertiary sedimentary rocks 75 m of erosion (per 1.0 m of SLR) + 1:2 slope for Pleistocene sands 200 m at stream mouths on the open coast Also provides for long term potential sensitivity to coastal flooding, including the effects of wave run-up. Measured from 2012 shoreline baseline.
Raglan South	Whaanga Coast West (West of Lagoon)	1:1.5 m slope 5 m landward from top edge of slope 20 m minimum 6 m RL minimum	Provides for potential land instability, further investigation warranted for development on steep seaward slopes. Top of slope applied on high steep cliffs where 1:1.5 slope cuts very deeply. Hard volcanic geology. Only expect occasional and relatively shallow slips, setback from top of slope to provide for this. In some areas that are lower, minimum setback width is set at 20 m, measured from edge of vegetation (top of rock shore platform). 6 m contour allows for coastal inundation with 1 m of sea level rise. <u>Sensitivity measured from toe of cliff or bank (approximately 3.5 m NZVD 2016).</u>

Whale Bay	Whale Bay Lagoon	1:1.5 slope 20 m minimum	<p>Provides for potential land instability, further investigation warranted for development on steep seaward slopes.</p> <p>Some areas low lying and 1:1.5 slope provides insufficient certainty given lack of knowledge about exact nature of substrate. 20 m minimum SA provides for potential landward and upward migration of shore.</p> <p>Much more sheltered here so 6 m minimum not required.</p> <p><u>Sensitivity measured from toe of cliff or bank (approximately 3.5 m NZVD 2016).</u></p>
Whale Bay (settlement)	Boulder beach and bank.	15 m + 1:1.5 slope 10 m + 1:2 slope 20 m minimum 6 m RL	<p>Allowance for 2 m toe erosion and stable slope for high risk.</p> <p>10 m + 1:2 slope - allowance for inland migration of beach in response to sea level rise of 1.0 m and stable slope.</p> <p>20 m minimum SA provides for potential future effects and uncertainty.</p> <p>Small areas where land below 6 m RL have been included.</p> <p><u>Sensitivity measured from 4.5 m contour (NZVD, 2016).</u> Allows for landward and upward migration with 1 m SLR.</p>
Whale Bay to Manu Bay	Cliff	1:1.5 m slope 20 m minimum	<p>Greater of these criteria.</p> <p>In some areas that are lower, minimum setback width is set at 20 m, measured from edge of vegetation (top of rock shore platform).</p> <p><u>Sensitivity measured from toe of cliff or bank (approximately 3.5 m NZVD 2016).</u></p>

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Manu Bay Car Park and Boat Ramp	Rocky boulder beach and shore platform.	15 m landward migration of beach + 1:1.5 slope 20 m minimum 6 m RL	<p>Coast very exposed and hard here. Possible landward and upward migration of shore in response to sea level rise.</p> <p>In some areas that are lower, minimum setback width is set at 20 m, measured from 3.5 m contour (edge of vegetation).</p> <p>6 m contour allows for coastal inundation. Shore profiles indicate wave effects to approximately 5 m. 6 m contour allows for 1 m sea level rise in sensitivity area. May be very occasional wave run-up effects to higher level but this should be covered by minimum 20 m width of SA. This applies to eastern portion of car park, which is more low lying.</p> <p><u>Sensitivity measured from toe of bank/edge of vegetation.</u></p>
Manu Bay East to Ngarunui	High steep cliffs.	1:1.5 m slope 5 m landward from top edge of slope 20 m minimum 1:15 beach	<p>Lesser of slope-based criteria. In this area dominantly defined by 5 m landward of break in slope at top of cliff. Where not clearly defined, change in slope chosen where slope becomes consistently flatter than 1:2.</p> <p>Where sandy beach present (Manu Bay), 15 m to allow for inland migration of beach where coastal plain wide enough + 1:1.5 slope.</p> <p>In some areas that are lower, minimum setback width is set at 20 m, measured from edge of vegetation (top of rock shore platform).</p> <p><u>Sensitivity measured from toe of bank/edge of vegetation (typically 3.5 m RL but adjusted as necessary to pick up toe of cliff).</u></p>

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13 March 2020

Kelly Nicolson
 Senior Policy Planner
 Waikato District Council
 Private Bag 544
 Ngaruawahia 3743

Dear Kelly,

Waikato District Council Coastal Hazard Assessment – Response to Peer Review

Waikato District Council (WDC) engaged Tonkin & Taylor Ltd (T+T) to undertake a review of the Waikato District Coastal Hazard Assessment (the report) prepared by the Focus Resource Management Group. This letter provides an overview of the peer review process and commentary on our response.

The peer review was received in December 2019 and provides a detailed and useful examination of the methods and conclusions of the draft report. In addition to the written peer review, two teleconferences were held between the authors of the report and the peer reviewers to discuss and clarify various matters. The report has been revised to reflect the outcomes of these discussions and the written peer review and has been supplied to WDC as a final version.

There were a number of very useful comments and observations made by T+T throughout the report relating to the Figures, Tables, timeframes and presentation of additional data that we have implemented in full. A number of figures have been revised, additional shoreline change data has been provided and a number of tables have been updated.

Other matters raised by T+T are outlined below and discussed in more detail in the following sections:

- Outline of the basis for the erosion hazard estimates
- The use of terminology: “high risk”, and “zones”
- Wave set-up and wave run-up in inundation calculations
- Determination of stable slope values for cliff shorelines
- Use of “emotive” language and discussion of management options
- Report structure

Erosion hazard areas

The peer review notes that the erosion hazard estimate generally appear reasonable but observed that it was not always clear how these erosion hazard estimates had been arrived at. The various data and methods used to assess coastal erosion are outlined in Sections 2 and 4 of the report. The site-specific assessments for each area are discussed in relevant parts of Sections 6 and 7. Some additional detail has been added to the report to provide a clearer explanation to the reader.

The coastline of the Waikato Region is highly varied, and in many areas coastal processes are very complex. In open coast and near entrance areas, shorelines undergo very large fluctuations in position over multi-decadal and even century scale cycles. These processes are not well quantified by the limited short-term data available. The assessment of existing and historic rates of erosion have therefore relied largely on historic data (e.g. mapped shorelines where available, historic aerial and other photos), community information and geomorphic analysis. Assessment of how existing erosion rates might be changed by future projected sea-level rise generally relies on the simple models discussed in Section 4.3.1 and geomorphic considerations.

In our view, there is considerable uncertainty in respect to estimation of future erosion around the coast of the Waikato District and the use of standard deterministic or probabilistic approaches to define erosion hazard areas for the next 100 years is not appropriate in this district. An attempt to transparently quantify all possibilities (e.g. relating to lower, modal and upper level estimates of the various erosion components; different estimates for a range of future sea-level rise scenarios) would create a confusing multitude of different hazard areas, each with their own particular set of assumptions. Less transparent approaches that select a single scenario or propose a given probability would give the appearance of a level of certainty that we believe is simply not real.

In order to identify coastal hazard areas that are appropriate to guide effective coastal management while acknowledging the uncertainties, we have:

- Restricted estimates of “high” future erosion vulnerability and risk to relatively short periods (e.g. 20-30 years) where uncertainties are less. The basis for the assessment of these “high risk” (see discussion of terminology below) areas at each location is outlined in the relevant parts of Sections 6 and 7.
- Identified the wider area of coastline that might potentially be affected over the next 100 years (the minimum planning period Council is required to consider) so that appropriate attention can be given to the management of coastal erosion. These areas are generally conservative and the level of uncertainty is very high. As such we have referred to them as “coastal erosion sensitivity areas” rather than coastal erosion hazard areas.
- Advocated that Council move towards the development of adaptive management strategies for each area of coastline. As outlined in the report, these are strategies developed in partnership with the wider community and relevant stakeholders which define how coastal erosion will be managed for different future erosion scenarios,

including triggers (and sometimes timelines) for moving from one management approach to another where appropriate. The recommendation to adopt this approach is the reason why we have included some site-specific commentary on coastal hazard management (see also further discussion of this aspect below).

Terminology

The peer review suggested that the word “zones” is usually associated with planning instruments rather than simply areas vulnerable to coastal hazards. While the term “zones” has commonly been used for areas vulnerable to coastal hazards, we have altered the terminology to “areas” in the final version of the report to avoid any potential confusion.

T+T also note that use of the terminology “high-risk” for the defined high-risk coastal erosion and coastal flooding areas implies that there has been an assessment of consequence as well as hazard; since use of the term “risk” by hazard management professionals typically refers to the combination of both hazard vulnerability and consequence.

We note that this strict interpretation of “risk” assumes that high or low consequence is something that can be objectively assessed by “experts”. In our experience this is not the case with coastal hazards. For example, a coastal landowner will sometimes regard any loss of their land as being a matter of high consequence, even if that land is relatively undeveloped (e.g. no dwellings or significant infrastructure within the area vulnerable to hazards). Similarly, any adverse consequences (e.g. environmental effects) of protecting that land are often viewed as being of less consequence. Other stakeholders who value the natural shoreline may view the loss of land as a minor consequence and the loss of the natural shoreline (e.g. beach loss) through protection of the land as being a major consequence. One of the reasons that we advocate the development of adaptive management strategies in partnership with communities and all relevant stakeholders is so that all consequences/risks and the varying weightings of these by different stakeholders can be transparently assessed and negotiated.

In our identification of “high-risk” areas, we have focussed on areas zoned for residential/commercial use and the adjacent roads and reserves. The high-risk areas therefore predominantly affect roads and road margins, coastal reserve land and private residential properties. We feel that it is reasonable to expect that these areas are subject to a relatively high level of public or private use and/or considered to be of relatively high “value” either in terms of monetary value to the private owner, or in terms of public use value in the case of coastal reserves and roads. When combined with the short timeframe and relatively high certainty of hazard, we are comfortable that this is a reasonable approach to identifying “high-risk”. This matter was also discussed with WDC planners who agreed to retain the existing terminology. However, we emphasize that consequence and risk can only be properly assessed in partnership with stakeholders during the adaptive management process. As such, we note that the definition of “high risk” areas may well change during the development of adaptive management strategies.

Wave Set-up and Run-up

T+T comment that the recommendations for coastal inundation levels do not appear to include allowance for wave set-up. As outlined in the report, the extreme sea-level estimate we have used sums the maximum observed tide, maximum observed storm surge and maximum sea-level anomaly as determined by the work of Stephens et al. (2015), based on water level measurements from the tide gauge on Kawhia Wharf. We can confirm that wave set-up is included as this was a component of the maximum storm surge estimated by Stephens et al. (2013). For the reasons outlined in Section 4.2 of the report, we believe the extreme sea-level used to map flooding around the harbours is adequately conservative for the combination of tides and storm surge, including wave set-up.

The inundation levels expressed in the report do not however include any allowance for wave run-up; only the static components of the assessed extreme storm-elevated sea level (i.e. tides, storm surge, sea-level anomaly and future sea-level rise). Wave run-up is very site-specific and varies around the harbours with exposure to wave effects. We have recommended that WDC include a “freeboard” allowance when converting the flooding level into minimum floor levels to allow for wave run-up and other sources of uncertainty. The required freeboard will likely vary with exposure, though a freeboard of 0.5 m is commonly used around estuarine shorelines.

On the open exposed coast, wave run-up and other complex wave effects will likely be very significant but limited to the more seaward areas; with lower-lying areas further inland typically protected by the high dunes common on sandy beaches along this coast. Nonetheless, there are low-lying areas (e.g. upstream of stream/river entrances) which may be subject to significant wave effects. The width of the sensitivity area on the open coast has been set at sufficient width (200 m) to ensure that such areas are identified as requiring a site-specific coastal hazard assessment should future activities requiring resource consent occur in these areas.

Stable Cliff Slope and Baseline

T+T note that the application of a 1(V):1.5(H) slope to define some high risk coastal erosion hazard areas in Raglan (e.g. Cox Bay and Greenslade Road) may provide insufficient protection from slope instability given observations of highly varied existing slopes and limited data.

We have reviewed this matter. While most existing stable slopes are steeper than 1(V):1.5(H), there is presently no detailed information on potential slope instability in these areas. Moreover, while existing slopes suggest that failure to a gentler slope might be a relatively low probability event; such failure would be very high consequence (i.e. potential risk to houses and human life). Unlike coastal erosion, these events are not gradual and the use of gradual adaptation landward in response to erosion is therefore not practicable. As such, we concur with T+T and have adopted a more conservative approach (i.e. a slope of 1(V):2(H)) in definition of the high risk coastal erosion risk areas. This increases the width of the high risk area and in some locations (e.g. Cox Bay) it will now be difficult for landowners to avoid the need for a site-specific assessment of slope instability to support consent applications. It may also affect insurance for

these properties. However, given that we were not able to find any detailed investigations of slope instability in this area, a precautionary approach is required.

T+T also suggest that the baseline for the stable angle mapping following 1.0 m of sea level rise should be based on the current toe elevation rather than the RL 3.0 m contour suggested in our assessment. We understand the reasons advanced by T+T but believe that RL 3.0 m is more appropriate – as the toe of the bank will rise with sea level. We also believe that bed levels within the estuaries will generally rise with sea level. To assume that current bed levels are maintained would be to assume that the harbour will become largely subtidal with higher (e.g. 1.0 m) sea-level rise scenarios. Given catchment inputs and the active circulation of marine and catchment sands by tidal and wave processes, we believe that is extremely unlikely.

Management Recommendations and Report Structure

The peer review recommends that “...*the hazard part of the report (assessment of hazard values, extents and what is affected) is separated from the discussion of management options*”. T+T feel that “*this would allow the hazard assessment to be dealt with as a factual report while the management options can be discussed and worked through with stakeholders.*” T+T feel this would avoid concerns that options were already pre-determined.

We understand the concerns raised by T+T and have given this matter careful consideration. We have also discussed it with WDC officers and planning advisors.

The site-specific commentary on coastal management that is included in our report in Sections 6 and 7 reflects the approach that we have proposed; i.e. that (over time) Council work with stakeholders to develop site-specific adaptive management strategies for the management of coastal hazards. At many sites in the Waikato District we have been very clear with WDC that successful long term management of coastal hazards cannot be achieved solely through the District Plan, but will require the development of an adaptive management plan, which will reflect the interests of all stakeholders and sustainable long-term environmental management. This process will involve all relevant stakeholders and the outcomes of these strategies cannot be pre-determined.

The site-specific comments are not management recommendations to be implemented by Council; but simply commentary and advice to help inform and facilitate the development of the adaptive management strategies by Council and relevant stakeholders. We have made some adjustments to the text to ensure this is clear. Expert advice of this nature is critical to the adaptive management approach to ensure that stakeholders are well-informed of the pros and cons of different management options. In addition, the management of coastal hazards does not occur in a vacuum; there are national and regional policies that need to be taken into account (e.g. to protect public access, natural character, amenity values). It is important that these various matters are highlighted so they can be incorporated with other site-specific considerations (e.g. property and infrastructure at risk) in the development of adaptive management strategies.

We have however provided general recommendations for Council in respect to management of coastal hazards, as outlined in Section 5; based on national and regional policy and existing best practice. The recommendations will also guide management of development in the identified high-risk and coastal hazard sensitivity areas until site-specific adaptive management strategies are developed and agreed. This is important as Council have significant duties and associated liabilities in respect to the management of hazard risk areas. The lack of coastal hazard setbacks and associated management guidance in past plans has led to the development of some very complex hazard management issues in Raglan and it is important that these issues are not further aggravated over time. The recommendations follow approaches typically adopted on the New Zealand coast. Once site-specific adaptive management strategies are developed and agreed with relevant stakeholders, these will take priority in the management of individual sites.

In regard to management, T+T also question some of the comments we have made in regard to seawalls, suggesting these are subjective or emotive. We firmly disagree with this. There have been extensive scientific investigations looking at the effects of seawalls and we are both familiar with this literature. Collectively, we also have over 50 years' experience working with coastal hazards. The adverse environmental effects of seawalls structures on beaches (to which most of our comments relate) are well-established. In short, seawalls placed on eroding/retreating beaches result in progressive beach loss and narrowing, which in turn impacts on recreational, aesthetic and amenity values of the beaches and public access at high stages of the tide. Additional adverse effects can also arise from seawalls even where beaches are not retreating; particularly where seawalls are placed too far seaward or with sloping structures that encroach seaward over beaches. Seawalls can also have significant adverse effects on natural character and landscape amenity when not sympathetically designed. These various adverse effects are particularly important considerations on high value public beaches in tourist towns like Raglan where the coast plays a significant role in the local economy. The various potential adverse effects of seawalls are a key reason these structures are discouraged by the NZCPS 2010 and, in fact, internationally. We note that there are also places where we have suggested that seawalls might well be a useful component of adaptive management strategies, if appropriately designed and located (e.g. Wallis Street and Lorenzen Bay). We do not believe that the report has any inherent bias against these structures but it is important that the pros and cons of these measures are openly acknowledged. Nonetheless, we acknowledge the peer review and have reviewed our comments on seawalls to ensure they are factual and not subjective.

Overall, we are grateful to T+T for a very useful and helpful peer review.

Yours sincerely

Jim Dahm and Bronwen Gibberd

For the Focus Resource Management Group

1 APPENDIX A: SUMMARY OF RECOMMENDED HAZARD AREAS

Location	Shoreline Type	High Risk Hazard Area	Coastal Sensitivity Area	Notes
Open West Coast (Rural) Erosion	All	n/a	200 m	<p>Provides for diverse range of coastal hazards on the open west coast, which could be otherwise estimated by:</p> <p>10 m toe erosion + 1:2 slope for tertiary sedimentary rocks</p> <p>75 m of erosion (per 1.0 m of SLR) + 1:2 slope for Pleistocene sands</p> <p>200 m at stream mouths on the open coast</p> <p>Also provides for long term potential sensitivity to coastal flooding, including the effects of wave run-up.</p> <p>Measured from 2012 shoreline baseline.</p>
Estuary Shorelines (Rural) Erosion	All	n/a	100 m	<p>Flags the area that may be dynamic/erodible for further investigation. Coastal erosion hazard could be estimated by:</p> <p>10 m toe erosion + 1:2 slope.</p> <p><u>Measured from 2012 shoreline.</u></p>
Estuary Shorelines (Rural) Flooding	All	n/a	<5.0 m elevation	Provides for long term coastal inundation risk including effects of sea level rise.

Port Waikato Northern Coast	Major River Entrance	n/a	1,500 m	<p>Reflects very large historic changes in entrance location.</p> <p>Provides for large dynamic fluctuations and future sea level rise. Reflects uncertainty.</p> <p><u>Measured from 2012 shoreline (ocean shoreline alignment)</u></p>
Raglan Harbour Entrance Northern coast	Major Estuary Entrance	n/a	400 m	<p>Provides for dynamic shoreline fluctuations and future sea level rise.</p> <p><u>Measured from 2012 shoreline</u></p>
Aotea Harbour Northern Coast	Major Estuary Entrance	n/a	400 m	<p>Provides for dynamic shoreline fluctuations and future sea level rise.</p> <p><u>Given low probability of future development could be mapped as rural open coast (200 m) translating to rural estuary hazard area (100 m).</u></p> <p><u>Measured from 2012 shoreline</u></p>
Estuary Shorelines (Developed)	Banks/Cliffs	1:2 slope	5 m toe erosion + 1:2 slope	<p>Includes Nihinihi, Cox, Greenslade. Also extend to cover the shoreline fronting Marine Parade (south of the Te Kopua Bridge), Oputuru Road, Goodare Road, Smith Street, Karioi Crescent and Wainui Road from the one lane bridge to Raglan Town Centre.</p> <p><u>High risk measured from 2.0 m RL contour (MVD '53)</u></p> <p><u>Sensitivity measured from 3.0 m contour (MVD '53).</u></p>
Estuary Shorelines (Developed)	Beaches	10 m	25 m	<p>Applies to Lorenzen Bay. Uses site specific baseline.</p> <p>Limited to landward by 5.0 m contour at Lorenzen.</p>

Port Waikato Sunset Beach	Beach	60 m		Provides for 10 years of erosion + stable dune slope. <u>Measured from 2019 shoreline</u>
Port Waikato Spit	Wider spit	n/a	Entire spit.	Flagging entire spit as sensitivity area due to extreme uncertainty and long-term potential for spit breach.
Port Waikato Upstream	Putataka Headland	2 m + 1:1.5 slope	5 m + 1:2 slope	Consistent with developed estuary sensitivity area with small allowance for seawall effects. <u>Measured from 2017 shoreline</u>
Whale Bay	Bank/cliff	7 m	30 m	Allowance for 2 m toe erosion and stable slope. Sensitivity: toe erosion increased based on SLR effects – 10 m + 1:2 slope. <u>High risk measured from 2.0 m RL contour (MVD '53)</u> <u>Sensitivity measured from 3.0 m contour (MVD '53).</u>
Raglan Entrance Area	Beach	24 m on open coast, reducing to 16 m at toilet block continuing at 16 m around to Te Kopua	All areas on sand <u>(approximated by 10 m contour in absence of detailed data)</u>	Allowance for 15 m dune fluctuations in short term on open coast, 10 m at toilet block, plus stable dune slope. Sensitivity area reflects harbour entrance setting and lack of knowledge about subsurface geology. <u>Measured from 2017 shoreline.</u>

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Te Kopua	Estuarine beach/entrance	Northern shore: 12 m, Southern shore: 7 m	All areas on sand <u>(approximated by 10 m contour in absence of detailed data)</u>	Provides for 10 m short term fluctuations plus stable dune slope. 5 m plus stable slope on southern Te Kopua shoreline. <u>Measured from 2012 shoreline baseline</u>
<u>Upstream Te Kopua</u>			<u>15 m</u>	<u>Measured from 2012 shoreline baseline</u>
Cliff Street	Low Estuary Bank	5.5-8.0 m <u>(varies with elevation)</u>	14.5 m	2 m toe erosion + stable slope (1V:1.5H). Sensitivity 10 m toe erosion + stable slope (1V:1.5H). <u>High risk measured from 2.0 m RL baseline (MVD '53)</u> <u>Sensitivity measured from 3.0 m contour (MVD '53).</u>
Wallis Street	Low Estuary Bank	7.0 m	11.5 m	High risk provides for seawall effect and minor erosion + stable slope (1V:1.5H) Sensitivity: 10 m toe erosion + stable slope (1V:1.5H). <u>High risk measured from 2.0 m RL contour (MVD '53)</u> <u>Sensitivity measured from 3.0 m contour (MVD '53).</u>
Estuary Coastal Flooding (developed)	All	3.1 m RL (MVD)	4.1 m (MVD)	These include no allowance for wave effects or freeboard.

Job No: 1012915
18 December 2019

Waikato District Council
Private Bag 544
Ngaruawahia 3742

Attention: Kelly Nicolson

Dear Kelly

Review of Waikato District Coastal Hazard Assessment

1 Scope of review

Waikato District Council ("WDC") have engaged Tonkin & Taylor Ltd. ("T+T") to undertake a review of the Waikato District Coastal Hazard Assessment (the "Assessment") dated September 2019. The intent of this review is to assess the information, methodology and recommendations contained in the assessment and to make recommendations on whether they are appropriate, defensible and consistent with national and regional policy direction and national coastal hazard guidance.

