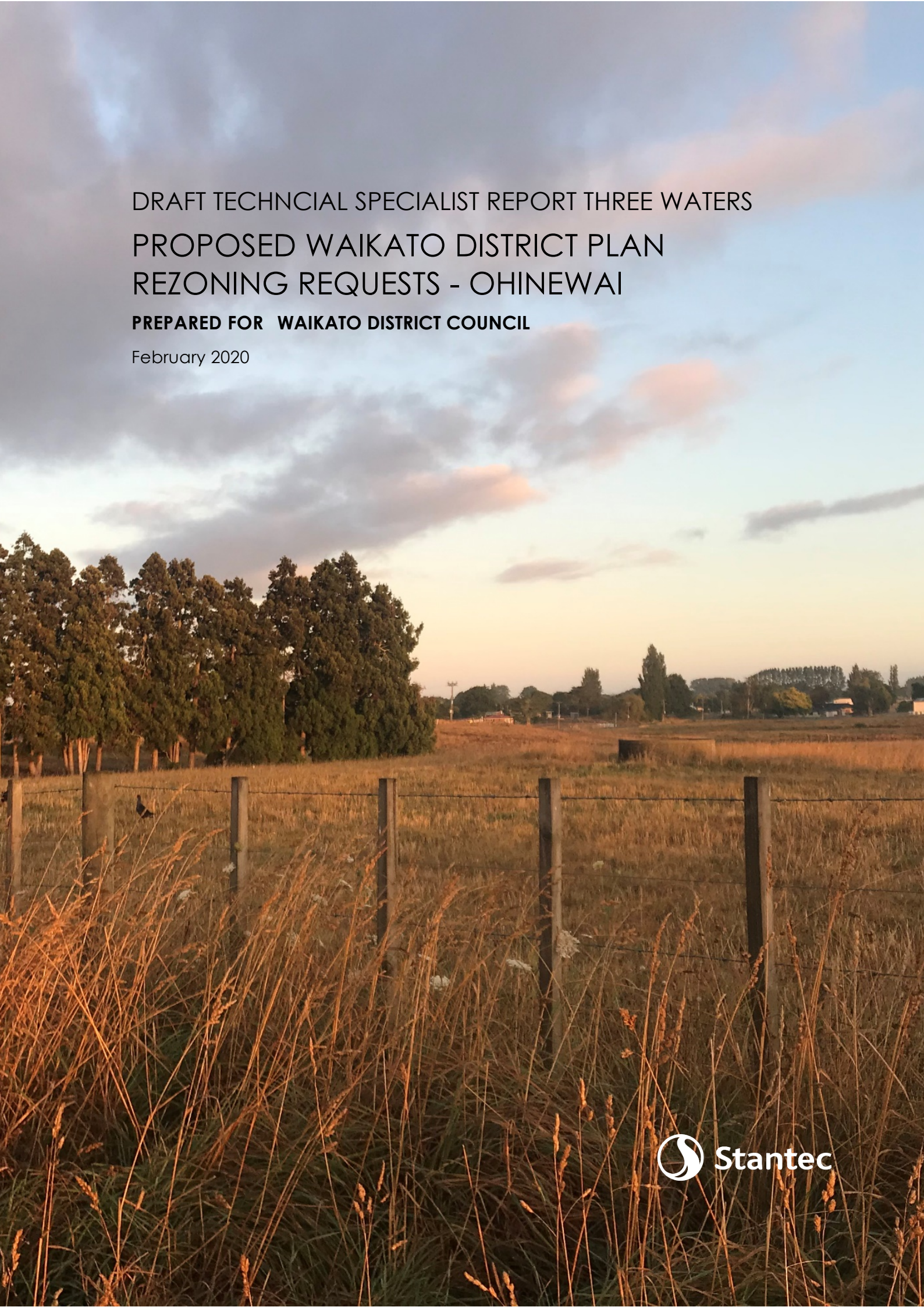
Appendix 8: Three Waters Peer Review



DRAFT TECHNCIAL SPECIALIST REPORT THREE WATERS

PROPOSED WAIKATO DISTRICT PLAN REZONING REQUESTS - OHINEWAI

PREPARED FOR WAIKATO DISTRICT COUNCIL

February 2020

Stantec

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REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
1	7/2/2020	Initial draft (internal review)	MB/JB	JG	PH	
2	10/2/2020	Draft for WDC review	MB/JB	PH	JG	JG
3	28/2/2020	Final	MB/JB	PH	PH	JG

Abbreviations

The following are abbreviations used throughout this report. Other abbreviations specific to particular sections of the report are introduced in those sections.

APL	Ambury Properties Ltd
BBO	Bloxam Burnett Olliver – Consultants to APL
DoC	Department of Conservation
GHD	GHD Limited - Consultants to APL
HG	Harrison and Grierson – Consultants to OLL
OLL	Ohinewai Lands ltd
RMA	Resource Management Act 1991
SMP	Stormwater Management Plan
Stantec	Stantec New Zealand; Consultants to WDC
WDC	Waikato District Council
WLASS	Waikato Local Authority Shared Services
Woods	Woods and Partners Ltd – Consultants to APL
WRC	Waikato Regional Council
WS	Water Supply
WSL	Watercare Services Limited - Waikato
WW	Wastewater
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

Waikato District Council

Proposed Waikato District Plan Rezoning Requests - Ohinewai

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APPENDICES

1. Introduction

We (Stantec) have been engaged by Waikato District Council (WDC) to undertake a technical peer review of the Ohinewai Rezoning Requests to the Proposed Waikato District Plan, in relation to Three Waters issues (Stormwater, Water Supply, and Wastewater). The key deliverable is a technical peer review memorandum (this report) that is appropriate to be attached to the Section 42A report. This report includes:

- A review of the assessment of Three Waters aspects associated with the proposed land uses;
- Response to issues raised in submissions and further submissions; and
- Recommendations within the scope of submissions including plan provisions.

This technical peer review memorandum is structured into three key sections (Section 2 to 4), representing each of the Three Waters (Stormwater, Water Supply and Wastewater). For each of these sections we provide:

- An overview of the context for the assessment (e.g. proposed changes, key submitters)
- Key issues identified in the submissions and associated documentation
- Additional key issues identified as part of this review, and provided for consideration by all parties
- A summary and critique of the assessment(s) of effects available for review (namely provided by submitters)
- Conclusions drawn from our review, and recommended actions or items for further consideration by all parties.

Finally, Section 5 of this report identifies recommended changes to District Plan provisions, identified as an output of this review. Our overall findings are presented in Section 6.

1.1 Documents Considered

In preparing this report the following documents were reviewed, as relevant to each of the Three Waters:

1.1.1 Stormwater

- Sleepyhead Estates Stormwater Management Plan (SMP) – Ambury Properties Ltd (APL), dated November 2019. Including:
    - *Meeting Minutes #4 Tangata Whenua Governance Group*
- Ohinewai Flood Assessment Report (OFA) – APL, dated November 2019. Including:
    - *Meeting Minutes from 12/09/2019 and 23/10/2019*
    - *Memorandum to Mercury Energy dated September 2019*
- Ohinewai Land Limited (OLL) Section 32AA Planning Report, Infrastructure Services Assessment (Appendix 4 to OLL Report).

Considerations for separate rezoning requests in the Ohinewai area have been included in this report. Developments in Ohinewai that have submission rezoning requests are listed below, and the submissions that included stormwater components have been highlighted.

- Planning Focus Limited
- Shand Properties
- Ohinewai Area Committee

- Ribbonwood Family Trust

The Shand Property developments has been reviewed to understand stormwater approaches from other developers, and is discussed in Section 4.2 Matters Raised by Submitters. However, the focus of this report is on the APL and OLL submissions.

The technical guidance document reviewed and referenced in this report, are as follows:

- Regional Infrastructure Technical Specification Version 1.0 (RITS); Waikato Local Authority Shared Services (WLASS)
- Waikato Stormwater Management Guideline Technical Report 2018/01 (TR201801), WRC
- Waikato Stormwater Runoff Modelling Guideline Technical Report 2018/02 (TR201802), WRC
- Environment Waikato Best Practice Guidelines for Waterway Crossings Technical Report 2006/25R (TR0625R).

1.1.2 Water supply

- Woods - Water Supply Service Strategies Rezoning Submission to the Proposed Waikato District Plan 28/11/2019. Prepared for APL (Referred to as Woods WS (2019))
- Ohinewai Land Limited Section 32AA Planning Report, Infrastructure Services Assessment (Appendix 4 to OLL Report).

1.1.3 Wastewater

- Woods- Wastewater Servicing Strategies for Re-Zoning Submission to the Proposed Waikato District Plan 28/11/2019. Prepared for APL (Referred to as Woods WW (2019)
- Bloxam Burnett & Olliver – Ambury Properties Limited Rezoning Submission to the Waikato Proposed District Plan Review – Assessment of Environmental Effects Report and Section 32AA Evaluation December 2019.

1.1.4 Subsequent Documents and Information

- After Stantec had completed the review of APL's SMP and OFA Reports, two meeting occurred between Stantec, Woods and BBO to discuss the approaches to stormwater management and clarify any questions or concerns raised by Stantec, before completing this Report.
- The first occurred on 19th February 2020 to discuss the SMP, and a follow up meeting then occurred on 20th February 2020 with the Flood Hazard modeller. Attendees at the meeting, questions discussed, and Woods responses are provided in Appendix A.
- GHD Memorandum – "Waters Review Ambury Properties" – Draft 20 February 2020.

  This memorandum was made available to Stantec on 21 February. This was after Stantec had evaluated and commented on Woods and BBO reports and included in our draft report.

  GHD's task was to review the Woods analysis in terms of the planning and regulatory context with a view to producing a more refined recommendation for the provision of water and wastewater infrastructure that could be discussed with WDC/WSL and be placed before the panel.
- Meeting notes from Watercare Services Limited – Waikato (WSL) meeting with Stantec 21 February 2020.

  These are attached as Appendix B to this report. This meeting took place immediately after the receipt of the GHD Memorandum.

1.1.5 Subsequent Documents and Further Information

After Stantec had completed the review of APL's SMP and OFA Reports, two meeting occurred between Stantec, Woods and BBO to discuss the approaches to stormwater management and clarify any questions or concerns raised by Stantec, before completing this Report.

The first occurred on 19th February 2020 to discuss the SMP, and a follow up meeting then occurred on 20th February 2020 with the Flood Hazard modeller. Attendees at the meeting, questions discussed, and Woods responses are provided in Appendix A.

1.2 Summary of Submissions

Table 1-1 sets out our understanding of the relief sought by the various submitters and the submissions / matters we have focussed on from a Three Waters perspective.

Table 1-1: Summary of issues (relating to Three Waters only) raised by submitters

Submitter	Summary of relief sought	Comments
Ambury Properties (primary and further)	• Rezone from Rural to Industrial, Business and Residential • 63ha industrial land • 8.7ha business land • 52ha residential land (1100 dwellings)	This rezoning request has been a key focus of our assessment
Ohinewai Lands Ltd. (primary and further)	• Identify 39ha (235 dwellings) as a future growth area	While this is not a request for a live zoning it is a request for the Proposed Plan to signal that this land is appropriate for future urban development and we have considered the implications of this in our assessment.
Planning Focus (primary)	• Rezone land to industrial	This is generally addressed at a high level through the assessments of the AML and OLL requests.
Shand Properties (primary)	• Rezone land to Country Living	The Country Living Zone is required to be self-sufficient in the provision of water supply, wastewater and stormwater disposal, so we have not assessed this request. Flooding implications generally addressed at a high level through the assessments of the AML and OLL requests.
Ribbonwood Family Trust (primary)	• Rezone land to Country Living	The Country Living Zone is required to be self-sufficient in the provision of water supply, wastewater and stormwater disposal, so we have not assessed this request. Flooding implications generally addressed at a high level through the assessments of the AML and OLL requests.
Ohinewai Area Committee (primary)	• Rezone existing commercial land to residential	We have not assessed this request as the land already has an urban zoning.
FutureProof (further)	• Support Ambury Properties industrial rezoning request • Oppose Ambury Properties residential rezoning request	We have taken this further submission into consideration because it is seeking to better understand impact on infrastructure capacity and costs in terms of the industrial zoning requests.

Submitter	Summary of relief sought	Comments
	• Oppose in part Ohinewai Land submission • Oppose Shand properties submission • Oppose Ribbonwood submission • Support in part Planning Focus submission • Seek to better understand impact on infrastructure capacity and costs	
Mercury NZ Ltd (further)	• Oppose Shand Properties submission because of flooding risk	We have taken this further submission into consideration because it is concerned about flooding risk.
Auckland / Waikato Fish and Game Council (further)	• Oppose Ambury Properties, Planning Focus and Ohinewai Land submissions because of potential effects on flood storage capacity and capacity requirements in surrounding areas	We have taken this further submission into consideration because it is concerned about flooding risk.

1.3 Limitations and Assumptions

- This report does not include a statutory assessment of the relevant planning instruments.
- Water quality issues have only been assessed at a high level as this is assumed to be a regional matter that will be addressed by the Waikato Regional Council.
- No costings or cost comparisons have been undertaken.
- There have been no discussions with WDC or Watercare Waikato Three Waters staff as yet. It is intended that this draft report would form the basis of these discussions.
- It is noted that Stage 2 of the Proposed Plan which addresses natural hazards and climate change including flooding is yet to be publicly notified. It is unclear at this stage the extent to which Stage 2 will address and include provisions to manage flooding on the land subject to the rezoning requests and surrounding areas.
- The rezoning requests apart from those of APL and OLL have not been specifically addressed as they have not included any technical information on the Three Waters. However, the implications of these requests have to some extent been addressed at a high level through the assessments undertaken for APL and OLL.
- The integration and inter-relationships of the Three Waters has only been assessed at a high level.
- We have relied on the statements made in the APL documentation (in particular the letter from Bloxam, Burnett and Olliver dated 3 February 2020 that there is water allocation available from existing water permits and that there is an established water allocation trading system available from multiple parties that would service development enabled by the requested rezoning. APL have advised that evidence of these arrangements cannot be provided due to commercial sensitivities. We have however, raised an issue about the security and duration these trade permits if used would provide.

1.4 Stantec's involvement in the Waikato District and the FutureProof Sub-region

In recent years, Stantec personnel have been involved in a number of Three Waters projects for Waikato District Council and other Councils within the FutureProof sub-region. Many, if not all of these projects provide some background relevant to this rezoning request in terms of Three Waters.

These projects include but are not limited to:

- Current involvement in the Waikato Sub-Regional Three Waters project
- Preparation of the FutureProof Three Waters Strategy
- Preparation of Water, Wastewater and Stormwater 50 year strategies for WDC
- Securing Wastewater discharge consents for Huntly and Ngaruawahia
- Preparation for WDC of a report on centralised and Decentralised Wastewater Treatment Plant Investigation – October 2017
- Water supply demand and consented take assessment for FutureProof Councils.

1.5 Report Authors

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- Jim Bradley BE(Hons), Dip SE Delft, DistFEngNZ, CEng (Civil Environmental), IntPE, MCIWEM, ANZIM, BCEE – Water Supply and Wastewater
- Allan Leahy – FEngNZ – Stormwater Review
- Paula Hunter BA, Dip TP, FNZPI – Planning and Review
- Jessica Grinter BSc, MIWM, MEIANZ – Project Management and Review.

2. Stormwater Matters

2.1 Overview

The WDC has undertaken a two-stage notification process for the Proposed Plan, for which Stage 1 is currently underway (with submissions received). Stage 2 is yet to be notified and relates to the management of natural hazards within the District. The APL documentation (listed in Section 1.1.1) includes the Ohinewai Flood Assessment Report prepared by Woods in November 2019[1]. Flooding mitigation has therefore been covered in APL's technical assessment but there is a lack of clarity regarding the extent to which flooding matters will be addressed in Stage 2 of the District Plan.

The *Assessment of Environmental Effects Report and section 32AA* evaluation report prepared by Bloxham Burnett & Olliver (BBO; 2019)[2]t covers and overview of the flooding and stormwater effects of APL's proposed development, with reference to APL's Stormwater Management Plan (SMP) (as Appendix I to the BBO 2019 evaluation report) and the Ohinewai Flood Assessment Report (as Appendix F, in BBO 2019). The SMP and Ohinewai Flood Assessment Report are the key documents provided by APL, that outline in detail the potential effects, an assessment the effects and propose mitigation methods. This report therefore refers to these key documents.

APL's SMP was completed to support the rezoning of the APL rezoning request. The SMP outlines the overarching objectives of the stormwater design based on WRC Stormwater Management Guidelines (2018), statutory considerations, site conditions and best practice, and outline how they will achieve the objectives within the land zoning.

The APL's SMP defines the key objectives as being:

- "Incorporate a water sensitive design approach that manages the impact of land use change from predominantly rural/farmland to urban. The proposed approach promotes at source stormwater management which is in line with Waikato Regional Council's Stormwater Management Guidelines.
- Account for flood risk areas and provide for development without creating adverse effects on the neighbouring properties or result in increases to the water level in the receiving Lake Environment.
- Provide stormwater quality treatment for roads and carparks and avoidance of high contaminant yielding roof and cladding materials.
- Minimise the adverse effects on the water quality and ecological values of the receiving environment through the implementation of stormwater management devices to be selected using a toolbox approach.
- Reduction of nitrogen and phosphorus in stormwater runoff considering the eutrophic/hyper eutrophic status of Lakes Rotokawau and Waikare".

As part of this technical peer review, we have assessed whether APL's SMP proposals demonstrated alignment with WRC's guidelines, statutory considerations, site conditions and best practice; how the objectives will be met and outlines any issues or concerns within APL's SMP that could impact on the rezoning. Our comments concerning the Flood Assessment Report, and OLL's Infrastructure Services Assessment, are summarised in Sections 2.3.6 and 2.4.

We note that the stormwater design has not been completed; APL's SMP outlines the approaches that will be applied in the development and provides a high-level overview of the SMP direction. The SMP acknowledges that any devices implemented in the development and the level of treatment achieved is

[1] Woods 2019 Flood Assessment Report, Sleepyhead Estate Ohinewai, prepared for Ambury Properties Limited by Wood & Partners Consultants Ltd, 21 November 2019 (appended to BBO 2019 report – referenced in footnote below). Referred to in this memo as the "OFA Report".

[2] BBO 2019 *Rezoning submission to the Waikato Proposed District Plan Review – Assessment of Environmental Effects Report and Section 32AA Evaluation*, prepared for Ambury Properties Limited by Bloxham, Burnett & Olliver, December 2019 (131pp).

not yet determined and will be completed at a later stage. As such this current review was limited to considering the stormwater effects at a high level and the ability to meet the above objectives. It is understood that design components will be subject to further detailed design, engineering approval and consenting.

Communication from WRC included in the minutes of the SMP confirm that WRC is of the view that the Waikato River Vision and Strategy is addressed and a focus on "betterment" is incorporated into the SMP.

2.2 Key Issues

2.2.1 Background

The APL development is a 178 hectare development that is located next to Lake Rotokawau and Department of Conservation (DoC) reserve land, and aligns with the OLL Development, Figure 2-1. The developments contain two existing drainage networks, the Balemi Drain and Tahuna Drain, illustrated in Figure 2-1 below, with the decommissioning of Balami Drain being part of APL's SMP.

Figure 2-1 Location of APL and OLL Developments

Flows from the developments will travel to Lake Rotokawau, which is a Significant Natural Area and hydraulically connected to Lake Waikare. Lake Waikare has a catchment area of 3,600 hectares, which includes the proposed developments, and is an integral component of the Lower Waikato Waipa Flood Control Scheme (LWWFCS), with excess flows from the Waikato River being diverted to the lake during flood events. The Lake Waikare levels are controlled through outlet structures that discharge to the Whangamario Wetlands and through the To Onetea Stream, discharging back to the Waikato River at Meremere, refer to Figure 2-3below. The LWWFCS provides flood protection to the flood plains of the Lower Waikato and Waipa rivers and falls under the Lower Waikato Management Zone. The impact of the developments on the LWWFCS and surrounding properties are an important component of the rezoning review. Flood modelling was completed by Woods on behalf of APL to understand and quantify the

effects of the proposed development on Lake Waikare's water levels and land adjacent to the development (see Woods 2019 – the OFA Report).

The lakes and wetlands in the area also have significant ecological values and the rezoning of land should serve as a best practice approach to future developments in the Ohinewai area.

