

I hereby give notice that a hearing by commissioners will be held on:

Dates:	Monday 24 February 2019
	Wednesday 26 February 2019
	Thursday 27 February 2019
	Friday 28 February 2019
	Wednesday 04 March 2019
	Thursday 05 March 2019
	Friday 06 March 2019
	Monday 09 March 2019
	Wednesday 11 March 2019
	Thursday 12 March 2019
	Friday 13 March 2019
Time:	9.30am
Meeting Room:	Council Chamber
Venue:	Level 3, Henderson Civic Building,
	6 Henderson Valley Road, Auckland

HEARING REPORT (VOLUME ONE)

WOODLANDS PARK ROAD / MANUKA ROAD, WAIMA (TITIRANGI)

WATERCARE SERVICES LTD

COMMISSIONERS

Chairperson Commissioners Philip Brown Hugh Leersnyder Michael Parsonson Juliane Chetham

> Larissa Rew HEARINGS ADVISOR

Note: The reports contained within this document are for consideration and should not be construed as a decision of Council. Should commissioners require further information relating to any reports, please contact the hearings advisor.

WHAT HAPPENS AT A HEARING

At the start of the hearing, the Chairperson will introduce the commissioners and council staff and will briefly outline the procedure. The Chairperson may then call upon the parties present to introduce themselves to the panel. The Chairperson is addressed as Mr Chairman or Madam Chair.

Any party intending to give written or spoken evidence in Māori or speak in sign language should advise the hearings advisor at least five working days before the hearing so that a qualified interpreter can be provided.

Catering is not provided at the hearing. Please note that the hearing may be audio recorded.

Scheduling submitters to be heard

A timetable will be prepared approximately one week before the hearing for all submitters who have returned their hearing attendance form. Please note that during the course of the hearing changing circumstances may mean the proposed timetable is delayed or brought forward. Submitters wishing to be heard are requested to ensure they are available to attend the hearing and present their evidence when required. The hearings advisor will advise submitters of any changes to the timetable at the earliest possible opportunity.

The Hearing Procedure

The usual hearing procedure is:

- The applicant will be called upon to present his/her case. The applicant may be represented by legal counsel or consultants and may call witnesses in support of the application. After the applicant has presented his/her case, members of the hearing panel may ask questions to clarify the information presented.
- The relevant local board may wish to present comments. These comments do not constitute a
 submission however the Local Government Act allows the local board to make the interests and
 preferences of the people in its area known to the hearing panel. If present, the local board will
 speak between the applicant and any submitters.
- Submitters (for and against the application) are then called upon to speak. Submitters may also be represented by legal counsel or consultants and may call witnesses on their behalf. The hearing panel may then question each speaker. The council officer's report will identify any submissions received outside of the submission period. At the hearing, late submitters may be asked to address the panel on why their submission should be accepted. Late submitters can speak only if the hearing panel accepts the late submission.
- Should you wish to present written information (evidence) in support of your application or your submission please ensure you provide the number of copies indicated in the notification letter.
- Only members of the hearing panel can ask questions about submissions or evidence. Attendees may suggest questions for the panel to ask but it does not have to ask them. No cross-examination either by the applicant or by those who have lodged submissions is permitted at the hearing.
- After the applicant and submitters have presented their cases, the chairperson may call upon council officers to comment on any matters of fact or clarification.
- When those who have lodged submissions and wish to be heard have completed their presentations, the applicant or his/her representative has the right to summarise the application and reply to matters raised by submitters. Hearing panel members may further question the applicant at this stage.
- The chairperson then generally closes the hearing and the applicant, submitters and their representatives leave the room. The hearing panel will then deliberate "in committee" and make its decision.
- Decisions are usually available within 15 working days of the hearing.



A NOTIFIED NON-COMPLYING ACTIVITY RESOURCE CONSENT APPLICATION BY WATERCARE SERVICES LTD

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Reporting Officer, Richard Blakey, Reporting Planner

Reporting on an application regional resource consents an a land use consent (NES Soil) for earthworks, vegetation removal and associated activities related to the Huia Replacement Water Treatment Plant. at Woodlands Park Road / Manuka Road, Waima (Titirangi). The reporting officer is recommending, subject to contrary or additional information being received at the hearing, that the application be **CONSENTED** to, subject to certain conditions.

Report on a notified application for resource consents under the Resource Management Act 1991 (RMA)



Non-complying activity

То:	Independent Hearing Commissioners
From:	Richard Blakey – Planning Consultant/Reporting Planner
Hearing date:	24 February 2020

Notes:

- This is not the decision on the application.
- This report sets out the advice and recommendation of the reporting planner.
- This report has yet to be considered by the independent hearing commissioners delegated by the Auckland Council to decide this resource consent application.
- The decision will be made by the independent hearing commissioners only after they have considered the application and submissions and have heard from the applicant, submitters and Council officers.

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Glossary of abbreviations

Term	Meaning	
ACM	Asbestos Containing Material	
AEE	Assessment of Effects on the Environment	
AEMMRP	Adaptive Environmental Monitoring and Management Response Plan	
AMP	Adaptive Management Plan	
AP 2050	Auckland Plan 2050	
ASCNVMP	Activity Specific Construction Noise and Vibration Management Plan	
AUP(OP)	Auckland Unitary Plan (Operative in Part)	
BCG	Biodiversity Collaborative Group	
BOD	Basis of Design	
CIA	Cultural Impact Assessment	
CLG	Community Liaison Group	
CNVMP	Construction Noise and Vibration Management Plan	
Council	Auckland Council	
CTMP	Construction Traffic Management Plan	
CVA	Cultural Values Assessment	
dB	Decibel	
DoC	Department of Conservation	
DSI	Detailed Site Investigation	
DWSNZ	Drinking Water Standards New Zealand 2005 (Revised 2018)	
ECR	Environmental Compensation Ratios	
EMP	Ecological Management Plan	
ESCP	Erosion and Sediment Control Plan	
GD	Guidance Document	
GSMCP	Groundwater and Settlement Monitoring and Contingency Plan	
HAIL	Hazardous Activities and Industries List	
HMP	Herpetofauna Management Plan	
HNZ	Heritage New Zealand Pouhere Taonga Act 2014	
KCZ	Kauri Contamination Zone	
KDMP	Kauri Dieback Management Plan	
LAP	Local Area Plan	
LGA 2009	Local Government (Auckland Council) Act 2009	
MDA	Marshall Day Acoustics	
mgbl	Metres below ground level	
ML	Million Litres	
NES	National Environmental Standard	

NES Soil	National Environmental Standard for Assessing and Managing	
	North Harbour No 2 watermain	
	North Hardour No.2 Watermain	
NPS	National Policy Statement	
NPS-FM	National Policy Statement for Freshwater Management 2014	
OPW	Outline Plan of Works	
PSI	Preliminary Site Investigation	
RMA	Resource Management Act 1991	
RPS	Regional Policy Statement	
SCPA	Sediment Control Protection Area	
SEA	Significant Ecological Area	
SEV	Stream Ecological Value	
SEVP	Stream Ecological Valuation Plan	
SIA	Social Impact Assessment	
SMAF	Stormwater Management Area - Flow	
SMP	Site Management Plan	
SRP	Sediment Retention Pond	
SVR	Site Validation Plan	
Т	Tonnes	
T&T	Tonkin & Taylor Limited	
TPZ	Tree Protection Zone	
Trust	Waima Biodiversity Trust	
USLE	Universal Soil Loss Equation	
WBMP	Waima Biodiversity Management Plan	
WHRRA	Waitakere Ranges Heritage Area Act 2008	
WSL	Watercare Services Limited	
WSMO	Water Supply Management Area Overlay	
WTP	Water Treatment Plant	

1. Application description

1.1 Application and property details

Application number(s):	BUN60339273 (Bundle reference number)
	LUC60339274 (Land use)
	LUS60339442 (Streamworks)
	WAT60339409 (Water permit)
	DIS60339275 (Contaminated land discharge)
	DIS60339441 (Diversion and discharge of stormwater)
Applicant's name:	Watercare Services Limited
Site address:	Woodlands Park Road / Manuka Road, Waima (Titirangi)
	 Designated site located south of Woodlands Park Road and east of Manuka Road (where replacement WTP to be located)
	 Designated site located north of Woodlands Park Road (where Reservoir 1 is to be located)
	 Designated site located south of Woodlands Park Road and west of Manuka Road (existing Huia WTP, and where Reservoir 2 is to be located)
Legal description:	Lot 2 DP 484666 (30.61 ha), Lot 5 DP 156565 (4.01 ha) and Lot 6 DP 156565 (4.20 ha)
NZTM map reference:	1746295E, 5910748N
Lat/Long:	174° 38.5' 36° 56'
Lodgement date:	24 May 2019
Acceptance date:	21 June 2019
Notification date:	5 August 2019
Submission period ended:	2 September 2019
Number of submissions received:	500 (472 in opposition, 20 in support, 8 neutral)

1.2 Auckland Unitary Plan – zones and overlays¹

Designation:	Ref 9324 – Huia and Nihotupu Water Treatment Plants
Zone:	Open Space – Conservation Zone
Overlays:	Site south of Woodlands Park Road and east of Manuka Road:

- Notable Trees Overlay

¹ As affecting the immediate vicinity of the sites

	- Outstanding Natural Landscapes Overlay
	72 and 73 (South Titirangi and Waitakere Ranges)
	- Ridgeline Protection Overlay (Natural)
	- Significant Ecological Areas (Terrestrial)
	- Waitakere Ranges Heritage Area Overlay
	Site located north of Woodlands Park Road:
	- Ridgeline Protection Overlay (Natural)
	- Significant Ecological Areas (Terrestrial)
	- Waitakere Ranges Heritage Area Overlay
	Site located south of Woodlands Park Road and west of Manuka Road
	- Historic Heritage Overlay Extent of Place
	- Significant Ecological Areas (Terrestrial)
	- Waitakere Ranges Heritage Area Overlay
Controls:	Stormwater Management Area Control: Flow 1
	Macroinvertebrate Community Index – Urban
Precincts:	N/a
GIS Hazards:	Overland Flow Paths
	Flood Prone Areas
	Flood Plains
AUP Map:	See Figure 1 below:



Figure 1 – Zone and Designation/Overlay Map (Auckland Unitary Plan)

Location Plan:

See Figure 2 below:



Figure 2 – Location Plan/Aerial Photograph (Auckland Council Geomaps 2017)

1.3 Application documents

The application is supported by an Assessment of Environmental Effects report, titled "*Huia Replacement Water Treatment Plant (WTP) Project*", prepared by Tonkin & Taylor Ltd ("T&T"), dated July 2019 Version V1 ("AEE").

The AEE is supported by the following documents and reports:

- Appendix A: Records of Title;
- Appendix B: Legal advice regarding resource consent and OPW process, prepared by Simpson Grierson, dated 22 May 2019;
- Appendix C: WTP Reservoirs Site Layout Development Report, prepared by GHD Ltd, dated May 2019;
- Appendix D: Reservoirs storage, location and layout assessment, prepared by Beca Ltd, dated 22 May 2019;
- Appendix E: Indicative design drawings, prepared by GHD Ltd, dated May 2019 (Rev 2);
- Appendix F: Indicative Construction Methodology Report, prepared by Alta, dated 23 May 2019 (Rev 5);
- Appendix G: Stormwater and Erosion and Sediment Control Report, prepared by Cook Costello, dated May 2019, Ref 14191;
- Appendix H: Groundwater and Settlement Report, prepared by T&T, dated 24 May 2019, Ref 30848.2000;

- Appendix I: Preliminary Land Stability Assessment, prepared by T&T, dated 24 May 2019, Ref 30848.2000;
- Appendix J: Preliminary Site Investigation, prepared by T&T, dated July/August 2019 (Version 1.1), Ref 30848.2000;
- Appendix K: Site Management Plan for Ground Contamination, prepared by T&T, dated May 2019, Ref 30848.2000v2;
- Appendix L: Ecological Assessment, prepared by Boffa Miskell Ltd, dated 26 July 2019;
- Appendix M: Traffic and Transport Assessment, prepared by CH2M Beca Ltd, dated 10 July 2019 (Rev 3.0);
- Appendix N: Construction Noise and Vibration Assessment, prepared by Marshall Day Acoustics, dated 20 May 2019 (Rev 3);
- Appendix O: Permitted activity standards assessment, prepared by T&T, dated May 2019, Ref 30848.2000;
- Appendix P: Objectives and policies assessment, prepared by T&T, dated May 2019, Ref 30848.2000;
- Appendix Q: Proposed draft consent conditions, prepared by T&T, dated May 2019, Ref 30848.2000; and
- Appendix R: Draft Deed of Trust for the Waima Biodiversity Trust, prepared by Simpson Grierson, dated 23 May 2019.

The application materials are provided at **Attachment 1** to this report.²

1.4 Adequacy of information

The information submitted by the applicant is sufficient to enable the consideration of the following matters on a reasonably informed basis:

- The nature and scope of the proposed activity that the applicant is seeking resource consent(s) for;
- The extent and scale of the actual and potential effects on the environment;
- Those persons and / or customary rights holders who may be adversely affected; and
- The requirements of the relevant legislation.

Notwithstanding the above, a number of matters were identified by Auckland Council ("Council") specialists for which further information was required, and this was set out in a letter issued under s92 of the RMA on 25 July 2019 (**Attachment 2**).

On 15 August 2019, a response to the s92 request was received from the applicant, comprised of the following:

- A covering letter prepared by T&T, dated 13 August 2019;
- Appendix A Stormwater Response, prepared by Cook Costello, dated 9 August 2019;
- Appendix B Groundwater and Earthworks Response, prepared by T&T, dated 13 August 2019;
- Appendix C Ecology Response, being a memorandum from the applicant's counsel regarding the Trust Deed dated 31 July 2019 and a memorandum from Boffa Miskell Ltd, dated 9 August 2019;

² This includes Appendix K (Site Management Plan) which was omitted from the notification documents, and is referred to at sections 4.3(g) and 9.4.7 of this report.

- Appendix D Arborist Response, prepared by GreensceneNZ Ltd, dated 9 August 2019; and
- Appendix E Transport Response, prepared by CH2M Beca Ltd, dated 9 August 2019.

In addition, an updated PSI (Appendix J, September 2019) was provided on 27 September 2019.

This information is included within Attachment 2 to this report.

Following the receipt and review of submissions, a number of further matters were identified by Council specialists for which further information was required, and this was set out in a second s92 letter dated 27 September 2019 (**Attachment 3**).

On 8 November 2019, a response to the second s92 request was received from the applicant, comprised of the following:

- A covering letter prepared by T&T, dated 8 November 2019;
- Attachment A Regional stormwater and earthworks response, prepared by Cook Costello, dated 8 November 2019 (a further component to the response in the form of 'USLE' calculations was provided on 2 December 2019);
- Attachment B Streamworks, terrestrial ecology and kauri dieback response, prepared by Boffa Miskell Ltd, dated 20 October 2019 (a further component to the streamworks aspect of the response was provided by way of an Addendum to the Stream Ecological Value Plan, dated 26 November 2019);
- Attachment C Transportation response, prepared by CH2M Beca Ltd, dated 4 November 2019;
- Attachment D Road stability response, prepared by T&T, dated 8 November 2019; and
- Attachment E Social Impact Assessment response, prepared by Beca, dated 8 November 2019.

This information is included within Attachment 3 to this report.

Notwithstanding the provision of the above information in response to two s92 requests, some additional matters have been identified throughout this report as likely to benefit from further clarification, and these have been summarised at section 18. In particular, the 8 November 2019 s92 response also advises of various information items that will be provided "at the hearing", including various management plans. It also indicated that an updated set of conditions would be provided "shortly", but subsequent advice from the applicant's agent was that such a document was no longer proposed to be provided as part of the s92 response.

1.5 Report and assessment methodology

The application is detailed and comprehensive and includes a number of expert assessments. Accordingly, no undue repetition of descriptions or assessments from the application is made in this report, in accordance with s42A(1A) of the Resource Management Act 1991 ("RMA"), except as necessary to provide a reasonable understanding of the relevant matters or to provide relevant assessments with which I agree.

I have made a separate and independent assessment of the proposal, with reference to the review of technical aspects by independent experts engaged by the Council, as needed and as relevant.

Where there is agreement on any descriptions or assessments in the application material or the advice of the Council's specialists, this is identified in this report.

Where professional opinions differ, or extra assessment and / or consideration is needed for any reason, the relevant points of difference of approach, assessment, or conclusions are detailed. The implications for any professional difference in findings in the overall recommendation is also provided.

The assessment in this report relies on, and/or has regard to, the following specialist reviews (listed in order of the relevant effects topics at section 9.4 and 11 of this report):

- Streamworks and Earthworks Review, prepared by Carl Tutt, Ecologist (Auckland Council), dated 10 December 2019;
- Terrestrial Ecology and Arboricultural Review, prepared by Carol Berquist, Senior Ecologist NW (Auckland Council), dated 20 November 2019;
- Kauri Dieback Review, prepared by Murray Fea, Senior Adviser, Kauri Dieback (Auckland Council), dated 29 November 2019;
- Development Engineering Review, prepared by Irshaad Chawdhary, dated 15 November 2019;
- Contamination Review, prepared by Sharon Tang, Senior Specialist (Auckland Council), dated 24 October 2019;
- Geotechnical (Groundwater Diversion) Review, prepared by Sian France (Beca), dated 14 November 2019;
- Regional Stormwater Review prepared by Hillary Johnston (Tektus Consultants Ltd), dated 29 November 2019;
- Transportation Reviews, prepared by Mat Collins (Flow Transportation), dated 9 December 2019, and Anatole Sergejew (Traffic Planning Consultants Ltd), dated 29 November 2019;
- Noise and Vibration Review, prepared by Andrew Gordon (Auckland Council), dated 29 November 2019; and
- Ecological Compensation Review, prepared by Graham Ussher (RMA Ecology), dated 12 December 2019.

These specialist reviews are included in Attachment 4 to this report.

This report is prepared by:

Richard Blakey Planning Consultant

13 January 2020

Signed:

Date:

Signed:

Date:

Application No. BUN60339273

Reviewed and approved for release by:

Principal Project Lead, Premium Resource Consents

Tracey Grant

22 January 2020

2. Executive summary

Watercare Services Limited ("WSL") has applied to the Council for regional resource consents and a land use consent under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 ("NES Soil") for enabling earthworks, vegetation removal and associated activities related to the Huia Replacement Water Treatment Plant ("WTP") project. The application relates to three sites owned by Watercare as follows: the Replacement WTP site on the corner of Manuka Road and Woodlands Park Road; a new reservoir located on the northern side of Woodlands Park Road (Reservoir 1); and the existing Huia WTP site (where a second 25 ML reservoir is to be located once the existing Huia WTP has been decommissioned). The application also includes enabling earthworks to provide for the North Harbour 2 watermain valve chamber and tunnelling reception shaft within the Reservoir 1 site.

The proposal involves earthworks and vegetation removal, including in a Significant Ecological Area ("SEA") overlay, as applied under the Auckland Unitary Plan (Operative in Part) ("AUP(OP)"), and stream works including the reclamation and diversion of a small length of intermittent stream. Resource consents are also sought for the diversion and discharge of groundwater and stormwater, and the disturbance of potentially contaminated land. The application requires assessment overall as a non-complying activity.

The land on which the WTP and reservoirs are located is designated under the AUP(OP) for 'Water supply purposes – water treatment plants and associated structures' (designation reference 9324 – Huia and Nihotupu Water Treatment Plants). Works undertaken in accordance with this designation do not require a land use consent (other than in respect of the NES Soil). Therefore land use activities, including the construction of the replacement WTP and reservoirs and associated traffic and noise effects (albeit with some cross-over with regional works), do not form part of this application, and instead will be addressed through the Outline Plan of Works ("OPW") that Watercare has submitted to the Council as required under s176A of the RMA in relation to its designation.

A total of 500 submissions have been received in response to public notification of the application, the overwhelming majority of which are opposed to the proposal, primarily focused on effects associated with the removal of regenerating bush and ecological effects generally, impacts on the control of kauri dieback and impacts on the local roading network from construction traffic.

On the basis of a review of the application materials, the submissions and the expert assessments provided by Council technical specialists, it is considered that the application will have more than minor adverse effects on the environment, particularly in respect of effects on terrestrial ecology. However, and having regard to measures to mitigate those effects, including the imposition of appropriate conditions, and the ecological compensation proposed by the applicant, the proposal is also considered, in overall terms, to be consistent with, and not contrary to, the relevant statutory documents, including the AUP(OP) and the Regional Policy Statement ("RPS"). The proposal is also considered to be reasonably aligned with most of the various non-statutory strategic policy documents of relevance to the proposal.

As such, it is recommended that consent is approved, subject to conditions.

Should the hearing commissioners decide, after reviewing the information provided and hearing the evidence to be presented at the hearing, that consent can be granted, draft

conditions of consent have been prepared which reflect the assessments provided in this report, and which are recommended to be imposed as part of any such decision, subject to any amendments that may be proposed by the parties and such further amendments that the hearing commissioners may deem necessary. The recommended conditions are based initially on those provided with the application documents (at Appendix Q) but amended and expanded upon as a result of the detailed specialist assessments prepared on behalf of the Council.

3. Site and locality description

3.1 Introduction

The applicant's agents, T&T, have provided a detailed description of the Project site and surrounding environment within the AEE.³ I generally concur with the description provided therein, but provide the following summary and additional comments and information where applicable.

3.2 Site description

3.2.1 General description

The replacement Huia WTP site is located on land owned by WSL and which is designated for 'Water Supply purposes – water treatment plants and associated structures' at 'Woodlands Park Road, Manuka Road and Exhibition Drive, Titirangi' (designation reference 9324 – Huia and Nihotupu Water Treatment Plants). This is a roll-over designation that was previously included in the legacy District Plan (Waitakere Section) (reference WSL4).⁴

The designation encompasses three sites, collectively described as the "Project site", and the overall WTP scheme spans each of these sites. It is subject to three conditions under the aforementioned designation – conditions 2 and 3 relate to the requirement for appropriate sedimentation and erosion control measures and the protection of those structures identified in the AUP(OP) Schedule of Significant Historic Heritage Places.

Condition 1 of the designation states:

To ensure that section 176A 3(f) of the Act has been adequately addressed, an outline plan shall include, as appropriate: a. a statement on the relevant Plan objectives, policies and rules; and b. a statement on any adverse effects the works will have on the environment and the mitigation measures to be carried out.

It includes the following Explanation:

While it is accepted that the project or works will be (or should be) in accordance with the designated purpose, the Council wishes to be reasonably assured that the specific works to be carried out will not unnecessarily compromise the objectives, policies and rules of the Plan or adversely affect the environment. The Council's principal opportunity to influence the works to assist the requiring authority to meet its environmental

³ Dated 22 July 2019, as contained in the notification documents.

⁴ The decision of the High Court in *Titirangi Protection Group* (refer section 9.3 of this report) notes that Designation 9324 is largely in the same terms as Designation WSL4, except that the earlier designation did not include the words "and associated structures".

responsibilities is through the outline plan, and the assessment of compliance and effects will assist it in determining whether to request changes.

Further reference to the OPW process is contained in sections 5.1.1 and 9.4.1 of this report.

A copy of the designation, from Chapter K (Designations) of the AUP(OP), is attached to this report as **Attachment 5**.

The individual sites are described further as follows (including with reference to the descriptions contained in the applicant's Ecological Assessment report prepared by Boffa Miskell):

Replacement WTP site

• The site located south of Woodlands Park Road and east of Manuka Road has a total area of approximately 4.2 ha. This site is undeveloped and slopes gently from the Woodlands Park Road boundary to the south, with gullies adjacent to the southern boundary running generally north to south. A section of the Yorke Gully Stream traverses the south-eastern part of the site and a small tributary of the Armstrong Gully Stream is located to the north-western corner. The eastern extent of the site features steep slopes which rise up towards Scenic Drive.

The works associated with the replacement Huia WTP are approximately 2.7 ha in area, approximately 2.2 ha of which will form the permanent plant footprint.

Reservoir 1 site

• The site located north of Woodlands Park Road has a total site area of approximately 6.4 ha. Structures within this site are currently limited to a small process tank and associated pipework (which will be decommissioned and removed as part of the Project works). This site is described by Boffa Miskell as relatively hummocky, with a knoll located in the middle of the site near the southern boundary, and a small gully feature (Armstrong Gully) runs through it. The site features extremely steep slopes along the northern boundary beneath and above Exhibition Drive. A permanent section of the Armstrong Gully stream is located to the west of proposed Reservoir.

The works associated with the NH2 shaft and Reservoir 1 are approximately 0.8 ha in area.

Reservoir 2 site

• The site located south of Woodlands Park Road and west of Manuka Road (currently occupied by the existing Huia WTP) has a total area of approximately 4.0 ha. This site has been operated as a WTP for the last 90 years, and incorporates associated buildings, hardstand areas as well as a discharge attenuation basin. The site has a generally moderate to steep slope towards the south, with very steep slopes along the southern and eastern boundaries. The Armstrong Gully watercourses are piped beneath the centre of the site, discharging into an open channel near the southern boundary. A small tributary of the Armstrong Gully stream extends from the replacement WTP site into the north-eastern corner of the site.

Within this site, the Project works associated with Reservoir 2 are approximately 0.8 ha in area.

It is noted that almost all of the Replacement WTP and Reservoir 1 and half of the Reservoir 2 sites are almost completely covered in native bush, with the remainder of the Reservoir 2 site developed as part of the existing Huia WTP. The Project site is identified as being within and part of the extensive Significant Ecological Area ('SEA_T_5539', having an area of 24,000 ha) identified under the AUP(OP) which extends across the entire Waitakere Ranges. Schedule 3 of the AUP(OP) advises that SEA_T_5539 meets all five of the relevant criteria for inclusion in the SEA schedule. These are referenced at Policy B7.2.2(1) of the RPS, as follows:

- (a) representativeness;
- (b) stepping stones, migration pathways and buffers;
- (c) threat status and rarity;
- (d) uniqueness or distinctiveness; and
- (e) diversity.

A scheduled kauri tree (reference 2175 under the Council's Cultural Heritage Index) is located in the northwest corner of the replacement WTP site (and sits outside the proposed works area).

The review by the Council's ecologist, Dr Carol Bergquist, also notes in her description of the site that "[a]lthough modified by resource exploitation and human settlement, the ecosystems of the Waitakere Ranges Heritage Area are nationally significant as one of the largest areas of coastal and lowland forest with intact sequences remaining in the Auckland region".⁵ The review by Dr Graham Ussher observes that the age of forest within the Project site appears to be approximately 70 years old based on aerial photos, although there are mature kahikatea scattered across parts of the footprint with trunk diameters that equate to trees aged 80 -120 years old. Other large specimen trees of broadleaved and podocarp species also occur through areas of regenerating forest and may be of similar age (100+ years).⁶

Further particulars regarding the Project site, in terms of its topography, geology and groundwater, hydrology, freshwater and terrestrial ecology and ground contamination can be found at sections 3.3-3.8 of the AEE.

The records of title for the Project site (Appendix A to the application) identifies that it is subject to a caveat imposed by the former Auckland Regional Council (reference C582941.4, 1994) and a building line restriction (reference A450306, 1970). The former prevents any memorandum of transfer or other instruments affecting the land parcel. The latter requires that no new buildings shall be built on Lot 1 within 49.5 feet (15m) of the middle line of Huia Road and so does not affect the proposal.⁷

3.3 Surrounding locality

The Project site is located approximately 1km from Titirangi Village (to the east) and approximately 1.5km to the north of the closest reach of the Manukau Harbour. The Project site is surrounded predominantly by residential zones, other than to the south-east where the

⁵ Bergquist, memorandum dated 20 November 2019, at 2.1

⁶ Ussher, memorandum dated 12 December 2019, at 3

⁷ This is a carry-over from a much earlier subdivision along Huia Road. WSL has nevertheless commenced a process to have it removed from the subject title(s).

proposed WTP site adjoins Open Space zoned land, and which is designated by the Council for Regional Park purposes.