This review has been undertaken in accordance with guidance provided within Engineering New Zealand: Practice Note No.2: Peer Review – dated April 2018 and has included the following approach:

- 1 Initial teleconference between WDC, T+T reviewers and assessment authors to provide context (5 December 2019)
- 2 Review of assessment with draft comments provided directly by T+T reviewers to authors for comment or clarification
- 3 Teleconference between T+T reviewers and assessment authors to discuss these draft comments (12 December 2019)
- 4 Final review comments provided to WDC (this letter).

This review has focussed on three parts including:

- Assessment methods used to derive hazard components and final values
- Assessment of the location and spatial extent of each hazard area and the recommendations for mapping these, and
- Identification of management options for each hazard area.

General commentary on each of these themes is provided below with specific comments included within a mark-up of the assessment attached within Appendix A.

2 Assessment methods

2.1 Comments on concepts

The study considers coastal erosion and coastal inundation. The region is split into developed sites (Raglan and Port Waikato urban areas) and rural areas. Hazard areas are termed *High risk coastal erosion/flood zones* and *Coastal erosion/flood sensitivity zones* in urban areas and *Coastal hazard sensitivity zone* in rural areas. Comments on these concepts and terms are as follows:

- The term 'risk' generally includes a consequence component and, while the proposed high risk zones are generally located in urban areas and therefore likely to have higher consequence (because there are public and private assets likely to be impacted by erosion and/or inundation) than non-urban areas, T+T consider that the term 'risk' may not be appropriate. This opinion is based on the current lack of a consequence assessment and the fact the assessment authors have only considered houses as being affected by the hazard and not natural/ecological features and processes. T+T consider that a more appropriate and simpler descriptor would be 'Current coastal erosion/flood area'.
- The term 'Zones' is usually associated with planning instruments rather than spatial extent of hazard susceptibility areas. However, in this case it appears that the hazards extents shown in the assessment are being developed specifically for use in developing updated District Planning maps so this term may be appropriate.

The timeframes provided within the assessment indicate that a 20-25 year horizon has been used to derive the current hazard zone and 2120 used for development of the sensitivity zones.

- The assessment has discounted the effects of sea level rise (SLR) for the 20-25 year timeframe associated with the current hazard zone. T+T consider the exclusion of the effects of SLR to be inappropriate. The MFE (2017) Guidelines suggests that under the RCP8.5 M scenario the sea level at 2045 could be 0.15m above the 2020 sea level. Consequently, T+T consider the current hazard zone should take account of SLR, or alternatively, the current hazard zone is based on a 10 year timeframe and effects of SLR can be discounted.
- T+T note that many councils are now adopting a 2130 timeframe into their hazard assessments to ensure that the NZCPS requirement of 'at least 100 years' is maintained throughout a 10 year district plan period.

The initial part of the assessment discusses the project approach, policy settings, hazard identification methods, and broad management recommendations. The final chapters of the assessment discuss specific coastal hazard extents, which settlements/assets are affected by these hazards and specific management options and recommendations.

- While Figures 1 to 3 of the assessment show the Waikato District and areas covered by rural and developed area assessments, they aren't particularly clear. T+T consider that perhaps a larger map of the Waikato District could be produced, including colouring the shoreline one colour for rural areas and one colour for developed areas with insert boxes showing the developed areas more closely (though again colouring the shoreline to reflect the level of detail being provided). We have provided an additional comment below on shoreline definition in Section 2.2.

2.2 Comments on erosion assessments

- T+T consider that the discussion included within the assessment regarding the data used for deriving erosion rates is useful. However, we note that no analysis of the data is provided and presentation of historic shorelines variable. Consequently, T+T has been unable to thoroughly

review any of the specific erosion rates given throughout the assessment with regard to their accuracy/validity.

- T+T note there is a lack of data (i.e. beach profiles) available for the assessment authors to define short-term fluctuations in beach elevations and shoreline positions. However, the values adopted by the assessment authors appear to be in keeping with similar assessments elsewhere (i.e. Auckland and Taranaki regions).
- T+T consider that there are some errors in the Bruun equation and terms applied by the assessment authors (see report comments) and values such as closure depth have not been provided. T+T consider that in general the response values for 1m SLR look appropriate but that perhaps the values should increase for the higher SLR used in the rural area assessment.
- T+T note the assessment authors provide limited discussion on cliff slope angles in Section 4 of the assessment. Given the importance of slope variables for defining hazard extents of cliffed coastline it is likely worth further discussion. The limited consideration of slope by the assessment authors is found in the site-specific section where it is stated that slopes of between 1.5(H):1(V) and 2(H):1(V) are typically used for high risk and erosion sensitivity zones. The T+T reviewers are not geologists so cannot provide expert comment on the appropriateness of these slope assumptions, but do consider it is important to continue to reinforce that flatter slopes may occur throughout the district with site-specific factors and this can influence the erosion assessment.
- T+T generally agree with the erosion widths presented by the assessment authors noting the above caveat on slope angle. T+T also consider the tables used in some site-specific assessments to present these erosion widths is useful. T+T suggest that the assessment authors include these erosion widths in all tables and that consistency between tables is provided (i.e. some tables include a slope stability horizontal distance and some give a slope)
- T+T consider that the adopted SLR value of 1 m for urban areas is in keeping with the transitional values presented within the MFE (2017) Guidelines but is lower than the RCP8.5 H+ value recommended for stress testing. Therefore, any new major infrastructure or greenfield development within the urban areas may still require a further future hazard assessment, even if outside the mapped areas.

2.3 Comments on inundation levels

- The discussion of inundation levels provided by the authors of the assessment in Chapter 4 is difficult to follow as the tables alternate between datums (MSL, MVD, NZVD) and locations. T+T suggest that the assessment authors use a consistent datum and undertake any conversions outside of the assessment. T+T further suggest that the assessment authors provide a final complete table of the adopted values for the different zones (including SLR where appropriate). In the final table the assessment authors could provide inundation levels in terms of MVD and NZVD, as future users of the assessment may be dealing with either in setting floor levels.
- T+T understand that the assessment authors developed the inundation levels based data collected from tide gauges in deepwater so the levels will not include any wave set up component. T+T acknowledge that wave set up contribution to an inundation level is likely to be small in a harbour environment (likely <0.2m) but T+T consider that an allowance for wave set up should be considered, unless the assessment authors believe the building block approach or rounding they have used has covered this allowance some other way .
- T+T consider that it is important to note that these inundation levels proposed by the assessment authors are applicable only to harbours, and that levels for wave-exposed open coast shorelines should include an allowance for additional set up. T+T note that open coast

shoreline levels are typically higher and so the allowance for set up is unlikely to have a material effect on the hazard extent in mapping.

- As to T+T's assessment of what assets are included within the hazard extents, specific comments are included in the assessment mark up (Appendix A) but of note, Wainui Road near the corner of Wainui and Riria Kereopa Memorial Drive is predicted to be affected at current flooding levels but hasn't been mentioned.

3 Hazard mapping

The assessment has provided distances and levels corresponding to predicted inundation and erosion hazards relative to current shoreline position. Inundation has been mapped within the assessment and instructions for future mapping erosion provided within an appendix, except where some indicative erosion lines are presented for north of the Waikato River. T+T's comments on the hazard mapping are as follows:

- Being able to see the inundation mapping is useful, though captions within and below figures should be aligned, i.e. some captions use 1% AEP, some use 'severe storm', some use 'extreme events'. The assessment authors confirm that the 1% AEP event wasn't specifically used to develop the inundation level (but rather a building block level), so T+T consider it is likely better to use a term like 'extreme inundation event' in the captions.
- T+T consider that the specific inundation level being mapped should also be included in the figure caption to allow users to reproduce within the Waikato Regional Council inundation tool.
- When T+T compared the inundation extents proposed by the assessment authors we observed slightly different extents to those shown on the WRC inundation tool for the same level. However, we understand from discussions with the assessment authors that the WRC inundation tool has recently been updated and that they intend to re-check their predicted inundation extents using the most recent version.
- For the erosion hazard, T+T understand that mapping is yet to be undertaken and therefore review of the maps by T+T has not been possible. Instructions from the assessment authors for future mapping appears sufficient to ensure that mapped distances are in agreement with the assessment values. T+T consider that it will be important to define the transition between different erosion areas/extents during mapping. For example, some very large values are used around major harbour entrances (S8.3.2) but these are maximum values, and it will be important for those undertaking mapping to show where the values extends from/to for adjoining shorelines with the assessment authors' input.
- T+T consider that accurate definition of a current shoreline will be important for future erosion mapping and current shoreline definition needs to be completed prior to mapping commencing, along with the extents requiring the differing mapping treatments.
- T+T disagree that stable angle mapping for cliffed shorelines should be based on the RL 3m contour as suggested by the assessment authors. T+T consider that a more appropriate basis for stable angle mapping is the current toe. Higher sea levels may increase erosion rates but unless a platform developed the current cliff toe should continue to be used.

4 Management options

This report has presented broad management options and the final chapters discusses specific management options and provides recommendations.

T+T comments around the management approaches suggested by the assessment authors include:

- The report contains quite emotive language around hard protection structures and their “huge” cost, provides limited options, and could be read to mean that the options are already pre-determined.
- We recommend that the hazard part of the report (assessment of hazard values, extents and what is affected) is separated from the discussion of management options. This would allow the hazard assessment to be dealt with as a factual report while the management options can be discussed and worked through with stakeholders.
- Similarly, the funding model for implementing an adaptive management framework is fundamental to its success and this requires discussion, the use of other council processes (LTP etc), and agreement outside of the hazard assessment.
- Further regulatory comments include the timeframe of the DP is stated as being 10-20 years and LIM are identified as supporting an adaptive management framework. These statements are confusing and require further explanation. Similarly, the assessment is to inform a District Plan review, but repeatedly refers to an adaptive management strategy with no commentary on how this is or is not related to or tied back to the review versus resource consents versus coastal management strategies etc.

5 Other comments:

- Many references used throughout the assessment are not included in reference section at the end.
- Page numbering has been reset throughout the assessment and needs updating to be continuous.

6 Conclusion

This assessment has derived hazard extents over a large and widely varying coastline and has provided a range of management options for the differing environments.

Overall T+T consider that the proposed hazard distances are generally appropriate based on our assessments in similar locations, although lack of data available and detail on assessment methods used by the authors preclude us from undertaking a detailed examination of individual components. Future mapping will be important, particularly around transition zones and care should be taken on these.

General management options have been provided together with commentary for specific locations. We suggest these are separated from the hazard report, as one should be a factual presentation of data and modelling outputs and one is a range of options to be discussed by and agreed with stakeholders.

7 Applicability

This report has been prepared for the exclusive use of our client Waikato District Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

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Waikato District Plan Review: Natural Hazards and Climate Change Economic Assessment

12 June 2020

m.e
consulting



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1 Background

Market Economics (M.E) has been engaged by Waikato District Council (WDC) to undertake an economic assessment of a number of aspects of the proposed natural hazards and climate change provisions to be included in the Proposed District Plan (PDP), as compared to the Operative District Plan (ODP).

From an economic perspective, natural hazards and climate change can impact economic activities in both urban and rural environments. The costs and benefits associated with natural hazards and climate change can be managed by ensuring that land uses within identified areas occur a way that minimises the potential impacts. The negative impacts of natural hazards and climate change typically accrue to the wider community, both directly to landholders and to the wider public through flow-on impacts. It is well established in economic theory that the free market will fail to produce an optimal outcome in the presence of market failures. In the case of natural hazards and climate change, free markets will result in an outcome where too little consideration of the risks are incorporated in decision-making. In many cases, local governments will impose rules on activities that occur in vulnerable areas to assist the market to produce an optimal outcome.

While it is recognised that the development of natural hazard and climate change provisions will generate benefits to the community, it is also important to acknowledge that the provisions will result in corresponding negative impacts through the reduction of some activities or additional costs to the community on an ongoing and one-off basis. For example, some natural hazard and climate change provisions impose greater costs on developers in terms of building requirements (e.g. raised building floor levels). Alternatively, other rules may limit the locations where an activity can occur – as an example, restrictions on building in close proximity to the sea due to storm inundation and sea-level rising.

At this stage, our brief is to consider the costs and benefits generated by the key natural hazard and climate change provisions in the Plan, including Flooding¹, Coastal², Subsidence, Liquefaction³ and Climate Change⁴.

The scope of work for this report is based on the following information:

- **Natural Hazard Coverage:** which provides the spatial coverage for the natural hazards and climate change policy, both under the ODP and PDP.⁵ This information outlines which land is likely to be impacted by natural hazards as defined according to research conducted by appropriate natural hazards experts (in Council or external consultants). In some cases the spatial extent of the coverage of the natural hazard in question can not be defined (especially for some of the flooding areas in the ODP).

¹ Includes the flood plain management area, high risk flood and defended areas.

² Both high risk coastal erosion and high risk coastal inundation areas.

³ This hazard is not mapped.

⁴ Not technically a natural hazard in itself.

⁵ Waikato District Council (2020) GIS Layers, received 10th February.

- **Zone Areas:** This provides the spatial coverage of the land use potential, both under the ODP and PDP.⁶ This is important because rural areas with a rural zoning have less development potential under the zone rules than other areas such as residential and commercial zones.
- **District Plan Provisions - Natural Hazards and Climate Change:** which provides the operative and proposed objectives, policies and rules that relate to natural hazards.⁷
- **Natural Hazards and Climate Change Activity Summary:** This provides a comparison of the ODP and PDP natural hazards and climate change in terms of activities.⁸
- **Residential Capacity Assessment:** property level assessment of development potential within Waikato District under the ODP.⁹
- **Waikato District Hazard Reports:** These reports include assessments by experts in hydrological modelling¹⁰, coastal hazards¹¹ and subsidence risk¹². Each of these reports assesses hazards and include where applicable climate change and sea level rise allowances, although there was no reporting specifically provided on this topic. The council has not commissioned a district wide assessment of liquefaction, instead relying on government guidelines¹³, practice notes¹⁴ and a number of case study risk assessments that had been submitted by applicants.
- **Waikato Region Reports:** the regional assessment of earthquake risk and subsoil conditions was reviewed for this report to establish the potential risk of liquefaction in the District.¹⁵
- **Waikato Planning Framework Memo:** during the drafting of this report it became apparent that the existing planning framework for hazards did not and align with the practical application of the plan. M.E requested council officers to develop a memo that outlined how the Operative District plan is actually applied in practise. This memo has been used to update the report.¹⁶

We note that there are a number of other natural hazards provisions in the Plan, which are not assessed in this report (e.g. wildfire). During the scoping stage of this report it was noted by the client that the remaining rules would be outside the scope of this economic assessment.¹⁷

The aim of this report is to cover the specific scope requested, and enable informed discussion moving forward. Also, the results from this report will be used to inform s32 assessment of the proposed natural hazards and climate change provisions in the Plan to assist in the District Plan Review hearing processes.

⁶ Waikato District Council (2020) GIS Layers, received 10th February.

⁷ Waikato District Council (2019) Draft Waikato District Plan (Stage 2).

⁸ Waikato District Council (2020) Policy Option - ODP, PDP Stage 1 and Stage 2, received 14th February.

⁹ Market Economics (2018) National Policy Statement Urban Development Capacity – Residential Assessment.

¹⁰ DHI (2019) WRC Lower Waikato 2D Modelling - Huntly, Ohinewai and Horotiu Model Build.

¹¹ FOCUS (2020) Waikato District Coastal Hazard Assessment.

¹² RDCL (2019) Risk Assessment for Urban Development Areas – Huntly East Mine.

¹³ EQC, MBIE, MFE (2017) Planning and engineering guidance for potentially liquefaction-prone land

¹⁴ MBIE and NZ Geotechnical Society Inc (2016) Earthquake geotechnical engineering practice, Module 3: Identification, assessment and mitigation of liquefaction hazards.

¹⁵ Environment Waikato (1998) Earthquake Risk Mitigation Plan.

¹⁶ Waikato District Council (2020) Natural Hazards and Climate Change Planning Framework – Memo (draft) received 4th May.

¹⁷ Waikato District Council (2020) Natural Hazards and Climate Change Economic Assessment – Scoping Brief, received 20th February.



2 District Plan – Natural Hazards

The following section briefly outlines the natural hazards and climate change provisions in the Operative District Plan (ODP) and the Proposed District Plan (PDP). This section draws from the technical study conducted for the council, the GIS layers and Policy wording provided by council. The reader should refer to these documents to gain a more detailed understanding of the natural hazards and climate change provisions in the Plan. This section has also relied on council officers to provide detail about the revisions of the provisions that have occurred during the internal council planning and wider engagement processes.

In summary, Waikato District has significant natural hazards, most important are the flooding and coastal hazards, which are likely to be compounded by the effects of climate change.

In terms of flooding hazard, the Waikato River which traverses the District is New Zealand's longest river, and has a total catchment area of some 14,250 square kilometres.¹⁸ This includes its largest tributary, the Waipa River, which has a catchment of some 3,050 square kilometres, extending from South of Te Kuiti to join the Waikato River at Ngaruawahia.

The Lower Waikato has a flood plain of approximately 36,400 hectares originally dominated by lakes and wetlands. The flood plain has little fall through the river system, which can result in long term flooding or ponding, taking weeks to drain. Some 21,500 hectares has been defended using stopbanks, achieving a high standard of protection (mainly to 1% AEP).

In terms of coastal hazard, the shoreline of the Waikato District is extensive and diverse. Key areas around Raglan and Port Waikato are characterised by open coast sandy beaches, estuarine intertidal sand flats and estuarine beaches, cliffed shorelines, and low lying estuarine margins. The west coast is exposed to prevailing weather from the Tasman Sea, which includes large swells and storms. Continual erosion and coastal flooding events are also a significant natural hazard within the District.

There are also a number of more localised natural hazards such as subsidence in Huntly and potential for liquefaction.

The following sections outline the provisions in the ODP and PDP that relate to these four natural hazards. The discussion begins with a summary of the natural hazard objectives and policies, then provides detail on the spatial extents and the rules.

2.1 Operative District Plan

There are currently two sections in the ODP, the Franklin section and the Waikato section. The Franklin section is a legacy of the amalgamation of the previous territorial authorities in Auckland into a single authority - Auckland Council. In this process the Franklin District was split in three, with one part being merged into the Waikato District, a small part merging with the Hauraki District and the remainder being merged into the Auckland Council.

¹⁸ Waikato Regional Council (2016) Lower Waikato Waipa Control Scheme Land Classification and Direct Benefit Analysis for Differential Rating Purposes.



Chapter 5 of the Waikato Section of the ODP addresses natural hazards, and includes three objectives which are summaries as follows:

- 5.2.1. minimise natural hazard risk to health, safety and property;
- 5.2.11. retain hydrological characteristics of Mangaonua, Mangaone and Mangaharakeke Streams and their tributaries; and
- 5.2.15. Avoid risks from ponding of surface water and poor drainage.

Part 7 of the Franklin Section includes four objectives which are summaries as follows:

- 7.2.2 - 1. reduce risk to activities on land subject to land instability;
- 7.2.2 - 2. reduce risk of flooding by watercourse/stormwater overflow and coastal inundation;
- 7.2.2 - 3. avoid, remedy, mitigate adverse effects of erosion on property and the environment; and,
- 7.2.2 - 4. Ensure public are informed of natural hazards.

Most of the natural hazard policies in Waikato section of the ODP relate to minimising risk. The policies are outlined in Chapter 5 and are summaries below:

- P5.2.2 Avoid use or development on land subject to significant natural hazards; P5.2.2.A Mitigate risks to health, safety and property on land subject to natural hazards; P5.2.3 Use or development of land subject to natural hazards should not increase risk or compromise natural processes; P5.2.4 Do not construct or alter buildings on land that will be subject to coastal hazards with 0.5m SLR; P5.2.5 Minimise impervious surfaces, provide adequate drainage and mitigate off site effects of stormwater; P5.2.6 Provide fire breaks and water source for firefighting; P5.2.7 Locate buildings away from fire risk; P5.2.8 Use, maintain or enhance natural buffers; P5.2.9 Development should be designed and located to avoid or mitigate the predicted effects of climate change on natural hazards and take a precautionary approach where information is incomplete.
- P5.2.12 Subdivision, use and development to maintain or enhance overall hydrological characteristics of gully streams and maintain surface and groundwater flows, ponding and drainage patterns; P5.2.13 Limit modifications to flow paths and drainage patterns to minor adjustments; P5.2.14 Manage stormwater close to source.
- P5.2.16 Subdivision, use and development to not increase ponding hazard; P5.2.17 Subdivision, use and development to avoid or mitigate adverse effects of surface water ponding; P5.2.18; Stormwater management practices and devices in accordance with low impact design principles.

Most of the natural hazard policies in the Franklin section of the ODP focus on avoiding, remedying or mitigating risk from land instability, inundation and erosion. The policies are outlined in 7.2.3 and are summaries below:

- **Instability:** (1) Avoid, remedy or mitigate adverse effects of land instability arising from subdivision and development; (2) Avoid stormwater discharge on land that is unstable; (3) Activity and development shall not cause instability or erosion in the coastal or riparian margins.
- **Inundation:** (4) Avoid land use, subdivision and development on flooding plains unless adverse effects can be avoided, remedied or mitigated; (5) Stormwater management systems should include low impact design responses where possible; (6), Avoid, remedy or mitigate adverse effects on flood protection works.

- **Erosion:** (7) Avoid accelerated erosion from land use, subdivision and development along the banks of streams, rivers, lakes and watercourses; (8) Land use, subdivision and development is located to avoid, remedy or mitigate adverse effects on or from natural coastal or river processes; (9) Only allow land use, subdivision and development if it maintains and enhances natural buffering of the coastal environment.
- **General:** (10) Where information on hazard risk is limited use a precautionary approach; (11) Use precautionary approach to other hazards (earthquake, volcanic activity, tsunami, sea level rise and climate change; (12) Avoid, remedy or mitigate adverse effects of natural hazards on historic heritage. There are a number of differences between the two sections of the ODP, which creates issues in terms of consistency of the treatment of natural hazards across the District.

The rest of this section will focus on the spatial extent of hazard areas and the rules that have been set out in the ODP that relate to natural hazards. The hazard extents and rules define how the objectives and policy described in the ODP are to be given effect to. Importantly they describe the types of activities that can occur as of right (Permitted) and the circumstances under which a resource consent will be required.

