IN THE MATTER	Waikato District Plan Review Resource Management Act 1991
AND	
IN THE MATTER OF	Submission pursuant to Clause 6 of Schedule 1 of the Act made on behalf of Dinah Robcke and the Estate of John Robcke relating to Hearing 25 Rezoning Requests.

STATEMENT OF EVIDENCE OF LEIGH JOHN ROBCKE

Dated: 19 February 2021

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1 INTRODUCTION, QUALIFICATIONS AND RELEVANT EXPERIENCE

1.1 My full name is Leigh John Robcke. I am a Senior Project Manager at Hauraki District Council, dealing mainly with gold mine consenting and district plan changes, and are based in Paeroa.

1.2 Prior to beginning work at Hauraki District Council I was the District Plan Manager at Thames-Coromandel District Council (for 14 years) and was responsible for the full review and restructure of that Council's District Plan. Going back further, I have held various resource management roles at the Ministry for the Environment, Waikato District (monitoring and enforcement) and Waikato Regional Councils.

1.3 My qualifications include a Bachelor of Planning from the University of Auckland, graduated 1992, and a Bachelor of Social Sciences from the University of Waikato, graduated in 1990.

1.4 I have lived in and around the Waikato for round 50 years, and in that time have seen significant land use changes. The majority of my immediate family have lived in Glen Massey for the last 25 years. In that time members of my family have undertaken a number of small development projects within the village and investigated a larger scale development.

1.5 I have read the Section 42A Report 'Hearing 25 Zone Extents Framework Report' (prepared by Dr Mark Davey) dated 19 January 2021. This statement addresses matters I raised as submitter 551 with specific reference to the Framework Report.

2 EXPERT CODE OF CONDUCT

2.1 I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Practice Note 2014 and I have complied with that Practice Note in preparation of this evidence.

2.2 I confirm that the issues addressed in this brief of evidence are within my area of expertise except where I have stated my reliance on other identified evidence. I have considered material facts that are known to me that might alter or detract from the opinions expressed in this evidence.

3 BACKGROUND TO SUBMISSIONS

3.1 In the currently Operative Waikato District Plan (OWDP) an area of approximately 48ha of land (immediately behind the school and to the west) is zoned Country Living Zone, with the balance of the farm being zoned Rural. Most of the residential properties within the village are zoned Living.

3.2 In the Proposed Waikato District Plan (PWDP) a reduced area of approximately 31ha of land is zoned Country Living (CLZ) with the balance of the farm being zoned Rural (RZ), including 17ha that was previously CLZ. Most of the residential properties within the village are proposed to be zoned Village (VZ).

3.3 When reviewing the Proposed District Plan in July 2018 I was curious as to the reason for the proposed deletion of 17ha of CLZ and also what other options had been investigated for zoning the remaining CLZ to the newly created VZ. I subsequently made the following submissions:

> **SUBMSSION 1**
>
> Oppose deletion of the area of land (approximately 16ha) previously zoned Country Living Zone at 859 Waingaro Road to Rural Zone (Map 19.3).
>
> **Decision sought:**
>
> Reinstate the area of land (approximately 16ha) previously zoned Country Living Zone at 859 Waingaro Road and make any consequential changes required to give effect to this submission.

SUBMISSION 2

Oppose Country Living Zone subdivision standards 23.4.2 (a)(i) [net site area of at least 5000m^2], 23.4.8 (a)(i) [building platform of 1000m^2] and 23.4.8 (a)(ii) [average gradient no steeper than 1:8] as they relate to the Country Living Zone in Glen Massey.

Decision sought:

- Either: introduce greater flexibility in subdivision development standards for the Country Living Zone in Glen Massey (e.g. minimum net site area of 2500m^2 with an average of 5000m^2, building platform of 500m^2, etc.) and make any consequential changes required to give effect to this submission;
- Or: rezone the areas of land at 859 and 889 Waingaro Road that were previously zoned Country Living Zone to Village Zone and make any consequential changes required to give effect to this submission.

3.4 The 'Reasons' noted for my submissions included that the area zoned CLZ in the OWDP provided for a logical extension of the existing Glen Massey village and community. Also, that a District scale, it would make better sense for residential/lifestyle development to be directed to areas/soils with poor productive capacity – as opposed to high quality soils. Even after reviewing the information available to me as part of this Plan review process (i.e. Section 32 reports, Section 42A reports, etc.), I maintain that my submissions, and the reasons for those submissions, remain valid.

3.5 On 6 April 2020 (the day before the CLZ hearing) I sent a letter to the District Plan Administrator, to be tabled at the hearing (refer to **Attachment 1**). In that letter I indicated that, given the stance taken in the s42A Report, I would focus my energies on the part of my submission requesting that our family land at Glen Massey be rezoned from CLZ to VZ.

3.6 Whilst this statement of evidence is primarily concerned with Submission 2 and the specific relief sought under the "or" part of the decision sought (underlined), I believe the overall context within which the submission was made is also important and this is discussed further in this statement.

4 BACKGROUND TO PROPOSED ZONING IN GLEN MASSEY

4.1 In terms of setting direction for the zoning/rezoning of land, the 'Ngaruawahia, Hopuhopu, Taupiri, Horotiu, Te Kowhai & Glen Massey Structure Plan' (Waikato District Council, 2017) is of particular relevance. Key pages from the Structure Plan are attached to this evidence (refer to **Attachment 2**). It is noted in the Introduction to the Structure Plan that:

> The Structure Plan is a non-statutory document that will be given effect to by Waikato District Council ... [it] will assist the District Plan Review to incorporate appropriate rezoning and development controls to enable the future growth and development of these six settlements.

4.2 The Structure Plan describes Glen Massey as:

> "... a small village located approximately 12 minutes' drive west of Ngaaruawaahia and accessed via Waingaro Road. The village is a former coal mining settlement ... contained by the surrounding rugged hill country. A definite focus of the settlement is the Glen Massey Primary School which serves the wider surrounding farming community as well as the residents of the village ... Glen Massey is zoned predominantly for residential and rural activities. Although not serviced by reticulated water and waste water, the village comprises land historically zoned for both 'Living' and 'Country Living' and is surrounded by 'Rural Zoned' pastoral farming activities ... the village is valued by its residents for its village and country lifestyle character."

4.3 Whilst Figure 13 of the Structure Plan (Existing Land Use Zoning for Glen Massey) does not show the area of CLZ existing at that time, Figure 20 (Glen Massey Key Move Plan) shows two substantial areas for "Future Residential Expansion".

4.4 Although the sequencing is somewhat difficult to follow, I note that at the time the Structure Plan was being developed the Council was in the process of developing 'Proposed Plan Change 17: Ngaruawahia and Surrounding Villages' (publicly notified on 15 April 2016). Plan Change 17 proposed that the extent of land zoned CLZ be reduced to just 17ha – in two areas similar to those shown for Future Residential Expansion in the Structure Plan. The reasons noted for the proposed reduction of CLZ

were lack of market demand, lack of landowner interest and topographical challenges, in places.

4.5 In the Section 42A Report for Plan Change 17 (September 2016) staff recommended that, due to a lack of cadastral and topographic constraints associated with the reduced areas of CLZ, the proposed change as notified be revoked and the CLZ as currently shown in the District Plan be retained.

4.6 The subsequent decision of the Council on Plan Change 17 (made operative on 17 February 2017) was that the proposed rezoning (to RZ) be revoked.

5 AN ALTERNATIVE ZONING PROPOSAL FOR GLEN MASSEY

5.1 The currently PWDP reduces the area of CLZ land to the south of the property by 17 ha, which is not inconsistent with the extent of land shown to be available for "Future Residential Expansion" in the Structure Plan, and comments around topographical challenges. I can however find no discussion in the Section 32 Report regarding the merits, or otherwise, of an alternative zoning (e.g. VZ) for the remaining CLZ land.

5.2 Whilst this is not a serious oversight in terms of the scale of the overall Plan review process, it is significant in terms of development potential, and subsequent community outcomes, for the village of Glen Massey.

5.3 In an attempt to establish some sort of potential development 'baseline' (to provide context for myself), I have calculated potential 'lot yield' associated with current and proposed CLZ and VZ subdivision standards, as follows:

Zone	Gross Area	Net Area	Lot Yield
OWDP = CLZ	48ha	36ha[1] 36ha/5000m2	72
PWDP = CLZ	31ha	27ha[2] 27ha/5000m2	54
VZ as Proposed via submission	31ha	23ha[1] 23ha/3000m2	76

1 Assumes that 25% of land will be required for roads, open space or is otherwise not suitable for subdivision to minimum standards.

2 Assumes that 15% of land will be required for roads, open space or is otherwise not suitable for subdivision to minimum standards.

5.4 The above analysis shows that, based upon a very simplistic interpretation of OWDP subdivision standards, with assumptions made around land required for roads, land not suitable for subdivision to minimum standards, etc., in the current CLZ area approximately 72 lots could be developed (36ha/5,000m^2).

5.5 If the zone of the land was to go from CLZ to VZ, discounting the 17ha proposed to be Rural Zone in the PWDP, and accounting for land required for roads, land not suitable for subdivision to minimum standards, etc., then approximately 76 lots could be developed (23ha/3,000m^2).

5.6 It is my view that another option should have been considered for the remaining land – rezone from Country Living Zone to the newly created Village Zone. The rest of my evidence is focused on demonstrating the suitability of this alternative zoning.

6 MATTERS ADDRESSED IN EVIDENCE

6.1 To support the rezoning request (CLZ to VZ) the following matters are addressed in my evidence:

- RPS Directions – Soils as a Resource
- Soils and Land Use Capability in Glen Massey
- Site-Specific/Suitability Assessment - Appendix 2 ('Lens 1')
- Site-Specific/Suitability Assessment - Technical Reports
- Settlement Pattern – Future Proof and the Village Zone

Each of the above matters is addressed in the following sections and there is a brief summary to conclude.

7 RPS DIRECTIONS – SOILS AS A RESOURCE

7.1 The Waikato Regional Policy Statement (the RPS) became operative in May 2016. Part A of the RPS contains the Objectives (or outcomes) to be achieved via implementation of the RPS. Of particular relevance to my submission on the PWDP are the following Objectives:

> **3.2 Resource use and development**
>
> Recognise and provide for the role of sustainable resource use and development and its benefits in enabling people and communities to provide for their economic, social and cultural wellbeing, including by maintaining and where appropriate enhancing:
>
> a) access to natural and physical resources to provide for regionally significant industry and primary production activities that support such industry;
>
> b) the life supporting capacity of soils, water and ecosystems to support primary production activities; ...
>
> **3.10 Sustainable and efficient use of resources**
>
> Use and development of natural and physical resources, excluding minerals, occurs in a way and at a rate that is sustainable, and where the use and development of all natural and physical resources is efficient and minimises the generation of waste.

3.25 Values of soil

The soil resource is managed to safeguard its life supporting capacity, for the existing and foreseeable range of uses.

3.26 High class soils

The value of high class soils for primary production is recognised and high class soils are protected from inappropriate subdivision, use or development.

7.2 Part B of the RPS identifies what action is to be taken, by whom, and by what means to achieve the objectives identified in Part A. Of particular relevance to my submission are the following policies:

6.1 Planned and co-ordinated subdivision, use and development

Subdivision, use and development of the built environment, including transport, occurs in a planned and co-ordinated manner which:

a) has regard to the principles in section 6A;

b) recognises and addresses potential cumulative effects of subdivision, use and development;

c) is based on sufficient information to allow assessment of the potential long-term effects of subdivision, use and development; and

d) has regard to the existing built environment

14.2: High Class Soils

Avoid a decline in the availability of high class soils for primary production due to inappropriate subdivision, use or development.

7.3 Of particular relevance to the evidence in support of my submission is Implementation Method 14.2.1 which directs district plans to give priority to productive uses of high class soils over non-productive uses including through:

a) restricting urban and rural-residential development on high class soils; ...

d) directing urban and rural-residential development onto soils of lesser versatility where there is an option to do so;

8 SOILS AND LAND USE CAPABILITY IN GLEN MASSEY

8.1 Both the RPS and the Proposed Waikato District Plan define "High Class Soils" as:

> Means those soils in Land Use Capability Classes I and II (excluding peat soils) and soils in Land Use Capability Class IIIe1 and IIIe5, classified as Allophanic Soils, using the New Zealand Soil Classification.

8.2 Land Use Capability is determined via reference to the Land Resource Inventory (LRI) which assesses land characteristics such as rock type, soil unit, slope, vegetation cover and erosion potential.

8.3 From the LRI land use capability is able to be determined. LUC is a broad assessment of how versatile the land is for sustained production taking into account its physical limitations.

8.4 Unfortunately the soils in and around Glen Massey do not meet the definition of High Class Soils in the PWDP. The Land Use Capability (LUC) Map for Glen Massey (refer to **Attachment 3**) shows that the soils around Glen Massey are generally LUC6, with the soils subject to this submission generally classified as LUC4.

8.5 The publication Our Land Resources[1] describes LUC4 soils as having:

> "... severe limitations to arable use. These limitations substantially reduce the range of crops which can be grown and/or make intensive conservation treatment and careful management necessary.

8.6 Further, commentary contained in Our Land Resources outlines potential uses of the LRI and the associated LUC system:

> "Using the worksheets as a base, local authorities can easily identify areas where development may be safely promoted or should be restricted. For example, areas can be defined which should be protected from urban intrusion and preserved for intensive forms of agriculture, and areas most

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1 Our Land Resources; a bulletin to accompany New Zealand Land Resource Inventory Worksheets; Water and Soil Division, Ministry of Works and Development; Wellington, 1979.

appropriate for production forestry, for semi-rural living or for mineral extraction ...".

8.7 From the information presented above, it is clear that the soils in and around Glen Massey do not fall within the definition of High Quality Soils contained in both the RPS and the PWDP. It is my contention that, if the site is deemed suitable, rezoning the land from CLZ to VZ would present an opportunity to implement the relevant Objectives and Policies of the Waikato RPS (see Section 7 above).

9 SITE-SPECIFIC/SUITABILITY ASSESSMENT – APPENDIX 2 ('LENS 1')

9.1 The Minute and Directions from Hearings Commissioners dated 12 May 2020 noted:

> *"Requests for rezoning on a district plan review are site-specific and require site-specific assessments to be undertaken ...".*

9.2 Subsequent to the above, on 19 January 2021 the Section 42A Report 'Hearing 25 Zone Extents Framework Report' was released. This report provides useful direction not only for Section 42A authors, but also for submitters preparing evidence.

9.3 Whilst I had prepared an assessment of the re-zoning proposal against the RPS 6A Development Principles (refer to **Attachment 4**), given the contemporaneous nature of the Framework Report I have chosen to comment directly on the rezoning proposal against Appendix 2 (i.e. 'Lens 1') of that report: 'Matrix of Relevant Objectives and Policies in the PWDP'. A brief assessment against Appendix 2 is as follows:

Relevant PWDP Objectives and Policies	**Comment**
1. Growth occurs in defined growth areas (1.5.2(a))	Whilst Glen Massey is not identified as a defined growth area in the RPS (Map 6C Future Proof Map (indicative only)), the land is within an area defined as CLZ in both the

	OWDP and the PWDP and there is therefore an expectation of growth. Glen Massey is outside the area of the Hamilton-Waikato Metropolitan Spatial Plan (2020) and is not within an area with future infrastructure expectations. [refer also to Section 11 of this statement of evidence].
2. Urban development takes place within areas identified for the purpose in a manner which utilises land and infrastructure most efficiently. 1.12.8(b)(i)	This submission is seeking the rezoning of land from CLZ to VZ on the basis that the VZ provides an opportunity to more efficiently use the available land resource. With the exception of Waingaro and Wilton Colleries Roads, there is no Council infrastructure in Glen Massey, and nothing significant is planned or required.
3. Promote safe, compact sustainable, good quality urban environments that respond positively to their local context. 1.12.8(b)(ii)	Glen Massey is an existing village and development in line with VZ standards (and associated Codes of Practice) would ensure a safe, good quality environment in keeping with the local context (i.e. compliance with roading, earthworks and wastewater disposal standards). The opportunity would be provided for additional walkways and recreation areas, identified as a "key move" for Glen Massey in the 'Ngaruawahia, Hopuhopu, Taupiri, Horotiu, Te Kowhai & Glen Massey Structure Plan' (Waikato District Council, 2017).
4. Focus urban growth in existing urban communities that have	Glen Massey is an existing village with around 48ha identified as CLZ in the OWDP (31ha in the PDP).

capacity for expansion. 1.12.8(b)(iii)	Based upon a very simplistic interpretation of current subdivision standards, and accounting for land required for roads, land not suitable for development, etc., it is anticipated that approximately 72 lots could be developed in the area currently shown as CLZ (i.e. 36ha/5,000m²). If the zone of the land was to go from CLZ to VZ, discounting the 17ha proposed to be zoned RZ in the PWDP, and accounting for land required for roads, land not suitable for subdivision to minimum standards, etc., then it is anticipated that approximately 76 lots could be developed (i.e. 23ha/3,000m²).
6. Protect and enhance green open space, outstanding landscapes, and areas of cultural, ecological, historic & environmental significance. 1.12.8(b)(vi)	There is an opportunity to protect and enhance an area of approx. 6ha of land that is currently farmed – a large, steep (in places) watershed that runs between the areas that would be available for development to VZ standards. There are no areas of outstanding landscape, areas of cultural, ecological, historic nor environmental significance associated with the land in question. Tonkin + Taylor[2] (T+T) assessed Ecological Constraints for development in the immediate area as 'Low' (refer to **Attachment 5**).
7. Future settlement pattern consolidated in and around existing towns and villages in	Compact urban development (1.5.1.(b)): the submission seeks rezoning of land from CLZ to VZ in the existing village of Glen Massey.

[2] Tonkin & Taylor; Catchment Management Plan Ngaruawahia & Surrounds Structure Plan Area; 2015; prepared for Waikato District Council.

the district and in 'defined growth areas' (1.5.1(b); 1.12.3(a); 1.12.3(c); 4.1.2(a); 5.3.8)	This seems to be consistent with the stated direction of 1.5.1(b) whereby growth is directed primarily into towns and villages, encouraging a compact form of urban development for residents to live work and play in. Built Environment 1.12.3(a): VZ in Glen Massey would help to provide a variety of housing/lifestyle forms for a range of potential residents in the Waikato District, within reach of community facilities and employment opportunities and within ordinary household budgets. Built Environment 1.12.3(c): VZ in Glen Massey would enhance/complement the existing urban environment, more so than the current CLZ. VZ would improve existing opportunities for community well-being, recreation and economic growth. Urban Growth and Development 4.1.2(a): in terms of consolidation around the existing village of Glen Massey, VZ makes better sense than CLZ, assuming the land is suitable for more dense development/reduced lot sizes. Effects on rural character and amenity 5.3.8:
Direct urban form to within towns and villages	a) Directing growth and development to less productive areas like Glen Massey would help protect more productive land/soils in the Waikato District. The land in question is already zoned CLZ and there is an expectation there will be future

		development creating a new village boundary.
Do not compromise open space, character and amenity of rural areas	b)	The sense of open space in Glen Massey is predominantly created by the rugged and extensive hills surrounding the village/CLZ land. Development to VZ standards would create opportunities for additional and more accessible open/public space, views and vistas for existing and new village residents without compromising the underlying rural amenity values of Glen Massey.
Minimise ribbon development	c)	Development of the area of land currently zoned CLZ would not result in ribbon development as the area is set back from the existing roads and houses. Development to VZ standards would lead to consolidation or 'rounding off' of the existing village form.
Rural hamlet subdivision helps ensure:	d)	Subdivision to VZ standards will help ensure:
Protection of rural land for production purposes	i.	rural land in other parts of Waikato District (i.e. more productive land) remains available for productive purposes.
Maintenance of rural character and amenity	ii.	the rural character and amenity of Glen Massey is influenced more by the rugged and extensive hills surrounding the village than the area of land currently zoned CLZ

Minimisation of cumulative effects	iii.	cumulative effects will be contained and managed within a defined area, already zoned CLZ.
Rural character and amenity values maintained	e)	As already noted, the overall rural character and amenity values of Glen Massey (i.e. rugged and extensive hills) will be maintained and in some ways enhanced through a move from CLZ to VZ. Application of the VZ development standards will ensure subdivision, use and development is consistent with VZ expectations, which are not markedly different to those in the CLZ.
Effects on public infrastructure minimised	f)	Subdivision, use and development to VZ standards (non-reticulated) would not affect public infrastructure. Waingaro Road is identified as a Collector Road in the PWDP and Wilton Colleries Road is a Local Road. Neither road is currently fully utilised and subdivision design would ensure the continued safe, efficient and effective operation of these roads. It is anticipated that there is ample capacity where Waingaro Road adjoins Great South Road, which until 2013 was part of the State Highway 1 road corridor (approx.

	17,000 vehicles/day in 2013 cf 8,500 vehicles/day[3] on 23/1/2020).
8. Urban growth areas are consistent with Future Proof Strategy for Growth 2017 (4.1.3(b))	Refer to the earlier response for 1.5.2(a) and to Section 11 of this statement of evidence.
13. Infrastructure can be efficiently and economically provided (4.1.3(a))	Glen Massey is not identified as a water and wastewater infrastructure/growth cell. This is entirely appropriate as development of the land to VZ standards would rely on on-site infrastructure services (water, wastewater, stormwater) and be provided independently of the Council. Any associated road/s, footpath, etc. would be provided by the developer and be constructed to Code of Practice standards with the intention of vesting with the Council. A site specific report prepared by Civil Engineering Services[4] (refer to **Attachment 6**) concluded that soil conditions are generally suitable for development to VZ standards – with specific comment on wastewater, stormwater and earthworks (in relation to the construction of building platforms and access roads).
22. Meets district wide rules and any relevant overlays.	It is anticipated that development of the land to VZ standards would be able to comply with the relevant district wide rules (e.g. those in the Infrastructure and Energy, Natural

[3] https://mobileroad.org/desktop.html

[4] Civil Engineering Services (1994) Ltd; Site Suitability Report - Portion of Property to Southwest of Glen Massey; 2019; Prepared for Robcke family.

	Hazards and Climate Change, etc. sections of the PWDP). A site specific report prepared by Civil Engineering Services (refer to **Attachment 6**) noted that soil on site "... is stable and not prone to slip failure ... ". No other natural hazards were noted on site. A report by T+T (refer to **Attachment 5**) assessed 'Flooding Constraints' for development in the immediate area as 'Low', along with 'Overall constraint to development' also being assessed as 'Low'. There are no overlays relevant to the site.

10 SITE-SPECIFIC/SUITABILITY ASSESSMENT - TECHNICAL REPORTS

10.1 To help determine suitability of the land for rezoning from CLZ to VZ a geotechnical engineer was engaged to undertake an initial investigation of site soil and ground conditions. Specifically, the geotechnical engineer was asked to assess: overall site suitability for rezoning from CLZ to VZ (min lot size of 3,000m2); suitability of the land to be serviced via on-site wastewater and treatment systems, and; any observations in terms of overall development suitability, location of access roads, stormwater disposal, etc.

10.2 Around 25 test borings were subsequently undertaken to determine subsoil conditions and commentary was subsequently made on: geological setting; natural contour and soil stability; road and site access; central gully area, and; building sites.

10.3 Conclusions reached in the subsequent report (refer to **Attachment 6**) are that soil conditions are suitable for VZ for the following reasons:

- Soil and ground conditions are inherently stable.
- Soil conditions generally meet "good ground" requirements (within the upper 0.6m) for construction under NZS 3604:2011.

- Near surface soils are suitable for On Site Effluent disposal and final treatment of Primary and Secondary treated effluent.
- Terrain contour is sufficiently mild over much of the site to ensure access and site earthworks are likely able to proceed without undue difficulties.
- Natural drainage features of the site will allow appropriate stormwater design methodologies to be adopted and implemented under normal development criteria.

10.4 The report also specifically notes the central gully area (approx. 6 ha in area) which could be utilised as a natural feature (wetland, planted/wooded area), as a partial community reserve area and for stormwater attenuation.

10.5 A report by T+T, commissioned by the Waikato District Council in 2015 and titled 'Appendix D Catchment Management Plan Glen Massey Structure Plan Area', provides additional relevant site suitability information (refer to **Attachment 5**).

10.6 The T+T report contains information on in-stream ecological values (fish species, habitat quality, etc.) and hydrology/hydraulic information (culvert location, road levels, rainfall, etc.) and from that a 'rough order flood extent' has been identified (based upon a 1% AEP (m3/s)).

10.7 In an associated report also prepared by T+T in 2015 for the Waikato District Council, titled 'Catchment Management Plan Ngaruawahia & Surrounds Structure Plan', ecological constraints, flooding constraints and overall constraint to development for Glen Massey are all assessed as 'Low' (refer to **Attachment 5**).