There are five residential sites adjoining the proposed WTP southern boundary (12 - 20 Manuka Road), 14 properties located on the ridge at an elevation well above the Reservoir 1 site (64, 90A, 90B, 94 – 120 Scenic Drive), and 12 immediately neighbouring properties directly to the south of the existing WTP site (13 Manuka Road, 11, 15 and 17 Taraire Road, 4-16 Ngaio Road and 80 Woodlands Park Road). The Nihotupu Filter Station is located further to the east along Woodlands Park Road, near the intersection with Scenic Drive.

4. Proposal description

4.1 Overview

The applicant's agents have provided a detailed description of the proposal within the AEE report. I generally concur with the description provided therein but provide the following summary and additional comments and information where applicable.

WSL proposes to construct a WTP on the corner of Manuka Road and Woodlands Park Road (the Replacement WTP site) to replace the existing Huia WTP. The replacement WTP will have a maximum production capacity of 140 ML/day. The improved water treatment process will also provide a more effective form of treatment for the raw water received from the Waitakere Ranges catchment, ensuring ongoing compliance with the New Zealand Drinking Water Standard ("NZDWS"). Two new treated water reservoirs (50ML total capacity) will also be constructed:

- Reservoir 1 will be located on the northern side of Woodlands Park Road, and except for its eastern extent will be completely buried below ground level; and
- Reservoir 2 will be constructed on the existing Huia WTP site once the existing plant has been decommissioned. The proposed works also include construction of the NH2 watermain valve chamber and tunneling reception shaft within the Reservoir 1 site.

The Project works area is approximately 4.3 ha across the three sites within a total combined site area of 15 ha. A construction footprint has been established as set out in **Figure 3** below. The AEE advises that this represents the minimum footprint required to construct and operate a WTP scheme developed in accordance with the Basis of Design, which balances ecological and constructability constraints and maintains an acceptable level of operational flexibility. It also represents the maximum envelope in terms of the vegetation removal and earthworks sought through this application.



Figure 3 – Construction Footprints (source: Figure 4.1 of AEE)

The AEE states that the replacement WTP and reservoirs have a functional and operational need to be located at a particular elevation and in proximity to existing (and proposed) infrastructure. In this respect it notes that the proposed site is located at a good elevation with minimal pumping requirements which increases overall system efficiency and resilience. It is also located in close proximity to the existing raw water network and to the existing and future treated water network, including the designated route for the future NH2 watermain duplication. A detailed consideration of alternative locations and sites is set out in sections 5.4 and 5.5 of the AEE.

In this regard it is also relevant to note that raw water to the replacement WTP will be supplied from the existing Huia raw water sources, being the four dams that are located further to the west and south-west of the replacement WTP. The catchments surrounding the dams are almost fully vegetated in native bush. The Water Supply Management Area Overlay ("WSMO") in the AUP(OP) provides for the protection of the water catchments that supply the freshwater to Auckland municipal water supply dams. The Waitākere WSMO forms part of the wider Waitākere Ranges Heritage Area. One of the heritage features recognised by the Waitākere Ranges Heritage Area Act 2008 is the operation, maintenance and development of the public water catchment and supply system that services the needs of the people of Auckland.

An overview of the various particulars associated with the Project works are set out at sections 4.2 - 4.9 of the AEE, under the following topic headings:

- Vegetation alteration and removal;
- Earthworks associated with the following activities:
 - Construction establishment, including diversion of existing services and establishment of laydown areas, site access and haul roads;
 - Establishment of erosion and sediment controls including clean water diversions;
 - Bulk earthworks and placement of fill material;
 - Construction of retaining walls and slope stabilisation; and
 - Construction of the NH2 watermain tunnel shaft and valve chamber on the reservoir site,
- Creation of a stream diversion channel around the perimeter of the WTP works;

- Construction of the reception shaft to provide for a connection to the new raw water intake tunnel on the replacement WTP site;
- Construction of a new inlet structure in the form of a wing wall in the eastern embankment of the existing off-specification discharge lagoon on the existing WTP site.
- Installation of underground pipework between the replacement WTP site, the reservoir site and the existing Huia WTP site;
- Temporary diversion and damming of surface water and the discharge of treated sediment laden water associated with earthworks;
- Disturbance of a small area of potentially contaminated soil;
- Stream works including diversion and reclamation works in the Yorke Gully Stream, and the establishment of erosion and scour protection;
- Groundwater diversion and dewatering on the reservoir site; and
- Diversion and discharge of stormwater.

Details of environmental management and mitigation measures are set out in section 7 of the AEE. These include an outline of proposed tree protection controls, kauri dieback hygiene protocols, erosion and sediment control, dust control, contaminated land management, construction noise and traffic management, and ecological mitigation and compensation.

While most of these mitigation measures represent those environmental management aspects that would be anticipated with construction works generally, and those within sensitive ecological areas particularly, the latter aspect relating to ecological compensation is reasonably unique. The AEE describes the overall intent of these measures as follows:

The layout optimisation approach undertaken as part of the onsite alternatives focused on avoiding as far as practicable effects on the values of the SEA and the streams and otherwise minimising and mitigating adverse effects. However this has had to be undertaken within the constraints posed by locating a WTP scheme and reservoirs on the sites which means complete avoidance is not practicable.

Therefore a key part of the Project works is a comprehensive mitigation and biodiversity compensation package, which comprises specific ecological management and protocols and stream diversion, including protection and enhancement of the remaining 11ha of vegetation within the Project site outside the development area. In addition, the AEE advises that:

Watercare also proposes to implement a comprehensive ecological compensation package – the Waima Biodiversity Management Plan (WBMP) - over a 990 ha area within the Little Muddy Creek catchment, approximately 720 ha of which is bush-covered and classified as SEA in the AUP (refer Figure 4.7 below). This is to be administered through a charitable trust with trustee representatives from Watercare, Auckland Council, the CLG, Mana Wheuna, a local community-led conservation project and an independent trustee.

The WBMP has the objectives of coordinating and increasing conservation efforts within the Waima catchment, repairing and strengthening connective linkages throughout the catchment through promoting natural forest regeneration, improving the health and resilience of remnant kauri forest, increasing community-wide engagement in stewardship and sustainable environmental management of the catchment, and undertaking biodiversity monitoring. Through the proposed conditions of consent, Watercare is required to provide a lump sum of \$5,000,000 to the Trust to implement and achieve the targets set out in the WBMP.

This aspect is discussed in further detail as part of the s104(1)(ab) assessment at section 11 of this report.

4.2 Consultation

Section 9 of the AEE provides an overview of the consultation undertaken with respect to the community and a number of organisations. It advises that:

Watercare has undertaken early stakeholder engagement with the local community, including through the input of a focus group in the early stages of the site selection process, along with public meetings further on in this process. Following the adoption of the preferred site by the Watercare Board, a Community Liaison Group (CLG) was formed. Public open days were held to keep the public informed and to provide opportunities for input into management and mitigation measures to address potential adverse effects. Engagement with Mana Whenua and a range of stakeholder and interest groups has also been undertaken.

A summary of consultation undertaken to date is provided in the following sections. There is a high level of community and stakeholder interest in this project which is expected to continue through until commissioning and beyond. Acknowledging this, engagement and consultation will continue during the design, consenting and construction phases of the project and is anticipated through the proposed conditions of consent which include the requirement for a CLG.

The discussion in this section of the AEE describes the consultation objectives, methods, initial design work, establishment of the Community Liaison Group ("CLG"), consultation with Mana Whenua, immediate neighbours, the Council and Auckland Transport and the Department of Consultation, and publicity methods.

I note that details in this regard, including CLG meeting minutes and project newsletters, can be viewed on the WSL website.⁸

In this regard, I consider that WSL have carried out detailed and extensive consultation in respect of the requirements of clause 1(f) of Schedule 4 of the RMA ("identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted"). I note that clause 3 clarifies that, in requiring an applicant to report on the outcomes of consultation, clause 1(f) does not "oblige the applicant to consult any person". However, it is generally accepted that it is good practice to seek consultation with affected parties as the quality of an application can be significantly informed by information and opinions provided through consultation, and I consider that the application has benefitted from the consultation that the applicant has undertaken in this case.

4.3 Proposed conditions of consent

Appendix Q to the AEE sets out a draft set of consent conditions which draw together the various mitigation measures and management plans recommended in the specialist reports provided with the application and in the assessment of effects in the AEE. They have also been considered by the Council's specialists in their review of the proposal and the consideration of



⁸ https://www.watercare.co.nz/About-us/Projects-around-Auckland/Huia-water-treatment-plant-replacement-Manuka-Ro

the adequacy or otherwise of the various mitigation measures. Section 8.1.3 of the AEE summarises the measures and intent of the proposed conditions as follows:

- (a) The establishment, administrative support of and consultation with a community liaison group comprised of representatives of the local community (i.e. the CLG).
- (b) The preparation and implementation of an Ecological Management Plan ("EMP"), that includes construction management protocols to protect retained vegetation from accidental encroachment and damage, a kauri dieback protocol, management measures for bat, lizards and birds, and a Revegetation Plan for the balance area of the Project Site.
- (c) The preparation and implementation of a Stream Design Plan, that includes design details (including long- and cross-sections) for the stream diversion channel, demonstration that the stream diversion will maintain or improve the existing Stream Ecological Valuation ("SEV") attributes of the stream to be removed, design details for instream protection works required to address erosion and scour resulting from the stream diversion or stormwater discharges, and a Riparian Planting Plan.
- (d) The preparation and implementation of the aforementioned Waima Biodiversity Management Plan ("WBMP"), that has the objectives of coordinating and increasing conservation efforts within the Waima catchment, repairing and strengthening connective linkages throughout the catchment through promoting natural forest regeneration, improving the health and resilience of remnant kauri forest, increasing community-wide engagement in stewardship and sustainable environmental management of the catchment, and undertaking biodiversity monitoring.
- (e) The establishment of a charitable trust, the Waima Biodiversity Trust ("Trust") that has the purpose of mitigating or compensating for residual adverse ecological effects of the Project. The Trust Deed must establish an accountable administrative structure committed to implementing the projects and achieving the targets set out in the WBMP, provide a mechanism for achieving the objectives of the WBMP, setting priorities and allocating funding for projects, and providing measurable targets that the Trust is required to meet. Watercare is required to provide a lump sum of \$5m to the Trust.
- (f) The preparation and implementation of an Erosion and Sediment Control Plan, that is generally in accordance with the draft Stormwater and Erosion and Sediment Control Report included as Appendix G to the application.
- (g) The works to be undertaken in accordance with the Site Management Plan ("SMP"), which includes undertaking pre-works contamination testing to establish actual contamination concentrations (if any). The SMP will be updated to reflect the findings of soil sampling if required.
- (h) The preparation and implementation of a Groundwater Settlement and Monitoring Contingency Plan that includes monitoring and alert and alarm trigger levels for groundwater and ground surface settlement.

- (i) Detailed design, including drawings, specification, design report and calculations for the stormwater management devices, and preparation and implementation a Stormwater Operation and Maintenance Plan that includes details of maintenance and inspections.
- (j) The preparation and implementation of a Construction Traffic Management Plan ("CTMP") that is generally in accordance with the draft CTMP included as Appendix M to the application. The CTMP will include the required traffic management measures, site access points and heavy vehicle routes, vehicle movement restrictions, and pavement monitoring and remediation.
- (k) Preparation of a Pavement Impact Assessment, with the scope and extent of the assessment agreed with Auckland Transport.
- (I) The preparation and implementation of a Construction Noise and Vibration Management Plan that includes management and mitigation options, methods and frequency of monitoring and reporting, and a protocol for communication, consultation and complaints response.

The applicant's s92 response of 8 November 2019 noted that an amended and updated list of conditions was to be prepared in order to respond to some of the points raised in submissions (including condition amendments sought by Forest & Bird, 5032, and the Department of Conservation, 5287) and to reflect updates following matters raised in the Council's second s92 request. Subsequent advice was received that such an updated set of conditions would not be provided until the hearing. It is anticipated that any further condition proposals from the applicant will be in the form of requested amendments to those attached to this report.

Further discussion with respect to conditions in respect of the overall recommendation of this report is set out in section 14.2 of this report.

5. Reasons for the application

5.1 Consents required

5.1.1 Consents under the AUP(OP)

Regional resource consents are required for the works under the AUP(OP), as set out at section 6.2 of the AEE. I have reviewed the reasons set out therein, and generally agree with them. As part of the review by Hilary Johnston (Tektus Consultants), it was identified that consents were also required under E8.4.1 (A10) (diversion and discharge of stormwater) and E10.4.1 (A4) (new impervious areas within a SMAF).

Resource consents are needed for the following reasons in terms of s15 of the RMA and the AUP(OP):

Stream diversion/replacement

(a) The diversion of an intermittent section of the Yorke Gully Stream is required to enable construction of the WTP. Under E3.4.1 (A19), the diversion of a river or stream to a new course and associated disturbance and sediment discharge in a SEA is a <u>non-complying</u> <u>activity</u>.

- (b) Erosion control structures such as riprap or concrete baffle block may be required in Yorke Gully Stream to protect the stream from scour associated with the stormwater discharge. Erosion protection is also proposed as part of environmental compensation in the Stream Ecological Valuation Plan ("SEVP") to address existing erosion issues. Under E3.4.1 (A34), erosion control structures less than 30m in length when measured parallel to the direction of water flow complying with the standards in E3.6.1.14, are a <u>discretionary activity</u> in a SEA.
- (c) The location of the replacement WTP site encompasses a small reach of the Yorke Gully Stream classified as an intermittent stream (this section of stream is located towards the centre of the site and the AEE notes that these works cannot therefore be avoided). Under E3.4.1 (A49), new reclamation or drainage, including filling over a piped stream in a SEA, is a <u>non-complying activity</u>.

Groundwater

- (d) There are two groundwater systems present within the Project Site, one shallower groundwater table at approximately 6 metres below ground level ("mbgl") and a deeper groundwater system at 9 mbgl. Groundwater will therefore need to be managed during excavation works on the Reservoir 1 site. The proposed works cannot meet permitted activity standard E7.6.1.6 (3) as the water take will occur for a period of more than 30 days, and so requires consent under E7.4.1 (A20) as a <u>restricted discretionary activity</u>.
- (e) The proposed excavation as part of the construction works on the Reservoir 1 site will result in the permanent diversion of groundwater, which does not meet the permitted activity standard E7.6.1.10(2), as the excavations will extend more than 6m below ground in some places over an area greater than 1ha which is not a specifically listed activity. Pursuant to E7.4.1 (A28), consent is required as a <u>restricted discretionary activity</u>.

Impervious areas

- (f) The proposal involves the development of approximately 28,430m² (2.84 ha) of impervious area, and stormwater from this area will be discharged to the Yorke Gully Stream (to maintain hydraulic neutrality) and the existing off-spec discharge lagoon (from where it is discharged to Armstrong Gully). Under E8.4.1 (A10), the diversion and discharge of stormwater runoff from impervious areas over 5,000m² outside an urban area is a <u>discretionary activity</u>.
- (g) The proposal involves the development of approximately 28,430m² (2.84 ha) of impervious area within a SMAF 1 overlay and does not comply with the restricted discretionary activity standards in E10.6.1 and requires consent as a <u>discretionary</u> <u>activity</u> under E10.4.1 (A3).

Vegetation removal

(h) The proposal involves vegetation removal on both the reservoir site and the replacement WTP site will include trees over 6m in height and 600mm in girth. Vegetation removal will also result in the removal of more than 20m² of vegetation within a SEA. Therefore, the proposed works cannot comply with conditions (1) and (2) of the permitted activity standard E26.3.5.2 and consent is therefore required under E26.3.3 (A77) as a <u>restricted</u> <u>discretionary activity</u>.

Earthworks

- (i) The proposal involves earthworks for infrastructure that exceed 2,500m² (other than for maintenance, repair, renewal or minor infrastructure upgrading), on a slope that is greater than 10 degrees and within the Sediment Control Protection Area ("SCPA") and within a SEA, and therefore requires consent under E26.5.3 (A106) and (A107) as a restricted discretionary activity (the total area is 44,800m²).⁹
- (j) The proposal involves earthworks for infrastructure of 35,000m²/118,000m³ within the SEA Overlay¹⁰ which exceeds 2,500m² and 2,500m³, and therefore requires consent under E26.6.3 (A118) as a <u>discretionary activity</u>.

Contamination

(k) The volume of soil disturbed on the site will exceed 200m³ and therefore the proposed disturbance exceeds permitted activity standard E30.6.1.2 and does not meet controlled activity standard E30.6.2.1, and so requires consent under E30.4.1 (A7) as a discretionary activity. The AEE notes that "in the absence of a DSI [Detailed Site Investigation] this is a very conservative approach which assumes environmental contaminants may be present".

It is noted that land use activities (under s9 of the RMA) are not part of the application because the land is subject to a designation for "water supply purposes". Accordingly, and as set out in the letter from Simpson Grierson dated 13 May 2019, all environmental effects arising from land use -related matters, such as the design and construction of the WTP and reservoirs, will be addressed through the separate OPW process, pursuant to s176A of the RMA. That process will address the following aspects of the proposal:

- Traffic effects, and proposed management and mitigation measures associated with the construction and operation of the WTP and reservoirs;
- Construction and operational noise effects, and proposed measures to manage and mitigate these effects;
- Landscape effects, including the height, shape and bulk of the replacement WTP and reservoirs, along with proposed landscape mitigation measures; and
- Any effects on heritage values or archaeology.

The OPW was submitted to the Council on 20 December 2020 (reference OPW60351346).

5.1.2 National Environmental Standard - Soil

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2010 ("NES Soil") applies to activities that disturb the soil if the relevant piece of land is, or has previously been, recorded on the Ministry for the Environment's Hazardous Activities and Industries List ("HAIL"). The AEE noted that one activity potentially on the HAIL may have previously occurred on the site,

⁹ As defined in the s92 response letter, 8 November 2019 ¹⁰ Ibid.

being the removal of buildings (dwellings) potentially containing Asbestos Containing Materials and/or lead based paints.

Regulation 11 applies to an activity described in any of regulation 5(2) to (6) on a piece of land described in regulations 5(7) or (8) that is not a permitted activity, controlled activity, or restricted discretionary activity.

In this regard, soil disturbance volumes on site exceed the permitted activity standards under the NES Soil of no more than 25m³ per 500m² of disturbance and no more than 5m³ per 500m² removed from site per year. The duration of works will also be greater than 2 months. In order for soil disturbance to qualify as a controlled or restricted discretionary activity under the NES Soil a Detailed Site Investigation ("DSI") must exist for the site. A DSI has not yet been prepared for the site.

Accordingly, the activity is a discretionary activity under the NES Soil.

5.2 Permitted activities

The AEE addresses relevant permitted activities that are provided for under the AUP(OP). These are set out in detail at Appendix O to the AEE, but is also summarised at section 6.6 of the AEE as follows:

- (a) E3.4.1 (A53) (Activities in the bed of an ephemeral stream): Sections of the watercourse traversing through the Project site are classed as ephemeral, and so specific mitigation for the loss of these watercourses would not be required under the AUP(OP).
- (b) E7.4.1 (A11) (Diversion and discharge into an artificial watercourse): The diversion and discharge will be designed to meet all permitted activity standards, including not increasing flooding, scouring, erosion, instability or sediment discharge.
- (c) E7.4.1 (A29) (Off-stream dam): The earth embankment on the dry pond on the replacement WTP site) bund will be designed to meet all permitted activity standards, including having a bund height not exceeding 4m, surface area of the impounded water not exceeding 5,000m², storage volume of the impounded water not exceeding 20,000m³, and an emergency spillway and outlet to convey the 100 year flow.
- (d) E11.4.2 (A13) (Diversion of surface water/discharge of sediment-laden water): The temporary damming, diversion, and discharge of sediment laden water ancillary to erosion and sediment control measures will meet all relevant permitted activity standards, including being in accordance with the Council's Guidance Document GD05 and in line with best practice.

In addition, the AEE notes that while a new stormwater outlet is proposed on the replacement WTP site, this will be located upstream of the confluence of the Yorke Gully Stream within the newly formed diversion channel which is an artificial watercourse. Therefore, the application does not seek consent for this structure under the AUP(OP) rules set out in Chapter E3.

6. Status of the applications

The proposal involves multiple resource consents under the AUP(OP) and the NES Soil. Where there is an overlap between the consents and / or the effects of the activities – so that

consideration of one could affect the outcome of another – the appropriate practice is to treat the applications together.

In this instance, the consents required are generally classified as either restricted discretionary or discretionary activities. However, it also involves stream reclamation and diversion for which consent as a non-complying activity is required. All activities are considered to overlap such that it is considered appropriate to assess the consents in bundled manner as a **non-complying activity** overall. This is consistent with the approach that has been adopted in the AEE.¹¹

7. Notification and submissions

7.1 Notification background

The application was publicly notified on 5 August 2019 at the request of the applicant (per section 10 of the AEE, and in accordance with s95A(3)(a) of the RMA). A total of 80 adjacent or nearby properties and stakeholders were directly notified of the application, and it was publicly notified in the NZ Herald and the Council's website on the same day.

7.2 Submissions

7.2.1 Overview of submissions

The submission period closed on 2 September 2019. A total of 500 submissions were received, and of these submissions, 472 were recorded as being in opposition to the proposal, with 20 in support and eight neutral.¹²

It is noted that one submission was received after the closing date, being a submission from Waima to Laingholm Pest Free (9003), dated 1 September 2019 but received by the Council on or about 20 September 2019. A decision will need to be made by the hearing commissioners at the start of the hearing as to whether to accept this submission, pursuant to s37 of the RMA, although it is noted that the applicant does not oppose acceptance of the submission. The recommendation is set out at section 19.1 of this report.

Approximately 150 submitters advised on their submissions that they wish to be heard in support of their submission.

The submissions are contained in full in a website link, forming **Attachment 6** to this report. A summary spreadsheet is attached at **Attachment 7**.

7.2.2 <u>Submission topics</u>

(a) <u>Introduction</u>

The issues raised by submissions have been summarised for this purpose in broad topic categories, and it is acknowledged that this may not always capture the particular matters sought to be raised by the submitter in some cases, and the reader is directed to the full copy

¹¹ AEE, section 6.2

¹² When completing their submission forms, submitters ticked whether they support, oppose or are neutral to the application. These numbers reflect what submitters ticked. However, it is worth noting that of those submissions recorded as 'neutral', three appear to oppose the application (4794, 5225 and 5311). Of the submissions recorded as 'in support', eight are clearly in opposition (4893, 4999, 5014, 5154, 5155, 5158, 5258 and 5259).

of the submissions to understand the submissions in detail. I have read all the submissions and have taken these into account in the assessments at sections 9 - 12 of this report where applicable or relevant to the assessment that is required to be made under the RMA. The submissions have also been reviewed by the relevant Council's technical specialists, and further summaries or excerpts are included in their respective technical memoranda where they raise matters of particular relevance to their areas of expertise.

The broad submission topic areas are summarised here, generally listed in order in which they are addressed through the assessment provided in this report and associated technical reviews, as follows:

- Need to review site selection process
- Insufficient consultation
- Impact of works on Shetland Road residents
- Earthworks effects and sediment discharges
- Stream diversion and discharge
- Biodiversity effects including ecological values, arboricultural/deforestation etc associated with removal of native bush
- Narrow width of vegetated buffer zone
- Effects on the management of kauri dieback
- Contamination effects
- Ground instability/groundwater diversion
- Cultural effects
- Traffic impacts during earthworks and vegetation removal stage, including effects on schools and removal of public parking
- Noise of proposed works and traffic movements
- Social impacts
- Ecological compensation not adequate (e.g. timescale too short, scale of offset is too low)
- Proposal doesn't pass s104D RMA threshold tests
- Inconsistency with statutory and non-statutory documents (e.g. RMA, AUP(OP), Waitakere Ranges Heritage Area Act, Muddy Creek Local Area Plan, Urban Ngahere (Forest) Strategy, draft NPS on Biodiversity)
- Impact on climate change (with reference to the Council's declaration of a climate emergency)
- Tourism amenity effects
- Impacts on property values
- Proposal is contrary to s5 (Part 2)

Submissions to the proposal are primarily from local residents. Submissions from various interest groups and organisations have also been received from:

- Titirangi Primary School (4849)¹³
- Wirihana Community Gardens (4885)
- Auckland Conservation Board (4988)

¹³ The four digit submission number is the identification (ID) coding reference used by the Council as allocated to each submission on receipt, and is the number to be used when searching submissions on the link at Attachment 6.

- Waituna Action Group (5004)
- Te Kawerau Iwi Trust (5025)
- Waitakere Ranges Protection Society (5028)
- The Royal Forest & Bird Society (5032)
- Kaurilands School Board of Trustees (5089)
- The Tree Council (5133)
- Titirangi Residents & Ratepayers Association (5146)
- South Titirangi Ratepayers and Residents Association (5174)
- Manuka Road Residents Society (5206)
- Titirangi Protection Group (5230)
- Waima and Woodlands Park Residents & Ratepayers Association (5242)
- Woodlands Park School (5243)
- Green Bay High School (5260)
- Little Muddy Creeks Estuary Rehabilitation Project (5261)
- Department of Conservation (5287)
- Waitakere Ranges Local Board (5297)
- Waima to Laingholm Pest Free (9003)

Submissions in support advised of support for provision for new water supply infrastructure, or the maintenance and protection of the Nihotupu and Huia Filter Station buildings (e.g. West Auckland Historical Society, 5112 and Engineering Heritage 5034).

7.2.3 Relief sought

In general terms, the relief sought by the submitters was primarily that the consent authority refuse consent to the application, or move it to another location. Where submitters opposed the application, some sought changes to conditions.

The submissions have been taken into account in the assessments by the Council's specialists in section 9 below.

8. Statutory considerations

8.1 Overview

When considering an application for resource consent for a discretionary or non-complying activity, a consent authority must have regard to Part 2 ("purpose and principles" – ss 5 to 8), and ss 104, 104B, 104D and, where relevant, ss 105, 106, 107, 107A to 107E and 108, of the RMA.

In considering any application for resource consent and any submissions received, the consent authority must have regard to the following requirements under s104(1) – which are subject to Part 2 (the purpose and principles):

- any actual and potential effects on the environment of allowing the activity;
- any relevant provisions of national policy statements, New Zealand coastal policy statement; a regional policy statement or proposed regional policy statement; a plan or proposed plan; a national environmental standard ("NES"), or any other regulations; and
- any other matter the consent authority considers relevant and reasonably necessary to determine the application.

When considering any actual or potential effects, the consent authority may disregard any adverse effects that arise from permitted activities in a NES or a plan (the permitted baseline). The consent authority has a discretion whether to apply this permitted baseline.

For a discretionary or non-complying activity a consent authority may grant or refuse consent (under s104B). If it grants the application, it may impose conditions under s108.

As a non-complying activity, the applications are subject to the "threshold tests" under s104D. Section 104D provides that:

- (1) Despite any decision made for the purpose of notification in relation to adverse effects, a consent authority may grant a resource consent for a non-complying activity only if it is satisfied that either—
 - (a) the adverse effects of the activity on the environment (other than any effect to which section 104(3)(a)(ii)applies) will be minor; or
 - (b) the application is for an activity that will not be contrary to the objectives and policies of—
 - *(i) the relevant plan, if there is a plan but no proposed plan in respect of the activity; or*
 - *(ii) the relevant proposed plan, if there is a proposed plan but no relevant plan in respect of the activity; or*
 - (iii) both the relevant plan and the relevant proposed plan, if there is both a plan and a proposed plan in respect of the activity.

In summary, consent authority may only grant consent to a non-complying activity if it is satisfied that the adverse effects on the environment will be minor, or that the activity will not be contrary to the objectives and policies of the relevant plan or proposed plan. Only if the proposal satisfies either of the two limbs of this test can the application be considered for approval, in terms of an assessment under s104.