2.1.1 Flooding

Waikato Section

The flooding hazard within the District includes flooding and ponding around the various waterbodies, including rivers, streams and lakes. Figure 2.1 shows the spatial extents in the ODP that relate to flooding hazard. There are the following four extents,

- **Flood Risk Area:** is a set of polygons that note some of the areas that are at risk of flooding, and cover a total of approximately 600 hectares of land or 0.1% of the land in the District. Most of the land is located along the banks of the Waikato River and some along the Mangawara stream.
- **Design Flood Level:** is a set of reference points along the Waipa and Waikato rivers, Lake Waikare and the Whangamarino Wetland that indicate the 1% AEP flood level at the time the Lower Waikato-Waipā Flood Protection Scheme was constructed. These points were intended to be used to establish the floor level for buildings to mitigate against flooding. Based on land elevation approximately 24,000 hectares of land in the District is at elevations that are below the Design Flood Level, which is 5% of the land in the District.¹⁹ However, these reference points are largely outdated and although the design flood level notation is referenced in the Waikato Section rules for building in a flood risk area, these reference points are not currently used by council officers to determine compliance with the minimum floor level required by the rule. It is not possible to assess the area over which the ODP rules have effect.
- **Flood Limits:** is a line that indicates the extent of flooding around the township of Te Kauwhata. The flood limits relate to the north shore of Lake Waikare and the southern banks of the Whangamarino Wetland and covers approximately 300 hectares of land or 0.1% of the land in the District.
- **Huntly South Assessment Area:** is an area of land just south of Huntly that is at risk of ponding during a 1% AEP flood event, and covers a total of 17 hectares of land.

¹⁹ Coverage based on elevation data (Waikato District Council (2019) Contour Composite – GIS layer of 1 metre contours) and the levels noted in each point of the Design Flood Level.

Figure 2.1: Map of Flooding Extents in Operative District Plan and Zones

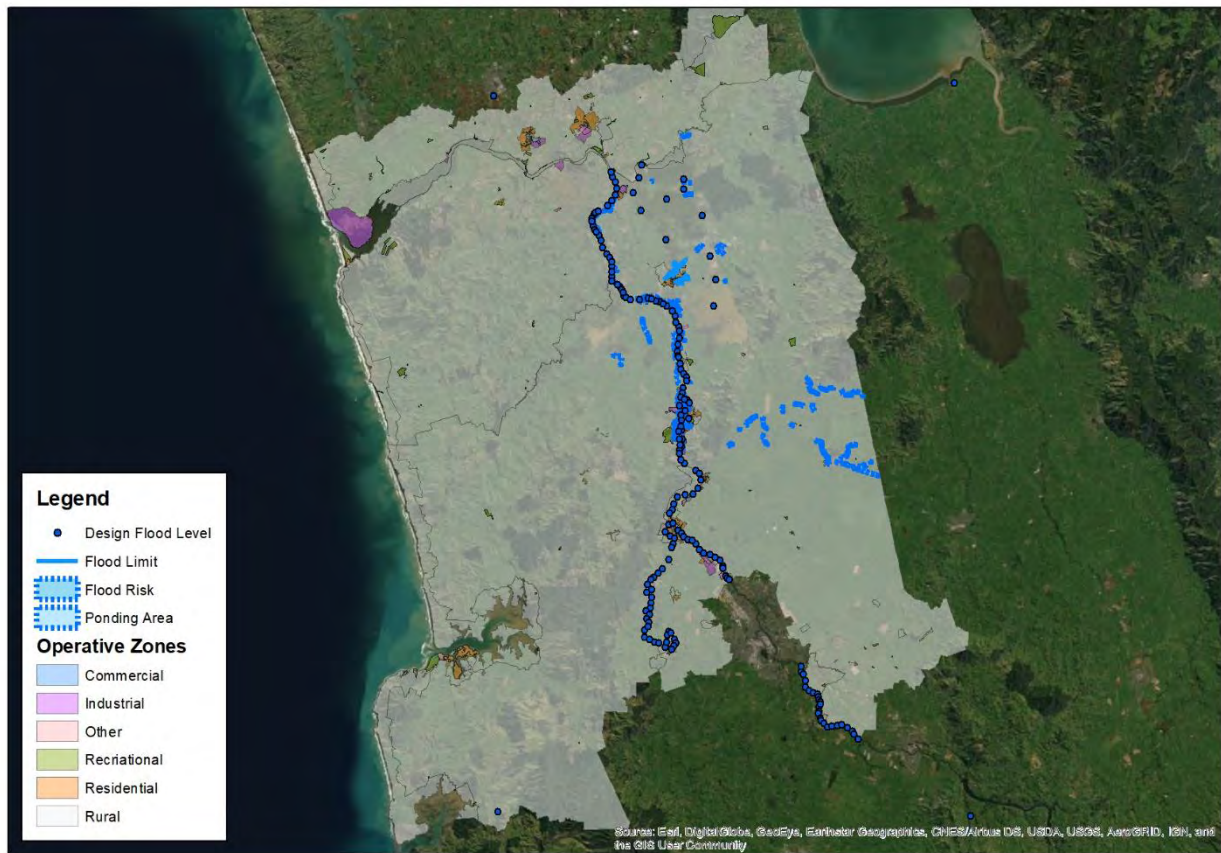


Table 2.1 shows the distribution of land within the flooding extents in the ODP based on the current ODP zones. The majority of the land covered by flooding is currently zoned Rural (83%) or Other²⁰ (5%). Also, many of the largest towns in the District are located near the flooding areas, which means that some of the more intensively used areas in the District will be affected by flooding hazard, in total over 100 hectares of urban land falls within the extents.

Table 2.1: Flooding Extents in Operative District Plan and Zones, hectares of land

ODP Zones	Flood Level	Flood Limit	Flood Risk	Ponding	Total	% of land in extents
Residential	Coverage Uncertain No Data	2	57	7	66	7%
Business		13	18	8	40	4%
Rural		285	453	1	739	83%
Other		7	41	2	49	5%
Total Flood Area		307	569	17	893	100%

²⁰ Includes reserves and roads.

While it is not possible to precisely quantify the practical application of the ODP Flood Level provisions, it is likely to be a large area of land in the District. The practical application of the ODP provisions is likely to cover more land in the District than the Proposed Plan 1% AEP Floodplain extent.

The rules within the Waikato section of the ODP aim to ensure that buildings are designed and located to mitigate the effects of flooding. The floor level of habitable rooms within dwellings, commercial or community buildings must be at least 0.3 metres above the 1% AEP flood level. For non-habitable rooms the floor level must be at or above the 1% AEP level. If these standards are met the building is permitted. It would be difficult to get a consent to construct a building that does not meet the required floor levels as it would be a discretionary activity in the Industrial Zone and a non-complying activity in all other zones.

The rules within the Waikato section of the ODP are designed to enable most utilities as a Permitted activity within the flood areas. However, if the works relate to buildings then the building rule applies and any non-compliance with minimum floor level will default to a Discretionary activity (Industrial Zone) or Non-Complying (all other zones) resource consent.

Generally earthworks in a flood risk area requires a resource consent (either Discretionary or Restricted Discretionary depending on the purpose and type of earthworks). The ODP rules provides an exception for earthworks that relate to filling for access or foundations (Permitted).

Subdivision is a Discretionary activity within a flood risk area.

Table 2.2: Flooding Extents Operative District Plan Provisions -Waikato Section

Rule	Activity/Use	Status	Notes
	Habitable Rooms - Dwellings, Commercial or Community buildings	P (NC)	Permitted if minimum floor level for habitable rooms at least 0.3m above 1% AEP flood level. Otherwise Discretionary (Industrial Zone) or Non-complying (all other zones).
	Non-habitable Rooms - Dwellings, Commercial or Community buildings	P (D/NC)	Permitted if at least at the 1% AEP flood level. Otherwise Discretionary (Industrial Zone) or Non-complying (all other zones).
	Utilities	P (D)	Permitted, unless a building then Discretionary or non-complying (see above).
	Earthworks - Filling	P (D/RD)	Permitted if filling is no more than necessary to provide foundations and access for building approved by building Consent. Otherwise Discretionary (Living/Business/Rural) or Restricted Discretionary (industrial).
	Earthworks – Other	D	Discretionary, requires a consent to undertake earthworks in flood area.
	Subdivision	D	Discretionary, requires a consent to undertake subdivision in flood risk area.

Franklin Section

The rules within the Franklin section of the ODP aim to ensure that the occupiable floor space of buildings are designed and located to mitigate the effects of flooding. To be a permitted activity the minimum floor level of any occupiable floor space of buildings must be 0.5 metres above the 1% AEP flood level. There is

no requirement to meet a minimum floor level for parts of buildings that do not meet the definition for occupiable floor space. Where a proposal cannot meet the conditions for a permitted activity, a restricted discretionary resource consent is required.

The rules within the ODP for the operation and maintenance of utilities are permitted where all conditions are met. The Franklin Section rules require buildings and structures to not inhibit or divert overland flow paths or to exacerbate flooding. If these conditions are not met, a consent is required as either a controlled, restricted discretionary or discretionary activity depending on the nature of the proposed utility.

Earthworks are regulated based on quantity or location in relation to a waterbody. Where compliance with conditions for a permitted activity cannot be met then Restricted Discretionary consent is required.

Subdivision is a controlled activity if new lots are sited to avoid natural hazards. The subdivision defaults to a discretionary activity if compliance with this condition cannot be met.

Table 2.3: Flooding Extents Provisions Operative District Plan - Franklin Section

Rule	Activity/Use	Status	Notes
	Residential Buildings	P (D)	Permitted if minimum floor level for occupiable floor space of any building is at least 0.5m above 1% AEP flood level. Otherwise Discretionary.
	Business and Industrial Buildings	P (RD)	Permitted if at least at the 1% AEP flood level. Otherwise Discretionary.
	Utilities	P (RD)	Permitted, unless a works exacerbates flooding hazard then Restricted Discretionary.
	Subdivision	C/RD (D)	Lots shall be sited so as to avoid or mitigate the potential effects of natural hazards. Otherwise Discretionary.

2.1.2 Coastal

Coastal hazards within the District include inundation and erosion around the open coast and estuary shorelines. These hazards are not mapped in either section of the ODP. However, both sections of the plan include a set of building rules that require a specified coastal setback distance from Mean High Water Springs (MHWS) and a minimum floor level (habitable room or occupiable floor space) above a specified datum or inundation level.

The building setback distance ranges from 100 metres in the Coastal Zone (Waikato Section) and 23-30 metres in the urban zones of Port Waikato and Raglan. The Waikato Section states that building setbacks from MHWS are to provide space for esplanade reserves and public access, to preserve natural character and amenity and to go some way towards mitigating the effects of coastal hazards. The building setback in the Coastal Zone of the Waikato Section is 100m unless the entire allotment is within the 100m setback and then a 32m setback applies. The building setback distance in the Coastal Zone of the Franklin Section is not specified but the building platform for new buildings or new allotments must be located to avoid or mitigate the effects of natural hazards.

Within the Waikato Section, the minimum floor levels have been calculated to include a 0.3m freeboard plus combined spring tides, storm surges and a 0.5m sea level rise due to climate change.

The Waikato Section minimum floor level is 3.7m above Moturiki Datum (Raglan). The Franklin Section minimum floor level is RL 3m in Port Waikato and RL 3.5m (Firth of Thames) or 0.5m above the highest observable flood level.

In total approximately 2,450 hectares of land is within the area covered by the coastal setback provisions. However, as noted above the coastal setbacks in the ODP are defined based on several factors, not just coastal hazards. Therefore, some of the area within the coastal setbacks will have been included to account for these other factors and will be unrelated to coastal hazards. It is not possible to establish the extents of the coastal hazards or the practical application of the provisions are applied.

Figure 2.2: Map of Coastal Setback in Operative District Plan and Zones

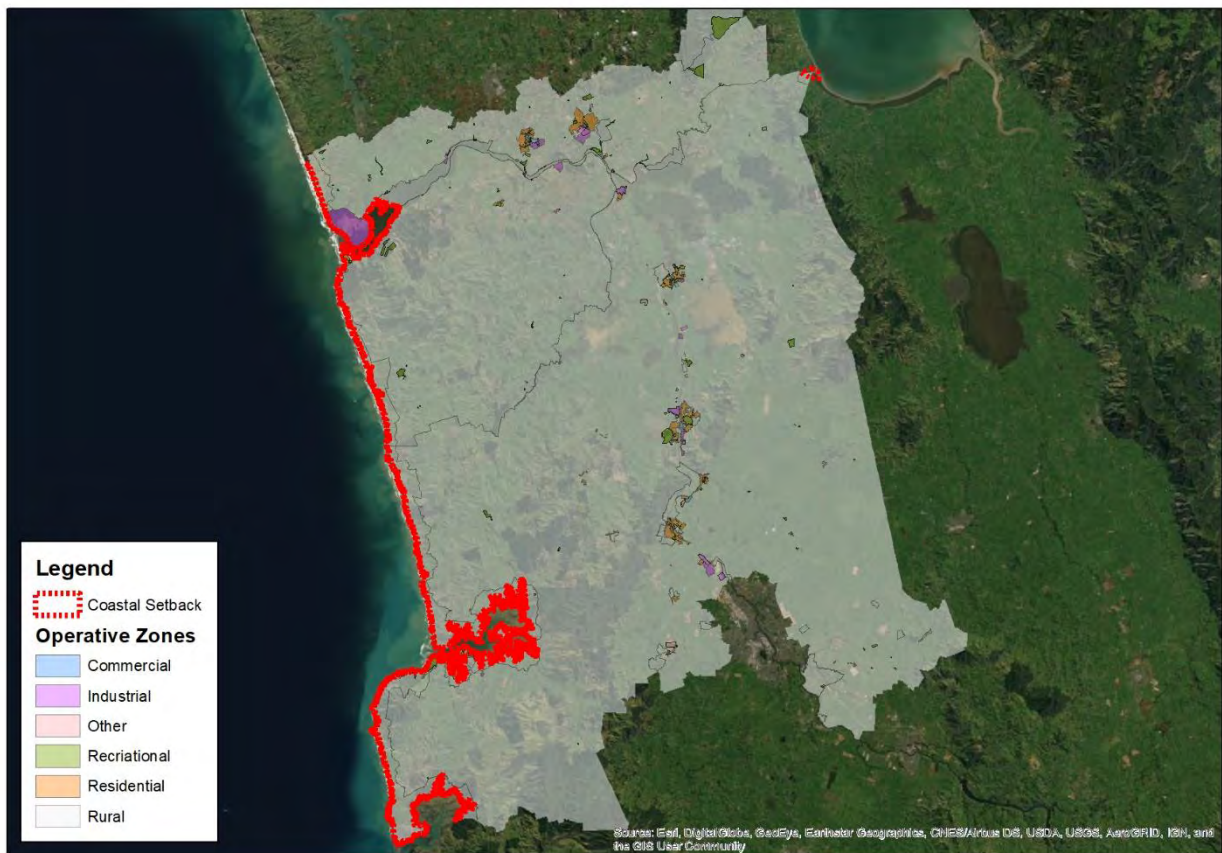


Table 2.4 shows the distribution of land that is subject to the building setback rules in the ODP. The majority of this land is currently used for rural (95%) and other (4%) activities. The other 1% of land within the coastal building setbacks is zoned for residential and business land uses and although the land area is smaller, it is more intensely developed than the rural areas (approximately 22 hectares of residential and 2 hectares of business). The coastal building setback rules affect 1% of the residential land in the District and 0.2% of the business land in the District.

Table 2.4: Coastal Extents Operative District Plan and Zones, hectares of land

ODP Zones	Coastal Setback	% of land in extents
Residential	22	1%
Business	2	0%
Rural	2,318	95%
Other	109	4%
Total Coastal Area	2,451	100%

The rules within the ODP aim to ensure that buildings are designed and located to mitigate the effects on the coastal area (including hazards). Rules in the Waikato section of the ODP require buildings to be setback between 23-30 metres in urban zones and up to 100 metres back in Coastal Zone. Also, for residential buildings, the habitable parts of dwellings must be built to a level of 3.7 metres above the Moturiki Datum. If these standards are met the building is a permitted activity but where compliance cannot be achieved the activity is discretionary and a resource consent is required (Living and Business Zones). Most buildings in the Coastal Zone require a controlled activity resource consent. If the building setback distances cannot be achieved the activity will require resource consent for a non-complying activity.

Rules in the Franklin section of the ODP require buildings to be setback 30 metres in the Village Zone. Coastal building setbacks in the Coastal Zone are not defined but are based on the ability of the development to avoid or mitigate natural hazards. If these standards are not met a resource consent is required (Restricted Discretionary). The Franklin rules only cover a small part of the western coastline, including around Port Waikato.

Table 2.5: Coastal Extents Operative District Plan Provisions

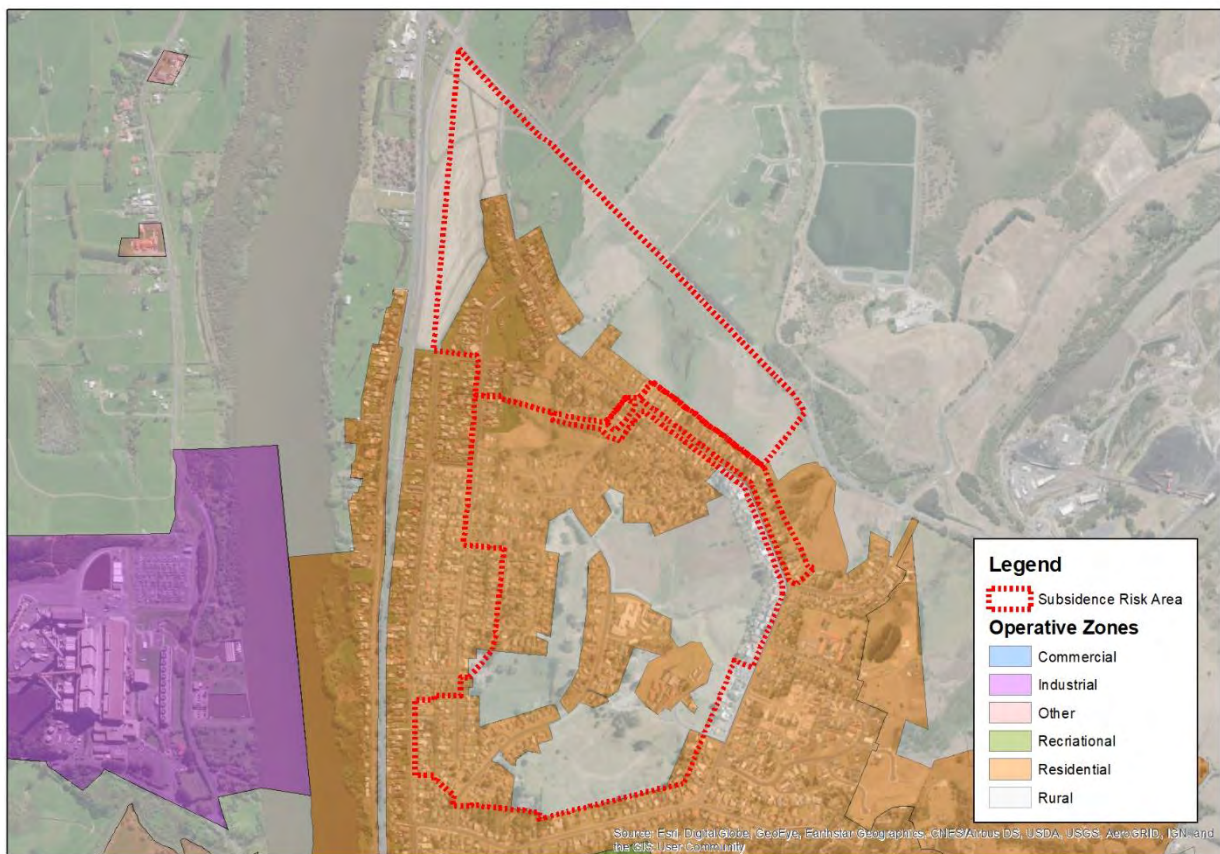
Section	Activity/Use	Status	Notes
Waikato	Building setbacks from MHWS.	P (D)	Permitted if floor level for any habitable room to be at least 3.7m above Moturiki Datum and setback according to following zone: <ul style="list-style-type: none"> • Living - 23m • Business - 23m • Industrial - 30m • Coastal - 100m • Country Living - 27.5m • Recreation - 32m Otherwise Discretionary.
Franklin	Building setbacks from MHWS	P (RD)	Permitted if setback according to following zone: <ul style="list-style-type: none"> • Village - 30m • Wetland Conservation & Forest Conservation - Coastal Marine Area - 60m • Coastal - Buildings must be sited to avoid or mitigate natural hazards and have a safe and stable building platform. Otherwise Discretionary

2.1.3 Subsidence

Ongoing surface settlement (subsidence) following closure of underground mine workings is a well-recognised phenomenon in other parts of the world.²¹ The Huntly Mine Subsidence Area is located in the north-eastern part of Huntly. This area has been subject to ground subsidence as a result of historic underground mining carried out in the late 1970s and early 1980s. The Huntly Mine Subsidence Area currently 125 hectares of land, of which 50 ha is residential (Living Zone) and 64 ha rural (Rural Zone).

Under the Waikato section of the ODP activities such as building, earthworks and subdivision are discretionary activities and can only be carried out with a resource consent. This means the development of land in this area will be relatively more costly to carry out compared to other parts of Huntly. There are no subsidence provisions in the Franklin section of the ODP.

Figure 2.3: Map of Subsidence Extent in Operative District Plan and Zones.



2.1.4 Liquefaction

There are no provisions in either section of the ODP that specifically refer to liquefaction. However, geotechnical investigations and assessments of natural hazards, which can include liquefaction, are required to fully assess the effects of some building proposal (depending on location) and all subdivision proposals and are currently part of the Council's consenting process.

²¹ RDCL (2019) Risk Assessment for Urban Development Areas – Huntly East Mine.



For example, an application for resource consent to subdivide land to create an additional lot is required to include a geotechnical report. In some instances, this report is to include an assessment of liquefaction risk. Council requires an investigation of natural hazard risk when undertaking a subdivision fulfil its obligations under s106 of the Resource Management Act.

2.1.5 Climate Change

Climate change and sea level rise are not a hazard in their own right. However, they impact the frequency and intensity of a range of the natural hazards which the council must undertake planning for.

Chapter 5 of the Waikato section includes policies to address the predicted effects of climate change, including sea level rise and to take a precautionary approach when there is incomplete information available. This suggests that planning for natural hazards should take into account the possible impacts of climate change on the frequency and intensity of weather events (s5.3.8), as well as sea level rise (s5.3.9). While there are limited mentions of climate change or sea level rise in the rest of the ODP, these policies potentially allow Council consent planners, where relevant, to require natural hazard assessments to include the predicted effects of climate change, including sea level rise, on development proposals such as building or subdivision near the coast or in hazard risk areas.

Part 7 of the Franklin section includes reference to taking a precautionary approach when avoiding or mitigating the adverse effects of climate change and sea level rise). Again this gives Council consent planners scope to consider the predicted effects of climate change and sea level rise when assessing discretionary or non-complying development proposals.

Apart from the policy framework, the only rule that includes the predicted effects of sea level rise is the requirement for a 3.7m minimum floor level above Moturiki Datum for habitable rooms within buildings near the coast (Waikato section). This level includes allowance for a 0.3m freeboard above combined spring tides, storm surges and a 0.5m predicted SLR due to Climate change. The Franklin section of the plan refers to the use of coastal development setbacks as a means to partially address hazards such as sea level rise. However, it is unlikely that this statement is based on any technical assessment that confirms the development setback distances are sufficient to avoid or mitigate hazard risk as a result of future sea level rise.