11 SETTLEMENT PATTERN – FUTURE PROOF AND THE VILLAGE ZONE

11.1 Policy 6.14 of the RPS requires that, within the Future Proof area:

a) new urban development within Hamilton City, Cambridge, Te Awamutu/Kihikihi, Pirongia, Huntly, Ngaruawahia, Raglan, Te Kauwhata, Meremere, Taupiri, Horotiu, Matangi, Gordonton, Rukuhia,

Te Kowhai and Whatawhata shall occur within the Urban Limits indicated on Map 6.2 (section 6C);

b) new residential (including rural-residential) development shall be managed in accordance with the timing and population for growth areas in Table 6-1 (section 6D); ...

11.2 Table 6-1 in the RPS is titled "Future Proof residential growth allocation and staging 2006-2061" and under the heading "Growth areas" there is reference to "Waikato Rural Villages" with residential population in these villages projected to increase from 6,725 people in 2006 to 15,775 people in 2061.

11.3 While the village of Glen Massey is not specifically mentioned in Policy 6.14 (unlike other villages including Te Kowhai and Taupiri), at the time that Future Proof was developed Glen Massey was an existing village with an additional 48ha of land zoned CLZ immediately adjacent to the village.

11.4 In my experience, it would be unusual to ignore existing zone/development allocations when attempting to predict/plan future settlement and population patterns. I therefore expect that such allocations have been provided for in the "Waikato Rural Villages" part of the Waikato District projections in Future Proof.

11.5 In the more recent iteration of Future Proof (Future Proof Strategy Planning for Growth (Nov 2017)) it is noted that:

> "The settlement pattern as set out in the 2009 Strategy forms the basis for the settlement pattern in this document." (pg 26)

and that in relation to Waikato District:

> "The Future Proof Strategy aims to achieve around 80% of growth into Pokeno, Tuakau, Te Kauwhata, Huntly, Ngaruawahia, Raglan and various villages." (pg 26)

11.6 Future Proof 2017 then goes on to estimate the staging and allocation of residential land in 10 year cohorts (2016-25, 2026-35 and 2036-45), primarily to help partner councils plan, provide and fund infrastructure in a timely manner. Whilst the projections are different than in the 2009

iteration of Future Proof (households instead of population), for the Waikato District there is still an allocation for the "Rest of District" which again, I expect includes allocations for land that is already zoned but not yet developed, like in Glen Massey.

11.7 The only other point that I would like to make in relation to Future Proof 2017 relates to Section 11 "Implementation of the Settlement Pattern" and, in particular, the list of "Issues" which reads as follows:

- Urban sprawl in the Future Proof sub-region.
- Significant amounts of rural-residential development which can impact on versatile soils and water quality and create reverse sensitivity issues for rural activities.
- Ribbon development.
- Loss of productive rural land.
- Difficulties in achieving timely and efficient infrastructure servicing.
- Out of synch developments which cannot be adequately or efficiently serviced by councils.
- Increasing travel distances.
- The need for equitable funding.
- Pressure on natural resources.
- Unplanned development in rural areas adjacent to the boundaries of Hamilton City and other urban settlements.
- Ensuring there is sufficient land/development supply at the right time to meet demand (greenfields, intensification and business).
- Integrated planning to co-ordinate development in an effective and affordable way.
- Providing for a range of housing choices, including papakāinga housing.

11.8 I do not consider that any of these issues would be created or exacerbated by the rezoning of land at Glen Massey from CLZ to VZ and further, that such rezoning would be consistent with the with Future Proof Strategy for Growth 2017.

11.9 Lastly, I have reviewed the Objectives and Policies for the Village Zone (as notified) and note the following, which I believe are relevant to my request

for that zone to be extended in Glen Massey, and which would be achievable for any subsequent development:

4.3.1 Objective – Village Zone character

(a) The character of the Village Zone is maintained.

4.3.2 Policy – Character

(a) Buildings and activities within the Village Zone are designed, located, scaled and serviced in a manner that:

(i) Is low density;

(ii) Maintains the semi-rural character;

(iii) Recognises lower levels of infrastructure and the absence of Council wastewater services.

(b) Require activities within the Village Zone to be self-sufficient in the provision of on-site water supply, wastewater and stormwater disposal, unless a reticulated supply is available.

4.3.4 Objective – Village built form and amenity

(a) Neighbourhood residential amenity values in the Village Zone are maintained.

12 SUMMARY

12.1 In my opinion, this statement of evidence has demonstrated:

- Rezoning the land in Glen Massey from CLZ to VZ would be consistent with RPS directions - particularly those relating to resource use and development, sustainable and efficient use of resources and, protection of high quality soils.
- The soils subject to this submission and statement of evidence are not 'high quality soils'.
- The land and soils subject to this submission and statement of evidence are suitable for development down to VZ standards with on-site services (refer to **Attachment 6**).
- Rezoning from CLZ to VZ, and subsequent development, would not be inconsistent with the relevant objectives and policies of the PWDP.

- Rezoning from CLZ to VZ, and subsequent development, would not be inconsistent with Future Proof directions.

12.2 Based upon the above, and the rest of this statement of evidence, it is my view that the amendments sought to the PWDP via my submission will help provide for outcomes that are consistent with achieving the Purpose of the RMA – the sustainable management of natural and physical resources.

Leigh Robcke

Planner

19 February 2021

LIST OF ATTACHMENTS

Attachment 1:	Letter tabled at Countryside Living Zone Hearing (dated 2 April 2020)
Attachment 2:	Relevant pages from Ngaaruawahia, Hopuhopu, Taupiri, Horotiu, Te Kowhai & Glen Massey Structure Plan (March 2017)
Attachment 3:	Land Use Capability (LUC) Map for Glen Massey
Attachment 4:	Assessment of Re-zoning request against Waikato Regional Policy Statement 6A General Development Principles (RPS 6A)
Attachment 5:	Catchment Management Plan: Ngaruawahia & Surrounds Structure Plan Area (March 2015), including Appendix D: Catchment Management Plan Glen Massey Structure Plan Area (March 2015)
Attachment 6:	Site Specific Geotechnical Report: Civil Engineering Services Ltd (September 2020)
Attachment 7:	Section 32AA Assessment

2 April 2020

The Waikato District Plan Hearings Panel
(sent via email to District Plan Administrator)

REQUEST FOR LETTER TO BE TABLED AT COUNTRYSIDE LIVING ZONE HEARING ON 7 APRIL 2020

Dear Panel.

I am writing to you in the hope that you will read this letter and cogitate on the points raised, unless of course you have already done so.

I represent submitter 551 – the Estate of John Robert Robcke & Dinah Leigh Robcke. I made 2 submissions. Submission 2 is relevant in the context of the Country Living Zone (CLZ) hearing and is as follows:

> *"Oppose Country Living Zone subdivision standards 23.4.2 (a)(i) [net site area of at least 5000m^2], 23.4.8 (a)(i) [building platform of 1000m^2] and 23.4.8 (a)(ii) [average gradient no steeper than 1:8] as they relate to the Country Living Zone in Glen Massey.*
>
> *Decision sought:*
> - *Either: introduce greater flexibility in subdivision development standards for the Country Living Zone in Glen Massey (e.g. minimum net site area of 2,500m^2 with an average of 5,000m^2, building platform of 500m^2, etc.) and make any consequential changes required to give effect to this submission;*
> - *Or: rezone the areas of land at 859 and 889 Waingaro Road that were previously zoned Country Living Zone to Village Zone and make any consequential changes required to give effect to this submission."*

Based upon my research – in which I have looked at comparable development standards in the Thames-Coromandel, Hauraki, Western Bay, Matamata-Piako, Waipa, South Waikato and Auckland Councils – these standards seem overly conservative. The main reasons given in the S42A report for staying with these development standards seem to be administrative simplicity and maintenance of 'rural amenity' which whilst important, need to be balanced with other national and regional policy imperatives such as the protection of high quality soils, efficient use of the land resource, avoidance of reverse sensitivity effects, etc.

Given the stance taken in the S42A report with regard to the CLZ development standards, I have decided that I will focus my energies on the "or" part of the decision sought in my Submission 2 (i.e. rezone the land at Glen Massey from CLZ to Village Zone) which I understand is to be heard later in the year.

Getting now to the main point of this letter, I see in the S42A report that it is recommended that the title of the CLZ be amended to the Rural Lifestyle Zone (RLZ) so that it is consistent with the National Planning Standards (NPS).

Whilst I do not have any issue with aligning the Waikato District Plan to the NPS per se, I do note that the description for the RLZ in the NPS is as follows:

> *"Areas used predominantly for a residential lifestyle within a rural environment on lots smaller than those of the General rural and Rural Production zones, while still enabling primary production to occur." (emphasis added)*

In the context of the Waikato District, is it being suggested that primary production will be enabled on 5,000m^2 of land? Even though many of the CLZ areas within the Waikato District are on highly productive soils (which is not the case in Glen Massey), I doubt that viable primary production can occur on such small areas of land – particularly given the large size of houses, recreation amenities, curtilage, etc. Is the Panel confident that the objectives and policies of the CLZ (or the RLZ for the Waikato District) reflect the zone description in the NPS?

In the case of Glen Massey, this all leads me to the conclusion that the land subject to the above submission should more logically be Village Zone, or Settlement Zone if the NPS directions are to be followed, the description of which reads:

> *"Areas used predominantly for a cluster of residential, commercial, light industrial and/or community activities that are located in rural areas or coastal environments."*

Thank you for taking the time to read this document.

Regards

Leigh Robcke

Leigh Robcke
Authorised to sign on behalf of Dinah Robcke and the estate of John Robcke

Ngaaruawaahia, Hopuhopu, Taupiri, Horotiu, Te Kowhai & Glen Massey Structure Plan

Waikato DISTRICT COUNCIL
Te Kaunihera aa Takiwaa o Waikato

March 2017

Contents

1. Introduction

The Ngaaruawaahia, Hopuhopu, Taupiri, Horotiu, Te Kowhai & Glen Massey Structure Plan[1] (NSP) is a guide to the development of the town of Ngaaruawaahia and the satellite settlements of Hopuhopu, Taupiri, Horotiu, Te Kowhai & Glen Massey over the next 30 years to 2045. The plan has been prepared by Waikato District Council working with local iwi, residents and key stakeholders.

Importantly, the plan reflects the vision of the local communities to each maintain their individual identity and character and continue to thrive as settlements while absorbing the expected growth in population and development over the next 30 years.

The Structure Plan is a non-statutory document that will be given effect to by Waikato District Council in two ways. Firstly, it informed a plan change to the Waikato District Plan and will assist the District Plan Review to incorporate appropriate rezoning and development controls to enable the future growth and development of these six settlements. Secondly, but equally important, the plan and proposed staging of development will be used to guide the Council's Long Term Plan and strategic planning of infrastructure and service delivery of projects for these settlements over the next 30 years.

1.1 Purpose of the Structure Plan

The Structure Plan provides a strategic and spatial framework for future land uses, open space, transport and utility networks in the six settlements over the next 30 years. The plan is a guide to the staging of development and the integrated provision of transport networks, water supply, wastewater and stormwater disposal, open space, other utility networks, community facilities and the funding of development.

Key benefits of the Structure Plan

- Incorporation of community values and aspirations for the future development of Ngaaruawaahia, Hopuhopu, Taupiri, Horotiu, Te Kowhai & Glen Massey;
- Setting of agreed development standards;
- Guidance to landowners and Council regarding the layout and form of future development;
- Coordination and staging of infrastructure funding and development;
- Reduction of land use conflict;
- Better monitoring and timely release of land supply for urban development; and,
- More efficient assessment and approval of subdivision and land use consents.

[1] The Structure Plan is a report and plan together with supporting technical documents and maps

Figure 12. Glen Massey – Local Context and Key Features

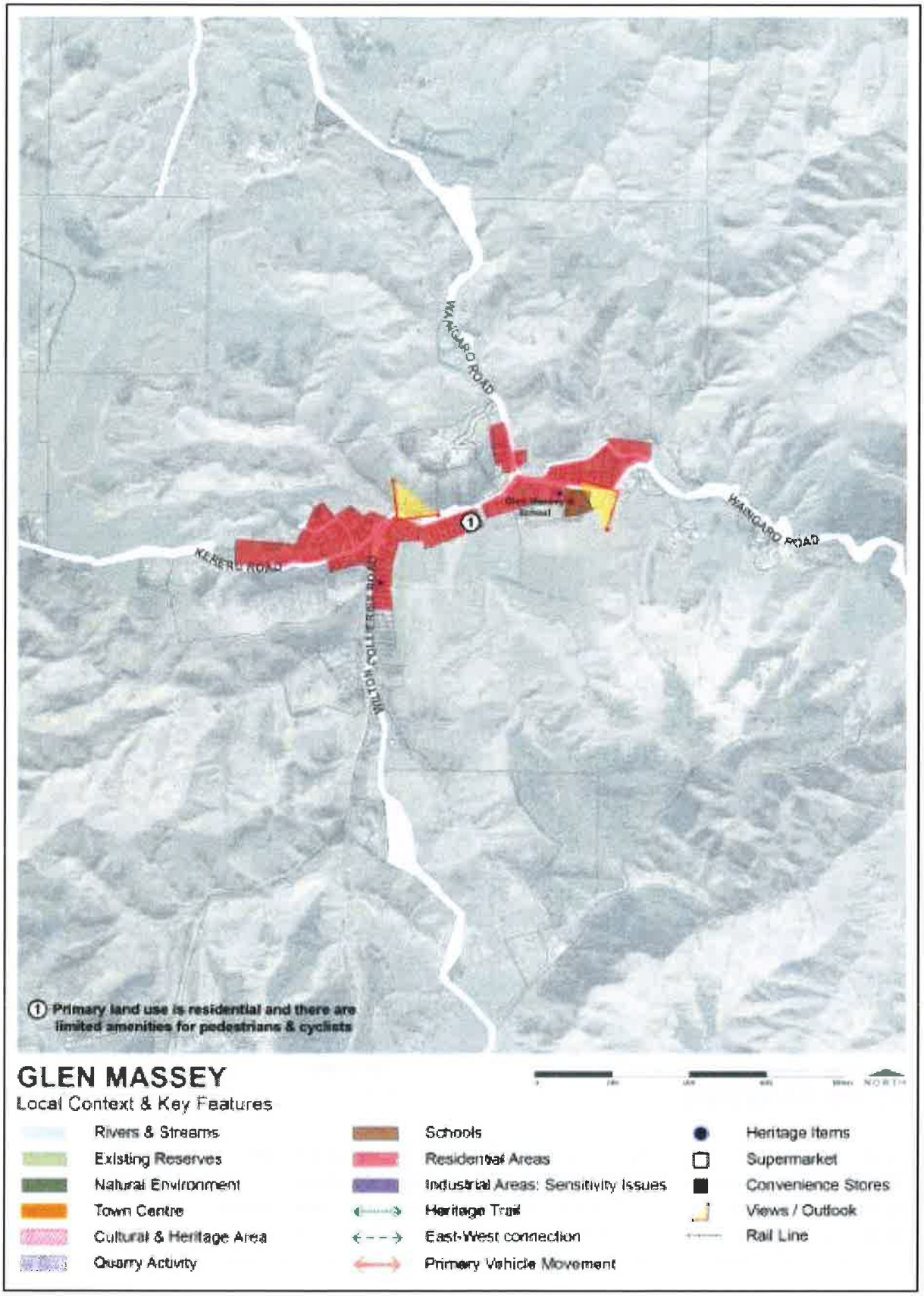
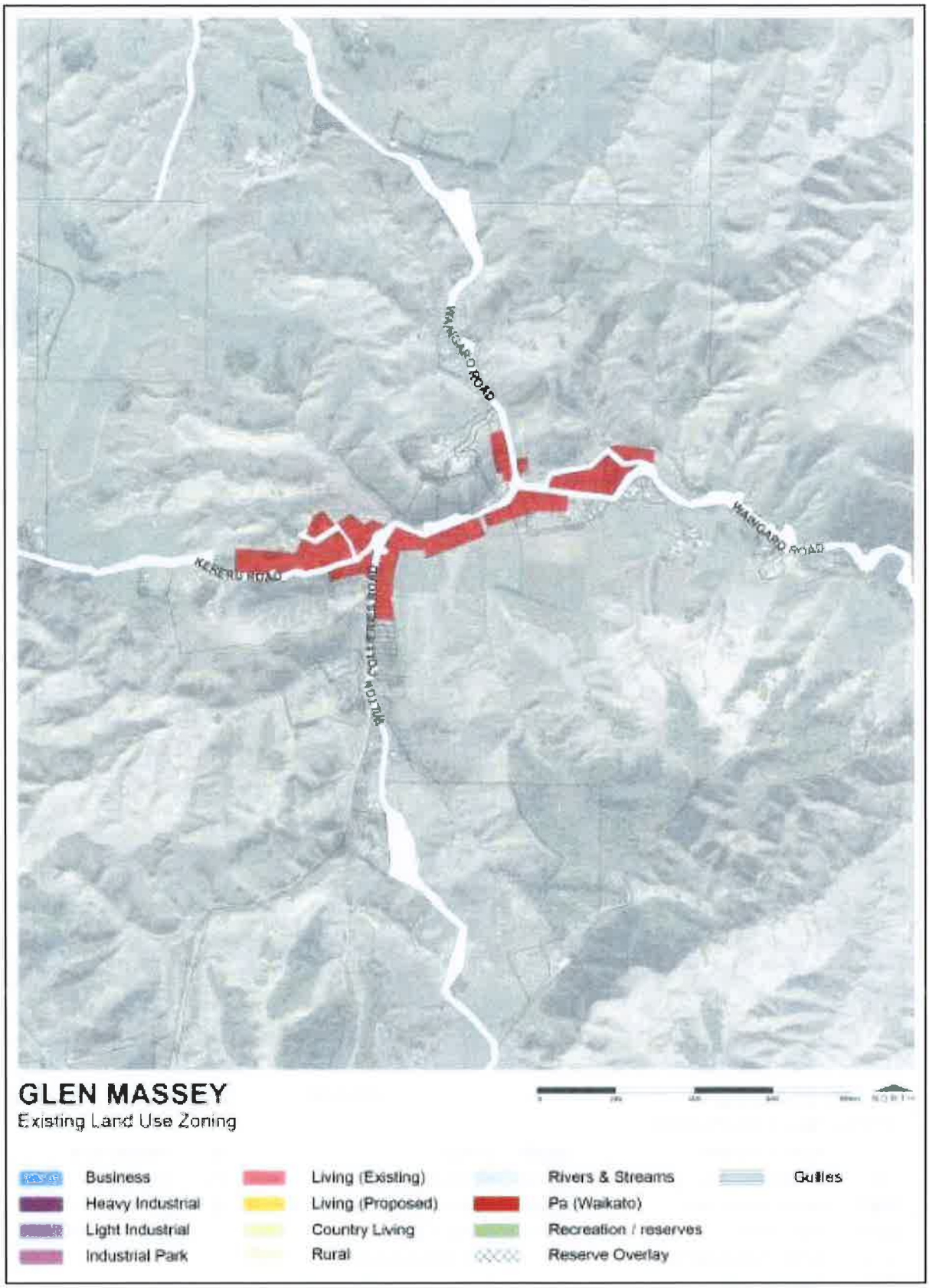


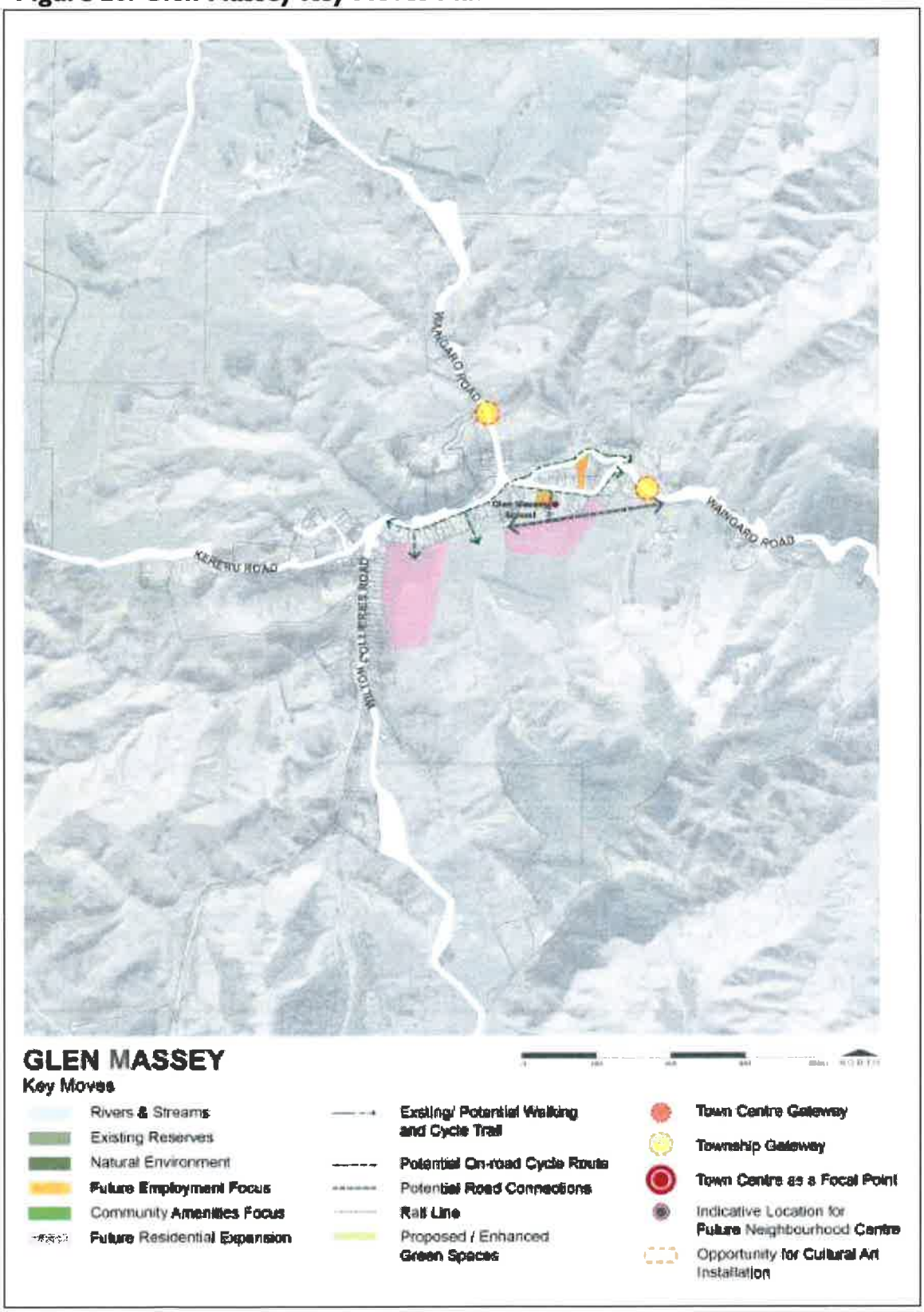
Figure 13. Existing Land Use Zoning for Glen Massey



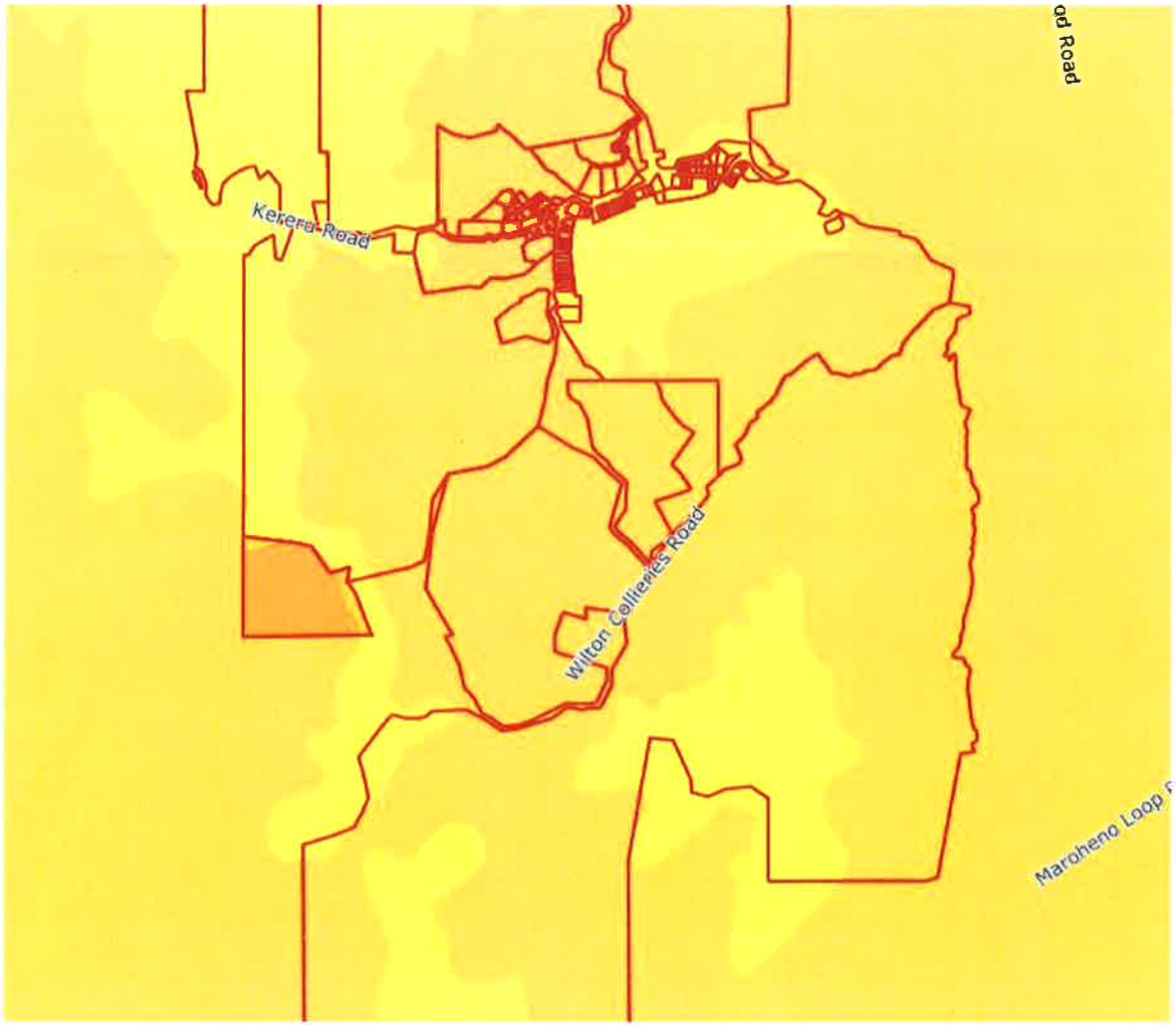
4.2.6 Key moves for Glen Massey

- Footpaths connecting from the school through the village and along the Wilton Colleries Road;
- More recreational facilities; and
- Focus village identity on its coal mining heritage.