An assessment of the proposal in terms of s104D(1) is set out in sections 9 and 10 of this report.

Sections 105 and 107 address certain matters (in addition to the matters in s104(1)), relating to discharge permits where the proposal would otherwise contravene s15 (or ss 15A or 15B).

Section 108 provides for consent to be granted subject to conditions and sets out the kind of conditions that may be imposed, and which are subject to the requirements at s108AA. The requirements of that section are set out at section 14.2.1 of this report.

8.2 Plan changes

It is noted that the Council has notified a total of 38 public and private plan changes to the AUP(OP) at the time of preparing this report. However, only a few of those are of general applicability, or relevant to the matters to be considered in this application. In summary:

- Plan changes 14 and 16 were notified by the Council on 29 November 2018 and seek to improve the consistency of Auckland-wide provisions and overlays, and the consistency of zones and definitions, respectively. These plan changes do not involve changes in the substance of the plan provisions or shifts in policy direction of the AUP(OP), or amend the consents that are required, but changes to the text of the AUP(OP) under those plan changes have been noted in the statutory analysis at section 10 where applicable. Decisions on these plan changes were publicly notified by the Council on 22 August 2019 and have not been subject to appeal. It is understood that they will be formally approved as operative at the first meeting of the Planning Committee in February 2020.
- Plan Change 22 was notified by the Council on 21 March 2019 and involves Aucklandwide additions to:
 - Schedule 6 Outstanding Natural Features Overlay;
 - Schedule 12 Sites and Places of Significance to Mana Whenua; and
 - Schedule 14.1 Schedule of Historic Heritage.

A review of the maps included with Plan Change 22 shows that the proposed changes do not affect the subject site(s).

• Plan Change 29 was notified by the Council on 15 August 2019 and involves amendments to Schedule 10 relating to Notable Trees (to re-order and address technical amendments to the mapped overlay). However, this plan change does not add to or re-evaluate present trees on the schedule and seeks only to ensure that the current schedule is correct and up to date. It therefore does not affect the present Notable Tree notation applicable to the Replacement WTP site.¹⁴

9. Section 104D(1)(a) - Adverse effects on the environment

9.1 Introduction

An assessment of adverse effects on the environment is required to be considered in terms of s104D(1)(a). There are, however, a number of considerations related to the nature of effects that should form part of such an assessment, as set out in s104(2) and (3). While the following analysis precedes an assessment against s104, these preliminary considerations are considered relevant to the matters to be addressed under s104D(1), and to the subsequent assessment under s104(1)(a), and so are set out in sections 9.2 and 9.3 below.

9.2 Effects that must be disregarded

9.2.1 Any effects of trade competition

Section 104(3)(a)(i) of the RMA provides that a consent authority must not have regard to trade competition or the effects of trade competition. The proposal is not one where potential trade competition effects could be considered to arise, and no effects are able to be discounted in respect of this clause.

¹⁴ Further submissions closed on 15 November 2019

9.2.2 Any effect on a person who has given written approval to the application

Section 104(3)(a)(ii) of the RMA provides that a consent authority must not have regard to any effect on a person who has given written approval to an application. No written approvals have been provided by the applicant and so no effects have been disregarded on this basis.

9.2.3 Activities permitted by the plan

Section 104(2) provides that a consent authority may disregard those effects that are permitted by a national environmental standard or by "the plan" and can therefore be carried out as of right. This is commonly referred to as the "permitted baseline". In this case, the AEE addresses relevant permitted activities that are provided for under the AUP(OP). These are set out in detail in the 'Permitted activities standards assessment' at Appendix O to the AEE, and have been summarised, by reference to section 6.6 of the AEE, at section 5.2 of this report above.

The permitted activities as summarised in section 5.2 do indicate that some elements of the proposal could be implemented on a permitted basis. However, in my view they are considered to represent only small components of the proposal such that they do not provide a useful basis for any meaningful comparison with the effects of the Project works in overall terms. In any event, the AEE does not seek to advance the proposition that there are elements or effects of the proposal that should be disregarded on the basis of the aforementioned identification of permitted activities.

The AEE does comment that the WTP site "is also located immediately adjacent to the existing Huia WTP which was considered to provide an established baseline in terms of the operation of a WTP at this location from a social and community perspective".¹⁵ That observation is accepted, although in my view it represents a relatively peripheral consideration to the overall scale of environmental effects to be assessed in this case.

9.3 Receiving environment

On the basis of caselaw, the commonly accepted understanding of the receiving environment in planning and resource management terms can be described as being made up of:

- the existing environment and associated effects from lawfully established activities;
- effects from any consents on the subject site (not impacted by the proposal) that are likely to be implemented;
- the existing environment as modified by any resource consents granted and likely to be implemented; and
- the environment as likely to be modified by activities permitted in the plan.

These factors establish the reasonably foreseeable environment within which the adverse effects of the proposal can be assessed. In this regard, a detailed description of the receiving environment has been provided in section 3 of the AEE and which is summarised at section 3 of this report above.

In terms of existing consents, section 6.5 of the AEE identifies two existing consents held by WSL, being:

¹⁵ AEE, p63

- Permit No. 35534 which authorises scheduled overflow discharges ("off-spec discharges") and unplanned contingency overflow discharges from the Huia WTP to an attenuation lagoon and into the Armstrong Gully. This consent expires on 31 December 2030. The AEE advises that, once commissioned, overflow discharges from the replacement WTP will be directed to the existing off-specification discharge lagoon and will be discharged in accordance with this existing resource consent.
- Permit No. 26979 that authorises an allowable stormwater discharge of 0.25 m³/s to an unnamed tributary of the Warituna Stream (via Armstrong Gully) in the 1 in 20 year event. The AEE advises that WSL is seeking consent to discharge stormwater from new impervious areas to Armstrong Gully as part of this application, and will surrender Permit No. 26979 in due course, and that the proposed stormwater management measures have been designed to comply with the limits specified in the existing consent.

It is noted that some submitters have raised concerns with respect to consented works within Shetland Street (the southern extremity of which reaches to within 230m of the Reservoir 1 site), that are associated with construction of the North Harbour No.2 ("NH2") watermain. Details of this consent were not included in the AEE but have been clarified by Mr Jones on behalf of WSL.

Mr Jones advises that the consent applications providing for the NH2 watermain were notified, and a hearing was held in November 2016.¹⁶ Three corresponding Notices of Requirement were heard concurrently (and now form part of the AUP(OP) as Designation 9376). He notes that the proposed plan was to tunnel under Scenic Drive (from Woodlands Park Road) to the head of the cul-de-sac in Shetland Street, and would be 50m under the ground at the deepest section. Consent was granted by independent hearing commissioners on 25 January 2017.¹⁷

These works have been redesigned as a result of relocating the second reservoir to the existing Huia WTP site, so that there is the potential that the tunnel section could be continued to the intersection of Shetland Street and Selwyn Street (this section of the NH2 pipeline has not been designed yet), whereby the placement of the second reservoir on the Project site allows the tunnel to be extended down from the intersection with Selwyn Avenue (which extends to the east of Shetland Street). This will eliminate the issue with how the pipe would be trenched down the lower section of Shetland Street – the road is split level along this section so one level would need to be closed so several houses would have no access for a period of time, while the one open lane would need to be managed to provide for two way traffic. Mr Jones advises that the issue of noise and vibrations are dealt with on every trenching project, and in this regard notes that WSL trenched 54km of watermains within roads in 2018 (including large pipes up to 2m in diameter).

The applicant's s92 response of 8 November 2019 further notes that the present application does not provide for, or include, any works in Shetland Road.

Another existing consent of relevance to the broader environmental setting is that relating to the redevelopment of the site at 490 South Titirangi Road and 408-416 Titirangi Road, approximately 1.4km to the east of the Project site. This consent is to establish and operate a

¹⁶ Details of this project can be viewed here: https://www.watercare.co.nz/About-us/Projects-around-Auckland/North-Harbour-2-watermain.

¹⁷ Council consent references REG-2016-1032, REG-2016-1034, REG-2016-1036, REG-2016-1037, REG-2016-1039, REG-2142955, REG-2142957, REG-2142958, REG-2142959 and REG-2142965.
retail and office activity within a new two to three level commercial building over an at-grade carpark, and to undertake associated earthworks and native vegetation alteration/removal. This consent was granted on 7 November 2018 (reference LUC60316216). This consent is relevant insofar as the construction stage may affect public parking in the Titirangi village and has been discussed further within the assessment of transportation-related effects at section 9.4.11. By way of summary, the site was formerly owned by the Council and is required to provide 18 public parking spaces. The approved development provides a total of 40 parking spaces of which 18 will be public spaces.

I am not aware of any other consents that have been granted, including for the Project site, and which are likely to be implemented that would be relevant to an assessment of the proposal.

The AEE also notes the background and history of planning provisions related to the existing WTP, as relevant to defining the existing environment and associated effects from its lawfully established activities, and planning provisions for the overall Project site, as follows:

Construction on the Huia WTP commenced in 1927 and it was commissioned in 1929. The land has been identified as being for 'Water Supply Purposes' under numerous statutory planning documents since at least 1972. This notation remained in various planning documents until 1999, when a Notice of Requirement (NoR) was lodged by Watercare with the Waitākere City Council. This NoR led to a designation in the Waitākere District Plan,¹⁸ which was eventually rolled over into the AUP.

The land within designation 9324 have therefore been used in some shape or form for water supply purposes for over 90 years, with some form of district plan recognition of this for around 50 years or more. Designations have been described as "notice to the world" of the use to which the land subject to a designation may be put. Both the High Court and the Environment Court recently confirmed that the designations provide for a new water treatment plant within the designated area. The conditions of the designation also address earthworks on the designated site and require that appropriate sediment and erosion control measures are employed (Condition 2).

As such, the designation of the land and the activities it provides for, including the construction and operation of water supply infrastructure and associated enabling earthworks, should be considered as part of the existing environment.

It is noted that the above reference to the High Court (and the Environment Court) is a reference to the findings set out in *Titirangi Protection Group and Ors v Watercare Services Ltd* regarding the extent of works provided for under the present Designation 9324.¹⁹ The key findings of the High Court in that regard can be summarised as follows:

- That an "ordinary, reasonable person" would understand that the designation permitted the construction of a new water treatment facility within the area designated for that purpose but not in the same position as the two existing sites.
- That in the absence of any conditions in the designation limiting the scale or intensity of the use to which the land may be put, it was not possible to identify how an increase in

¹⁸ This can be seen by reference to the 'Human Environments' map of the Waitakere District Plan, Sheet G9 (Designation Reference WSL 4, RP)

¹⁹ CIV-2017-404-2762 [2018] NZHC 1026

the degree or scale of an activity falling within the purposes of a designation could result in the activity falling outside the designation.

• The designation, and in particular the conditions attached to the designation, contemplated future works being carried out within the designated area.

A copy of that decision is attached as Attachment 8.

The following assessment of effects will therefore rely on and utilise these previously provided descriptions of the receiving environment, in accordance with the designation and its purpose as upheld by the High Court.

9.4 Assessment of effects

9.4.1 Introduction

While having regard to the above preliminary considerations, the following assessment has been carried out following:

- an analysis of the application (including proposed mitigation measures and proposed conditions);
- a visit to the site and surrounds;
- a review of the submissions received; and
- the receipt of technical memoranda from appropriate experts.

The AEE includes a detailed assessment of effects on the environment, and addresses this under the following themes or topics:

- Positive effects;
- Effects of stream diversion and reclamation;
- Effects of earthworks and sediment generation/discharge;
- Terrestrial ecology effects;
- Land stability effects;
- Contaminated soil disturbance effects;
- Groundwater and settlement effects;
- Stormwater diversion and discharge effects;
- Cultural effects;
- Transport effects;
- Noise and vibration effects; and
- Social impact effects.

I agree that these topics address the relevant effects to be considered, noting that some of these, and in particular 'terrestrial ecology', are reasonably complex and include a number of sub-topics. These topics also align with the areas of specialist assessment that have been provided by Council-appointed experts to review the proposal, and I have therefore adopted the same topics as the AEE for the assessment below, and have addressed these in the same order for ease of reference as between this report and the AEE.

Because the proposal is being advanced under the 'umbrella' of the designation applying to the site, the above effects relate to regional rules, as all matters that would otherwise be covered by district rules, and by s9 of the RMA, are only required to be addressed by way of

an OPW (other than in respect of the NES Soil). The letter from the applicant's legal advisers, Simpson Grierson (Appendix B to the application), advises in this regard that:²⁰

Land use activities (under section 9 of the RMA) are not part of the Regional Applications because Watercare has a designation of the land for "water supply purposes – Huia and Nihotupu water treatment [plants] and associated structures". All effects arising from land use matters, such as environmental effects from the design and construction of the WTP and reservoirs, is addressed through the OPW process (described below). Specifically, the OPW process will address district land use matters including:

- (a) Traffic effects, and proposed management and mitigation measures associated with the construction and operation of the WTP and reservoirs;
- (b) Construction and operational noise effects, and proposed measures to manage and mitigate these effects;
- (c) Landscape effects, including the height, shape and bulk of the replacement WTP and reservoirs, along with proposed landscape mitigation measures; and
- (d) Any effects on heritage values or archaeology.

The letter further states that:²¹

The process for consideration by the Council of the Regional Applications is very separate to the OPW process where a requiring authority provides an OPW to the Council. There would be no basis under the RMA for the Council to seek to delay processing of the Regional Applications or notification on the basis that the OPW has not been lodged. The two "applications" will track along separate processes, as required under the RMA.

While the above legal 'boundaries' to the assessment of the present application are agreed with, it is perhaps relevant to note the observations made in the aforementioned High Court decision, where it endorsed the preceding decision of the Environment Court that:²²

...In this designation there are significant constraints that would avoid the possibility of the entire site being converted to a water treatment plant, for example. Even if only aspects of the activity are non-complying, or fully discretionary, it is clear that the regional consents would require considerable attention to the details of design.

The High Court, at [69], noted in this regard that:

Furthermore, I accept the submission for Watercare that the Environment Court may also have included these observations to provide the appellants with some assurance that Watercare would still be subject to some significant controls in relation to future construction works.

In other words, while the scope of the decision-makers' inquiry into the effects of the proposal are restricted to regional consents only, the courts have observed that these nevertheless require a detailed level of analysis and assessment. I note that the analysis and assessment provided is of sufficient detail to capture most of the significant issues raised in submissions to

²⁰ Simpson Grierson, letter of 22 May 2019, para 13

²¹ Ibid., para 26

²² Titirangi Protection Group v Watercare Services Limited [2017] NZ EnvC 181, para 22

the application (i.e. effects on ecology and biodiversity, impacts on streams and earthworks and consequent impacts on roading infrastructure).

Returning to the matter of the types of effects to be considered, it should be noted that I have not included 'positive effects' as part of the assessment below, as these are not applicable to an assessment under s104D(1)(a). Such effects are instead addressed by reference to s104(1)(ab) which is discussed in section 11 of this report. Section 104(1)(ab) requires consideration of:

any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity;

It is appropriate to acknowledge at this point, however, that the proposal will have a positive region-wide effect which can be described in broad terms as the security of supply of safe and reliable drinking water for an increasing population, and indeed this effect also represents the objective and rationale for the proposal itself. Those effects would be expected to form part of the proposal irrespective of its location, albeit that those outcomes may be better realised at this site as compared with others (having regard to applicant's assessment as to the costs and efficiencies of ongoing operational considerations).

In considering the adverse effects of the proposal, I have also not included the proposed ecological compensation measures (via the proposed WBMP), as these are also relevant only to an assessment under s104(1)(ab).

The following assessment does however consider the applicant's analysis of alternatives, which is a matter that the applicant has addressed as part of its application in terms of clause 6(1) of Schedule 4 of the RMA.

It is relevant to note at this juncture that the summary of effects set out in section 7.13 of the AEE states that:

Taking into account the positive effects, in particular the provision of quality water supply and resilient water supply infrastructure, and the proposed draft conditions of consent in in Appendix Q, it is concluded that the actual and potential effects of the proposed replacement Huia WTP project are able to be appropriately managed, mitigated and compensated for.

However, its conclusions with respect to an assessment of effects under s104D(1)(a) at section 8.7 are stated as follows:

An assessment of any actual or potential effects on the environment is included in Section 7 of this report. On the basis of this assessment, it is concluded that the adverse effects on the environment will be more than minor. The application therefore cannot meet the first gateway test of Section 104D.

We note that this conclusion in relation to the first limb of the gateway test takes into account legal advice which directs that positive effects, including those associated with offsite mitigation and environmental compensation, are specifically excluded from this

component of the assessment (but are relevant to the overall consideration of the application pursuant to Section 104(1) of the RMA).

In this regard, the reference to the conclusions at section 7.13 appear to be at variance to the actual conclusions reached therein, but I otherwise agree with the description of the relevant legal tests for an assessment under s104D(1)(a), for the reasons noted above.

In the following assessment of effects I have reviewed the applicant's assessment and corresponding documents and have referred to its conclusions where appropriate, and have provided a summary of the key conclusions regarding each effect identified.

As part of the following assessment I have also set out the key conclusions from the Council's technical specialists, with reference to any recommended conditions that could be imposed should consent be granted to mitigate adverse effects, and I have highlighted any areas where further information may be required to be provided at the hearing. It is noted that the assessment of effects of various technical matters set out in the AEE are based on detailed technical analyses contained in the supporting reports to the application, and the reader is directed to those reports should they require further detail in respect of these subject areas.

9.4.2 Assessment of alternatives

The AEE includes a section relating to its 'Consideration of Alternatives'. Such an analysis of options or alternatives is not always a mandatory requirement for resource consent applications. However, it can be said this analysis been provided in accordance with the obligations set out in clause 6(1) of Schedule 4 of the RMA, which requires that an assessment of effects on the environment must include, *inter alia*:

(e) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:

The AEE acknowledges in this regard that:

Sections 7.3 of this report concludes that the actual and potential effects associated with the proposed extent of native vegetation clearance are likely to be high. In contemplation of possible "significant" effects, Watercare has undertaken a thorough assessment of alternative locations or methods which is described in the sections below.

It goes on to provide a detailed analysis of the various alternative sites and methods that were considered in its eventual selection of the subject site and proposed WTP development. With reference to the summary at section 5.5.5 of the AEE,²³ the following is noted:

- The Site Layout Development Report prepared by GHD illustrates that considerable work has gone into optimising the layout and reducing and minimising environmental effects of the proposal, with over seven water treatment plants and five reservoir layouts having been developed as part of the alternative assessments undertaken.
- A further detailed assessment of the reservoir location and layout was then carried out as a subsequent piece of work as described in the Reservoir Storage Alternatives Report

²³ Which also references the *Huia Water Treatment Plant Site Selection: Long-list Option Development* report prepared by CH2M Beca Ltd (25 May 2016).

and Reservoir Site Layout Development Report prepared by Beca. While this reevaluation exercise required deferral of lodgement of the application, this responded to feedback from the CLG and, while representing a more complex layout, results in improved environmental (ecological and landscape) outcomes. The AEE comments that the "reservoir layout optimisation process was a detailed and iterative process that involved numerous design team and site meetings with SME's [subject matter experts] along with constructability and operational experts to determine the preferred footprint for the two reservoirs".

- The initial WTP footprint and reservoirs occupied approximately 2.3 ha and 3 ha respectively of highly valued ecological area, with the reservoir footprints being within the headwaters of the Armstrong Gully and associated wetland area. In the updated shortlist conceptual site layout plan shown in Figure 5.4 of the AEE, the replacement WTP footprint occupied approximately 3 ha, most of which is native vegetation. Construction of the reservoirs was estimated to impact a further 2 ha of SEA, including several large trees. The originally planned expansion of the 'off-spec' discharges lagoon on the existing Huia WTP site from a capacity of 12 ML to 16 ML also further impacted on adjacent SEA vegetation.
- The WTP and reservoir layouts now proposed have been optimised to avoid areas of vegetation which have been identified as the highest value through the ecological integrity mapping exercise.

The AEE concludes in this regard that:

Overall, Watercare considers the proposed WTP and reservoir layouts represent the absolute minimum footprints required to construct and operate a gravity-fed WTP scheme developed in accordance with the BOD, which balances ecological and constructability constraints and maintains an acceptable level of operational flexibility. The approach outlined above has minimised the vegetation removal required to the greatest extent practicable, and ensured the protection of higher value (ecological integrity) vegetation.

In my view, the applicant's assessment in this regard has been appropriately detailed and thorough and has been presented in a manner that accords with their obligations set out under Schedule 4.

It is also noted that a number of submissions in opposition to the proposal have cited the availability of alternatives, and so the applicant's assessment in this regard is of assistance to the consideration of those submissions. Many submitters cite their preference for a site that is not subject to a SEA overlay, and/or that is not subject to a constrained road network, amongst other matters. The memorandum by Dr Bergquist acknowledges these concerns, and notes that the adverse ecological effects of developing the Project site could be avoided by selecting an alternative and less ecologically significant site.²⁴

The AEE highlights, however, that the obligations under Schedule 4 are for an applicant to *describe* alternatives, and does not extend to a requirement to progress that option which has the least overall effect.

²⁴ Bergquist, para 6.1

Overall, it is my understanding that the primary alternative site was at Parker Road, but that this was eventually dropped in favour of the present site due to the significance of social impact effects. It was noted in the Council's second s92 request that a social impact assessment ("SIA") had not been provided as part of the present application, and so a meaningful comparison between the Parker Road site and the present site could not be made in terms of such effects. In its s92 response of 8 November 2019, the applicant has responded to this matter, noting that:

A [SIA] was undertaken at the shortlist stage for the four shortlisted sites which included the current site (termed the Manuka Road Option in the SIA). An SIA therefore has been prepared for the subject site, however it is not limited to this site and includes the other three sites that were shortlisted.

The assessment provided (as Attachment E to the s92 response) was described as forming an 'addendum' to the original SIA and summarises the potential impacts and mitigation measures proposed in the original SIA, and considers the implications of the design refinements and proposed mitigation developed since the original SIA was undertaken and that form part of this current resource consent application.

Reference is therefore made in respect of social impact effects as part of the assessment at section 9.4.13 below.

9.4.3 Stream diversion and reclamation effects

The proposed replacement WTP is primarily located within the headwaters of the Yorke Gully. The reservoirs will be located within the headwaters of the Armstrong Gully. Both of these streams discharge into the Waituna Stream before discharging into Little Muddy Creek. The proposed WTP will result in the loss and diversion of approximately 53m of intermittent stream channel. The diversion of this stream channel will result in the creation of an intermittent stream channel of approximately 70m in length and the daylighting of 45m of piped channel within the upper reaches of the Armstrong gully.

The AEE notes that Cook Costello have provided an assessment of the erosion and sediment control and stormwater components of the project, and that Boffa Miskell Ltd have undertaken an assessment of the freshwater ecological values of the Project Site and the actual and potential effects of the Project works on these values (as contained in Appendices G and L to the AEE respectively), and the conclusions reached therein are summarised in the AEE as follows:

The main effect of the replacement WTP on freshwater ecological values will be the reclamation and diversion of some 53 m of moderate-low value intermittent stream in the headwaters of the Yorke Gully stream. The watercourse will be re-aligned as a stream diversion of at least 70 m in length and will be an intermittent watercourse that collects clean water from the upper catchment to bypass the earthworks and the final developed site. The final diversion will be designed to maintain and improve the existing SEV attributes to provide an improved overall aquatic ecological benefit, including revegetation and enhancements to the riparian margins. In addition, further offsite compensation is proposed through the installation of erosion protection works in the Upper Yorke Gully.

Overall, Boffa Miskell considers that the reclamation and diversion of the intermittent stream will have minor short term effects, but these effects will be appropriately mitigated and compensated such that overall the works will not result in any adverse freshwater ecology effects, and will provide an overall ecological enhancement.

Boffa Miskell provided additional comment by way of an Addendum to the Stream Ecological Value Plan (dated 20 October 2019) in respect of the ecological effects of stream diversion and reclamation as part of the applicant's s92 response of 8 November 2019, based on additional stream surveys undertaken in October 2019. The summary to the Addendum (section 6.4) states that "the overall package encompasses both the creation of the diversion channel to mitigate on-site effects, and the daylighting of a currently piped channel section to provided additional benefit as a compensatory measure".

The effects of stream diversion and reclamation have been reviewed by Carl Tutt, the Council's Earthworks and Streamworks Specialist. Mr Tutt raised some queries in respect of these effects as part of the Council's first s92 request, and these were responded to in the applicant's s92 response of 13 August 2019, which included a memorandum from Sarah Flynn of Boffa Miskell (dated 9 August 2019).

Mr Tutt's memorandum of 10 December 2019 has considered streamworks effects with respect to the topics of "methodology", "avoidance", "accountancy", "like for like and proximity", "mitigation and offsetting" and "timescale effects". The key points made in respect of each of these topics by Mr Tutt are set out below:

- The methodology as set out in the information from Cook Costello is adopted, and Mr Tutt notes that the final stream designs need to incorporate the Stream Ecological Valuations ("SEV") assumptions considered when quantifying stream mitigation and offset requirements. He advises that "[c]onditions to this effect have been recommended below to ensure the accepted ecological assumptions are factored into the final stream design along with monitoring requirement to ensure the stream operate".
- Direct stream impacts in the Armstrong Gully system have been avoided. Due to the required construction footprint of WTP, impacts on the headwater stream sections of the Yorke gully system are unable to be avoided.
- The methods (Environmental Compensation Ratios ["ECR"] and SEV) for quantifying the impacts and to ensure effects are appropriately managed are commonly applied in the Auckland Region for calculating stream function and determining subsequent mitigation and offset requirements.
- Daylighting a section of the Armstrong stream is considered appropriate on balance as it is similar in character (size and shape), close to the impact site and within the same catchment, and this scenario "is preferable to enhancing an intermittent stream further away from the impact site in a different catchment".
- The SEV numbers applied to the streams subject to this application are considered appropriate and demonstrate that the impacts on the Yorke stream are able to be managed within the Project site, although it is considered necessary to recommend monitoring to ensure that these Mitigation Stream Potential (SEVm-P) values are obtained, including provision of interim '5 and 10 years after restoration' SEV values against which to measure outcomes.
- Ecological equivalence also needs to take into account the associated effects the anticipated three-year delay between the stream impact and the new diversion channel

being created may cause, but has not been adequately considered in the application documents. Mr Tutt notes that while the applicant suggests that some ecological function can be incorporated into the clean water diversion channel, and that while this clean water diversion will provide some hydrological function during rainfall, it is impractical to attempt to incorporate ecological function into this due to the proposed grades of the diversion channel. Having considered timescale effects, Mr Tutt recommends that, to ensure that no net loss is achieved in perpetuity, an appropriate maintenance and protection mechanism should be established. The entire Yorke and Armstrong stream enhancement areas are therefore recommended to be covenanted to achieve ongoing protection and prevent future degradation.

Mr Tutt states that in summary:

The streamworks application has demonstrated alternatives considered to avoid stream impacts, with all impacts on freshwater ecology being appropriately mitigated and offset. On balance, provided this activity is undertaken in accordance with the details and recommendations in application documents, and recommendations set out below it is considered that the application results in a no net loss of aquatic ecological function and the adverse effects will be sufficiently managed.

His review also addresses relevant submissions and sets out recommended conditions of consent (including the aforementioned requirement for a covenant regarding riparian works). Mr Tutt has also suggested amendments (post-memorandum) to those conditions proposed by the applicant (at Appendix Q, conditions 29-32), which had required a Stream Ecological Valuation Plan ("SEVP") for the diversion of the Yorke and Armstrong Streams. The requirements of these conditions have been amended to require the formulation of two Diversion Design Plans relating to each stream and to specify the minimum SEV values to be achieved in respect of both streams.