2.2 Proposed District Plan

The review of any district plan provisions must include a review of any relevant higher order policy documents and where applicable it must give effect to the higher order policy through the provisions in the proposed district plan. In the case of the Waikato District Plan Review (Stage 2), the relevant higher order policy direction comes from the New Zealand Coastal Policy Statement 2010 (NZCPS) and the Waikato Regional Policy Statement 2016 (WRPS). These documents contain objectives and policies to address a range of resource management issues and some of these policies are required to be given effect to through district plan provisions.

In order to give effect to the higher order policy documents, the Waikato District Council has:

- identified and assessed the spatial extent of land potentially affected by natural hazards, such as flooding, ponding, land subsidence, and coastal inundation and erosion;
- factored in the effects of climate change on weather related natural hazards and sea level rise;
- assessed the level of risk associated with each hazard;
- designed a regulatory framework that allows for land use and development where risk can be reduced through avoidance, remediation or appropriate mitigation;
- significantly restricted land use and development where the risk to people and property cannot be avoided, remedied or appropriately mitigated.

The coastal hazard assessment and the development of the proposed coastal hazard provisions have been largely directed by the NZCPS, the WRPS and the Ministry for the Environment Coastal Hazards and Climate Change: Guidance for Local Government (2017). These documents have guided the development of a risk based regulatory framework and the identification and assessment of land that is currently affected by coastal inundation and/or erosion along with the land that will potentially be affected over the next 100 years with 1m of sea level rise. The provisions for management of land use and development on land that will potentially be affected by future hazards recognises that the risk is not imminent and that the land can continue to be used as long as new development is able to easily adapt to future scenarios.

The development of the Flood Management Area, the High Risk Flood Area and Defended Area rules work in conjunction with the spatial hazard areas identified through flood modelling either carried out by, or commissioned by, the Waikato Regional Council. The provisions for development in these areas also follow a risk based approach. This approach allows for development to occur in areas where the risk can be either avoided or appropriately mitigated. In areas where avoidance or mitigation is not considered feasible, certain types of land use activities and development are significantly restricted.

The PDP includes three objectives; 1) Resilience to natural hazard risk, 2) Awareness of natural hazard risk and 3) Climate change. The objectives are to be achieved through the avoidance and mitigation of the risks associated with natural hazards; by informing the community of the types and extent of natural hazards affecting the district, as well as preparing them to respond and recover from natural hazard events; and by mitigating and adapting to the effects of climate change.



The proposed policies are summarised as follows:

- Policies 1.1 – 1.3 manage new development; changes to existing land use and development; and new emergency services and hospitals in high hazard areas by ensuring risk is avoided
- Policy 1.5 provides for the operation, maintenance and minor upgrading of existing infrastructure, while policy 1.4 provides for new infrastructure where risk is not increased.
- Policy 1.6 provides for rezoning, subdivision and development outside high risk area where risk is adequately assessed and avoided, remedied or mitigated.
- Policies 1.7 – 1.11 address hazard protection through recognising the importance of natural features and buffers and soft hazard protection works; limitations on hard protection works; protecting, maintaining or enhancing natural features and buffers that provide natural hazard protection; controlling subdivision, land use and development in areas defended by stopbanks; and avoiding new development in areas that will create demand for new protection structures.
- Policies 1.12 – 1.15 provide for development and earthworks on the 1% AEP floodplain where the potential for flood damage to buildings is either avoided, remedied or mitigated; the adverse effects of filling are avoided or mitigated; the location and storage of hazardous substances do not create unacceptable risk; and new subdivision and development within flood ponding areas and overland flow paths use an integrated catchment plan based stormwater management methods.
- Policies 1.16 provides for controls on subdivision, land use and development, in coastal areas that will potentially be affected by coastal hazards over the next 100 years due to sea level rise by undertaking site specific assessments which include measures to address the effects of climate change;
- Policy 1.17 addresses coastal hazard risk by requiring built development to be setback from the coast unless there is a functional or operational need for it to be at or near the coast;
- Policy 1.18 address fire risk to residential development through appropriate buffers or setbacks;
- Policies 1.19 – 1.21 manage new subdivision, use and development and stormwater discharge in areas subject to land instability and subsidence, including the Mine Subsidence Risk Area, through appropriate assessments and mitigation measures;
- Policies 1.22 and 1.23 control new land use, subdivision and development on land potentially susceptible to liquefaction through a level of assessment that reflects the type and scale of subdivision, use or development and that the level of risk is acceptable;
- Policies 2.1 – 2.2 provide for access to natural hazard risk information through various mechanisms; and improvements to response and recovery from natural hazard events through awareness and use of information and methods in Community Response Plans;
- Policies 3.1 – 3.5 address climate change through making adequate allowances for the projected effects of climate change in the design and location of new subdivision and development; increasing the ability of the community to adapt to the effect of climate change when undertaking future land use planning; adopting a precautionary approach for new subdivision, use and development where the adverse effects are potentially significant or irreversible but for which there is incomplete or uncertain information; providing for sufficient development setbacks; and assessing the impact of climate change on the level of natural hazard risk.

The rest of this section will focus on the spatial extent and the rules that have been set out in the PDP that relate to natural hazards and climate change. The extents and rules define how the objectives and

policies described in the PDP will be given effect to in the Plan. Importantly they define the types of activities that can occur as of right (Permitted) or those that require a resource consent.

2.2.1 Flooding

Waikato Regional Council (WRC) engaged DHI Water and Environment Ltd to model and produce maps of flood inundation for the 1% AEP flood event, including the future climate scenario based on the Relative Concentration Pathway (RCP) 6.0 with 2.3°C temperature increase.²² **Error! Not a valid bookmark self-reference.** shows the spatial extents in the PDP that relate to the 1% AEP flood plain and areas that would flood in a 1% AEP flood event were it not for structural defences (stopbanks). There are the following four extents,

- **High Risk Flood Area:** an area located within the Flood Plain Management Area where, during a 1% AEP flood event, the depth of flood water exceeds 1 metre, and the speed of flood water exceeds 2 metres per second, or the flood depth x the flood speed exceeds 1. The High Risk Flood Area covers a total of 560 hectares of land or 0.1% of the land in the District. The High Risk Flood Area has only been assessed in the 2D 1% AEP flood model between Horotiu and Ohinewai.
- **Flood Plain Management Area:** this area identifies the spatial extent of flooding from the Waipa and Waikato Rivers during a 1% AEP flood event. It consists of a total of 9,600 hectares of land or 2% of the land in the District and extends along both the Waipa and Waikato Rivers from the southern boundary of the district to Port Waikato.
- **Flood Ponding Area:** is located adjacent to the Waikato River in an area just south of the Huntly town centre and an area around Lake Waahi and Lake Puketirini on the western side of Huntly. These areas have a total of 580 hectares of land.
- **Defended Area:** this area identifies the spatial extent of the areas defended by a 1% AEP design stopbanks. The defended areas have a total of 13,800 hectares of land, or 3.% of the land in the District. Subdivision is restricted within in the Defended Area. Also building and earthworks is restricted within 50 metres around the stopbanks.²³

²² DHI Water and Environment Ltd (2019) WRC Lower Waikato 2D Modelling - Huntly, Ohinewai and Horotiu Model Build.

²³ The area covered by this restriction is around 850 hectares of land or 0.2% of the land in the District.

Figure 2.4: Map of Flooding Extents and Defended Area in Proposed District Plan and Zones

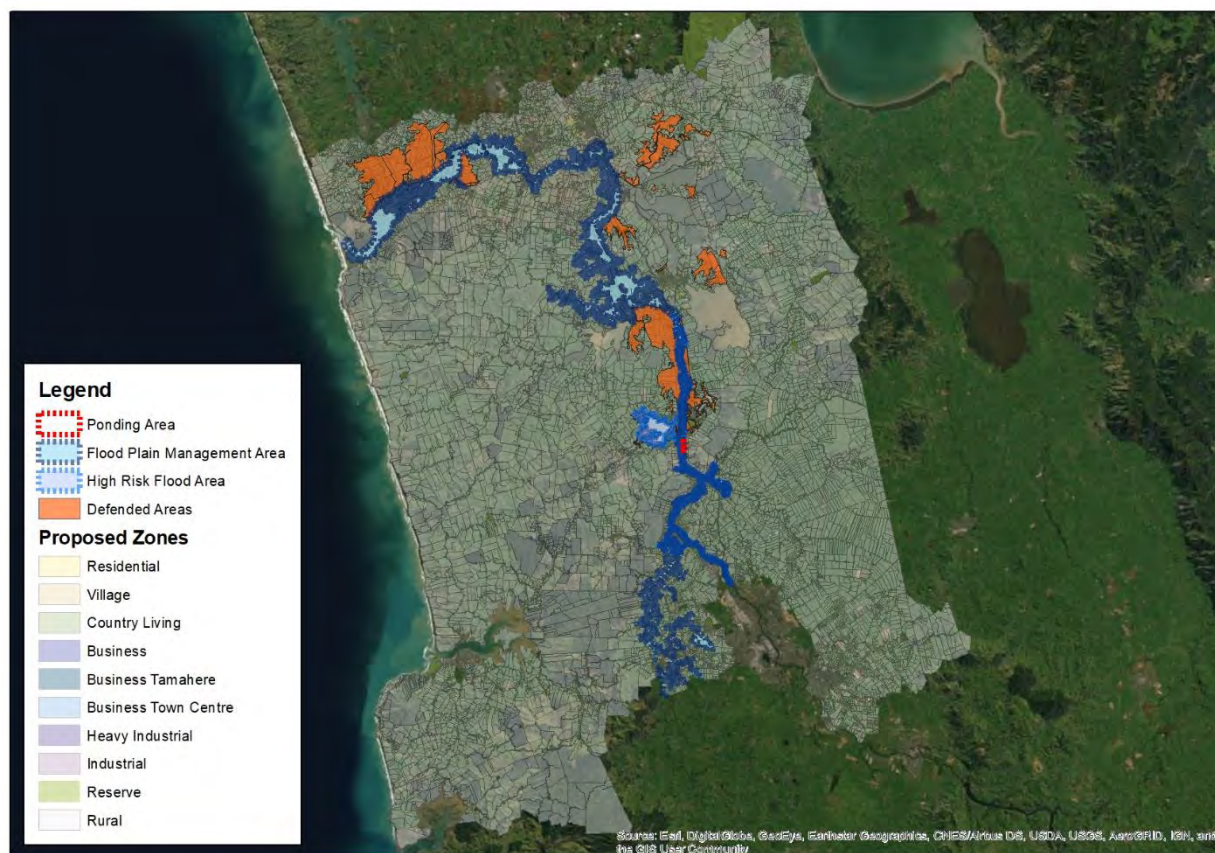


Table 2.6 shows the distribution of land within the Flood Plain Management Area in the PDP based on the current PDP zones. The majority of the land within the flood extents is currently zoned Rural (95%) or Other (4%). However, Huntly and Ngaruawahia are both partially located in the flood plain. This means that some of the more densely developed areas in the District are likely to be affected by flooding during a 1% AEP flood event, in total almost 246 hectares of urban land falls within the flood extents.

Table 2.6: Flooding Extents and Defended Area Proposed District Plan and Zones, hectares of land

PDP Zones	Flood Plain	High Risk Flood	Stopbank	Ponding	Defended	Total	% of land in extents
Residential	54	26	7	6	91	184	1%
Business	16	7	9	6	24	62	0.2%
Rural	9,173	483	761	488	13,143	24,048	95%
Other	327	41	72	79	516	1,035	4%
Total Flood Area	9,570	557	850	579	13,773	25,329	100%

Relative to the ODP the amount of land covered by flooding extents is likely to be smaller. As discussed in the previous section, the Design Flood Level are not an accurate way to evaluate the 1% AEP flood extent, so it is not possible to accurately establish the change in the extents of the flood provisions. However, it is considered likely that the PDP extents are refinement compared to the ODP, which means that the

natural hazard provisions in the will impact fewer landholders, households and businesses than in the ODP.

The PDP has introduced a number of new rules which increase the requirement to mitigate the effects of flooding. First, for areas with a high risk of flooding most buildings are non-complying, which means that it will be difficult to get a consent to build in this area. Second, for properties in the Flood Plain Management Area, buildings must be built to a level of 0.5 metres above the 1% AEP, which is 0.2 metres higher than under the ODP (Waikato Section). The Franklin Section rules currently require a 0.5 metre freeboard above the 1% AEP flood level. There are some exceptions to the minimum floor level requirement, including additions up to 15m² to the ground floor area of an existing building; a standalone garage up to 40m²; and accessory buildings or farm buildings without a floor. A proposal to construct a building that does not meet the conditions for a permitted activity will require a resource consent for a discretionary activity and through that process, alternative mitigation measures can be considered.

The rules within the PDP are designed to enable the establishment, operation, replacement, repair, maintenance or upgrading of utilities and associated earthworks as a Permitted activity within the Flood Plain Management Area. The rules are more restrictive in the High Risk Flood Area, where a restricted discretionary resource consent is required for the establishment of new utilities and a more than minor upgrade to existing utilities.

The proposed rules are more restrictive than the ODP in some cases as highlighted below;

- **Earthworks:** Currently the ODP requires a discretionary resource consent for earthworks in a flood risk area with an exception for earthworks to provide a building foundation and access to the building and up to 50m³ for minor upgrading of existing electricity lines. The PDP rules in the Flood Plain Management Area (not the High Risk Flood Area) provide for earthworks associated with the establishment, replacement, repair, maintenance or upgrading of utilities, as well as for the creation of a building platform for residential purposes as a permitted activity, and small quantities of excavation and filling which is less restrictive than the ODP.
- **Subdivision:** is a Discretionary activity in the proposed Flood Plain Management Area where the subdivision creates one or more additional lots and is either discretionary or non-complying in the High Risk Flood Area, depending on the location of the lots and building platforms. Subdivision within a Flood Risk Area in the ODP is a discretionary activity.
- **Defended Area:** any building or earthworks within 50 metres of a stopbank is a Discretionary activity, and all subdivision to create one or more additional lots is a Restricted Discretionary. There is no equivalent area or rules in the ODP.

Table 2.7: Flooding Extents Proposed District Plan Provisions

Rule	Activity/Use	Status	Notes
	Building in High Risk Flood Area	P(NC)	Addition to an existing lawfully established building up to 15m ² and accessory building with no floors are Permitted. Otherwise Non-complying
	Building in Flood Management Area	P (D)	Building with minimum floor level at least 0.5m above 1% AEP flood level or accessory building with no floor or addition to an existing lawfully established building up to 15m ² Permitted. Otherwise Discretionary.

	Utilities in Flood Plain Management Area, High Risk Flood Area	P	Establishment, operation, replacement, repair, maintenance and upgrading of utilities are generally permitted in non-high risk areas. In high risk flood area and high risk coastal overlays, new utilities mostly require RDA consent (new telecommunication lines, poles, cabinets, masts and poles are permitted). The establishment of new utilities or more than minor upgrade of existing utilities in the High Risk Flood Area is a restricted discretionary activity.
	Earthworks	P (RD)	Permitted 0.2m maximum height of filling above natural ground level and 0.5m maximum depth of excavation . Maximum permitted cumulative volume of filling varies between zones but range from 20m ³ – 200m ³ per site. Filling for a building platform for residential purposes is permitted if it is only to the extent necessary to achieve compliance with minimum floor level. Earthworks associated with the establishment, operation, replacement, repair, maintenance and upgrading of utilities is permitted. Otherwise Restricted Discretionary.
	Subdivision in Flood Plain Management Area, High Risk Flood Area and Defended Area	RD/D (NC)	Discretionary consent required to undertake subdivision in the flood plain and where new lots are located partially within the High Risk Flood Area, the building platform is not located in the high risk flood area (otherwise Non-Complying). Restricted Discretionary Consent required to subdivide within the defended area.
	Defended Area	D	Building and earthworks within 50m from a Council or Crown owned stopbank.

2.2.2 Coastal

Focus Resource Management Group (FRMG) was commissioned by the Council to define areas potentially vulnerable to coastal erosion and coastal flooding in Waikato District.²⁴ This study has included a District wide broad scale coastal hazard assessment and management recommendations, and a more detailed assessment of hazards and management approaches for Raglan and Port Waikato. That research identified hazard areas which include areas of greatest risk with existing sea level, and additional areas that could be affected with projected sea level rise over the next 100 years. This work did not include the eastern coastline at Miranda. The assessment of coastal hazards on the east coast is part of the Hauraki District Council's Wharekawa Coast 2120 project.

The coastal hazard study defined two coastal erosion hazard areas and two coastal flood hazard areas for developed sites in Raglan and Port Waikato:

- High risk coastal erosion/inundation areas, identifying the areas where there is significant risk from coastal erosion or flooding with existing sea level and coastal processes in the short term (within the lifespan of the District Plan).
- Coastal erosion/inundation sensitivity areas, identifying the areas potentially vulnerable to coastal erosion/inundation over the period to 2120, assuming sea level rise of 1.0 metre. In the rural areas, i.e. along the open coastline and estuaries, a single coastal hazard sensitivity area was identified, which is made up of areas of the coastal margin that could potentially be impacted by coastal inundation and/or coastal erosion, assuming sea level rise of 1.0 metre to 2120.

²⁴ FOCUS (2020) Waikato District Coastal Hazard Assessment.

In total, over 3,830 hectares of land is located within the coastal hazard extents which covers almost 1% of the land in the District. **Error! Not a valid bookmark self-reference.** shows the spatial extents in the PDP that relate to coastal hazards. There are the following five extents,

- **High Risk Coastal Hazard (Inundation) Area:** This spatial extent identifies the areas that are at high risks of flooding with current sea level and coastal processes, and consist of a total of 140 hectares of land or less than 0.1% of the land in the District.
- **Coastal Sensitive Area (Inundation):** This spatial extent identifies land that is potentially at risks of flooding over the next 100 year period, assuming 1 metre of sea level rise, and consist of a total of 310 hectares of land or 0.1% of the land.
- **High Risk Coastal Hazard (Erosion) Area:** This spatial extent identifies areas that are at high risks of erosion with current sea level and coastal processes, and consist of a total of 22 hectares of land.
- **Coastal Sensitive Area (Erosion):** This spatial extent identifies land that is potentially at risks of erosion over the next 100 year period, assuming 1 metre of sea level rise, and consist of a total of 3,800 hectares of land or 1% of the land in the District, the majority of which is within the Rural Zone.
- **Coastal setback Area:** which is set as 23 metres from MHWS for most zones (including rural). In total the setback includes 720 hectares of land or 0.2% of the land in the District.

Figure 2.5: Map of Coastal Extents in Proposed District Plan and Zones



Error! Not a valid bookmark self-reference. shows the distribution of land within the coastal extents in the PDP based on the current PDP zones. The majority of land affected by the coastal inundation hazard areas

is currently zoned Rural (90%) or Other (8%). In total approximately 50 hectares of urban land falls within the coastal hazard extents compared with 3,480 hectares of rural land.

Table 2.8: Coastal Extents Proposed District Plan and Zones, hectares of land

PDP Zones	Coastal Sensitivity Erosion	High Risk Coastal Erosion	Coastal Sensitivity Inundation	High Risk Coastal Inundation	Coastal Setback	Total*	% of land in extents
Residential	42	7	5	19	11	49	1%
Business	0	0	1	2	2	1	0%
Rural	3,478	3	263	65	578	3,481	90%
Other	306	13	38	53	130	319	8%
Total Coastal Area	3,827	22	307	139	721	3,849	100%

*Note that the coastal overlays overlap. To avoid double counting land the total presented here is the sum of the two coastal erosion overlays.

There are no coastal hazard extent areas in the ODP. However there are rules that require buildings to be setback from MHWS.²⁵ For this reason it is difficult to carry out a comparison between the ODP provisions and the PDP provisions for coastal hazard extent areas.

The rules within the PDP are designed to ensure that buildings are designed and located to mitigate the effects of coastal hazards. Most building within the high risk areas will be heavily restricted, with a non-complying activity status meaning that it would be difficult to get consent to build in this area. Also most building within Coastal Sensitive areas will be either permitted or require a resource consent, for a Restricted Discretionary activity. Permitted activities include minor additions to existing buildings, accessory or farm buildings without floors and utilities. The PDP includes coastal building setbacks that are similar to the ODP building setback rules, with the main change being the reduction in the building setbacks in the Coastal Zone (now Rural Zone) from 100m to 23m. The proposed coastal building setback distances are defined according to requirements for access (esplanade) rather than coastal hazards. The PDP also requires a consent for subdivisions within the coastal risk areas, with subdivision in the Coastal Sensitive areas being Discretionary and Non-complying in some parts of the High Risk Coastal Hazard areas.

Table 2.9: Coastal Extents Proposed District Plan Provisions

Rule	Activity/Use	Status	Notes
	Building in High Risk Area (Erosion and Flood).	P/D/NC	Construction of an accessory building or farm building without a floor up to 40m ² - Permitted Re-siting/replacement of existing building within the same site – Discretionary Construction of a new building or additions not provided for as a permitted or discretionary activity - Non-complying.
	Building in Coastal Sensitive Area (Erosion and Flood).	P/RD (D)	One off addition up to 15m ² ground floor area and accessory buildings without a floor – Permitted Construction of an accessory building or farm building without a floor - Permitted

²⁵ Coastal building setback distances range from 100 metres in the Coastal Zone (Waikato Section) to 23 metres in the Living Zone (Waikato Section). Building within these setback distances requires either a Restricted Discretionary or Discretionary resource consent. These setbacks distances have been defined to provide some mitigation for the effects of coastal hazards but are not calculated specifically for that purpose.



			New building or additions to an existing building is a restricted discretionary activity. Matters of discretion include structural design including the ability to relocate the building
	Building setbacks	P (D)	<p>Permitted if Setback according to following zone,</p> <ul style="list-style-type: none"> • Residential - 23m, • Business - 23m, • Rural - 23m, • Country Living - 27.5m, • Recreation - 32m and • Rangitahi - 23m. <p>Otherwise, Discretionary.</p>
	Subdivision in Coastal Risk Area	D (NC)	<p>Subdivision of land entirely outside the high risk areas or building platform can be located outside high risk area - Discretionary (Otherwise Non-complying).</p> <p>Subdivision in the coastal sensitivity areas is Discretionary</p>

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2.2.3 Subsidence

In late 2015 the Huntly East Mine was closed permanently and without actively pumping water out of the underground mine workings, they are now filling with groundwater. This change in conditions within the underground mine presented potential for further subsidence through pillar collapse and the potential for methane gas to be forced out of the mine workings as they fill with water and to find its way to the ground surface where, given the right conditions, it may become an explosive hazard. The Council commissioned a study to assess risk presented by the closed underground mine, both in terms of subsidence and gas leakage.²⁶ That assessment found that the subsidence is likely or possible in the area currently defined in the ODP. However, suitable arrangements to mitigate moderate differential settlements can be incorporated in the building design via the building code. The assessment provided detailed mapping of the hazard area, which has resulted in the extent being amended. This has resulted in the removal of the extent in some areas and extending it in others. The net result is that this hazard area now covers approximately 137 hectares of land, which is mostly residential (53 ha) and rural (69 ha). There is a small increase in residential land impacted (3 hectares).