Figure 20. Glen Massey Key Moves Plan



Land Use Capability (LUC) Map for Glen Massey



- Land Use Capability
  - LUC1
  - LUC2
  - LUC3
  - LUC4
  - LUC6
  - LUC7
  - LUC8
  - Quarry
  - Default Class

Source: Waikato District Council GIS services.

Assessment of Re-zoning request against Waikato Regional Policy Statement 6A General Development Principles (RPS 6A)

... new development should:

RPS Development Principles (Section 6A) [abridged]	Assessment/Comment
a) Support existing urban areas	**Relevant** Glen Massey is an existing village with a large area already zoned CLZ for further growth and development. Additional development at Glen Massey would provide opportunities to support and enhance the existing village environment.
b) Provide a clear delineation between urban and rural areas	**Relevant** There is currently a clear delineation between rural and urban areas in Glen Massey and the existing CLZ boundary would provide for this to be replicated – albeit at a lower density (i.e. existing residential sections in the village are approx. 1,000-2,000m2 in size whilst the proposed VZ min lot size is 3,000m^2).
c) Make use of opportunities for intensification	**Relevant** Rezoning the land from CLZ (min lot size 5,000m2) to VZ (min lot size 3,000m2) would be in line with this principle. I consider a minimum lot size of 5,000m2 to be a wasteful and uneconomic use of the available land resource.
d) Safe, efficient and effective operation and use of existing infrastructure	**Relevant** Council infrastructure services available in Glen Massey are Waingaro and Wilton Colleries roads, with some associated local footpaths and street lights. Waingaro Road is identified as a Collector Road in the Proposed District Plan and Wilton Colleries Road is a Local Road. Neither road is currently fully utilised and subdivision design could ensure the continued safe, efficient and effective operation of these roads.
e) Connect well with existing and planned development	**Relevant** If zoned VZ, the site lends itself to construction of a loop road/s and footpath/s which would connect the existing village with new development and provide recreational opportunities.
f) & g) Availability and efficient use of water	**Relevant**

	Like in most other rural and rural residential situations, water would be supplied via self-managed roof collection and storage in on-site tank/s. Self manged collection and storage leads to the most efficient water management practices.
h) Be directed away from: - Significant mineral resources	**Not relevant** There are no mineral resources identified on site/planning maps and none known of. Note: there is a disused clay works and brick factory to the north and a disused coal pit 2km to the west.
- Natural hazard areas	**Not relevant** None identified on site/planning maps, none known of. None noted by geotechnical engineer whilst on site. None noted in T+T Catchment Management Plan.
- Energy and transmission corridors	**Not relevant** None identified on site/planning maps. Note: Transpower 220kv line and pylons (Stratford to Huntly) to the east.
- Locations identified for renewable energy generation	**Not relevant** None identified on site/planning maps, none known of.
- Regionally significant industry	**Not relevant** None in the area.
- High class soils	**Not relevant** See section 7 of the accompanying statement of evidence.
- Primary production on high class soils	**Not relevant** No high class soils present.
i) promote compact urban form, design and location to ... minimise energy and carbon use; encourage walking & cycling; maximise opportunities to live, work and play locally.	**Relevant.** Development to VZ standards would provide opportunities for increased participation in walking and cycling and enable people to live, work and play within the local area (working from home via the internet, home occupations, etc.).
j) Maintain or enhance landscape values, protect historic and cultural values	**Relevant** The site is not identified on the Proposed Planning Maps as an Outstanding Natural Feature, Outstanding Natural Landscape or a Significant Amenity Landscape.

	In any case, any development on site would continue to be dominated by the large forested and grazed hills surrounding Glen Massey. There are no known or identified historic or cultural values on the site.
k) Promote positive biodiversity outcomes, protect SNAs	**Relevant** The site is currently in pasture and there is the opportunity to improve biodiversity through on-site planting and restoration of a large gully area. The site is not identified on the Proposed Planning Maps as a Significant Natural Area.
l) Maintain public access to and along the coastal marine area, lakes and rivers	**Not relevant.** The site is not near the coastal marine area, a lake or river.
m) avoid as far as practicable adverse effects on natural hydrological characteristics and processes (including ... flooding patterns), soil stability, water quality and aquatic ecosystems ...	**Relevant.** A site specific geotechnical engineering assessment was commissioned for the site. Soil and ground conditions were found to be inherently stable. A site specific report by Tonkin + Taylor assessed 'Ecological constraints', 'Flooding constraints' and 'Overall constraint to development' for Glen Massey as 'Low'. There are opportunities for enhancing water quality and aquatic ecosystems on site.
n) adopt sustainable design technologies, such as ... energy efficient design, low-energy street lighting, rain gardens, renewable energy, rainwater harvesting and grey water recycling techniques where appropriate	**Relevant.** Development to VZ standards would be required to comply with relevant design standards, the Engineering Code of Practice, etc. Rainwater harvesting would be undertaken to provide drinking water and it would be standard practice for subdivision and building design to maximise opportunities for capture and storage of rainwater.
o) not result in incompatible adjacent land uses (including those that may result in reverse sensitivity effects) ...	**Relevant.** The land adjacent to the CLZ land is used for extensive drystock farming. Stock numbers and inputs are low and this is unlikely to change in the future.
p) be appropriate with respect to projected effects of climate change and be designed to allow adaptation to these changes	**Relevant.** Whilst there are no natural hazards (flooding, land instability, etc.) noted for the property, Glen Massey, like the rest of the Waikato/NZ, may become increasingly susceptible to drought in the future.

	It would be wise for subdivision and building design to maximise the capture and storage of water on site.
q) consider effects on the unique tāngata whenua relationships, values and aspirations ...	**Relevant.** No unique tangata whenua relationships, values or aspirations are known to be associated with the site. There are no recorded archaeological sites in the area.
r) support the Vision and Strategy for the Waikato River;	**Relevant.** Rezoning from CLZ to VZ would provide the opportunity for areas of steep land/gully to be retired from farming and for a local stream and associated biodiversity to be restored and protected.
s) encourage waste minimisation and efficient use of resources ...	**Relevant.** Development to VZ standards would result in less waste of the land resource and a more compact urban form than under the CLZ standards.
t) recognise/enhance ecosystem services.	**Relevant.** There is a central gully area (approx. 6 ha in area) which has been identified as a natural feature (potential wetland, planted/ wooded area), that could be used as a partial community reserve and for stormwater attenuation.

Attachment 5

REPORT

Waikato District Council

Catchment Management Plan
Ngaruawahia & Surrounds Structure Plan Area

Tonkin & Taylor

ENVIRONMENTAL AND ENGINEERING CONSULTANTS

REPORT

Waikato District Council

Catchment Management Plan
Ngaruawahia & Surrounds Structure Plan Area

Report prepared for:

Waikato District Council

Report prepared by:

Tonkin & Taylor Ltd

Distribution:

Waikato District Council	**PDF**
Tonkin & Taylor Ltd (FILE)	**1 copy**

March 2015

T&T Ref: 61814.2

Table of contents

Executive summary

This Catchment Management Plan has broadly considered the background issues and potential constraints with regard to freshwater ecology and flood hazard to urban growth within the Ngaruawahia and Surrounds Structure Plan Area.

A draft Catchment Management Plan was prepared and issued to Council in August 2014. In February 2015, Council advised that no changes were required to the draft plan. This final version has been released with no new work completed since the draft version was issued.

The Structure Plan Area includes the towns of:

- Taupiri.
- Horotiu.
- Ngaruawahia.
- Glen Massey.
- Te Kowhai.

Flood hazard associated with the Waikato River affects the towns of:

- Taupiri.
- Horotiu.
- Ngaruawahia.

Flood hazard associated with the Waipa River affects the towns of:

- Ngaruawahia.
- Te Kowhai.

The streams and tributaries within all towns are potentially subject to flood ponding which extends well beyond the nominal stream channels and impacts the broader floodplains of many of these streams. Potential flood hazards associated with ponding areas and overland flow paths exist in urbanised parts of all of the towns within the Structure Plan Area.

The streams and tributaries within the Te Kowhai Structure Plan Area are potentially subject to significant flood hazard (deep and or fast flowing flood waters) and this hazard extends well beyond the nominal stream channels and impacts the broader floodplains on many streams.

Ponding as a result of culvert capacity issues with Glen Massey results in adverse flood effects on some properties but no detailed topographic information was available to fully assess the extent of the issues.

The proposed growth area land uses within the Structure Plan Area include residential development around stream corridors and overland flow paths and this includes areas where flood hazard has been estimated to occur. Overall the nominated growth areas are relatively large compared to the extent of flood and ponding hazard and therefore there is an overall low constraint to the proposed development. Notwithstanding there are still parts of proposed growth areas which do not have adequate open space provisions and future development of those areas would be significantly constrained by the estimated flood hazard.

A number of culverts and bridges are considered to be either exacerbating flood issues or limiting the upstream migration of fish and therefore require further assessment.

The status of the freshwater streams is generally considered degraded but there is potential for stream value enhancement throughout the Structure Plan Area. At this stage no open space areas and have been identified by WDC but it is expected that these will likely be included after a review of flood issues, and could include riparian planting.

Overall, outside of flood and ponding hazard areas, we consider that there is generally a low constraint to growth within the Structure Plan Area assuming that good practice stormwater management measures are employed. Some specific mitigation measures (over and above good practice) are recommended for some areas or land parcels.

The identification and use of open spaces areas can be used as a tool to help manage the flooding hazard maps and ecological issues presented in this report.

Waikato District Council holds a Comprehensive Stormwater Discharge Consent for urban areas within the Structure Plan Area and this resource consent in effect sets the standard for good practice planning and design.

1 Introduction

1.1 Background

Waikato District Council (WDC) engaged Tonkin & Taylor Ltd (T&T) to prepare a draft Catchment Management Plan (CMP) for the Ngaruawahia and Surrounds Structure Plan Area (SPA).

The Structure Plan Area (shown in Figure 1 below) includes the towns of:

- Taupiri.
- Horotiu.
- Ngaruawahia.
- Glen Massey.
- Te Kowhai.

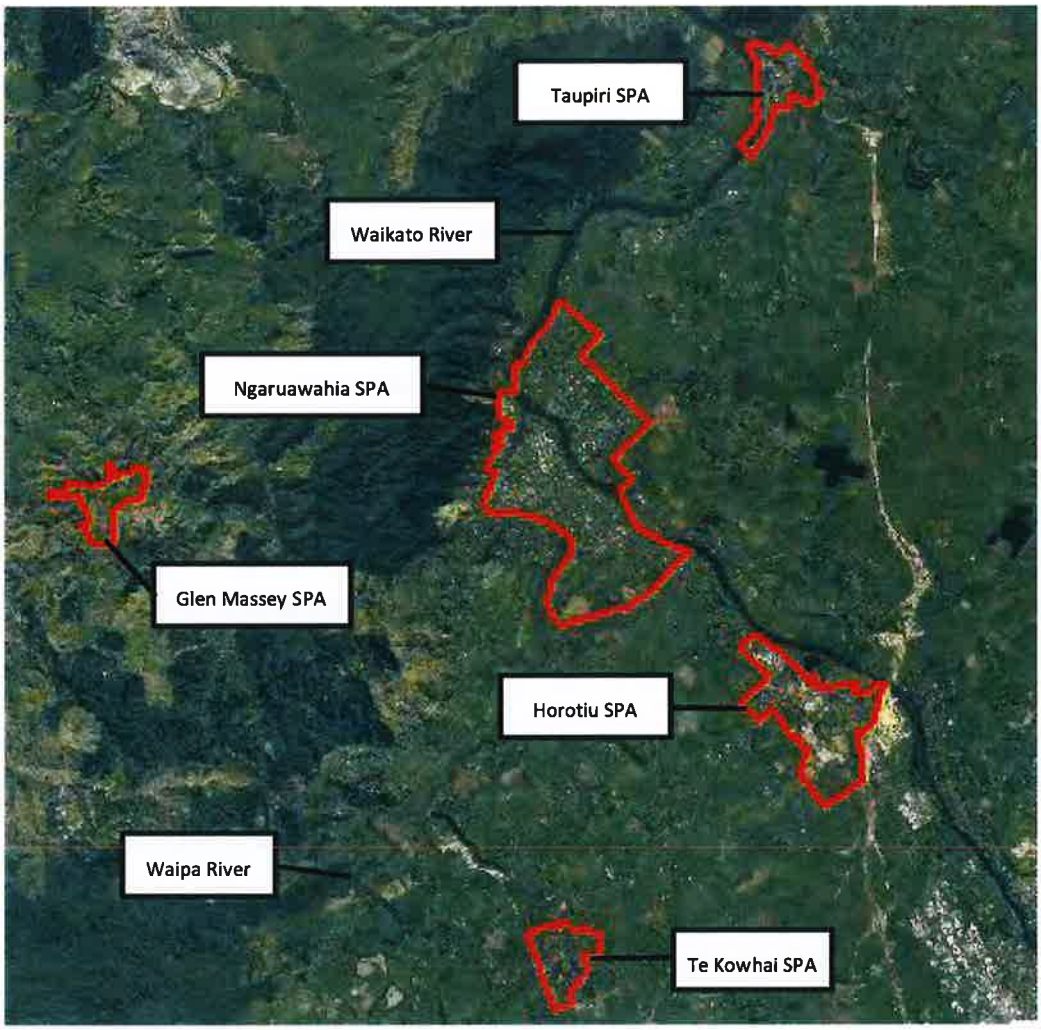


Figure 1. Location plan

This CMP has been produced to support and inform WDC's planning decisions relating to urban growth for each of these towns.

WDC has progressed high level planning for growth in the towns to develop preliminary growth areas and the SPAs used herein. The SPA extents are shown in the following sections.

This CMP focuses individually on each of the towns surrounding and including Ngaruawahia. WDC has provided indicative plans for each town (except Glen Massey) showing the proposed extent of future (exclusively residential) land use.

This CMP should be read in conjunction with a number of other reports commissioned by WDC for the each SPA covering issues related to:

- Contaminated land.
- Built heritage.
- Archaeology.
- Tangata whenua matters.
- Landscape and amenity.
- Geotechnical matters.
- Transport.
- Water.
- Wastewater.
- Urban design.
- Property economics.
- Aquatic ecology.

This CMP is limited to an assessment of ecological issues and flooding hazards within the defined Taupiri, Horotiu, Ngaruawahia, Glen Massey, and Te Kowhai SPAs.

1.2 Purpose

With respect to ecological and flood issues, the purpose of the CMP is to:

- Provide baseline information within each SPA.
- Broadly identify potential environmental effects on riparian and aquatic ecology from urban development within the nominated growth areas.
- Broadly identify potential flooding hazards in the nominated growth areas.
- Summarise the potential limitations to growth within the nominated growth areas.
- Identify means to address potential adverse environmental effects.

1.3 Scope

The following tasks have been undertaken and are outlined in this CMP:

i. A Rapid Flood Hazard Assessment (RHFA) for Te Kowhai using available LiDAR to map flood hazards.

ii. An engineering survey and culvert capacity analysis for Glen Massey.

iii. An assessment of potential ponding areas for Taupiri, Horotiu and Ngaruawahia.

iv. A review of flood extents from the Waikato River and Waipa River for all towns except Glen Massey.

v. Identification and review of critical structures to help inform the RFHA, culvert capacity and ponding assessment results interpretation.

vi. Review and assessment of the ecological status of water resources in the catchment.

vii. Site walkovers at critical (and publicly accessible) locations to identify and map the key hydrological features of the catchment including; floodplain extents and levels of

development, in-stream structures and visually assess barriers to fish passage and riparian and freshwater habitat condition.

viii. Preparation of GIS layers (shape files) that show the extent of potential flooding and ecological attributes.

ix. Preparation of GIS layers that show the key stormwater features.

x. Identification of gaps or areas where further data collection is required.

xi. Identification of stormwater management issues and potential adverse effects from growth and presentation of options for management of these issues.

1.4 Data obtained from councils

The following data has been supplied by WDC:

- Aerial photographs.
- Raw LiDAR data for the Taupiri, Horotiu, Ngaruawahia and Te Kowhai areas.
- Stormwater asset data (this generally excludes culverts as these are "road" assets).
- The SPA boundaries.
- Previous relevant reports.
- Basic residential growth areas for Taupiri, Horotiu, Ngaruawahia and Te Kowhai.

Waikato Regional Council (WRC) has provided:

- Waikato River 1D[1] flood model (MIKE 11) cross sections including 1% AEP (with no climate change) flood levels from the Karapiro Dam to Port Waikato as well as an interpolated 2D flood extent.
- 2D interpolated[2] flood levels for the Waipa River (1% AEP with no climate change).
- Additional raw LiDAR data for the Te Kowhai area.

1.5 Report structure

This CMP has been structured so that the main report body includes a high level overview, summary and conclusions relating to each of the towns and villages only.

Separate reports for each town addressing more specific background, issues, and assessments have been included in the appendices.

[1] We note that the 1D modelling carried out by WRC was undertaken in 2009 with no allowance for Climate Change.

[2] 1D flood levels interpolated by WRC using 2007/2008 LiDAR data.

2 Ecological assessment overview

2.1 Introduction

This section provides an overview of the issues considered when undertaking the assessment of the potential effects on surface water resources as a result of development of the five SPAs.

This section:

- Outlines the types of stressors on surface water environments from urban development.
- Outlines the issues considered when determining the significance of potential environmental effects from urban development.
- Identifies areas of uncertainty, where further information may need to be gathered to more fully assess and understand these effects (common to all five SPAs).

Specific assessments for each SPA are presented in appendices to this report

2.2 Effects of urban development on surface water resources

This section summarises the potential adverse effects of urban development on surface water resources within and downstream of the SPA.

2.2.1 Catchment land uses and effects on water quality

All of the main streams passing through the five SPAs drain areas of agricultural and/or urban land use in their catchments. These streams are influenced to varying degrees as a result of these land uses. The management of urban stream reaches cannot be undertaken effectively without consideration of these influences on water and habitat quality, and in some instances the measures that may be carried out to manage potential adverse effects on water and habitat quality from urban development may not significantly improve water and habitat quality in these water bodies.

2.2.2 Effects on water and sediment quality

Existing water quality issues for streams in the SPA and potential issues associated with development are described as follows:

- Physical and chemical water quality – Key potential stressors for aquatic fauna include water temperature, dissolved oxygen and water clarity. Elevated water temperature is a direct stressor to aquatic fauna as well as affecting dissolved oxygen concentrations. Water temperature elevations can occur as a result of loss of stream riparian cover and shade as well as introduction of sources of heat, such as on-line stormwater ponds, that discharge to streams. Decreased levels of dissolved oxygen and water clarity are stressful to aquatic organisms and reduce habitat quality. Reduced dissolved oxygen and water clarity conditions often occur as a result of organic pollution and reductions in base flows that are typically associated with urban development.
- Nutrients – Elevated concentrations of nitrogen and phosphorous contribute to excessive and nuisance growth of aquatic plants including algae and macrophytes, particularly where little riparian shade is present and this reduces stream habitat quality. Urban stormwater runoff can contribute to nutrient concentrations in streams but the main source in the subject streams is likely to be from agricultural land use in the catchment.
- Stormwater contaminants – Typical contaminants include metals and hydrocarbons. These toxic substances can impact on in-stream biota and can accumulate in stream sediments potentially affecting sediment biota as well. Current practices in the management of

stormwater can reduce impacts on receiving waters but existing developed catchments can be difficult to successfully retro-fit improvement measures and the receiving environments may already be compromised by historical land uses and land use practices. The existing contamination status of streams (in terms of water and sediment quality) in these areas is unknown.

- Urban development increases the chance of accidental spills of contaminants occurring. This is particularly the case for industrial areas where storage and transport of hazardous materials is concentrated and spills are more likely to occur. Development and associated expansion of the sewer network introduces a potential for overflow events to a wider range of aquatic receiving environments.

2.2.3 Effects on in-stream habitat quality

A range of habitat types are required to support diverse and healthy aquatic communities. Habitat quality is impacted by the water and sediment quality issues described above as well as physical habitat characteristics that can be modified and adversely affected as a result of urban development. Physical habitat issues for the streams in the SPA are described as follows:

- Reduction in habitat diversity – Streams in both rural and urban catchments can be affected by sedimentation that smothers stream beds, riparian vegetation removal that reduces bankside cover and woody debris input, and results in uniform flow conditions that affect the ability of plants and animals to become established in these reaches. These activities can collectively result in significant reduction and disruption of habitat and habitat diversity through loss or reduction of physical habitat and reduction in food sources and/or food source substrates.
- Exacerbation of nuisance aquatic plant growth – Excessive periphyton and macrophyte biomass is currently an issue in the catchment streams and reduces habitat quality for macroinvertebrates and fish.
- Introduction of aquatic pests – Aquatic plant and fish pest species area already present in the streams in the area. Fish pests such as Gambusia can displace native species and aquatic weeds such as the various oxygen weeds can clog streams, reduce habitat quality and are difficult to eradicate.
- Erosion and sedimentation – Stream bank erosion and the movement of sediment is a natural process, but acceleration of this process through earthworks in riparian margins, poor earthworks and construction practices, or the concentration of stormwater flows into streams can lead to a disproportionate sediment supply smothering existing substrates, and destabilising stream channels, resulting in habitat loss or severe degradation of habitat quality. Sediment runoff from large urban developments is usually managed through controls put in place by resource consents. However, sediment loss from smaller developments can be also be significant and is often more difficult to manage as it may not be captured via a resource consent process.
- Removal of riparian vegetation – many of the streams in the study area lack vegetated riparian margins. Riparian margins provide a range of ecological services including filtering of contaminants, providing shade and temperature control in streams and providing habitat and food for aquatic and terrestrial fauna.

2.2.4 Habitat modification and loss

Ideally urban development planning works with the stream resources present, does not alter natural stream channels and allows for sufficient riparian buffers. However, in some cases modifications to streams cannot be avoided and diversion, piping and in some cases filling are

required. In general these activities will require mitigation works to offset habitat modification or loss and this will apply to both intermittent and permanently flowing reaches of streams.

2.2.5 Changes in hydrology

Increases in impervious surface area as a result of development and associated stormwater discharges and management can affect both base and peak flow conditions in streams.