Submissions have raised issues of stream culverts, reclamation and diversion of streams, adequacy of the diversion channel, timing of impacts with respect to mitigation and offsetting and hydrological changes. In this regard, Mr Tutt advises that:

No streams are proposed to be culverted or piped as part of this application and existing piped sections of the Armstrong stream are going to be removed and daylighted. Reclamation of the Yorke intermittent stream is required, and a subsequent diversion channel will be made to shift the alignment of the stream. This diversion channel will not achieve a SEV value comparable to the current stream due to reduced riparian margins along the true right bank, some armouring of steeper sections, hydrological changes and an outfall from the dry pond. However, whilst the final channel designs are yet to be determined, recommendations below will require that the SEV assumptions are incorporated into channel design along with ongoing monitoring to ensure that the diverted Yorke stream achieves the predicted form and function. The same monitoring will apply to the daylighting sections of the Armstrong stream.

Regarding timing, typically stream offsetting activities are undertaken within 6-12 months of the impact occurring, depending on the type of impact. As this application is anticipating a delay of three years, this delay needs to be factored into the offset package. As described above, given the unique nature of this intermittent stream, undertaking a portion of the stream enhancement work now and the remainder three years later is deemed acceptable.

The memorandum by Dr Bergquist (at 6.6) also comments in respect of streamworks that:

As it has not been possible to quantify potential effects on freshwater habitat values for native freshwater fish, riparian restoration plans were again requested to include bank profiles, weed removal, revegetation plans, planting schedules and a 5-year maintenance period for riparian margins of streams that are affected by the proposed works. Watercare have confirmed that "a full Ecological Management Plan and a Stream Valuation Plan (including riparian management plan) will be submitted to Council prior to the hearing".

The conclusions of Mr Tutt, and those of Dr Bergquist, are adopted, and accordingly it is considered that, subject to a review of the EMP and SVP and the imposition of consent conditions (including amendments to those proposed by the applicant), the potential effects associated with the disturbance to aquatic environments are able to be appropriately managed and will be minor.

9.4.4 Earthworks and sediment generation effects

The proposal involves extensive earthworks and associated vegetation loss. Section 3.2 of the report by Cook Costello included as Appendix G ('Stormwater and ESC Report') to the application notes the following areas, volumes and depths of proposed earthworks for the three development sites and are summarised in the following table:²⁵

Site	Area (m²)	Stripped material 26	Cut (m ³)	Fill (m ³)	Max cut / fill depths (m)
WTP Site	27,200	13,600	41,460	30,400	13m/10m
Reservoir 1	9,200	4,400	44,000	400	16m/3m
Reservoir 2	7,200	4,500	6,000	11,000	4m/10m
Total	43,600	22,500	91,460	41,800	N/a

Table 1 - Summary of earthworks measurements

The Cook Costello report notes that, in respect of the WTP and Reservoir 1 sites, that all cut material will be removed from the site and all fill material will be imported, and that "this is highly conservative but assumes a worst case scenario for the earthwork's operations and the subsequent traffic movements it creates" (as they applicant will seek to reuse as much material as possible on site).

The AEE notes that such bulk earthworks activities have the potential to cause adverse erosion and sedimentation effects and that, in particular, "earthworks and the associated mobilisation of sediment may adversely affect high quality freshwater habitats and associated aquatic organisms in the vicinity and downstream of the Project Site if not managed appropriately".

The management of earthworks is addressed through the Stormwater and ESC Report which outlines potential erosion and sediment control measures to be implemented during the works

²⁵ Table 1 incorporates the revised figures set out in the applicant's s92 response of 8 November 2019.

²⁶ The stripped material calculation assumes a 0.5m thickness over the relevant area.

in order to minimise the effects of erosion and discharge of sediment laden runoff generated by the works. The AEE notes that these measures include the following:

- Stabilised entry/ exit points and wash down facilities;
- All perimeter controls as well as the main sediment retention devices will be installed prior to the commencement of bulk earthworks;
- Staging of earthworks in order to reduce the sediment yield and ensure adequate controls are in place downstream of the earthworks site. Upon completion of earthworks operations in a particular catchment, surface areas shall be stabilised;
- Construction of clean and dirty water diversions (bunds or channels) along the edge of each site;
- Contour drains or cut off drains will be used on steep terrain. These temporary channels constructed across the contours act to shorten the slope length over which sheet flow occurs, and therefore reduce the velocity and erosion potential of the run off;
- Silt fences or super silt fences to be used for localised catchments close to the construction boundary or where dirty water diversions or discharge to a sediment retention pond (SRP) are not practical;
- The use of Sediment Retention Ponds as the primary measure proposed to capture and treat dirty water. These will be designed in accordance with GD05 and installed with forebays and flocculation sheds; and
- Dewatering of excavations, with collected water discharged to a sediment retention pond for treatment prior to discharge.

The AEE advises that "[a]ny sediment laden runoff from the stream diversion works or broader site enabling works will be treated through the methods summarised above and in the indicative ESCP. This will ensure appropriate management and mitigation measures are in place to minimise surface erosion and prevent the discharge of sediment laden water from the site during and immediately following earthworks".

Further information was sought in the Council's s92 requests, and additional information in respect of earthworks and sediment management was provided by Cook Costello by way of a letter dated 8 November 2019.

The additional information provided by Cook Costello provides further details with respect to the following:

- Water quality treatment options.
- Confirmation of the use of a second baffle in the sediment retention pond.
- Contingencies and management protocols with respect to rainfall in excess of a 20-year event.
- Confirmation as to the consideration of implementation of an Adaptive Environmental Monitoring and Management Response Plan ("AEMMRP").
- Details of earthworks volumes within the SEA, which are set out in Table 2 below (using the same format as Table 1 above):

Site	Area (m²)	SEA Area (m²)	Total volume (m³)	Total volume SEA (m³)
WTP Site	27,000	25,000	71,860	68,000

Reservoir 1	8,800	6,000	44,500	43,000
Reservoir 2	9,000	4,000	17,000	7,000
Total	44,800	35,000	133,360	118,000

Table 2 - Summary of earthworks measurements (SEA)

- Re-statement of the earthworks volumes set out in the main report, "with the assumption that all cut materials will be removed and all fill material imported" (as noted above). Table 1 above has been amended to reflect these revised figures.
- Updates to the figures used in the Universal Soil Loss Equations ("USLE"), and clarification of the net sediment yield from the three sites, being 88.2 tonnes ("T") from the WTP site, 32.38T from Reservoir 1, and 44.96T from Reservoir 2 (a total of 165.55T).

The review by Carl Tutt, the Council's Earthworks and Streamworks Specialist, addresses the earthworks aspects of the Project and the methods of erosion and sediment control and management. In terms of erosion control, Mr Tutt advises:

Clean water diversions will be established along the northern boundaries for [reservoir 1 and 2] and the north eastern boundary of WTP. Each of the three sites with clean water flows will be directed around the earthwork site into the nearest watercourse. Any sections of the clean water diversions that exceed a gradient of 2% will be lined. The clean water diversions will limit the amount of clean water entering the site, thereby reducing the potential for overland flows to entrain sediment.

Exposed areas will be progressively stabilised as earthworks are completed and all exposed surfaces will be stabilised prior to 30th April in any given year unless a winter works exemption is approved. A seasonal restriction to this effect has been recommended.

Sediment control aspects are subject to more detailed analysis by Mr Tutt. Key aspects of that analysis are noted below:

An assessment of the project's sediment generation based on the universal soil loss equation (USLE), estimates that approximately 167 tonnes of sediment could be discharged downstream to both the Yorke and Armstrong gullies during the two years bulk earthworks are expected to occur. This USLE assumes that the bulk earthworks for the individual sites (R1, R2 and WTP) take two years to complete. The USLE also calculates the pre development sediment discharge at approximately 3.4 tonnes per annum. On a per annum comparison this is a downstream sediment loading of approximately 25 times the baseline discharge into the Little Muddy Creek. For comparison, if this activity was to be undertaken without any ESC in place the sediment discharges over the two year constriction period could be over 1000 tonnes.

While this is a large amount of potential sediment discharged downstream, the USLE does not take into account additional management measures such as site stabilisation or diverting dirty water into excavation pits when large rainfall events occur. It has been calculated as if bulk earthworks will occur year round for two years, whereas this will not be the case.

...

Additional site management methodologies can be employed to ensure that sediment discharges remain minimal, retaining as much sediment on site as possible. These



additional management actions can be linked to triggers such as forecast rainfall, sediment pond efficiencies and downstream freshwater monitoring. Actions that could be taken if trigger levels are reached include stabilising the site, diverting dirty water into excavation pits and making amendments to the erosion and sediment controls. A requirement for an adaptive management plan has been recommended that details monitoring requirements, trigger levels and management actions.

Lastly, the provided erosion and sediment control plan is for consenting purposes only. While the provided plan is appropriate for the most part, minor amendments will increase the protection of the receiving environments from potential sediment discharges. As such, provision of a finalised erosion and sediment control plan designed by the appointed contractor which is in general accordance with the consent plan, has been recommended.

Other aspects addressed in Mr Tutt's review includes the design of Sediment Retention Ponds ("SRPs") (and their location), the use of dirty water diversion bunds, discharge locations, the use of silt and super silt fences, and the use of rainfall activated chemical treatment for each SRP along with batch dosing and dewatering processes.

Mr Tutt has also addressed the key topics raised by submissions in respect of earthworks effects (adequacy of controls and conditions, the size of SRP 1, accounting for increased rainfall, extent of the proposed footprint, location in an SEA and duration). He comments in this respect as follows:

The overall footprint of the earthworks has been reduced from what was initially proposed. It is currently at a size that provides erosion and sediment controls to be properly established. Overall, bar some minor alterations, the sediment controls proposed are in accordance with industry best practice. [SRP 1], while an odd shape, will still function as a sediment pond and is deemed appropriate given the site constraints. Additional management techniques and monitoring such as device, and downstream freshwater monitoring, will ensure the devices function properly throughout the earthworks phase of the development. If it is found that a device is not functioning to appropriate standards, then investigations will be undertaken to identify and resolve any issues. There will ultimately be sediment discharged from the site, however, provided the devices are functioning correctly it is expected that the resulting sediment discharges will be managed appropriately. The anticipated sediment discharge, as calculated in the USLE has used the latest HIRDSv4 rainfall data from the rainfall gauge on the existing water treatment plant. This is an accurate representation of expected rainfall in this location of the Waitakere Ranges. Finally, appropriate erosion and sediment control consent conditions have been recommended below to ensure that the effects of sediment discharge are kept to a minimum.

Overall, Mr Tutt concludes that:

The earthworks erosion and sediment controls proposed are largely in accordance with GD05 which is considered best practice. Some amendments to the erosion and sediment control plan have been recommended. Provided the erosion and sediment controls are installed and constructed in accordance with the application report, supporting documentation and any additional requirements as necessary by the guidance outlined in GD05 and recommendations below, it is considered the resulting effects on the

environment from sediment discharges during the earthworks will be appropriately managed.

Further to the above, Mr Tutt has also outlined the nature of recommended conditions in respect of earthworks and streamworks, noting that:

The applicant has proposed erosion and sediment controls in accordance with the guidance recommended in [GD05]. It is considered appropriate however, to include a standard suite of earthworks and streamworks consent conditions relating to the installation, maintenance and monitoring of erosion and sediment controls and the protection of the surrounding environment. The inclusion of these conditions is consistent with similar earthworks and streamworks operations granted consent for in the Auckland region and will ensure that the effects of the proposed works will be managed appropriately.

I adopt Mr Tutt's conclusions, and accordingly it is considered that the proposed earthworks and associated erosion and sediment discharges can be appropriately managed to ensure that adverse effects on downstream environments will be minor.

9.4.5 Terrestrial ecology effects

(a) Introduction

The proposal involves the removal of an area of 3.5 ha of intact native forest and scrub, and this is noted in the AEE as being the primary ecological impact arising from the proposed works. The application includes an Ecological Assessment prepared by Boffa Miskell (Appendix L to the AEE), which finds, based on the Environment Institute of Australia and New Zealand matrix, that the level of ecological effect arising from the Project works will be high.

The various ecological effects that have been assessed relate the following sub-topics:

- Forest clearance;
- Effects on retained vegetation;
- Loss of threatened or at-risk flora;
- Spread of kauri die-back disease; and
- Effects on amphibians, bats, birds, reptiles and terrestrial invertebrates.

With respect to forest clearance, the AEE advises:

Ecological constraints have been the primary determinant of the WTP and reservoir footprint locations within the Project Site. As a priority the footprint was developed to avoid areas with the highest ecological integrity, including mature kauri forest, kauripodocarp forest and swamp forest ecosystem units. Nevertheless the development will result in the removal of 2.5 ha of ecologically significant native forest and scrub from the replacement WTP site, 0.6 ha from the Reservoir 1 site and 0.4 ha from the existing WTP site i.e. approximately 3.5 ha in total (approximately 0.01 % of the 24,000 ha SEA).

The AEE acknowledges that the unmitigated effect of forest clearance is assessed as being very high. As previously noted, the primary method of mitigation is proposed to be by way of weed and animal pest management to enhance the ecological values and ecosystem integrity of the remaining 11 ha of native vegetation within the Project Site, which will enhance the viability of these populations in conjunction with the wider WBMP. Native planting will also be



undertaken within open areas within the Project Site area, to buffer the forest interior, inhibit weed encroachment and accelerate regeneration. However, the AEE notes that while these measures within the Project Site will improve the ecological value of this 11 ha area, they will only partly mitigate the adverse effects of the project. The comprehensive WBMP (described in section 7.5.9 therein) has been designed to fully compensate the residual adverse ecological effects of the project that cannot practicably be avoided, remedied or mitigated. The AEE expresses the view that "the positive benefits on the environment from the proposed mitigation and compensation package are considered to appropriately compensate for the loss of forest extent".

However, as previously noted, these compensation measures can only be taken into account at the s104(1)(ab) stage (and as part of the assessment of objectives and policies), and so do not alter the conclusion that the effect of forest clearance is "very high" (and therefore more than minor).

The AEE includes following sections that summarise the abovementioned terrestrial ecological effects of the project, and mitigation measures in respect of each of these topics are discussed below. Reference is also made to the additional information provided by Boffa Miskell as part of the s92 response of 8 November 2019 where applicable.

(b) Vegetation clearance

Vegetation clearance has the potential to result in poor health or failure of adjacent trees to be retained (known as 'edge effects'). Recommendations to address such impacts are set out in the Ecological Assessment and include a requirement for arborist supervision during detailed design and during site set-out works. The AEE further notes that "exposed bush edges, old tracks and open areas within forest remnants in the Project Site will be revegetated with fastgrowing forest edge species to buffer the forest interior, inhibit weed encroachment, and accelerate regeneration".

The first s92 response included an Arboricultural Assessment by GreensceneNZ Ltd (9 August 2019) which advised of specific requirements depending on the extent of any incursion of works within a defined Tree Protection Zone ("TPZ"). The GreensceneNZ response advises:

All tree protection zones will require tree protection fencing and ground matting for construction access. Where plant or vehicle access is required within a TPZ permeable geo grid cells with metal rock are recommended to negate any compaction, designed to arboricultural best practice.

Incursions have been assessed for all upper canopy, large stature trees in relation to the proposed construction footprint. Low canopy small stature and mid canopy medium stature trees at the margins should be assessed on a case by case basis by a works arborist during construction of the site boundaries. Here many trees have the potential to be retained.

The new bush margins exposed at the edges of the proposed construction will lead to increased wind loading and light levels. All upper canopy large stature trees are unlikely to be affected by the neighbouring lower to mid canopy tree removal. These larger trees were already established when the land use was residential /commercial before the more recent forest regeneration occurred. The lower and mid canopy trees that will be retained at the bush margin should be assessed individually for wind loading and removed if only

necessary. If removed, shade trees, ferns or plants that provide soil armour or ground anchoring should be replanted with eco sourced species and a weed management plan followed.

The second s92 request raised the need for information regarding the proposed clearance of vegetation and construction works within the riparian margins of watercourses. It also noted that:

As it is not possible to quantify potential effects on freshwater habitat values for native freshwater fish, and it is not appropriate to leave this issue to management plans that are prepared by the applicant following the grant of resource consents, it is requested that riparian restoration plans are provided that include bank profiles, weed removal, revegetation plans, planting schedules and a 5-year maintenance period for riparian margins of streams that are affected by the proposed works.

The response from Boffa Miskell advised that "full Ecological Management Plan and a Stream Valuation Plan (including riparian management plan) will be submitted to Council prior to the hearing". It is noted in this regard that an "Addendum to Stream Ecological Value Plan" was provided by Boffa Miskell, dated 26 November 2019, being an addendum to the Stream Ecological Valuation Plan included as Appendix 9 to the original AEE. It is unclear if this document is to serve the purpose of the SVP, as it does not include a riparian management plan, and so it considered that the SVP remains to be provided at the hearing.

The review of ecological effects by Dr Bergquist is provided at section 5 of her memorandum dated 9 December 2019, which concludes in terms of vegetation loss that:

I concur with Boffa Miskell's description and assessment of ecological values of the Project Site as Very High. However, in my view there will also be major alteration to key elements/features to the baseline (existing) condition through the sheer quantum of vegetation loss to the centre of the Project Site, including the loss of kahikatea forest aged at 80-120 years. This will fundamentally change the forested character and ecological values of the core local area and effects will be permanent.

Dr Berguist also notes that there are two main areas of outstanding information, relating to:

- The potential adverse effects on individual trees in close proximity to and with root zones within the Project Site, including a major stand of kauri near Reservoir 1 and individual kauri near the proposed treatment plant footprint; and
- The extent of encroachment into the riparian margins and measures to mitigate effects on the Armstrong-manuka stream south of Woodlands Park Road. As previously noted, this is expected to be provided prior to the hearing by way of "a full Ecological Management Plan and a Stream Valuation Plan (including riparian management plan)".

At section 6.2, Dr Bergquist advises:

... The ecological damage and biodiversity loss from this site, and the impact on ecological connectivity across the Waitakere Ranges will be permanent. However, the remaining 11 hectares will still provide connectivity around the Project Site. The proposed compensation package provides for ecological enhancement of the Waima catchment over a 10-year period but currently provides no certainty of on-going maintenance of the

enhanced condition on a permanent basis. Even if the proposed ten years of pest control is effective, unless control measures are continued to maintain low or zero pest levels, particularly predator levels, pest populations will recover.

Notwithstanding the above, Dr Bergquist also notes at section 6.3 that "[t]he outstanding residual effects of the loss of up to 3.5ha of functioning native forest ecosystems must be offset or compensated for". An assessment as to the proposed compensation package, via the WBMP, is discussed separately with respect to relevant objectives and policies at section 10 of this report, and in terms of s104(1)(ab) at section 11.

(c) Loss of threatened or at risk flora

With respect to the loss of threatened or at risk flora, the AEE advises that the proposed works:

... will result in the removal of vegetation species that are identified as being threatened or at risk, the threat classification is due to disease risk rather than scarcity or habitat loss as they currently have large and widespread populations. These include younger kauri trees (noting the project has been designed to avoid the removal of any mature kauri), kanuka-dominated forest, pohutukawa trees, a few manuka and vegetation containing common and widespread climbing rata species. The removal of these specimens from within the proposed development footprint has no bearing on the viability of the threatened/ at risk species, and the effect of the removal is assessed as being minor.

Having regard to Dr Bergquist's review, this comment is agreed with.

(d) Kauri dieback

In terms of Kauri dieback, the AEE advises:

While there are no mature kauri trees in the Project footprint, mature kauri trees are present in the immediate vicinity of the proposed replacement WTP footprint and reservoirs (occasional kauri seedlings and saplings were also encountered within the WTP footprint). The likelihood that kauri dieback disease is present is relatively high. Movement of machinery, equipment and people between sites during construction work is considered by some to be a key pathway for the spread of kauri dieback.

Watercare proposes a robust protocol for kauri dieback hygiene as a means to help prevent the spread of the disease, including the establishment of KCZs near all kauri trees where a strict protocol for vegetation and soil removal and disposal will be followed (Section 4.10.2). With these measures in place, the potential adverse effects of the proposed works on the spread of kauri dieback disease will be adequately managed.

The GreensceneNZ response provided in August 2019 also addressed the potential effects of kauri dieback on the knoll adjacent to proposed Reservoir 1, arising from the potential stress associated with alterations to the groundwater table. It concludes in this regard that:

The [effect] of the temporary drawdown of groundwater during excavation of Reservoir 1 is unlikely to affect the Kauri trees in the long term due to their evolved adaptive features to deal with drought. Mitigation measures that increase the available surface water by artificial means should be avoided as this may increase the Kauri trees susceptibility to

Phytophthora, a water-borne pathogen. Therefore it is recommended that the Kauri are monitored regularly throughout the process of drawdown to record any negative effects or drought response behaviour. If any drought effects are discovered then further monitoring after construction and drawdown should ascertain whether the Kauri have returned to their pre drought phase.

Further details were sought by the Council's kauri die-back adviser in the Council's second s92 request, including with respect to the area of vegetation to be removed, proposed hygiene procedures and sediment control. The response by Boffa Miskell in respect of these matters is as follows:

- Given the extent of pressures on Kauri Forest in the Waitakere Ranges, [Boffa Miskell] do not consider that an assessment of the impact of removing 3.5 ha of this forested area on the survivability of kauri forest in the Waitakere Ranges is warranted as a result of the proposed project. [Boffa Miskell] do consider that a multi-agency study on the survivability of Kauri Forest in the Waitakere Forest (and beyond) would be highly worthwhile, as there are many factors that will influence the outcome for Kauri.
- A draft Kauri Dieback Management Plan ("KDMP") will be prepared and submitted to Council for review prior to the hearing.
- Appropriate controls to prevent discharges of sediment to waterways is a requirement of construction. Prevention of sediment discharges to watercourses would also prevent movement of *P. agathadicida*. Requirements for specific stormwater management measures over and above best practice will be detailed in the KDMP.

The review of the proposal in this regard by Dr Murray Fea, the Council's Senior Biosecurity Advisor – Plant Pathogens, dated 29 November 2019, has reviewed the applicant's proposed conditions and measures to address kauri dieback effects. Dr Fea's review advises that:

Due to the entire site being an area of likely kauri dieback presence, and having kauri throughout and adjacent to the site, it is not possible for the proposed activity to avoid this risk on this site. Because there is no cure for kauri dieback disease, and no practical way of removing P. agathidicida from a site once introduced, it is also not possible to remedy any spread that is caused or disease that is induced. Furthermore, due to the time taken for kauri to reach a mature phase, the loss of ancient individuals in and adjacent to the site will not be reversible within a meaningful timeframe.

Dr Fea has considered the applicant's proposed hygiene protocols but considers these to be insufficient for a number of reasons. The s92 response to the matters raised by Dr Fea have been assessed, but notes that the methodologies to be set out in a KDMP are unknown because a draft of this plan has not been viewed, and so an "[a]ssessment of the ability of the applicant to manage kauri dieback disease risks in the site is therefore not possible". Dr Fea also expresses a concern with respect to the effects of sediment discharges and the manner by which these may act as a further vector for the disease. He states in this regard that:

the applicant has stated that prevention of sediment discharges will also prevent movement of P. agathidicida. However there is no evidence that this is the case, and no reason to expect that P. agathidicida propagules (which can be as small as 2.5 microns in diameter) would be filtered by standard sediment control devices such as decanting settlement ponds and silt fences. This also fails to acknowledge that the erosion and sediment control devices are expected to operate at efficiencies that will still result in 165



tonnes total sediment loss during the bulk earthworks stage. While there are established acceptable margins of sediment loading expected to have minor impact on receiving aquatic environments, the same is not true for the kauri in the receiving catchment, which could be killed outright by the introduction of even a minute number of P. agathidicida propagules.

In response to submissions in this regard Dr Fea also comments that:

avoidance of effects relating to kauri dieback disease will be practically impossible using currently available best practice. This is because the avoidance of soil movement is the only surefire way to avoid risk of vectoring the microscopic, soil-dwelling pathogen, but earthmoving and soil disturbance are fundamental to the proposed activities. Standard mechanisms for preventing sediment movement such as ESC devices do not suffice to prevent the spread of Phytophthora.

Dr Fea therefore concludes that:

Adverse effects relating to kauri dieback disease risk are not able to be avoided or remedied on this site for the reasons outlined above. Mitigation of the risk will also be extremely difficult due to the pervasive, cryptic nature of the disease, the nature of the works, the location of the site and the proximity of high-value kauri stands and individuals. Available best practices based on current knowledge are not adequate to mitigate the risks posed by activity of this scale in an area that is highly likely to be contaminated with P. agathidicida and is situated immediately upslope of kauri forest including the oldest and largest remaining kauri in the region.

Notwithstanding that conclusion, Dr Fea has provided a set of conditions that are recommended to be imposed should consent be granted.

(e) Effects on amphibians, bats, birds, reptiles and terrestrial invertebrates

The AEE addresses effects with respect to terrestrial fauna, with reference to the Ecological Assessment prepared by Boffa Miskell, and the key matters from that assessment with respect to the various classifications of such fauna are set out below:

Amphibians and reptiles

• Lizard surveys and salvaging will be undertaken within the delineated works footprint immediately prior to and during vegetation clearance. Boffa Miskell have recommended that lizard searches and salvage target only vegetation deemed to be high quality lizard habitat, and that this salvage work be undertaken between October to April only (consistent with the earthworks season), as clearance proceeds, to coincide with peak lizard activity periods. Vegetation clearance will be staged, so that lower quality habitat areas can be cleared outside of the October to April period.

The loss of herpetofauna habitat will be mitigated through enhancement of the ecological values and ecosystem integrity of remaining forest areas within the Project Site (by weed and animal pest control), which will improve the viability of lizard populations. Edge habitats are favoured by lizard species and there may be potential to enhance these areas for lizards by planting low-growing, lizard-friendly species such as pohuehue and shrubby *Coprosma* species.

The further information provided by Boffa Miskell in the 8 November 2019 s92 response advised within regard to Hochstetter's frogs that they "have been detected at a single location in the Nihotupu catchment within 5 km of the site, and at numerous locations in the forested Waitakere Ranges to the west and northwest", and:

Prospective Hochstetter's frog habitat within the project footprint is a scoured intermittent stream channel with little overhanging vegetation or debris that would offer suitable cover. We acknowledge that habitats both upstream and downstream of the project footprint contain habitat that is potentially suitable for Hochstetter's frogs, and further fieldwork is scheduled to ascertain whether frogs are present in these areas to inform preparation of the ecological management plan for the wider site.

In terms of lizards, the response advises:

Records include a total of 142 native lizards comprising six species, five of which are classified as "At Risk". Copper skinks from three locations account for a large number of the individuals recorded, nevertheless the distribution and species richness of the lizard population in peri-urban and urban bush areas in the vicinity of the Project Site (Figure 1) demonstrates that the quality of this habitat for lizards is high, and the presence of forest gecko and elegant gecko in particular within the site itself is likely.

Herpetofauna surveys will be recommenced within the 2019/2020 field season as soon as conditions are favourable, and will include the use of tree wraps in addition to nocturnal surveys in an effort to increase the likelihood of detecting forest geckos.

The Council's request for further information included reference to observations of other rare species (native wasp, slave ant and thread bug). In this respect Boffa Miskell advised that "[h]erpetofauna surveys will be recommenced within the 2019/ 2020 field season as soon as conditions are favourable, and will include the use of tree wraps in addition to nocturnal surveys in an effort to increase the likelihood of detecting forest geckos".

Longtailed bats

• The Project site is not considered likely to be important habitat for longtailed bats, although they may occasionally utilise the site for foraging and/or solitary roosts. The AEE notes that while the risk of direct bat mortality during vegetation clearance is expected to be small, clearance during cooler months increases the risk of mortality to roosting bats. Pre-clearance bat monitoring will be undertaken to ensure possible roost trees are not occupied at the time of clearance, avoiding injury or mortality of bats. If bats are found to be occupying a tree scheduled for removal or a tree near to the works area, a buffer will be established around the tree that prevents vegetation clearance being undertaken until the roost is vacated.