The gas hazard was considered to pose a low risk due to the impermeable nature of the ground conditions above the mine. As a result the PDP does not include any regulatory framework to mitigate the hazard.

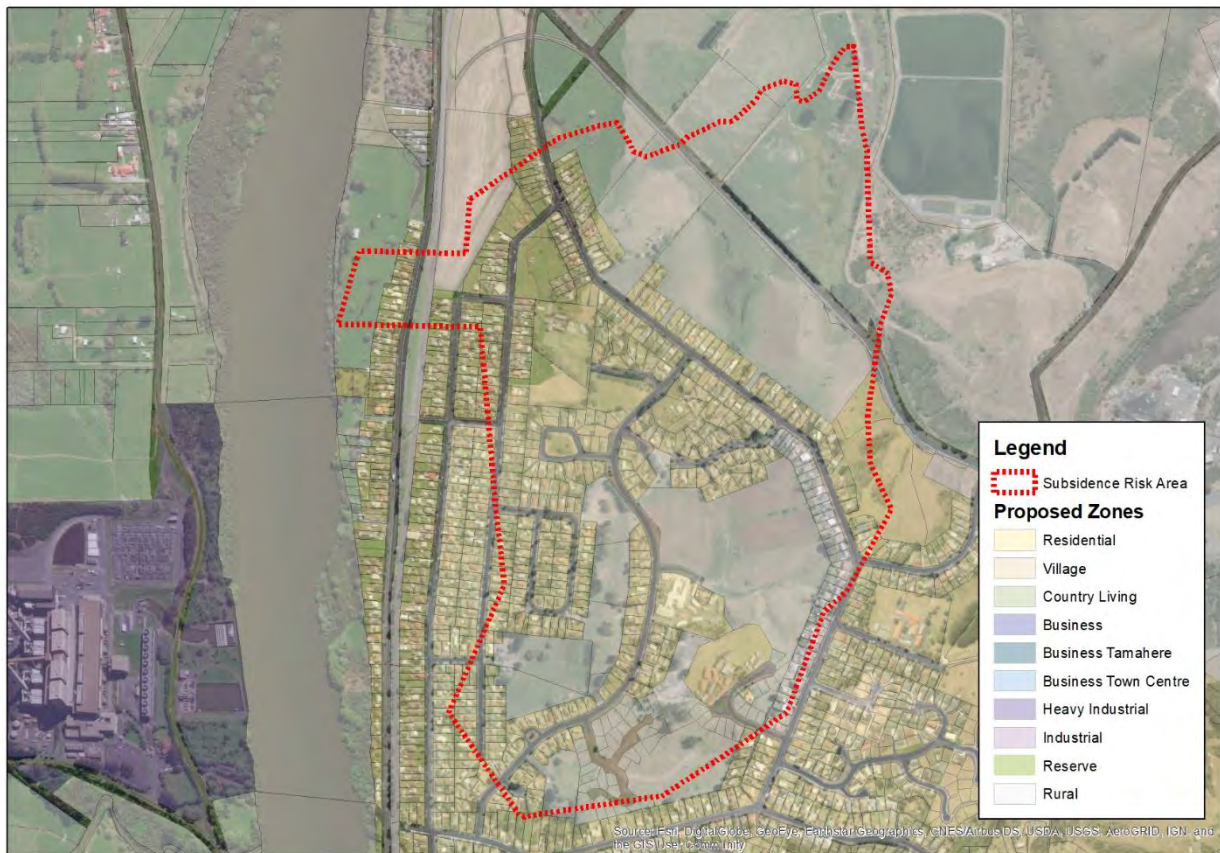
The proposed rules do however continue to regulate activities such as buildings, earthworks and subdivision in terms of subsidence as discretionary activities. The main difference between the current and proposed rules is that there are now some activities that can be carried out without requiring a resource consent. These include minor additions to existing buildings, standalone garages, utilities and small quantities of earthworks, see table 2.10 below.

Table 2.10: Mine Subsidence Risk Area Extent Provisions Proposed District Plan

Rule	Activity/Use	Status	Notes
	Additions to an existing building	P (D)	Additions to the gross floor area to 15m ² and do not result in any wall exceeding 20m.
	Standalone Garages	P (D)	Do not exceed 55m ² gross floor area and the maximum length of any wall does not exceed 20m.
	Establishment, operation, replacement, repair, upgrading or maintenance of utilities	P	The activity must meet the definition of utility
	Earthworks	P (D)	Maximum volume of filling not to exceed 20m ³ and maximum excavation depth not to exceed 1m above or below ground level

²⁶ RDCL (2019) Risk Assessment for Urban Development Areas – Huntly East Mine.

Figure 2.6: Map of Subsidence Extent in Proposed District Plan and Zones.



In terms of the provisions in the PDP, the Council is proposing to maintain the activity status of most construction as Discretionary, which means that a consent is required. The main change is that some types of earthworks, garages up to 55m² and small additions (under 15m²) to existing buildings will become Permitted in the PDP, which means that landholders no longer need a resource consent from the Council for these activities. Land use in this area will be relatively more enabling compared to the ODP. The rules for subdivision are unchanged, with a consent being required (Discretionary).

2.2.4 Liquefaction

The PDP has included additional matters for assessing liquefaction risk, which apply to restricted discretionary activities where liquefaction is listed as a matter that discretion is restricted to, i.e. subdivision and multi-unit²⁷ development.

This is not a significant departure from the current situation. Currently Council officers can request a liquefaction assessment as part of the information that accompanies a subdivision consent application even though there is no provision for liquefaction assessments in the Operative District Plan. Council consent planners are required to understand the level of risk from natural hazards on any subdivision proposal in order to determine whether to grant or decline the consent pursuant to Section 106 RMA.

²⁷ PDP defines Multi Unit as Apartments or Duplex. The definition excludes retirement villages, Kainga Ora or detached housing that may have multiple units.



The purpose of the proposed additional matters of discretion are to provide clearer guidance for planners, development engineers and applicants with regard to who should undertake the assessment and what information is required to be included in a liquefaction assessment, i.e. determining the liquefaction vulnerability category and where applicable detailing appropriate remediation or mitigation measures.

This is a different approach to the regulatory framework for other natural hazards in the Proposed District Plan. Other hazards are generally based on modelling and technical assessments that identify a spatial hazard area to which the provisions apply. The requirement for liquefaction risk assessments places the onus of proof on the landholder to establish the liquefaction risk. However, the new assessment matters do allow for alternative accepted methods to determine if a site is potentially susceptible to liquefaction, i.e. observation or desk-top assessments.

2.2.5 Climate Change

As noted above in the ODP, climate change and sea level rise are not hazards in their own right. However, they impact the frequency and intensity of a range of the hazards which the council must take into consideration when planning for land use and development. The PDP has included the effects of climate change in the 2D modelling of the 1% AEP flood extent and also includes the effects of climate change on coastal hazards, based on the effects of 1 metre of sea level rise on coastal erosion and inundation over the next 100 years to 2120.

Allowances for climate change are implicit in the floodplain management area rules (2D modelled extents only) and rules for the coastal sensitivity areas. The Coastal Sensitivity Area provisions allow for the continued use and development of land that may potentially be affected by coastal hazards over the next 100 years but requires new development to be either minor additions to existing buildings or easily adaptable. Minor additions to an existing building (up to 15m²); an accessory or farm building without a floor; and the establishment, operation, upgrading, replacement, repair or maintenance of utilities are all provided for as a permitted activity. New buildings and more than minor additions to existing buildings are provided for as a restricted discretionary activity. Discretion is restricted to matters such as the requirement for an coastal hazard risk assessment; mitigation measures such as appropriate setback distance from the coast, engineering and structure design solutions, including minimum floor levels, and the ability for the building to be removed or relocated; and the ability to impose triggers that determine when the building should be removed or relocated.

2.3 Findings of District Plan Review

The assessment of natural hazard extents and rules in the ODP and PDP in this section shows that in many instances the differences between the policies is insignificant. However, there are some instances where the changes are significant. Based on this assessment of the policies, the following initial findings are made for each natural hazard;

- **Flooding:** provisions in the PDP are likely to generate significant positive effects, for the following four reasons.
 - First, the area of land effected by the flooding provisions is likely to be reduced in size from ODP to PDP. The detailed modelling conducted by experts has allowed WDC to narrow the application of policy to a specific area that is likely to be at risk of flooding.



Also, under the ODP the application of the policy was not accurately defined which introduced uncertainty and cost to landholders, there may have been landholders outside the areas noted above that would have been required to commission experts to establish any flood risks.

- Second, the area covered by the provisions is relatively large (approximately 6% of the District in the PDP), which is likely to have sizable effects when considered at the local or district level.
- Third, the rules within the PDP introduce more stringent requirements for activities which may impact costs of building and using the land.
- Fourth, the simplification from two sets of rules in the ODP (Waikato and Franklin) to one set of rules is likely to result in lower administration, assessment, and application costs. The change is likely to improve the consistency of the application of the flooding provisions.
- **Coastal:** The provisions are likely to generate significant positive effects, for the following four reasons.
 - First, the area covered by the coastal provisions is relatively large (1% of the District in the PDP), which is likely to have sizable effects when considered at the local or district level.
 - Second, the rules within the PDP introduce more stringent requirements for activities within the hazard areas which may impact costs of building and using the land.
 - Third, the simplification from two sets of rules in the ODP (Waikato and Franklin) to one set of rules is likely to result in lower administration, assessment and application costs.
- **Subsidence:** provisions are likely to generate relatively insignificant effects, but they will be positive for the following three reasons.
 - First, the spatial definition of the area covered by this natural hazard extent is similar in size between the ODP and PDP (increased marginally by 12 hectares).
 - Second, the area covered by the extent is relatively small (less than 0.05% of the District), which is likely to have limited impact when considered at the district or local level.
 - Third, changes to the rules will permit more activity, which means that the PDP is more flexible than the ODP. For these three reasons it is considered that the difference between the ODP and PDP is likely to be positive, however not significant.
- **Liquefaction:** The proposed provisions are likely to generate insignificant effects, but will be positive for the following three reasons.
 - First, while there are no existing rules in the ODP that cover this hazard, applications for subdivision are currently required to include an assessment of liquefaction risk as a requirement under s106 RMA to determine if there is a significant risk from a natural hazard present. The PDP merely codifies this requirement within specific liquefaction provisions.
 - Second, the coverage will remain the same within the PDP as the current application of the ODP (i.e. entire District).
 - Third, the PDP also requires assessment of liquefaction for multi unit developments. The apartment or duplex developments is relatively rare in Waikato District, this means that the impact of this provision will be limited.

- **Climate Change:** the effects associated with this hazard are captured in the other natural hazards. Therefore, the climate change provisions are not assessed separately in the remainder of this report.

In terms of natural hazard provisions the main difference between the ODP and PDP is that the area covered by an extent have been refined based on better information – especially flooding and coastal hazards. For the remainder of this report the subsidence, liquefaction and climate change hazards are not assessed. Given the potential significance of the effects of the flooding and coastal hazard policies, these hazards are assessed in more detail in the remainder of this report.

3 Economic Assessment – Natural Hazards

The following section draws from existing research to establish potential costs and benefits associated with flooding and coastal provisions. Our assessment establishes the marginal value of the PDP, as compared to the existing provisions in the ODP.

This economic assessment starts with a qualitative discussion of costs and benefits associated with the plan provisions. Section 32(2)(b) of the RMA requires that, where practicable, the benefits and costs of a proposal are to be quantified. The economic assessment provides a quantitative estimation, where possible, of the value of some of the costs and benefits. This assessment provides an understanding of the potential outcome for each of the natural hazards individually, as well as the whole package of provisions.

3.1 Costs and Benefits

The flooding and coastal provisions in the Plan are likely to result in benefits and costs accruing to the Waikato community, both in terms of activity in the economy and other non-market values. The literature search conducted for this report indicates that the following eleven costs and benefits are generally important for natural hazard and climate change provisions:

- Community Safety²⁸,
- Protection of Economic Activity, loss of income and work disruption
- Protection of Buildings,
- Compliance Costs,
- Construction Costs,
- Development Opportunity,
- Land Value,
- Administration,
- Development Pattern Efficiency,
- Cultural, and
- Biophysical/environmental.

²⁸ Includes preventing loss of life and injury, and psychological /social impact including displacement



The following subsections provide a qualitative discussion of the processes by which these costs and benefits accrue to the community, as a result of the proposed Plan provisions.

3.1.1 Community Safety

The most important element of the natural hazard provisions is that they protect the community from harm during a natural disaster. Risks associated with natural disasters are inherently uncertain, however it is clear that over a long enough time horizon the likelihood of a natural disaster occurring increases. In addition to increasing likelihood, natural disasters can have significant impacts on community safety including injury and loss of life.

It is common to assess risk severity using two dimensions, likelihood²⁹ and consequences³⁰. More detail on the standard risk assessment can be found in RDCL report on subsidence.³¹ In terms of planning, the ODP and PDP have generally applied a conservative approach that takes into account hazards that have a range of likelihood of Unlikely-Rare (e.g. 1% AEP), which is an event that is conceivable but highly unlikely (expected to occur once in a generation or longer, i.e. 1:20 to 1:200). The consequences of the event that are accounted for in the ODP and PDP tend to have minor to catastrophic outcomes.

The following risk profiles apply to the natural hazards included in the District Plans,

- **Major Flooding:** which has been defined within the DHI report as a 1%AEP, which is by definition a “Rare” event (one-in-one-hundred-year).³² But is likely to have “Catastrophic” impacts because of the likely extent of the event (including urban areas). While these events are expected to occur rarely, they can result in significant health/safety issues (injuries and fatalities), damage to infrastructure (housing, roads, services) and impacts on the environment (eco-systems being harmed).³³
- **Major Coastal Event:** which has been defined within as a 1%AEP which is by definition a “Rare” event (one-in-one-hundred-year).³⁴ But could have ‘Major’ impacts. While these events are expected to occur rarely, they can result in health/safety issues (injuries), damage to infrastructure (housing, roads, services) and impacts on the environment (eco-systems being harmed).³⁵
- **Subsidence Risk:** which is a risk that is “Likely” to “Possible” but could have ‘Moderate’ impacts.³⁶
- **Liquefaction Risk:** As noted above the council has not commissioned an assessment of the liquefaction risks. Based on the information we have collected from other sources it is considered that the risk is “Very Rare” but could have a “Catastrophic” impact on the community. The likelihood of liquefaction hazard relates to two factors, the chance of an earthquake and the subsoil conditions. First, the chances of a large earthquakes (5.0 or more) occurring in Waikato

²⁹ Almost Certain/Likely/Possible/Unlikely/Rare.

³⁰ Catastrophic/Major/Moderate/Minor/Negligible.

³¹ RDCL (2019) Risk Assessment for Urban Development Areas – Huntly East Mine.

³² DHI Water and Environment Ltd (2019) WRC Lower Waikato 2D Modelling - Huntly, Ohinewai and Horotiu Model Build.

³³ Note: that some minor flooding can be expected to occur more frequently but the natural hazard provisions in the plan account for extreme flooding events, rather than common or seasonal issues.

³⁴ FOCUS (2020) Waikato District Coastal Hazard Assessment.

³⁵ Note: that some minor flooding can be expected to occur more frequently but the natural hazard provisions in the plan account for extreme flooding events, rather than common or seasonal issues.

³⁶ RDCL (2019) Risk Assessment for Urban Development Areas – Huntly East Mine.



area is low (once every 5,000 years³⁷) which means the official building code places all of the District in low seismic risk area.³⁸ Second, the subsoil conditions within much of western and northern parts of the District have been classified as either “Least” or “Not Very” hazardous for liquefaction, however areas northeast of Hamilton and along Waikato River have either “Quite” or “Most” hazardous.³⁹ It would seem that the risk of liquefaction is very rare, which sits outside of the normal risk evaluation. However, the potential consequences of an earthquake and liquefaction could be catastrophic. Therefore, it would seem rational for council to plan for such an event, especially given relatively recent issues in Christchurch City and Waimakariri District since the earthquakes of 2010 and 2011.

Given the relatively high consequence of natural hazards on community safety, this benefit should be assessed. It is acknowledged that while the likelihood of disaster events occurring during the life of the District Plan is low, it is very likely that a natural hazard event will occur during the life of buildings or subdivisions that are controlled by the natural hazard provisions. Also, that the rural nature of the District means that much of the impact will occur in farm areas, either along the coastline or the Waikato River. However, much of the community lives within the areas effected by natural hazards.

Finally, while the majority of impacts on the community relate to health and safety there may be other social benefits associated with the natural hazard provisions. For example, the PDP has an objective that relates to awareness of natural hazards. The provision of information and civil defence planning may create social benefits because the wider community is better prepared for an event and hence be more resilient. It would be difficult to assess the potential impacts of the ODP or PDP on the preparedness or resilience of the community and any associated social benefits. This report has assessed social benefits in terms of community safety.

3.1.2 Protection of Economic Activity

Another important element of the natural hazard provisions is that they are likely to mitigate impacts on the economy from harm during a natural disaster. As noted above, much of the land within the natural hazard areas is used for farming purposes. There is also some land that is used for industrial and commercial activities. Mitigation measures within the ODP and PDP can minimise the chances of negative impacts on the economy.

The above discussion about risk severity using; dimensions, likelihood and consequences, also applies to understanding of protection of economic activity. In summary, there will be relatively high consequences of natural hazards on economic activity, and therefore this benefit needs to be assessed. However, it is acknowledged that the likelihood of disaster events means that any impact will be rare to very rare during the life of the District Plan.

3.1.3 Protection of Buildings

The natural hazard provisions are also likely to mitigate impacts on the buildings during a natural disaster. Mitigation measures within the ODP and PDP can minimise the chances of negative impacts on the buildings that are developed in the District.

³⁷ Waikato University (2019) Project to investigate earthquake frequency and activity on Hamilton’s faults.

³⁸ Ministry of Business Innovation and Employment (2017) Z-values to determine seismic risk.

³⁹ Environment Waikato (1998) Earthquake Risk Mitigation Plan.



The above discussion about risk severity using; dimensions, likelihood and consequences, also applies to understanding of protection of building stock. In summary, there will be relatively high consequences of natural hazards on economic activity, and therefore this benefit needs to be assessed. However, it is acknowledged that the likelihood of disaster events means that any impact will be rare to very rare during the life of the District Plan.

3.1.4 Compliance Costs

The natural hazard provisions can require additional assessments for developments that occur within the extents. These assessments will be required to ensure that buildings or land uses within the affected areas comply with any additional requirements set out in the provisions.

For example, flooding and coastal rules requires a report to be submitted to council that shows that building floor level will be above 0.5m above the 1% AEP. Also, liquefaction rules will require a geotechnical report that outlines whether there is a risk of liquefaction for all buildings and subdivision.

Given the relatively large scale and location of each of the natural hazard provisions, this cost is likely to be important. The rules will require many applicants within the District to commission experts to enable them to undertake certain activities.

3.1.5 Construction Costs

There can be additional development costs associated with some of the natural hazard provisions in the Plan. These costs will mostly accrue to households and businesses that build/buy buildings in the areas of the District within the extent areas (as discussed in the previous subsection). These costs are mostly related to additional costs to cover specific building requirements that such as minimum floor height or subfloor design. For example, requiring greater floor height to mitigate flooding will result in some additional costs, would may include more materials and engineering design.⁴⁰

Given the relatively large scale and location of each of the natural hazard provisions this cost is likely to be important. The rules will require many applicants within the District to commission experts to enable them to undertake certain activities.

3.1.6 Development Opportunity

Some of the natural hazard provisions will impact on development opportunities in some parts of the District. The provisions can impact whether the land could be subdivided and/or where dwellings can be constructed on the land (e.g. high risk areas along the coast line).

In some instances, provisions may reduce the type of activity or nature of building that could be developed. This represents a lost opportunity to the landholders.

Given the relatively small scale and location of the restrictive provisions this cost is likely to be not significant. There are only a few locations where activities are likely to be curtailed.

⁴⁰ QS Cost Management Limited (2003) Assessment of Building Costs by Floor Level - Christchurch.



3.1.7 Land Value

The presence of planning extents on top of a property can result in reduction in land values. The difference in land value can be caused by a number of factors. Some of these factors have already been addresses above, which includes additional costs required to use the land (Compliance and Construction costs), lost potential use of the land (Development Opportunity) and potential risks associated with using the land (Safety and Economic). These direct costs associated with natural hazards are not addressed in this discussion of land values.

However, it is considered likely that the natural hazard extents will cause some land value loss beyond the direct values noted above. There may be perception of lower land value because of impacts of natural hazards on the landholders other non-market uses of the land. For example, the landholders enjoyment of land within a hazard zone may be interrupted when an event occurs, such that the benefits from land are reduced. This type of impact may result in a lower value for land in the area affected.

Given the relatively large scale and location of each of the natural hazard provisions this cost is likely to be important. However, the fact that most extents have been refined to smaller areas in the PDP suggests that land values may actually improve overall, as a result of the changes from the ODP.

3.1.8 Administration Costs

The Council expends resources administering the natural hazard provisions, both in terms of the development of the PDP and reviewing new applications for activities.

Given the relatively large scale and location of each of the natural hazard provisions this cost is likely to be important. The rules will require many resource consent applications, which will result in the Council needing to undertake assessments of the material presented by the applicants.

3.1.9 Development Pattern Efficiency

The natural hazard provisions may have implications for development patterns in the District. The provisions could result in changes in the location of urban and rural settlements and developments. In some cases, the costs of complying with the provisions could result in developments not being financially feasible (i.e. additional building costs may result in developers choosing not to develop in the extent areas). Also, the high-risk areas may result in some land no longer being developable for dwellings, which will impact on the overall value of the land.

Therefore, natural hazard provisions may result in a different development pattern. The potential shifting of development from relatively more connected locations to less connected locations may have negative impacts on the efficiency of the District economy.

Given the relatively small scale and location of each of the natural hazard provisions this cost is likely to be insignificant and is not assessed in the following section.

3.1.10 Cultural

There may well be cultural impacts associated with the natural hazard provisions in the ODP and PDP. For example, coastal areas tend to have a high incidence of culturally important sites. These cultural sites may be impacted positively (better protection) and/or negatively (impact customary uses). It is not possible to



assess these values in this report as there is no data or evidence that can be used to establish the potential impacts on the cultural value.

While there are a number of natural hazard provisions in the ODP and PDP that may impact the cultural values. It is considered that the cultural implications of the natural hazards provisions would have been assessed within other research on the wider cultural topics, which is beyond the scope of this report. Also, it is beyond the expertise of Market Economics to assess the potential values of these benefits. For the remainder of this report the cultural impacts of the natural hazard provisions are not addressed.