- Decreases in base flows – increases in impervious area can reduce water infiltration to groundwater and subsequently reduce contributions to base flows in streams. This is particularly important in headwater areas or areas that have a high proportion of impervious cover and may impact on the amount of aquatic habitat available during dry conditions.
- Increases in peak flows – also occur with increasing impervious surfaces which increase the rate of stormwater runoff into streams. This in turn can cause stream erosion, or more subtly can impact on aquatic resources, through the frequent disturbance of habitat during high flow events.

2.2.6 Fish species, habitats and passage

The streams within the SPA retain some fish habitat values despite being characterised by generally reduced habitat quality. Development has the potential to impact on native fish populations and habitats in the short term during construction works and in the long term if in-stream structures form a barrier to their migration. Many native fish species migrate between freshwater habitats and the sea as part of their lifecycle. Development that includes in-stream works and structures will need to consider the migration timing and requirements of fish present in the catchment.

2.1 Assessment of effects

In determining the significance (high, medium and low) of effects, we have considered the general potential effects discussed above with respect to the types of land uses proposed by WDC with specific issues as outlined below.

Stormwater runoff from developed urban land will likely include elevated concentrations of total suspended solids (TSS), have on occasions elevated temperature, contain litter and have elevated concentrations of metals, hydrocarbons and nutrients (nitrogen and phosphorus). All of these have the potential to adversely affect water quality and place stresses on flora and fauna living in receiving waters. While runoff from residential land is considered to represent a low risk to water quality, stormwater runoff from industrial and commercial land represents a higher risk to water quality. Also for these types of land uses, there is the potential for industrial site activities to result in spills of contaminants to the stormwater network.

The effects of urban development on stream base flows will depend on the nature of development (i.e. commercial and industrial development is more likely to require the formation of flat building platforms, resulting in the infilling of zero and first order stream channels than large lot rural developments) and location of the development within a stream's catchment i.e. zero and first order streams located within growth areas are considered to be more vulnerable to the effects of development than if development was adjacent to larger streams or rivers.

Urban development has the potential to adversely affect stream riparian margins through the removal of tall and woody vegetation, and/or regular herbicide spraying to reduce urban flooding risks, planting of species that provide limited shading or other habitat, or neglect leading to weed infestation. Urban development has the potential to adversely affect stream water temperature directly through removal of vegetation (often to reduce urban flooding risks) that provides shade or indirectly as stormwater runoff from impervious areas can also have elevated temperatures.

These effects can be further exacerbated through the construction of stormwater treatment devices that result in thermal gain and in particular the use of on-line ponds. Riparian planting can reduce potential adverse effects of elevated temperatures from stormwater discharges through shading of waterways. The low density residential land use has been proposed by WDC within the SPA. For this assessment, we have assumed that planning, design and construction of new growth areas will occur in accordance with best practice guidance including riparian enhancement and the provision for fish passage.

Our assessment is based on fully developed urban areas, and does not take account of effects during construction (such as erosion and sedimentation).

The main ecological issues associated with future urban development in the five SPAs are described in detail in the appendices to this report.

2.2 Information gaps

Through our review of available information and our assessment of issues and constraints for all five SPAs, we have identified the following information gaps.

- **Site specific ecological information on streams within the SPA** – No specific ecological information was available for streams inside the SPA. A site walkover of all stream and tributaries is required to gain a comprehensive understanding of these environments.
- **Comprehensive fish passage information** – At present the diversity of native fish in the catchment sites is low but it is not clear if this is due to poor water and habitat quality or the presence of barriers downstream. A comprehensive fish passage assessment would be required and could be undertaken in conjunction with stream walkovers.
- **Base flow information** – No readily available information on the hydrological regime of streams within the SPA has been found. Flow gauging data collected on an *ad hoc* basis by WRC might be available for some streams, but this would require further analysis in order to quantify base flows and determine site specific flow conditions that are necessary to sustain aquatic ecosystems.
- **Water quality information** – There is no readily available information on the nutrient status of the streams within the SPA, although some data may be available from WRC for some streams.
- **Existing stream contamination status** – We have not found any sediment sampling and analysis data for the SPA streams and this is required to clarify issues and establish baseline conditions. This is particularly important for infill areas and expansion of growth areas, where stream values may be compromised from previous land uses.

Development will likely require resource consent(s) from WRC. Both WRC and WDC will likely want to ensure that the effects of any land use changes are monitored. For some areas this will require data gathering to provide a baseline from which changes can be measured and assessed. This could include gathering data on ecological properties, base flows and water and possibly sediment quality.

3 Flooding review method summary

The information and methods used to review flood information within the five SPA's has included:

- Waikato and Waipa River Flood extents provided by WRC.
- Culvert analysis (hydrology and hydraulics).
- Rapid Flood Hazard Assessment (RFHA).
- Depression (ponding) mapping.

A detailed description of the information and methodology used to review flooding for each SPA is included within the relevant appendix for each town. The information and methods used are summarised in Table 1 below:

Table 1. Flood Review Information and Method Summary

Information/Method Town	River Flooding (WRC)	Culvert Analysis	RFHA	Ponding Maps
Taupiri	✓			✓
Horotiu	✓			✓
Ngaruawahia	✓			✓
Glen Massey		✓		
Te Kowhai	✓		✓	

4 Constraints to growth

In terms of fresh water ecology and flood hazard, the most significant constraint to growth is generally limited to the flood plains and riparian margins of the rivers, streams and tributaries within the five SPAs.

Development of land subject to flooding or ponding would need to be avoided and in the most part can been achieved through the identification of open space areas.

Rivers, streams, tributaries and drains are also the main ecological corridors within the five SPAs and although somewhat degraded already, development within their catchments would need to consider protecting and/or enhancing these natural features, whilst avoiding further degradation as a result of development.

Outside of these riparian areas, there are localised constraints to growth as a result of potential flood hazards. These are most significant in Growth Sectors B (Taupiri), E (Ngaruawahia), G & F (Te Kowhai) where overall there are medium to high constraints to development.

In terms of ecological constraints to development Growth Sector F (Ngaruawahia) poses a slightly elevated (low to medium) constraint to development.

Overall and considering both ecological and flood issues, the Te Kowhai Growth Sectors (G and H) have medium to high constraint to growth with Taupiri Growth Sector B having medium constraint. All other growth sectors have low or low to medium constraint.

A summary of constraints to growth sectors in each town is presented in Table 2 below.

4.1 Mitigation

Flood risk to growth areas may be addressed in many areas by the inclusion of open space zones around streams, tributaries and drains. The extent of the open space zones should be reviewed in light of the flooding maps presented in appendices to this report or future flood modelling efforts.

Similarly the key ecological mitigation for freshwater streams is the inclusion of riparian buffers (open space zones around streams and tributaries). Ideally riparian margins should be planted (to improve riparian habitat and provide shading) with maintained open space areas being set back from the streams.

Approaches to stormwater quantity and quality management to mitigate the effects of the proposed growth are provided in Section 5.

Table 2. Growth constraint summary.

Town/SPA	Taupiri	Taupiri	Horotiu	Ngaruawahia	Ngaruawahia	Ngaruawahia	Glen Massey	Te Kowhai	Te Kowhai
Growth Sector	**A**	**B**	**C**	**D**	**E**	**F**	**-**	**G**	**H**
Ecological constraint	Low	Low	Low	Low	Low	Low to Medium	Low	Low	Low
Flooding constraint	Low	Medium to High	Low	Low	Medium	Low	Low	High	High
Overall constraint to development	**Low**	**Medium**	**Low**	**Low**	**Low to Medium**	**Low**	**Low**	**Medium to High**	**Medium to High**

5 Stormwater management

5.1 Resource consent requirements

Waikato District Council holds Resource Consents, being a Comprehensive Stormwater Discharge Consents (CSDC), associated with the existing urban areas of:

- Taupiri: Resource Consent No. 105651
- Horotiu: Resource Consent No. 105653
- Ngaruawahia: Resource Consent No. 105645
- Glen Massey: Resource Consent No. 105655
- Te Kowhai: Resource Consent No. 105656

The CSDC has a number of conditions which in effect sets out the stormwater management measures that should be considered and/or adopted for all (existing and new) council stormwater diversions and discharges to avoid or mitigate adverse effects on surface water resources[3].

Consents will normally be needed to facilitate the construction of any urban development (earthworks, temporary stormwater diversion and the discharge of stormwater from earth worked areas), and consideration of these consents is outside the scope of this report.

Other consents will be required following construction to allow for the ongoing diversion and discharge of stormwater to land and water, and for the placement of structures on or over water bodies. In this instance the consent applicant would normally be the land developer but may on occasions it may be WDC.

In situations where development progresses with a Structure Plan in place, the development would need to take account of the requirements of the Structure Plan generally and any particular requirements for stormwater management set out in either the Structure Plan, a relevant catchment management plan and/or District Plan.

For developments where assets are vested with WDC, it is expected that the Council will take responsibility for any consents related to these assets, including stormwater discharges and structures following vesting.

The CSDC provides a mechanism for the transfer and where appropriate the surrender of individual consents for new development in favour of a comprehensive consent for the district. The general process for incorporating new consents into the CSDC will generally be as follows:

i. Anyone seeking to develop land will need to seek separate stormwater resource consents (and consent for structures if applicable) from WRC.

ii. WRC will assess the effects of the activity in the normal manner. WDC would be considered an affected party to the consent, and would therefore able to participate in the consideration of the consent applications.

iii. At completion of the development, the developer will seek to transfer the individual consent to WDC. At that point WDC would need to satisfy itself that the activity is consistent with its CSDC.

iv. Once WDC becomes the consent holder, it would seek to surrender the consent to WRC in favour of the comprehensive consent. WRC will also need to satisfy itself in a technical

[3] In some situations it is possible that stormwater management for new areas within existing urban settings may be able to remedy some adverse effects.

capacity that the surrender is consistent with the CSDC, and that there are no outstanding matters that would need to be addressed.

A separate but related process would be expected to occur with the WDC, in that anyone seeking to develop land will most likely need to obtain either a land use or subdivision consent from WDC, and that the WDC would assess this application against its District Plan, any other relevant plan or strategy and infrastructure development standards set out in the HCC Development Manual.

We understand that WDC intends to prepare a Structure Plan that includes stormwater infrastructure to be developed to manage effects in accordance with the conditions of the CSDC. We expect that individual developers would likely implement elements of the Structure Plan pertinent to the development of their land, and would typically need to demonstrate compliance with the WDC's final CMP and Structure Plan for the area with any consent application made to council. Compliance may also be via rules in the District Plan.

5.2 General design approach

The CSDC has a number of conditions and in effect sets out the stormwater management measures that should be considered and/or adopted for all (existing and new) stormwater infrastructure development. The key issues for each development include:

i. Stormwater quantity management.
ii. Stormwater quantity management.
iii. Aquatic resource and erosion protection.
iv. Flood hazard management.
v. Use of a Best Practicable Option approach.

In addition to the above, a significant issue for development over a large area such as the SPA is the scale and timing of individual developments and how the first developments cater for those that come after.

Relevant guidelines documents (from planning through to design) to assist in achieving the desired outcomes of the CSDC include but are not limited to:

1. WRC approved Structure Plans.
2. WRC approved Catchment Management Plans.
3. WRC approved Stormwater Management Plans.
4. WDC's Comprehensive Stormwater Discharge Consent.
5. Waikato District Plan and Waikato Regional Plan.
6. HCC Development Manual (or its approved successor)
7. WRC's Sustainable Subdivision Development – An Environment Waikato Perspective.
8. AC's Technical Publication 124: Low Impact Design.
9. AC' Technical Publication 108: Guidelines for stormwater runoff modelling in the Auckland Region.
10. AC's Technical Publication 10: Stormwater Management Devices, Design Guidelines Manual.
11. NZTA Bridge manual (for bridge and culvert design).
12. NZTA Fish Passage Guidance for State Highways.

Of the key issues identified above, issues 1, 2, 3 and 4 (in part) are addressed by the provisions contained in TP10. In particular, the requirements for peak flow attenuation in the 50% and 10% AEP storm events and the requirement to store and release (via extended detention) of the first

34.5mm of rain are considered standard practice and we have assumed that these measures will be adopted for most stormwater design.

Flood hazard management is addressed in part herein by providing preliminary modelling results to inform high level planning. The next step is to undertake more detailed modelling including the reticulated network and various development scenarios.

Flood hazard management (Issue 4) would also be exercised in part though the District Plan and SP, where areas vulnerable to flood hazards are excluded from urban development.

5.3 Best practicable option

All stormwater management matters should considered under a Best Practicable Option (BPO) approach. In relation to stormwater discharges, a BPO approach refers to the best method for preventing or minimising the adverse effects on the environment having regard to:

- The nature of the discharge
- The sensitivity of the receiving environment to adverse effects
- Up-to-date technical knowledge
- Implementation compared to other options
- Comparative environmental effects compared to other options
- Financial implications compared to other options

WDC's Stormwater Management Plan (T&T, 2009) sets out a comprehensive procedure for identifying and implementing Best Practicable Options (BPOs) to minimise actual and potential adverse effects resulting from the operation and maintenance of the municipal stormwater system.

The use of TP10 and other documents noted above within a BPO framework for each sub-catchment is likely to yield a variety of solutions that are appropriate to each location and environmental setting.

5.4 Specific issues mitigation

5.4.1 Ecological matters

Low to medium significance ecological issues have been noted in Growth Sector F (Ngaruawahia) as receiving waters are likely sensitive to:

- Contaminant runoff including elevated temperature
- Reduced stream base flows and changes in flow variability

The above issues are not necessarily managed under the framework set out in Section 5.2 above.

Specific management measures that WDC could consider include:

- Adding Open Space land use around identified tributaries and providing an opportunity to provide vegetative cover to assist with managing temperatures.
- Restricting infilling of perennial and/or ephemeral streams.

5.5 Flooding and infrastructure matters

Some existing infrastructure has been identified to be significantly contributing to the estimated flood hazard and/or are barriers to the upstream migration of native fish species. The following water way features have been highlighted for investigation and analysis.

5.5.1 Potential barriers to upstream fish passage:

- Culvert cGM103 located on a tributary of Firewood Creek underneath Wilton-Colleries Road.

It is anticipated that the barrier to fish passage could be removed/remedied as part of or separate to development within the SPA.

The above culvert appears to be within the Glen Massey 'urban area' in terms of Resource Consent No. 105655, being a Comprehensive Stormwater Discharge Consent. As such we consider that WDC are required to consider fish passage improvement at the culvert in accordance with Resource Consent No. 105655 Condition number eight (refer extract below):

Fish passage

8. *With the exception of ephemeral watercourses, all structures that have been placed in natural and modified watercourses to enable municipal stormwater diversion and discharge activities shall allow, or be modified where possible to allow, for the safe upstream and downstream movement of fish. When acting on this condition, all stormwater system modifications and fish passage devices shall be designed and constructed to the satisfaction of the Waikato Regional Council.*

   Note: When acting on this condition the consent holder shall also consult with the Department of Conservation, in accordance with Part VI of the Freshwater Fisheries Regulations 1983.

5.5.2 Culverts

The following culverts (in order of priority for each SPA) require further investigation, analysis and possibly upgrading to improve flood conveyance:

Taupiri

i. cTAU101 – Taupiri
ii. cTAU100 – Taupiri

Horotiu

i. cHOR100 – Horotiu

Ngaruwahia

i. cNGA103 – Ngaruawahia
ii. cNGA102 – Ngaruawahia
iii. cNGA106 – Ngaruawahia
iv. cNGA104 – Ngaruawahia
v. cNGA105 – Ngaruawahia
vi. cNGA100 – Ngaruawahia
vii. cNGA101 – Ngaruawahia

Glen Massey

i. cGM100 – Glen Massey
ii. cGM103 – Glen Massey
iii. cGM102 – Glen Massey
iv. cGM101 – Glen Massey

Te Kowhai

i. cNGA101 – Te Kowhai
ii. cNGA101 – Te Kowhai

6 Conclusions

This assessment has broadly considered the background issues and potential constraints to urban development with regard to ecology and flood hazard to urban growth within the Ngaruawahia and Surrounds SPA.

There is generally a dearth of ecological and environmental information on which to base a robust analysis but in general terms the streams, tributaries and drains are considered to be compromised, likely as a result of catchment land use activities and lack of riparian cover.

There is potential for improvements in water quality by way of providing riparian buffer zones (open spaces near streams) and planting of the riparian margins of those zones.

If appropriate open space and riparian buffers within the proposed growth sectors are provided by WDC, together with the assumption that good design practice will be implemented for all future growth areas, we consider that there is an overall low environmental constraint to development within the SPA.

One engineered barrier to fish passage in Glen Massey has been identified and this could be removed or retrofitted.

In terms of flood issues, the most significant constraint to growth is generally limited to Growth Sectors within Te Kowhai, Taupiri and Ngaruawahia (in descending order of significance) and in general the modelled flood plain and riparian margins of the Waikato and Waipa Rivers. Areas of significant constraint are associated with moderate flood hazard or ponding depth within tributaries and drains, particularly at road and access way embankments with culverts. It is anticipated that the significance of the constraint in terms of flood extent would reduce if the culverts were included within a more detailed flood model, and a series of prioritized recommendations to better understand the performance of these structures is provided herein.

Stormwater management should be considered under a Best Practicable Option (BPO) approach, and WDC's Stormwater Management Plan (T&T, 2009) sets out a comprehensive procedure for identifying and implementing Best Practicable Options to minimise actual and potential adverse effects resulting from the operation and maintenance of the municipal stormwater system.

7 Applicability

This report has been prepared for the benefit of 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 without our prior review and agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
.....	.....
Bryn Quilter	Peter Cochrane
Project Manager	Project Director

BMQ

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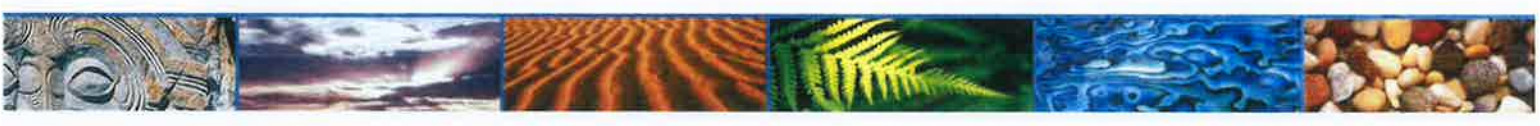
REPORT

Waikato District Council

Appendix D
Catchment Management Plan
Glen Massey Structure Plan Area

Tonkin & Taylor

ENVIRONMENTAL AND ENGINEERING CONSULTANTS



REPORT

Waikato District Council

Appendix D
Catchment Management Plan
Glen Massey Structure Plan Area

Report prepared for:

Waikato District Council

Report prepared by:

Tonkin & Taylor Ltd

Distribution:

Waikato District Council	**PDF**
Tonkin & Taylor Ltd (FILE)	**1 copy**

March 2015

T&T Ref: 61814.2000

Table of contents

1 Catchment description

1.1 Location

The Glen Massey Structure Plan Area (SPA) surrounds the North Waikato township of Glen Massey, and is located approximately 10 km west of Ngaruawahia. The location of the Glen Massey SPA is presented in Figure 1. The SPA (red outline) covers approximately 74 ha of the broader 580 ha catchment (green outline).

Figure 1. Glen Massey SPA and catchment location (Image sourced from Google Earth, 2014)

1.2 Topography

The topography of the catchment and SPA is typically rolling to steep hills divided by ridges and valleys with natural water courses. The SPA is located adjacent to Firewood Creek in the upper reaches of this catchment. The majority of the SPA is on the floodplain and hillside to the south of the creek. Firewood Creek generally flows from west to east through the SPA.

1.3 Geology and hydrogeology

The published geology of the area indicates that the majority of the Glen Massey SPA is underlain by hard siltstone with fine to coarse-grained sandstone (commonly referred to as greywacke) of the Newcastle Group (Edbrooke S. W., 2005) as shown in the geological map in Figure 2 below. This is overlain by Oligocene age fine to medium-grained sandstone overlying siltstones of the Glen Massey Formation, which outcrops in the elevated parts of the catchment generally to the north of Glen Massey. In the low lying (north) area of the SPA there is a small pocket of alluvial sediments of the Pleistocene age Walton Subgroup (Edbrooke S. W., 2005).

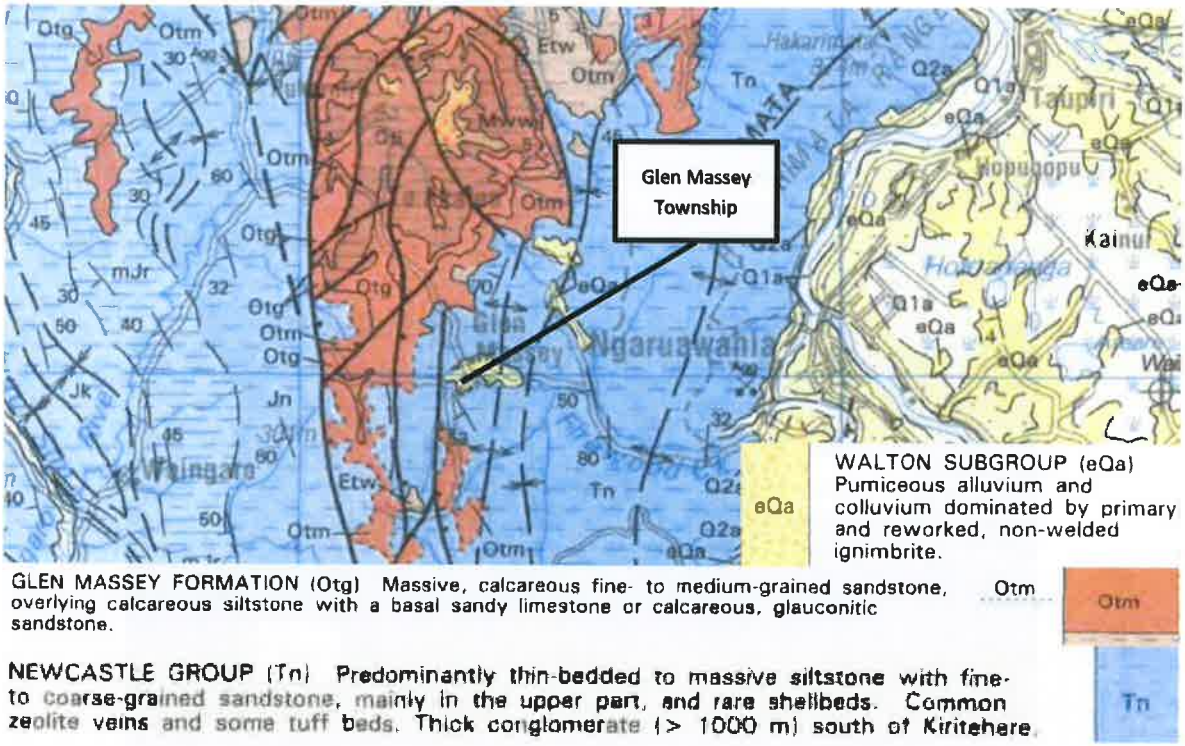


Figure 2. Geological map of Tuakau structure plan area

The hydrogeology of the area is characterised by the presence of limited quantities of groundwater in either the greywacke rocks of the Newcastle Group or calcareous siltstones, sandstones and occasional limestones of the Glen Massey Formation. Marshall and Petch (1985) consider that the rocks of the Newcastle Group and have low porosity and permeability, except in localised areas where these rocks have been fractured, resulting in moderate secondary porosity. The rocks of the Glen Massey formation similarly contain limited quantities of groundwater. This indicates that groundwater flows are likely to be limited and form a small proportion of the overall water balance for the area.

Recharge of groundwater is likely to be limited to infiltration of rainwater onto relatively steep land, where surface runoff is more dominant.

1.4 Watercourses

There is one main watercourse flowing through the existing Glen Massey Township; Firewood Creek. Firewood Creek runs through the Township within an incised channel receiving runoff from the north, south and west, before discharging to the east. The creek drains both agricultural and residential land that make up the SPA. The middle reach of Firewood Creek runs through the low lying areas of the SPA. After exiting the SPA Firewood Creek drains to the east before discharge to the Waipa River some 10km downstream.