Further surveys carried out by Boffa Miskell were reported on as part of the applicant's second s92 response, which advised that:

Our surveys found no indication that bats use the site as a commuting route, and the site's habitat characteristics have habitat potential but do not distinguish it as of



particular value for foraging. Long tailed bats are 'edge specialists', i.e., they use linear features such as forest edges to navigate and forage, and they range widely throughout the landscape on a nightly basis to feed. Preferred habitats include forested riparian corridors, forest roads and tracks, forest gaps and edges, and areas of open water. The forest clearance associated with construction of the WTP will create approximately 800 m of additional forest edge (though revegetation within the site will infill existing tracks and reduce some edges), however we do not anticipate that additional edge habitat will adversely affect long-tailed bats as this species does not rely on intact forest interior environments to move through the landscape; nor is there evidence that bats regularly frequent the site.

The proposed WTP will not generate significant noise as water flows are to be gravity-fed, and the plant will not be manned at night so will not require lighting. This is consistent with the operation of the current Huia WTP.

Further bat surveys within the site and surrounding areas will be undertaken in the 2019/2020 field season to increase our understanding of long-tailed bat activity in the landscape, in order to provide further context for our observations to date.

Birds

Vegetation clearance is likely to impact birds primarily by way of habitat loss and intensification of competition as resident birds are displaced to adjacent territories. The mortality of chicks and nesting birds is also probable if vegetation clearance is undertaken during bird breeding season. Clearance of the site will result in the loss of numerous mature kahikatea and other fruit and nectar producing trees, however surrounding areas contain more intact, mature forest that produce periodically abundant food sources. Surveys will be required prior to any vegetation clearance during the bird breeding season (August to February) to identify any active native bird nests in the affected area. The loss of bird habitat will be mitigated through enhancement of the ecological values and ecosystem integrity of remaining forest areas within the Project site (by weed and animal pest control, as discussed below), which will improve the viability of bird populations.

The Boffa Miskell response referred to above also advised with respect to birds that:

... the development of the proposed WTP will not constrain the movements of any species recorded at the site (all species observed are present in urban landscapes). The loss of connectivity is more likely to adversely affect dispersal and gene flow between populations that do not range widely (i.e., lizards, flightless invertebrates, some flora) at a local-scale. We note that intersecting roads and residential development surrounding the project site already pose physical barriers to movement of these taxa.

Terrestrial invertebrates

 Field surveys have indicated that the invertebrate fauna present is generally representative of the wider Waitakere Ranges. Some less-common invertebrate taxa were observed, but these were found in their characteristic mature forest habitats, including intact kauri forest and wet kahikatea forest, that will not be cleared as part of the proposed work. The review by Dr Bergquist (at 6.4) advises in respect of these effects that:

With forest clearance, it is inevitable that there is huge loss of fauna. Even if lizard rescue, bat surveys and avoidance of peak bird breeding season is undertaken, huge loss would be likely to occur in my view. In addition, birds moving away from the Project Site will encounter resident birds defending their feeding territories. Similarly, relocated lizards will have to fight for a new space to occupy. So, an ecologically sound outcome is likely to be more complex than simply moving fauna species to a new location.

Watercare advise that they are undertaking further surveys for bats, lizards; including the nocturnal use of tree warps to detect geckos, and Hochstetter's frog. Watercare also advise that further confirmation of site locations for invertebrate species of interest documented post-lodgement of the resource consent application will be confirmed.

However, even with knowing the scale of potential loss, it would be practically impossible to rescue and relocate even a small percentage of the fauna expected to be affected by the works. This potential loss is even more significant when considering the risk status of the species affected such as long-tailed bat, Hochstetter's frog, two of the three skink species and three gecko species.

Dr Bergquist makes the following conclusion and recommendation in respect of ecological effects at section 7 of her memorandum:

There are some adverse ecological effects that can be remedied, mitigated or offset on site with implementing the ecological conditions recommended in section 8 of this technical memo. However, there are also outstanding and significant residual effects that cannot be adequately mitigated. The proposal directly conflicts with the provisions and expected outcomes for the SEA overlay. However, there is also the long-standing Designation underlying the SEA overlay that has recently been tested through the Environment Court and High Court with the decision that the Designation provides for the water treatment upgrade. Because of this unique circumstance of the underlying Designation and provided that the compensation package can offer adequate and permanent ecological restoration and enhancement for the Waima Catchment, the proposal is considered to be acceptable.

The reviews by Dr Bergquist and Dr Fea also address relevant submissions and sets out recommended conditions of consent to be imposed should consent be granted. Particular submission topics include "site selection and requirement to avoid", "landscape scale effects, fragmentation, wildlife corridor, downstream effects", climate change, vegetation loss", Loss of native fauna, "loss of kauri" and "effects on riparian margins".

Overall, and separate from any conclusions as to the merits of offset measures through the WBMP, the writer agrees with the assessment of Dr Bergquist that the proposal will give rise to adverse ecological effects that will be more than minor. This appears to be consistent with the applicant's own assessment, as set out in the analysis by Boffa Miskell. I also adopt the conclusion of Dr Fea that effects of increased risk of kauri dieback are also potentially high, and not able to be effectively remedied or mitigated (albeit subject to further information regarding management and protocols to address this effect to be provided by the applicant at the hearing).

9.4.6 Land stability effects

The proposed earthworks described in section 9.4.4 involve significant excavations and have the potential to result in adverse land stability effects. Such effects have been assessed for the applicant in a Preliminary Land Stability Assessment report, prepared by T&T and included as Appendix I to the AEE. The AEE notes in respect of that assessment that:

The proposed earthworks will not affect the stability and safety of surrounding land, buildings and structures, and the proposed vegetation removal will not increase the risk of natural hazards (namely landslips).

It further states that:

Watercare will undertake onsite geotechnical investigations as part of detailed design, which will confirm the ground conditions and inform any particular design considerations or construction methods required to appropriately address this risk. On this basis, the effects of the proposal on land stability are assessed as being no more than minor.

An assessment of land stability effects has been provided by the Council's Development Engineer Irshaad Chawdhary in a memo dated 15 November 2019. Mr Chawdhary advises that most of the district rules will be covered under the OPW application, but he has expressed his opinion on geotechnical and stormwater aspects while noting that SMAF considerations will be addressed by others. It is also noted that land stability effects in terms of groundwater diversion and settlement is addressed by Sian France, at section 9.4.8 below. Mr Chawdhary's memorandum advises that:

Overall, [the] development engineer might concur with the approach and preliminary assessment undertaken by the project geotechnical engineer, in terms of the stability of the site, however, [the] development engineer would recommend undertaking further ground investigations to determine actual soil design parameters for the temporary and permanent retaining structures, and revise the stability assessment accordingly, especially for Reservoir-1, tunnel shaft sites and near the public road.

Furthermore, it is proposed to use soil infiltration method for complying part of the SMAF retention requirements. Though the infiltration idea is appreciable, [the] development engineer would recommend that the geotechnical engineer considers effects of soil infiltrations on overall stability of the site including the stability of the ponds foundation and ground in vicinity of these ponds.

Since this consent is for regional works only, [the] development engineer will recommend that during subsequent [OPW] application a detailed ground investigation and slope stability assessment must be undertaken within Reservoir 1 location to identify actual subsoil parameters and detailed design for the geotechnical retaining works must be provided along with the risk assessment.

These recommendations appear to be consistent with the applicant's stated approach regarding the need for further geotechnical investigations at the detailed design stage, and as proposed by Ms France, as addressed in section 9.4.8 below (and which will be subject to an extensive conditions). Subject to those undertakings and recommendations, it is considered that adverse effects on land stability can be appropriately managed and will be no more than minor.

9.4.7 Contamination soil disturbance effects

The application has included a Preliminary Soil Investigation ("PSI") report prepared by T&T (Appendix J to the AEE), which indicates that the following HAIL activities may have been undertaken on Reservoir 1 and WTP sites:

 Housing and associated structures that may have used asbestos containing materials (ACM) and/or lead-based paints (HAIL Category I – only if contaminants are present above the risk based human health criteria).

The AEE notes that the inclusion of these activities in the PSI was on a conservative basis, "which reflects the fact that while there is very limited information regarding the use or presence of asbestos and/or lead based paints, buildings on the sites were constructed and removed from the site during the period when the use of ACM and lead-based paint was common".

The application has also included a Site Management Plan ("SMP"), also prepared by T&T (Appendix K to the AEE), so as to provide appropriate controls to minimise potential discharges of contaminants to the environment and inform health and safety measures.²⁷ The AEE comments that:

The objectives of the procedures set out in the SMP are to protect human health, prevent uncontrolled discharges during the works and to ensure appropriate disposal of surplus excavated material. The SMP sets out excavation, erosion, sediment and dust controls as well as procedures for material disposal and ground contamination-related health and safety procedures for undertaking the proposed enabling works. With these measures in place, the adverse effects of disturbing potentially contaminated soil are considered to be no more than minor.

The s92 response included reference to an updated version of the PSI to respond to the requests of Sharon Tang, the Council's Senior Specialist Environmental Health set out in the first s92 request letter. The updated PSI states:

Reports of unauthorised fill deposited in an unknown area within the Water Catchment area of this site in 2009. The HAIL information request did not identify the location of the fill. However, based on discussions with Watercare, this appears to be related to an area of land in the Nihotupu catchment (the next catchment to the west) and not associated with the project Site...

The applicant's s92 response letter advised that the subject area "does not relate to the land where the proposed replacement WTP and reservoirs are to be located. It is therefore not included within the PSI for the site or addressed in the SMP". It also comments that:

• The maintenance workshop and chemical storage were located on the existing Huia WTP site. They were demolished in 2008 and the new chlorine building was erected in the same location. They are not included within the PSI as there are no works within the vicinity of the existing chlorine building and it is not affected by the proposed reservoir.

²⁷ It is noted during the preparation of this report that the SMP (Appendix K) was not included in the notification link for the application. As previously noted, this has now been included in the application link for the hearing. Potential contamination issues were raised by only three submissions, and the omission of the SMP was not cited as a reason for the submissions.

• There is no intention to demolish the existing WTP on the site - as clearly set out in the AEE this does not form part of the application.

Ms Tang sought further clarification with respect to the asbestos-related risks associated with demolishing the existing WTP and requested an updated PSI and SMP (being a matter raised in two submissions). In her review dated 24 October 2019, she advises as follows:

- The PSI and subsequent s92 response have appropriately identified the potential HAIL activity at the replacement WTP site and the proposed reservoir 1 site that may have caused soil contamination with lead and/or asbestos/ACM due to potentially inappropriate maintenance/demolishing/disposal of these historical buildings. However, the PSI and s92 response have not assessed the existing WTP, which will be decommissioned for the proposed reservoir 2. It is uncertain whether the building contains lead-based paint and/or ACM. Poor practice in maintenance/demolishment of old buildings may result in soil contamination if the buildings contain lead-based paint and/or ACM.
- Therefore, the WTP building should be surveyed for potential lead-based paint and ACM prior to the building being demolished. If the survey demonstrates there is the potential for soil contamination from lead and/or asbestos, the SMP sampling plan should be revised and extended to this area. The results of the survey and soil testing (if required) need to be included in [a] detailed site investigation report (DSI), which should be provided to Council prior to any other earthworks to commence. This is recommended as a condition.
- Based on the HAIL activity identified on the site, I concur with the AEE that soil contamination, if present, is likely to be in isolated areas relating to historical buildings as well as the existing WTP. The extent of soil contamination is likely to be small as compared to the proposed large volume of earthworks at the site.
- The key concerns raised from the submissions relating to soil contamination are airborne discharge of hazard dust and asbestos on adjacent properties on Manuka Road and Huia Road and the spread of soil contamination to other clean areas. In consideration of the likely isolated soil contamination if it is present, I consider that the SMP has provided appropriate mitigation measures such as the below for dust control and prevention of cross-contamination.
 - erosion and sediment control
 - minimising stockpiles
 - stockpiles to be damped, covered overnight and at weekends
 - asbestos air monitoring (if required)
 - decontamination of vehicles prior to leaving the site or traveling from a contaminated area to another clean area to avoid cross contamination
 - trucks to be lined and covered when transporting asbestos-contaminated material off the site
- The AEE proposes to use the existing Watercare Parau Landfill site (3km to the southwest of the proposed WTP) as a possible alternative landfill site for partial

disposal of the cut material. One of the submissions has raised the concern with the appropriateness of disposal of contaminated soil to Parau landfill site. Available Council data shows that Parau Landfill holds a permit No. 37113 (variation to permit No. 26980) granted by the former Auckland Regional Council to receive discharge of 120m³ of water treatment sludge per week and an additional 300m³ of earth slip material per year to land at 421 Huia Road Parau. The consent expires on 31 December 2030. Considering a different nature and source of the material consented to be deposited at the site back then from the currently large volume of soil intended to be placed within the site, I am of the view that a new consent (Cleanfill or Managed Fill consent) is likely required for such activity.

The SMP states that contaminated soil including asbestos contaminated soil will be disposed to an appropriate licensed landfill facility. The location of the landfill is not specified. If Parau Landfill is chosen as an alternative landfill site, confirmation with Auckland Council on consenting requirement is required. This can be addressed by consent conditions.

In general, I consider that the SMP has been prepared in accordance with the [requirements of the Ministry for the Environment's Contaminated Land Management Guidelines No. 1 and 5 (revised 2011)]. Although the plan states it is prepared based on the assumption of low levels of contamination present at the site, the plan in general includes sufficient details and appropriate control measures to manage/mitigate effects of the proposed earthworks from potentially contaminated soil, stormwater runoff and unexpected discovery of contamination. The SMP will be updated by a condition should significant contamination is identified from the proposed further site investigation.

Ms Tang concludes that "I therefore consider that the site can be made safe and any potential adverse effects of the earthworks on human health and the environment can be mitigated/ managed provided that the recommended conditions are implemented".²⁸ I adopt that conclusion, and accordingly it is considered that the proposal will have no more than minor adverse effects in terms of potential contamination effects on human health and the environment.

9.4.8 Groundwater and settlement effects

The application includes a Groundwater and Settlement Report prepared by T&T (Appendix H to the AEE), which provides an assessment of the magnitude and extent of groundwater drawdown and settlement effects that can be reasonably expected from the construction of the proposed WTP and reservoirs. The assessment has been based on the existing borehole data located within and adjacent to the proposed WTP and reservoir sites. The report addresses four potential effects in respect of groundwater settlement:

- Groundwater drawdown;
- Drawdown-induced settlement effects;
- Potential effects on Armstrong Gully stream; and
- Monitoring requirements.



²⁸ Ms Tang has clarified to the writer that, with respect to her proposed condition 9 ("soils shall be tested at a rate of 1 per 500m³ of material imported to site"), the initial reference to '1' means "1 sample" and this is reflected in the conditions at Attachment 10.

The AEE summarises the findings of the report in respect of drawdown settlement effects as follows:

In terms of the relevant matters of discretion which apply to rules E7.4.1 (A20) and (A28), potential settlement is contained within Watercare property, except for minor settlement of less than 30 mm estimated to occur at the northern curb line of Woodlands Park Road. Watercare has consulted with AT regarding this potential effect on the road, and AT has requested that the condition of the road be monitored during the works and remediated if required. No neighbouring properties to the north will be affected by the lowering of groundwater, due to their location on a rock escarpment beyond the possible zone of influence. The proposed works therefore largely avoid and otherwise remedy adverse effects.

Excavations on the replacement WTP site and existing WTP site will not encounter groundwater. Therefore no drawdown-related settlement effects will occur as a consequence of construction of the replacement WTP or Reservoir 2.

The AEE also comments that drawdown of the static groundwater table will not affect the flows within Armstrong Gully Stream and proposes conditions that require a groundwater monitoring programme to ensure effects are within the predicted range. In particular, it advises that "monitoring of adjacent private properties will not be required as they are located on a rock escarpment immune to the effects of dewatering and settlement".

Further information was provided by T&T as part of the applicant's s92 response which, in summary, provides estimates of the extent of mechanical settlement for the relevant excavations which show:

- Mechanical settlement from the construction of the NH2 tunnel shaft, NH2 tunnel and DAF and BAC structures will not extent into non-WSL property; and
- Mechanical settlement originating from the southern and eastern walls of Reservoir No. 1 will potentially affect Woodlands Park Road.

The groundwater diversion and settlement effects of the proposal have been assessed on behalf of the Council by Sian France (Beca Ltd) in a technical memorandum dated 14 November 2019. Ms France's conclusions are as follows:

An initial ground model has been developed from the information that is available and provides a sufficient basis on which to assess the effects. Further investigations are proposed as part of subsequent design phases. We concur with the Applicant that these additional investigations should be used to validate and if necessary, update the model discussed in this review.

The technical information provided in support of the resource consent application, including in response to s92 questions, indicates that:

• There will be dewatering and groundwater drawdown during construction, which is likely to result in some consolidation settlement within the road reserves of Woodlands Park Road and Manuka Road.

- There is also the potential for some mechanical settlement in the road reserves of Woodlands Park Road and Manuka Road.
- Settlement is not expected to extend into any private third party properties.
- The risk of adverse effects on services and transport infrastructure is expected to be less than minor.
- The risk of adverse effects on any third party owned assets due to stability issues triggered by the proposed works is likely to be very low.

Overall, any adverse effects on the environment are likely to be less than minor.

Given the scale and duration of excavations and associated dewatering, some monitoring will be required to allow confirmation of effects, and where necessary trigger remedial measures.

The final GSMCP to be prepared by the applicant and referenced in the consent conditions will enable any settlement that does occur to be checked against the envelope of effects considered here. The monitoring will provide an early warning of any groundwater or ground movements that are approaching or exceed the envelope presented here and will be used trigger re-evaluation of effects and if necessary, implement remedial measures.

Ms France's review also addresses relevant submissions and sets out recommended conditions of consent. Key matters noted in respect of submissions are as follows:

- Present reliance on historical investigations will be supplemented at the detailed design stage, and will be subject to peer review;
- Further site investigation will be required to validate the global site stability analysis undertaken to date, but [i]t is likely that any changes in the model would not materially impact the assessment of effects on third parties, and, that there are sufficient design solutions which can be employed to mitigate the risk to the level presented in the AEE. This also addresses the concerns set out in a desk-top study by Riddos Consultants Ltd (#5252).²⁹
- No buildings are located within the expected zone of settlement and the project is not expected to exacerbate existing instability of adjacent properties. However, if additional investigations identify that any buildings are within a zone of settlement, then building condition surveys would be required, although it is recommended that such surveys for properties adjacent to the siter boundaries are undertaken, and that such work would help inform the global stability assessment and determine any existing ground instability.

Ms France's conclusions, and response to relevant submissions is adopted, and accordingly it is considered that adverse effects from groundwater drawdown and settlement will be within acceptable parameters and able to be appropriately managed, based on adherence with the conditions recommended by Ms France.

²⁹ Ms France notes that the report appendices (geological cross-sections) were not attached the submission and suggests that the submitter may wish to provide these at the hearing.

It is noted that the applicant's s92 response of 8 November 2019 advises that a draft version of the GSMCP will be provided at the hearing, and this will be expected to provide further detail in respect of proposed monitoring processes ,and to reflect the requirements for this plan as recommended by Ms France at page 34 (condition 8) of her memorandum.

9.4.9 Stormwater diversion and discharge effects

The Project site is within a SMAF1 overlay within the AUP(OP) and is therefore subject to a number of hydrology mitigation requirements, including for retention and detention. A Stormwater and ESC Report has been prepared on behalf of the applicant by Cook Costello and is contained in Appendix G to the AEE.

The AEE summarises the assessment and findings of the Stormwater and ESC Report at section 7.9.1, and is further summarised below:

- Key design principles are to replicate as much as possible the pre-development scenario in terms of catchment areas and points of discharge, and to manage this through detention/ attenuation of flows to predevelopment levels in both the Armstrong and Yorke Gullies up to the 1 in 100 year event.
- Stormwater flows from the development will enter either the Armstrong Gully catchment or the Yorke Gully catchment, and it is proposed to manage the flows to pre-development levels in all assessed storm events up to a 1 in 100 year event. This will be achieved by controlling the discharge from two online stormwater management structures; one within each catchment. Flows that discharge to Armstrong Gully will be via an existing lagoon in the existing Huia WTP site with further modifications if required as a result of detailed design). Flows that discharge to Yorke Gully will pass through a proposed dry pond and into the new section of stream, with runoff volumes from the dry pond designed to mimic pre-existing flows into the Yorke Gully.
- Surface water runoff from some WTP roof areas is to be conveyed into the water treatment system, reducing the volume of stormwater discharged to the environment and providing the level of retention required by the AUP(OP) and the Council's Guidance Document GD01 (for Stormwater Management Devices in the Auckland Region). Further retention volume will be provided by the proposed living (green) roof on Reservoir 1.³⁰
- Water quality from paved areas will be addressed through the construction of two proprietary devices on the replacement WTP site. A stormfilter vault is proposed to provide treatment for the majority of the catchment, while the smaller catchment within the replacement WTP site that discharges to Armstrong Gully shall also be treated by a proprietary device (the AEE notes that it is assumed that roof areas will be constructed of non-zinc material). No treatment is considered necessary within the Reservoir 1 or existing WTP sites. In this regard, the AEE advises that alternative methods such as a wetland, biofiltration and swales were considered, but these were not considered suitable for the proposal. It notes that the Ecological Assessment (Appendix L to the AEE)

³⁰ The review by Ms Johnston comments at p4 of her memorandum that "[t]he applicant's engineer has also considered the use of living roofs for Reservoir 1 and Reservoir 2, although this is yet to be formally included as part of the proposal". Clarification by the applicant as to the use of green roofs is recommended to be provided at the hearing.

concludes that the ecological function of the receiving streams will not be affected by the proposal.

In terms of detention, the AEE advises that the requirements of the AUP(OP) and GD01 will be met for events up to a 1 in 100 year storm. Overland flow paths will be constructed to accommodate rain events that exceed this. It notes that these measures will ensure that the risk of increased flooding of downstream environments is adequately managed and that the retention of stormwater on site in events up to a 1 in 100-year storm will reduce the risk of erosion downstream.

The AEE concludes that, overall, "the proposal has been designed to provide the appropriate level of stormwater retention (volume reduction) and detention (temporary storage) to maintain predevelopment flows, and best practicable measures will manage stormwater quality, quantity and erosion potential to ensure effects are appropriately avoided or mitigated".

The review by Ms Johnston (technical memorandum dated 29 November 2019) has assessed stormwater effects in terms of stormwater quality, quantity (retention and detention), natural hazards and flooding (including with respect to overland flow paths), outfalls and operation and maintenance. In respect of these topics the following key observations by Ms Johnston are noted:

- The proposed approach to stormwater quality treatment is appropriate in the site and project context, and the water quality-related effects of stormwater discharging to the receiving environments are likely to be adequately mitigated.
- The applicant has proposed to achieve the required retention and detention within the existing and proposed dry ponds. The dry ponds will achieve hydrology mitigation outcomes in line with the specified requirements of the AUP i.e. to achieve the equivalent of 'SMAF-1' requirements under Table E10.6.3.1.1. The approach to managing stormwater quantity effects in respect of hydrology mitigation, and in terms of natural hazards and downstream flood-related risk, is considered appropriate in the context of the Project site and its context, and that any potential effects in these respects will likely be appropriately mitigated.
- While the design of outfalls is consistent with appropriate design guidelines, there is potential for 'green' outfall designs to be considered during detailed design phase to reduce the impact of engineered structures within a sensitive receiving environment.
- Maintenance of the proposed stormwater devices for the project will be undertaken by WSL as the consent holder, and once detailed design of the devices has been confirmed, a specific operation and maintenance plan will be developed. It is noted that the natural debris loads from bush catchments can lead to higher than expected maintenance frequencies, and while the functionality of such devices can be maintained long-term, this is dependent on a regular and often high-frequency maintenance regime.

Ms Johnston's review also addresses relevant submissions and sets out recommended conditions of consent. The submissions considered include those of a general nature (regarding flood risk, impacts on instream ecology and riparian habitat and stormwater quality), and those from specific organisations (Forest and Bird, the Waima and Woodlands Park

Residents & Ratepayers Association and the Little Muddy Creek Estuary Rehabilitation Project). In summary:

- The approach to managing downstream flood-related risk is appropriate in the site and project context, and in-line with Council's best practice guidelines (including GD01).
- The applicant has proposed to achieve hydrology mitigation in accordance with the relevant standards within Chapter E10 of the AUP(OP) and has demonstrated that the proposed methods of achieving hydrology mitigation will be achievable at the site however this is subject to detailed design. Conditions have been recommended to ensure the objectives of the design to achieve these standards is realised.
- The use of proprietary Stormwater360 StormFilter devices for water quality treatment of all trafficked impervious area is appropriate in the site and project context, and the water quality-related effects of stormwater discharging to the receiving environments will be adequately mitigated.

The reader is directed to Ms Johnston's review in respect of her detailed responses to those submissions from the aforementioned organisations. Of note, however, Mr Johnston has agreed with the submission from Forest and Bird with respect to the need for an amendment to the condition regarding the need for stormwater retention (per condition "X.38" of her memorandum).

Overall, Ms Johnston agrees with the conclusions of the applicant's stormwater report, and concludes that:

As outlined above, potential effects resulting from the diversion and discharge of stormwater from new and redeveloped impervious area within a SMAF area will be suitably mitigated. The current (conceptual) proposal is generally appropriate in respect of stormwater outcomes and in the context of this site, receiving environments and existing infrastructure and site constraints.

The above conclusion is adopted, and accordingly it is considered that adverse effects from stormwater diversion will be minor and able to be appropriately managed, based on adherence with the conditions recommended by Ms Johnston.

9.4.10 Cultural effects

Section 9.6 of the AEE describes the consultative process undertaken by the applicant with Mana Whenua, through its Mana Whenua Kaitiaki Forum. It notes that of the 19 Mana Whenua groups represented on the Forum, interest in the proposal was expressed by Te Kawerau ā Maki ("Te Kawerau"), Te Akitai and Ngāti Whātua o Ōrākei. Further, it advises that Te Kawerau were the only Mana Whenua who have indicated that they would prepare a Cultural Values Assessment ("CVA"), while Te Akitai and Ngāi Whātua o Ōrākei both requested to be informed as to the progress of the project.

The assessment of cultural effects at section 7.10 of the AEE notes that Te Kawerau consider the Waitākere Ranges to be a nationally significant taonga (treasure) for the people of New Zealand, with the death of the forest due to kauri dieback identified as an existential threat. Te Kawerau has subsequently decided to place a rāhui (customary prohibition) over the Waitākere Ranges forest to prevent and control human access until effective and appropriate research,

planning and remedial work is completed to ensure the risks of kauri dieback are neutralised or controlled.

In this respect, the AEE highlights the various environmental management and mitigation measures proposed as part of the application, including with respect to minimising the risk of kauri dieback. It states that a broad range of environmental management and mitigation measures are proposed to ensure that the adverse effects of the proposed works are appropriately avoided, remedied and mitigated. This is stated to include stringent protocols and a best practice approach to managing and minimising the risk of kauri dieback. The proposed mitigation and compensation package also incorporates tree assessments and treatment, including on private property, to contain and minimise harm from kauri dieback and the minimisation of the overall development footprint. These measures have been discussed in more detail at section 9.4.5 above, although it is noted that no specific measures have been proposed at this stage by way of a draft KDMP, nor have the measures described in section 4.10.2 (by reference to the applicant's Ecological Assessment) and 7.5.4 of the AEE formed part of the applicant's proposed condition of consent (Appendix Q to the AEE), other than inclusion of "kauri dieback protocols" as part of the proposed EMP.

The AEE advised of the desire by Te Kawerau to prepare a CVA, which was understood by the applicant to be underway at the time of lodgement of the application, and that this would "further inform the assessment of effects on cultural values". However, a submission from Te Kawerau Iwi Tribal Authority and Settlement Trust (#5025) states that it opposes the application (noting that other submissions, such as 4792, 4802 and 4834, also advised of concerns on cultural grounds). In particular, the submission advises that:

Te Kawerau a Maki are submitting as opposition due to the adverse cultural impacts expected to occur through the development. We are currently in the processes of preparing a Cultural Impact Assessment ["CIA"] based on the reports provided on the Auckland Council Public Notification web-page. This report will identify what and where the adverse cultural impacts will be and how they may be addressed through further engagement between Watercare and Te Kawerau a Maki.