Figure 2-2: Land Drainage Schemes from SMP

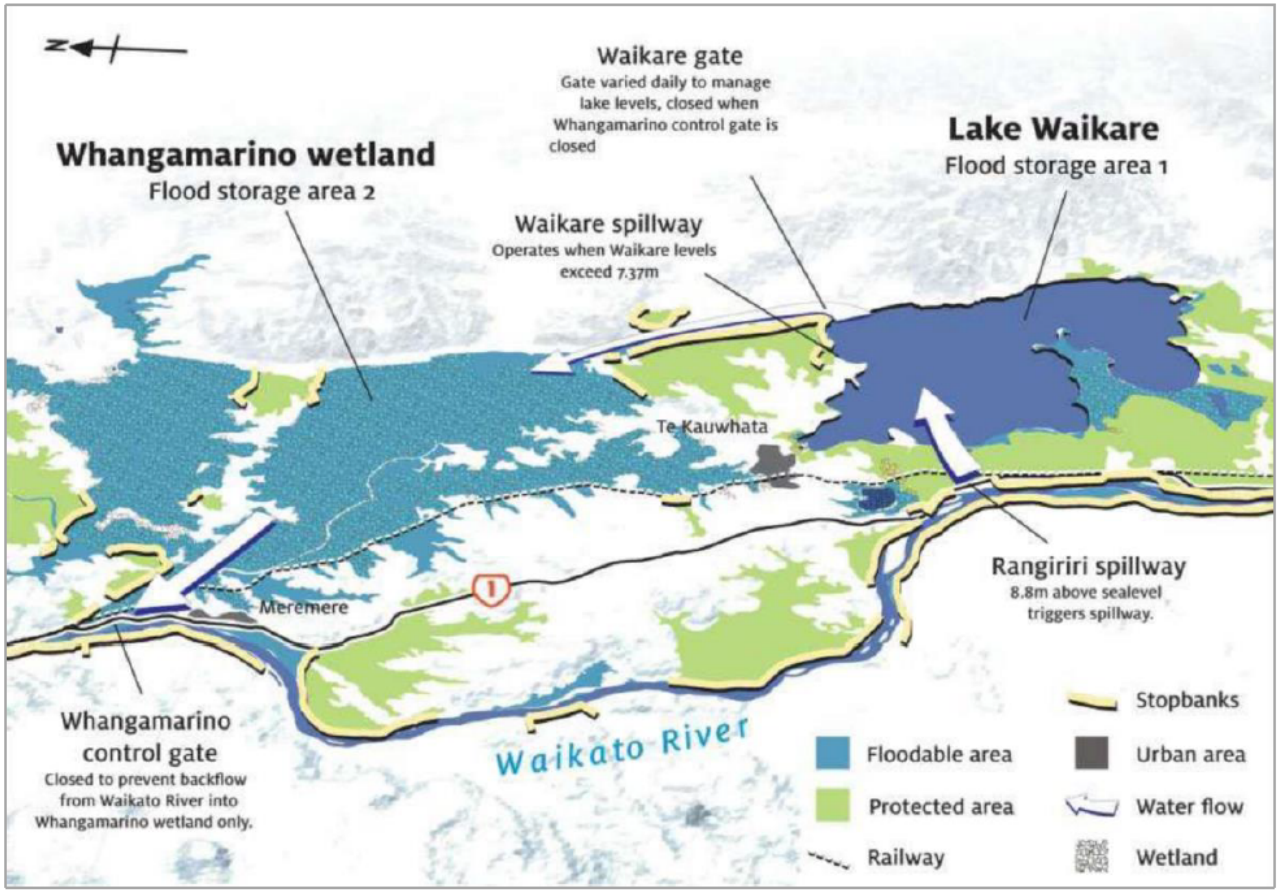


Figure 2-3: The Lower Waikato Waipa Flood Control Scheme & Location of APL Development

The SMP is based on high level design information and not all of the issues, particularly those related to diversions and discharges have been fully addressed. One risk to APL with this approach is that the resolution of issues through the detailed design stage may result in the need for the SMP or the development plans to be modified. This issue has been left in this review as a risk that APL has accepted and is therefore not addressed further.

2.2.2 Key Potential Issues Summary

From a stormwater perspective the key potential overarching issues identified from the submitters' technical documents include the following:

- The level of service standards outlined in Regional Infrastructure Technical Specification (RITS) Section 4.1.3 are met for the stormwater design, including sizing of primary and secondary networks, level of treatment and volume and peak flow requirements.
- Stormwater devices installed within the development will have the ability to treat discharges to an acceptable standard in accordance with the WRC consenting requirements, and to a level that maintains or improves the current water quality in Lake Waikare and Lake Rotokawau, particularly regarding the contaminants of concern - nitrogen, phosphorus and total suspended solids.
- The capacity and design of the stormwater infrastructure will convey flows without causing adverse effects on neighbouring properties, watercourses and ecology.
- The development aligns with the LWWFCS and considers the risks around stop bank failure. It is assumed that this will be assessed in more depth in Stage 2 of the Proposed Plan.
- The space allocated for stormwater devices can conveyance and treatment without compromising function of either.

- The SMP presents a sustainable resilient long-term strategy.
- Understanding on who will maintain the devices.
- The construction phase effects on DoC reserve, streams and the lakes have been considered.
- Accessibility and safety have been considered regarding space allocations.
- The relationship of the rezoning request and the future consenting processes, in particular with the WRC consents.

A number of the above issues relate to water quality and discharge outcomes rather than the land use outcomes that are the subject of this rezoning request. As such the detailed effects assessment of those matters is expected to be carried out at the regional consenting stage. This review has focused on whether the rezoning application adequately addresses these effects to enable the details to be address at a later stage.

Communication with the Department of Conservation (DoC), that was provided to us as part of an information request, outlines the following concerns raised by DoC:

- Lake Rotokawau should be a rain-fed peat lake. Ideally stormwater should not discharge to the lake and water quality from the development is an issue.
- DoC is concerned over the relationship with long term flood management schemes and how developments may affect the Whangamarino wetland.

2.3 Assessment of Effects

2.3.1 APL's Assessment of Effects

The key stormwater considerations and potential issues for the APL development that were highlighted in the APL documentation, include the following:

- Important considerations for flows draining to Lake Waikare include:
    - *The potential impacts of the proposed development enabled by the rezoning on the LWWFCS and vice versa*
    - *The flood hazard extent and impact of the proposed development on surrounding properties*
    - *The lake has poor water quality with high levels of nitrogen and phosphorus*
    - *Consultation with WRC identified the need to consult with DoC and Fish and Game regarding the discharges to Lake Waikare*
- Important considerations for flows draining to Lake Rotokawau include:
    - *Lake Rotokawau is classified as hyper-eutrophic, with poor water quality, in the WRC report – Significant Natural Areas of the Waikato Region: Lake Ecosystems*[3].
    - *The lake is identified as part of the wetland surrounding Lake Waikare*
    - *Consultation with WRC identified the need to consult with DoC and Fish and Game around discharges to Lake Rorokawau*
- DoC reserve land surrounds Lake Rorokawau. Flows from the proposed development will travel through DoC land to Lake Rotokawau and any new conveyance methods could impact on the function and ecology of the reserve. Important considerations include:
    - *No evidence has been provided by APL regarding discussion with DoC*

[3] Waikato Regional Council Technical Report 2011/05

- *No information is available about how the land is currently used*

- The Balemi drain captures flows from the north of the proposed development, discharging to Lake Waikare
  - *The drain is currently unable to adequately convey flows into Lake Waikare and requires pumping*
  - *It is unclear in the APL documentation how the pumps operate, their location and the effects of the proposed development on them*
- The Tahuna drain is an open channel that runs through the proposed development with a culvert to convey flows under Tahuna Drive. Flows discharge to Lake Rotokawau, before travelling to Lake Waikare. Important considerations include:
  - *The culvert has existing drainage issues with standing water and a pump to facilitate drainage into Lake Rotokawau*
  - *The standing water has led to growth of submerged macrophytes which has exacerbated capacity issues*
  - *It is unclear in the APL documentation how the pumps operate, their location and effects of the proposed development on them*
  - *WRC has indicated that a bridge under Tahuna Road is preferred.*
  - *Ohinewai Land Ltd (OLL) owns the land upstream of the culvert and future development could impact flows in the Tahuna drain.*
  - *The drain is noted as being an 'Indigenous Fish Habitat' from WRC online mapping system*

2.3.2 OLL's Assessment of Effects

The OLL report[4] relates back to the RITS, which "*broadly states that developments should not increase peak stormwater discharge rates to receiving environment*". The OLL acknowledges that flows from the site need to be managed in the proposed development.

Additional considerations from the OLL Report include:

- The rural farm drains are not in a condition to intercept and convey runoff from large flood events, and the hydraulic efficiency of the drains effected by the proposed developments would require further investigation and remedial works
- Land modification, where filling is done to raise properties above the flood plain, will cause displacement of floodwaters into the surrounding properties, shifting flood waters elsewhere. To reduce this risk, it is recommended that the same about of fill be removed elsewhere on the site, to achieve hydraulic neutrality.

2.3.3 ALP's Proposed Mitigation

2.3.3.1 Flood Mitigation

The Ohinewai Flood Assessment (OFA) Report, completed by Woods for APL, was undertaken to understand flooding impacts of the proposed development enabled by the rezoning on surrounding properties. The OFA Report included input from WRC on objectives and parameters for modelling flooding and was then peer reviewed by T&T on behalf of WRC. We requested the T&T peer review comments, but as T&T are still reviewing the report, their comments were not available at the time of writing. The APL (Sleepyhead) Model extent is shown in Figure 2-4below.

[4] HG 2019 Appendix 4 - Infrastructure Services Assessment, attached to *Section 32AA Planning Report , Proposed Waikato District Plan, Ohinewai*, prepared by Harrison Grierson (HG) for Ohinewai Lands Limited (OLL), 5 December 2019 (158pp); referred to here as "the OLL report"

In the OFA Report five flood modelling scenarios were generated to understand and quantify the effects of the proposed development on the surrounding catchment. The scenarios considered the proposed APL development, surrounding developments and emergency management plans for stop bank failures. The 2, 10 and 100-year storm scenarios were modelled, and a sensitivity model scenario tested the assumed parameters within the model.

The River Waikato draft model built by DHI for WRC was reviewed when developing the APL model, to determine what assets within the LWWFCS are required in the APL model (Woods 2019; the OFA Report). The DHI model showed peak water levels exceeding 8mRL[5], which is above the Waikare Spillway operational level and design flood level of 7.37mRL. Based on this the APL model included a constant water level of 8mRL for Lake Waikare and excluded interactions between Lake Waikare and the Waikato River. This means that water levels in Lake Waikare were modelled as achieving a maximum of 8.00 mRL, which was agreed upon by the reviewer and modeller (as captured in the minutes for a meeting held on 23/10/2019, provided as Appendix C of the OFA Report).

Eight sites were tested in the model, as shown in Figure 2-5 below. Of the eight sites the seven sites that drain to Lake Waikare recorded pre and post development levels at 8.00mRL (for 2, 10 and 100-year storm events), the only site that recorded an observed increase in levels was Lumsden Road, Site 4. It is unclear whether this was due to climate change considered in the post scenario or other factors, such as flows from the proposed development entering the ponding area.

A subsequent model run for a 2-year event with a lower boundary condition of 5.4mRL at Lake Waikare, produced more variable results. Showing increases in water depth at Site 4 and 5 and decreases at Site 6 and 8, and no flooding for site 1 and 7 (only in the post development scenario), as in Figure 2-6below.

The changes are due to proposed topographical changes to the post development scenario, including the filling in of existing floodplain storage to raise the site out of the floodplain, and increases in runoff volume.

[5] 'mRL' represents the elevation in metres, relative to datum

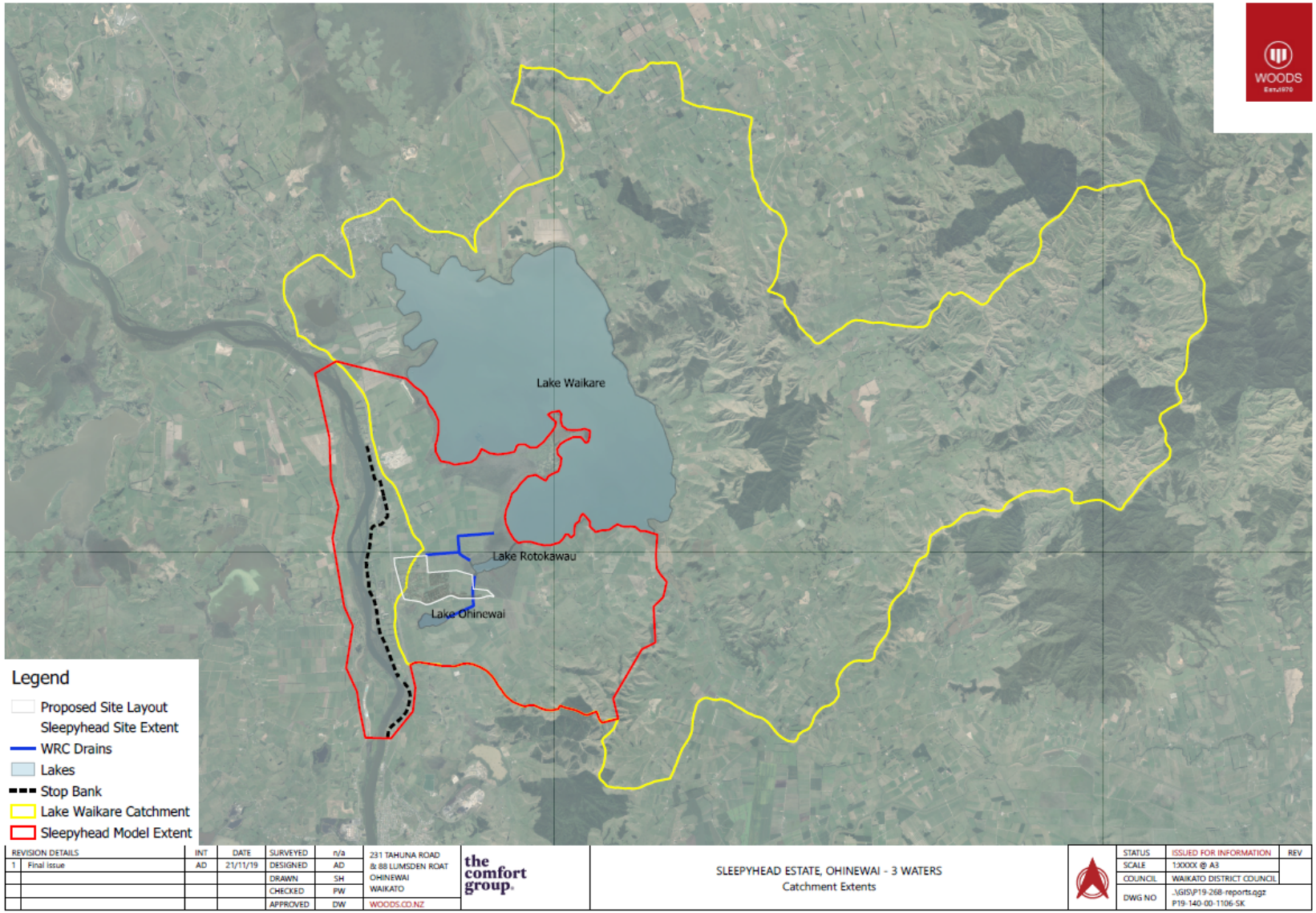


Figure 2-4: APL Model Extents - from Appendix D, OFA Report

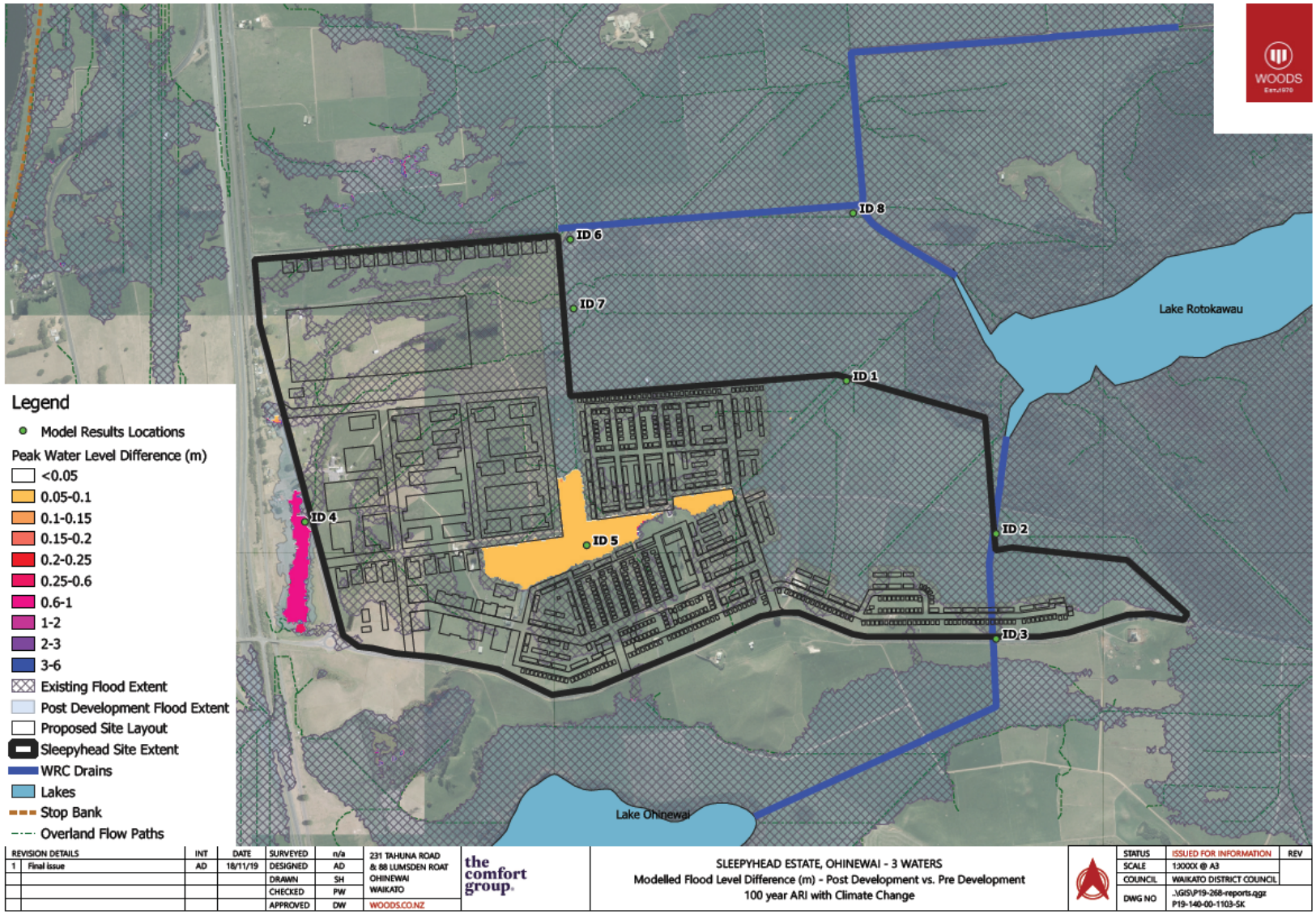


Figure 2-5: Modelling Results for 8mRL Tail Water Level in 100-year ARI (from OFA Report)