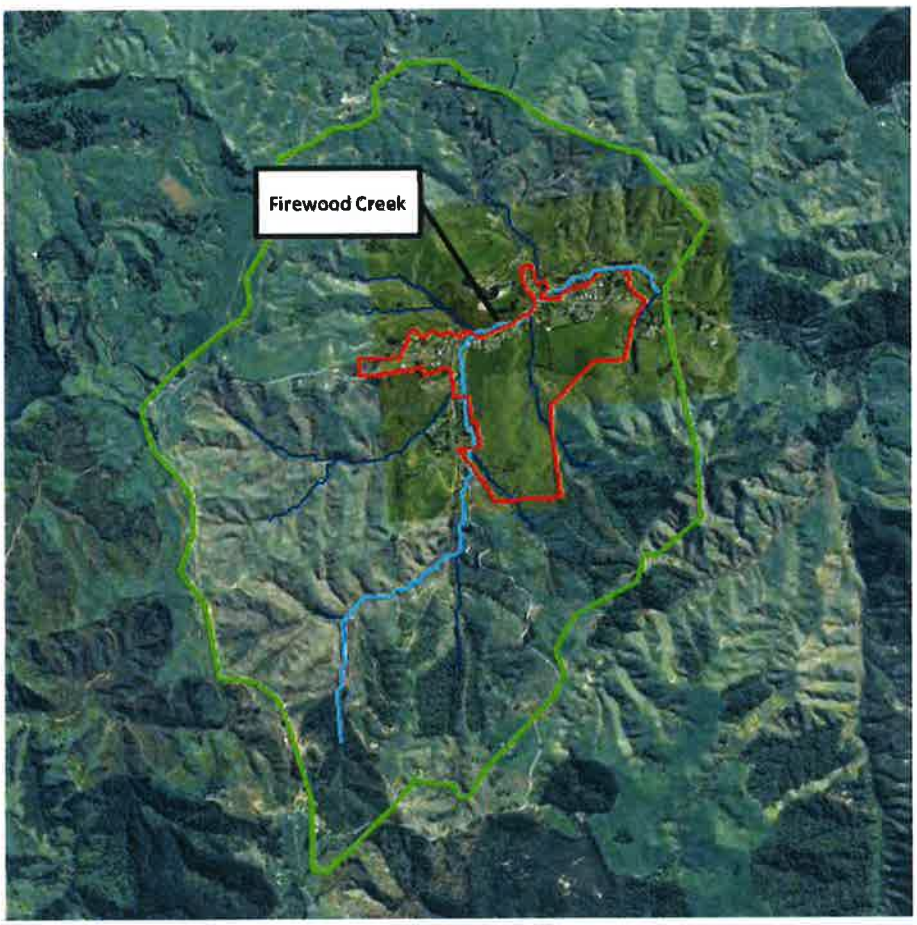


Figure 3. Firewood Creek (light blue) and tributaries (dark blue) within the catchment.

There are a number of unnamed tributaries within the Glen Massey SPA that discharge to Firewood Creek. The unnamed tributaries drain predominantly agricultural and a small amount of residential land and are shown in Figure 3.

1.5 Receiving environments

The identified surface water receiving environments within or adjacent to the Glen Massey SPA include:

- Firewood Creek
- Unnamed tributaries of Firewood Creek

1.6 Existing WRC resource consents

1.6.1 General

WRC's online database has been used to broadly identify the types of resource consents held within the SPA and these are summarised in Table 1 below.

Table 1. WRC Resource Consents

Resource Consent Type	Number
Discharge - Air	Nil
Discharge - Land	Nil
Discharge - Water	Nil
Land Use – Bore/Well	Nil
Land Use – Other	2
Water Take - Ground	Nil
Water Take - Surface	Nil
Water Take - Other	Nil

1.6.2 Comprehensive stormwater discharge consent

Waikato District Council holds Resource Consent No. 105655, being a Comprehensive Stormwater Discharge Consent (CSDC) associated with urban Glen Massey.

Relevant extracts from the resource consent are reproduced below:

Consent Type: Discharge permit

Consent Subtype: Discharge to land and water

Activity authorised: To divert and discharge urban stormwater and associated contaminants at multiple locations to land and Firewood Creek, the Waipa River, and use discharge structures, within the Glen Massey urban area.

Consent duration: Granted for a period expiring on 22 September 2028

It is noted that the extent of the above consent (reticulated urban area of Glen Massey) is significantly smaller than the extent of the SPA.

2 Land use in Glen Massey

2.1 Current land use

Land within the SPA is dominated by agricultural land uses, with the residential Glen Massey Township and rural residential outskirts also occupying a significant portion of the total area. There are negligible other land uses currently occurring within the SPA. The residential area of the Glen Massey Township is located in the northern part of the SPA with predominantly agricultural land surrounding it to the south.

A key arterial route to the north and south is Waingaro Road, which is the only transport corridor giving access to the township.

2.2 Future land use

The future growth in Glen Massey has not been specified by WDC. This CMP therefore only generally assesses the areas within the SPA and highlights areas that are not suitable for future growth.

3 Ecological review

This section presents the results of our review and assessment of the ecological status of stream resources in the Glen Massey SPA. The assessment is based on a review of existing ecological information with a brief site visit to publicly accessible parts of the SPA.

3.1 SPA overview

3.2 Assessment methods

There has been no ecological assessments of Glen Massey and its surrounds provided by Waikato District Council. Our assessment has reviewed the information available in national and regional ecological databases.

In addition, a site walk over of streams at publicly accessible locations was conducted by a T&T ecologist on 9 April 2014 to confirm levels of development, observe in stream structures, assess fish passage conditions and visually assess habitat condition. The sites assessed during the field assessment are shown on Figure 292 in Appendix DA.

3.3 Summary of existing ecological information

3.3.1 Operative District Plan

The Operative Waikato District Plan and associated maps were reviewed for any ecological features of note. The Glen Massey SPA is included on Planning Map 19.3. There was no ecological features of note within the Glen Massey SPA.

3.3.2 Waikato Regional Plan maps

Waikato Regional Plan (WRP) water management and stock exclusion maps were reviewed to check for any specific values that apply to SPA streams. All watercourses within the area are classified as Waikato Surface Water (Map S14) and will be subject to the relevant standards in Section 3.2 of the WRP in regard to discharges of contaminants.

Firewood creek directly downstream from Glen Massy is classified as Indigenous Fisheries and Fish Habitat, and Trout Fisheries and Trout Spawning Habitat. This classification is applied to significant habitats or areas that are characterised by high water quality.

From the downstream end of the SPA to its headwaters, the unnamed tributaries of Firewood Creek are approximately 13.0km long with approximately 11.0km (85%) upstream of the SPA boundary.

3.3.3 T&T's 2014 field assessment

A site inspection of publicly accessible locations on Firewood creek and its unnamed tributaries in the Glen Massy SPA was conducted on 9 April, 2014. Locations inspected are shown on Figure 292 in Appendix DA.

Observations from site inspections concluded that streams where typically open with limited areas of riparian vegetation providing shade to the stream bed. The stream bed was dominated by gravels and small cobble sized sediments embedded in fine silts and sands. There was excessive periphyton growth in unshaded areas. Upper catchment land use is a mix of agriculture and regenerating vegetation which likely contributed to the excessive periphyton growth.

In-stream habitat at the sites inspected was generally diverse with a range of habitats including riffles, runs and shallow pools, with good connectivity to the flood plain in upstream areas of the SPA. A short section of stream along Wilton Collieries Rd has undergone channel modification and is now a straightened U shaped channel.

A barrier to upstream fish passage was identified at the culvert under Wilton Collieries Rd east of the intersection with Kereru Rd. This culvert has previously been retrofitted for fish passage but a small concreate lip on the downstream end would prevent the migration of non-climbing fish species such as inanga during low flows. It is noted that inanga and longfin eel are present in all catchment streams and are classified as At Risk: Declining (Goodman, 2014).

4 Ecological assessment

4.1 Introduction

This section provides an assessment of the potential effects of development of the Glen Massey SPA on surface water resources. The assessment has considered the general issues outlined within Section 2 of the main report and provides an assessment of the significance of these issues for growth.

We note that WDC has not provided any indication of the types of future land use within Glen Massey, so for the purposes of this assessment, we have assumed that any growth in Glen Massey would be low density residential.

4.2 Assessment of effects

The main ecological issues associated with future urban development in the Glen Massey SPA are described below and the significance of possible future development to a range of issues for each is presented in Table 2.

Table 2. Significance of potential adverse effects from proposed development

Future development / **Issue**	**Low density residential**
Stormwater	
Contaminants[1]	Low
Increase in peak flows leading to stream bed/bank erosion	Low
Hydrological	
Reductions in base flow[2]	Low
Reduction in flow variability leading to reduced habitat quality	Low
Habitat	
Culverting or infilling of perennial streams reducing habitat	Medium
Protection of riparian margins	Low
Barriers to fish movement	Low
Overall potential adverse effect on surface water	Low

5 Flood analysis

5.1 Introduction

A Culvert Capacity Analysis (CCA) has been undertaken. The purpose of the CCA was to determine culvert capacity and also to approximate levels of inundation within and surrounding the incised stream due to the culvert obstructions. An engineering survey to determine key levels and CCA was performed due to the absence of LiDAR making it impossible to undertake the previously proposed Rapid Flood Hazard Assessment. The CCA provides information to indicate where flooding hazards may occur and is considered a 'rough order' estimate of flood extents only.

5.2 Methodology

5.2.1 Waterways and culverts

WDC did not provide any information on any bridges or significant culverts within the catchment.

Stormwater from the township is generally directed via open drains to tributaries of Firewood Creek, or directly into the creek itself. As there was no ground level or asset data available, two site visits were undertaken to establish critical stormwater asset level and approximate ground levels at some locations. These site visits were undertaken on 9 April 2014 and 15 May 2014.The culvert information gathered during site visits is outlined below.

In total four culverts were identified that have the potential to influence the stream and cause flooding to adjacent property within the SPA. The location of these culverts is shown on Figure 4.

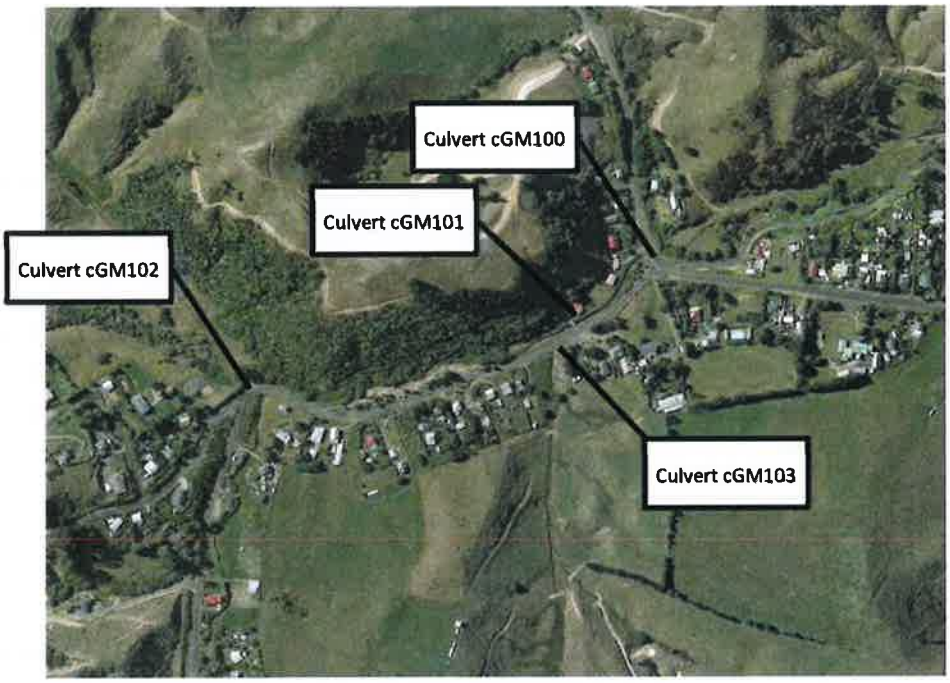


Figure 4: Culvert locations

Culverts cGM100 to cGM102 are located on Firewood Creek, while Culvert cGM103 is located on an unnamed tributary of Firewood Creek.

Culvert cGM100 is located under Waingaro Road and has the largest catchment.

Culvert cGM101 is located just upstream of cGM100 under a private access way.

Culvert cGM102 is located upstream of cGM101 underneath Wilton-Colleries Road.

Culvert cGM103 is located on a tributary of Firewood Creek underneath Wilton-Colleries Road, the culvert discharges directly to Firewood Creek above cGM101.

Culvert details were obtained using a GPS and dumpy survey. All measurements and levels obtained are approximate only with a likely margin of error of +/- 0.3m in the vertical and +/-1.0m in the horizontal. Vertical datum is approximates Moturiki Vertical Datum based on GPS survey only as no suitable LINZ survey benchmarks were available. The culvert information is summarised in Table 3 .

Table 3: Culvert properties

Culvert	Type	Diameter/ width (m)	Upstream invert (mRL)	Downstream invert (mRL)	Length (m)	Road overtopping level (mRL)
cCGM100	Corrugated iron with concrete base	4.25	126.20	125.98	21	129.30
cCGM101	Corrugated iron	2.2	126.74	126.66	8	129.67
cCGM102	Concrete	0.75	128.17	128.17	18	129.62
cCGM103	Corrugated iron with concrete base	3.45	129.85	129.76	14	132.46

We understand that culvert information may be available on WDC's RAMM database but these were not available at the time of this assessment.

5.2.2 Hydrology

Hydrologic modelling of the catchment areas has been carried out using the SCS curve number method as prescribed in Technical Publication 108 (Auckland Regional Council, 1999).

5.2.2.1 Catchments

Culvert catchment boundaries and flow paths were adopted based on REC (NIWA, 2004) database 1st Order catchments and classifications. The catchment boundary for cGM100 (indicative only) is shown in Figure 5 below. This catchment is the largest of the four and encompasses the other three culvert catchments.

Figure 5. Indicative catchment boundary for CCA

The slope within each catchment was determined using the equal area method and 30 m contours obtained from Terraview software. The catchment properties for each culvert are shown in the table below.

Table 4: Catchment properties

Culvert catchment	Area (Ha)	Flowpath length (m)	Slope (m/m)
cGM100	580	3884	0.02
cGM101	573	3730	0.02
cGM102	407	3390	0.03
cGM103	69	1640	0.04

5.2.2.2 Underlying geology and land cover

Aerial photography and satellite imagery from Google Earth has been used to determine percentage land cover.

Land cover has been approximated at 90% pasture and 10% bush, with the hydrologic condition of this cover assumed as fair and good respectively. The underlying soil has been estimated at 5% group B soil (moderate-high soakage) and 95% group C soil (low-moderate soakage).

It was assumed that all catchment areas were pervious, and the presence of buildings and roads was negligible. An initial abstraction of 5mm was applied to all catchment areas.

5.2.2.3 Rainfall

The 24 hour rainfall depth for a 1%, 10% and 50% AEP design storms was obtained using NIWA's HIRDSv3 online rainfall inventory based on the approximate centroid of the catchment. Although the 1% AEP is the critical design storm, the other design storms were analysed for comparison. To incorporate climate change, the rainfall depth was then increased by applying a 3 degree Celsius temperature increase within the HIRDSv3 inventory. An increase of 3 degree Celsius has been adopted in accordance with unpublished guidance from WRC. The 24 hour rainfall depths are shown below:

- 1% AEP 218.7 mm
- 10% AEP 129.5 mm
- 50% AEP 83.5 mm

5.2.3 Hydraulics

The CCA involved hydraulic modelling of the culverts and overtopping of these culverts where applicable.

5.2.3.1 Culverts

The capacity of identified culverts was analysed using CulvertMaster software. Properties for the culverts were taken from the site visit as summarised in Table 3. Flows at each culvert were taken from the hydrologic analysis.

Tail water levels were assumed to be defined by the culvert obvert at the downstream end. Where the required headwater for a culvert to pass a flow was above road or access way overtopping levels at that culvert, flow through the culvert was limited and excess flow was assumed to be flowing over the above road or access way.

5.2.3.2 Road overtopping

Headwater levels of flows in excess of culvert capacity (above road or access way crown) were analysed as a weir using FlowMaster software. All weirs were assumed to be v-notch weirs with an angle of 176 degrees and a discharge coefficient of 0.57 and were also checked using a broad crested weir calculation. Road overtopping was analysed at all culverts. Tail water levels at cGM101 and cGM102 were assumed to be defined by the headwater level at cGM100 and cGM101 respectively.

5.2.3.3 Buildings

WDC provided building footprints in the district but no information on any floor levels.

5.3 Results and discussions

5.3.1 Analysis review

Results of the analysis are shown below in Table 5. Flow to the culverts is significantly higher than culvert capacity at road/access overtopping level. Indicative overtopping levels at each culvert are also provided in the summary table.

Table 5: Analysis results

Culvert	1% AEP Flow (m^3/s)	Culvert capacity at overtopping (m^3/s)	Overtopping water level (approximate mRL)
cGM100	72.9	26.3	130.5
cGM101	72.7	12.6	131.0
cGM102	55.2	1.2	131.1
cGM103	12.6	17.8	133.5

5.3.2 Rough order flood extent

The rough order flood extent has been approximated only based on the analysis results and site visits. Due to lack of a detailed ground elevation data, the accurate flood extent or flood hazard could not be quantified.

The rough order flood extent map has been produced using estimated flood levels, interpolation between surveyed ground levels and photo records. **The flood extent is rough order only and should not be used for any building consent or detailed land planning purposes**. The rough order flood extent is shown in Figure 282 in Appendix DA.

Building footprints supplied by WDC are shown on the flood maps presented in Appendix DA. Where the flood extent encroaches on a building footprint we consider that the buildings are potentially flood prone, however building floor levels are unknown and therefore the number of buildings actually affected by flooding cannot be determined.

6 Flooding assessment

This section presents the results of our review and flooding assessment of the Glen Massey SPA. The assessment is based on results from a Culvert Capacity Analysis (CCA) and a brief site walkover of selected parts of the SPA.

6.1 Assessment methods

6.1.1 Existing documentation

No existing documentation was available.

6.1.2 CCA

A Culvert Capacity Analysis (CCA) was undertaken for the Glen Massey SPA for a 1% AEP (plus climate change) storm event to identify flood hazards.

6.1.3 Infrastructure

Critical infrastructure within or affecting the Glen Massey SPA is summarised in Table 3 of this report. This infrastructure will likely restrict the flow of major overland flow paths, watercourses or streams. Refer to Figure 282 in Appendix DA which shows the locations of these restrictions.

6.1.4 Drainage operational issues and flooding

No drainage issues or flood reports were noted or provided by WDC. WDC have not indicated any properties effected by flooding.

6.2 Summary of flooding issues

This section provides an assessment of the potential effects of flooding on the Glen Massey SPA. The assessment includes an evaluation of flood hazards on existing residential development, and on the capacity of infrastructure critical to managing flood hazard within the SPA.

A summary evaluation of the issues is presented in Table 6.

Table 6. Summary of flooding issues

Flooding Assessment	Upstream of culvert CGM100	Upstream of culvert CGM101	Upstream of culvert CGM102	Upstream of culvert CGM103
Existing buildings within significant flood hazard?	Yes	No	No	Yes
Growth area affected	N/A	N/A	N/A	N/A
Existing critical infrastructure	CGM100	CGM100, CGM101	CGM100, CGM101, CGM102	CGM103
Overall constraint[1]	Low	Low	Low	Low

1. Based on area estimated to be affected by flooding compared to the SPA area.

6.3 Information gaps

Through our review of available information and our assessment of issues and constraints we have identified the following information gaps:

- Historical flooding information for Glen Massey.
- A detailed ground elevation model or topographic survey so that flood extents could be more accurately determined.
- Similar to above, information on waterway dimensions is required to enable more detailed modelling.
- Existing building floor levels to clarify potential flood vulnerability.
- Any information on future growth areas including road layout and waterway crossings.

7 References

Auckland Regional Council. (1999). *Technical Publication 108 Guidelines for stormwater runoff modelling in the Auckland Region.* Auckland: Auckland Regional Council.

Edbrooke, S. W. (2005). *Geology of the Waikato area.* Lower Hutt: Institute of Geological & Nuclear Sciences.

Goodman, J. (2014). *Conservation status of New Zealand freshwater fish, New Zealand Threat Classification Series 7* . Wellington: Department of Conservation .

NIWA. (2004). *New Zealand River Environment Classification.* Wellington: Ministry for the Environement.

White, P. A., & Rosen, M. R. (2001). *Groundwaters of New Zealand.* Wellington: New Zealand Hyrological Society.

8 Applicability

This report has been prepared for the benefit of 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 without our prior review and agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
.....	.....
Regan Robinson/Bryn Quilter	Peter Cochrane
Civil Engineer/Project Manger	Project Director

BMQ

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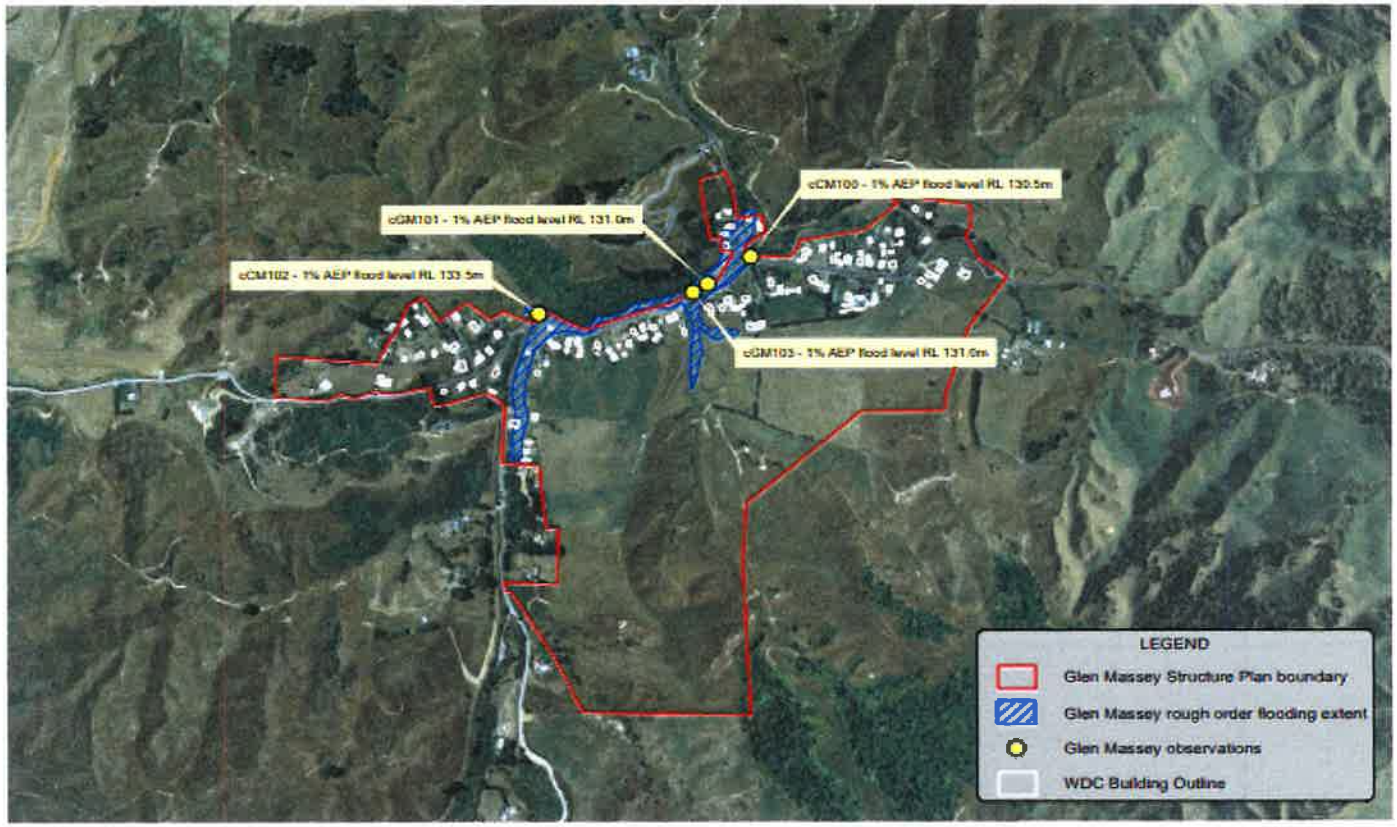
Appendix DA: Figures