3.1.11 Biophysical/environmental

Finally, the natural hazard provisions in the ODP and PDP may have impacts on the biophysical environmental. For example, the ODP and PDP both have policies that encourage the use of natural features (soft defences) rather than hard features (concrete defences) for mitigation against erosion and flooding. The encouragement of soft defences in the provisions may mitigate some of the effects of natural hazards on the environment. Another example is that the provisions may encourage utility operators to design and locate their networks to avoid the risks of natural hazard. This may limit the chances that these networks fail and/or need maintenance, both of which can harm the environment.

There are a number of natural hazard provisions in the ODP and PDP that may impact the environment. It is considered that the environmental implications of the natural hazards provisions would have been assessed within other research on the wider environmental topics, which is beyond the scope of this report. Also, it is beyond the expertise of Market Economics to assess the potential values of these benefits. For the remainder of this report the environmental impacts of the natural hazard provisions are not addressed.



3.2 Estimating Value of Costs and Benefits

The following section provides a quantitative assessment, where possible, of the costs and benefits discussed in the previous section for each of the key natural hazard provisions in the Plan. The quantification could not be conducted using a marginal assessment – i.e. What are the additional costs and benefits that the natural hazard provisions in the Plan will produce compared to the existing provisions in the ODP? This is because the council has been unable to provide a robust set of information about the extents of the ODP application. Also, the hazard provisions in the ODP have become redundant, such that the practical application of the provisions by council officers cannot be established. Therefore, this report has focused in quantifying the costs and benefits of the PDP and then providing a qualitative discussion of how these values are likely to compare to the situation under the ODP.

The following assessment is conducted using information from 2019, which is applied for the coming five decades. The time period has been selected because most activities that are controlled by the natural hazard provisions will be in place for at least this period (i.e. building life tends to be 30-50 years). Specifically, the planning framework will have implications for the long term, beyond the life of the plan. The assessment in the following section compares the applies standard Net Present Value method to convert future values into one comparable value.⁴¹

Also the costs and benefits associated with the natural hazard provisions have been grouped into three categories based on who they accrue to – i.e. by stakeholder groups that are impacted. The three groupings used in the following section are, Community Impacts, Landholder Impacts and Council Impacts.

Matters to be taken into account when assessing benefits and costs of natural hazards, are as follows:

- i. the likelihood of the event,
- ii. the consequences of the event,
- iii. the coverage of the event; and
- iv. the types of activity that are impacted.

In order to assess the benefits and costs this report makes a number of assumptions about these four matters.

Table 3.1 shows the assumed likelihood of the two natural hazards assessed in this section of the report. The flooding and coastal hazards are assumed to be “Rare”, with an expected frequency of once every hundred years. This is based on the modelling conducted by DHI Water and Environment Ltd (flooding) and Focus Resource Management Group (coastal), that applies a “1% AEP” which by definition models an event that occurs every hundred years.

Table 3.1: Natural Hazard Likelihood and Frequency

Event	Likelihood	Frequency
Flooding	Rare	1 : 100
Coastal	Rare	1 : 100

⁴¹ The discount rate applied in the NPV was set at 5%.

In terms of consequence, it is assumed that both natural hazards can result in 'Major' to 'Catastrophic' damages. The impacts range from significant impacts on community safety (fatalities, serious injury and minor injury) and damage to properties (destroyed buildings). However, the consequence also relates to the coverage of the natural risks.

Coverage of the events is assumed to relate to the land which is covered by the natural hazard extents (as outlined in the Section 2) and the potential new activity during the life of the District Plan. The assessment is conducted using new growth, in terms of population and employment, between 2018 and 2033. For this report it is assumed that all existing activity will continue to occur, regardless of the provisions in the ODP or PDP.

Given the time constraints of this study and the ambiguity around the coverage of the existing hazard provisions, it was not possible to develop a fine grained growth estimate which matches the spatial definition of the natural hazard extents. For this study the results from the capacity assessment 2017⁴² have been used to estimate the proportion of growth in each Census Area Unit which may be impacted by the natural hazard. Specifically, the growth in each Census Area Unit has been applied pro-rata according to the share of capacity in that area. For example, if 20% of the capacity within a Census Area Unit was located in the hazard extent defined in the PDP, then it is assumed that 20% of the growth may be impacted by the hazard. It is acknowledged that this may result in an overestimation of the amount of population that could be impacted by hazards, as the provisions within the ODP and PDP are designed in many cases to inhibit new growth locating in the areas affected by the hazards. Notwithstanding, it is considered that this overestimation will not change the overall findings of this report.

Table 3.2 shows the maximum number of households and jobs that could be impacted by each natural hazard. The growth is established using Stats New Zealand Population Projections⁴³ and M.E employment forecasts⁴⁴.

- **Flooding:** could impact less than 3,500 new residents and 200 new jobs, and
- **Coastal:** could impact less than 800 new residents and 50 new jobs.

Table 3.2: Potential Growth in Natural Hazard areas (based on CAU in PDP Extents)

Coverage	Population	Emplymnt*
Flooding	3,500	200
Coastal	800	50

**excludes primary sectors, farming and mining*

Impacted activities are assessed according to the rules set out in either the ODP or PDP. This includes residential and business activity, while rural activity is not covered as this activity is (mostly) unaffected by the natural hazard provisions within the ODP or PDP.⁴⁵ Specifically, the natural hazard provisions in the

⁴² Market Economics (2018) Residential Capacity Assessment – Future Proof Partners.

⁴³ Stats NZ (2018) Subnational Population Projections.

⁴⁴ Market Economics (2018) Economic Forecasts modelling.

⁴⁵ It is acknowledged that natural hazards will affect rural activities. However the impacts will be more or less the same under the ODP and PDP, as the provisions do not control this activity.

ODP and PDP manage building, subdivision, earthworks and utilities, as such will have little impact on the operation of most rural activities.

3.2.1 Community Impacts (Safety, Economic Activity and Buildings)

In this report community impacts have been quantified by estimating the effects of each natural hazard in terms of safety, lost economic activity and protection of buildings under the PDP. The estimation has been established using an equation and a set of assumptions, which is designed to provide an indicative understanding of the potential order of magnitude of the values rather than a definitive quantification.

First, the expected safety impacts of each natural hazard (S_{NH}) in any given year has been valued using the following formula,

$$S_{NH} = R_{NH} \times Pop_{NH} \times EI_{NH}$$

Where,

NH denotes the natural hazard, which includes flooding and coastal,

R_{NH} is the risk of natural hazard NH occurring in any given year (as defined in Table 3.1),

Pop_{NH} is the population of new people that may live in NH hazard area (as defined in Table 3.2),

EI_{NH} is the expected injury costs that could occur to an individual during natural hazard NH .

There is no data available on the expected injury cost that could occur during a natural disaster, either at the national level or for the District. In order to estimate the safety impacts of each natural hazard we must make assumptions about the cost and probability of an injury. The following assumptions have been used to derive a proxy value for EI_{NH} .

- **Social Cost of Injury:** for each injury there is a social cost, both to individual and the wider community. For this study the cost has been set based on the official values ascribed by Ministry of Transport.⁴⁶ These Social Cost values are used by the Ministry to assess the merits of investments in safety improvements to the transport network, however they should be sufficiently accurate for the purposes of understanding injuries from natural hazards. The research of the Ministry suggests that minor injury has a social cost of \$0.1 million and a serious injury has a social cost of \$0.5 million, while a fatality has a social cost of \$4.4 million.
- **Probability of Injury:** there is no data available on the probability of injury during a natural disaster, either at the national level or for the District. We consider that probability of injury during a natural event is likely to be very low. For this report it is assumed that during a natural hazard event one in a hundred people are impacted by a minor injury (probability of 1%) and one in ten thousand people are impacted by a serious injury (probability of 0.01%). Finally, it is assumed that fatality is very unlikely during a natural hazard event, with a chance of one in a million people being impacted (probability of 0.0001%).

The following formula is used to establish the expected injury cost (EI_{NH}),

$$EI = \sum_{In} Prob_{In} \times SC_{In}$$

⁴⁶ Ministry of Transport (2018) Social Cost of Road Crashes and Injuries.

In denotes the range of injuries that could affect a person, which includes minor, serious and fatal.

$Prob_{In}$ is the probability of a person having an injury In during an event.

SC_{In} is the social cost of injury In , as defined in Ministry of Transport official road injury data described above.

The results from the social safety cost formula show that the annual expected cost of flooding natural hazard is the most significant, at \$32,000 per annum. This is understandable as this natural hazard covers a wide area which has a number of important urban areas and this type of event has a relatively higher risk of occurring. The coastal hazard, which is also has a relatively higher risk of occurring, has a smaller coverage and of which most is rural land which means that the social cost is lower at \$7,000 per annum. Finally, the table also shows the total expected safety cost over the coming 50 years. This indicative assessment suggest that the total safety cost of the hazards could be valued at,

- \$0.5 million for flooding hazard, and
- \$0.1 million for coastal hazard.

Table 3.3: Indicative Social Cost of Natural Hazard (Safety)

Safety	Hazard Risk (R_{NH})	Population (Pop_{NH})	Expected Injury (EI_{NM})	Annual Social Cost (S_{NH})	Total Cost (NPV @5%)
Flooding	1.00%	3,500	\$900	\$ 32,000	\$ 463,000
Coastal	1.00%	800		\$ 7,000	\$ 101,000

Second, requires assessing the economic benefits associated with the natural hazard extents. The majority of the economic activity that falls within the extents are primary sector in nature (farming, agriculture, mining, forestry etc.). While these primary sector activities will be impacted by natural hazards, there are limited provisions in the ODP or PDP that restrict these activities. Therefore, it is assumed in this report that the outcomes for the primary sector is the same under both the ODP and PDP.

The focus of the following discussion is on economic activity that generally locates within the urban areas of the District (retail, offices, accommodation, factories, warehouses, etc.). In the event of a natural hazard occurring some businesses and employees may be impacted, with business activity either ceasing for the duration of the event or potentially being stopped for a longer period if the premises is destroyed.

In this report the expected economic impacts of each natural hazard (E_{NH}) in any given year has been valued using the following formula,

$$E_{NH} = R_{NH} \times Emp_{NH} \times ES_{NH}$$

Where,

NH denotes the natural hazard, which includes flooding and coastal,

R_{NH} is the risk of natural hazard NH occurring in any given year (as defined in Table 3.1),

Emp_{NH} is the new employment that operate in NH hazard area (as defined in Table 3.2),

ES_{NH} is the expected stoppage costs that could occur to an individual during natural hazard NH .

For this report the expected stoppage is equal to one month of salary for each employee⁴⁷ multiplied by the probability of being impacted which is set at 25%. This means that one in every four jobs is assumed to stop for a month. This may overestimate the true economic impacts, as in many cases jobs will be able to shift to a new premises and stoppage of an entire month is likely to be longer than what normally occurs in a natural hazard event. The expected stoppage (ES_{NH}) is set at \$1,000 per job.

The results from the economic cost formula shows that the annual expected cost of flooding natural hazard is the most significant, at \$2,000 per annum. This is understandable as the natural hazard covers a wide geography containing a number of important business areas and this type of event has a high risk of occurring. The coastal hazard is expected to have limited impact on the economy as the hazard covers an area with little business activity. Table 3.4 also shows the total expected economic cost over the coming 50 years. This indicative assessment suggest that the total economic cost of the hazards could be valued at,

- \$0.03 million for flooding hazard, and
- \$0.01 million for coastal hazard.

Table 3.4: Indicative Economic Cost of Natural Hazard

Economic	Hazard Risk (R_{NH})	Employment (Emp_{NH})	Expected Stoppage (ES_{NM})	Economic Cost (E_{NH})	Total Cost (NPV @5%)
Flooding	1.00%	200	\$1,000	\$ 2,000	\$ 29,000
Coastal	1.00%	50		\$ 500	\$ 7,000

Third, requires assessing the potential damage to buildings associated with the natural hazard extents. As discussed above there is limited urban business activity within the extent areas, so the focus of the following estimation is on residential buildings. In the event of a natural hazard occurring some buildings may be impacted, either minor damage or even being destroyed.

In this report the expected building impacts of each natural hazard (B_{NH}) in any given year has been valued using the following formula,

$$B_{NH} = R_{NH} \times Dwe_{NH} \times ED_{NH}$$

Where,

NH denotes the natural hazard, which includes flooding and coastal,

R_{NH} is the risk of natural hazard NH occurring in any given year (as defined in Table 3.1),

Dwe_{NH} is the number of new dwellings that are built in NH hazard area⁴⁸,

ED_{NH} is the expected damage that could occur to a building during natural hazard NH .

⁴⁷ Salary is assumed to be \$50,000 per annum.

⁴⁸ Population in Table 3.2 divided, by an assumed household size of 2.5 persons per dwelling.

For this report the expected damage is equal to \$100,000 multiplied by the probability of being impacted which is set at 25%. This means that one in every four dwellings is impacted by \$100,000 of damage. This may overestimate the true damage, as in many cases impacts will be minimal. The expected damage (ED_{NH}) is set at \$25,000 per dwelling.

The results from the building damage formula shows that the annual expected cost of flooding natural hazard is the most significant, at \$350,000 per annum. This is understandable as the natural hazard covers a wide geography containing a number of important business areas and this type of event has a relatively higher risk of occurring. The coastal hazard, is expected to have lower impact on the buildings as the hazard covers an area with less development potential (\$75,000 per annum). Table 3.5 also shows the total expected building damage cost over the coming 50 years. This indicative assessment suggest that the total economic cost of the hazards could be valued at,

- \$5.1 million for flooding hazard, and
- \$1.1 million for coastal hazard.

Table 3.5: Indicative Building Damage Cost of Natural Hazard

Building Damage	Hazard Risk (R_{NH})	Dwellings (Dwe_{NH})	Expected Damage (ED_{NM})	Building Cost (E_{NH})	Total Cost District Plan Period
Flooding	1.00%	1,400	\$25,000	\$ 350,000	\$5,065,000
Coastal	1.00%	300		\$ 75,000	\$1,085,000

These indicative results provide an understanding of the relativity of the safety, economic costs and build damage costs associated with the two main natural hazards in Waikato District. However, the difference between the ODP and PDP provisions will also result in different levels of safety mitigation and protection of economic activity. For example, the flooding provisions in the ODP require buildings to have floor level of 0.3m above 1% AEP compared to the PDP that requires floor level of 0.5m above 1% AEP. Likewise, the coastal hazard provisions in the PDP provide an understanding of the areas that are at risk (high risk and sensitive) which will ensure that human activity takes into account the risks associated with this hazard, in the ODP there was no specific provisions for this hazard. Therefore, it is likely that the safety outcome in the PDP should be better than the ODP. However, the benefit from the provision can only be a proportion of the value estimated above.

Given the lack of spatial data and time constraints of this report, it is not possible to estimate the marginal difference between the safety and economic outcomes between the ODP and PDP. However, it is considered very likely that the PDP will result in positive safety, economic benefits and build damage benefits relative to the ODP. The value of these benefits is likely to be a subset of the values shown in tables above.

3.2.2 Landholder Impacts (Compliance, Construction, Opportunity, Land Value)

In this report the landholder impacts have been quantified by estimating the effects of each natural hazard in terms of Compliance, Construction, Opportunity and Land Value. The estimation has been established by combining the number of new building (dwellings) or land that could be impacted under the PDP, along with assumed costs.

First, in order to build within the extent areas, the landholder will need to commission experts to establish the risks associated with the natural hazards. For the flooding and coastal extent areas the landholders will need to pay for a surveyor report to establish that the floor level is sufficient to meet the provisions in the District Plan. In the absence of evidence on the potential cost, it has been assumed that these reports will cost \$500 per dwelling.

Table 3.6 outlines an indicative estimate of compliance costs associated with each of the natural hazards. The table shows the annual number of dwellings that may be built within each of the natural hazard extent areas for the PDP. These results indicate the cost of compliance for new dwellings within the flooding and coastal extents in the PDP will be relatively small compared to the potential harm that could be inflicted during a hazard event. The final information in the table shows the total compliance cost for the dwellings built during the District Plan period.⁴⁹ This data shows the following compliance costs,

- \$0.5 million for flooding hazard, and
- \$0.1 million for coastal hazard.

Table 3.6: Indicative Compliance Costs of Natural Hazard

Compliance Costs	Annual Dwellings	Assumed Costs	Annual Cost (\$m)	District Plan Period
Flooding	140	-\$ 500	-\$ 70,000	-\$ 541,000
Coastal	30	-\$ 500	-\$ 15,000	-\$ 116,000

Second, in order to build within the extent areas, the landholder may need to build to a higher standard to mitigate the risks associated with the natural hazards. For the flooding and coastal extent areas the landholders may need to build to a higher floor level that is sufficient to meet the provisions in the District Plan (applies in the ODP and PDP). In the absence of district specific evidence on the potential additional build cost, it has been assumed that building to a higher floor level will cost \$2,000 per dwelling.⁵⁰

⁴⁹ For a building the risk of hazard impacts occur every year, while the compliance cost only occurs once when the landholder applies to develop the land. That is once built there are no additional compliance costs for the dwellings built during the District Plan.

⁵⁰ This assumption is broadly consistent with QS Cost Management Ltd Floor Level Cost regression equation, which suggests a \$2,012 to build an extra 200mm.

Table 3.7 outlines an indicative estimate of the additional build costs associated with each of the natural hazards. Again, the table shows the annual number of dwellings that may be built within each of the natural hazard extent areas for the PDP. The tables then apply the assumed building cost per new dwelling to establish the annual cost of compliance for the PDP. The final information in the table shows the total additional build cost of dwellings built during the District Plan period. This data shows the following construction costs,

- \$2.2 million for flooding hazard, and
- \$0.5 million for coastal hazard.

Table 3.7: Indicative Constructoin Costs of Natural Hazard

Construction Costs	Annual Dwellings	Assumed Costs	Annual Cost (\$m)	District Plan Period
Flooding	140	-\$ 2,000	-\$ 280,000	-\$ 2,162,000
Coastal	30	-\$ 2,000	-\$ 60,000	-\$ 463,000

Third, in some instances the extent areas may result in building being very difficult (Non-complying). For the high-risk flooding and coastal extent areas building may be difficult. While the landholder may lose development potential on their land, it is very likely that development will occur somewhere else within the District. For this report we assess the marginal change in development opportunity which has been estimated by assuming a marginal cost of 10% of the average section price in the District (i.e. \$26,000) and assumes that development potential has a one in ten chance of being developed during the life of the District Plan.

Table 3.8 outlines the indicative estimate of the lost building opportunity associated with each of the natural hazards. The table shows the annual number of dwellings that may be built within each of the high risk extent areas for the PDP. The tables then apply the assumed lost development opportunity per new dwelling, to establish the annual cost for the PDP. The final information in the table shows the total lost development opportunity during the District Plan period. This data shows the following opportunity costs,

- \$1.2 million for flooding hazard (cost), and
- \$0.4 million for coastal hazard.

Table 3.8: Indicative Lost Development Opportunity of Natural Hazard

Opportunity Costs	Annual Dwellings	Assumed Costs	Annual Cost (\$m)	District Plan Period
Flooding	6	-\$ 26,000	-\$ 156,000	-\$ 1,205,000
Coastal	2	-\$ 26,000	-\$ 52,000	-\$ 402,000

Finally, the hazard extent areas can cause a negative impact on land values. For example economic research suggests flooding extents can cause a -2.3% impact on land values in the extent areas compared to land outside of the extent.⁵¹ However, in this case it has not been possible to assess the potential

⁵¹ Samarasinghe, O. and Sharp, B. (2010) Flood prone risk and amenity values: a spatial hedonic analysis

impacts of the PDP in terms of land values. It is not clear how the PDP hazards will be recorded against the properties or how existing ODP hazards are currently recorded. We consider that more research would be required to assess this value.

In summary, we consider that landholders will face costs to comply with the PDP. However, in marginal terms much of this cost will also occur under the ODP. Given the lack of information on the ODP it is not possible to establish the exact nature of the costs to landholders. However it is considered likely that much of the costs discussed above will accrue to landholders under the ODP and PDP.

3.2.3 Council Impacts (Administration)

In this report the council impacts have been quantified by estimating the effects of each natural hazard in terms of administration costs. The ODP and PDP both require the council to assess the materials provided by the applicants, both in terms of compliance reports and build specifications.

For this report it is assumed that for every compliance report relating to the natural hazards a council officer must expend 5 hours of time at a cost of \$500. It is also assumed that for every building consent relating to the natural hazards a council officer must expended a further 5 hours of time at a cost of \$500. In total council administration costs could be in the order of \$1,000 per dwelling.

Table 3.9 outlines the indicative estimate of the administration costs associated with each of the natural hazards. The final information in the table shows the total administration cost over the District Plan period. This data shows the following compliance costs,

- \$1.0 million for flooding hazard, and
- \$0.2 million for coastal hazard.

Table 3.9: Indicative Administration Costs of Natural Hazard

Administration Costs	Annual Dwellings	Assumed Costs	Annual Cost (\$m)	District Plan Period
Flooding	140	-\$ 1,000	-\$ 140,000	-\$ 1,081,000
Coastal	30	-\$ 1,000	-\$ 30,000	-\$ 232,000

In summary, we consider that Council will face costs to administer the PDP. However, in marginal terms much of this cost will also occur under the ODP. Given the lack of information on the ODP it is not possible to establish the exact nature of the costs to Council. However, it is considered likely that much of the costs discussed above will accrue to Council under the ODP and PDP. The PDP may actually result in a small positive savings for the natural hazards, because the provisions will enable council officers to assess applications more quickly.



4 Conclusion

This report has applied an economic assessment to establish the net outcome if the natural hazard provisions in the Operative District Plan are changed to the provisions as outlined in the Proposed District Plan. Specifically, this report has drawn on all available data to assess the potential costs and benefits for the key natural hazard provisions.

While the lack of information on the ODP has resulted in this report not being able to provide definitive quantifications of the marginal benefits of the PDP, it is still possible to conclude that the PDP is likely to result in a net positive benefit for the community.

A key point noted during this report is that the extent of the application of the natural hazard provisions has tended to be refined as more research is conducted. This has allowed the council to refine the coverage of natural hazard extents, which retains the benefits (safety, economic and buildings) while minimising the costs (landholder and council). In summary the chance of false positives⁵² is reduced in the PDP, which allows the community to maximise the use of the land while reducing the risks of harm from natural hazard events. We are informed that this approach will also be adopted for liquefaction, with council undertaking future research to minimise the instances of false positives.

Caveat: it is important to note that it is inherently difficult to undertake an economic assessment of costs and benefits associated with natural hazards. This report has been based information provided by council officers and other experts. Notwithstanding the difficulty of the assessment, this report has quantified each of the costs and benefits based on a range of assumptions.

⁵² i.e. instances where a landholder must meet the requirements of the natural hazard provisions, when in fact their land is not at risk of a natural hazard.