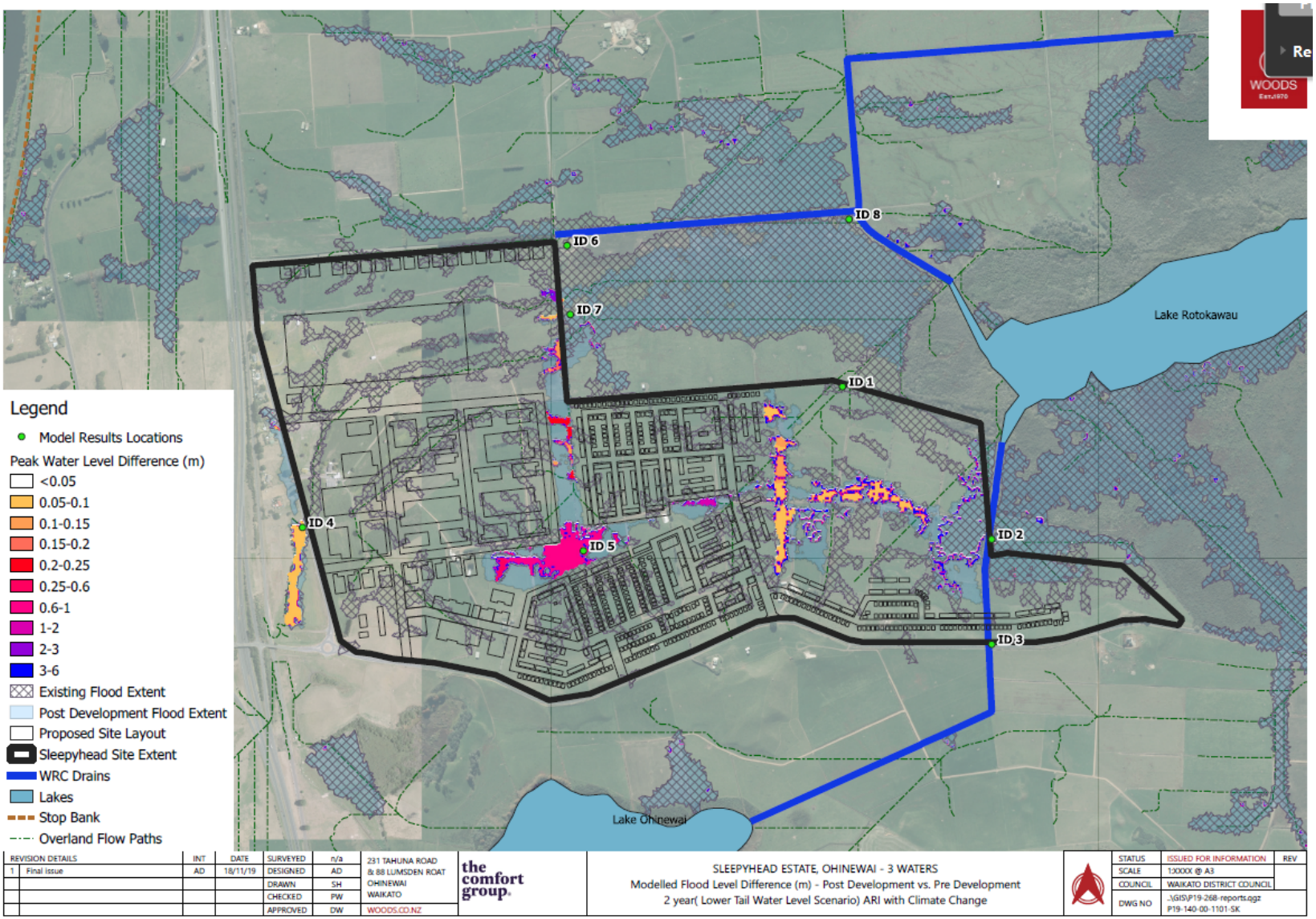


Figure 2-6: Model Results for Lower Boundary Condition Level 2-year ARI (from OFA Report)

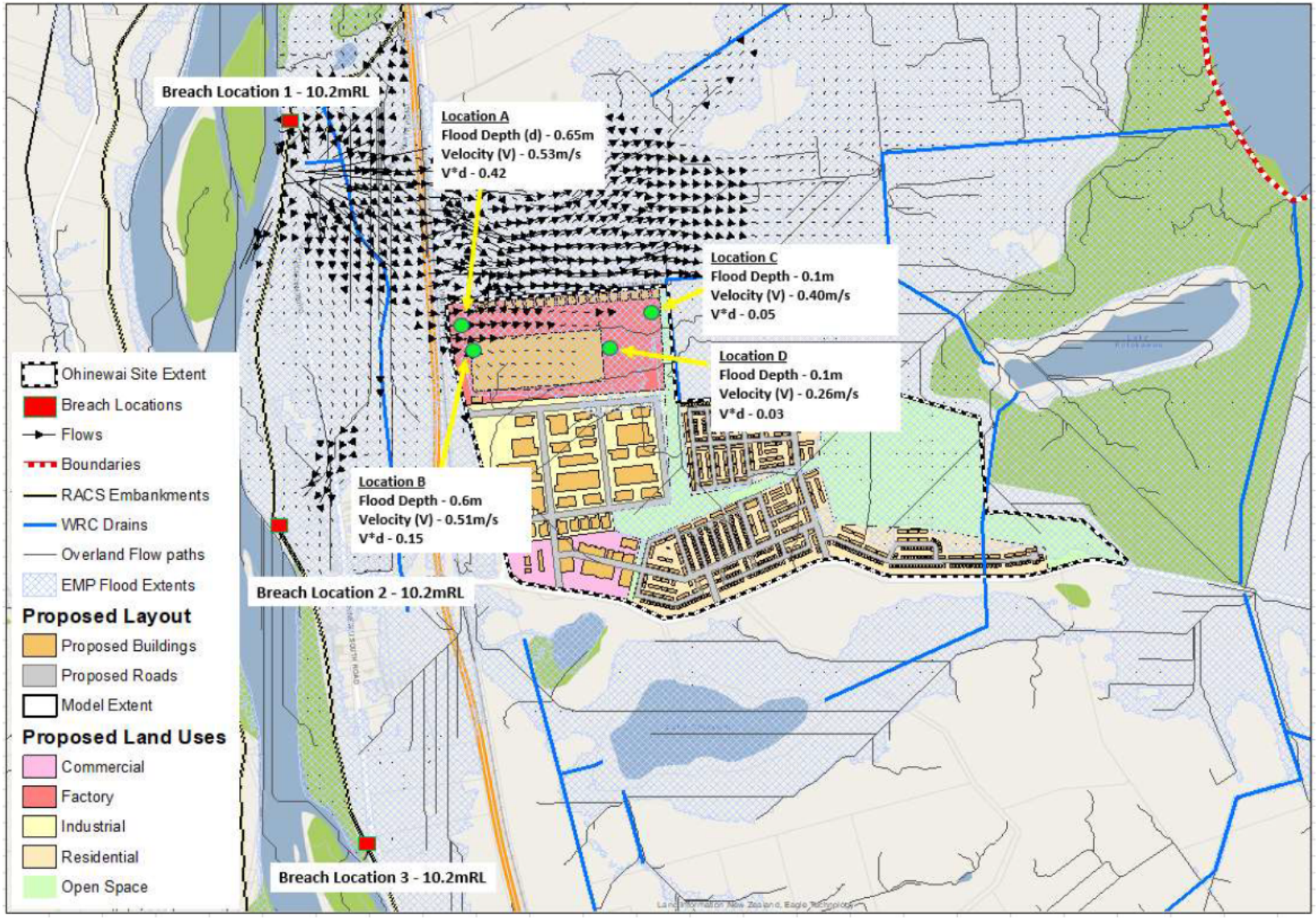


Figure 2-7: Stop Bank Breach Model Results (from OFA Report)

The stop bank breach scenario was modelled and found that a breach on Ohinewai North Road would affect the factory site, with the model predicted effect shown in Figure 2-7.

Based on the findings from the OFA Report, the SMP design solution to flooding is as follows:

- Given the site is located close to Lake Rotokawau and no increase in flood levels at the lake, no attenuation was included in the SMP for the 2, 10 and 100 year storm events
- The proposed development to have adequate freeboard above the 1% AEP floodplain
- Stormwater flows will be 'passed forward' in the 1% AEP event
- It is intended that the road network will convey secondary flows, which is discharged to the Wetland Park areas and into DoC reserve
- It is recommended that an evacuation plan be drafted at detailed design of the factory, ensuring safety of employees in the event of stop bank failure.

We note that terminology describing frequency and magnitude of flooding events (e.g. "2 year event") is not used consistently through the OFA report and the SMP. For the purpose of our review, we have assumed that, for example, a '2- year event' referred to in these documents is equivalent to a 1 in 2 year Average Recurrence Interval (ARI), or a 50% AEP event.

2.3.3.2 Lake Quality

The SMP outlines that it will either enhance or maintain the quality of the receiving lakes and wetland to meet the objectives of the RMA and National Policy Statement for Freshwater Management; and supports the restoration of the Waikato River. The SMP has outlined that it will meet statutory requirements for water quality and erosion through:

- Reduction of nitrogen, phosphorus, total suspended solids, total petroleum hydrocarbons
- A treatment train approach of at least two devices
- No high contaminant yielding cladding or roofing materials
- Reuse of the difference in volume between the pre and post development runoff volumes, in the 2-year storm event, to be carried out where possible
- Alternatively, detention or reuse of the difference in volume for the pre and post development runoff volumes in 1/3 of the 2-year storm event to be carried out.

2.3.3.3 Existing Drains

There are two drains that intersect with the development, each have been assessed by APL and the proposed mitigation methods are as follows.

Balemi Drain is currently unable to adequately convey flows by gravity into Lake Waikare with pumping required. The proposed solution in the SMP is to decommission the existing drain (refer to Figure 2) and divert flows to the Central Area, which will flow to the Wetland Park Area via a swale.

Tahuna Drain is currently culverted under Tahuna Road and discharges within the proposed development site, changing to an open channel, before discharging to Lake Rotokawau. The solution described in the SMP is to pipe flows under the residential area. No solutions to the existing issues at the culvert are provided in the SMP.

2.3.4 OLL's Proposed Mitigation

Stormwater flows are managed within the proposed development through attenuation systems and maximising soakage.

A comprehensive stormwater management plan will be developed to confirm options for treating and managing flows. The potential methods included in the OLL report are:

- "Roadside swales: used to convey run-off and trap gross pollutants
- Raingardens: provide water quality improvement and some attenuation
- Rainwater tanks: utilized on buildings and residential units to provide attenuation and water quality improvement
- Wetlands: water quality improvement and attenuation (the OLL site present a perfect opportunity to investigate)
- Dry detention area: attenuation to pre development levels (Not a likely option)
- Sand filters: water quality improvement and limited attenuation
- Filter strips: water quality improvement and limited soakage.

From a flood hazard perspective, the OLL proposed development intends to manage the flood risks through hydraulic neutral land modification.

2.3.5 Matters Raised by Submitters

The matters raised by submitters as they relate to the stormwater provisions are summarised below.

Further Submission 1399, Auckland / Waikato Fish and Game Council

The submitter is concerned with:

- Proximity to sensitive wetlands and outstanding natural features
- Potential effects on flood storage capacity and capacity requirements in surrounding areas

Further Submission 1397, Mercury NZ Limited

The submitter is concerned with flooding risks around Shand Properties

Submission 738, Shand Properties

This submission seeks the rezoning of some 61ha of land between SH1 and the Waikato River from Rural to Country Living. Flooding is a concern as the site is in a flood plain and relies on stop banks. The submission documents how flooding occurred on this property in 1998 at RL9.6m (MV Datum 1953), prior to the LWWFCS. The submission states there are opportunities to mitigation flood risks through drainage infrastructure improvements and land modification, allowing flood hazards to be managed on the property. Suggested stop bank protection measures in the submission include: Agreement of appropriate level of protection by stop banks with WRC, assessing the stop banks for stability, floor levels above flood plain and adequate evacuation plans. The report notes that a "*review of the Operative Plan relating to Natural Hazards and Climate Change will be notified as Stage 2 of the Proposed Plan in 2019*". As previously noted it is unclear the extent to which these flooding issues are to be addressed through this process or left to be addressed in Stage 2 of the Proposed Plan.

2.3.6 Stantec's Assessment and Proposed Mitigation

Due to minimal details provided in the OLL Report on stormwater management approaches compared with APL's application, our review focused on APL's mitigation methods with reference to the proposed OLL development.

Stantec reviewed APL's SMP and OFA Report and APL's assessment of effects (as outlined in Section 2.3.3). Then to resolve questions identified from the review and assist in providing clarity in the approaches to stormwater management, technical meetings between Stantec, Woods and BBO were arranged, as detailed in Section 1.1.5. The questions raised at the meetings and additional information provided by Woods is included in Appendix A.

2.3.6.1 Flood Mitigation

Based on the assessment of APL's OFA Report, flood mitigation processes outlined in Section 2.3.3 above, and feedback from the meetings with Woods, the following points have been identified:

- Clarity was requested on how the model can determine the impacts of infilling on surrounding properties when all scenario rainfall events maintained the same flood levels. Stantec noted that infill reduces storage volumes which impact on properties surrounding the development and further downstream of the Lake Waikare outfall. Hydraulic neutrality had been recommended in the OLL Report and a consistent approach should be used across the developments. It was understood from discussions with Woods that the 8mRL level represents the 100-year storm event even though it was applied to 2, 10 and the 100-year scenarios. The outcome of the higher water level was confirmation that Lake Waikare system is tailwater controlled, as the tailwater level had no impact on pre and post development flows from the site. The lower tailwater level of 5.4mRL was then used to more accurately represent a 2-year storm event while the 8.0mRL represents the 100-year storm event.
- In the lower tailwater level scenario - the OFA Report noted an increase in ponding at the Lumsden Road culvert (Site 4) between pre and post development scenarios. Clarity over the cause of the increase in depth was requested. Woods have confirmed that the increase is due to infilling the Industrial Zone which removed the existing channel, in the modelled post scenario, therefore flows are not able to drain to the lakes. Woods have stated that design of the Lumsden Road culvert will be left to Detailed Design stage, however, flows from the culvert will be redirected to Central Park area. If the drain is to be culverted under the development, then blockage risks need to be addressed. Recommend that WDC and Woods discuss the potential design and risks to properties and surrounding roads.
- In the lower tailwater level scenario - the OFA Report noted a decrease in depth at Sites 6 and 8 and complete removal of flooding at Site 1 and 7 in the post-development scenario. Stantec requested clarity on how this has been achieved. Woods have responded that the reduced flows at Sites 1, 6, 7 and 8 are due to flows being diverted away from Balemi Drain, down through the Central Park area and towards the wetland, as agreed by WRC. Flows through Tahuna Drain have been passed forward within the model so the model will not show any capacity issues. Design requirements for Tahuna Drain are discussed in Section 2.3.6.2.
- The results of the lower tailwater level showed that Lake Waikare system is still a tailwater controlled system, even in small storm events. Flood levels are affected by lake levels not local drainage. The changes are summarised below:
- Changes to flow paths directions across the development lead to changing flow depths at Sites 4 (Lumsden Road drain), 5, 6, 7 and 8 (Balemi Drain)
- Where there was no local land modification (Site 2) the flood levels were maintained
- While increase impervious area leads to changes in runoff from the development, the peak flows from the development occur before the main peak of the storm. Therefore, while the results show no impact from the development on the flood plain level, it could impact on the rising limb of the storm flows leading to longer periods of inundations within the site.
- Woods provided a simple storage volume-based analysis for Lake Waikare to understand the increase in water level within the Lake Waikare, with loss of storage by fill in development area, assuming the Lake Waikare gate is closed, i.e. no flows discharging downstream to Lake Whangamarino, the results are as follows:
    - *At 5.4mRL the increase in water level is ~0.006mm (0.0004% of total storage)*
    - *At 6.3mRL the increase in water level is ~1.026mm (0.0577% of total storage)*
    - *At 8.0mRL the increase in water level is ~13.03mm (0.4470% of total storage)*

- Woods noted "this considers storage within Lake Waikare only, with zero storage within Lake Rotokawau. So, the numbers could be slightly on the lower side in reality".
- If Lake Waikare gate is closed, then the development is expected to have <0.5% reduction on the overall storage volume in the area.
- The OFA Report states that "The model results indicate that there is no increase in water levels or flood extents in neighbouring properties with the proposed development". The model has been peer reviewed by T&T on behalf of WRC. Stantec has requested the T&T peer review comments but to date have not been received. Stantec will be relying on the peer review to confirm if the model is accurately showing any potential impacts of the development and risks.
- Will the stormwater management devices on site address both flood displacement volume and attenuation volume from the increase in impervious area? This was stated in the Memo to Mercury Energy in Appendix C. Woods have responded "holding flows back could results in coinciding of peak of the storm resulting in higher risk to the proposed development *as well as neighbouring properties*". For this reason, no attenuation is included in the SMP. This approach would need to change for developments further upstream in the catchments but is appropriate for the APL proposed development location.
- Additionally, the RITS Level of Service states "Development shall prevent, or minimise, any increase in discharge volumes to receiving waters to the extent reasonably practicable". It appears that having no attenuation in the SMP could conflict with other stormwater management guidelines. However, it is recommended that stormwater management approaches consider the location within the catchment.
- In the OFA Report it was recommended that an evacuation plan/ emergency management plan (EMP) should be completed for a stop bank failure scenario. Stantec requested information on how this will be included moving forward. BBO have responded that the EMP has been proposed for inclusion in the District Plan, and that APL are currently planning to lodge Resource Consent for the factory with the EMP included as a requirement.
- The SMP says that the "stop bank breach has no influence on the stormwater management plan framework". Devices however would be affected in a flooding/stop bank failure scenario, for example if the industrial area drains to a swale in the Central Park Area, then the swale will be affected. How the LID devices will be affected by flooding or a stop bank breach is not confirmed. Woods have responded, noting the standards do not provide guidance on resiliency of devices and impact of inundations on devices. Woods have proposed ongoing discussions with WRC to determine whether devices are required to be out of floodplains.
- Stantec requested an update on if there will be integration between the Flood Hazard Model (Waikato River Model) prepared by DHI for WRC and the OFA model? In recognition that there should be a consistent approach to flood mapping for the Ohinewai area. Woods have stated that the WRC model was reviewed and found inappropriate and therefore the OFA model will be used.

2.3.6.2 Lake Quality

When considering the lakes' quality three main factors were considered in the SMP - treatment approaches, peak flows and volume controls. An increase in volume and peak flows from the proposed development may affect the lakes' quality, even if the effect is considered minor, and stormwater treatment can offset the effects of the development and improve the lakes' water quality. The SMP solution as outlined in Section 2.3.3 above has been reviewed and assessed. Feedback from the meetings with Woods have been incorporated into the following points below.

Low Impact Design Approach

As outlined in Section 2.3.3, the SMP solution to lake water quality is to include treatment devices in the proposed development, in particular swales have been suggested in Central Park land, a Wetland Park Area upstream of DoC reserve land and roof runoff is recommended for water reuse. The WRC Low Impact Design (LID) scoring matrix (TR2018/01) was included in the SMP (Table 9), where a score was assigned for

re-use, infiltration devices and swales or filter strips (among other LID factors). Explanations for the LID scores assigned are set out below:

- For **water re-use** the SMP includes the volume the SMP aims to achieve (as outlined in Section 2.3.3), then in the SMP LID matrix water re-use has been given a score of 3. Under Section 6.1.3.1 of TR2018/01 a score of 3 represents *'site use for garden watering and for non-potable inside waters uses including laundry and toilets'*.
- The SMP LID matrix includes a score of 3 for **infiltration** which means infiltration is designed to the **water quality storm**.
- The SMP LID matrix includes a score of 3 for **swales and filters.** A score of 3 means that all impervious surfaces drain to swales /filters and have the capacity of the **2-year storm event**.

The RITS requirements and LID scores included in the SMP did not appear to align with the design criteria in the SMP, and further clarification was requested. Woods have informed Stantec that the devices that will be included in the Central Park area are yet to be determined and the design of the devices will comply with RITS, TR201801 and TR201802.

Based on the assessment completed by Stantec and discussions with Woods, additional information provided by Woods is as follows:

- Regarding erosion concerns as flows travel through the Central Park area, Woods have stated "given the flat grade, the conveyance will be driven by head. Given that flows are driven by head, it is not anticipated that sharp bends will see scour or velocity issues resulting from the sharp bend. Rather it is anticipated that water will pond up and find its way downstream".
- Regarding space allocation in the Central Park area for devices, Woods have stated "the proposed width for the Central Park wetland varies between 24m at its narrowest and up to 100m.
    - *It is noted that the conveyance through the Central Park area will need to cater for the 100yr + CC event*
    - *Given the size of the Central Park wetland area, it is anticipated that there is room for both conveyance and treatment without compromising function"*
- Woods noted that the proposed stormwater management devices and two step treatment train is yet to be finalised, and devices within the Central Park area are yet to be confirmed. Detail on the devices will be covered in the Resource Consent stage.
- Woods clarified that "the wetland park area is not proposed to be an "engineered" wetland. It is intended that the natural wetland function be retained. Flows are to sheet flow towards Lake Rotokawau in this area. Some natural treatment may be offered within these wetlands in the smaller storm events prior to discharge into Lake Rotokawau".
- The SMP recommends no high contaminant yielding cladding or roofing materials are used. Stantec requested information on how this will be enforced. BBO have suggested *"that the roofing materials and roof runoff for re-use requirements are best managed via the Regional Council consenting process"*.

Peak flows

The SMP outlines that no attenuation of peak flow controls are recommended, due to the site being located near Lake Rorokawau and given that the proposed development does not discharge to any streams or land drainage schemes. The site will however drain to the Balemi Drain (discussed in more detail in the following section) and DoC reserve land.

Based on the assessment of peak flows the items below were discussed with Woods:

- How the SMP considers erosion concerns with peak flows. Woods have responded that "in the instance that modelling finds this (erosion) to be an issue, it is anticipated that this (erosion) can be designed/engineered out through shaping the land in this area to prevent scour and erosion".

- While no consideration for peak flows are currently included in the SMP, it was noted that there were errors with the calculations. Woods have acknowledged the errors and will amend the values. Woods have confirmed that the amended calculations have provided lower peak flows and runoff volumes. Therefore, the Central Park swale has been conservatively sized to accommodate runoff volumes.