The reasons for the submission are noted as follows:

The proposed treatment plant upgrades are within the rohe and cultural landscape of Te Kawerau a Maki and will have adverse cultural impacts. Adverse effects such as, but not limited to, the removal of threatened native vegetation, fragmentation of Waitakere forest, discharge to a receiving environment and lack of cultural identity and representation throughout the area are several of the reasons for this submission and will be discussed in depth through the [CIA]. Te Kawerau a Maki have legislated recognition over the area through the Waitakere Ranges Heritage Area Act 2008 and the Te Kawerau a Maki Treaty Settlement Act 2015.

It is understood from this submission that a CIA (or CVA) is being prepared, although the timing as to when that will be provided is presently unknown. Further information in that regard was sought as part of the Council's second s92 request, including with respect to the opposition expressed by Te Kawerau and how that may affect the applicant's assessment of cultural effects provided to date. The applicant's s92 response of 8 November 2019 advised in this regard that:

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The AEE acknowledges the importance of the Waitakere Ranges to Te Kawerau a Maki and identifies the environmental management and mitigation measures proposed that may be of relevance to cultural effects. This includes refining the size/footprint of the proposed WTP and reservoirs and locating the footprint, wherever possible, away from permanent and intermittent streams and areas identified as having particularly high values, protecting water quality through best practise stormwater treatment and erosion and sediment control, and containing and minimising the harm from Kauri dieback along with the broader suite of ecological mitigation and compensation measures proposed. The opportunity for mana whenua to exercise their kaitiakitanga in assisting in the proposed ecological mitigation and compensation works and ensuring the knowledge, expertise and practices held by mana whenua is utilised in the final design of these measures is also recognised.

In light of the most recent Court of Appeal 'Davidson decision', a brief assessment against Part 2 of the RMA is set out in Section 8.2.2 of the AEE which takes into account the above. A comprehensive assessment against the AUP provisions is set out in Section 8.6 and Appendix P. It is acknowledged in a number of places in the AEE that Te Kawerau is currently preparing a [CVA] to assess the cultural implications of the proposal and identify opportunities for kaitiakitanga and that this will further inform the assessment of effects on cultural values.

We understand that Te Kawerau has indicated to Watercare that the CVA will be available shortly, however we are unable to provide a definite indication of timing. We expect that where there any updates to the cultural effects assessment and policy assessment required as a result of the CVA then this will be able to be reflected in evidence.

At the time of preparing this report, however, it is the writer's view that the extent of adverse effects on the cultural values identified by Te Kawerau are not clear. Accordingly it is not presently possible to confirm that these effects will be minor or more than minor, although it is acknowledged that the measures undertaken in the development of the proposal have sought to mitigate those adverse effects likely to be of concern to Te Kawerau. It is expected that the applicant will provide an update with respect to the CVA (or CIA) for the hearing.

9.4.11 Transport effects

The transport-related effects of the bulk earthworks and construction activities, through to commissioning of the new WTP and reservoirs, have been assessed for the applicant by CH2M Beca (Appendix M to the AEE). The outcomes of that assessment are summarised in the AEE, to the extent that they relate to the vegetation removal and earthworks provided for under this application.

The AEE notes by way of summary of the assessment by CH2M Beca that the existing road network, including the Titirangi roundabout, will have sufficient capacity to cater for the proposed heavy and staff vehicle movements generated by the proposed construction and operational activities. It advises that a 'worst case' scenario, and concludes that:

The proposed CTMP will satisfactorily manage the potential adverse effects of the enabling and construction works for the replacement WTP and proposed reservoirs providing for the safe and efficient operation of the local transport network. A draft CTMP

is appended to the Transport Assessment and it is anticipated that the conditions of consent will provide for the further development and certification of the CTMP by the Council prior to the enabling works and construction commencing.

In their assessment CH2M Beca conclude that the Project can be undertaken with effects on the safe operation of the transport network that are minor or less and are overall acceptable.

The construction traffic -related effects of the proposal have been considered on behalf of Auckland Transport by Mat Collins (Flow Transportation), report dated 9 December 2019, and on behalf of the Council by Anatole Sergejew (Traffic Planning Consultants Ltd), report dated 29 November 2019. Mr Sergejew's report considers traffic impacts in the context of both light and heavy construction vehicles, potential pinch points on the identified routes, effects on school traffic, road capacity and congestion, site access and effects on parking, and particular matters raised in submissions. Mr Sergejew's report makes the following conclusions and recommendations:

As the proposed works are located on land designated for water supply purposes, the design, construction and operation of the WTP and reservoirs are authorised by the designation and are thus not the subject of this application or this review. This traffic review is therefore confined to traffic effects associated with the earthworks and vegetation removal associated with the construction of a new Water Treatment Plant and reservoirs.

Having said this, my review has given consideration to the cumulative effects of both earthworks and construction traffic effects, as these activities will overlap.

The applicant has suggested various conditions of consent to avoid, remedy or mitigate adverse traffic effects during earthworks and vegetation removal, and I have suggested some additions and modifications.

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It is proposed that most of the measures to avoid, remedy or mitigate adverse traffic effects will be detailed in the CTMP, which must be prepared by the applicant and approved by Council prior to works commencing.

Overall, I consider that, provided the consent includes the attached conditions, the proposal is acceptable from a transport perspective.

Two aspects of note in Mr Sergejew's assessment, and the subject of minor differences from the proposal as put forward by the applicant (and assessment by Auckland Transport), are:

 The requirement for construction traffic to be prohibited during school pick-up/drop-off times, particularly on the Woodlands Park Road, Atkinson Road and Golf Road routes, unless such movements are otherwise agreed via the CTMP with Auckland Transport and named stakeholders (e.g. school boards). The difference from the applicant's position appears to be that the applicant considers this too restrictive, and that such a prohibition could be reflected in the CTMP if considered necessary at the time of construction. I consider the approach adopted by Mr Sergejew to be appropriate, whereby the default position is that such movements are precluded, unless otherwise able to be agreed through the CTMP process in consultation with affected parties, rather than enabled (albeit on a restricted basis) and leaving affected parties to make a case for prohibition through the CTMP development process.

• The extent of use of Atkinson Road versus Titirangi Road. Mr Sergejew has concerns with respect to the use of the former, due to the prevalence of schools and childcare centres etc, but Auckland Transport do not wish to rely on Titirangi Road ("option 1"). In this regard he advises:

While I consider Option 1 (inbound and outbound movements along Titirangi Road only) to be more appropriate, I agree with Auckland Transport that a degree of flexibility should be preserved to allow the construction routes to be determined and adapted as part of a Construction Traffic Management Plan and Corridor Access Request.

In the updated transport conditions attached to their Section 92 response, dated 4 November 2019, CH2M Beca propose a condition that the CTMP prefer heavy vehicles using Titirangi Road instead of Atkinson Road (South), Kaurilands Road and Glendale Road. I support this, but suggest that use of Titirangi Road also be favoured over Godley Road, Golf Road and Portage Road.

A separate but related matter is the effect of the additional construction traffic on public road assets. In this regard, Mr Sergejew notes that:

Auckland Transport has proposed a condition that the CTMP include measuring the condition of public road assets prior to construction and requiring the applicant to repair any such asset damaged by construction works within 5 days, unless the damage raises safety issues in which case it should be repaired as soon as practicable. I support this condition.

A condition requiring preparation of a Pavement Impact Assessment is also endorsed, based on Auckland Transport's input as set out above.

The review by Mr Sergejew also addresses relevant submissions and sets out recommended conditions of consent. Submission topics include the effects of existing heavy traffic volumes on proposed construction traffic routes and heavy vehicle traffic generation generally and on identified roads and specific intersections, impacts on schools and pedestrians from heavy vehicles, congestion effects, the need or otherwise for speed cushions on Atkinson Road, effects on local parking. The analysis therein reflects the findings reached in respect of these topics as addressed within the main body of Mr Sergejew's assessment, including his recommendations outlined above.

Mr Sergejew's conclusions and recommendations have been considered by Mr Collins for Auckland Transport, who advises that:

I consider that the matters raised in Section 92 queries and public submissions have been appropriately addressed by the applicant or can be addressed through the consent conditions and advice notes included in this report. As part of my review I have worked closely with [Mr Sergejew] and support the content and conclusions of his summary report (attached as Appendix A), other than minor amendments as detailed in my report.

Should my recommended conditions of consent and advice notes be accepted, I would be satisfied that the proposed enabling works for the Huia Water Treatment Plan can be safely and efficiently provided for from a transportation perspective.

The conclusions and recommendations by Messrs Collins and Sergejew are adopted, and it is therefore considered that adverse transportation effects as a result of the construction of the WTP Project will be no more than minor, subject to the conditions as recommended by Mr Sergejew (and amendments thereto by Mr Collins) and which reflect the above commentary.

9.4.12 Noise and vibration effects

(a) <u>Construction noise and vibration (Project site)</u>

The noise and vibration-related effects of the bulk earthworks and construction activities, through to commissioning of the new WTP and reservoirs, have been assessed for the applicant by Marshall Day Acoustics ("MDA", Appendix N to the AEE). The outcomes of that assessment are summarised in the AEE, to the extent that they relate to the vegetation removal and earthworks provided for under this application.

The assessment advises that noise from enabling and bulk earthworks carried out at the replacement WTP site is predicted to comply with the relevant noise limits, apart from when vegetation removal (chainsaw/chipper) occurs at 55m from Manuka Road receivers, and at 65m from Scenic Drive receivers. For Scenic Drive receivers the exceedances are considered to be minor (3dB) and intermittent. The AEE comments that, because the work will be carried out during normal construction hours, "no adverse effects are anticipated".

The assessment by MDA has also considered the potential noise impact of increased truck movements on the road network which indicate that the increased truck movements and the ratio of heavy vehicles on the identified roads would result in less than a 1dB increase in noise when assessed over a daytime hour. The assessment of vibration effects notes that these will be "negligible" for Reservoir 1 and the existing Huia WTP/Reservoir 2 location, and potential risks of cosmetic damage to the existing WTP buildings, or the Nihotupu and Huia Filter Stations will be low.

The AEE advises that a Construction Noise and Vibration Management Plan ("CNVMP") will be developed to define mitigation measures and implementation of best practice construction techniques to minimise adverse effects arising from noise and vibration. It concludes that:

In terms of the potential noise impact of increased truck movements on the road network, MDA concludes that given the relatively moderate number of trips generated during construction works and when considering the already comparatively high number of nonproject related vehicle movements on the identified roads, the predicted increase in traffic noise level in a daytime hour due to project heavy traffic would be generally imperceptible.

The CNVMP will contain the procedures necessary for identifying and mitigating/managing any potential noise issues through an adaptive management
approach, as has historically occurred on various large infrastructure projects in Auckland.

MDA concludes that, if general compliance with the construction noise limits is achieved and a CNVMP implemented, particularly for those activities predicted to exceed the relevant limit, then construction noise would be adequately controlled.

The Council's second s92 request sought further information with respect to the availability of a draft CNVMP (along with an EMP and GSMCP), noting that other draft management plans had been provided. The 8 November 2019 response advised in this regard that:

A draft CNVMP will be prepared for the hearing however it will be based on a number of assumptions. MDA has indicated that the most appropriate time to develop the CNVMP and provide it to Council for review would be once the main Contractor has been engaged and the construction methodology has been confirmed. The draft CNVMP would therefore need to be updated and finalised at this time.

The construction noise and vibration effects of the Project have been assessed on behalf of the Council by Andrew Gordon, a Specialist in the Council's Contamination, Air & Noise Team (review dated 29 November 2019). Mr Gordon advises of his agreement with the MDA assessment that noise from works carried at the replacement WTP site is predicted to generally comply with the permitted noise standards, except where vegetation is removed/processed at 55m from Manuka Road receivers and 65m from Scenic Drive receivers, where infringements of 3 to 4 dB are predicted. He agrees that "predicted infringements of 3-4 dB are not significant when works are carried out during reasonable day time hours and affected neighbours have been notified in advance of the works".³¹ However, he notes that the duration of the infringement has not been estimated and advises that this should be provided by the applicant at the hearing.

Construction vibration effects have been assessed by Mr Gordon as compliant with the relevant standards. I note that the potential effects of vibration from truck movements on the local road network have been addressed in section 9.4.11 of this report above (Transport effects).

In terms of management and mitigation of construction noise and vibration effects, Mr Gordon advises:

I consider the extent of noise infringements to be reliable but can be re-checked once the contractor, equipment, and methodology is confirmed in a CNVMP and, validated by onsite monitoring when the works are carried out.

A CNVMP is the most appropriate method for managing temporary construction noise and vibration. I concur with this approach and the submission of a CNVMP to council for certification prior to commencement of any works on the site and should be conditioned accordingly.

Furthermore, if works are required outside of normal construction hours, or expected to infringe the permitted noise standards (e.g. vegetation clearance), an Activity Specific Construction Noise and Vibration Management Plan (ASCNVMP) will be prepared to

³¹ While Mr Gordon's memo advises that the Predicted infringement of E25.6.27 Construction noise is a reason for consent, however this is not a regional rule and so is considered to be excluded from the reasons, as noted at paragraph 13 of the 22 May 2019 letter from Simpson Grierson (Appendix B to the application).

mitigate and manage effects associated with the specific works. This is an additional and separate activity specific management plan under the umbrella CNVMP.

Noise and vibration monitoring should be carried out at commencement of noisy and high vibrating creating activities so that works can be managed accordingly to ensure noise and vibration effects are minimised as far as practicable.

Provision of a draft CNVMP for the hearing is recommended providing the assumptions used to prepare the CNVMP are clearly stated. Providing a draft CNVMP will be helpful for decision makers (and submitters) to see how noisy construction works and in particular noisy works predicted to infringe the noise limits, will be mitigated and managed. The estimated duration of the noise infringement mentioned earlier can be included.

Mr Gordon has considered submissions regarding construction noise effects and notes that in his view, such effects have been adequately assessed by MDA and that "the submissions generally do not raise any issues that have not been addressed with the acoustic information provided". He has endorsed the conditions proposed by MDA, but has considered that additional conditions are required in respect of operational noise compliance, and a restriction on the use of tonal reverse vehicle alarms. While the latter is accepted, I consider that operational noise management will be a matter to be addressed through the OPW process, and so have not included these conditions in the schedule at Attachment 10.

(b) <u>Construction noise (local road network)</u>

The Council's second s92 request also sought further information with respect to potential vibration nuisance effects created by passing trucks driven on the road network during the construction phase, and indicative vibration levels for a dwelling set back "an arbitrary distance of 10m from a well maintained road with guideline limits in ISO 2631-2:1989 or other suitable standards/guidelines". This was addressed in the 8 November 2019 s92 response, by reference to advice from MDA. This advises of vibration thresholds, including for perceptibility, and comments that:

We have limited measurement data available for heavy vehicle movements on roads. ... The figure below indicates that for a distance of 10m from the road, a level of 1mm/s could be expected. While this would be perceptible (e.g. crockery or glassware could rattle), with prior notification of the activity the resulting effects are considered acceptable on the basis that the activity would occur during daytime hours. It should also be noted that dwellings located 10m from a road would also experience similar levels of vibration from other non-project related heavy vehicles.

The applicant's covering letter notes that "houses along the main transportation routes in proximity to the Replacement WTP are typically set back in the order of 15 to 20m or more from the edge of the carriageway", and so "[u]sing a setback distance of 10m therefore represents a conservative assessment".

Mr Gordon has considered this issue, along with associated traffic noise effects, in his review. In terms of noise, he notes his agreement that "noise from trucks/vehicles driving on the public road network (to and from the construction site) is outside the scope of the AUP(OP) as there are no specific noise standards". Nevertheless, and with reference to the applicant's assessment of such effects, he advises that traffic volumes would need to double to result in a

+3dB increase in noise. The expected increase in the percentage of truck traffic, from 3% to 6.3% over months 29 -35 of the construction process), will lead to an estimated 1 dB L_{Aeq} increase. He notes that for some residents "truck noise will become more noticeable as trucks will pass their property more frequently" but advises that the change in total traffic noise levels will be imperceptible.

(c) <u>Summary</u>

Overall, it is considered that, based on the assessment provided by MDA and Mr Gordon, that the noise and vibration effects of the construction works can be adequately controlled through the implementation of a CNVMP (and ASCNVMP as required), and other conditions as recommended by MDA. It is noted that a draft version of the CNVMP is expected to be provided at the hearing for the consideration of the hearing commissioners.

9.4.13 Social impact effects

As noted in section 9.4.2 above, the applicant's s92 response of 8 November 2019 has addressed the issue raised in submissions with respect to the potential social impact effects of the present proposal, including with respect to the relative effects of the various WTP options identified, as originally assessed through the "Options SIA". The new SIA has been prepared by Amelia Linzey of Beca Ltd, dated 8 November 2019. In terms of the relative social impacts between the current proposal and the "second choice" site at Parker Road, the SIA comments that:

these potential impacts were generally considered to be at a lower scale of impact than other short-list options (in particular the Parker Road options) based on the following reasons:

- the smaller number of people potentially impacted;
- the nature of the community;
- accessibility for that community existence of a WTP in a similar location; and
- residential properties are not directly affected by the site options.

For the proposal as now presented in the application, the SIA concludes:

On the basis of the above review, it is considered that the potential social impacts of the proposed WTP (as identified in the Options SIA) have been considered in the design refinement of the proposal, the AEE and the development of measures to manage and mitigate these effects (the conditions, particularly relating to management of construction effects). In particular, the proposed conditions for the management of the effects provide for ongoing community consultation during construction through the [CLG]. Active community engagement was a key mitigation measure proposed in the options SIA. During design, community concerns raised through the CLG resulted in design changes to the proposal. The conditions provide for this forum to discuss management of effects going forward.

The proposed conditions have responded appropriately to most of the potential social impacts identified. Preparation of a CTMP and CNVMP will provide for management of construction effects, which is appropriate for impacts of way on life [sic] caused by heavy vehicle traffic as an example.

There is room for the CLG to include representation of local businesses as the potential impacts on sustaining one's self are not addressed in the AEE. There is also potential for the CTMP to include provision for pedestrian access along footpaths and roads, as impacts on way of life identified in the SIA included recreational users walking and cycling in the area.

Overall, it is considered that the potential adverse social impacts identified in the Options SIA can be appropriately managed through the mitigation measures proposed in the AEE if these form conditions of that consent. On this basis, the level of assessed impact from the Options SIA are considered to either remain the same, or be less than in the earlier assessment.

The conclusions of the SIA are generally agreed with. While it is noted that a CNVMP has not yet been prepared (to draft stage), as discussed in section 9.4.12, the principle that this will provide for the management of construction effects, in conjunction with the final CTMP, is accepted.

Accordingly, it is considered that while adverse social impacts are considered likely to be experienced as a result of the construction of the WTP in this location, those effects are considered to be able to be appropriately mitigated through adherence to conditions and management plans, and will be of lesser effect than those that would arise from development of alternative sites, such as at Parker Road, for the reasons set out in the SIA.

9.4.14 Conclusion

The proposal raises a range of effects topics to be considered. By way of summary, the following conclusions are set out in table format below in respect of the topics as assessed in the preceding analysis (noting that conclusions in respect of each topic are subject to proposed mitigation measures and/or adherence to recommended conditions of consent):

Effect topic	Scale of adverse effect	Report reference
Stream diversion and reclamation	Minor	Refer 9.4.3
Earthworks and sediment generation	Minor	Refer 9.4.4
Terrestrial ecology	More than minor	Refer 9.4.5
Land stability	Minor	Refer 9.4.6
Contamination and soil disturbance	Minor	Refer 9.4.7
Groundwater and settlement	Minor	Refer 9.4.8
Stormwater diversion and discharge	Minor	Refer 9.4.9
Cultural	Unknown	Refer 9.4.10
Transportation	Minor	Refer 9.4.11

Noise and vibration	Minor	Refer 9.4.12
Social impact	Minor	Refer 9.4.13

Table 3 – Effects summary

I therefore conclude that, overall and in terms of s104D(1)(a) of the RMA, and because of the high significance of terrestrial ecology impacts to the overall consideration of effects generally, the adverse effects of the proposal will be more than minor. I therefore agree with the conclusions of the AEE (at 8.7) that "adverse effects on the environment will be more than minor".

Accordingly, it cannot be concluded that the proposal is able to satisfy the first gateway test under s104D(1). It is therefore necessary to consider if the proposal is consistent with, and not contrary to, the provisions of the relevant plan (i.e. the relevant regional plan provisions of the AUP(OP)), before an overall evaluation can be carried out under s104. This assessment is provided in section 10 below.

10. Section 104D(1)(b) - Assessment against the AUP(OP)

10.1 Introduction

The relevant regional plan sections of the AUP(OP) that are to be assessed in s104D(1)(b) terms are related to the matters for which consents are required, being those relating to the SEA Overlay (Chapter D9), stream diversion and reclamation (Chapter E3), groundwater diversion (Chapter E7),³² impervious areas discharging to the Yorke Gully Stream and to a SMAF 1 area (Chapters E8³³ and E10), vegetation removal in a SEA (Chapter E26), earthworks (Chapters E11 and E26) and contamination (Chapter E30). The proposal is considered against the relevant provisions of these chapters below.

In undertaking an assessment of the objectives and policies, based on an understanding of caselaw guidance on the subject, the writer agrees with the comments at section 8.7 of the AEE that this test of s104D:

does not require a detailed 'policy by policy' assessment, but rather an overall consideration of the proposal within the context of the Regional Plan provisions. In addition, the Court has applied the definition of "contrary" as being "repugnant to" or "opposed to", not simply that the proposal does not find support from the relevant policies and objectives.

On this basis, the AEE reaches a conclusion that "the application is considered to be not contrary to the objectives and policies of the Regional Plan provisions of the AUP" and that "[t]he application therefore passes the second gateway test of Section 104D and can proceed for consideration under Section 104(1)". I note in this regard that the basis of an assessment under s104D(1)(b) differs from the assessment of effects under s104D(1)(a), which is limited to an assessment of adverse effects, whereas proposed ecological compensation measures, are not precluded from consideration as part of an analysis of the objectives and policies (noting that such measures are expressly anticipated, for example at Policy D9.3).

Given the significance of this assessment to the outcome on the application (in view of the conclusion with respect to s104D(1)(a)), I have carried out a detailed review of the relevant objectives and policies, but have provided an overall consideration against each relevant chapter, before arriving at an overall conclusion in section 10.11 below. This adopts the applicant's assessment in the AEE (at Appendix P) in the first instance, where that is concurred with, and incudes reference where applicable to the comments on these provisions by the Council's specialists.

10.2 Chapter D9 – SEA Overlay

10.2.1 Introduction

Chapter D9 addresses the provisions related to the SEA Overlay. The Background (explanation) to this chapter states as follows:

Auckland's indigenous biodiversity is unique with a diverse range of ecosystems reflecting the complex physical environment of the region. Natural ecosystems and

³² The objectives and policies related to groundwater are addressed by reference to the objectives and policies in Chapters E1 and E2 (per E7.2/3).

³³ The objectives and policies related to stormwater discharges and diversion are addressed by reference to the objectives and policies in Chapters E1 and E2 (per E8.2/3).

indigenous biological diversity contribute to the character and identity of Auckland and distinguish it from other regions of New Zealand.

Healthy and functioning ecosystems contribute to improved water quality, soil conservation and carbon sinks, as well as providing opportunities for our recreation, economic, and cultural use. However, development has resulted in the loss of habitats and a reduction of biodiversity. Urban expansion and development, changes in coastal and rural land uses, and the ongoing degradation from pest species continue to threaten the maintenance of indigenous biodiversity.

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10.2.2 Assessment

The objectives and policies are discussed as follows:

Objectives D9.2

- (1) Areas of significant indigenous biodiversity value in terrestrial, freshwater, and coastal marine areas are protected from the adverse effects of subdivision, use and development
- (2) Indigenous biodiversity values of significant ecological areas are enhanced.
- (3) The relationship of Mana Whenua and their customs and traditions with indigenous vegetation and fauna is recognised and provided for.

AEE Comment

The AEE comments with respect to these objectives that:

The proposed development footprint has been designed to avoid areas assessed as
of highest ecological integrity, including mature kauri forest, kauri-podocarp forest
and swamp forest ecosystem units. The area of significant vegetation to be cleared
has been minimised as much as practicable through a series of iterative design
layouts.

The comprehensive ecological compensation package (WBMP) has been designed to fully compensate the residual adverse ecological effects of the project and provide an overall net benefit to ecological values.

Significant indigenous biodiversity areas to be retained will be protected from the adverse effects of development through the implementation of robust construction management measures including a kauri dieback protocol.

• The proposal includes the protection and enhancement of the remaining 11 ha of native vegetation within the Project Site, most of which is SEA. Residual adverse ecological effects will be compensated for by the comprehensive WBMP described in the AEE Report, which will enhance the biodiversity values of 990 ha of public and private land, approximately 720 ha of which is classified as SEA. The compensation package is anticipated to appropriately compensate for the loss of forest extent, and result in significant biodiversity gains for the Little Muddy Creek catchment, with expected benefits including the return and/ or range expansion of

suppressed biota, and improved forest condition, regeneration processes and habitat values within the managed forest areas.

 Mana Whenua have been engaged through Watercare's Mana Whenua Kaitiaki Forum. Te Kawerau is the only mana whenua who have indicated that they would prepare a CVA for the project, which is underway. Watercare will continue to liaise with the representatives of the other iwi through the Forum. Through these processes, opportunities for the recognition and provision of the relationship of Mana Whenua with indigenous vegetation and fauna will be identified.

Assessment

Having regard to the particular wording of objective 1, it is not apparent that the biodiversity values of the existing forest are 'protected' by the proposal, but it is acknowledged that efforts have been made to avoid those areas of significant ecological integrity and that implementation of the WBMP is expected to compensate for those values lost within the Project site, and which Dr Ussher considers will lead to an overall enhancement of the biodiversity values in the Waima catchment.

In respect of Mana Whenua, it is noted that at the time of preparing this report, no CVA had been provided. However, based on the submission by Te Kawerau, it is not apparent that the relationship of Mana Whenua and their customs and traditions with indigenous vegetation and fauna has been appropriately recognised or provided for. This may, however, be clarified by the submitter at the hearing and/or through provision of a CVA.

Policy D9.3(1) – Managing effects on terrestrial ecology

Manage the effects of activities on the indigenous biodiversity values of areas identified as significant ecological areas by:

- (a) avoiding adverse effects on indigenous biodiversity in the coastal environment to the extent stated in Policies D9.3(9) and (10);
- (b) avoiding other adverse effects as far as practicable, and where avoidance is not practicable, minimising adverse effects on the identified values;
- (c) remedying adverse effects on the identified values where they cannot be avoided;
- (d) mitigating adverse effects on the identified values where they cannot be avoided or remediated; and
- (e) considering the appropriateness of offsetting any residual adverse effects that are significant and where they have not been able to be mitigated, through protection, restoration and enhancement measures, having regard to Appendix 8 Biodiversity offsetting.

AEE Comment

The AEE comments with respect to this policy as follows:

As set out previously, the replacement WTP and reservoirs are located in an area that is subject to an SEA overlay. The proposed development footprint has been designed to avoid areas assessed as of highest ecological integrity, including mature kauri forest, kauri-podocarp forest and swamp forest ecosystem units. However, development will



result in the clearance of 2.5 ha of ecologically significant native forest and scrub from the WTP site, 0.6 ha from the Reservoir 1 site, and 0.4 ha from the existing WTP site (for Reservoir 2). In total, this is approximately 0.01 % of the 24,000 ha SEA). The following measures have and will be undertaken to avoid, remedy or mitigate adverse effects on the SEA overlay as far as practicable:

- Development footprint avoids permanent watercourses and areas with highest ecological integrity on the sites;
- Development footprint including laydown area has been limited in size to minimise the area of vegetation clearance as far as practicable;
- Protection of adjacent vegetation from construction effects;
- Implementation of a robust kauri dieback protocol as a means to help prevent the spread of the disease;
- Lizard, bat and bird management measures including pre-clearance monitoring and/ or translocation; and
- Weed and animal pest management and native planting across the remaining 11 ha of native vegetation within the Project Site.