Proposed Waikato District Plan Stage 2 – Section 32 - Appendix 6 Specific Consultation Process

Date	Group	Subject Matter	Feedback
17 – 19 November 2017	Key stakeholders – meetings held at Ngaruawahia and Tuakau	Release of Draft District Plan (Stage 1 and 2 objectives and policies) for public feedback. The natural hazards and climate change section consisted of flood maps, objectives, policies and rules (first draft).	Queries were received about the completion date for flood modelling and the merits for drafting objectives and policies when the modelling was not completed, its availability, progress of Huntly subsidence work, how council intend to deal with climate change and promote resilient communities.
20 November – 7 December 2017	Huntly, Mangatangi, Ngaruawahia, Pokeno, Raglan, Tamahere, Te Kauwhata, Te Kowhai, Tuakau Public open days/drop-in sessions on draft Proposed District Plan	Release of Draft District Plan (Stage 1 and 2) for public feedback. The natural hazards and climate change section consisted of flood maps, objectives, policies and rules (first draft).	At this point in time, people were more interested in other parts of the plan, given the lack of detail available. The hazard maps available for consultation (1D 1% AEP model only) were at a very broad scale and there were only draft objectives and policies but no rules drafted at that stage.
16 December 2017	Raglan Hui with Tainui o Tainui	Initial public session with a short presentation to introduce the coastal hazards assessment project and gather information/local knowledge.	In this session the approach to assessing coastal erosion and inundation was presented and local knowledge was submitted by the public. Concerns were raised regarding new development in areas prone to flooding, including: Ngaranui Beach road, subdivision at Whale Bay, 400-500 house subdivision as part of the Rangitahi development. Comments around avoiding development similar to that which is still occurring under the Thames Coromandel District Plan. Eyewitness accounts of sand dunes eroding and recovering, property owners offered historic photographs and shared accounts of flood events occurring. Local hazard information was used by Focus Resource Management Group for the development of the coastal hazard assessment.
17	Public open day - Port	Initial public session with a short	The following issues and concerns were raised:

December 2017	Waikato	presentation to introduce the approach to the coastal hazards project and gather information/knowledge from the community	<ul style="list-style-type: none"> - long-term implications of the active erosion at Sunset Beach - the value of dune restoration for preventing wind-blown erosion and other mitigation methods - the effects of sea level rise - the effects of lower stream sediment loading - vehicles driving on the base of the dune - legal liabilities/responsibilities are for property owners to remove the buildings - what area the management recommendations covered - what geographical area was taken into account when evaluating coastal processes - what responsibility does the council have in terms of protecting services and infrastructure - rates of erosion and need for managed retreat – break down of communication between community and council.
4 November 2018	Second coastal hazards public meeting – Raglan	Short presentation on the coastal hazard assessment findings: <ul style="list-style-type: none"> - Areas of existing and potential future risk (and uncertainty) - Discuss options for managing current/potential future risk - Particular information and feedback sought to improve the assessment. 	Discussion was raised about how communities can help themselves (resilience). Community had concerns regarding erosion, increases in flood risk, specific stormwater issues and seabed mining from an active beach system. There were also concerns around property values and insurances. A follow up meeting was organised due to concerns about access to Lorenzen Bay. Separate feedback was received from a group of Lorenzen Bay and Whale Bay residents as a result.
3 November 2018	Second coastal hazards public meeting - Port Waikato	Short presentation on the coastal hazard assessment findings: <ul style="list-style-type: none"> - Areas of existing and potential future risk (and 	Concerns were raised regarding: <ul style="list-style-type: none"> - erosion, including the health and safety issue of overhanging tarmac at the carpark at Sunset Beach - sand mining at Taharoa and in the long term at Glenbrook. (Jim Dahm

		<p>uncertainty)</p> <ul style="list-style-type: none"> - Discuss options for managing current/potential future risk - Particular information and feedback sought to improve the assessment. 	<p>from Focus Resource Management clarified that the sand taken is above the active system, so no effect for now.)</p> <ul style="list-style-type: none"> - Importance of the surf club as a community asset. The beach cannot be used without it. <p>Questions were raised regarding:</p> <ul style="list-style-type: none"> - the recent subdivision that had been granted and if it would still be granted under current conditions, - what would happen to Maraetai if the spit had breached, who would pay for relocation, would the road into town be maintained by council? <p>A local business owner has been GPS-tracking changes. The north shore is still eroding, the spit is getting longer and the track on the river side has gone.</p>
18 January 2019	Meeting with Mercury	Comments on Stage 1 Draft District Plan	<p>Mercury requested that the draft natural hazard and climate change provisions should not be notified until the flood hazard modelling and mapping has been completed, as it compromises the risk-based approach. Mercury indicated that it is premature to set objectives and policies that rely on hazard mapping and flood assessment when neither of these tasks has been completed. Once mapping and modelling is complete any new rules should be applicable district wide. Mercury requested that council is mindful of Mercury's existing commitments to manage water levels (Waikato Hydro Scheme) (through resource consent conditions) within Taupo-nui-a-tia and the Waikato River upstream of the Karapiro Dam.</p>
19 January 2019	Land owners of No. 52A and 54 Lorenzen Bay, and 8B Cambrae Road	To view evidence of coastal inundation.	<p>The owners would like to construct a sea wall to provide continuous safe pedestrian access along the esplanade and protection from coastal erosion, at the rear of the properties.</p>
19 January 2019	Land owners of No. 25 Culvert Road	To view evidence of coastal erosion and the extent of inundation around Whale Bay and Manu Bay	<p>Evidence of coastal erosion is present. Eye witness accounts of large boulders of 1m³ being lifted by the waves during storm events. In some cases the slopes are eroding as a result of freshwater flowing down off the catchment.</p>
26 January 2019	Meeting with Mercury	Stage 1 and Stage 2 District Plan review processes	<p>Mercury provided feedback on the submission process and hearings and that they may be compromised or involve a lot of rework. Prior to writing land use policy, it is essential to understand the natural hazard risk and consequence. Mercury reiterated that they have been advocating for the need for a flood model to inform land use planning since 2004 and this is well documented.</p>

13 February 2019	Meeting regarding Huntly East Mine	Introduction of WDC working group to investigate the Huntly East Mine issues	<p>Concerns were raised over:</p> <ul style="list-style-type: none"> - continued subsidence, gas migration and how flooding will interact with the gas. - the validity of the statements made regarding geotechnical issues in the peer review commissioned by WDC. <p>Recommendations were made regarding further modelling and monitoring at surface level to gain a better understanding of future events.</p>
24 March 2019	Raglan Hui with Tainui o Tainui	Second meeting to present and receive feedback on findings from coastal hazard assessment.	<p>Discussions on findings presented. Feedback received focussed mostly on:</p> <ul style="list-style-type: none"> • Te Kopua, entrance to harbour, • shoreline changes over time, • historic flood events, • reclamation of air strip land, • presence of an iron pan near the entrance (south side), • Manu Bay erosion linked to boat ramp, • Whale Bay erosion rates are slow, • concerns around the wastewater treatment ponds being too low, and • land owners have a long association with Te Kopua and are aware of the hazards, plan to be adaptable and can relocate inland if and when required.
4 May 2019	Oreroa Marae – Port Waikato Hui	Presentation of coastal hazard assessment and stage 2 work to Ngati Karewa/ Ngati Tahinga Trust and to gather local knowledge on hazards in the Port Waikato area	<p>Discussions on findings presented. Feedback received included:</p> <ul style="list-style-type: none"> • Waikato river used to cut through the spit approximately in the location of the wetland and reserve and met the ocean near the access to the beach by the car park (southern end of the beach); • Detection of high ground water table under the Marae during high tide; • Evidence of sand scouring rocks further down the coastline while diving off the coast with NIWA scientists; • Issues with horses and motorbikes destroying vegetation on the sand spit and causing erosion (on Maaori land); • Erosion on northern bank of river with pine trees falling into the river; • Refer to cultural impact assessment prepared as part of hall relocation project; • Concerns over surf club facility being consented without consultation with iwi.
15 - 24	Raglan, Ngaruawahia,	Release of Draft District Plan	Feedback received included:

October 2019	Tuakau, Huntly, Port Waikato Public open days/drop-in sessions following the release of the draft Proposed District Plan (Stage 2) and Variation 2 to Stage 1.	(Stage 2 and Variation 2 to Stage 1) for public feedback. The natural hazards and climate change section consisted of flood maps, objectives, policies and rules (first draft). Variation 2 consisted of minor additions to Stage 1 provisions to ensure consistency between stage 1 and stage 2.	<ul style="list-style-type: none"> • Allow for relocation/retreat of building within the High Risk Erosion Area at Port Waikato District Council • Issues with the Port Waikato public car park at Sunset beach • Allow for accessory buildings as a permitted activity in urban areas same as Rural zone rules. • More emphasis on actions to mitigate climate change • Mapping inconsistencies • Adaptive management plan needed for Lorenzen Bay to resolve issues with coastal flooding and stormwater issues. • Need for mapping of flooding around tributary streams • Storm event predictions • Comments on activity status of rules and liquefaction assessment and land instability requirements being too onerous • Need for liquefaction hazard mapping • Provision for fire breaks and water supply • Issues with severely restrictive development provisions in high hazard areas; • Restriction on infrastructure in hazard areas too strict. Make provision for infrastructure to locate in or traverse hazards areas, particularly high hazard areas. • Effects of hazards on heritage • Allow for farm buildings and earthworks within the floodplain management area; • Issues with flood protection scheme, especially around Lake Waikare.
29 November 2019	Tainui o Tainui hui at Te Kopua Kokiri Centre	Present main approach taken on Draft District Plan	This session was part of a hui organised by WRC to allow eCoast to present on the findings of a coastal hazards assessment carried out for Ngarunui Beach. Presented on approach taken with the draft Stage 2 and Variation to Stage 1. No feedback received on the day.
18 January 2020	Consultation/Engagement Hui with Ngāti Karewa/ Ngāti Tahinga Trust on Draft District Plan (Stage 2) - Oraeroa Marae – Port Waikato	Present main approach taken on Draft District Plan and received feedback	<p>Discussions on presentation. Feedback received focussed mostly on</p> <ul style="list-style-type: none"> • objection with regards to time required for iwi to absorb technical information and submit feedback; • Discussion on adaptive management plans; • Questions around cost of relocating buildings;

			<ul style="list-style-type: none"> • Issues with the pine plantation on northern side of river mouth. Trees falling into the river and blocking the river channel; • Urupa within the pine plantation; • Focus on sea level rise over 100 years, but what about now?; • No Tsunami warning system at Port Waikato; • Erosion at Sunset Beach part of a natural multi-decadal erosion cycle; • Issues with unconsented houses and buildings. People do not have the money to move.
21 May and 4 June 2020	Consultation/Engagement Hui with Tainui o Tainui Raglan	Discussion on draft hazard maps and provisions associated with the hazard areas	<p>Issues raised at these two hui included:</p> <ul style="list-style-type: none"> • The Whaanga Coast Coastal Sensitivity Area mapping is too conservative and places too heavier burden on owners of Maaori Freehold Land to develop land in accordance with development aspirations; • Council regulatory instruments have continuously placed significant restrictions on land development along the Whaanga Coast that result in costly regulatory processes for landowners; • Te Kopua land MFL blocks significantly affected by hazard modelling - Coastal Sensitivity Areas (inundation and erosion). This places an addition burden of needing resource consent to construct any buildings on this land where the land may not be affected by coastal hazards for some decades. • Addressing future hazards areas (as a result of sea level rise) through an adaptive management approach was debated. This approach was generally supported, but only if rules could be redrafted to allow development as a permitted activity. • No formal written feedback submitted. However, through discussions at both hui, agreement was reached on an approach to resolve the main issues raised. <p>The following agreement was reached between council and the Tainui Hapuu Environmental Management Committee:</p> <ul style="list-style-type: none"> • Council to carry out detailed modelling for the Coastal Sensitivity Area for the Maaori Freehold Land blocks along the Whaanga Coast from just west of Whale Bay to the just west of Wainui Reserve. Also a minor amendment was made to the Coastal Sensitivity Area (Erosion) overlay area to remove the overlay from part of the Te Kopua 2B3 land block

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			<p>(western side of Riria Kereopa Memorial Drive). Both updates to the mapping have been completed.</p> <ul style="list-style-type: none"> • With regards to the issue of requiring resource consent to develop land at Te Kopua, an agreement was reached to consider development of rules for that land to allow development as a permitted activity where an approved adaptive management plan is in place and development is carried out in accordance with the plan. • The Tainui Hapuu Environmental Management Committee agreed to investigate the criteria for an adaptive management plan and to formally submit on this matter through a submission on the Proposed District Plan.
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Summary of meetings held with the Waikato Regional Council to discuss flood modelling and residual risk:

A number of meetings were held with the Waikato Regional Council to discuss the flood modelling and residual risk work being undertaken to inform the District Plan review.

Date	Purpose of the meeting	Feedback and outcomes
12 July 2018	<p>Present latest results from flood modelling work.</p> <p>Discuss and agree any additional modelling or other work that needs to be completed and the council programme of engagement.</p>	The feedback identified a series of items that the flood model does not include and is required to.
17 August 2018	Discuss information requirements from WRC for Stage 2 District Plan review, flood model work, Waikato Regional Policy Statement requirements to identify residual risk and how it will be identified.	This meeting provided a progress report. It was recommended that the Huntly South Pounding Area provisions are removed from the District Plan. The discussion covered the flood hazard classification required by the Waikato Regional Policy Statement, what the 1%AEP flood model should show and methods to mitigate residual risk.
10 October 2018	<p>Updates on:</p> <ul style="list-style-type: none"> - WRC natural hazards work streams; including guidance note; - Flood extent work; - Residual risk (banks down or benefit areas?) 	<p>Progress update on the guidance note to assist with the interpretation and implementation of Chapters 13 (natural hazards), 4 (integrated management) and part 6 (built environment – urban growth).</p> <p>Discussed the risk management philosophy of the WRPS, primary hazard zones, high risk flooding, areas of intolerable risk and community's</p>

		<p>appetite for risk.</p> <p>Confirmed that WRC will develop an assessment framework to help determine intolerable risk.</p>
06 March 2019	Review of the 1% AEP 1d flood extents in relation to the direct benefit areas to identify any anomalies with the data and discuss use of benefit areas as residual risk areas.	Feedback received related to the direct benefits areas, which required amending, as a number of anomalies were discovered within it.
24 January 2019	<ul style="list-style-type: none"> - Meeting set in anticipation of having the final Waikato River 2d model completed and to provide an opportunity to discuss the results - View draft 2d modelling - Discuss peer review of modelling 	<p>The following update was provided:</p> <ul style="list-style-type: none"> - the final model still being unviable. - confirmed the level of service for stop banks/flood scheme is reviewed every 10 years.
15 March 2019	<ul style="list-style-type: none"> - General discussion on approach to residual risk areas and the risk-based approach. - Discussion on direct benefit areas as residual risk areas and how they do not have to align with a (banks down) 1% AEP flood area. 	<ul style="list-style-type: none"> - Received feedback that the risk assessment framework is more important than how the property is identified, only some part of the property is potentially at risk if an overtopping or breach occurs. - A risk assessment framework should be required for all activities either through building consent for permitted activities, or a resource consent if one is required. - Discussed a 'banks down' (i.e. no protection) flood model. Such a model would be impractical as it won't accurately model or represent the hydrological dynamics of a breach, which could take place at any point along the stop banks.

Proposed Waikato District Plan Stage 2 – Section 32 - Appendix 7 Decision-Making Process

Meeting / Feedback	Document	Decision/direction
December 2015 Presentation to Council Workshop	A presentation to inform Council of the District's susceptibility to a range of natural hazards, the climate change effects on natural hazards and relevant legislative requirements.	This workshop informed council of the relevant statutory framework that guides local authorities. No decisions were required.
March 2016 Presentation to Council Workshop	A presentation to inform Council of the effects of climate change and how they are managed under a number of statutes, namely the RMA, the LGA and the CDEMA.	This workshop informed council of the relevant statutory framework that guides local authorities. No decisions were required.
22 August 2017 Presentation to Council Workshop	<p>A presentation to inform Council of relevant legislative requirements under Part 2 sections 6(h) and 7(i) of the RMA, as well as give effect to the WRPS (2016). A literature review and gap analysis was presented that identified gaps and priorities, such as the extent of hazard risk and the spatial areas to which they apply. On this basis the following options were discussed:</p> <ol style="list-style-type: none"> 1. Continue with full plan review without the necessary information for a s32 evaluation. This option would be unlikely to give effect to NZCPS and WRPS. 2. Undertake a rolling review, whereby Natural Hazards and Climate Change are notified at a later date, with the necessary hazard information. 3. Combined approach, whereby some existing and some new provisions are notified, and a variation is undertaken at a later date. This option will still require a high level of information to support the s32 evaluation. 	<ul style="list-style-type: none"> - Clarified that a full review would be carried out, however the flood modelling underpins a lot of the district. The recommended approach was consistent with a legal opinion from Tompkins Wake to delay work on natural hazards until the missing information was available. The outcome was that a couple of chapters in the Plan review will be delayed. - Councillors were concerned that the supporting information is not good enough and it could take several years to do the required work. What is released must be defensible. However, if the modelling work can be done in 18 months, then the delayed chapters could 'catch up' to the main plan change. - The rolling review option was supported, but a formal council resolution was sought to ratify the approach.
12 February 2018	The officer report recommends a rolling review	- The review commences for future notification;

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Strategy & Finance Committee Meeting	<p>approach (provided for by Section 79 (clauses (1)-(3)) of the RMA). This enables the review and notification of the Natural Hazards and Climate Change topic when critical technical data becomes available. This approach was discussed and agreed at the council workshop on the 22 August 2017.</p> <p>The report notes that the Council decision to undertake a rolling review will require a media update to explain the implications to the community and identified stakeholders.</p>	<ul style="list-style-type: none"> - matters related to the review be presented to the whole Council with the option to delegate matters to a subcommittee. - a rolling review of the Operative Plan be commenced; - the topic concerning climate change and natural hazards be reviewed and notified separate from the rest of the District Plan topics once critical updated technical data is available.
28 November 2018 Strategy and Finance Committee Meeting – District Plan Review Stage 2 project update	District Plan Review - Stage 2 Update	<p>The purpose of this report was to provide an update on Stage 2 of the District Plan Review. This included:</p> <ul style="list-style-type: none"> - a broad summary of the Stage 2 project, - an update on the key project milestones including the indicative timeframes for each milestone, and an update on the consultation schedule.
18 June 2019 Council Workshops on draft Stage 2 (Natural hazards and climate change)	<ul style="list-style-type: none"> - Presentation of coastal hazards assessment work (Jim Dahm – Eco Nomos Ltd). - Present and explain 1D and 2D 1%AEP flood modelling (Rick Liefing – WRC). - an overview on draft policy framework for stage 2 of the District Plan Review (Kelly Nicolson). - Provide the opportunity for Councillors to ask questions and provide input/feedback. 	<p>This was intended as an informative meeting.</p> <p>Questions were raised about the coastal hazards and further clarification was requested about the 1% AEP and what this meant.</p>
23 July 2019 Council Workshops on draft Stage 2 (Natural hazards and climate change)	<p>Present draft policy framework for Stage 2 regulatory framework and appropriate controls in mapped hazard areas, and assessment criteria for unmapped hazards.</p> <p>Provide the opportunity for Councillors to ask questions and provide input/feedback.</p>	<p>The Councillors requested further clarification about the defended areas on the maps and requested another meeting to seek resolution.</p> <p>Discussed requirement for 20m setbacks in the Waikato Regional Policy Statement, an agreement was reached to change current 100m setback from stop banks to 50m</p>

		<p>setback.</p> <p>Discussed other draft rules, including minimum floor levels and additions, garages, accessory buildings, access to properties and the definition of community infrastructure.</p>
<p>24 July 2019</p> <p>Huntly Mine Hazards Workshop with council staff and RDCL</p>	<p>Presentation from Cam Wylie with respect to Huntly East Mine and Urban Development:</p> <ul style="list-style-type: none"> - brief of assessment, IRBA Report and assessment methods. - Huntly Mine East Development and closure - Geology of the mine - Different mining methods - Long-term behaviour - Way forward 	<p>This workshop informed council. No decisions were required.</p>
<p>20 August 2019</p> <p>Council Workshops on draft Stage 2 plan</p>	<p>Discussed the following:</p> <ul style="list-style-type: none"> - Chapter 13 and Policies 13.1, 13.2, 13.3 of the Waikato Regional Policy Statement. - Risk of subsidence and risk of gas in Mine Hazards Study Area. - Adding additional assessment criteria, matters of discretion and control for liquefaction and other hazards. 	<p>Discussed potential risks associated with the mine and further detail around the pillars, gas hazard occurrence, water and monitoring.</p> <p>Council agreed to accept the risk presented.</p> <p>Provisions for minor alterations and additions were discussed, including permissible size thresholds.</p>
<p>27 August 2019</p> <p>Council Workshops on draft Stage 2 plan</p>	<p>Consultation for the Draft Proposed District Plan – Stage 2 Natural Hazards.</p> <p>An overview of coastal hazard assessment, examples of hazard mapping, hazard areas based on hazard type and level of risk, NCPS, WRPS, Draft Objectives and Policies for Climate Change and Coastal Hazards and Draft Coastal Flood Hazards Rules.</p>	<ul style="list-style-type: none"> - Discussion about developing an adaptive management strategy to assist the community. - Development setbacks vary depending on the zone and can be reassessed through variations. - Exclude internal renovations so that they do not require resource consent (capture only increase of GFA as a trigger). - Farm buildings without floors are low value. - Wharves/jetties/boat ramps are developments that typically require WRC consent. - Importance of public feedback and communities directing decisions. - Coastal erosion hazard rules.

		- Concerns were raised about landowners losing insurance over time.
28 August Council Workshops on draft Stage 2 plan	Final draft stage 2 plan change and variation to stage 1	Intended to inform elected members of the changes made following the previous workshop.
9 September 2019 Full Council Meeting.	Report - Approval for Release of Draft Proposed District Plan (Stage 2) for Public Consultation (WDC1909/45)	Council approval to release the draft Stage 2 provisions for public consultation and feedback.
3 February 2020 Policy and Regulatory Committee	District Plan Review – Update on Stage 1 and 2.	The report provided an update for councillors and included a summary of the feedback received on the draft of Stage 2.
11 March 2020 Council Workshop	A presentation to report back on public feedback.	Update and direction on provisions of Proposed District Plan Stage 2 before being finalised for public notification.
18 March 2020 Council Workshop	A presentation to report back on public feedback.	Update and direction on provisions of Proposed District Plan Stage 2 before being finalised for public notification.
20 July 2020 Full Council Meeting (Extraordinary)	Approval of the Proposed Waikato District Plan Stage 2 (Natural Hazards and Climate Change) for Notification.	Council approval to notify Stage 2.

Proposed Waikato District Plan Stage 2 – Section 32 - Appendix 8 Scale and Significance assessment

This assessment uses a range of ‘low’, ‘moderate’ and ‘high’ in assessing *significance*. *Scale* is measured using the following range: ‘localised’, ‘more than localised but not district wide’, or ‘district wide’.