Volume

The SMP describes the level of treatment to be achieved in various ways throughout the report. Stantec requested clarity on the approach that would be used across devices. Woods have confirmed that the following approach will be applied.

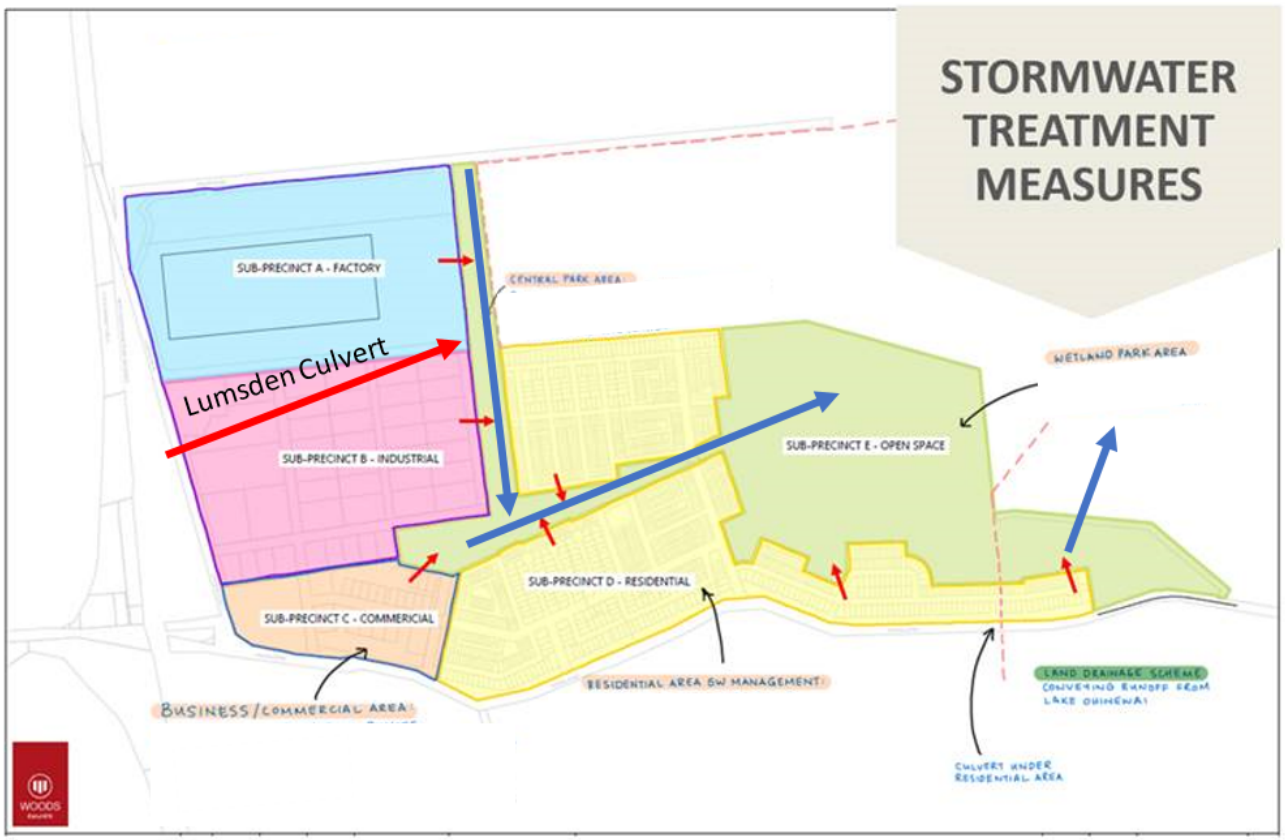
- The water quality volume will be calculated as 1/3 of the 2 year + climate change storm event (post development flows)
- Design of the devices will comply with RITS, TR201801 and TR201802.

2.3.6.3 Existing Drains

The SMP solution as outlined in Section 2.3.3 above has been reviewed and assessed. Feedback from the meetings with Woods and BBO has been incorporated into the following points below.

Balemi Drain and Swale Design

- Stantec requested confirmation of the flows paths within the development. The image below shows flow paths within the development based on discussions with WOODs.



- Stantec requested more information on the location of the drain pumps and how the SMP will impact on the pumps. Woods have confirmed that the pumps are not located in the site. The Balemi Drain pump is located near Site 8 in the OFA Report and the Tahuna Drain pump is located upstream of the proposed development. As flows are diverted away from the Balemi Drain the SMP will reduce some level of pumping required.

- The SMP states that the swale design will contain approx. 159,000m^3 of volume and be to a depth of 1-1.5 m. It was not clear in the SMP if the swale would be a detention device, treatment device or conveyance device, therefore Stantec discussed the function of the swale with Woods during the meeting. Woods have confirmed that the devices implemented in the Central Park area will be determined at a later stage, however, as mentioned above Woods have confirmed that both conveyance and treatment can be achieved in the space allocated.

Tahuna Drain

- To understand what is envisioned for the Tahuna Drain, discussions on expectations around the drain was covered during the meeting with Woods. Stantec requested confirmation that consideration had been given to changing Tahuna Drain from a rural drain to an urban drain whether it had been designed to standard and will avoid any negative impacts to road users and surrounding properties. Woods have responded that any structure (bridge or culvert) will be:
    - *"Designed to convey the 100-year flows inclusive of climate change without restriction or effects on upstream areas.*
    - *Analyses as part of the design of this structure will account for blockage scenarios.*
    - *Residential lots adjacent to the structure will meet the freeboard requirements specified in the RITS so that residential properties are raised outside of the floodplain and will not be inundated.*
    - *If detailed design finds that inundation cannot be avoided, residential lots will not be proposed in the area.*
    - *It is noted that there are no pumps within the APL site and that the Tahuna Drain currently gravity discharges into Lake Rotokawau within the APL site".*

It is recommended that the approach above for Tahuna Drain is also applied to Lumsden Road culvert.

During the discussion it was noted that Tahuna Drain is a 'Indigenous Fish Habitat' and an area having at risk species, in particular the Mudfish was discussed. BBO noted that "*the ecology reporting completed for the rezoning has addressed the potential for mudfish to be present on the site (within the Artificial drains present across the site). Specific mudfish surveys have been undertaken (with overview from WRC) over a part of the site (40ha) and no mudfish were found*". BBO also confirm that the ecologists will be completing further assessments as the development programme continues, and if mudfish are found, then appropriate strategies can be put in place.

2.3.6.4 Effects on Adjacent Properties

The SMP outlines that there will be no effects on neighbouring properties in terms of flooding, drainage path alterations or land modification. As mentioned above, there are concerns around:

- The model results are dependent on Lake Waikare gate being open or closed and lake operating levels, as Lake Waikare is a tailwater controlled system. The impact on properties is dependent on whether WRC accepts the operating levels within the model and how flow discharges. Having flow freely discharge in the model makes it more difficult to determine the impacts on surrounding properties and is the reason the volume-based analysis was completed for Lake Waikare.
- While Stantec has received feedback from DoC on concerns related to the proposed development, it is recommended that APL consults directly with DoC and Fish and Game throughout the process to improve understanding of the effects on the wetland and lakes.
- Consultation between APL and OLL could provide a collaborative approach to the Tahuna Drain.

2.3.6.5 WSL Perspective on Stormwater Matter

On Friday 21st February Stance meet with WSL to discuss the approaches to the three waters. As WSL had not received the SMP and OFA Reports, the key issues and proposed mitigation was not able to be discussed in detail. WSL has since received the reports for review.

At the meeting with WSL the following points were discussed:

- The key issues for WSL was maintenance of LID, outlining flood areas and climate proofing
- The need for clarity around areas set aside for flood and stormwater management, recreation and open space areas, and who is responsible for these WSL or Parks and Reserves
- The LID devices selected have different levels of maintenance required. WSL could provide direction on preferred devices for the area based on long term management
- None of the potential costs for WDC associated with this proposal are included in the next LTP

The meeting minutes are included in Appendix B.

2.4 Conclusion and Recommendations

Generally, from a stormwater perspective the information in support of the rezoning requests addresses the stormwater issues at a high level, as discussed above. The analysis work has been carried out to a general level of understanding, however as set out above our review has identified a number of items that needed clarification.

Further clarification from Woods has confirmed the following:

- The outcome of the high tailwater level (8mRL) scenarios, provided confirmation that the drainage system to Lake Waikare is tailwater controlled at these levels, hence the on-site pre and post levels all remained at 8mRL (across all scenario testing except for the Lumsden Road drain).
- To understand the impact of the proposed development at a local level, a lower tailwater level (5.4mRL for the 2-year storm event) was modelled to help understand how flow paths act in the pre and post scenario with more normal lake levels. The results showed that Lake Waikare system is still a tailwater controlled system, even in small storm events. Flood levels are affected by lake levels not local drainage. The changes noted in the lower tailwater level scenario are:
- Changes to flow paths directions across the development lead to changing flow depths at Sites 4 (Lumsden Road drain), 5, 6, 7 and 8 (Balemi Drain).
- Where there was no local land modification (Site 2) the flood levels were maintained.
- While increase impervious area leads to changes in runoff from the development, the peak flows from the development occur before the main peak of the storm. Therefore, while the results show no impact from the development on the flood plain level, it could impact on the rising limb of the storm flows leading to longer periods of inundations within the site. To understand the change in flow volumes a volume-based analysis was completed for Lake Waikare showing <0.5% increase at water level ranging from 5.4-8.0mRL.
- The model has been peer reviewed by T&T on behalf of WRC. Stantec has requested the T&T peer review comments but to date have not been received. Stantec will be relying on the peer review to confirm if the model is accurately showing any potential impacts of the development and risks.
- When assessing the rezoning request, consideration for how other submitters' rezoning requests approach the concept of hydraulic neutrality with regards to land modification and peak flows is recommended.
- While LID devices are discussed with calculations in the SMP, Woods have confirmed that they are still in the process of determining what devices will be used. Therefore, any comments on LID are considered indicative only. Woods have confirmed that:
    - *The calculations will be corrected from what is in the SMP and that the revised calculations have lower peak flows and volumes, therefore sufficient space is available within the Central Park area.*
    - *The design of the LID devices will comply with RITS, TR201801 and TR201802.*

- *The water quality volume will be calculated to be 1/3 of the 2 year + climate change storm event (post development).*
- *The Central Park area can accommodate stormwater conveyance and treatment without compromising function of either.*
- *A two-step treatment train approach will be used. Details on the devices are not currently known at this point. Detail on the devices will be covered in the Resource Consent stage.*
- *The wetland park area is not proposed to be an "engineered" wetland. It is a natural feature which will be retained.*

- Regarding peak flows no attenuation is proposed due to the impact of coinciding peaks. We understand the issue, but this will be a matter for the applicant and the WRC to work through based on detailed modelling outcomes.
- It is currently uncertain how stormwater management devices would be affected by local flooding events and a stop bank failure. As there is no guidance on resiliency of devices and impact of inundations on devices, Woods will continue to have ongoing discussions with WRC to determine whether devices are required to be out of floodplains.
- Three key issues for WSL were the maintenance of LID, defining the flood areas and climate proofing. WSL want a clear understanding regarding who will be responsible for the management the LID devices. It will need to be determined whether this can be addressed through the rezoning request process and district plan provisions or through other appropriate mechanisms. It is recommended that ongoing liaison occurs with WSL over the design of LID devices.
- As the area zoned Residential overlaps the location of Tahuna Drain additional information was requested to understand the future plans for the drain. Woods have responded that any structure will be designed to convey the "100-year flows inclusive of climate change and without restriction or effects on upstream areas… If detailed design finds that inundation cannot be avoided, residential lots will not be proposed in the area". Woods provided the above approach to designing conveyance within the Tahuna Road drain, and it is recommended that the same approach is applied to Lumsden Road culvert.
- The Woods response regarding not proposing residential lots in areas where inundation cannot be avoided raises the issue of how to prevent residential development on this residentially zoned land. The zoning of land residential sends a very clear signal that it is suitable for residential development. It would be helpful if Woods and BBO could identify proven mechanisms adopted in other district plans to ensure that the parts of the residential zone subject to inundation will not be used for residential purposes if the detailed design identifies that there are residential lots subject to inundation.
- APL made recommendations on including an EMP for a stop bank breach scenario, avoiding the use of high contaminant yielding cladding or roofing materials in the development and including roof runoff in the LID devices. Stantec requested information on how these measures would be achieved. BBO have responded, that the EMP has been proposed for inclusion in the District Plan and that the roofing materials and roof runoff for re-use requirements would be best managed via the Regional Council consenting process.
- On-going consultation with DoC's and Fish and Game is recommended to address concerns regarding the protection of Lake Rotokawau and the Whangamarino wetland. The outcome of these discussions could impact on the proposals.

In carrying out this assessment it is noted that the stormwater design has not been completed, APL's SMP outlines the approaches that will be applied in the development and provides a high-level overview of the SMP direction. From the information provided Woods have demonstrated commitment to ensuring the SMP will meets technical guidance documents and if that is not achieved then, as Woods suggested with the residential lots, development will not be able to occur in those areas.

OLL's approach towards managing flows within the development aims to align with WRC guidelines. However with minimal details provided it is not at the level where OLL can demonstrate how this will be achieved. OLL's stormwater approach should be subjected to a more thorough review once an SMP is provided.

WDC has undertaken a two-stage notification process for the Proposed Plan. It is unclear at this stage the extent to which Stage 2 will address and include provisions to manage flooding on the land subject to the rezoning requests and surrounding areas. While flooding mitigation has been covered in this technical assessment, it is uncertain the extent to which flooding matters will be addressed in Stage 2 of the District Plan. Therefore, part or all of the flooding section assessment may be deferred to a later date.

From the information provided the extent of any effects of the rezoning on neighbouring properties is reliant on the T&T peer review of the model. Therefore, we are recommending an amendment to the new policy proposed by APL for inclusion in the District Plan to the effect that the proposed development shall not increase flood risk, particularly on neighbouring properties. Refer to Section 5 of this report.

3. Water Supply Matters

3.1 Overview

3.1.1 Woods and BBO documents

The Water Supply Servicing Strategies (as outlined by Woods WS (2019[6]) to service the proposed APL rezoning submission have been developed to service the proposed rezoned mix of industrial, residential and business zones based on both an 'interim option' and 'potential long term' servicing basis. This approach allows consideration of WDC/Watercare Services Limited (WSL) (local authority) servicing options within the five year (or other) period planned by WDC/WSL in terms of regional and sub-regional solutions, should these be decided on as a long term solution.

In summary, these servicing options are as follows (these options are each set out in Woods WS(2019):

Six potential long-term options:

- Option 1: On-site bores, dual reticulation; rainwater supplementing non-potable supply
- Option 2: Local water body supply – dual reticulation
- Option 3: Rural Farm Supply – dual reticulation
- Option 4: Te Kauwhata Town Supply (WDC/WSL) – single reticulation; rainwater re-use to provide for non-potable use
- Option 5: Huntly Town Supply (WDC/WSL) – single reticulation; rainwater re-use to provide for non-potable use
- Option 6: Centralised Supply (WDC/WSL) – single reticulation; rainwater re-use to provide for non-potable use

The interim (short term) options include:

- Interim Option A: Bore Supply
- Interim Option B: Lake Take
- Interim Option C: River Take
- Interim Option D: Raw water supply form reticulated rural sources (water allocation trading)
- Interim Option E: Rainwater harvesting
- Interim Option F: 150mm pipeline from the South West – Te Ohaki Road. The water source for this option was not stated.

The interim strategies would be used for the initial stages of development when the demand is low and it is anticipated the final/long term water supply strategy will not be in place. It is envisaged that a combination of these options would be used.

Woods WS(2019) p5 confirmed that "*the level of development proposed can be serviced for water supply, however selection of the preferred strategy will require further consultation and design*".

Notwithstanding the relatively high level nature of the report prepared by Woods WS(2019), our review confirms that the options identified above are all technically feasible, and the provision of suitable, secure, sustainable water supply services can be confirmed as long as the following key requirements are met:

[6] Woods 2019 *Water Supply Servicing Strategies – Rezoning Submission to the Proposed Waikato District Plan, Sleepyhead Estate – Ohinewai*, Final report prepared for Ambury Properties Limited by Wood & Partners Consultants Ltd, 28 November 2019) – referred to as "Woods WS (2019)"

- Securing consented water takes (consents) and/or other secure water trading allocation agreements.
- Appropriate treatment to meet the New Zealand Drinking Water Standards
- Consideration of potentially pending requirements of the Government's Drinking Water Regulator (be those public or private supply requirements)
- An appropriate level of service including meeting of fire-fighting requirements.

In arriving at the above statement in terms of Stantec's review comments, due regard has also been taken of information in a number of meeting minutes.

The following summarises a number of comments that directly relate to water supply options and strategies that we consider have implications or give some direction to the water supply servicing.

a) WDC/WSL [7]

WDC/WSL confirmed an interim solution is required in order to develop ahead of the planned long term plan and WDC/WSL would support interim on site solutions for the development with connections to the network when it becomes available.

Woods WS (2019) noted that the WDC/WSL Sub-regional mid Waikato Servicing Strategy expected to be completed in the mid 2020 "will include in its scope the potential and significant water supply demands, such as the sleepyhead development".

b) Waikato Regional Council[7]

In this meeting WRC confirmed that "*no water allocation available, queue for allocation*" and that a "*ground and surface and water viewed the same*".

These two statements are also reflected in the body of the Woods Report in terms of seeking new water take permit(s)(consent(s)).

The above comments put more emphasis on the possible water source options of "Rural Farm" (Long Term) and "Raw Water Supply" (interim) as discussed in Section 2 above. "WRC also advised that options exist to utilise transferable water rights from an existing water allocation consent holder(s").

No details of water supply amounts and security/expiry of existing water takes that maybe available for trading are included in the documentation available. It is appreciated however such information is likely to be confidential.

c) Tangata Whenua Governance Group[7]

This group indicated general support for bore supply but a Waikato River take would not be supported as they understand the river is at its allocation limit. WRC confirmed this in their meetings.

d) Community[7]

The community workshop raised the question of a new bore(s) supply and the possibility of the effect on existing bore supplies and whether lowering of groundwater would cause settlement of buildings. Timing of a new WDC/WSL public water supply was also used.

e) Additional comments relating to submitters is included in the summary of submissions in Table 1-1 in Section 1.2 of this report.

Many if not all the above matters are raised by Woods WS(2019) and would be addressed in detail in further investigation of options and in consenting of (any) new water takes as well in detailed design and construction of the new infrastructure.

In considering the options, there are a wide range of matters and issues to be addressed through further investigations; option selection; design; implementation, and operation. The report by Woods WS(2019) highlights these and summarises the water source possibilities, likely infrastructure required, comparative risks and costs, and identifies advantages and limitations (from each of the supply strategies) for each

[7] Woods WW (2019) Section 3 and Appendix C

option. In Section 3.2 and 3.3 below, comment is made on what we consider to be the key issues associated with various options.

3.1.2 GHD Memorandum

The GHD (Draft) Memorandum of 20 February 2020, as introduced in Section 1.1.4 above, provides a review of the Woods documents with the view of producing more refined recommendations for the provision of water supply and wastewater infrastructure. The memorandum includes a sub-regional setting section, assessment of WDC's water and wastewater usage, treatment plant layouts, compliance status for the Huntly and Te Kauwhata Water and Wastewater Treatment Plants and the emerging solution (GHD/s terminology) of the mid Waikato Servicing Strategy being developed by WDC/WSL.

The recommendation made for the preferred Water Supply option is to *"secure the existing treatment and allocation capacity from the Huntly Water Treatment Plant and supporting WDC in securing further water from the river to cater for proposed district growth in both Huntly and Ngaruawahia"*.

It is also recorded that the industrial component may need to be supplied from an alternative source such as groundwater which GHD understands may be feasible.

The key issues identified in the GHD Memorandum and subsequent discussions between WSL and Stantec (Appendix B) are set out in Sections 3.2 and 3.3 following with conclusions and recommendations and key findings included in Sections 3.5 and 6 respectively.

3.1.3 Shand Properties and Ribbonwood Family Trust

In respect to the submission of Shand Properties and Ribbonwood Family Trust seeking the rezoning of land to county living, we have not considered these as this zone is required to be self-sufficient in the provision of water supply, wastewater and stormwater services. Refer to Table 1-2.

3.2 Key Issues Identified in the Documentation

3.2.1 Woods and BBO

From our review of the submission documentation, we have identified the following as key issues to be addressed in future investigations and decision-making processes (as to the interim and long term water supply strategies to be adopted, agreed to and consented (if necessary), designed, constructed, operated, and managed.