- **Figure 282 Flooding**
- **Figure 292 Ecological Map**



Notes: Aerial photograph supplied by Waikato District Council

A3 SCALE 1:10,000

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Tonkin & Taylor
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APPROVED	
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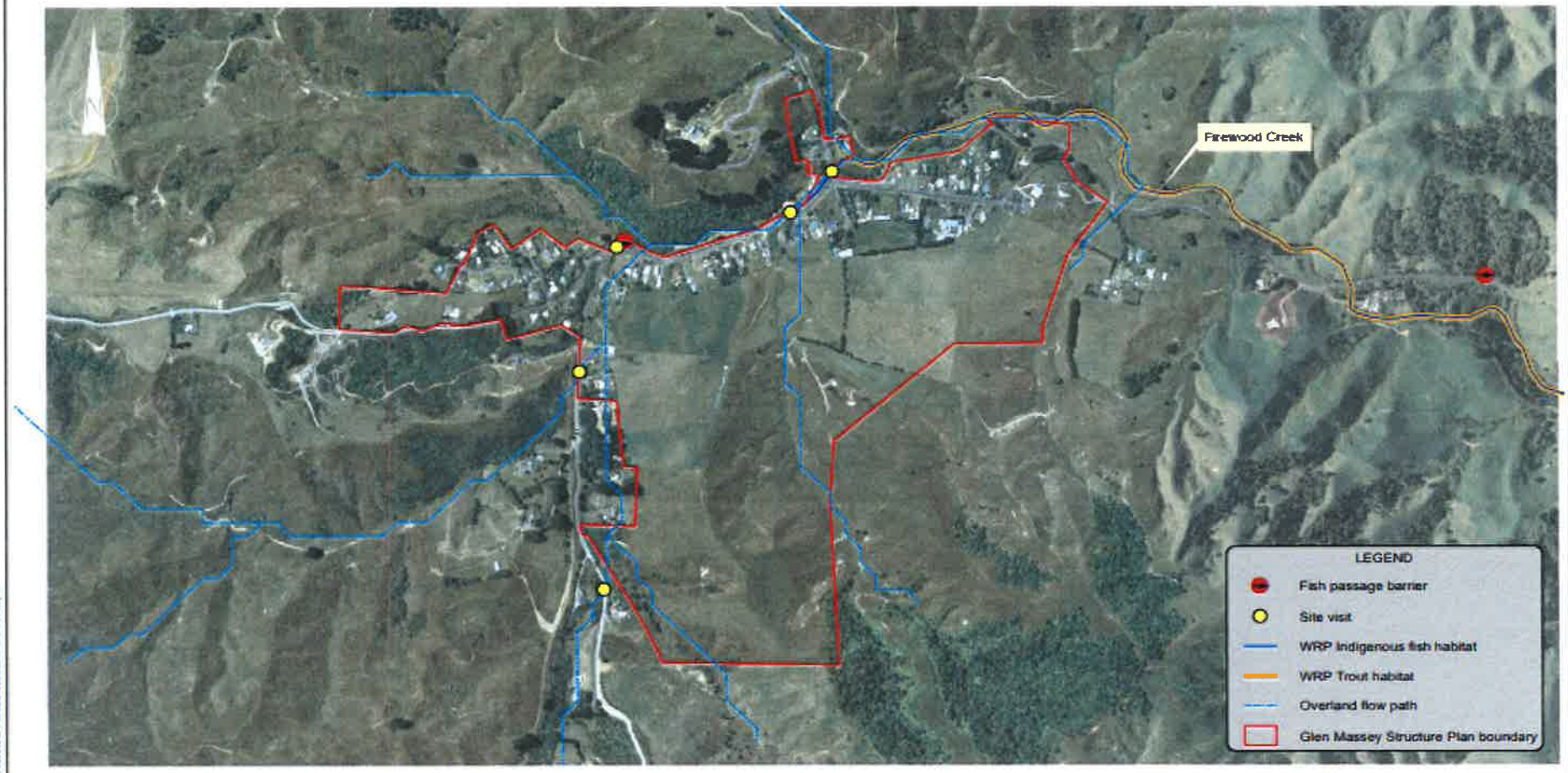
PROJECT No.	61814.200

WAIKATO DISTRICT COUNCIL
CATCHMENT MANAGEMENT PLAN
GLEN MASSEY STRUCTURE PLAN AREA
Flooding Map

FIGURE No. Figure 282

Rev 0



Notes: Aerial photograph supplied by Waikato District Council

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Environmental and Engineering Consultants
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www.tonkin.co.nz

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WAIKATO DISTRICT COUNCIL
CATCHMENT MANAGEMENT PLAN OF GLEN MASSEY STRUCTURE PLAN AREA
Ecological Map

Figure 292

Rev D

Civil Engineering Services (1994) Ltd
PO Box 240, Te Aroha • Phone/Fax: (07) 884-8317 • Mobile: (0274) 749525 • Email: office@ces94.co.nz • Web: www.ces94.co.nz

30/9/2020

Mr L Robcke
C/o 859 Waingaro Rd
Glen Massey

Re Portion of Property to Southwest of Glen Massey
(Part of Lot 2 DP443833)

Dear Leigh,

On 22/9/2020 Members of our team met you and members of your family on site at Glen Massey as arranged to investigate an area of around 32 ha as depicted in the aerial photo plan as supplied.

The land in question is currently zoned Country Living Zone (min Lot Size 5000 m2) and we understand you have made submissions to the Waikato District Council to have this area rezoned to "Village Zone" (min lit size 3000 m2).

Brief

We were engaged to undertake assessment of the site soil and ground conditions to enable initial assessment of the following:

- Suitability of the land that WDC currently to propose to remain as Country Living Zone to be rezoned Village Zone, as requested via submission (i.e. overall suitability of the land for development down to a minimum lot size of between 2500 m2 and 3000 m2).
- Suitability of the land to be serviced via On Site wastewater and Treatment Systems
- Any observations in terms of overall development suitability, location of access road, etc.

In line with your brief and anticipated requirements by the Council to receive a geotechnical overview of the land with regard to suitability for development of residential lots down to 2500 m2, we offer the following report.

This report follows our walk over the site, observations of the general relief and contour, and the undertaking of around 25 test borings to determine the subsoil conditions. This will allow us to comment on the stability, bearing capacity, suitability of soils for on site treatment of domestic effluent, and stormwater management for roading and site development.

Geological Setting

The geology of the site is indicated on the NZ Geological Map as being a localised portion of Puketoa Formation consisting of pumiceous alluvium and conglomerate. This often takes the form of red brown clayey silts which were found at the site.

The terrain at the site was of more easy rolling terrain with more gentle slopes than the more steep ridges and gully formation in all directions within 1 km of the site.

All test bores were very consistent with 200 mm of natural organic topsoil over firm, but friable orange brown silt grading to clayey silt at around 0.8 – 1.0m depth where the soil became stiff and cohesive to over 2m depth.

Natural Contour and Soil Stability

Typically soil as described above had moderate to high undrained shear strengths is stable and not prone to slip failure as the landscape within the site showed little or no signs of instability. While much of the terrain was of moderate slope ranging from 10 – 15 degrees and flatter, portions were steeper up to around 20 degrees. We understand an aerial topographical survey has been carried out which will confirm the slope of the terrain and ultimately assist with road and site determination.

We consider the natural terrain to suit a range of different sized properties to be incorporated within the development, perhaps larger 2 – 3 ha properties for those areas bordering the steeper gully/hill areas and encompassing the steeper terrain to perhaps keep some grazing regime amongst the smaller 2500m2 sections.

Road and Site Access

Existing Road access to the Site is available off Waingaro Rd (for the Eastern most portion of the site) and Wilton Collieries Rd (to the Western portion of the Site). Additional accesses are potentially also available off both roads.

The natural contour will allow building sites to be levelled and benched on elevated positions or at the lower natural flatter portions of the site and any subdivision should be designed with this in mind. Road access is recommended to provide access to such sites without encompassing or compromising the ideal building sites, as such the cutting and benching the road alignments should not necessarily choose the easy and somewhat obvious alignment to achieve the most desirable subdivision potential.

Conceptual design of the proposed road accesses through the site would need to be made at an early stage. While the steepness of the terrain would not generally necessitate the need for a swished back winding alignment to keep gradients mild, such an alignment would be beneficial to cater for many small (2500 m2) sites. It is recommended that stormwater runoff is via natural grassed surfaces to the natural gully that separates the two main eastern and western portions of the site.

Central Gully Area

This natural feature (as hatched on the plan) is seen as an asset to the site that could be utilised as partial reserve area (as opposed to Small block pastural farming). The development of a wetland or a wooded area and potentially being an area to attenuate stormwater runoff from both the eastern and some of the western portions of the site is seen as a likely scenario for this portion of the site.

Much of the western portion of the site falls to the west where a natural stream follows the gully floor along the eastern side of Wilton-Collieries Rd.

Building Sites

The test bores undertaken at various portions of the site showed ground conditions were very consistent across both the eastern and western portions of the site.

All bores showed moderate undrained shear strengths at shallow depth, generally increasing with depth to around 1.0m depth. Good ground conditions (suitable for Building in accordance with NZS 3604:2011) were generally achieved by 600 mm depth. The benching of a site level on any of the slopes would almost certainly provide adequate surface bearing capacities for most construction scenarios.

The near surface (0 - 0.6m) natural friable silt soils are considered to be a category 3 soil (in terms of NZS 1547:2012, the standard for On Site Domestic Wastewater Management) which will allow appropriately designed primary treated effluent systems in accordance with Waikato Regional Council's permitted activity rules.

While near surface soils are considered sufficiently permeable and appropriate for On Site treatment of domestic effluent, they are not considered ideal for the soakage of stormwater, especially as they become less permeable with depth.

Stormwater management is therefore in the opinion of the writer best carried out by attenuation in tanks and released to either shallow subsurface contour drains or overland flow paths at greenfield rates to the natural outfall.

Conclusions

We conclude that the soil conditions at the property within the envelope shown on the attached plan 20-1495-1-01 is suitable for Council's Village Zone for the following reasons:

- Soil and Ground conditions are inherently stable
- Soil Conditions generally meet "good ground" requirements (within the upper 0.6m) for construction under NZS 3604:2011.

- Near surface soils are suitable for On Site Effluent disposal and final treatment of Primary and Secondary treated effluent.

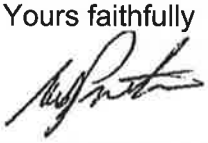
- Terrain contour is sufficiently mild over much of the site to ensure access and site earthworks are likely able to proceed without undue difficulties.

- Natural drainage features of the site will allow appropriate stormwater design methodologies to be adopted and implemented under normal development criteria.

On the basis of the above, Civil Engineering Services confirm that we are available to support the submission of the Robcke family to the Waikato District Council seeking that the land be rezoned from Country Living Zone to Village Zone.

We consider the land in question is generally suitable for development into a range of smaller rural residential style properties to around 2500 m2 with the steeper gully/hill areas being suitable for either small block grazing or environmental planting/restoration.

Yours faithfully



M J Preston
Civil Engineering Services

September 2020

Attachments: Plan (as provided), Plan showing location of test bores, Borelogs


Owen Drive
Wilkinsons Road
C22
Waikato River Catchment

Notes:	Investigation / Surveyed	IL McLAREN	08/XXXX	Email • office@ces94.co.nz • Web • www.ces94.co.nz	Civil Engineering Services (1994) Ltd	Phone (office) • (07) 8548317 • Postal • P.O. Box 240, Te Aroha	Client Ref 1495/1	Drawing Revision: CLIENT ISSUE
	Draughted / CAD	IL McLAREN	08/XXXX	Site Locality Diagram for L Robcke at Waingaro Rd & Wilton Collieries Rd, Glen Massey			Scale: Not To Scale Diagram Only	Drawing No. 20/1495/1/01
	Design / Proposal							Sheet No. 01
	Checked / Reviewed							

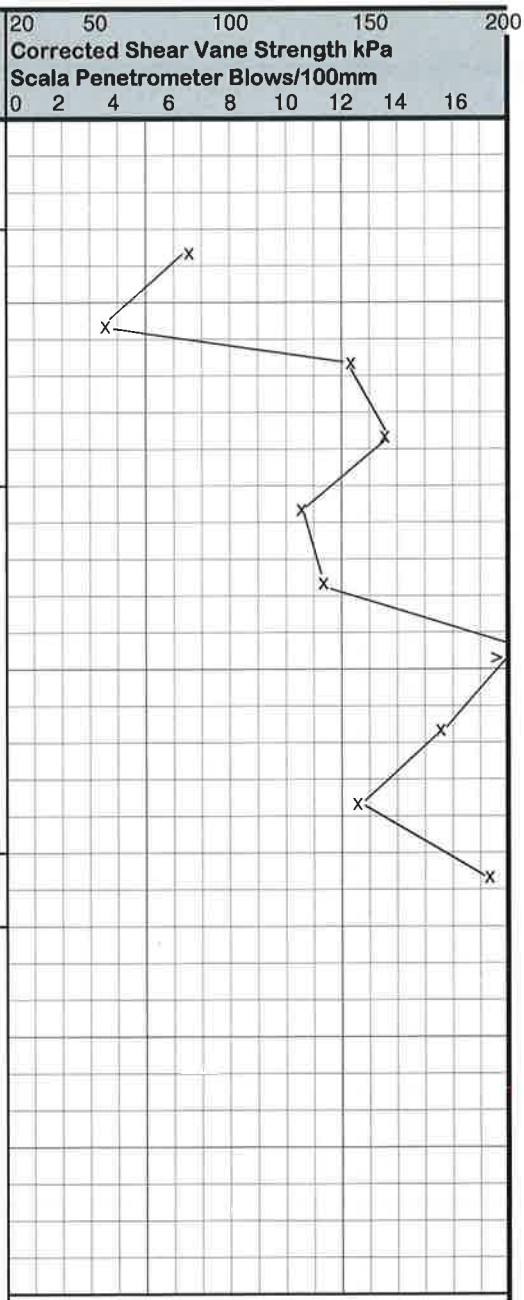
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. N1

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL: Brown silt
54/24	0.5		SILT: Light orange, ashy, crumbly
35/22			soft, crumbly light orange silt
90/40			
98/42	1.0		light orange silt, semi-cohesive, fine
80/42			CLAY: Orange, firm, cohesive
82/48			
140+	1.5		bright orange clay, hard, semi-cohesive crumbly
112/82			
92/40			light yellow-orange silty clay, crumbly
	2.0		semi-cohesive
120/62			SILT: Light orange, crumbly, small lithics
	2.5		END
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

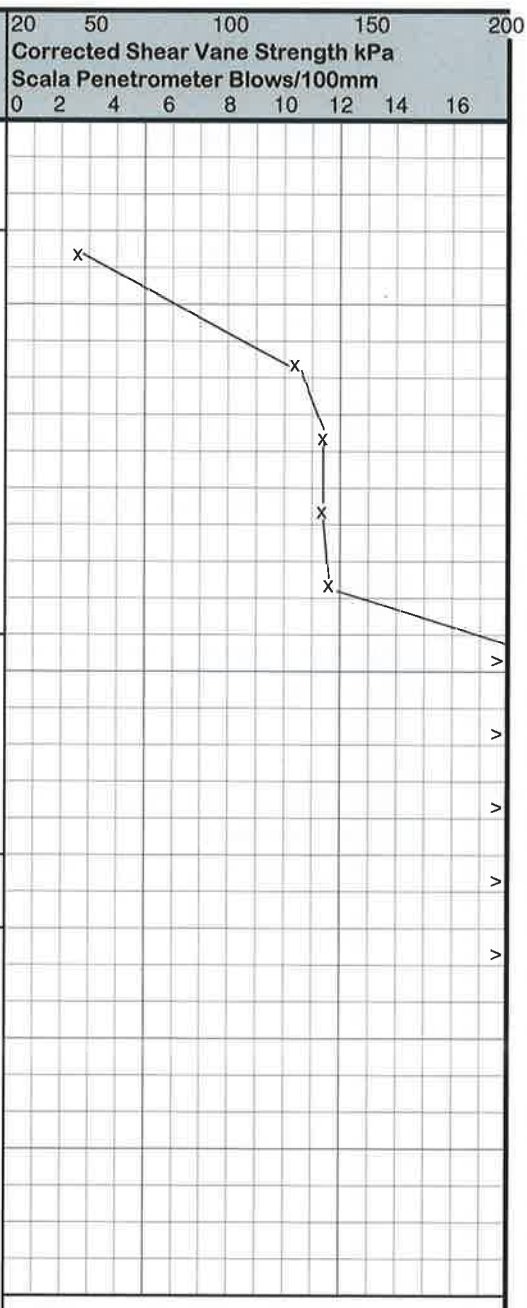
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. N2

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
30/18	0.5		SILT: Light orange, dry, friable
78/40			stiff, dry, crumbly silt
82/40	1.0		dry crumbly orange silt
84/36			light orange crumbly silt, firm, slight cohesion
85/42			
140+	1.5		CLAY: Orange, stiff, cohesive
140+			very hard, dry, crumbly
140+	2.0		
140+			SILT: Clayey, bright orange, hard, crumbly dry
140+			END
	2.5		
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

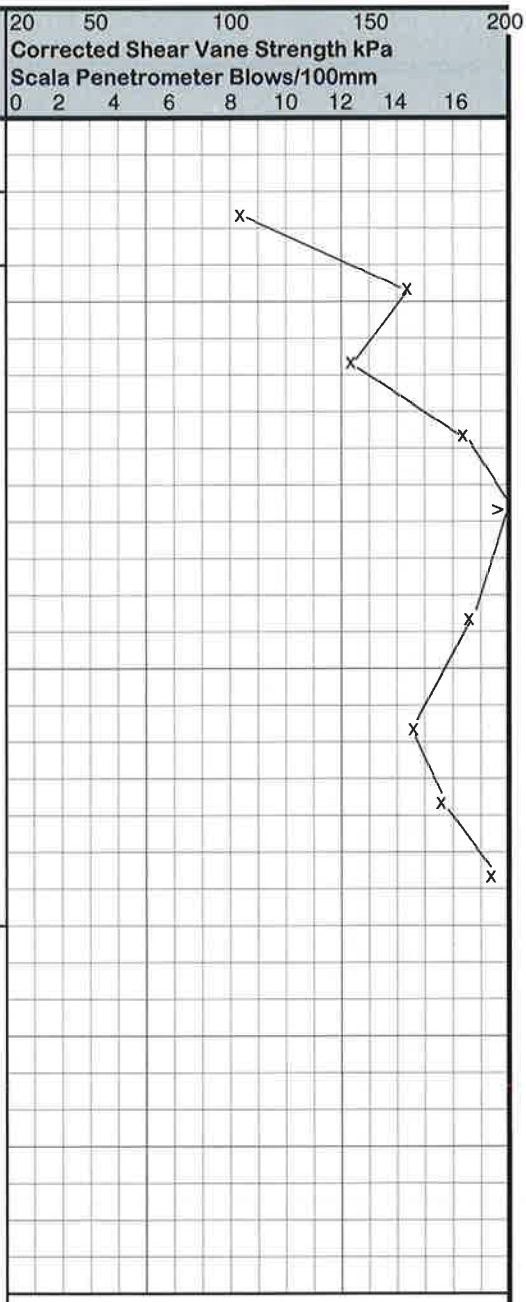
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. N3

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
64/32			SILT: Bright orange, dry, friable
100/52	0.5		CLAY: Dark orange, cohesive, stiff
90/40			bright orange clay, stiff, cohesive
115/40	1.0		
140+			orange silty clay, crumbly, stiff
116/58	1.5		
105/42			orange clay, slightly damp
110/42	2.0		
120/50			orange clay, damp, cohesive, stiff
	2.5		END
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

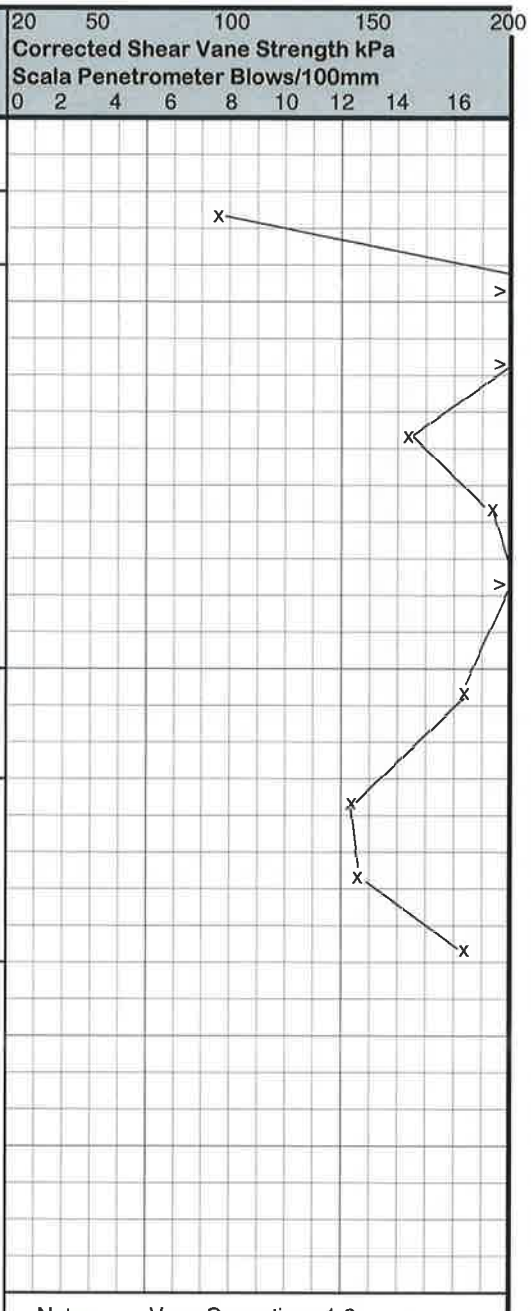
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. N4

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
62/28			SILT: Orange, dry, friable
140+	0.5		CLAY: Orange-brown, firm, cohesive
140+			stiff, dry, cohesive
100/52			bright orange, crumbly
	1.0		
125/48			
140+			bright orange silty clay, dry, crumbly, stiff
	1.5		
115/58			SILT: Orange, semi-cohesive, firm, dry
88/48			CLAY: Silty, orange, firm, cohesive
	2.0		
92/54			
115/52			light orange silty clay, firm, cohesive
			END
	2.5		
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

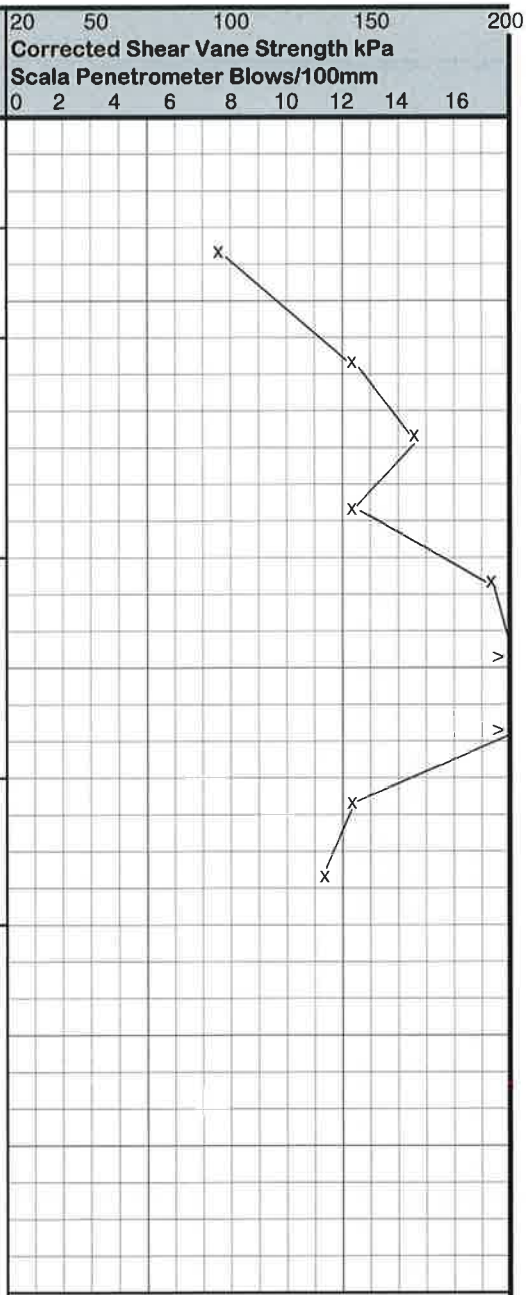
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. N5

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
60/25	0.5		SILT: Orange-brown, dry, crumbly
90/54			CLAY: Orange, stiff, cohesive
105/82	1.0		
90/60			orange, firm, cohesive
120/36			SILT: Bright orange, crumbly, stiff
140+	1.5		hard, dry, crumbly
140+			
90/58			CLAY: Bright orange, firm, cohesive
84/30	2.0		firm, cohesive clay
			END
	2.5		
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