These measures within the Project Site avoid where practicable, and otherwise remedy or mitigate. However significant residual adverse ecological effects are anticipated. The comprehensive ecological compensation package (WBMP) described in the AEE Report has been designed to fully compensate the residual adverse ecological effects of the project that cannot practicably be avoided, remedied or mitigated. Overall, the proposed mitigation and compensation package is assessed as providing a net benefit to ecological values and is appropriate for offsetting the residual effects in terms of (e).

<u>Assessment</u>

Having regard to the assessment by Dr Ussher, the above comments are agreed with, including the acknowledgement that "significant residual adverse ecological effects are anticipated". However, having regard to the provisions within the above policy framework, it is considered that these effects have been or are able to be minimised, remedied, mitigated and are able to be offset and compensated for. I note that Dr Ussher's review makes reference to Appendix 8 and advises in this regard that:

The AUP:OP provides guidance on the application of biodiversity offsetting, (Appendix 8), but is silent on ecological compensation. Others have interpreted this as leaving open the potential to consider a proposal from an Applicant that does not meet all of the guidance criteria for qualifying as biodiversity offset, but nonetheless provides for a package of ecological enhancements and protections.

In this assessment, I have taken the approach that a package such as that proffered by the Applicant should be assessed on its merits, and that good practice guidance should be used to assess how it stacks up against accepted good design principles. I have relied upon the LGNZ 2018 guidance which states that ecological compensation can deliver good benefits for biodiversity, and that such compensation should seek to satisfy as many of the key principles of good biodiversity offset design, where practicably feasible. That approach is also given support by s104(1)(ab) of the RMA which requires that Councils have regard to measures proposed to ensure positive environmental effects

<u>that offset or compensate</u> for adverse effects (as introduced by the Resource Legislation Amendment Act 2017).

I therefore consider that, based on the ecological compensation proposed through implementation of the WBMP, that the proposal will be in accordance with this policy.

Policy D9.3(2) – Managing effects on indigenous biodiversity

Adverse effects on indigenous biodiversity values in significant ecological areas that are required to be avoided, remedied, mitigated or offset may include, but are not limited to, any of the following:

- (a) fragmentation of, or a reduction in the size and extent of, indigenous ecosystems and the habitats of indigenous species;
- (b) fragmentation or disruption of connections between ecosystems or habitats;
- (c) changes which result in increased threats from pests on indigenous biodiversity and ecosystems;
- (d) loss of buffering of indigenous ecosystems;
- (e) loss of a rare or threatened individual, species population or habitat;
- (f) loss or degradation of originally rare ecosystems including wetlands, dune systems, lava forests, coastal forests;
- (g) a reduction in the abundance of individuals within a population, or natural diversity of indigenous vegetation and habitats of indigenous fauna;
- (h) loss of ecosystem services;
- *(i)* effects which contribute to a cumulative loss or degradation of habitats, species populations and ecosystems;
- (j) impacts on species or ecosystems that interact with other activities, or impacts that exacerbate or cause adverse effects in synergistic ways;
- (k) loss of, or damage to, ecological mosaics, sequences, processes, or integrity;
- (*I*) downstream effects on wetlands, rivers, streams, and lakes from hydrological changes further up the catchment;
- (*m*) a modification of the viability or value of indigenous vegetation and habitats of indigenous fauna as a result of the use or development of other land, freshwater, or coastal resources;
- (n) a reduction in the historical, cultural, and spiritual association held by Mana Whenua or the wider community;
- (o) the destruction of, or significant reduction in, educational, scientific, amenity, historical, cultural, landscape, or natural character values;
- (p) disturbance to indigenous fauna that is likely or known to increase threats, disturbance or pressures on indigenous fauna; or
- (q) increases in the extinction probability of a species.

AEE Comment

The AEE comments with respect to this policy as follows:

The Ecological Assessment included in Appendix L identifies the following potential ecological effects of the proposal that are required to be avoided, remedied, mitigated or offset: (a) – (e), (g), (i), (k) - (m). Each of these effects is assessed in the Ecological Assessment. In summary it finds that the measures proposed will avoid, remedy or mitigate adverse ecological effects to the greatest extent that is practicable. Residual effects will be compensated for by a comprehensive ecological mitigation and compensation package, which is focussed on achieving an overall net benefit in biodiversity.

Assessment

It is considered that ecological effects that are required to be avoided, remedied, mitigated or offset include many of the listed types of impacts. It is agreed that the applicant has undertaken to "avoid, remedy or mitigate" these effects to the "greatest extent that is practicable" having regard to the functional requirement for the proposed WTP, and these are able to be compensated for through the proposed WBMP, for the reasons noted above.

Policy D9.3(3) – Enhance indigenous biodiversity

Enhance indigenous biodiversity values in significant ecological areas through any of the following:

- (a) restoration, protection and enhancement of threatened ecosystems and habitats for rare or threatened indigenous species;
- (b) control, and where possible, eradication of plant and animal pests;
- (c) fencing of significant ecological areas to protect them from stock impacts;
- (d) legal protection of significant ecological areas through covenants or similar mechanisms;
- (e) development and implementation of management plans to address adverse effects;
- (f) re-vegetating areas using, where possible, indigenous species sourced from naturally growing plants in the vicinity with the same climactic and environmental conditions; or
- (g) providing for the role of Mana Whenua as kaitiaki and for the practical exercise of kaitiakitanga in restoring, protecting and enhancing areas.

AEE Comment

The AEE comments with respect to this policy as follows:

As part mitigation for the required clearance of SEA, the proposal includes the enhancement of the remaining 11 ha of native vegetation within the Project Site. Most of this area is SEA. Residual adverse ecological effects will be addressed by the comprehensive WBMP described in the AEE Report, which will enhance the biodiversity values of 990 ha of public and private land, approximately 720 ha of which is classified as SEA. The WBMP includes restoration, protection and enhancement of ecosystems

including those providing habitats for rare or threatened indigenous species, intensive plant and animal pest control including of Argentine ants, "kauri rescue" for private landowners and biodiversity monitoring. Significant opportunities will exist to provide for the role of Mana Whenua as kaitiaki.

The WBMP package is considered to appropriately compensate for the loss of forest extent. It is anticipated to result in significant biodiversity gains for the Muddy Creek catchment, with expected benefits including the return and/ or range expansion of suppressed biota, and improved forest condition, regeneration processes and habitat values within the managed forest areas. The proposal is considered to be broadly consistent with Policy D9.3 (3).

<u>Assessment</u>

Having regard to the assessment prepared by Dr Ussher, the above comments are agreed with, and that the implementation of the WBMP will compensate for the loss of forest extent and provide for biodiversity gains in the Waima catchment. Further, the recommendation of Mr Tutt that a covenant be required in respect of riparian margins, will align with the requirements of 3(d) above.

It is, however, unclear what "significant opportunities" will exist in respect of a role for Te Kawerau as kaitiaki (regarding (g) above), and the applicant may wish to clarify this at the hearing and subsequent to receiving the CVA.

Subject to that clarification, I consider that the proposal will be consistent with this policy.

Policy D9.3(4) – Ecological integrity and functioning

Enable activities which enhance the ecological integrity and functioning of significant ecological areas including:

- (a) the management and control of pest species that threaten indigenous biodiversity; and
- (b) managing works in the vicinity of kauri, such as deadwood removal or earthworks, to control kauri dieback disease by preventing the spread of soil and kauri plant material.

Assessment

The AEE does not comment on this policy. However, while the proposal is not one that is specifically "enabled" in terms of the SEA Overlay, it does involve environmental compensation that provides for the management and control of pest species that would otherwise threaten indigenous biodiversity within the surrounding catchment. The management of vegetation and earthworks to control kauri dieback has been considered by Dr Fea, who expresses some concerns at the ability to appropriately control this disease in view of the scale of works involved. However, in the context of this policy, it is accepted that the applicant proposes to manage such works and provide control measures by way of a KDMP, and that the details of this plan will be provided at the hearing (and with reference to the conditions recommended by Dr Fea to address this matter as far as is possible).



As noted in the AEE, Policy D9.3(5) provides for generally small to medium scale vegetation clearance e.g. to maintain access tracks, to provide for a dwelling, etc, and it is agreed that it is therefore of limited relevance to the Project and so has not been assessed here.

Policy D9.3(6) – Effects from infrastructure

... avoid as far as practicable the removal of vegetation and loss of biodiversity in significant ecological areas from the construction of building platforms, access ways or infrastructure, through:

- (a) using any existing cleared areas on a site to accommodate new development in the first instance;
- (b) assessing any practicable alternative locations and/or methods that would reduce the need for vegetation removal or land disturbance;
- (c) retaining indigenous vegetation and natural features which contribute to the ecological significance of a site, taking into account any loss that may be unavoidable to create a single building platform for a dwelling and associated services, access and car parking on a site;
- (d) designing and locating dwellings and other structures to reduce future demands to clear or damage areas of significant indigenous biodiversity, for example to provide sunlight or protect property;
- (e) avoiding as far as practicable any changes in hydrology which could adversely affect indigenous biodiversity values;
- *(f) implementing measures to maintain existing water quality and not increase the amount of sediment entering natural waterways, wetlands and groundwater; and*
- (g) using techniques that minimise the effects of construction and development on vegetation and biodiversity and the introduction and spread of animal and plant pests.

AEE Comment

The AEE comments with respect to this policy as follows:

As described above, the project has been designed to avoid as far as practicable the removal of vegetation and loss of biodiversity in significant ecological areas with a particular emphasis on permanent watercourses and the highest integrity/value vegetation. In particular, the following is noted:

- Watercare has undertaken a comprehensive assessment of alternatives in relation to the replacement WTP and reservoirs. On balance, taking into account a broad number of technical and environmental constraints, the Manuka Road site was considered to be the preferred site (refer Section 5 of the AEE Report). The proposed development is considered the best practicable option;
- The development footprint avoids the areas assessed as being of highest ecological integrity, however it is not possible to undertake the development at the Project Site without removing ecologically significant indigenous vegetation. This policy recognises that there may some unavoidable loss within the context of a single building platform for a dwelling and associated services;



- No further removal or damage to areas of significant indigenous biodiversity is expected to be needed for the operation or maintenance of the replacement WTP and reservoirs;
- The proposed development will not change the hydrology in a way that would affect indigenous biodiversity values;
- Comprehensive erosion and sediment control and stormwater treatment measures are proposed to ensure the project does not adversely affect the existing water quality of waterways;

<u>Assessment</u>

Having regard to the preceding assessment, the comments provided by the applicant in terms of this policy is generally agreed with. In particular, it is acknowledged that the applicant has:

- undertaken an assessment of alternatives;
- minimised the footprint of the WTP as far as practicable (on the basis of currently known technology);
- amended the proposal to avoid the removal of kauri; and
- proposed construction measures to minimise the effects of construction and development on vegetation and biodiversity and the introduction, and the spread of animal and plant pests.

In terms of alternative sites, it is noted that there are other sites (e.g. Parker Road) that would not have required the removal of SEA vegetation, but which did give rise to other impacts. This has been considered in terms of the applicant's social impact assessments in that assessment of alternatives, and at sections 9.4.2/9.4.13 above.

Policy D9.3(7) – The role of Mana Whenua

Provide for the role of Mana Whenua as kaitiaki in managing biodiversity, particularly in Treaty Settlement areas, and for cultural practices and cultural harvesting in significant ecological areas where the mauri of the resource is sustained.

<u>Assessment</u>

The AEE does not comment on this policy. In view of the submission by Te Kawerau Iwi Tribal Authority and Settlement Trust, however, it is considered that the proposal involves some challenge to the ability for Mana Whenua, and Te Kawerau specifically, to maintain biodiversity and for cultural practices and harvesting in an area that is advised by the submitter to be subject to the Te Kawerau ā Maki Treaty Settlement Act 2015 (albeit that current cultural practices and harvesting undertaken in the area have not been described). This may be further clarified by the furnishing of the CVA by Te Kawerau before or at the hearing.

Policy D9.3(8) - Infrastructure

Manage the adverse effects from the use, maintenance, upgrade and development of infrastructure in accordance with the policies above, recognising that it is not always practicable to locate and design infrastructure to avoid significant ecological areas.

AEE Comment

The AEE comments with respect to this policy as follows:

As described above, the potential adverse effects of the proposed infrastructure development will be managed through a wide range of measures. It is not practicable to avoid the SEA due to construction and operational requirements of the replacement WTP and reservoirs.

Assessment

I generally agree with the above comments, noting avoidance of SEA is not practicable, or possible, once the decision was made on the basis of a number of practical and operational reasons to construct the WTP on such a site that is comprised primarily of SEA, and noting that the site is designated for this purpose.

Summary

Overall, although the proposal will have adverse impacts insofar as it requires the removal of some 3.5 ha of SEA vegetation, the relevant objectives and policies do not seek to preclude this outright, particularly for the development of infrastructure, subject to demonstrating that such removal has been minimised to the extent practicable, and that effects are remedied, mitigated and offset/compensated for, as is proposed by the applicant. There remain some uncertainties as to the extent to which the effects on Mana Whenua values have been addressed, and this will be clarified through the provision of a CVA by Te Kawerau in due course and/or at the hearing. Subject to that aspect being appropriately addressed, it is concluded that the proposal is not contrary to these provisions in overall terms.

10.3 Chapter E1 – Water quality and integrated management

10.3.1 Introduction

Chapter E1 addresses the provisions related to the management of freshwater resources. The Background (explanation) to this chapter states as follows:

The National Policy Statement for Freshwater Management, the New Zealand Coastal Policy Statement and this Plan seek to improve the integrated management of freshwater and the use and development of land...

The focus of these provisions is to avoid adverse effects as far as practicable, particularly in greenfield developments where there are greater opportunities to do so. Where it is not practicable to avoid adverse effects the provisions seek to minimise them and to reduce existing adverse effects when the opportunity is provided by redevelopment.

10.3.2 Assessment

The objectives and policies are discussed as follows:

Objectives E1.2

- (1) Freshwater and sediment quality is maintained where it is excellent or good and progressively improved over time in degraded areas.
- (2) The mauri of freshwater is maintained or progressively improved over time to enable traditional and cultural use of this resource by Mana Whenua.

(3) Stormwater and wastewater networks are managed to protect public health and safety and to prevent or minimise adverse effects of contaminants on freshwater and coastal water quality.

AEE Comment

The AEE comments with respect to Objective E1.2(3) that:

Adverse effects of the discharge of stormwater are managed and minimised through appropriate retention, detention and treatment measures which are in accordance with best [practice] as set out in GD05.

Assessment

It is considered that the key concern relevant to this objective arises from the construction process, and the management of sediment discharges to downstream waterbodies. This aspect has been assessed by Mr Tutt (see section 9.4.4) who advises that:

- Subject to the imposition of consent conditions, it is considered that the potential effects on the receiving environment from sediment discharges, as well as the potential effects associated with the disturbance to aquatic environments will be appropriately managed.
- The sensitivity of the receiving environment to the adverse effects of the potential sediment discharges will not be compromised given the application of suitable control technologies and appropriate on-site management techniques.

I adopt the conclusions of Ms Johnston and Mr Tutt, and therefore, and based on the imposition of and adherence to the conditions that they have recommended, it is considered that the proposal will not be contrary to this objective.

Policy E1.3(1)

Manage discharges, until such time as objectives and limits are established in accordance with Policy E1.3(7), having regard to:

- (a) the National Policy Statement for Freshwater Management National Bottom Lines;
- (b) the Macroinvertebrate Community Index as a guideline for freshwater ecosystem health associated with different land uses within catchments in accordance with Policy E1.3(2); or
- (c) other indicators of water quality and ecosystem health.

AEE Comment

The AEE comments with respect to Policy E1.3(1) that:

The Stormwater and ESC Report in Appendix G sets out the proposed means of managing these discharges. During construction, appropriate measures will be in place to minimise the effects of erosion and discharge of sediment laden runoff. Stormwater requiring treatment will be treated by proprietary devices prior to being discharged to the receiving waterways, which is assessed as being the best practicable option. In these ways, the water quality and ecosystem health of the waterways will be maintained.

Assessment

As noted above, the stormwater and sediment control aspects of the proposal have been assessed by Mr Tutt, and on the basis of his conclusions the assessment by the applicant is agreed with.

Policy E1.3(2)

Manage discharges, subdivision, use, and development that affect freshwater systems to:

- (a) maintain or enhance water quality, flows, stream channels and their margins and other freshwater values, where the current condition is above National Policy Statement for Freshwater Management National Bottom Lines and the relevant Macroinvertebrate Community Index guideline in Table E1.3.1 below; or
- (b) enhance water quality, flows, stream channels and their margins and other freshwater values where the current condition is below national bottom lines or the relevant Macroinvertebrate Community Index guideline in Table E1.3.1 below.

•••

AEE Comment

The AEE comments with respect to Policy E1.3(2) that:

The Ecological Assessment in Appendix L finds that the current condition of the Yorke and Armstrong Gully Streams is generally below NPS-FM National Bottom Lines and the AUP MCI guideline for native forest specified in Table E1.3.1. The policy therefore directs freshwater values to be enhanced.

Appropriate erosion and sediment control measures will be implemented to ensure that the water quality of the receiving waterways will not be compromised during construction.

Operational stormwater discharges into the Armstrong Gully will be the same as the existing situation, as authorised by Watercare's Permit No. 26979. For Yorke Gully Stream, the contributing catchment area will be reduced once the construction of the WTP has been completed, due to the diversion of roof runoff to the WTP process. In addition to catchment inputs, the Yorke Gully stream diversion will also receive collected and treated stormwater from the replacement WTP site via a dry pond that will provide attenuation and detention of flows. The controlled delivery of clean and treated stormwater to the diversion channel will aim to mimic the intermittent nature of the existing stream and continue to support flows in the Yorke Gully stream downstream.

Enhancement of instream values including stream channels and their margins will be achieved through the stream mitigation and compensation package, which includes the ecological design of a stream diversion, erosion protection works in the upper Yorke Gully, and riparian restoration and enhancement of streams across the Project Site.

The proposal is considered to be consistent with Policy E1.3 (2).

Assessment

As noted above, the stormwater and sediment control aspects of the proposal have been assessed by Mr Tutt, who concludes with respect to the effects associated with streamworks in particular that:



The streamworks application has demonstrated alternatives considered to avoid stream impacts, with all impacts on freshwater ecology being appropriately mitigated and offset. On balance, provided this activity is undertaken in accordance with the details and recommendations in application documents, and recommendations set out below it is considered that the application results in a no net loss of aquatic ecological function and the adverse effects will be sufficiently managed.

Those findings, in combination with those related to earthworks, align with the applicant's conclusions and indicate that the outcomes sought by this policy will be achieved.

Policy E1.3(3)

Require freshwater systems to be enhanced unless existing intensive land use and development has irreversibly modified them such that it practicably precludes enhancement.

AEE Comment

The AEE comments with respect to Policy E1.3(3) that:

Freshwater systems will be maintained through the measures described, and enhanced through the ecological features to be developed during design of the 70 m diversion channel, restoration planting of the riparian buffer zones and erosion protection works in the upper Yorke Gully.

Assessment

Having regard to the preceding discussion and the assessment by Mr Tutt, the applicant's comments are agreed with.

Policy E1.3(4)

When considering any application for a discharge, the Council must have regard to the following matters:

- (a) the extent to which the discharge would avoid contamination that will have an adverse effect on the life-supporting capacity of freshwater including on any ecosystem associated with freshwater; and
- (b) the extent to which it is feasible and dependable that any more than a minor adverse effect on freshwater, and on any ecosystem associated with freshwater, resulting from the discharge would be avoided.

AEE Comment

The AEE comments with respect to Policy E1.3(4) that:

As described above, appropriate erosion and sediment control and stormwater treatment measures will be in place to ensure the quality of runoff from the site to the receiving freshwater systems. With these measures in place, the adverse effects of the discharges on water quality and freshwater ecosystems are assessed as being no more than minor.

Assessment

The assessment by Mr Tutt regarding earthworks and associated discharges concludes that:

The earthworks erosion and sediment controls proposed are largely in accordance with GD05 which is considered best practice. Some amendments to the erosion and sediment control plan have been recommended. Provided the erosion and sediment controls are installed and constructed in accordance with the application report, supporting documentation and any additional requirements as necessary by the guidance outlined in GD05 and recommendations below, it is considered the resulting effects on the environment from sediment discharges during the earthworks will be appropriately managed.

Mr Tutt's assessment is adopted, and accordingly the applicant's assessment with respect to this policy is agreed with.

Policy E1.3(5)

When considering any application for a discharge the Council must have regard to the following matters:

- (a) the extent to which the discharge would avoid contamination that will have an adverse effect on the health of people and communities as affected by their secondary contact with fresh water; and
- (b) the extent to which it is feasible and dependable that any more than minor adverse effect on the health of people and communities as affected by their secondary contact with fresh water resulting from the discharge would be avoided.

AEE Comment

The AEE comments with respect to Policy E1.3(5) that:

As described above, appropriate erosion and sediment control and stormwater treatment measures will be in place to ensure the quality of runoff from the site to the receiving freshwater systems. The discharges are not anticipated to affect the health of people and communities.

Assessment

Having regard to the assessment by Mr Tutt, and with the works not involving any known contaminant that would affect the health of people and communities (through secondary contact with the subject water bodies) the applicant's assessment is agreed with.

Policy E1.3(8)

Avoid as far as practicable, or otherwise minimise or mitigate, adverse effects of stormwater runoff from greenfield development on freshwater systems, freshwater and coastal water by:

- (a) taking an integrated stormwater management approach (refer to Policy E1.3.10);
- (b) minimising the generation and discharge of contaminants, particularly from high contaminant generating car parks and high use roads and into sensitive receiving environments;
- (c) minimising or mitigating changes in hydrology, including loss of infiltration, to:
 - (i) minimise erosion and associated effects on stream health and values;

- (ii) maintain stream baseflows; and (iii) support groundwater recharge;
- (d) where practicable, minimising or mitigating the effects on freshwater systems arising from changes in water temperature caused by stormwater discharges; and
- (e) providing for the management of gross stormwater pollutants, such as litter, in areas where the generation of these may be an issue.

AEE Comment

The AEE comments with respect to Policy E1.3(8) that:

The proposal involves the discharge of stormwater to the Armstrong Gully and Yorke Gully Streams. Operational stormwater discharges into the Armstrong Gully will be the same as the existing situation that is authorised by Watercare's Permit No. 26979.

Stormwater runoff from the WTP site will largely be discharged to Yorke Gully via a dry pond. Water from paved areas will be treated by proprietary devices prior to being discharged and roofs will use non-zinc materials, which is assessed as being the best practicable option and will maintain the water quality of the stream.

The stormwater management system has been designed to provide the appropriate level of stormwater retention (volume reduction) and detention (temporary storage) to maintain predevelopment flows, and best practicable measures will manage stormwater quality and erosion potential. The approach to stormwater adopts a best [practice] approach as set out in GD01. Freshwater systems will be maintained through the measures described above, and enhanced through the ecological features to be developed during design of the 70 m diversion channel, restoration planting of the riparian buffer zones, and erosion protection works in the upper Yorke Gully.

Assessment

Stormwater discharge and diversion effects have been considered by Ms Johnston (see section 9.4.9), who concludes with respect to these policies (and with reference to others) that:

In general terms, the proposal will achieve the above objectives and policies through the proposed stormwater management systems which can be considered to be representative of the Best Practicable Option for the development. Policies E1.3.(8) are E1.3.(9) are of particular relevance for to this application – policies which promote development and redevelopment to include measures to reduce and minimise contaminants and to minimise or mitigate changes in hydrology including loss of infiltration. The proposed stormwater management includes stormwater quality treatment for all trafficked impervious areas noting that these are not considered high contaminant generating car parks or high use roads, whilst also recognising the sensitivity of the receiving environment. Further, the proposed dry ponds.

Ms Johnston's assessment is adopted, and so subject to the imposition of and adherence to the conditions recommended in her memorandum, the applicant's assessment is agreed with.

It is noted that Ms Johnston's comments above refer to Policy E1.3(9) as being of relevance to the proposal, and this policy is set out below:

Minimise or mitigate new adverse effects of stormwater runoff, and where practicable progressively reduce existing adverse effects of stormwater runoff, on freshwater systems, freshwater and coastal waters during intensification and redevelopment of existing urban areas by all of the following:

- (a) requiring measures to reduce contaminants, particularly from high contaminantgenerating car parks and high-use roads;
- (b) requiring measures to reduce the discharge of gross stormwater pollutants;
- (c) requiring measures to be adopted to reduce the peak flow rate and the volume of stormwater flows:
 - (i) within sites identified in the Stormwater Management Area Flow 1 and Flow 2 Control (as shown on the planning maps);
 - *(ii)* where development exceeds the maximum impervious area for the relevant zone; or
 - (iii) from areas of impervious surface where discharges may give rise to flooding or adversely affect rivers and streams;
- (d) taking an integrated stormwater management approach for large-scale and comprehensive redevelopment and intensification (refer to Policy E1.3.10 below) and encourage the restoration of freshwater systems where practicable; and
- (e) ensuring intensification is supported by appropriate stormwater infrastructure, including natural assets that are utilised for stormwater conveyance and overland flow paths.

The proposal is considered to be in alignment with this policy, for the reasons set out by Ms Johnston and as discussed above.

Policy E1.3(10)

In taking an integrated stormwater management approach have regard to all of the following:

- (a) the nature and scale of the development and practical and cost considerations, recognising:
 - *(i)* greenfield and comprehensive brownfield development generally offer greater opportunity than intensification and small-scale redevelopment of existing areas;
 - *(ii) intensive land uses such as high-intensity residential, business, industrial and roads generally have greater constraints; and*
 - *(iii) site operational and use requirements may preclude the use of an integrated stormwater management approach.*
- (b) the location, design, capacity, intensity and integration of sites/development and infrastructure, including roads and reserves, to protect significant site features and hydrology and minimise adverse effects on receiving environments;

- (c) the nature and sensitivity of receiving environments to the adverse effects of development, including fragmentation and loss of connectivity of rivers and streams, hydrological effects and contaminant discharges and how these can be minimised and mitigated, including opportunities to enhance degraded environments;
- (d) reducing stormwater flows and contaminants at source prior to the consideration of mitigation measures and the optimisation of on-site and larger communal devices where these are required; and (e) the use and enhancement of natural hydrological features and green infrastructure for stormwater management where practicable.

AEE Comment

The AEE comments with respect to Policy E1.3(10) that:

An integrated stormwater management approach has been taken for the project. In particular, the stormwater management system has been designed to provide the appropriate level of stormwater retention (volume reduction) and detention (temporary storage) to maintain predevelopment flows, and best practicable measures will manage stormwater quality and erosion potential. This includes:

- Stormwater runoff from the WTP site will largely be discharged to Yorke Gully via a dry pond. This will provide attenuation and detention of flows.
- Water from paved areas will be treated by proprietary devices prior to being discharged.
- Roofs will use non-zinc materials.
- Roof run off from the WTP will be directed where practicable to the WTP process.
- Controlled delivery of treated stormwater to the diversion channel will aim to mimic the intermittent nature of the existing stream and continue to support flows in the Yorke Gully stream downstream.
- Extensive restoration and enhancement planting of riparian buffer zones.
- Erosion protection works in the upper Yorke Gully

Assessment

Having regard to the assessment by Ms Johnston, and via the conclusions of that assessment set out above, the applicant's assessment is agreed with.