- The availability of a suitable water supply source(s) that gives a sustainable supply of a known quality that after further treatment will confidently and consistently meet the NZ Drinking Water Standards and other statutory requirements
- Consenting requirements for water takes, and/or agreements for transferable water trading from existing consented water takes.
- Factors associated with any groundwater supply including groundwater quality, variability associated with ground settlement, and effect(s) on other bores and ground water levels.
- Potential difficulties with privately owned (by a body corporate for example), maintained and operated water supply infrastructure
- Consider the risk that rainfall harvesting options will not provide adequate water at all times to achieve security of supply; especially in terms of the level of service required for a reticulated water supply as required under the Proposed District Plan requirements for new residential development. This is of key importance for the long term options 4, 5 and 6 being public (WDC/WSL operated) schemes where it is proposed that rainwater harvesting provides for non- potable use. It is assumed that this means all non-potable use, for which larger on-site rainwater storage facilities would likely to be required.
- Appropriate agreements will need to be secured with existing water take permit holders (under the water trading approach) to ensure security of supply for the duration required by the Rural Farm Supply

(Long Term Option 3) and Raw Water Supply (Interim Option D) options, should either or all these options be proceeded with. This encompasses expiry dates of existing takes.

- Consideration of the amount of time which may be required for formal agreements to be reached in support of public, long term options (i.e. Options 4, 5 and 6 (WDC/WSL)), and the lag time before new/upgraded public schemes are available to connect to, 5 to 10 is suggested by WDC/WSL.
- Achieving the Fire Fighting Code of Practice, particularly for those options involving small bore potable reticulation and/or relying on rainwater harvesting.
- It is stressed that while the above are considered to be the key issues arising from review of the Woods 2019 Servicing Strategy, there are also other issues related to different interim and long term options.

3.2.2 GHD Memorandum

- In terms of the GHD draft Memorandum preferred option of using capacity in the Huntly water take, WSL in their meeting with Stantec (Appendix B) confirmed that the consented take is fully allocated for existing use and future growth in Ngaruawahia (using the new pipeline) and Huntly. It is noted that Section 6.2.2 of the Ohinewai Lands Ltd – HG Section 32AA report by HG also concludes that the consented take is fully allocated.
- To secure an additional water take allocation, WDC would need to lodge a new resource consent application. In this respect we understand that there are a significant number of applications already lodged and these are being processed by the Waikato Regional Council on a "first in, first served basis". These would all need to be dealt with before any (yet to be lodged) application by WDC would be considered.
- Accordingly, it is our opinion that there is significant uncertainty as to if and when an increased allocation of Huntly's Waikato River take would be considered, and if an increased allocation was granted what the volume granted would be.
- WSL has on a number of occasions including at the meeting with Stantec (Appendix B) confirmed their Sub-regional mid Waikato Servicing Strategy due mid 2020 includes water demand figures for the APL rezoning request and that a longer term solution with the 5 to 10 year time frame is likely be available.
- A further issue raised at the WSL/Stantec meeting (Appendix B) was that the Te Kauwhata supply's water take consent is held by the Te Kauwhata Water Association (not WDC) and is due to expire in 2024. This places additional uncertainty on the future use of this supply and the volume allocated post 2024.

3.3 Further Issues Identified by Stantec

3.3.1 Woods and BBO

The following are some further issues that have potential risks identified in our review, additional to those already raised in submissions. It is stressed these are potential issues only, as further investigations and assessments of the interim and long term options along with the WDC/WSL Sub-regional mid Waikato Servicing Strategy being developed on long term water supply options (due in mid-2020) would also be expected to address these matters that relate to a public water supply. We consider that all such matters can be satisfactorily resolved given time.

- The Proposed District Plan's residential and business subdivision rules require the provisions of a reticulated water supply (and wastewater) at the time of subdivision. This rule does not appear to apply to the industrial zone. Refer Section 5 of this report.
- The projected water supply demand at full development is an average daily demand of 2,150 m^3/day and peak daily demand of 4,300 m^3/day (Woods WS (2019)). The residential component of this is approximately 38% (based on the average figure). By comparison, the current Huntly (WDC/WSL) water

treatment plant has a capacity (which is fully utilised) of 8,000 m^3/day[8]. This highlights that a significant proportion especially at peak demand of the Huntly Supply would be required to service the APL development.

- The cumulative effect of such further potential subdivision would also appear to be a matter of consideration, for example the Ohinewai Lands Ltd possibility for 23 ha of residential land.
- With the approach of staging the proposed APL development this could provide the facility to ensure the interim solution and associated infrastructure could be minimised in terms of (any) infrastructure that may become redundant when the long term solution is implemented. Woods WS(2019) highlighted that at year 5 (the earliest time a long term WDC/WSL Servicing Strategy could be implemented) for APL 1905, of the 2,150m^3/day (88%) average daily water demand would be required, highlighting most of the area would need serving in the interim period.
- Both the potential long-term and interim options include various levels of rainwater harvesting and reuse for non-potable supply. Options 4, 5 and 6 of the potential long-term servicing options propose *"rainwater re-use to provide for non-potable use"* . However, Woods WS (2019) highlighted that there is a risk of the frequency of rainfall events not being sufficient to maintain the supply. This raised the very important question of security of supply for options with heavy reliance on rainwater harvesting as included in the list above. Climate change future proofing needs consideration in this respect.
- In view of a number of the comments about the potential difficulties and risks in securing new consented water sources, long term option 2 "Rural Farm Supply" and also an interim Option D "Raw Water Supply" appear to have merit water source wise, providing such water is available from currently consented water takes by "water allocation trading." Confirmation that such sources are available is inferred from references made by BBO[9] and Woods WS (2019)[10].
- This approach of arranging water allocation from existing consented supplies has been confirmed with Waikato Regional Council [11]. With the (apparent) preference for the long term solution being a public (WDC/WSL) Water Scheme (Long Term Options 4, 5 or 6) this interim source of water maybe the way forward should the Proposed District Plan change sought by APL be granted. The expiry date of existing consents being used is an important consideration.
- The need to ensure that the water supply approaches finally decided on will conform to an "integrated holistic approach"[12] in terms of meeting overall objectives and statutory requirements, and facilitating Three Waters (water supply, wastewater, stormwater) integration. Refer to Section 6 – Key Findings on this matter.
- The inclusion of climate change adaptation and natural hazards planning in the assessment of water supply options. It is noted that natural hazards will be addressed in Stage 2 of WDC's Proposed District Plan Review. Refer to section 1.3 of this report.
- The practicalities and risks of Long Term Options 4, 5 and 6 in terms of only reticulating potable water and using rainwater for non-potable supply, needs further assessment. For example, will these approaches provide for security of supply, meeting fire-fighting supply demands, and also meet the provisions of the Proposed District Plan for a public reticulated water supply. Refer to section 5 of this report.
- The views and (any) direction of the Medical Officer of Health/Waikato District Health Board on all options, from both legislative and local public health perspectives are important. This would particularly apply to any wastewater/greywater reuse and also large scale use of rainwater harvesting.

[8] Proposed Waikato District Plan – Ohinewai – Section 32AA Planning report – HG Ohinewai Lands Ltd Section 6.2.2
[9] BBO letter to Waikato District Council (3 February 2020) in response to Stantec's questions.
[10] Sections 3.7 and 10.5.1 and section 3.3 and Appendix C regard water allocation trading(Woods WS 2019)
[11] Woods 2019 – Section 3.3 (meeting with Waikato Regional Council) and Appendix C – 15.2
[12] Bloxham Burnett Olliver – Ambury Properties Limited. Rezoning Submissions to the Waikato proposed District Plan Review – Assessment of environmental Effects Report and Section 32AA Evaluation – December 2019

- There is a need to ensure an "integrated, holistic" approach for Three Waters that incorporates "big picture" planning initiatives.[13]
- Complying with as appropriate, the currently in progress Waikato Sub-Region Three Waters Project output, the FutureProof Three Waters Plan Strategy (2012) and Action Plan (2017), Plans and Policies including the WDC's 50 year Water Supply Strategy, and WDC/WSL Sub-regional Mid Waikato Servicing Strategy being developed due mid-2020.
- While the above key issues in Section 3.2 and in this section appear extensive, these are predominantly all issues that typically arise with water supply servicing in any proposed new business, industrial and residential developments. As highlighted by Woods WS (2019), future detailed investigations; options selection; signing up (any) water trading agreements and/or obtaining water take permits; detailed design, construction, operation, and management of the water supply servicing option(s) selected will all, it is expected address these issues, and would also likely address the potential issues identified here in Sections 3.2 and 3.3.

3.3.2 GHD Memorandum

- In terms of the GHD Memorandum as recorded in Section 3.1.2 above, it is stated that the industrial component of the development may require serving from an alternative source such as groundwater rather than the WDC Huntly supply. In this respect, it is noted from Table 1 Demand Summary of the Woods Water Supply Servicing Strategies 2019 Final Report that the industrial average daily demand is 1,125 m^3/d equating to 52% of the total project demand of 2,150 m^3/d. If the Factory sub-precinct A is added to this at 97.5 m^3/d this equates to some 57% of the total demand.
- The above figures highlight the significance of the industrial demand. Should a WDC public water supply not be available, could this amount be provided from bore water and / or other alternative supplies such as water allocation trading? It would be helpful if Woods would be able to confirm this.

3.4 Assessment of Effects

The Assessment of Effects undertaken by BBO for APL[14] considers the range of interim and long term options and refers to the Woods WS (2019) report which is appended to the assessment. As far as we can determine no specific and integrated potential or actual adverse effects assessments have been undertaken on individual options, such as assessment of:

- Effects on water body from new water takes and related water take effects
- Effects of water treatment plant discharges on receiving environments e.g. filter backwash water
- Effects of bore water takes on lowering groundwater levels
- Effects of infrastructure on amenity values
- Infrastructure construction effects
- Effects of Lake or Waikato River takes
- Other effects.

Comments were however made on the terrestrial ecological values of the proposed overall development including water supply infrastructure. There are also values which would be created or enhanced by the proposed development, such as positive effects of retiring existing farmland with a reduction of nutrient contamination (nitrogen and phosphorus) of surface and ground waters. Woods WS (2019) also included some comments on the effects of various options on tangata whenua.

[13] Hearings Commissioners Minute and Further Direction 20th August 2019
[14] Bloxham Burnett Olliver – Ambury Properties Limited. Rezoning Submissions to the Waikato proposed District Plan Review – Assessment of environmental Effects Report and Section 32AA Evaluation – December 2019.

The BBO assessment (2019) also included economic and social positive effects.

The BBO effects assessment concludes in Section 17 that the likely and potential effects of the development and proposed rezoning have been considered in detail. This includes Three Waters. In our view, the effects of the water supply matters have not been considered in detail unless there is some documentation we are missing.

We do acknowledge that such detail would be included in (any) application for water take consents (under the RMA), any other consents (e.g. water treatment plant discharges) and other agreements needed. In respect to the options involving water trading allocations, it is less clear to us how the effects assessments, if any, will be undertaken as it is expected such assessments were undertaken when such consents/allocations were applied for and granted.

In respect to the above position, it would have been useful to have had an assessment of potential and actual adverse effects of the options, particularly the interim options, at the time of this review.

The GHD Memorandum of 20 February 2020 does not address to any extent an assessment of effects.

3.5 Conclusions and Recommendations

This review highlights there are a wide range of issues or matters that still need addressing in determining the most appropriate interim and long term water servicing strategy.

The Woods WS (2019) report identified many of these issues, which are referred to as limitations and risks, and indicated that further investigations, options selection and design work will determine such matters.

Stantec confirm that the options set out in the Woods WS (2019) report for both the interim and long term provision or water supply servicing are all technically feasible providing that:

i) Water take permits can be secured for private and / or public water supplies and / or secure water source trading allocations can be agreed on.

ii) Appropriate treatment to meet the NZ Drinking Water Standards for the potable supply and suitable water quality for other non-potable uses when a dual water supply system is used.

iii) Measures can be put in place, be that for public (WDC/WSL) or private supplier to meet pending new requirements expected from the Government's Water Regulator (currently being set up).

iv) The infrastructure meeting appropriate technical standards including for a public (WDC/WSL) scheme the Council's own engineering standards, Codes of Practice and Bylaws.

v) The ability to meet the agreed level of service including firefighting requirements will provide a suitable, secure, and sustainable water supply service providing consented and/or otherwise secure water source allocation trading arrangements are in place. This could be achieved by Stantec's suggested amendments to the Proposed District Plan as set out in Section 5.

Accordingly, approval for the APL and any other related zoning changes to the Proposed District Plan, should that decision be made, are subject to requirements that a secure water supply source or sources be confirmed to WDC on terms WDC accept before any development is permitted on the site.

The provision of a reticulated public water supply at the time of subdivision is required in the subdivision rules relating to the residential and business zones under the Proposed District Plan. This is set out in Section 5 of this review memo, where we also note that this rule does not appear to apply to the industrial zone.

Complying with this subdivision rule could be problematic for any interim or long term water supply solutions that are private schemes i.e. not public as required by the rule.

The solution proposed in GHD Memorandum of using the spare capacity in WDC's Huntly Water Treatment Plant is not viable as advised by WSL. This is because the consented volume has already been allocated for current use and future growth in Ngaruawahia and Huntly.

Accordingly, APL will need to find an alternative interim supply until the mid-Waikato Sub-Regional Servicing Strategy is implemented or they develop their own long term solution. It would be helpful if APL's consultants could confirm their proposed solution and provide evidence that this will result in a secure water supply suitable for the needs of the developments.

WSL has confirmed that provision for APL's rezoning requests is included in the Sub-Regional mid-Waikato Servicing Strategy being developed for which a 5 to 10 year implementation period is being planned.

4. Wastewater Matters

4.1 Overview

4.1.1 Woods and BBO documents

As described for water supply matters above, the Wastewater Servicing Strategies (as outlined by Woods WW 2019[15])to service the proposed APL rezoning submission have been developed to service the proposed rezoned mix of industrial, residential and business zones based on both an 'interim option' and 'potential long term' servicing basis.

The servicing options for wastewater were identified as follows:

Five potential long-term options:

- Option 1: Upgraded Te Kauwhata Treatment Plant – vacuum reticulation
- Option 2: Upgraded Huntly Treatment Plant – vacuum reticulation
- Option 3: New Centralised Treatment Plan – low pressure reticulation
- Option 4: On Site Treatment - vacuum reticulation
- Option 5: On Site Treatment – STEP (Septic Tank Effluent Pumping)– low pressure reticulation and treatment plant

Options 1, 2 and 3 are public (WDC/WSL) schemes, while Options 4 and 5 would be private systems.

The interim (short term) options include:

- Interim Option A: Containerised treatment staged with development
- Interim Option B: Modular treatment staged with development
- Interim Option C: Septic tank and dripper feeds for early factory flows

Land, river and lake treated wastewater disposal has been considered for these three interim options. These interim schemes would be private schemes. They are also referred to by Woods WW (2019) as "*onsite* schemes."

Woods WW (2019)[15] is also detailed the composition of each of the above options and confirmed that "*the level of development proposed can be serviced for wastewater, however selection of the preferred strategy will require further consultation and design*" (p5).

Notwithstanding the relatively high level nature of the report prepared by Woods WW (2019), our review confirms that the options identified above are all technically feasible, and with the provision of suitable, secure, sustainable and consented wastewater discharge consents and any other approvals needed, can be implemented as long as the following are taken into account:

- For public (WDC/WSL) schemes agreement is reached with WDC/WSL on all necessary matters
- For private schemes be they interim or long term resource consents (discharge permits) and any designations, and/or on site disposal approvals are secured for durations consistent with scheme type
- Relevant engineering standards and appropriate treatment systems are implemented for public (WDC/WSL's) schemes that meet WDC/WSL's specifications. In terms of meeting Council's engineering specifications this also incudes for those parts of interim (private) schemes that would subsequently become part of a public (WDC/WSL) long term scheme at a later date.

[15] Woods 2019 *Wastewater Servicing Strategies – Rezoning Submission to the Proposed Waikato District Plan, Sleepyhead Estate – Ohinewai*, Final report prepared for Ambury Properties Limited by Wood & Partners Consultants Ltd, 28 November 2019) – referred to as "Woods WW (2019)"

In consenting the options there are a wide raft of matters to be considered and issues to be addressed through further investigations; option selection; design; implementation, and operation. The report by Woods WW (2019) indicated possible treated wastewater discharge and reuse options, likely infrastructure required, comparative risks and costs, and identifies advantages and limitations (from each of the servicing strategies) for each option. In Section 4.2 and 4.3 below, we have provided comments on what we consider are the key issues associated with the above options.

The following summarises a number of comments that directly relate to wastewater options and strategies. These may have implications or give some direction to the wastewater servicing.

a) WDC/WSL [16]

WDC/WSL confirmed an interim solution is required in order to develop ahead of a planned long term strategy and WDC/WSL would support interim on site solutions for the development with connections to the network when it becomes available.

Woods WS (2019) noted that the WDC/WSL Sub-regional Mid Waikato Servicing Strategy expected to be completed in the mid 2020 "will include in its scope potential significant demands, such as the Sleepyhead development".

b) Waikato Regional Council

In their meeting with Woods WRC indicated "*Land, River and Lake disposal for on-site treatment are all viable disposal options.*" We are unsure what is meant by this statement as River and Lake disposal are normally considered to be off site solutions. WRC also indicated the preference is land disposal and that "wastewater discharge*, needs to exceed current discharge quality levels and receiving environment quality levels.*" Further explanation is, it is suggested, needed as to what current discharges i.e. what existing land runoff and/or public (WDC/WSL) treatment plants does this statement apply to?

Furthermore, does the quality of a discharge need to be better than the quality in existing river, lake or groundwater receiving environments?

c) Department of Conservation[17]

At the time of issue of the Woods WR (2019) report no meetings had been held. Since then initial correspondences with DoC representatives have indicated concerns about the WDC's Te Kauwhata Treatment Plant already being at capacity and the need to "*adequately treat its wastewater discharge and not discharge contaminants into neighbouring water bodies*."

d) Tangata Whenua Governance Group

This group did not formally indicate their position but did suggest that all options proposed should be able to demonstrate a high level of treatment and cause no adverse effect to the receiving environment.

Notwithstanding the above position, it was indicated river disposal was the least preferred option and for lake disposal, the discharge quality would need to exceed the current farm runoff quality. In respect to this lake discharge comment, we refer to our additional issues in section 4.3 below relating to cumulative effects with stormwater discharge and its quality and also any discharges from water supply treatment plants as we also note in Section 3.3 and also any seepage of wastewater discharged to land.

It was also stated that onsite/land disposal with dripper fields were not suitable for locations within the existing site and they would need to be outside the 100 year flood plain.

e) Community

The community open day received a number of comments including needing a high quality of wastewater discharge, the difficulty there would be consenting a wastewater discharge through Lake Rotokawau and the position of the Huntly and Te Kauwhata WWTP's.

[16] Woods WW (2019) Section 3-1 and Appendix E
[17] Emails from Josh Crawshaw DoC to Chloe Trenouth and Carolyn Wratt – 5 February 2020.

We note that community consultation associated with (any) future discharge consent RMA processes would we expect address all these (and other) matters.

f) Bloxam Burnett Olliver (BBO)

In their Effects Report, BBO[18] traversed the options and position as set out in the Woods WW (2019) report and also noted that input from tangata whenua and key stakeholders is an important factor in selecting suitable options. They concluded by noting that "*However, the key conclusion in the Woods report is that suitable options for wastewater treatment are available.*"

4.1.2 Harrison Grierson (OLL) documents

Harrison Grierson (HG) – Section 32AA Planning report for Ohinewai Lands Ltd

This report includes information on the existing Te Kauwhata and Huntly WWTP's. It does not discuss the Woods WW (2019) report in any detail.

4.1.3 GHD Memorandum

The GHD Memorandum as introduced in Section 1.1.4 above, provides a review of the Woods documents with the view of producing more refined recommendations for the provision of water supply and wastewater infrastructure. The memorandum includes a sub-regional setting section, assessment of WDC's water and wastewater usage, treatment plant layouts, compliance status for the Huntly and Te Kauwhata Water and Wastewater Treatment Plants and the emerging solution of the Sub-regional mid Waikato Servicing Strategy being developed by WDC/WSL.

The recommendation for the "*preferred option for wastewater for the development is the use of the existing capacity within the Huntly Wastewater Treatment Plant*". This option would require the treatment process at Huntly Wastewater Treatment Plant to be upgraded to meet WDC's current discharge consent.

We understand that currently there are (potential) non-compliance issues in terms of meeting the suspended solids levels. A treatment upgrade in addition to meeting suspended solids levels would probably also need to remove additional mass loads of nitrogen and phosphorus and increase the disinfection capacity. The GHD assessment indicates there is significant volumetric capacity between the consented discharge volume and current volume discharged from the plant. This would enable the wastewater volumes generated by the APL's rezoning requests to be provided for while still leaving some spare capacity for growth in Huntly or elsewhere. This needs to be confirmed by APL's consultants in agreement with WSL.