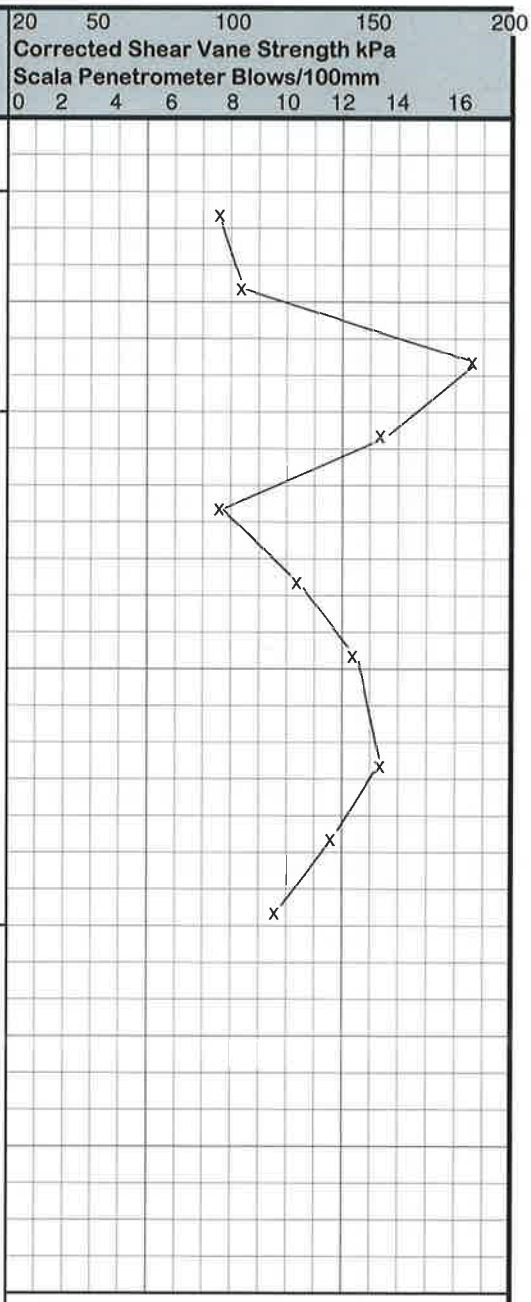
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. N6

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
60/32			SILT: Orange. dry, friable
64/28	0.5		crumbly, dry, gritty
118/45			
94/52			CLAY: Orange, firm, cohesive
	1.0		
60/35			
75/42			smooth orange cohesive clay
88/64	1.5		
95/60			bright orange clay, cohesive, firm
86/30	2.0		
72/50			
			END
	2.5		
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

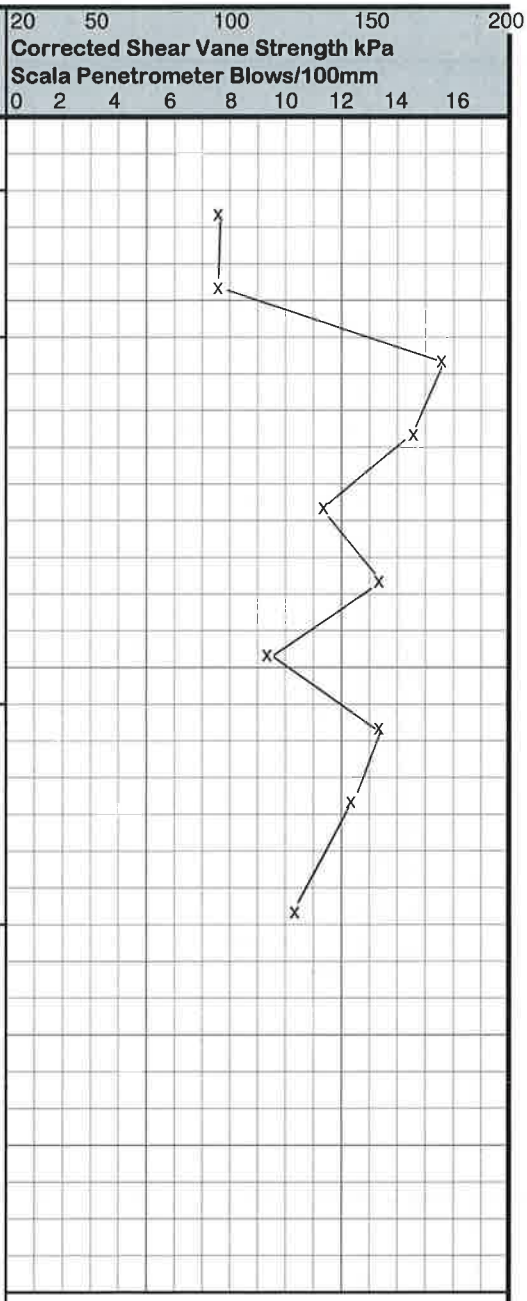
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. N7

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
60/28			SILT: Light orange, clayey, crumbly
62/40	0.5		crumbly, light orange-yellow
110/45			CLAY: Orange, stiff, semi-cohesive
104/46			crumbly, dry, orange, silty clay
	1.0		
82/58			light orange silty clay, firm, cohesive
95/62			
70/54	1.5		light orange-yellow, smooth, firm, cohesive
94/36			SILT: Light orange clayey silt, crumbly, firm
90/50			light grey bands, semi-cohesive
	2.0		
76/55			gritty clayey silt, orange-grey colouring
			END
	2.5		
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

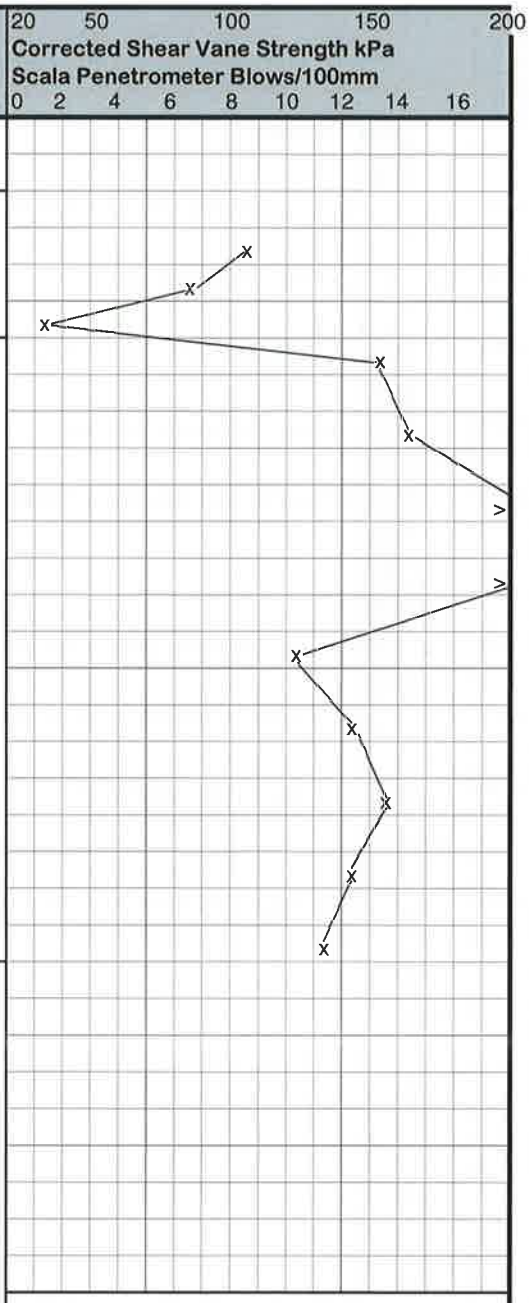
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. O1

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
68/30			SILT: Dark Orange-brown, dry, friable
54/24	0.5		orange-brown colouring, crumbly
20/10			low density, damp
94/52			CLAY: Silty, semi-cohesive, damp
102/78			silty clay, cohesive, dark orange-brown, damp
	1.0		stiff
140+			stiff dark orange-brown clay
140+			
78/58	1.5		soft, moist orange-brown clay
88/68			damp, semi-cohesive
98/68			firm, cohesive, damp
	2.0		
90/48			
82/65			orange-brown soft cohesive clay
			END
	2.5		
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

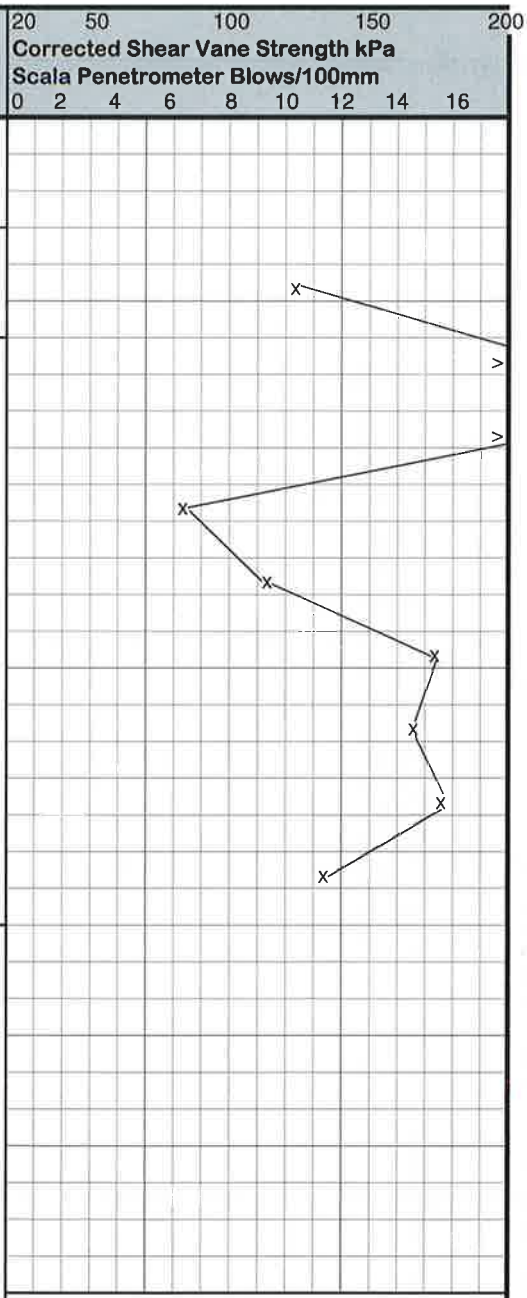
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. O2

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
75/48	0.5		SILT: Orange-brown, dry, friable crumbly
132/66			CLAY: Silty, semi-cohesive, damp orange-brown
125/56	1.0		stiff, cohesive, dark orange-brown
50/34			soft, cohesive
70/50			crumbly silty clay, no cohesion dark orange-brown
108/68	1.5		damp, slight cohesion
105/60			light orange-brown, damp, cohesive clay
110/60	2.0		
82/70			soft, light orange-brown, damp
	2.5		END
	3.0		



Notes. Vane Correction x1.6

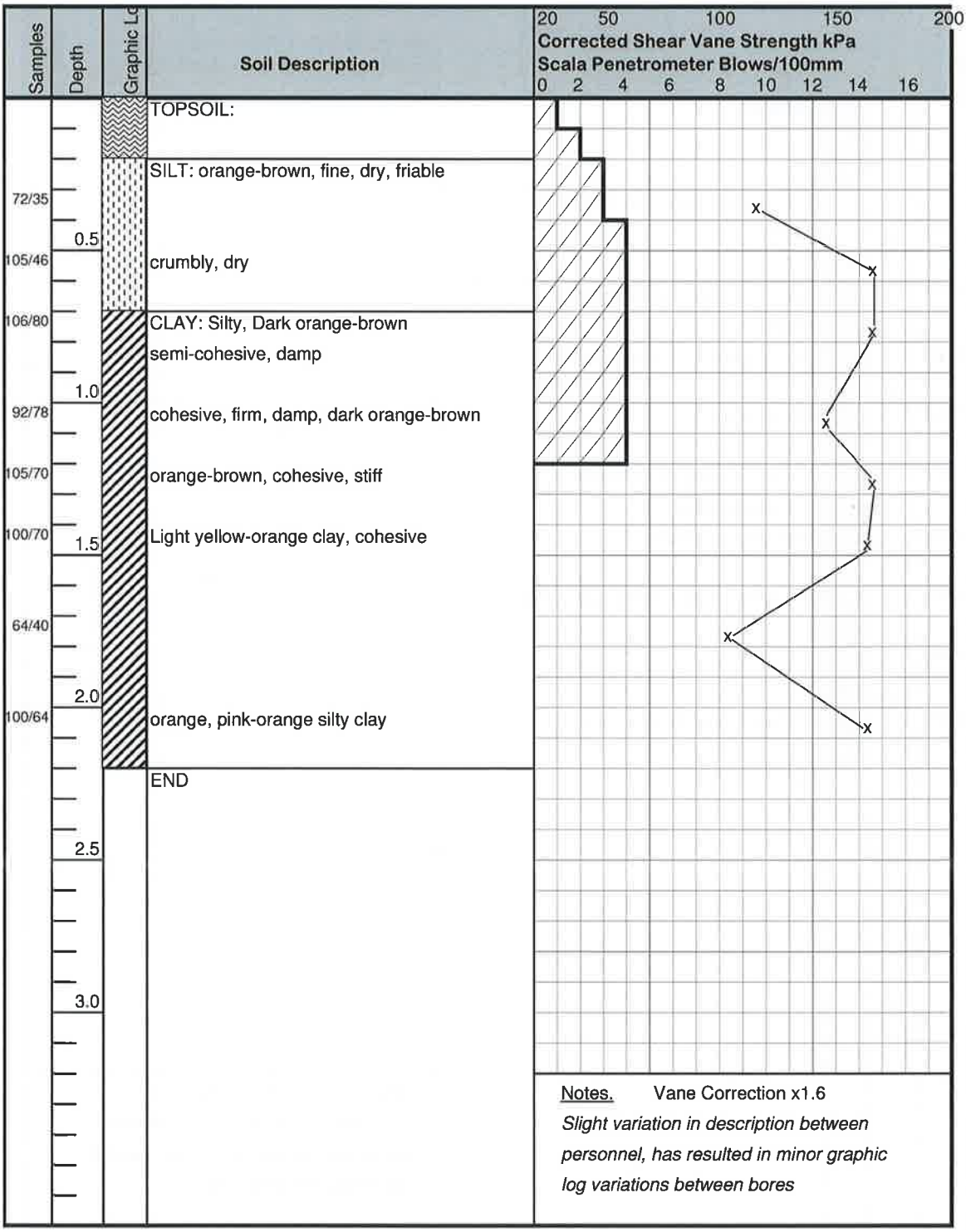
Slight variation in description between personnel, has resulted in minor graphic log variations between bores

Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. O3

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

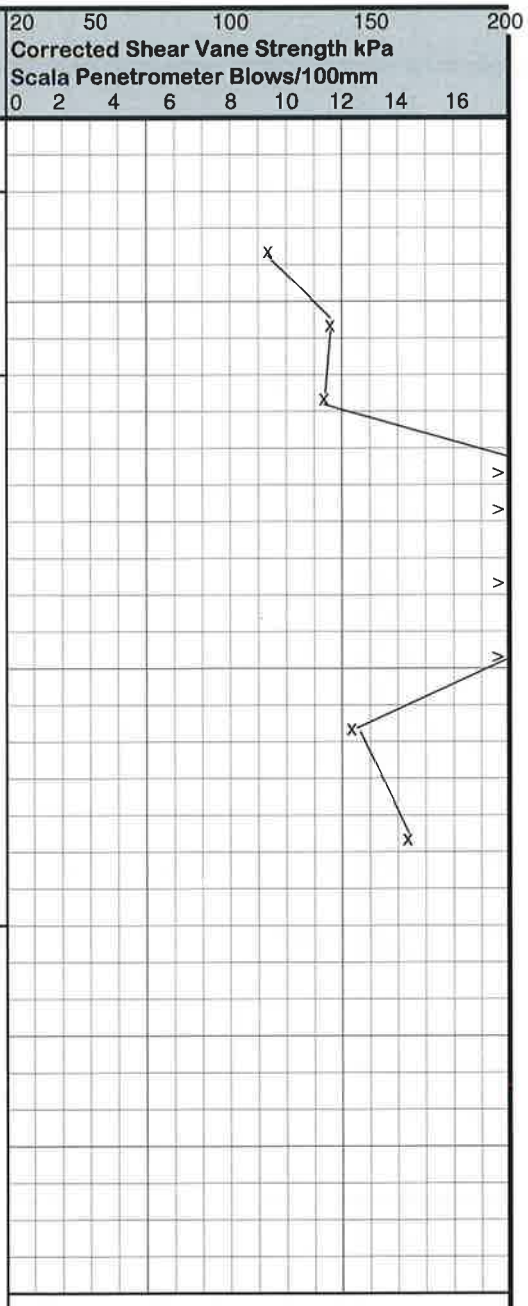
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. O4

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
70/34	0.5		SILT: Orange-brown, fine, dry, friable crumbly
85/50			
84/54			CLAY: Silty, semi-cohesive, orange-brown firm, damp
140+	1.0		cohesive, stiff, high density, darker colouring
140+			crumbly, dry, silty clay, orange-brown
140+			semi-cohesive, dry, stiff
138/74	1.5		cohesive, stiff
88/60			firm-soft, slightly silty
102/54	2.0		firm silty clay, orange-brown, semi-cohesive
			END
	2.5		
	3.0		



Notes. Vane Correction x1.6

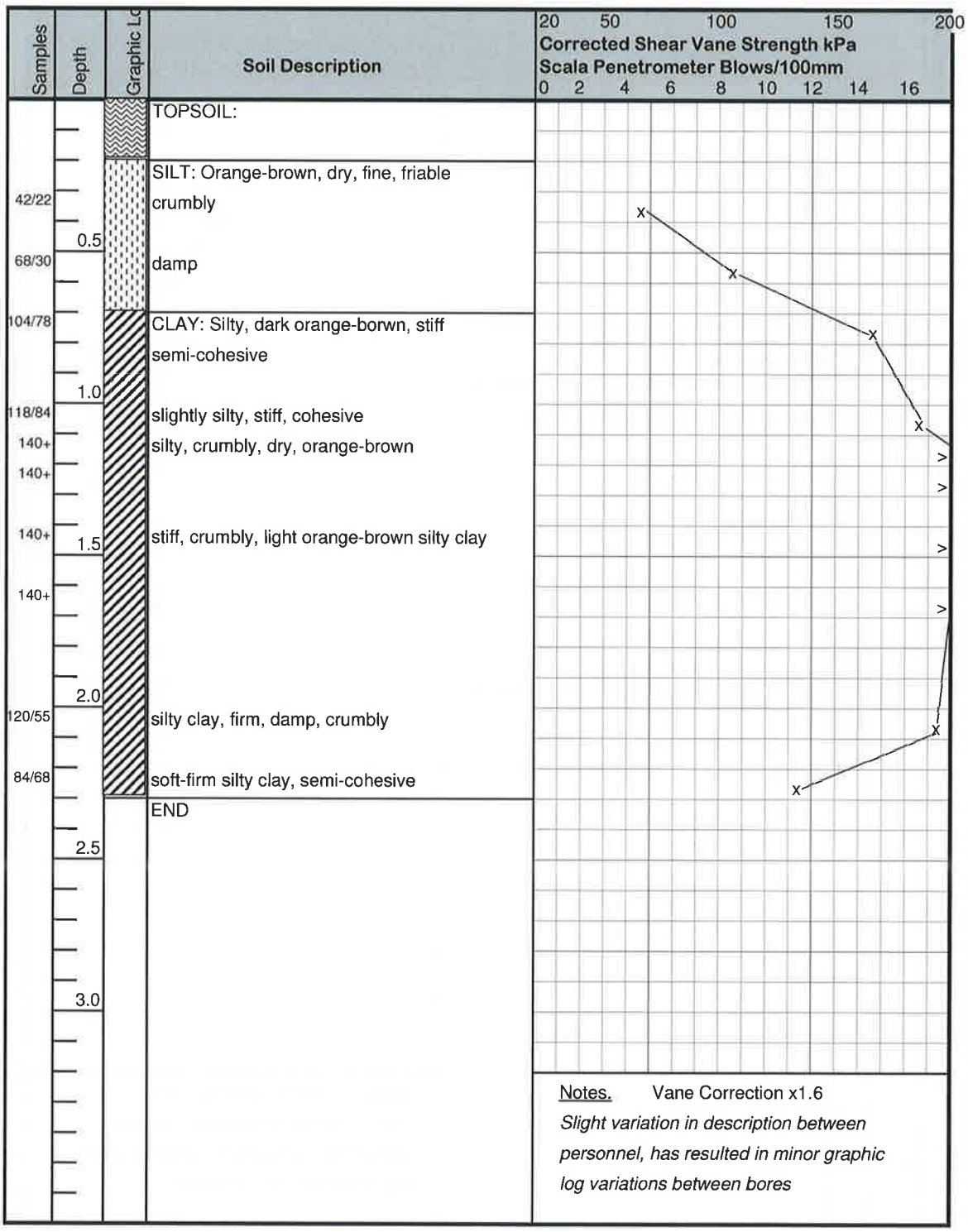
Slight variation in description between personnel, has resulted in minor graphic log variations between bores

Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. O5

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

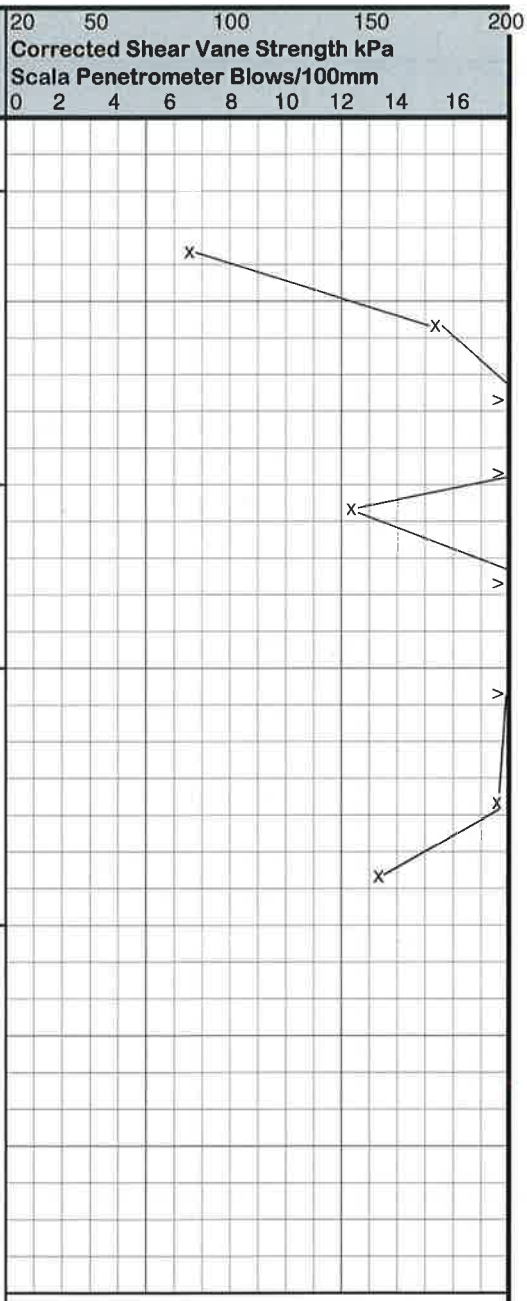
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. O6

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
55/30	0.5		SILT: Yellow-brown, fine, dry, friable crumbly
108/36			dense, fine silt, crumbly
140+			damp
132/63	1.0		
88/44			SILT: Clayey, semi-cohesive, darker colouring damp
140+	1.5		
140+			CLAY: Light orange-brown, silty, crumbly
122/52			damp, crumbly
	2.0		
94/38			silty, stiff, crumbly, light orange-brown clay
	2.5		END
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

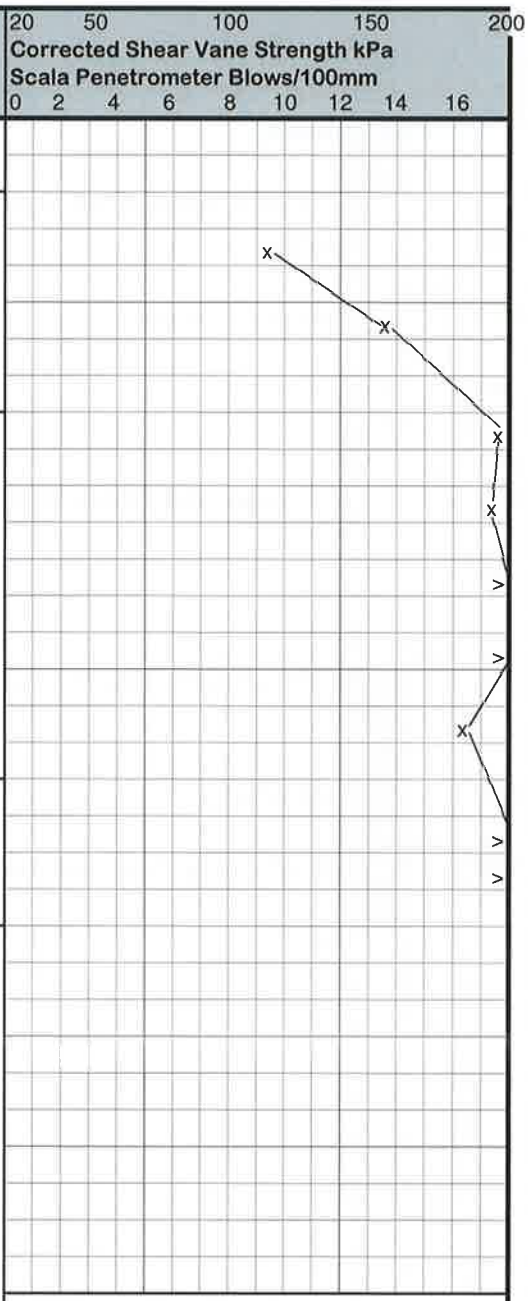
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. O7