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
Land use, subdivision and development on land that is prone to natural hazards can increase risks to people, property, infrastructure and the environment and reduces the resilience of the community to natural hazards.	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policies 15.2.1.1 – 15.2.2.2, Rules 15.4 – 15.11, Assessment matters in 15.12, Information requirements in 15.13 and Variation 2, Definitions in 15.14 and mapped hazard areas shown on the planning maps.</p>	<p>Part 2, Section 6 RMA specifies the management of significant risk from natural hazards as a matter of national importance which local authorities must recognise and provide for through planning instruments such as the District Plan. The relevant higher order documents including the WRPS¹ and the NZCPS² provide the overarching policy direction for the management of natural hazard risk through the District Plan. The WRPS includes implementation methods which the council is required to give effect to through planning provisions in the District Plan. (This factor is considered to be highly significant with a scale which is more than local, but will not affect the entire district.)</p> <p>The adverse effects of natural hazards are felt by both individual landholders and the wider community through flow on economic and social effects. The Waikato-Tainui Environmental Plan signals that the risk of adverse effects on human, cultural, spiritual, or environmental wellbeing should be prioritised over risks to individual properties when assessing natural hazard risks and/or the need for hazard protection structures³. The Maniapoto Environmental Plan specifies that land use activities should be located to avoid significant risk of damage from natural hazards and avoid the need for expensive natural hazard defence or mitigation infrastructure⁴.</p>

¹ See Relevant sections of the Waikato Regional Policy Statement in Appendix 2 Key Strategic Documents and Directions

² See Relevant sections of the New Zealand Coastal Policy Statement in Appendix 2 Key Strategic Documents and Directions

³ See Waikato-Tainui Environmental Plan Objective 17.3.2

⁴ See Maniapoto Environmental Plan Objective 20.3.1 in Appendix 2 Key Strategic Documents and Directions

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
Released to open (WDC2007/05)	<p>Information requirements in 15.13.</p> <p>Also includes processes outside the District Plan such as LIMs, Hazard Register, stormwater management plans and CDEM community response plans.</p>	<p>The damage caused by natural hazards has the potential to adversely affect people's social, economic and cultural wellbeing, health and safety, and can adversely affect the natural environment. Council has a duty to avoid, remedy or mitigate such adverse effects. Giving effect to higher order policy documents and having consideration of Iwi Environmental Plans helps Council to achieve. (This factor is considered of high significance, and a district-wide scale.)</p> <p>Most of the land in the district at risk of natural hazards is located in rural areas. There is less risks to people, property and infrastructure in low populated and less developed rural areas. Most of the hazard areas are not high risk areas i.e. flood plain management area and coastal sensitivity areas, where risk can generally be mitigated through the design and location of development. (This factor is considered to be of moderate significance, and at a scale which is more than localised, but not district-wide.)</p> <p>The damage caused by natural hazards can result in a temporary or permanent change in the character and amenity of local communities. (The changes are often localised in scale and the significance of this factor is considered to be moderate, as the effects may be temporary.)</p> <p>District Plan regulations to manage risks from natural hazards impose additional costs on individuals and communities to carry out development by way of additional compliance and construction costs and may negatively impact development patterns, development opportunities and potentially land values. Conversely, the natural hazard provisions also provide for community safety, protection of economic activity and protection of buildings during hazard events, which results in cost savings over the longer term.</p> <p>In some cases, the Proposed Plan has reduced the number of properties affected by some hazards, i.e. through more up to date and accurate flood hazard modelling. It also provides better guidance for information requirements for other hazards, i.e. liquefaction assessments, and in some cases it allows for more permitted activities than</p>

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
<p style="color: red; transform: rotate(-90deg); transform-origin: center;">Released to open (WDC2007/05)</p>		<p>the Operative District Plan provisions.</p> <p>The main difference between the economic costs of the Operative Plan and the Proposed Plan as a result of more up to date information and more accurate spatial hazard extents is through the reduction in false positives, i.e. where a landowner must satisfy the requirements of the natural hazard provisions, only to discover that the land is not at risk⁵. (This factor is of high significance and a district wide scale.)</p> <p>The Proposed Plan has introduced Coastal Sensitivity Areas to address land that may be at risk over the next 100 years as sea level rises and increases the inland extent of coastal hazards. Identifying areas that potentially will be affected by coastal erosion and coastal inundation is a requirement of the NZCPS and WRPS and the adaptive management approach taken to regulate land use, subdivision and development in these areas is guided by MfE's Coastal Hazards and Climate Change: Guidance for Local Government (2017).</p> <p>If the risks of natural hazards are not identified and planned for, this is likely to limit options for, and increase costs to future generations who will be left try to manage development in increasingly hazardous areas. This is particularly the case if the current generation continues to construct infrastructure and other development on land that is currently at high risk of being affect by natural hazards or construct development that is not adaptable to futures hazards as a result of sea level rise. (This factor is considered of high significance, with a scale which is more than local, but will not affect the entire district.)</p> <p><i>Overall, this issue is considered to be of district wide scale and highly significant, because of its potential to adversely affect not just individuals and their property, but the wider community, the natural environment and future generations.</i></p>

⁵ Market Economics. Draft Economic Assessment on Natural Hazards and Climate change. 2020 Prepared for Waikato District Council.

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
<p><i>Risks to people, property, infrastructure and the natural environment from flooding and ponding of flood waters</i></p> <p style="color: red; transform: rotate(-90deg); position: absolute; left: 170px; top: 270px;">Released to open (WDC2007/05)</p>	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policies 15.2.1.1 – 15.2.1.6, 15.2.19 – 15.2.1.15 and 15.2.2.1 – 15.2.2.2.</p> <p>Rules 15.4 – 15.6</p> <p>Assessment matters Variation 2, mapped hazard areas shown on the planning maps and information requirements in 15.13. Also includes processes outside the District Plan such as LIMs, Hazard Register, stormwater management plans and CDEM community response plans.</p>	<p>The Lower Waikato has a flood plain of approximately 25,300 hectares, which can be subject to long term flooding or ponding after high rainfall events, and can take weeks to drain. Over 14,000 hectares of the floodplain is protected from flooding by stopbanks (this area is called the Defended Area). Flooding and/or stormwater ponding are the most predominant and significant hazards within the district. Combined, flooding and ponding areas cover approximately 11,000 hectares of land within the district, however potential ‘unmapped’ ponding areas increase the scale of the hazard beyond the mapped area. (This factor is considered of high significance, with a scale which is more than local, but will not affect the entire district.)</p> <p>Flooding and ponding is likely to have adverse effects on people (including on their health and safety), property and the environment. The destruction, damage and debris left after major flood events are likely to have an adverse but temporary effect on the character and amenity of individual communities, depending on the severity of the event, as well as the vulnerability of the community and its ability to respond and recover. (This factor is likely to be of a localised scale and medium significance.)</p> <p>Under the Operative District Plan, a total of 893 hectares of land has been identified as being affected by a flood or ponding hazard. While a greater area of land is susceptible to flooding during a significant flood event, these areas were not mapped in the Operative District Plan (statement supported by aerial photographs of the significant flood event in 2004 and subsequent 1% AEP flood modelling carried out by WRC). Although not all land susceptible to flooding area mapped, the rules apply to any land that is subject to more than minor flood hazards. (The change is not considered to be of high significance, with a scale that is more than localised, but not district-wide.)</p> <p>The proposed new provisions and hazard mapping in the Proposed Plan differentiate between high risk flood areas and the rest of the floodplain (2D modelling only). Certain types of development are more strictly regulated in high risk flood areas as it is considered that risk to most development cannot be mitigated in these areas and is therefore not appropriate. This will impact on the ability to develop some land. However, the area of land affected is relatively small (557 hectares) and similar</p>

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
<p><i>Risks of inundation and coastal erosion on people, property, infrastructure and the coastal environment</i></p>		<p>restrictions exist under the operative provisions (currently habitable parts of buildings in the flood risk area is a non-complying activity). (The change is not considered to be significant and of a more localised scale.)</p> <p>If the risks of flooding are not identified and planned for, this is likely to limit options for future generations to remedy effects. This is particularly the case if the current generation continues to build and construct infrastructure on land at high risk of flooding, which is likely to be exacerbated by climate change. The Maniapoto Environmental Plan recognises that existing structures protect Maniapoto communities, but Maniapoto seek a shift towards restricting land use and activities in areas prone to natural hazards, or which would create a demand for hard protective infrastructure. (This factor is considered of high significance, but localised scale.)</p> <p>The effects of flooding have been considered explicitly by the WRPS, which includes implementation methods that the Council must put in place to manage risks from flooding⁶.</p> <p><i>Overall, this issue is considered to be at a scale which is more than localised, but not a district-wide issue. It is considered of high significance, because of the potential risks to people's health, safety and property, essential infrastructure and the environment. It also has an impact on future generations.</i></p>
	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policies 15.2.1.1 – 15.2.1.9,</p>	<p>The west coast is exposed to prevailing weather from the Tasman Sea, which includes large swellings and storms. Coastal hazards within the district include flooding, sea level rise and erosion around harbours and shorelines. The risk of coastal inundation and erosion is a particular issue for coastal communities, including Raglan and Port Waikato. (This is considered to be a factor of local scale but high significance to those communities.)</p> <p>The risks of coastal erosion and inundation particularly affect those with property and</p>

⁶ See Waikato Regional Policy Statement, in particular Policy 13.1 and 13.2 in Appendix 2 Key Strategic Documents and Directions.

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
Released to open (WDC2007/05)	<p>15.2.1.11, 15.2.16 – 15.2.1.17 and 15.2.2.1 – 15.2.2.2.</p> <p>Rules 15.7 – 15.10.</p> <p>Assessment matters</p> <p>Variation 2, mapped hazard areas shown on the planning maps and information requirements in 15.13.</p> <p>Also includes processes outside the District Plan such as LIMs, Hazard Register, stormwater management plans and CDEM community response plans.</p>	<p>land at the coast. Under the Operative District Plan, a total of 18,110 hectares of land fall within a coastal overlay, including 15,667 ha within a 'Coastal Area' and 2,453 ha within a 'Coastal Setback'. The coastal overlays cover just 1% (22ha) of residentially zoned land in the district and 0.2% (2ha) of the land zoned for business uses. Ninety nine percent of the land affected by coastal overlays is in the rural zone.</p> <p>Focus Resource Management Group have undertaken a study (2020) to define areas potentially vulnerable to coastal erosion and coastal flooding in the Waikato district (western coastline).</p> <p>In total, over 4,340 hectares of land is located within an area identified as being at risk or sensitive to coastal flooding or erosion. This is around 1.5% of the land in the district. The amount of land identified as being at risk of coastal hazards is 79% less than in the Operative Plan. The largest reduction in coverage is in the rural areas. This means that the coastal hazards provisions in the Proposed Plan will impact substantially less land than under the Operative Plan. However, the amount of residential zoned land at risk has increased by 28 hectares compared to the Operative Plan, which means more households may be impacted by the provisions relating to coastal hazards. (This factor is considered of local scale and moderate significance.)</p> <p>The provisions in the Proposed Plan are likely to be more stringent in those areas identified as being at high risk of coastal hazards, on the basis of this up to date information. It is likely that a number of properties will have additional restrictions placed on them as a result of the Proposed Plan, which will impact on their ability to develop their land in the future. However, the economic costs associated with this are felt at a local scale, rather than district wide. (This is considered to be a factor of local scale and significance.)</p> <p>Coastal hazards can adversely affect people's health and safety. Coastal communities at Port Waikato and Raglan have said they are concerned about their self-sufficiency and resilience to hazard events. They want to understand whether the council will continue to protect services and infrastructure. Consultation with iwi has indicated that their coastal communities acknowledge that they may have to be adaptable and</p>

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
		<p>potentially relocate inland if necessary, but are concerned about the cost of doing so. (This factor is considered to be of local scale and significance now, but the significance is likely to increase over time.)</p> <p>The effects of coastal hazards have been considered explicitly by the NZCPS and VRPS7, which includes implementation methods which the council must put in place to manage risks from coastal hazards.</p> <p><i>Overall, this issue is considered to be localised in scale but of high significance.</i></p>
<p>Risks to people, property, infrastructure and the natural environment from fire</p>	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policy 15.2.1.18 and 15.2.2.1 – 15.2.2.2.</p> <p>Assessment matters Variation 2. Also includes processes outside the District Plan such as Hazard Register.</p>	<p>Fires have the potential to adversely affect people's health and safety, destroy infrastructure and buildings and damage the natural environment. They can temporarily change the character and amenity of local communities, but it can take many years for the natural environment to recover from major events. (This is a factor of local scale but high significance.)</p> <p>The risks from fire in New Zealand is expected to worsen as a result of climate change, which is predicted to result in less rainfall, higher temperatures and stronger winds. More homes (and people) are likely to be at risk as a result of expanding urban development and increasing lifestyle block development. An increase in exotic plantation forests will also add to the risk. While the Waikato region is less affected than some regions, the risk is still expected to increase. A failure to consider the implications of fire risk and rural residential development is likely to limit the options for future generations to remedy the effects of future fires. (This is a factor of medium importance but district wide scale.)</p> <p>There are no provisions in the Operative Plan which specifically address the risk of fire, and no areas which are identified at particular risk. No specific studies have been undertaken on fire risk to inform development of the Proposed Plan. It is unlikely that the Proposed Plan will identify specific hazard areas to regulate risks from fire and thus</p>

⁷ See Waikato Regional Policy Statement, in particular Policies 13.1, 13.2 and 13.3 (relevant to tsunami) in Appendix 2 Key Strategic Documents and Directions

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
		<p>the economic costs associated with implementation of the Plan provisions are expected to be low. (This factor is of low significance and localised scale.)</p> <p><i>Overall, this issue is considered to be of local scale and moderate significance at present. The significance of this issue is expected to increase over time with climate change.</i></p>
<p>Risks to people, property, infrastructure and the natural environment from landslides, slips and subsidence, including mine subsidence.</p>	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policy 15.2.1.19 – 15.2.1.20 and 15.2.2.1 – 15.2.2.2.</p> <p>Assessment matters Variation 2. Also includes processes outside the District Plan such as stormwater management plans, CDEM community response plans and the Hazard Register.</p>	<p>Landslides and slips</p> <p>Only 1.6% of the district is categorised as having areas of land steeper than 35 degrees (landslides are more likely to occur on areas of land steeper than 45 degrees). Erosion severity is categorised as being extreme or very severe in only 0.2% of the district land area. There are small hot spots of erosion severity, which occur in isolated areas along the west coast. (For this reason, this factor is considered to be of local scale and low significance.)</p> <p>The effects of landslides and slips have been considered in the WRPS8. Objective 5.1.2 in the WRPS seeks a net reduction in accelerated erosion across the region in recognition of the adverse effects as a result of flooding or land instability, on the relationship of taangata whenua as kaitiaki with their identified taonga, and damage to property and infrastructure. The Maniapoto Environmental Management Plan identifies in Policy 20.3.1.1 that erosion-prone lands should be retired and appropriately revegetated, including riparian areas and steep slopes to avoid accelerated erosion. (Given the limited land potentially affected, this is considered a local scale and low significance issue, relative to other natural hazards.)</p> <p>There are no hazard areas specifically identified in the Operative Plan for landslide risk and no new information has been collected on these risks to inform the Proposed Plan. It is difficult to model landslides to predict their behaviour and it is also difficult and often expensive to prevent or minimise landslides. It is therefore unlikely that the Proposed Plan will identify specific hazard areas to regulate risks from landslides or slips. As a result, there will be limited economic costs for land developers and this</p>

⁸ See in particular policy 14.1 and associated implementation methods.

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
Released to open (WDC2007/05)		<p>factor is considered of low significance and local scale only.</p> <p><i>Overall, the risks to people, property and the environment from landslides and slips is considered to be an issue of low significance and local scale.</i></p> <p>Subsidence</p> <p>Subsidence is the sinking of the ground's surface. The early signs of subsidence are not always visible before a major slump occurs. This is a safety risk for people and subsidence could result in damage to property and infrastructure. Subsidence is unlikely to result in significant changes to the character and amenity of local communities. (These factors are considered of low significance and local scale.)</p> <p>The risk of subsidence is limited in scale to a relatively small area of land at Huntly (less than 0.05% of the land in the district). The risk of subsidence is not specifically addressed in the WRPS.</p> <p>The Huntly East Mine is an underground mine located under the north-eastern part of Huntly, which was closed in 2015. This could result in a subsidence hazard in the future (including for future occupants), and an area of subsidence hazard is identified in the Operative Plan of approximately 125 hectares of land. This includes 50ha of land zoned residential and 64 ha of land zoned rural.</p> <p>A study (2019) has assessed the risks of subsidence and coal seam gas leakage⁹. The risks of subsidence can be mitigated through building design. This provides an opportunity for the Proposed Plan to be more enabling in the way that it regulates development in this area.</p> <p>The assessment provides more detailed mapping of the hazard area. There have been minor changes to the hazard risk area, with a small increase in both residential (3 ha) zoned and rural zoned land impacted (3 ha) (total of 137 ha). However, as the</p>

⁹ RDCL (2019) Risk Assessment for Urban Development Areas – Huntly East Mine

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
		<p>Proposed can be more enabling (as the risk has reduced), the economic impacts are expected to be minor. (This factor is considered of low significance and local scale.)</p> <p><i>Overall, the risks to people, property and the environment from subsidence is considered to be an issue of low significance and local scale.</i></p>
<p>Risks to people, property, infrastructure and the natural environment from earthquakes and liquefaction of soils</p>	<p>Objective 15.2.1 - Resilience to natural hazard risk</p> <p>Objective 15.2.2 - Awareness of natural hazard risks</p> <p>Includes Policy 15.2.1.22 – 15.2.1.23 and 15.2.2.1 – 15.2.2.2.</p> <p>Assessment matters Variation 2 and information requirements in 15.13.</p> <p>Also includes processes outside the District Plan such as LIMs, Hazard Register, and CDEM community response plans.</p>	<p>An assessment of earthquake risk and subsoil conditions has been undertaken at a regional level (1996) but has not been updated recently. There is no expert research on seismic risks in the Waikato district. The 1996 regional study (by IGNS) found a significant potential earthquake hazard in the Waikato region, where active faults overlap with geological areas susceptible to ground shaking. Recent Holocene soils are the most susceptible to ground shaking, and soils of this type occur in the district, although they are limited in extent. Liquefaction is not expected unless an earthquake of magnitude 5 or bigger occurs. Earthquakes of this size do not occur regularly in the region and have been even less frequent in the district. Recent research from University of Waikato suggests that large earthquakes in the region are very rare and may occur just once every five thousand years¹⁰. There are no active faults in the Waikato district, although there are number of ‘possibly active’ or ‘inactive’ faults. (This issue is therefore considered to be of low significance, but of a district-wide scale, as a large earthquake would be expected to cause widespread damage if it did occur.)</p> <p>The adverse effects associated with earthquakes have been considered in the WRPS I I.</p> <p>A large earthquake is expected to have an adverse effect on people’s health and safety. It would also be expected to have an adverse effect on character and amenity of local communities. However, as such events are very rare in the district, this is considered to be a factor of low significance but district wide scale.</p> <p>The Operative Plan does not currently regulate for liquefaction risk, although geotechnical reports are required when applying for subdivision consents. Although no</p>

¹⁰ University of Waikato (2019) Project to investigate earthquake frequency and activity on Hamilton’s faults.

¹¹ See in particular Policy 13.3 and associated implementation methods.

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
		<p>new studies have been undertaken, it is expected that the Proposed Plan will be more stringent in relation to managing the risks of liquefaction. This is likely to have significant economic costs for individual landowners. However, it is also likely to have a positive effect in terms of ensuring that future generations are not saddled with buildings and infrastructure which are prone to earthquake damage. This is a factor of district wide scale (given that it is expected to be a blanket requirement) but low significance (it doesn't prohibit development, but it does add a compliance cost).</p> <p><i>Overall, the risks to people, property, infrastructure and the natural environment is considered to be of district wide scale but only moderate significance, because the likelihood of a large earthquake in the district is very rare.</i></p>
<p>The effects of climate change (including climate variability) can exacerbate weather related natural hazards and increase mean sea level. This may have adverse impacts on people (including their health and safety), land use, development, infrastructure and the natural environment</p>	<p>Objective 15.2.3 - Climate change</p> <p>Includes Policies 15.2.3.1 – 15.2.3.5 and includes 2D flood hazard modelling and the coastal hazard assessment and coastal hazard maps.</p> <p>Rules 15.4, 15.5, 15.7 and 15.8 and assessment matters in Variation 2.</p>	<p>Although climate change and subsequent sea level rise is not a hazard in its own right, it impacts on the frequency and intensity of a range of natural hazards, and thus has potential to affect people's social, economic and cultural wellbeing, health and safety. It also has an impact on character and amenity of local neighbourhoods. (This factor is considered to be of district wide scale and high significance.)</p> <p>Climate change is a matter which must be given particular regard to under section 7(i) of the RMA. It is a matter of regional and district wide significance, although the effects of climate change will be felt differently in different areas. Coastal areas and those areas already at risk of flooding are likely to be more adversely affected. These effects have been considered by higher order documents, including the NZCPS and WRPS12. (These factors are considered to be of high significance and a district wide scale, given the importance placed on addressing climate change in these higher order documents.)</p> <p>Failing to prepare for the effects of climate change is likely to limit options for future generations to remedy effects, especially if this results in more property and infrastructure being located in high risk areas. (This factor is considered of high significance and at a district wide scale.)</p>

¹² See in particular Objective 3.6 and associated policies, including 13.1 and 13.2 and their implementation methods.

Issue	Provisions which address the issue	Scale and Significance Reasoning This is a significant matter for the district for the following reasons:
Released to open (WDC2007/05)		<p>There are no provisions in the Operative Plan that directly regulate for climate change or sea level rise, although the building setback rules and setting of the 1% AEP flood level and storm event are likely to have been influenced by expected climate change and sea level rise.</p> <p>New assessments undertaken to inform the Proposed Plan on the risks of coastal hazards¹³ and flooding¹⁴ have incorporated climate change scenarios into the modelling. The new hazard risk areas incorporate predicted climate change effects, such as sea level rise. While this will mean that some properties will have additional restrictions placed on them as a result of the Proposed Plan, overall, fewer properties are likely to be affected, as a result of the more up to date information. This is because fewer areas have been identified as being at risk. The economic costs will be significant but less than what is anticipated under the Operative Plan. (This factor is considered of low significance, at a scale which is more than localised, but not district-wide.)</p> <p>Iwi environmental management plans identify climate change as a significant issue and that the causes and effects of climate change need to be understood and prepared for¹⁵. Iwi have told us that they are concerned about the ability of their people with limited resources to adapt to the impacts of climate change, including where relocation is likely to be necessary. (This is considered to be a factor of local scale but high significance.)</p> <p><i>Overall, this issue is considered to be of district wide scale and highly significant, because of its potential to adversely affect not just individuals and their property, but the wider community, infrastructure, the natural environment and future generations.</i></p>

¹³ FOCUS (2020) Waikato District Coastal Hazard Assessment

¹⁴ DHI (2019) WRC Lower Waikato 2D Modelling - Huntly, Ohinewai and Horotiu Model Build

¹⁵ Waikato-Tainui - Objective 17.3.3 and Policy 17.3.3.1 Maniapoto – Objective 13.3.1 and Policy 13.3.1.1