The GHD memorandum raises the possibility of conveying the Te Kauwhata wastewater jointly with APL's to the Huntly plant. It is anticipated that this option will be considered in the Sub-regional mid Waikato Servicing Strategy which is due to be completed in mid 2020.

The key issues identified in the GHD Memorandum and subsequent discussions between WSL and Stantec (Appendix B) are set out in Sections 4.2 and 4.3 following with conclusions and recommendations and key findings included in Sections 4.5 and 6 respectively.

4.1.4 Shand Properties and Ribbonwood Family Trust

In respect to the submissions of Shand Properties and Ribbonwood Family Trust (seeking the rezoning of land to country living); we have not considered these as this zone is required to be self-sufficient in the provision of water supply, and wastewater and stormwater services.

[18] Bloxham Burnett Olliver – Ambury Properties Limited. Rezoning Submissions to the Waikato proposed District Plan Review – Assessment of Environmental Effects Report and Section 32AA Evaluation – December 2019.

4.2 Key Issues Identified in the Documentation

4.2.1 Woods and BBO

The following are a number of the key matters Stantec have identified in the documentation that would need resolution in the further investigations, options assessment, design installation operation and private management of some options. Stantec's experience indicates that these issues are all resolvable providing appropriate resource consents, designations if needed, and other statutory and possible private party agreements can be put in place. In this respect the Woods report concludes "*these options presented, demonstrate the viability for wastewater serving for the site*" and that '*the options are developed through Woods report Section 12.3 preliminary design to identify a preferred option for implementation.*"

The key matters include:

- Obtaining new wastewater discharge and other consents and approvals
- Need to address existing resource consents (discharge permits) for the public (WDC/WSL) Te Kauwhata and Huntly and for a new public centralised treatment plant and discharges should that be proposed by WDC/WSL
- The 5 to 10 year period before any upgrade of an upgraded or new public (WDC/WSL) regional centralised public treatment plant would be available for the APL (and any other) developments
- The need to find and purchase or otherwise secure robust agreements for use of land for land disposal options, such land to be above flood levels and of suitable permeability and location. Additionally, securing land application consents or other Regional and District authorisations for on-site septic tank type system approvals for these option(s), should they be proceeded with
- Like the water supply scenarios, the need for any interim wastewater infrastructure that is to be incorporated into any long term public (WDC/WSL) scheme to be installed and maintained in accordance with Council's requirements until Council take over that infrastructure
- The acceptance, or otherwise by WDC/WSL of low pressure, STEP and vacuum collection systems as part of a public (WDC/WSL) Scheme.
- The control of Peak Wet Weather Flows. In this respect, the experience with new systems involving low pressure reticulation is that (very) low peak to average flow rates as can be achieved. In this respect, the peak wet weather flow peaking factors of up to 6-7 for these options look high
- The potential difficulties that can arise with privately installed and operated wastewater schemes including those owned by body corporates
- The Proposed District Plan's residential subdivision requirements include for reticulated wastewater (and water supply and stormwater) to be provided for. This does not include for industrial zoned land. This potentially raises the issue of a different wastewater strategy to be applied for residential and business to proposed industrial zones. Stantec addresses this in Section 5 in suggesting recommended changes to the District Zoning Plan provisions
- Consideration should also be made of other areas that may (potentially) be included in an adjoining District Plan Zoning change in the future (as described in our list of issues for water supply above, in Section 3).

Other matter:

- The term 'on-site' is applied to the interim options. Normally in the local authority wastewater sector, this term refers to the treatment and disposal of the treated wastewater on the site on which it is generated. It is noted that in APL's report, the term is used in a much wider context as a number of these options include conveyance, treatment and disposal/discharge off the site the wastewater is generated on. This especially applies to Interim Options A and B if there is a river or lake discharge.

4.2.2 GHD Memorandum

- The GHD proposed wastewater servicing option (refer Section 4.1) appears to have some merit and would not unduly limit growth in terms of the current consents volumetric consented capacity in the short term. However, this needs WSL's confirmation.
- A treatment upgrade to meet the currently consented limits would however be required. This could be undertaken by adding a new in tank treatment unit and / or oxidation pond upgrades. WSL indicated in their meeting with Stantec (Appendix B) that while they were not opposed to this option, they had significant concerns about the conveyance of raw sewage from the APL development. These concerns relate to septicity issues associated with conveying small flows over a considerable distance in the first few years of the development. While chemical dosing and regular flushing (if water supply was available) can be used to reduce/minimise such issues, WSL is of the opinion it is best to avoid such a conveyance situation if at all possible. It would be helpful if APL's consultant could address these issues and whether an alternative interim solution is required and what that would be.
- In terms of use of the existing Te Kauwhata Wastewater Treatment Plant WSL did not consider this a viable option at this stage because of the current discharge location into Lake Waikare. This consent expires in mid 2020's. The Woods Wastewater report 2019 also makes this point.
- On the matter of wastewater reticulation system options WSL expressed preference for conventional type approaches rather than low pressure or STEP (Septic Tank Effluent Pumping) systems. Vacuum systems may however be a suitable alternative to a conventional system.

4.3 Further Issues Identified by Stantec

- The Proposed District Plan's residential and business subdivision rules require the provisions of a public reticulated wastewater system (and water) at the time of subdivision. This rule does not appear to apply to the industrial zone. Refer to Section 5 of this report also.
- The matter of potential cumulative adverse effects from stormwater disposal (even after the proposed treatment) and land disposal of treated wastewater from on-site systems. This could especially apply to nutrients (nitrogen and phosphorus) and microbiological contamination. Such considerations are key matters in terms of "integrated holistic"[19] Three Waters management that fits into "big picture" planning initiatives.
- Likely new legislative requirements that will be included in Central Government's proposed new National Environment Standard on wastewater and overflows information which was released in late 2019 with draft documentation expected mid-2020. Additionally, there is the expected new National Policy Statement Freshwater Management and the implementation of this through WRC Plans and Policies.
- Interaction and/or compatibility with progressive outcomes from the Waikato Sub-regional Three Waters Project which WDC and WSL are involved in. Additionally, the compatibility with the FutureProof Three Waters Strategy 2012 and Action Plan 2017, and the WRC's documentation, should be considered. There is also WDC's 50 year Wastewater Strategy to take into account and the output when available of the current WDC/WSL investigations into the Sub-regional mid Waikato Servicing Strategy.
- Greywater reuse for non-potable water supply is in the options considered. The Medical Officer of Health/Waikato Area Health Board would need to be consulted about this option if it was to be further considered. A similar situation exists with reuse of treated wastewater (reclaimed water) in a residential development.

[19] Hearing Commissioners Minute and Further Direction 20 August 2019.

4.4 Assessment of Effects

The Assessment of Effects undertaken by Bloxam Burnett and Olliver (BBO)[20] for APL considers the range of interim and long term options and refers to the Woods WW (2019) report which is appended to the assessment. As far as we can determine, no specific and integrated potential or actual adverse effects assessments have been undertaken on individual options, such as assessment of:

- Effects on receiving surface water body from treated wastewater discharges including a wide range of issues such as for example, water quality; ecology; any downstream / down gradient water supply abstraction systems, public health of recreational water users and wild food consumers; tangata whenua; social; amenity; cultural and other effects
- Effects of WWTPs from air discharges (air quality / odour)
- Effects on neighbouring receptors to WWTPs and disposal areas
- Effects on land/soil and ground water of land disposal systems
- Effects of (any) treated wastewater beneficial reuse options
- Temporary effects of infrastructure construction e.g. noises, traffic, dust, disruption
- Effects of ongoing operation of the infrastructure such as trucking of sludge, noise and others
- Other effects.

However, comments were made on the terrestrial ecological values of the proposed overall development, including wastewater infrastructure. These are values which would be created or enhanced by the proposed development, such as positive effects of retiring existing farmland with a reduction of nutrient contamination (nitrogen and phosphorus) of surface and groundwaters. Woods WW (2019) also includes some comments on the effects of various options on tangata whenua.

The BBO assessment also featured a section on positive effects, including economic and social positive effects.

The BBO effects assessment concludes in Section 17 that the likely and potential effects of the development and proposed rezoning have been considered in detail, for all Three Waters. In our view, the effects of the wastewater matters have not been considered in detail based upon the documentation made available for review.

We do acknowledge that such detail would be included in (any) application for wastewater discharges consent (under the RMA),other consents (e.g. air (odour)) and other agreements needed.

In respect to the above position, it would be useful to have had an assessment of potential and actual adverse effects of the options, particularly the interim options, at the time of this review.

The GHD Memorandum of 20 February 2020 does not address to any extent an assessment of effects.

4.5 Wastewater Conclusions and Recommended Conditions

This review highlights there are a wide range of issues or matters that need addressing in determining the most appropriate interim and long term wastewater servicing strategy. The Woods WW (2019) report has identified many of these issues, which are referred to as limitations and risks, and indicated that further investigations, options selection and design work will determine such matters.

We confirm that many of the issues/matters are common to similar development procedures and that a range of solutions are available to address them and avoid, remedy or mitigate adverse effects of specific options.

[20] Bloxham Burnett Olliver – Ambury Properties Limited. Rezoning Submissions to the Waikato proposed District Plan Review – Assessment of environmental Effects Report and Section 32AA Evaluation – December 2019.

We also confirm that the options set out in the Woods WW (2019) report for both the interim and long term provision or wastewater servicing and are all technically feasible providing that:

i. Resource consents (discharge permits) and (any) other approvals can be secured preferably for the long term (35 years) for the long term solutions and/or onsite land disposal agreements reached with WRC and if needed with WDC also.

ii. Measures can be put in place to be able to meet the Government's proposed new National Environmental Standard on wastewater which is expected to include procedures for wastewater overflows in addition to a range of wastewater treatment and discharge matters.

iii. The infrastructure meets appropriate technical standards including WDC/WSL's own standards for a public (WDC/WSL) scheme.

iv. All WDC, WRC, and FutureProof statutory and non statutory requirements and provisions are met, and consistency with the direction of the (currently in progress) Waikato Sub-Regional Three Waters Project will be achieved. WDC's 50 year Wastewater Strategy and output when available of the WDC/WSL Sub-regional mid Waikato Servicing Strategy presently being developed (due mid 2020). The FutureProof drivers include the FutureProof Three Waters Strategy 2012 and Action Plan 2017.

Accordingly, approval for the APL and other related zoning changes to the Proposed District Plan, should that decision be made are subject to requirements that a secure consented wastewater disposal / discharge is available before any development is permitted on the site. A requirement for this could be included in the proposed amendments to the District Plan put forward by APL as part of their submission.

The provision of a reticulated public wastewater system at the time of subdivision is required in the subdivision rules relating to the residential and business zones under the Proposed District Plan. This is set out in Section 5 below, which also notes that this rule does not appear to apply to the industrial zone.

Complying with this subdivision rule could be problematic for any interim or long term wastewater solutions that are private schemes i.e. not public or not reticulated i.e. on-site as required by the rule.

The GHD proposed option of connecting to WDC's Huntly Wastewater Treatment Plant and using some of the consented spare volumetric capacity has some merit although a treatment upgrade would be required. The issue of controlling septicity in the long conveyance line especially with low raw sewage flows initially would need to be satisfactorily addressed.

The Huntly option may negate, or at least reduce the efficiencies that are likely to be gained by a sub-regional solution, especially if it a new central plant is the preferred option.

In terms of the issues associated with the GHD proposals it would be appropriate for APL's consultants to discuss these matters with WSL and determine whether workable solutions can be agreed to. If agreement cannot be achieved APL will need to identify and confirm the viability (refer to items i – iv above) of an interim solution.

The current WDC / WSL Sub-regional mid Waikato Servicing Strategy due for completion in mid 2020 is expected to identify a Sub-regional mid Waikato solution for wastewater servicing that would include APL's wastewater allowances. As advised by WSL implementation of a sub-regional solution could take between 5 and 10 years.

5. Possible Changes to District Plan Provisions

It is noted that in the notified version of the Proposed Plan the following rules apply to subdivision:

Residential Zone Rules

16.4.1 Subdivision – General

(a) Subdivision must comply with the flowing conditions

(ii) proposed lots must be able to connect to public-reticulated water supply and wastewater

Business Zone Rules

17.4.1 Subdivision – General

(a) Subdivision of land must comply with the flowing conditions

(ii) proposed lots must be connected to public-reticulated water supply and wastewater

There does not appear to be a corresponding general subdivision rule in the industrial zone provisions requiring connection to public-reticulated water supply and wastewater.

If the land subject to the rezoning requests is rezoned and subsequently subdivided Rules 16.4.1 and 17.4.1 should ensure that all new lots will be connected to public-reticulated water supply and wastewater. However, given there is no corresponding subdivision rule in the Industrial Zone there is no requirement for such servicing for industrial lots.

Consideration could be given to including a similar requirement in Rule 20.4.1 Subdivision – General in the Industrial Zone.

A further point to note is the general subdivision rules refer to a "public reticulated system". While this term is not defined it is assumed that this means a municipal wastewater and water system. As APL is proposing an interim solution for water and wastewater servicing that is not a public system these general subdivision rules may be problematic and further consideration to how this could be addressed is recommended.

APL has proposed a number of changes to the proposed District Plan these are contained in Appendix D of the Assessment of Environmental Effects report and section 32AA Evaluation. To ensure that future development at Ohinewai is serviced in terms of water and wastewater and flood risk appropriately managed the amendments (or similar wording) set out below to APL's proposed changes are suggested for consideration.

4.1.19 Policy – Ohinewai

a) Ohinewai is developed to ensure:

(v) Flood hazards and stormwater are managed to ensure the effects on sensitive uses are mitigated and to ensure that development does not increase flood risk, particularly to land adjacent to the structure plan boundary.

(vi) All industrial, business and residential development is connected to a reticulated water supply and a reticulated wastewater system and that the potable water supply meets the New Zealand Drinking Water Standards and other legislative requirements.

Rules to give effect to these amendments to Policy 4.1.19 could be included in the Industrial, Residential and Business Zones if it is considered that the subdivision rules discussed above are not sufficient in ensuring that development will be adequately serviced.

It is considered that there is scope within the submissions and further submissions to support the suggested changes to the Plan provisions, because Three Waters management and servicing is addressed in the submissions and technical documents provided by APL and OLL. Further submissions by Mercury and Auckland / Waikato Fish and Game Council raise issues with flood risk.

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6. Key findings

This technical peer review report has been produced on the basis of the information available to us at the time of review (as outlined in Section 1). We understand that the Proposed District Plan Review process is ongoing, and due to the current stage of the process, a number of key reviews and supporting documents are still in development.

Detailed issues raised in the submission documents, and identified separately by us, are described for each of Stormwater, Water Supply and Wastewater in Sections 2, 3, and 4 respectively. At this time, given the information available, we have presented our review findings for each of the Three Waters separately. The issues identified, and potential or actual adverse effects of the rezoning options, need to be further considered from an integrated three waters perspective. For example, the cumulative impact of the rezoning requests across all Three Waters should be examined, considering aspects and values which are common across each (such as common aquatic receiving environments for wastewater and stormwater). At this time, we are unable to complete the review from this integrated Three Waters perspective, as the information presented for review is not sufficiently detailed or organised in a manner which allows that level of assessment.

Furthermore, the review has revealed that of the Three Waters, the issues and potential or actual adverse effects for stormwater are the most complex, and potentially are of the greatest significance. This is reflected by the complexity and detail of our review findings presented in Section 2.4 (Conclusions and Recommendations) these cover a range of issues and require ongoing discussions with APL and other submitters.

One of the most significant issues identified with regards to stormwater is the risk of flooding, and associated options for mitigation of that risk. As described in Section 2.1, the 'Natural Hazards' elements of the Proposed Waikato District Plan (of which flood hazards are a major component) will be reviewed separately as part of Stage 2 in the plan review process. The separation of these elements from the Stage 1 review makes it difficult to review the potential or actual effects of the proposals with regards to stormwater, and much of the evidence required to make an informed and complete assessment is not yet available.

In terms of water supply and wastewater servicing WSL has indicated that there should be solutions available in the longer term following the completion and implementation of the Sub-regional mid Waikato Servicing Strategy currently being developed. Given that these solutions will not be available for at least 5 – 10 years, APL and the other submitters will need to adopt interim solutions to service the area. The critical issue for WDC is ensuring that these interim solutions are truly viable and meet Council's / WSL's standards for any elements that may be incorporated in the longer term solution.

The Conclusions and Recommendations for Water Supply are set out in Section 3.6 and Section 4.6 for Wastewater.

The issues identified with regards to Three Waters are also compounded by the current subdivision provisions in the Proposed District Plan, requiring connections to "public" reticulation systems for water supply and wastewater in the Residential and Business zones but not in Industrial zone. The issues that we have identified with these requirements need to be discussed further with WDC staff and the submitters.

We have provided suggested amendments to the changes to the Proposed District Plan provisions provided by APL (in Section 5 above) to address some of the key issues we have identified.

Appendices

Appendix A Stormwater Meetings attended by Stantec Personnel

First meeting between Stantec and Woods on the SMP

Date: 19th February

Attendees:

Pranil Wadan	Woods
Sakti Gounder	Woods
Stuart Penfold	BBO
Allan Leahy	Stantec
Megan Blackburn	Stantec

Absentees:

Ajay Desai	Woods

Questions raised and responses included below

From: Pranil Wadan <pranil.wadan@woods.co.nz>
Sent: Thursday, 20 February 2020 3:35 PM
To: Blackburn, Megan
Cc: Stuart Penfold; John Olliver; Ajay Desai; Sakti Gounder
Subject: RE: WDC Review - Sleepyhead Estate - SMP Response

Hi Megan

Response to matters discussed yesterday.

Stuart – Can you please provide Megan a response to the last item, along with a statement with respect to mudfish.

Ajay – Please populate or send through your responses separately.

Megan if you have any additional questions or queries please do not hesitate to contact me.