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
70/32	0.5		SILT: Yellow-brown, fine, dry, friable crumbly damp
98/55			
122/98	1.0		SILT: Dark orange-brown clayey stiff, semi-cohesive light orange, crumbly clayey silt, damp
120/90			
140+			
140+	1.5		black mottles, crumbly
115/84			increasing black mottles in silty clay, damp
140+	2.0		SAND: Dark brown, dense, shiny flecs light yellow-orange silty sand, medium grade
140+			dense, crumbly, silty, clayey mix light orange colouring
	2.5		END
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

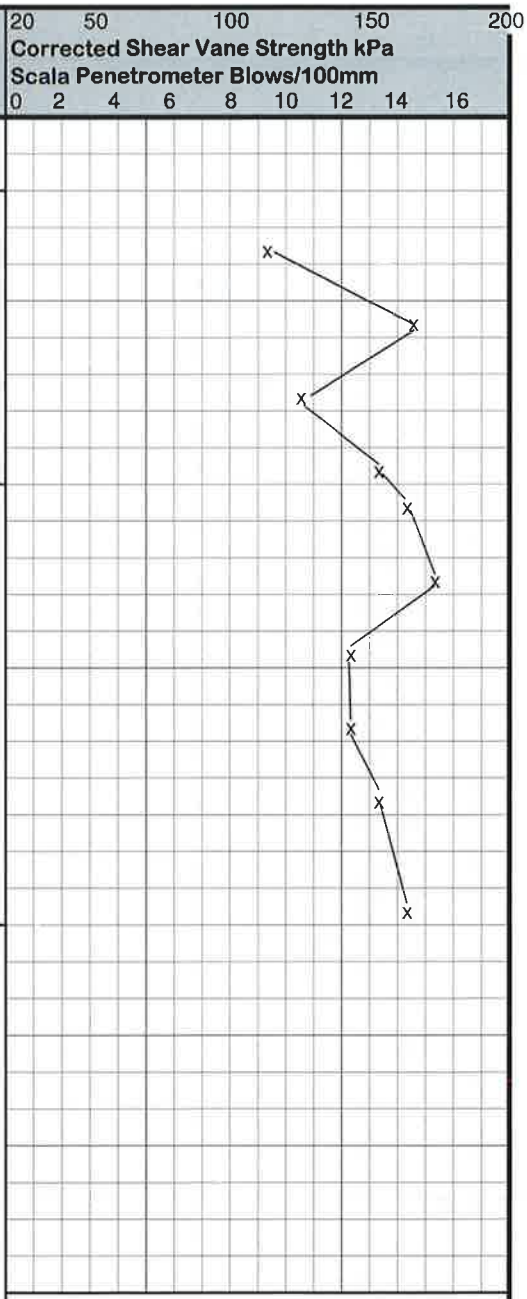
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. O8

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
70/35	0.5		SILT: Orange-brown, dry, friable, fine crumbly damp,
105/50			dense
80/74			dark orange-brown silt, damp
94/16	1.0		
100/78			CLAY: Silty, light orange, semi-cohesive damp
108/90			cohesive, damp, stiff silty clay
90/74	1.5		slightly silty clay, stiff, cohesive
90/72			light orange-yellow stiff clay
94/74			dark orange stripes
	2.0		
100/88			light orange-yellow stiff clay
			END
	2.5		
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

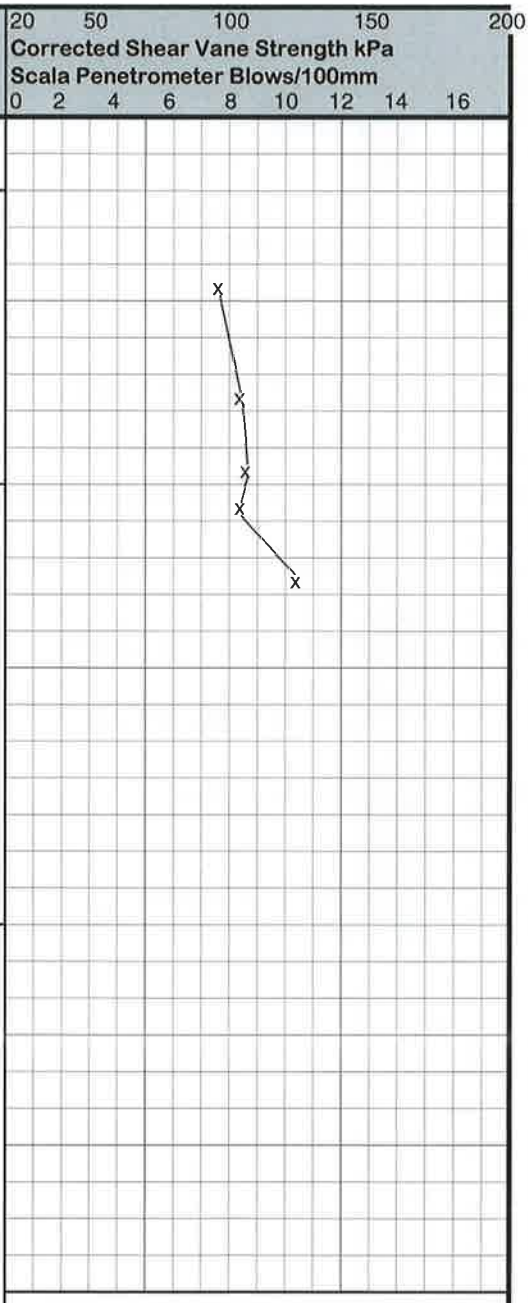
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. M1

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
	0		TOPSOIL:
60/25	0.5		SILT: Orange-brown, friable, firm
65/28			yellow-brown, increased cohesion
68/32	1.0		grades to clay
65/40			CLAY: Cohesive, firm
75/38	1.5		
	2.0		
	2.5		END
	3.0		



Notes. Vane Correction x1.6

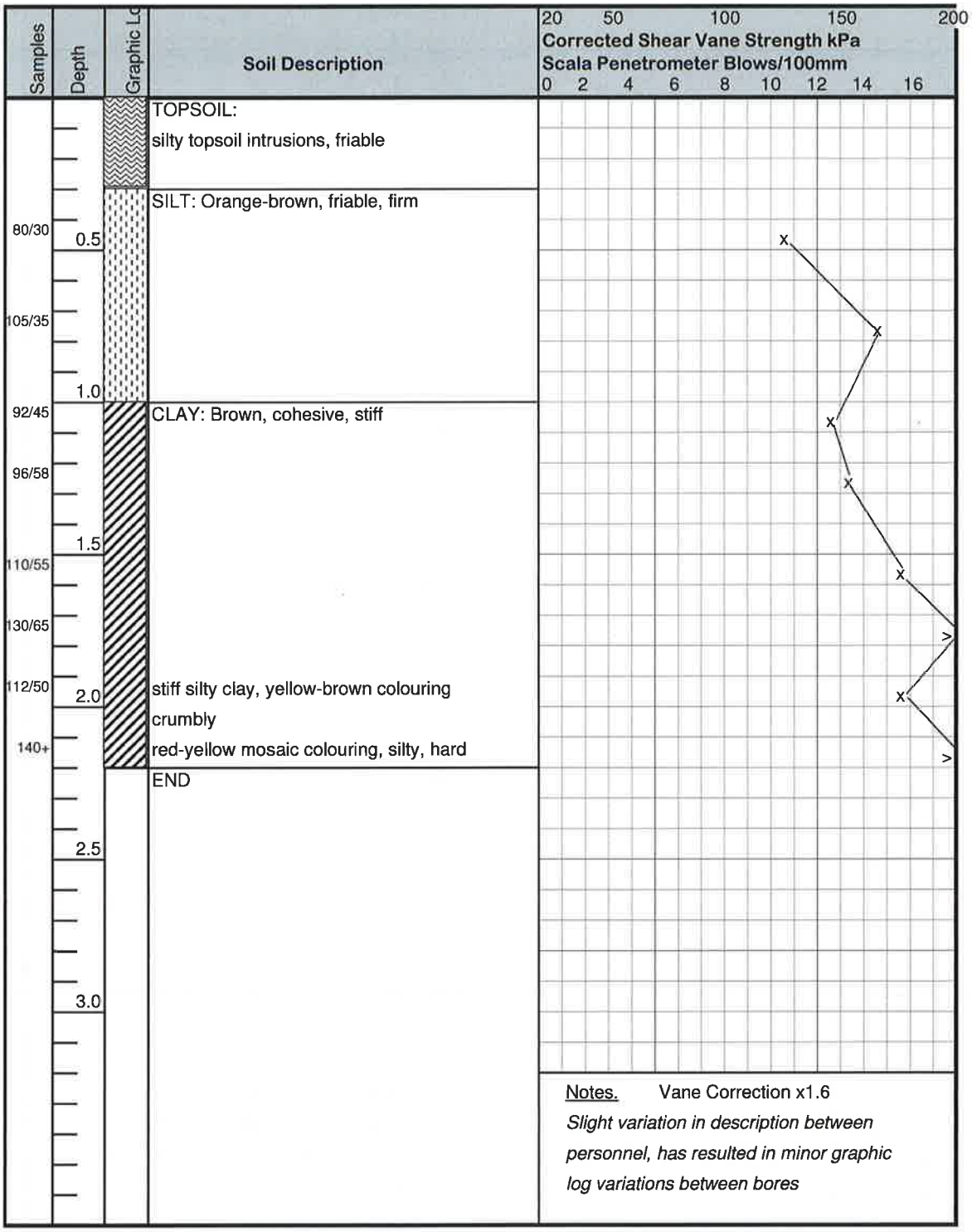
Slight variation in description between personnel, has resulted in minor graphic log variations between bores

Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. M2

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

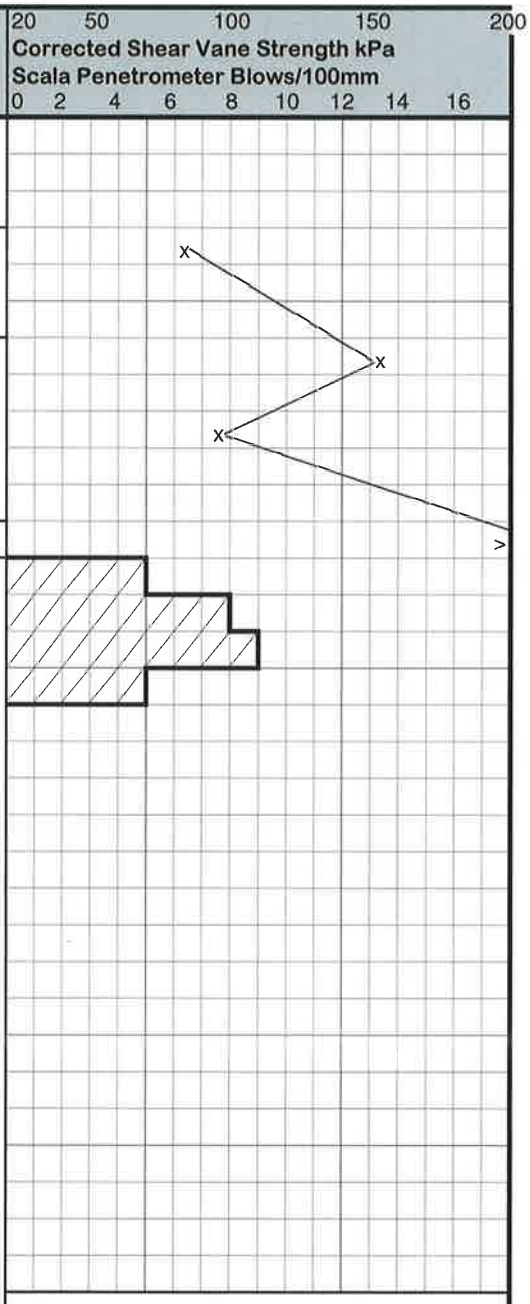
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. M3

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
	0.0		TOPSOIL: silty topsoil mixture
50/20	0.5		SILT: Orange-brown
95/40			CLAY: Yellow-orange, silty, black mottling intrusions
60/28	1.0		light brown, high plasticity
CNP			SILT: Orange-brown, hard, clayey
	1.5		END
	2.0		
	2.5		
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

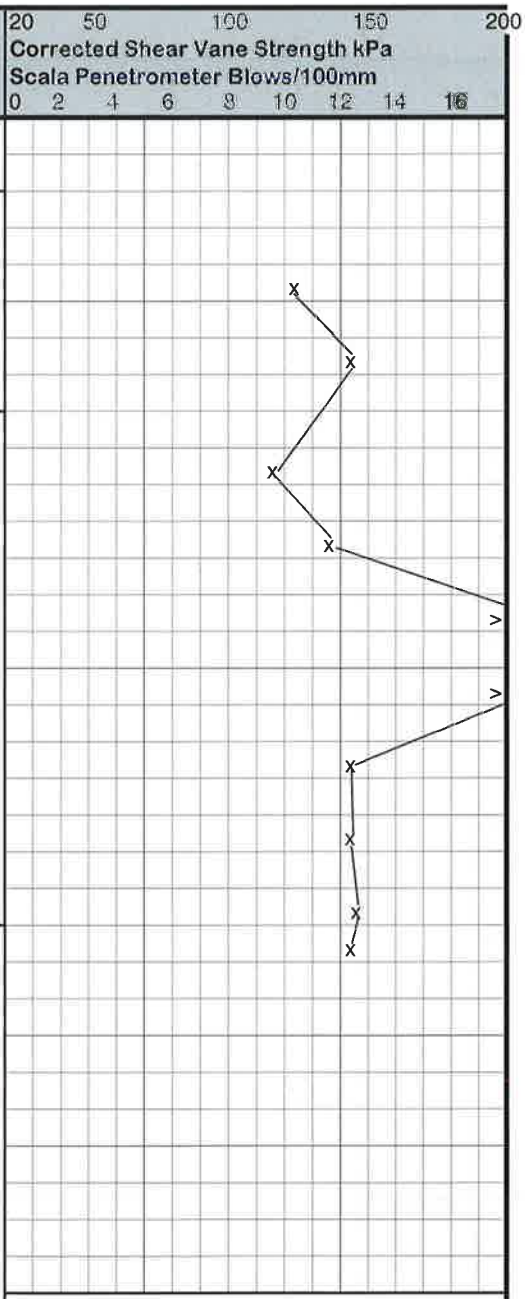
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. M4

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
78/30	0.5		SILT: Orange-brown, friable
90/30			
72/42	1.0		SILT: Clayey, increased cohesion
85/50			
140/70			
	1.5		stiff orange-brown clayey silt, cohesive
125/75			
90/58			traces of pumice
88/50	2.0		
92/55			
89/62			END
	2.5		
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

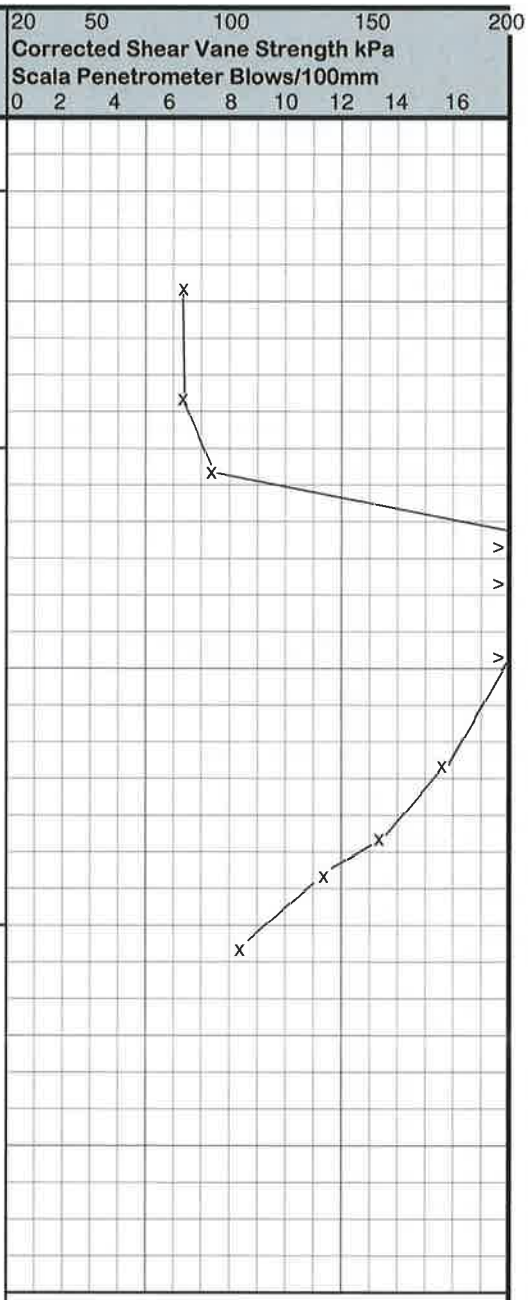
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. M5

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
55/22	0.5		SILT: Orange-brown, friable
55/25			
58/32	1.0		SILT: Clayey, increased cohesion
130/60			
135/38			decreased cohesion, slightly crumbly, dry
140/42	1.5		stiff clayey silt
110/60			
95/48	2.0		
82/42			softer
65/28			END
	2.5		
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

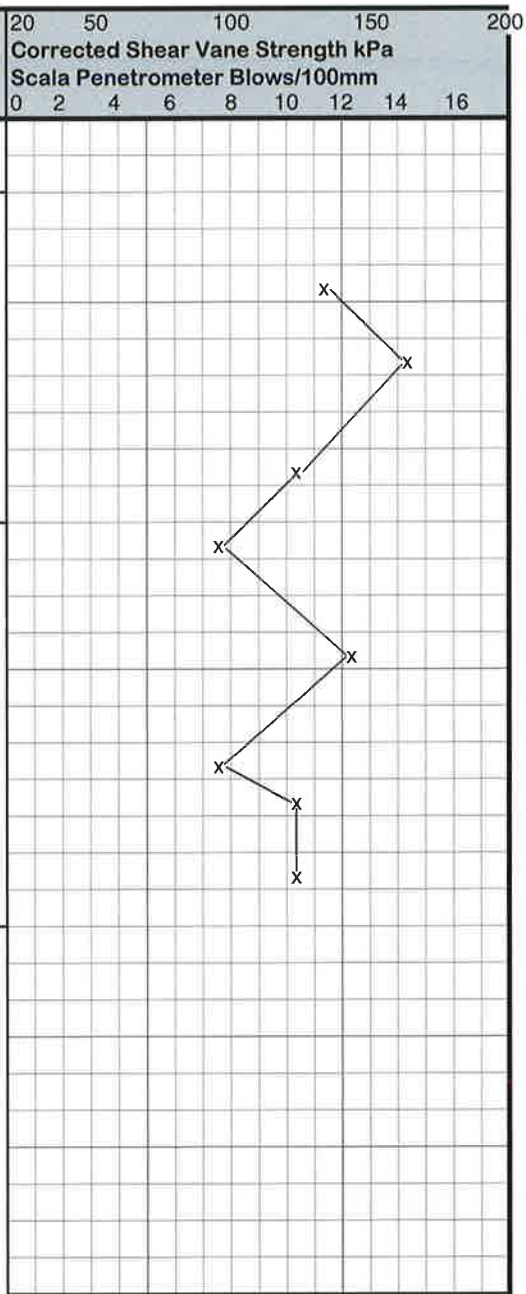
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. M

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
82/30	0.5		SILT: Orange-brown, friable
102/30			firm, slightly gritty, crumbly
78/40	1.0		
62/42			SILT: Clayey, increased cohesion
90/45	1.5		
62/35			
75/32			softer cohesive clayey silt
78/40	2.0		
	2.5		END
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

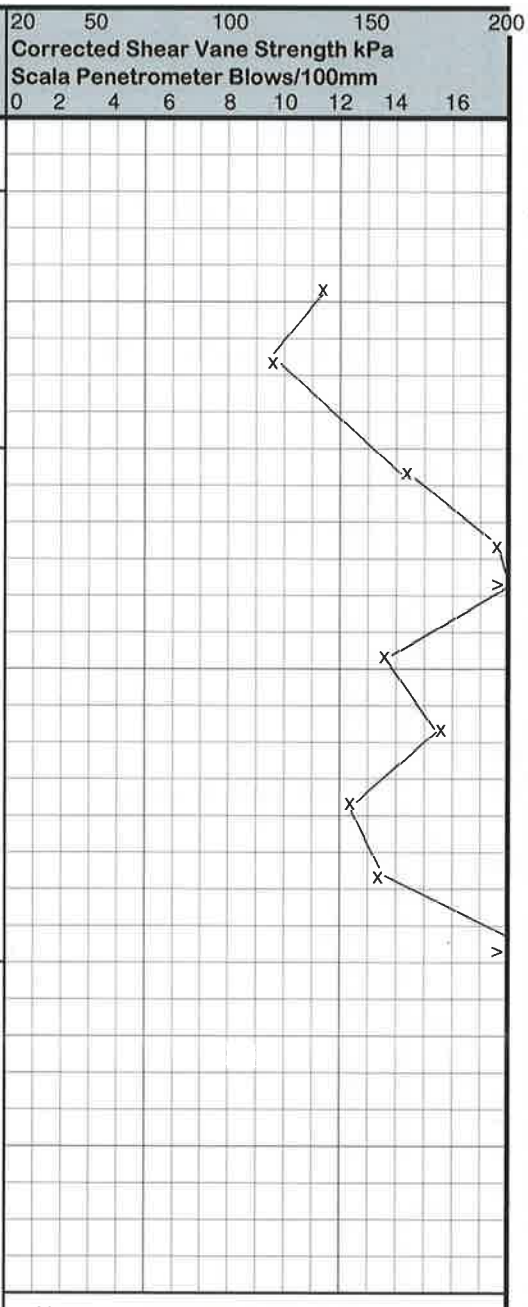
Civil Engineering Services — Bore Log

Date: 22-09-2020 Borehole No. M7

Client: Leigh Robcke
Project: Geotechnical Site Assessment

Personnel NM, AL, MP
Location Waingaro Rd, Glen Massey
Refer to locality diagram

Samples	Depth	Graphic Log	Soil Description
			TOPSOIL:
82/32	0.5		SILT: Orange-brown, firm, friable
72/30			
102/55	1.0		SILT: Clayey, increased cohesion
122/52			stiff, cohesive clayey silt, orange-brown
140/60			
98/40	1.5		
112/50			
90/35			
98/40	2.0		
125/50			
	2.5		END
	3.0		



Notes. Vane Correction x1.6

Slight variation in description between personnel, has resulted in minor graphic log variations between bores

Cost Benefit Assessment

(Assessment of costs and benefits from rezoning Country Living to Village Zone – refer also to the accompanying Statement of Evidence)

	Costs	Benefits
Social	Continued community disruption and uncertainty from ad-hoc development.	Opportunity for well-planned and integrated development that provides community benefits. Provision of 'choice' in the local housing market.
Economic	Sporadic and low level economic activity (and perhaps no activity) associated with development of the area.	Sustained local economic activity associated with development of the area.
Environmental	If developed to CLZ standards, there would be more open space (rural feel) between sections/dwellings.	If developed to VZ standards, opportunity for well-planned and integrated development leading to: - more efficient land use (preservation of high quality soils elsewhere) - opportunities to provide community benefits/assets - potential biodiversity improvements
Cultural	None identified.	None identified.
Risk of Acting or not acting (s32(c))	Not changing the CLZ to VZ increases the risk of incremental and ad-hoc development occurring on the site, or possibly, no further development occurring (which would mean no community or environmental benefits are realised).	
Efficiency	Changing the zone of the land from CLZ to VZ now, via a full review of the Plan (as opposed to a private plan change), is without doubt the most efficient way of acting in terms of landowner, community and Council resources.	
Effectiveness	Changing the CLZ to VZ will more effectively achieve the purpose of the RMA (i.e. the sustainable management of natural and physical resources) than the notified version.	