Issue identified	**Reasoning for flagging the issue / significance**	**Response**
If the model is sufficiently showing the impact of the development on surrounding properties and to the Whangamarino wetland, and how to align with OLL approach of hydraulic neutrality with regards to land modification.	The SMP shows large amount infilling occurring in the flood plain to make sure buildings are above flood levels. Infilling removes flood storage volume in the catchment area and can impact neighbouring properties. The flood assessment model appeared to contain a free discharge at 8mRL. The free discharge means there is no way to show the impact of infilling on surrounding properties and properties downstream of the development. Is this correct?	Ajay to action
The design criteria that will be used for the LID devices. Will minimum levels of treatment meet RITS specifications? The scoring in the LID matrix appears to differ from what is in the report. Meaning behind score are highlighted below • For water re-use the SMP includes the volume the SMP aims to achieve, then in the SMP LID matrix water	*Addressing this issue could be deferred until the consenting process. No necessary to discuss at our catch up.*	• The LID Matrix has been presented in the SMP as a high-level assessment to validate if the proposed methodology will comply. Scores have been assigned on a conservative basis (low to medium range) based on the proposed toolbox. • It is acknowledged that the matrix will need to be revised during each consenting stage as it is dependent

Issue identified	Reasoning for flagging the issue / significance	Response
re-use has been given a score of 3. Under Section 6.1.3.1 of TR2018/01 a score of 3 represents **'site use for garden watering and for non-potable inside waters uses including laundry and toilets'.** • The SMP LID matrix includes a score of 3 for infiltration which means infiltration is designed to the **water quality storm**. • The SMP LID matrix includes a score of 3 for swales and filters. A score of 3 means that all impervious surfaces drain to swales /filters and have the capacity of the **2-year storm event.**		on the mechanisms that are adopted for a particular stage. • Swales may be proposed in the central park area (this is subject to detailed design) or to convey flows to the central park area where pipes cannot reasonably be accommodated due to depth and tailwater issues. • Devices and locations are yet to be finalised; the toolbox provides a range of options. • Design of devices will comply with RITS, TR201801 and TR201802. • The central park is proposed to convey flows up to the 100yr ARI event inclusive of climate change. o Given the flat grade, the conveyance will be driven by head. The surrounding site is elevated to provide adequate depth. o The final design of this is to be detailed at consenting stage as it will be dependent on a number of factors including the devices that are adopted within this area.
Noticed an error in the flow calculations. Confirmation that the SMP's peak flow and volume calculations will align with RITS, TR201801 and TR201802. Regarding the calculations • The time of concentration (tc) is applying the Equation 7-4 from TR2018/02. This equation should only be used in rural areas. How do the calcs incorporate the change in flow paths/flow rates between the pre and post development conditions.	This is an issue that need to be address now if the SMP is based on the calculations being correct. If no component of the SMP is reliant on the calculations, then it can be addressed at a later stage.	• Acknowledge error in the calculations. These will be amended to reflect the correct numbers. o It is noted from discussion that using a time of concentration of 59 minutes will result in lower peak flows and lower runoff volumes. o The central park swale has been conservatively sized to accommodate runoff volumes. • Sizing of the primary and secondary network is as follows: o Primary network sized for the 10yr + CC event o Secondary network sized for the 100yr+CC event. o Freeboard requirements as per RITS and/or NZ Building code (E1)

Issue identified	Reasoning for flagging the issue / significance	Response
• There appears to be a potential error in the calculations around flow rates, to note it says the tc value is 59hours instead of 59mins, and this will make the peak flow rates significantly lower. Also can't follow how the flow rates were determined using the Specific flow rate (q* graph), and that it matches the method in TR2018/02		
Confirm how volumes are calculated and if the minimum criteria align with technical guidance documents listed in Table 1 of the SMP. I noticed throughout the report the volume calculation were written in different way. • 1/3 of the 2 yr event (pre development) • 1/3 of the 2 yr event + climate change (post development) • The difference between pre-Water Quality Volume (WQV) (1/3 of the 2 yr event) and post-WQV.	As long as the SMP is not reliant on volume calculations, this can be deferred until a later stage	• The water quality volume been calculated to be 1/3 of the 2 year + climate change storm event (post development). • At the time of the SMP being formulated, the final stormwater management devices are unknown. The calculations undertaken to date were used to inform the WQ volume required for us to verify space requirements for central park.
Confirmation on what is envisioned for the swale and wetland design, and if the devices will align meet RITS specifications.	*Addressing this issue could be deferred until the consenting process.* Would however be good to understand if you are envisioning a swales or a channel. Sounds like a large channel due to the volumes of flow involved.	• The wetland park area is not proposed to be an "engineered" wetland. It is intended that the natural wetland function be retained. Flows are to sheet flow towards Lake Rotokawau in this area. Some natural treatment may be offered within these wetlands in the smaller storm events prior to discharge into Lake Rotokawau.
Where devices will be located, such as the swale location and direction.	*In general this issue could be deferred until the consenting process.* Main point to discuss about device location is that in the Central Area of the zoning, a sharp bend is indicated on the maps	• Given that flows are driven by head, it is not anticipated that sharp bends will see scour or velocity issues resulting from the sharp bend. Rather it is anticipated that water will pond up and find its way downstream. • In the instance that modelling finds this to be an issue, it is anticipated that this can be

Issue identified	Reasoning for flagging the issue / significance	Response

	provided – swales located in this area may experience erosion problems.	designed/engineered out through shaping the land in this area to prevent scour and erosion.
		
		• The proposed width for the central park wetland varies between 24m at its narrowest and up to 100m.
		  o It is noted that the conveyance through the central park area will need to cater for the 100yr + CC event.
		  o Given the size of the central park wetland area, it is anticipated that there is room for both conveyance and treatment without compromising function.
		  o It is noted that the proposed stormwater management devices and two step treatment train is yet to be finalised and devices within the central park area are yet to be confirmed.

How stormwater management devices would be affected in flooding events.	*Need to discuss this to better understand how this has been accommodated*	• As discussed the standards do not provide guidance on the resilience of devices. It is anticipated that this will be dependent on the type of device, its locality and the impact it would have from being inundated. • It is proposed that this will be discussed with Brian Richmond from Waikato Regional Council to determine whether devices such as raingardens are required to be raised outside of the 100 year floodplain.

Confirmation that sufficient space has been provided around all existing drains to managing existing issues and future developments, and that the space can accommodate various options, such as a new bridge design for Tahuna Road.	The existing drains may be acceptable for rural use however the land is changing to urban and would like to understand how flows are conveyed in the drains, to avoid negative impacts to the road and properties. For example can it convey the 10 year storm event with climate change? Under a 100 year event does the culvert become submerged due to backwater effects and has consideration for it being blocked in a 100	• Discharge to any drains belonging to the land drainage scheme is not proposed as part of the ultimate solution for the site.
		• Whether an extension of the Tahuna Road culvert or a new bridge structure is proposed for this part of the site is unknown and subject to detailed design. Any structure will be designed to convey the 100yr flow inclusive of climate change without restriction or effects on upstream areas.
		  o Analyses as part of the design of this structure will account for blockage scenarios.
		  o Residential lots adjacent to the structure will meet the

Issue identified	Reasoning for flagging the issue / significance	Response
	year event been assessed. How will overland flow drain to the lakes under a blocked condition? This should be understood to ensure no risks to road uses and properties under a blocked / submerged condition. Need to confirm the culvert/new bridge crossing will meet standards and that zoning has accommodated land required for the drain. The SMP mentions no flows entering the drain, however sheet flows from APL land could enter the drain and the OLL development could impact flows. An addition consideration is that culverting is not a great solution for fish passage/access. Bridge may be required as a better option. Can apply culverts only for nationally significant infrastructure. Potentially a Future consideration	freeboard requirements specified in the RITS so that residential properties are raised outside of the floodplain and will not be inundated. o If detailed design finds that inundation cannot be avoided, residential lots will not be proposed in the area. o It is noted that there are no pumps within the APL site and that the Tahuna Drain currently gravity discharges into Lake Rotokawau within the APL site. • It is noted that flows are pumped from Lake Ohinewai to the Tahuna drain. The development does not propose to discharge post development flows to the Tahuna Drain therefore it is envisaged that the pump function and water levels in the drain will remain unaffected by the development. o As discussed, it is intended that site specific modelling is carried out to ensure that upstream and downstream properties and the existing function of the land drainage scheme from Lake Ohinewai to Lake Rotokawau will not be affected. • Part of the Balemi Road drain shown as discharging to Lake Rotokawau is not as displayed on Waikato Regional Council's GIS platform. It is understood from conversation with Russell Powell that the landowner to the north of the site has installed a pump with WRC's approval to push flows to discharge directly along existing farm drains into Lake Waikare.
How the recommendations in the SMP will be enforced, including: completing a stop bank evacuation plans, no use of high contaminant yielding cladding or roofing materials, and roof runoff for reuse.	How will these measures be achieved?	• Planning Matter – Stuart to address.

Pranil Wadan

Principal Engineer

BE Civil, CPEng, IntPE(NZ), CMEngNZ

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Visit our website to learn more about what we do and how we do it.

Subject: FW: WDC Review - Sleepyhead Estate - SMP Response

From: Stuart Penfold <spenfold@bbo.co.nz>
Sent: Friday, February 21, 2020 12:24 PM
To: Blackburn, Megan <Megan.Blackburn@stantec.com>
Cc: John Olliver <jolliver@bbo.co.nz>; Ajay Desai <ajay.desai@woods.co.nz>; Sakti Gounder <sakti.gounder@woods.co.nz>; Pranil Wadan <pranil.wadan@woods.co.nz>
Subject: RE: WDC Review - Sleepyhead Estate - SMP Response

Hi Megan,

My points within the table in **green** below.

In terms of the Mudfish question from Allan:
The ecology reporting completed for the rezoning has addressed the potential for mudfish to be present on the site (within the Artificial drains present across the site).
Specific mudfish surveys have been undertaken (with overview from WRC) over a part of the site (40ha) and no mudfish were found.

Our ecologists are well aware of the potential for mudfish and will be completing further assessments as the development programme continues.
If mudfish are found, then appropriate strategies can be put in place.

Trust this helps.

Thanks
Stuart

From: Pranil Wadan <pranil.wadan@woods.co.nz>
Sent: Thursday, February 20, 2020 3:35 PM
To: Blackburn, Megan <Megan.Blackburn@stantec.com>
Cc: Stuart Penfold <spenfold@bbo.co.nz>; John Olliver <jolliver@bbo.co.nz>; Ajay Desai <ajay.desai@woods.co.nz>; Sakti Gounder <sakti.gounder@woods.co.nz>
Subject: RE: WDC Review - Sleepyhead Estate - SMP Response

Hi Megan

Response to matters discussed yesterday.

Stuart – Can you please provide Megan a response to the last item, along with a statement with respect to mudfish.

Ajay – Please populate or send through your responses separately.

Megan if you have any additional questions or queries please do not hesitate to contact me.

Issue identified	Reasoning for flagging the issue / significance	Response
How the recommendations in the SMP will be enforced, including: completing a stop bank evacuation plans, no use of high contaminant yielding cladding or roofing materials, and roof runoff for reuse.	How will these measures be achieved?	**For the emergency planning (EMP) requirements for the factory, there are specific objectives and policies for Ohinewai that have been proposed for inclusion into the District Plan. This includes the following policy relevant to flood management:** ***(v) Flood hazards and stormwater are managed to ensure that effects on sensitive land uses are mitigated.*** **As the Factory development will require resource consent approval under the Plan rules (at least Discretionary) , an assessment against this policy is required and hence the applicant will need to ensure compliance with the policy.** **As an aside, APL are well down the track with their development planning and wish to lodge a resource consent for the Factory this year. The requirement for the EMP has already been addressed as part of the reporting underway.** **We suggest that the roofing materials and roof runoff for re-use requirements are best managed via the Regional Council consenting process.**

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Second meeting between Stantec and Woods on the OFA model

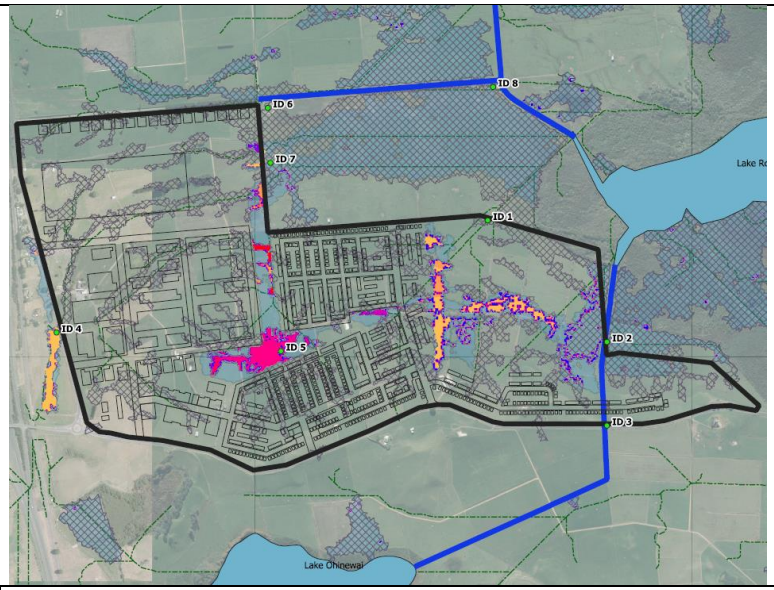
Date: 20th February

Attendees:

Ajay Desai	Woods
Megan Blackburn	Stantec

Questions raised and responses included below

Ref	Modelling Question	Response
01	Table 13: Model Results – 2yr with CC 	Location ID	Scenario 1 Pre-Development Model	Scenario 2 Post Development (Sleepyhead Estate)
1	8.00	8.00
2	8.00	8.00
3	8.00	8.00
4	*8.60	*8.70
5	8.00	8.00
6	8.00	8.00
7	8.00	8.00
8	8.00	8.00 | *Due to model representation - discussed in section 8.1.1* Table 14: Model Results – Lower Tailwater level Scenario | Location ID	Scenario 1 Pre-Development Model	Scenario 2 Post Development (Sleepyhead Estate)	Water Level Difference
---	---	---	---
1	5.71	Does not Flood	n/a
2	5.86	5.86	0
3	Does not Flood	Does not Flood	0
4	*8.60	*8.69	*0.09
5	6.29	6.93	**0.64
6	7.29	7.14	-0.15
7	6.42	Does not Flood	n/a
8	5.71	5.40	-0.31	 *Due to model representation - discussed in section 8.1.1* **Location within the proposed development site – Therefore no effect* Having free outfall of 8mRL – show no impact of effect on properties what was the purpose of this model when pre conditions were already at 8m? The lower tail water scenario appears to be the scenario that shows that impact. The 2yr model runs with lower boundary conditions of 5.4mRL	A conservative water level of 8mRL for Lake Waikare was given by Waikato Regional Council (WRC) based on the spillway level (which would be the maximum water level that the Lake can achieve). This was used to simulate 2yr, 10yr and 100yr model runs for pre and post development scenarios to assess the increase in flood risk within the site, to neighbouring properties as well as on receiving environment. This water level confirmed that Lake Waikare system is tailwater controlled for this high tailwater level and has no impact from pre or post development flows from the site. This conservative level of 8mRL was considered appropriate assumption for large storms like 100yr but may not be realistic for smaller storms and hence a lower tailwater was used in addition to above model runs for Lake Waikare for 2yr storm to understand flood effects of the proposed development. A constant water level of 5.4mRL was used based on the lower operating water level for Lake Waikare from the Gate Operations procedure provided by WRC. Using these two tailwater levels (lower tailwater level of 5.4mRL for smaller 2yr storm event and 8.0mRL for large 100yr storm event) helped assess the effects of the proposed development for extreme water levels for Lake Waikare.

		Reference figure
02	The OFA Report noted an increased ponding at the culvert (Site 4) between pre and post development scenarios. Clarity over the cause of the increase in depth is required to understand if the development is impacting on the levels, because of climate change, or other factors	For pre and post development model runs include climate change uplift. The overland flow path located around Lumsden Road at location 4 exhibits ponding behind Lumsden Road for pre and post development scenarios. This is caused by the model representation in this area which does not include the culvert under the existing road. This results in 'no flows' through the culvert and flows backing upstream with no downstream conveyance. This culvert under Lumsden Road will be addressed at detail design stage and designed to maintain the predevelopment flood levels.
03	The post development maps in Appendix E of the OFA Report show no flooding in and around the buildings with significant earthworks required. Will the stormwater management devices on site address both flood displacement volume and attenuation volume from the increase in impervious area? This was stated in the Memo to Mercury Energy in Appendix C.	Displacement volume/ flood storage lost based on flood levels of 5.4mRL as well as 8.0mRL are less than 0.5% when compared to the total storage available within Lake Waikare. Modelling undertaken indicates that flows from this development can be passed forward without impacting on predicted flood levels at Lake Waikare / Lake Rotokawau.

		The general approach is to pass flows forward from the proposed development (1.79 sq. km) before the upstream flows reach Lake Waikare (206 sq. km). Holding flows back could results in coinciding of peak of the storm resulting in higher risk to the proposed development as well as neighbouring properties. The time of concentration for the flows from the site is < 10minutes whereas that for upstream catchments discharging to Lake Waikare is > 3hrs (calculated using SCS Unit Hydrograph method, as specified in the Waikato Stormwater runoff modelling guidance (TR2018/02)). Refer to Figure 1 below. Hence the stormwater management devices would primarily serve the purpose of treatment with some attenuation benefits.
04	The OFA Report noted a decrease in depth at Sites 6 and 8 and complete removal of flooding at Site 1 and 7 in the post-development scenario. How has this been achieved at each site? Further explanation is needed. For example flow diversion? Can this be sketch up on a plan view?	Refer Figure 2 below shows the approximate discharge locations for the proposed development discharges. The existing terrain slopes down towards Lake Rotokawau/ Lake Waikare with low lying areas to the north-east of the proposed site. The locations shown in the figure and tabulated with water levels highlight the differences in overland flow paths for the pre and post development scenarios which now discharge to the Business Park area where they are either held back (where we see a localised increase within the site) or discharge overland to Lake Rotokawau. Primary reason for decreases at locations 6,7 and 8 are based on the fact that there are no discharges to the Land Drainage scheme (which in agreement with WRC).
05	Has WRC finished their flood hazard mapping and how does it compare with the OFA Report? There should be a consistent approach to flood mapping for the Ohinewai area.	The Flood Hazard Model (Waikato River Model) prepared by DHI for WRC was provided as a draft by WRC which was studied and considered to be used for this assessment, but significant issues were identified in the model and reported back to WRC. This was discussed with WRC's Technical reviewer and confirmed as inappropriate. Based on above criteria it was agreed to develop a local model for Flood Assessment.

		Further modelling would be needed to further understand the effects and risk using the River Waikato model when available which accounts for – - storage within Lake Waikare - performance of Control Gates (under the Lower Waikato Zone Management Plan) - provides a varying tailwater level applied for the proposed development discharge locations instead of a conservative constant water level as used in the modelling - appropriate climate change allowance applied to Historic Rainfall depth corresponding to RCP6.0 rather than to rainfall depths corresponding to RCP6.0 for the period 2081-2100 This modelling would be completed at detail design stage when the Final Waikato River model would be available with associated reporting.
06	If the model is sufficiently showing the impact of the development on surrounding properties and to the Whangamarino wetland, and how to align with OLL approach of hydraulic neutrality with regards to land modification. Why APL has a different approach?	The general approach is to pass flows forward from the proposed development (1.79 sq. km) before the upstream flows reach Lake Waikare (206 sq. km). Holding flows back could results in coinciding of peak of the storm resulting in higher risk to the proposed development as well as neighbouring properties. The time of concentration for the flows from the site is < 10minutes whereas that for upstream catchments discharging to Lake Waikare is > 3hrs (calculated using SCS Unit Hydrograph method, as specified in the Waikato Stormwater runoff modelling guidance (TR2018/02)). This approach may differ for all other properties within this area based on its location in relation to – - Lake Waikare / Lake Rotokawau - River Waikato - Lake Whangamarino - Other
07	Mentioned in meeting with Woods that the impact was insignificant (around 1mm?) please outline what the impact was even if minor.	A simple storage volume-based analysis was completed for Lake Waikare to understand the increase in water level within the Lake

		Waikare with loss of storage by fill in development area assuming the Lake Waikare gate is closed, i.e. no flows discharging downstream to Lake Whangamarino: - At 5.4mRL the increase in water level is ~0.006mm - At 6.3mRL the increase in water level is ~1.026mm - At 8.0mRL the increase in water level is ~13.03mm
08	How are the culverts modelled, do they pass forward flows? Sized to take the storm events. Confirm if the model identifies flooding around culverts or if that will be completed at a later stage.	All culverts are assumed to be designed based on the approach of pass forward and not included in the models. Only flooding observed around culverts is noted around Lumsden Road at location 4 exhibits ponding behind Lumsden Road for pre and post development scenarios. This is caused by the model representation in this area which does not include the culvert under the existing road. This results in 'no flows' through the culvert and flows backing upstream with no downstream conveyance. This culvert under Lumsden Road will be addressed at detail design stage and designed to maintain the predevelopment flood levels. There are no discharges proposed to Tahuna Drain will be designed to convey all upstream flows possibly as a culvert which has been discussed with WRC.
09	Considering catchment to Lake Rotokawau, and size of development relative to the lake. Re-suspension of sediment an issue?	It was agreed with WRC Technical Reviewer that Lake Waikare and Lake Rotokawau to be modelled without any storage associated with Lake Rotokawau as there is no data available and surveying is difficult with no access. It was also discussed that: - the two lakes would be hydraulically connected - operate as same water levels - storage within Lake Waikare will be significantly greater than that within Lake Rotokawau Hence the model has been extended to include all the area that contributes to Lake Waikare to enclose all overland flow path that either discharges towards the project site or share the same discharge location to Lake Rotokawau and Lake Waikare downstream of the project site.

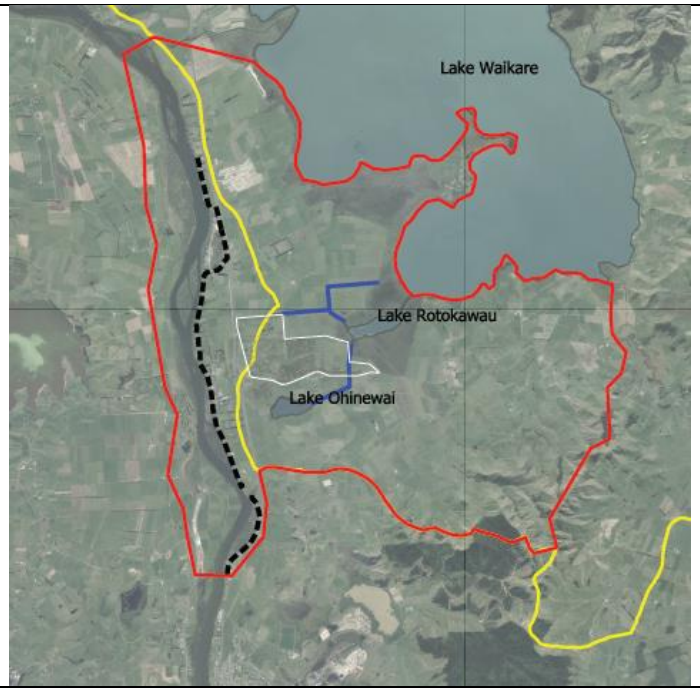
		Reference figure

Figure 1: Peak time analysis

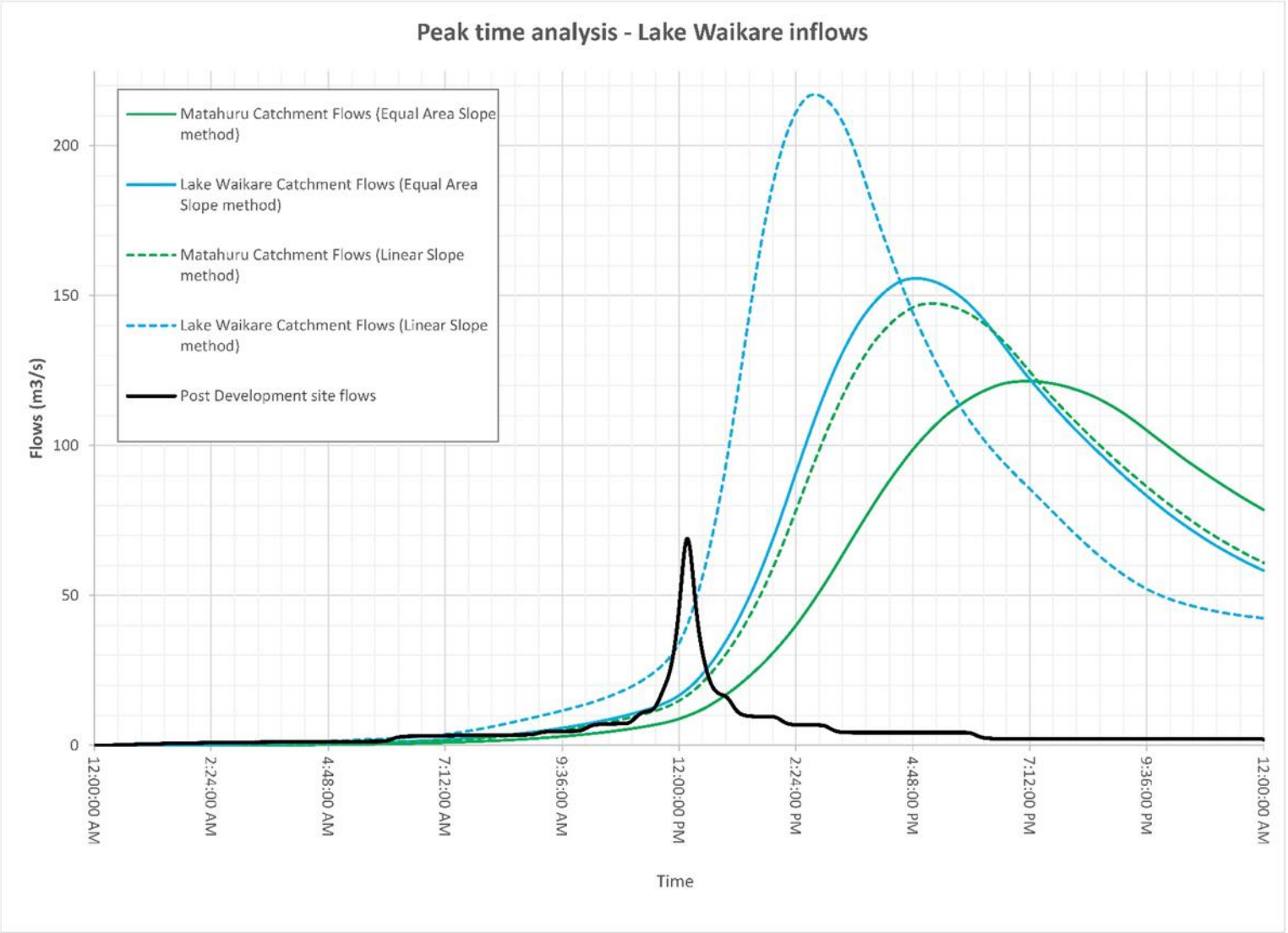
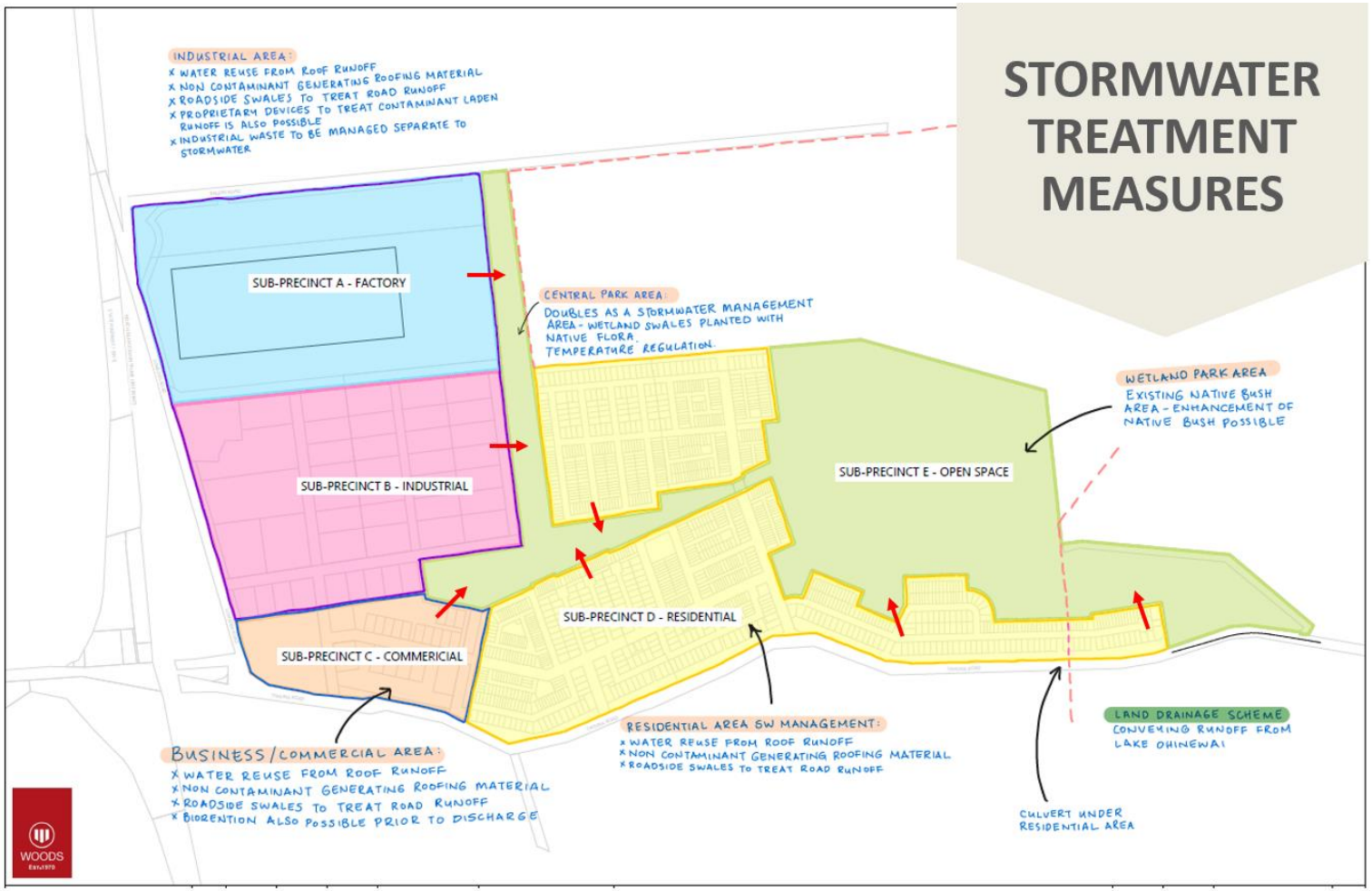


Figure 2: Approximate discharge locations for the Proposed Stormwater management Zones



Blackburn, Megan

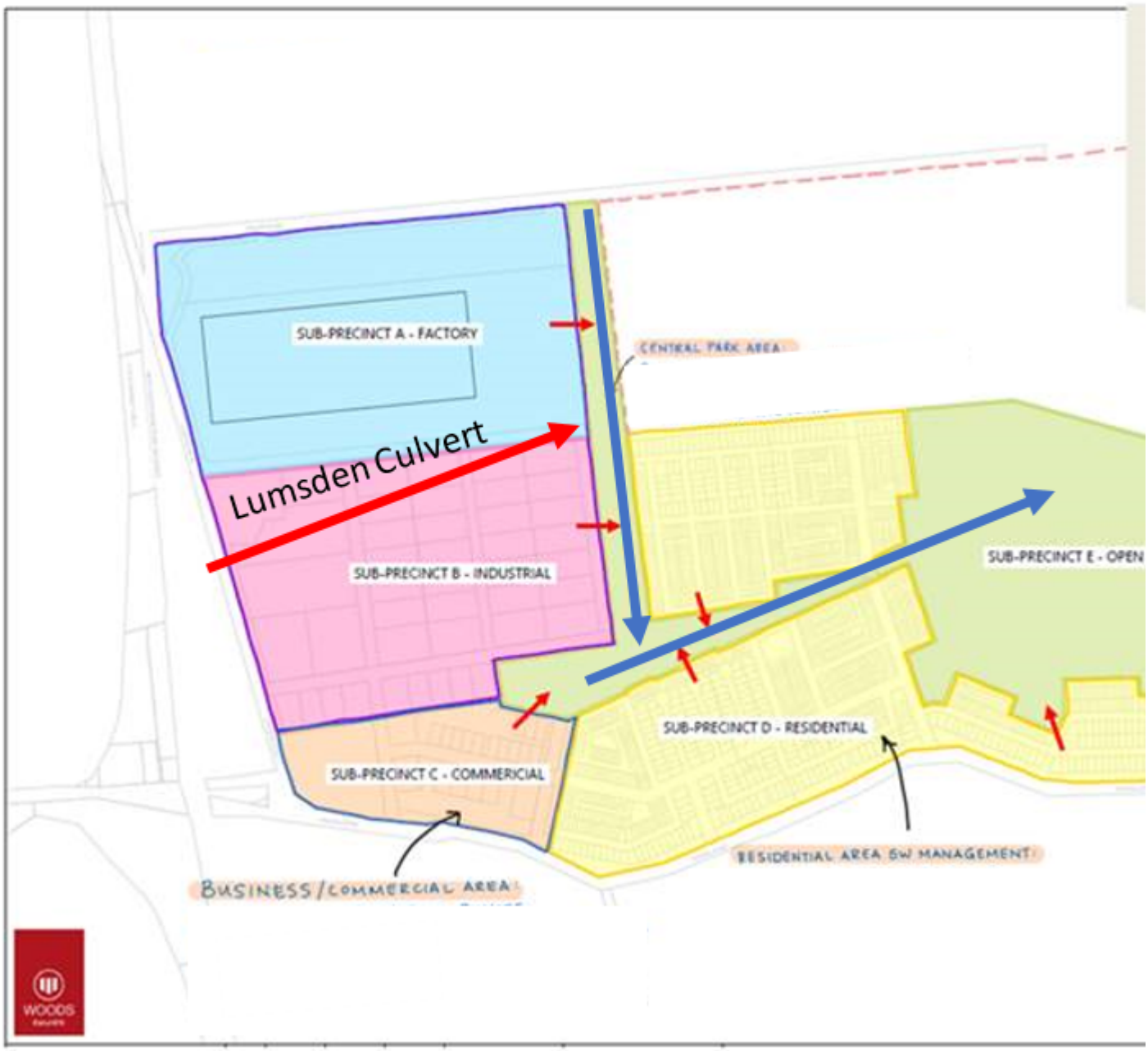
From: Blackburn, Megan
Sent: Monday, February 24, 2020 11:56 AM
To: Ajay Desai
Subject: FW: RE: WDC Review - Sleepyhead Estate - SMP Response

Hi Ajay,

I'm adding more detail to the s42a report and realized the image I sent you last week may not have come through properly.

Please confirm if the image below is correct in terms of flow paths. As I will add it to the report.

Thanks
Megan



From: Blackburn, Megan
Sent: Friday, February 21, 2020 11:58 AM
To: Pranil Wadan <pranil.wadan@woods.co.nz>; Ajay Desai <ajay.desai@woods.co.nz>
Subject: RE: RE: WDC Review - Sleepyhead Estate - SMP Response

Thanks Pranil

From: Pranil Wadan <pranil.wadan@woods.co.nz>
Sent: Friday, February 21, 2020 10:51 AM
To: Ajay Desai <ajay.desai@woods.co.nz>; Blackburn, Megan <Megan.Blackburn@stantec.com>
Subject: Re: RE: WDC Review - Sleepyhead Estate - SMP Response

Hi all,

Minor comments

1 - Lumsden road - existing culvert will be redirected to central park area.

4 - The Tc of 59mins that was used was because we were calculating the WQV for the entire site, The model breaks up the catchment into smaller sub catchments - Hence the approach is different.

WOODS Est.1970

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Health & Safety Quality Environment

Pranil Wadan
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From: Ajay Desai <ajay.desai@woods.co.nz>
Sent: 21 February 2020 10:47
To: Blackburn, Megan <Megan.Blackburn@stantec.com>
Cc: Pranil Wadan <pranil.wadan@woods.co.nz>
Subject: RE: RE: WDC Review - Sleepyhead Estate - SMP Response

Hi Megan,

Please find responses below.

Pranil – would you like to add/correct anything in here.

Ref	Comment	Response
01	Final check that I have understood flows directions. Are flows to the Central Park area intercepted and conveyed to the wetland as I've shown with the Blue arrows in the figure below? Has any decision been made around if flows from the Lumsden Road culvert will be conveyed through the Centre Park area? The design is left to a later stage, just check if space allocated for flows in Central Park Area need to accommodate these flows or not? Pranil may have the answer so copied him in.	Modelling assumes subcatchments loaded to dummy manholes located within the park area. Culvert location has not been decided for Lumsden Road but will eventually discharge to the park area.
02	Point 3 - Displacement volume/ flood storage lost based on flood levels of 5.4mRL as well as 8.0mRL are less than 0.5% when compared to the total storage available within Lake Waikare. Is the 5% based on the values below:	Adding % volume lost below. It's not 5%, its less than 0.5%
03	A simple storage volume-based analysis was completed for Lake Waikare to understand the increase in water level within the Lake Waikare with loss of storage by fill in development area assuming the Lake Waikare gate is closed, i.e. no flows discharging downstream to Lake Whangamarino: • At 5.4mRL the increase in water level is ~0.006mm **(0.0004%)** • At 6.3mRL the increase in water level is ~1.026mm **(0.0577%)** • At 8.0mRL the increase in water level is ~13.03mm **(0.4470%)** Thanks for providing the above figures to get a sense of the impact	A simple storage volume-based analysis was completed for Lake Waikare to understand the increase in water level within the Lake Waikare with loss of storage by fill in development area assuming the Lake Waikare gate is closed, i.e. no flows discharging downstream to Lake Whangamarino: • At 5.4mRL the increase in water level is ~0.006mm (0.0004%) • At 6.3mRL the increase in water level is ~1.026mm (0.0577%) • At 8.0mRL the increase in water level is ~13.03mm (0.4470%) Noting this considers storage within Lake Waikare only, with zero storage within Lake Rotokawau (so the numbers could be slightly on the lower side in reality).
04	To note you have stated time of concentration <10mins. The design team have used a 59min tc. Confirm this with Pranil.	Modelling assumes time of concentration 10mins as a worst-case scenario and would be refined during detail design, this approach can be considered as a conservative approach at this stage.

Regards,
Ajay

Ajay Desai
Stormwater Modeller
ajay.desai@woods.co.nz
woods.co.nz

Appendix B Minutes of Meeting Watercare Services Limited – Waikato and Stantec – 21 February 2020

Meeting Notes

Meeting Title Ambury Properties Ltd and other submitters – Three Waters Matters

Project Name / Proposed Waikato District Plan Rezoning Requests - Ohinewai

Date/Time:	February 21, 2020 / 1.00pm
Place:	Watercare Waikato Pukete Road
Next Meeting:	Next Meeting Date
Attendees:	Sharon Danks (WSL), Richard Pullar (WSL), Stephen Howard (WSL), Jim Bradley (Stantec), Megan Blackburn (Stantec), Paula Hunter (Stantec)
Absentees:	Absentees
Distribution:	Distribution List

Stormwater and Flooding

- WSL have not received both the Stormwater Management Plan and Flood Assessment Report, by WOODS.
- Stantec to confirm with WDC if the reports can be sent to WSL.
- WSL will comment on stormwater aspects once receive the reports.
- Noted that the land subject to the rezoning request is a Rural Drainage Area administered by Waikato Regional Council
- MB - Main considerations of the WOODS reports are the stormwater management plan and flooding concerns/risks. It is noted that Stage 2 of the Proposed Plan, which include flooding, will be addressed at a later stage (Stage2). However, as the Flood Hazard Report was provided it was reviewed at a high level to understand the impacts on properties and flooding risks. Other developments have discussed flooding concerns that have not currently been addressed and will be left to Stage 2 (such as OLL).
- MB – Main areas of concern are the impact on surrounding properties through land infill and the flow paths across the property. While LID approaches are discussed in the report the type of LID devices are not known. The tables providing in the presentation slide with LID ranking is indicative of the general score they want to achieve, APL is not sure of the devices that will be used, even if devices have been mentioned in the report. The land allocated for the devices is the Central Park area in the maps provided. The area labelled Wetland is not a treatment device more maintaining the existing land use.
- WSL – The LID devices selected have different levels of maintenance required. WSL could provide direction on preferred devices for the area based on long term management and do not favour rain gardens.Also maintenance of wetlands can be an issue. If devices are left to residents they may not be properly maintained.
- PH– Device selection is more of a resource consent - engineering code of practice matter rather than a rezoning matter.
- MB – Checking that the space allocated for LID is sufficient and questioning what happens to devices in the flood plain areas, with re-sedimentation.
- Need clarity around areas set aside for flood and stormwater management vs recreation/ open space areas and who is responsible for these WSL or parks and reserves.
- None of the potential costs for WDC associated with this proposal are included in the next LTP.
- Key issues for WSL – maintenance, flood areas and climate proofing.

Water Supply

- WSL have a number of concerns with the GHD Memo 20.02.20.
- WSL confirmed that the option that relies on obtaining water from the Huntly WTP that utilises the remaining capacity is not a viable option. That capacity has been allocated to Ngaruawahia (via new pipeline) and for growth at Huntly.

- In terms of securing additional water from the Waikato River, WSL confirmed that WDC has not yet lodged a resource consent and there are many applications seeking the available allocation already lodged with WDC.
- The water supply for Te Kauwhata is from a take held by the Te Kauwhata Water Association. This consent is due to expire in 2024.
- WSL confirmed that they are developing a strategy for water and wastewater servicing in mid Waikato and this will provide a solution for the servicing of this area, but the infrastructure will not be in place for 5-10 years. This is dependent on obtaining the necessary resource consents. Therefore if APL wants to proceed ahead of these timeframes then it will need to provide an interim solution.
- JB discussed APL's option of trading water permits and acknowledged the commercial sensitivity of this but considered evidence would be required as to the security of the supply especially the volumes secured and when the consents relied on would expire.
- WSL agreed water trading could be an option for APL and agreed that security needed confirming. Also rainwater tank systems could be an interim option for the factory but concerned about this option for residential development.
- WSL highlighted the need to provide for fire fighting for any public supply.
- WSL not in favour of dual water supplies using reclaimed wastewater and / or stormwater.

Wastewater Servicing

- GHD report proposed servicing the APL proposal by pumping the wastewater to the Huntly WWTP and utilising the existing capacity of the plant and the current consent.
- WSL were not opposed to this option as a short term solution but were concerned about the initial small flows to be reticulated to the WWTP and septicity issues. This is based on their experiences in other places and the need to regularly flush the pipes. WSL noted that the Huntly WWTP had issues with suspended solids and there are potential long term issues with the location of the plant and flooding that will need to be addressed.
- In terms of the use of the Te Kauwhata WWTP WSL considered this was not an option due to the current discharge location.
- WSL's strategy for water and wastewater servicing in mid Waikato is considering wastewater options including a new centralised plant.
- WSL noted from their knowledge it would be very difficult to achieve land application in this locality. However, a short term solution of a septic tank for the factory could be an option.
- WSL would prefer a gravity collection system and did not favour low pressure or STEP. There could be an opportunity to use a vacuum system.

Overall comments

Solutions will be available in the longer term. When these will be available will depend on the granting of consents and the development of the required infrastructure. Until these are available APL will need to rely on their own interim solutions.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Paula Hunter

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