Policy E1.3(11)

Avoid as far as practicable, or otherwise minimise or mitigate adverse effects of stormwater diversions and discharges, having particular regard to:

- (a) the nature, quality, volume and peak flow of the stormwater runoff;
- *(b) the sensitivity of freshwater systems and coastal waters, including the Hauraki Gulf Marine Park;*
- (c) the potential for the diversion and discharge to create or exacerbate flood risks;
- (d) options to manage stormwater on-site or the use of communal stormwater management measures;
- (e) practical limitations in respect of the measures that can be applied; and

(f) the current state of receiving environments.

AEE Comment

The AEE comments with respect to Policy E1.3(11) that

The potential adverse effects of the proposed stormwater diversion and discharge will be avoided as far as practicable, remedied and mitigated to ensure the effects are no more than minor.

The runoff originates from hardstanding areas and roofs on the Project Site. The volume and peak flows will be controlled through retention and detention, including recycling some roof runoff into the WTP system. Flows will be limited to those under predevelopment conditions in events up to a 1 in 100 year storm, with overland flow paths accommodating rain events that exceed this. These measures will ensure that the risk of increased flooding of downstream environments is adequately managed. The delivery of this treated stormwater to the Yorke Gully diversion channel will aim to mimic the intermittent nature of the existing stream, and to continue to support flows in the Yorke Gully stream downstream.

An adequate quality of the discharge will be achieved through the use of non-zinc material on roofs and treatment of runoff from paved areas by proprietary devices. Alternative methods such as a wetland, biofiltration and swales were considered, but these were not considered suitable for the proposal due to steep site contours and the strong drive to minimise the development footprint and vegetation clearance. The Ecology Assessment (Appendix L) finds that the quality of stormwater to be discharged to the streams is appropriate for the current state of these receiving environments. The proposal is considered to be consistent with Policy E1.3 (11).

Assessment

Having regard to the assessment by Ms Johnston, and via the conclusions of that assessment set out above, the applicant's assessment is agreed with.

Policy E1.3(13)

Require stormwater quality or flow management to be achieved on-site unless there is a downstream communal device or facility designed to cater for the site's stormwater runoff.

AEE Comment

The AEE comments with respect to Policy E1.3(13) that:

Stormwater quality and flow management will be achieved on-site through retention (by water recycling into the WTP system and a living roof on Reservoir 1), detention (storage ponds), use of non-zinc material on roofs, and treatment of runoff from pavement areas (by proprietary devices).

Assessment

Having regard to the assessment by Ms Johnston, and via the conclusions of that assessment set out above, the applicant's assessment is agreed with.

Policy E2.3(26)

Prevent or minimise the adverse effects from construction, maintenance, investigation and other activities on the quality of freshwater and coastal water by:

- (a) adopting best management practices and establishing minimum standards for the discharges; or
- (b) where Policy E1.3(26)(a) is not practicable, have regard to the following:
 - (i) the nature, volume and concentration of the contaminants in the discharge;
 - (ii) the sensitivity of the receiving environment to the contaminants in the discharge;
 - *(iii)* other practicable options for the discharge, including reuse or discharge to the trade sewer; and
 - *(iv)* practicable measures to reduce contaminant concentrations prior to discharge or otherwise mitigate adverse effects.

AEE Comment

The AEE comments with respect to Policy E1.3(26) that:

Appropriate erosion and sediment control and stormwater treatment measures will be in place to ensure the quality of runoff from the site to the receiving freshwater systems. With the suite of measures proposed in the ESCP in place, the adverse effects of the discharges on water quality and freshwater ecosystems are assessed as being no more than minor.

The Stormwater and ESC Report assesses a number of alternatives for the management of stormwater on the Project Site, and has determined the proposed design as the best practicable option. This has taken into account the nature of the discharge, the sensitivity of the receiving streams, effects on the environment (e.g. from earthworks and vegetation clearance for options requiring larger footprints), and the likelihood of the option being successfully applied given current technologies.

Assessment

Having regard to the assessment by Ms Johnston and Mr Tutt, the applicant's assessment is agreed with. It is also noted that adoption of "best management practices" and the setting of "minimum standards" is considered to be achieved in this case, and that the outcomes provided for under (b), including discharge to a trade sewer, is not required.

Summary

The objective and policy framework seek to improve the integrated management of freshwater and the use and development of land, through the minimisation of adverse effects and to utilise best practice management in order to maintain freshwater quality. The applicant's proposed methods for the management of stormwater and sediment control, as updated and amended through the s92 process, has been reviewed by Ms Johnston and Mr Tutt, who confirm that the proposed measures represent best practice and are appropriate to the nature of the project. Accordingly, it is concluded that the proposal is consistent with, and not contrary to, these provisions.

10.4 Chapter E2 – Water quantity, allocation and use

10.4.1 Introduction

Chapter E2 addresses the provisions related to water quantity, allocation and use. The Background (explanation) to this chapter includes the following:

The National Policy Statement for Freshwater Management requires that freshwater objectives are established and environmental flows and or levels set for all freshwater bodies. Water availability, flows and levels are included in Appendix 2 River and stream minimum flow and availability and Appendix 3 Aquifer water availabilities and levels to guide the assessment of resource consent applications to take and use surface water from lakes, rivers, streams, springs or wetlands, and take and use groundwater from aquifers. These guidelines will be reviewed and updated to meet the requirement of the National Policy Statement for Freshwater Management also requires the inclusion of interim policies in the Plan to guide fresh water allocation. This is until such time as the Plan's provisions give full effect to the National Policy Statement for Freshwater Management for Freshwater Management.

10.4.2 Assessment

The AEE addresses only Policy E2.3(22) in this chapter, relating to surface water diversions, under this chapter, and it is agreed that while this is a key policy of relevance to the Project, Policies E2.3(13) and (23) are also considered relevant, albeit that (13) addresses the NPS on Freshwater Management and is assessed in that regard at section 12.3 of this report.

Policy E2.3(22)

Require proposals to divert surface water to demonstrate the diversion will to the extent practicable avoid significant adverse effects and remedy or mitigate other adverse effects including where relevant, effects on:

- (a) existing lawfully established surface water takes including those allowed by section 14(3)(b) of the [RMA];
- (b) existing buildings, structures and services;
- (c) existing flood hazard risks;
- (d) river bank stability;
- (e) scheduled historic heritage places or scheduled sites and places of significance to Mana Whenua;
- (f) people and communities; and
- (g) The life supporting capacity of freshwater, ecosystem processes, and indigenous species and their ecosystems.

AEE Comment:

The AEE comments that:

The project includes the diversion of stormwater from buildings and paved areas to ponds, which enables the detention, retention and treatment of the stormwater prior to it

being discharged to the receiving streams. The diversion and collection will enable the mitigation of adverse effects, including flooding, ecology, and river bank stability. Instream erosion protection structures will be installed if deemed necessary. The proposal is assessed as being consistent with Policy E2.3 (22).

Assessment

The previous comments referred to by Ms Johnston include this policy, and the conclusion of her assessment of effects also advises that:

...potential effects resulting from the diversion and discharge of stormwater from new and redeveloped impervious area within a SMAF area will be suitably mitigated. The current (conceptual) proposal is generally appropriate in respect of stormwater outcomes and in the context of this site, receiving environments and existing infrastructure and site constraints.

Accordingly, it is considered that the proposal will be consistent with, and not contrary to, the above policy.

Policy E2.3(23)

Require proposals to divert groundwater, in addition to the matters addressed in Policy *E2.3(6)* and (7) above, to ensure that:

- (a) the proposal avoids, remedies or mitigates any adverse effects on:
 - *(i)* scheduled historic heritage places and scheduled sites and places of significance to Mana Whenua; and
 - (ii) people and communities.
- (b) the groundwater diversion does not cause or exacerbate any flooding;
- (c) monitoring has been incorporated where appropriate, including:
 - (i) measurement and recording of water levels and pressures; and
 - *(ii) measurement and recording of the movement of ground, buildings and other structures.*
- (d) mitigation has been incorporated where appropriate including:
 - (i) minimising the period where the excavation is open/unsealed;
 - (ii) use of low permeability perimeter walls and floors;
 - (iii) use of temporary and permanent systems to retain the excavation; or
 - (iv) re-injection of water to maintain groundwater pressures.

Assessment

Having regard to the assessment of groundwater diversion effects by Ms France, the proposal is considered to be in accordance with the above policy. In particular, the proposal does not involve scheduled sites (historic or of significance to Mana Whenua), will not exacerbate flooding effects, and appropriate conditions have been prepared to incorporate a robust monitoring regime and it includes mitigation measures as recommended in the applicant's



groundwater diversion assessment report. Further, as noted by Ms France, a GSMCP will be prepared that will:

enable any settlement that does occur to be checked against the envelope of effects considered here. The monitoring will provide an early warning of any groundwater or ground movements that are approaching or exceed the envelope presented here and will be used trigger re-evaluation of effects and if necessary, implement remedial measures.

10.5 Chapter E3 – Lakes, rivers, streams and wetlands

10.5.1 Introduction

Chapter E3 addresses the provisions related to lakes, rivers, streams and wetlands. The Background (explanation) to this chapter includes the following:

In urban Auckland lakes, rivers, streams and wetlands provide an important component for the assimilation and conveyance of stormwater and form part of the overall stormwater network. Streams have also been piped and filled over to reclaim land for urban land development and have been modified to accommodate infrastructure such as roads, stormwater and wastewater networks and other utility services. Urban streams nevertheless continue to provide important ecosystem services and can provide meaningful ecological and biodiversity values.

There is a balance to be struck between the need to provide for the ongoing growth of urban Auckland, including the requirements of infrastructure, and the protection, maintenance and enhancement of lakes, rivers, streams and wetlands. It is important that development occurs in a sustainable manner which should involve, where practicable, the retention and enhancement of lakes, rivers, streams and wetlands.

10.5.2 Assessment

Objectives E3.2

...

- (2) Auckland's lakes, rivers, streams and wetlands are restored, maintained or enhanced.
- (3) Significant residual adverse effects on lakes, rivers, streams or wetlands that cannot be avoided, remedied or mitigated are offset where this will promote the purpose of the [RMA].
- (4) Structures in, on, under or over the bed of a lake, river, stream or wetland are provided for where there are functional or operational needs for the structure to be in that location, or traverse that area.
- (5) Activities in, on, under or over the bed of a lake, river, stream and wetland are managed to minimise adverse effects on the lake, river, stream or wetland.
- (6) Reclamation and drainage of the bed of a lake, river, stream and wetland is avoided, unless there is no practicable alternative.

AEE Comment

The AEE comments with respect to the Objectives at E3.2 that:

- All stream reaches within the Armstrong Gully catchment have been avoided and a 10 m riparian buffer for these waterways will be retained wherever possible. At the WTP site, the proposed WTP development footprint has been designed to avoid permanent stream reaches, however the reclamation and diversion of approximately 53 m of moderate-low value intermittent stream in the headwaters of the Yorke Gully stream is required. The proposal is to mitigate this loss through the creation of a 70 m reach of intermittently flowing diversion stream, which will be designed to maintain and improve the existing SEV attributes to provide an overall aquatic ecological benefit, with additional compensation proposed through erosion protection works downstream of the site.
- The onsite alternatives assessment (refer Section 5.5 of the AEE) demonstrates that it is not practicable to avoid the reclamation and diversion of the 53 m length of intermittent stream. The Ecological Assessment (Appendix L) finds that the reclaimed portion of stream has poor habitat (mainly due to unsuitability for fish habitat) but high instream and riparian function (as assessed using SEV attributes), and overall the ecological values of the intermittent stream were ranked as moderate-low.

Adverse effects associated with the reclamation and diversion of an intermittent section of the Yorke Gully Stream will be mitigated through the creation of a new stream channel designed to mimic the hydrology of the existing channel, with riparian planting also proposed, and further compensation proposed through erosion protection works downstream of the site. Overall, it is considered that the proposal is consistent with Objective E3.2 (3).

- Erosion protection structures (if required) are proposed within the Yorke Gully Stream, and have a functional and operational need to be located there.
- Watercare has undertaken an on-site alternatives assessment (refer Section 5.5 of the AEE) to determine the most appropriate footprint for the replacement WTP and reservoirs. This assessment has focused on avoiding, as far as practicable, effects on the values of the SEA and streams. Due to the location of Yorke Gully stream traversing through the WTP site, it is not practicable to entirely avoid stream works within an ephemeral and then intermittent section of the Yorke Gully stream.

Assessment

Mr Tutt's review of the streamworks aspects of the application concludes that:

The streamworks application has demonstrated alternatives considered to avoid stream impacts, with all impacts on freshwater ecology being appropriately mitigated and offset. On balance, provided this activity is undertaken in accordance with the details and recommendations in application documents, and recommendations set out below it is considered that the application results in a no net loss of aquatic ecological function and the adverse effects will be sufficiently managed. Having regard to the above comments by Mr Tutt, and his assessment of the streamworks effects more generally, and based on the imposition of, and adherence to, recommended conditions, the applicant's

assessment is agreed with and the proposal is considered to be in accordance with these objectives.

I have adopted Mr Tutt's assessment and conclusions and based on the imposition of, and adherence to, recommended conditions, the applicant's assessment is agreed with and the proposal is considered to be in accordance with these objectives.

Policy E3.3(1)

Avoid significant adverse effects, and avoid where practicable or otherwise remedy or mitigate other adverse effects of activities in, on, under or over the beds of lakes, rivers, streams or wetlands within the following overlays:

...

(d) D9 Significant Ecological Areas Overlay; and

...

AEE Comment

The AEE comments with respect to Policy E3.3(1) that:

The section of the Yorke Gully stream proposed to be reclaimed and diverted is within a SEA overlay. As described above, the on-site alternatives assessment demonstrates that it is not practicable to avoid effects on this section of intermittent stream. However the adverse effects on the stream will be mitigated by minimising the length to be removed, managing works in proximity, and restoring and enhancing the riparian buffer zone, and further compensation proposed through erosion protection works downstream of the site. Residual adverse effects will be mitigated and offset by the creation of a replacement stream channel that will be designed to improve the existing SEV attributes and provide an overall ecological enhancement.

Assessment

Having regard to the assessment by Mr Tutt, and his comments set out above, the applicant's assessment is agreed with.

Policy E3.3(4)

Restoration and enhancement actions, which may form part of an offsetting proposal, for a specific activity should:

- (a) be located as close as possible to the subject site;
- (b) be 'like-for-like' in terms of the type of freshwater system affected;
- (c) preferably achieve no net loss or a net gain in the natural values including ecological function of lakes, rivers, streams or wetlands; and
- (d) consider the use of biodiversity offsetting as outlined in Appendix 8 Biodiversity offsetting.

Assessment

This policy is not addressed in the AEE. However, Mr Tutt comments in respect of (a) and (b) that:

The proposed stream offset site is located in the neighbouring Armstrong Gully. It is a stream tributary which originates on the WTP site before flowing under Manuka Road and joining the Armstrong Stream beyond the existing treatment plants detention dam. This site is proximal to the impact location, being approximately 300m west of the impact location, and ultimately discharging into the same Little Muddy Creek catchment. While this offset stream has a similar average width, it was initially classified as a permanent stream, however recently the applicant changed their classification of it to intermittent by the applicant. It does appear to have a higher base flow rate than the impact stream so more likely permanent as opposed to intermittent. On balance, daylighting this section Armstrong stream is deemed appropriate in this instance as it is similar in character (size and shape), close to the impact site and within the same catchment. This scenario is preferable to enhancing an intermittent stream further away from the impact site in a different catchment.

This comment is agreed with and accordingly it is my view that the proposal achieves consistency with this policy.

Policy E3.3(5)

Avoid significant adverse effects, and avoid, remedy or mitigate other adverse effects of activities in, on, under or over the beds of lakes, rivers, streams or wetlands on:

- (a) the mauri of the freshwater environment; and
- (b) Mana Whenua values in relation to the freshwater environment.

AEE Comment

The AEE comments with respect to Policy E3.3(5) that:

As described above, it is not practicable to avoid the reclamation and diversion of 70 m of intermittent stream, however a range of measures are proposed to remedy, mitigate or compensate for the effects of in-stream activities, including effects on mauri and Mana Whenua values.

Assessment

Having regard to the assessment by Mr Tutt, the applicant's assessment is generally agreed with, insofar as adverse effects are considered to be avoided, remedied or mitigated. It is less clear as to how these measures may affect Mana Whenua values, and as previously noted this may become clearer following receipt of Te Kawerau's CVA at or before the hearing.

Policy E3.3(7)

Provide for the operation, use, maintenance, repair, erection, reconstruction, placement, alteration or extension, of any structure or part of any structure in, on, under, or over the bed of a lake, river, stream or wetland, and any associated diversion of water, where the structure complies with all of the following:

- (a) there is no practicable alternative method or location for undertaking the activity outside the bed of the lake, river, stream or wetland;
- (b) the structure is designed to be the minimum size necessary for its purpose to minimise modification to the bed of a lake, river, stream or wetland;

- (c) the structure is designed to avoid creating or increasing a hazard;
- (d) the structure is for any of the following:
 - (i) required as part of an activity designed to restore or enhance the natural values of any lakes, rivers, streams or wetlands and their margins, or any adjacent area of indigenous vegetation or habitat of indigenous fauna;
 - (ii) designed to maintain and/or enhance public access to, over and along any lake, river, stream or wetland and their margins;
 - (iii) necessary to provide access across a lake, river, stream or wetland;
 - (iv) associated with infrastructure;
 - (v) necessary for flood protection and the safeguarding of public health and safety; or
 - (vi) required for the reasonable use of production land.
- (e) the structure avoids significant adverse effects and avoids, remedies or mitigates other adverse effects on Mana Whenua values associated with freshwater resources, including wāhi tapu, wāhi taonga and mahinga kai.

AEE Comment

The AEE comments with respect to Policy E3.3(7) that:

Erosion protection structures may be required within the stream beds. The structures comply with all of the requirements of this policy as follows:

- (a) There is no practicable alternative method for disposing of clean and treated stormwater from the site and the proposed approach reflects the best practicable option and is consistent with GD01. The need for erosion protection downstream of the outfall will be determined during detailed design;
- (b) The need for erosion protection structures will be confirmed at detailed design stage. Watercare commits to ensuring these structures are the minimum size necessary for their purpose;
- (c) The erosion protection structure (if required) will be designed to avoid creating or increasing a hazard, such as flooding and erosion;
- (d) The structures are associated with infrastructure; i.e. are required to discharge stormwater runoff from the replacement Huia WTP.

Overall, it is considered that Policy E3.3 (7) provides for the proposed structures in streams.

Assessment

Having regard to the assessments by Mr Tutt, the applicant's assessment is agreed with, and the proposal is considered to be in accordance with this policy.

Policy E3.3(13)

Avoid the reclamation and drainage of the bed of lakes, rivers, streams and wetlands, including any extension to existing reclamations or drained areas unless all of the following apply:

- (a) there is no practicable alternative method for undertaking the activity outside the lake, river, stream or wetland;
- (b) for lakes, permanent rivers and streams, and wetlands the activity is required for any of the following:
 - (i) as part of an activity designed to restore or enhance the natural values of any lake, river, stream or wetland, any adjacent area of indigenous vegetation or habitats of indigenous fauna;
 - *(ii) for the operation, use, maintenance, repair, development or upgrade of infrastructure; or*
 - (iii) to undertake mineral extraction activities; and
- (c) the activity avoids significant adverse effects and avoids, remedies or mitigates other adverse effects on Mana Whenua values associated with freshwater resources, including wāhi tapu, wāhi taonga and mahinga kai.

AEE Comment

The AEE comments with respect to Policy E3.3(13) that:

- (a) Watercare has undertaken an on-site alternatives assessment (refer Section 5.5 of the AEE) to determine the most appropriate footprint for the replacement WTP and reservoirs. This assessment has focused on avoiding, as far as practicable, effects on the values of the SEA and streams. Due to the location of Yorke Gully stream traversing through the WTP site, it is not practicable to entirely avoid stream works within an ephemeral and then intermittent section of the Yorke Gully stream.
- (b) N/A the proposal does not involve the reclamation of permanent waterbodies.
- (c) the adverse effects on the stream will be mitigated by minimising the length to be removed, managing works in proximity, and retaining and enhancing the riparian buffer zone. Residual adverse effects will be mitigated and offset by the creation of a replacement stream channel that will be designed to improve the existing SEV attributes and provide an overall ecological enhancement. These measures are also anticipated to adequately address any adverse effects on Mana Whenua values associated with the freshwater resource.

The proposal is assessed as meeting all of the criteria of Policy E3.3 (13) and is therefore not considered to be contrary to it.

Assessment

Having regard to the assessment by Mr Tutt, the applicant's assessment is generally agreed with. As noted previously with respect to other policy provisions related to water and stream management, the effects on Mana Whenua values are yet to be addressed and clarified through a CVA to be prepared by Te Kawerau, and so potential issues associated with (c) above may not be clarified until the hearing. Notwithstanding the lack of a CVA at this stage, I



agree that the proposed measures and enhancement of SEV attributes would seem likely to also address, at least in part, potential adverse effects on Mana Whenua values associated with local freshwater values.

Summary

Overall, it is concluded that the proposal is generally consistent with, and not contrary to, the objectives and policies related to the management of streams.

10.6 Chapter E10 – Stormwater management area – Flow 1

10.6.1 Introduction

Chapter E10 addresses the provisions related to the Stormwater management area Flow 1 (and Flow 2). The Background (explanation) to this chapter states as follows:

The Stormwater management area control – Flow 1 and Flow 2 identifies rivers and streams (and their contributing catchments) that are particularly susceptible to the effects of development or have relatively high values.

Stormwater management area control – Flow 1 are those catchments which discharge to sensitive or high value streams that have relatively low levels of existing impervious area.

In Stormwater management area control – Flow 1 and Stormwater management area control – Flow 2, future development and redevelopment is still enabled, but it is subject to standards to reduce stormwater runoff to protect Auckland's aquatic biodiversity and other values from further decline and enhance them where possible.

The objectives and policies in E1 Water quality and integrated management and E2 Water quantity, allocation and use are also applicable to the provisions in this section.

10.6.2 Assessment

The relevant policies are as follows:

Policy E10.3(1)

Manage stormwater runoff from impervious areas in Stormwater management area – Flow 1 and Flow 2 areas to minimise the adverse effects of stormwater runoff on rivers and streams to retain, and where possible enhance, stream naturalness, biodiversity, bank stability and other values

AEE Comment

The AEE comments with respect to Policy E10.3(1) that:

As described above, stormwater runoff will be managed to minimise adverse effects on the receiving streams. In particular, the delivery of treated stormwater to the Yorke Gully stream will aim to mimic the existing intermittent nature of the stream and continue to support natural downstream flows, and stormwater discharges to Armstrong Gully will continue to meet the requirements of Watercare's existing consent. Erosion protection structures will be installed near the stormwater outlet if required, and the proposed retention of stormwater will reduce peak flood flows, further reducing the risk of downstream erosion.

Assessment

Having regard to the assessment by Ms Johnston, as referenced in respect of Chapter E1 above, the applicant's assessment is agreed with.

Policy E10.3(2)

Require stormwater hydrology mitigation in Stormwater management area control – Flow 1 and Flow 2 areas where there are:

- (a) new impervious areas;
- (b) redeveloped impervious areas; or
- (c) entire sites where the area of development or redevelopment comprises more than 50 per cent of the site area.

AEE Comment

The AEE comments with respect to Objective E3.2(2) that:

The proposal results in approximately 2.26 ha of new impervious area at the replacement WTP site, approximately 0.88 ha on the Reservoir 1 site, and approximately 0.62 ha on the existing WTP site for Reservoir 2. The proposed stormwater design meets the mitigation requirements of the AUP and GD01 for retention and detention.

Assessment

Having regard to the assessment by Ms Johnston the applicant's assessment is agreed with.

Policy E10.3(3)

Recognise that there may be limitations to the hydrology mitigation that can practicably be achieved in some circumstances, particularly in association with redevelopment, including:

- (a) space limitations;
- (b) requirements to provide for other utility services; and
- (c) the function of roads as overland flow paths conveying stormwater runoff from surrounding land uses which the road controlling authority has limited ability to control.

AEE Comment/Assessment

The AEE comments with respect to Objective E3.2(2) that "[t]he proposed stormwater design meets the mitigation requirements of the AUP and GD01 for retention and detention". Having regard to the assessment by Ms Johnston, the applicant's assessment is agreed with.

Summary

Accordingly, it is concluded that the proposal is consistent with, and not contrary to, the objectives and policies under Chapter E10.

10.7 Chapter E11 – Land disturbance - Regional

10.7.1 Introduction

Chapter E11 addresses the provisions related to land disturbance (regional). The Background (explanation) to this chapter states as follows:

Land disturbance is an essential prerequisite for the development of urban land, for the use of rural land for both farming and forestry, for mineral extraction and for the construction and maintenance of infrastructure. In this plan, land disturbance encompasses the defined activities of earthworks, ancillary farming earthworks and ancillary forestry earthworks.

The management of the adverse effects of land disturbance focuses on both large and small disturbance areas, as the cumulative adverse effects from a number of small earthwork sites can be significant as can single large areas of exposed earth.

The major contaminant of Auckland's urban coastal marine area is sediment generated from rural areas and during land development. This sediment affects both the quality of coastal water and the amenity and recreational values of popular beaches. Sediment also reduces the biological diversity of urban and rural streams.

There are a number of best practice land management techniques that can be used to reduce the amount of sediment generated through erosion and discharged into water bodies during land disturbance. These form the basis of the land disturbance standards. However, even with the use of best practice techniques, it is not possible to prevent all sediment entering water bodies.

10.7.2 Assessment

Objectives E11.2

- (1) Land disturbance is undertaken in a manner that protects the safety of people and avoids, remedies and<u>or</u> mitigates adverse effects on the environment.³⁴
- (2) Sediment generation from land disturbance is minimised.
- (3) Land disturbance is controlled to achieve soil conservation.

AEE Comment

The AEE comments with respect to the Objectives at E11.2 that:

- The Preliminary Land Stability Assessment concludes the proposed earthworks will not result in land instability or increase the hazard risk.
- Earthworks will be staged in order to reduce the sediment yield and ensure adequate controls are in place downslope of the earthworks site. Upon completion of earthworks operations in a particular catchment, surface areas shall be stabilised. These measures will ensure sediment generation is minimised as much as is practicable.
- ... Watercare has undertaken an assessment of alternative sites and has found that it is not practicable to completely avoid adverse effects on the SEA. These effects

³⁴ As amended by the Decisions version of Plan Change 14 (22 August 2019)

will be mitigated to the greatest extent practicable, however significant residual ecological effects are anticipated. A comprehensive compensation package is proposed. The positive benefits on the environment from the proposed mitigation and compensation package are considered to appropriately compensate for the loss of forest extent.

<u>Assessment</u>

The effects of the proposal in terms of land stability and earthworks have been assessed by Ms France (section 9.4.6) and Mr Tutt (section 9.4.4). Having regard to the assessment by Mr Tutt, the applicant's assessment are generally agreed with. The objective relating to soil conservation is considered to relate primarily to the management of soil loss, as addressed in Mr Tutt's review, rather than issues of SEA disturbance and ecological compensation, although the applicant's comments in this regard are nevertheless accepted.

Policy E11.3(1)

Avoid where practicable, and otherwise mitigate, or where appropriate, remedy adverse effects on areas where there are natural and physical resources that have been scheduled in the Plan in relation to natural heritage, Mana Whenua, natural resources, coastal environment, historic heritage and special character.

<u>Assessment</u>

The AEE does not provide comment in respect of this policy, but it is considered applicable to the proposal as the Project site has been scheduled in the AUP as SEA. While the effects to be avoided, remedied or mitigated are not specified, the intent of the policy is expected to relate to earthworks effects and associated impacts within the SEA. These aspects have been addressed in respect of sections 10.2 and 10.3 above.

Policy E11.3(2)

Manage land disturbance to:

- (a) retain soil and sediment on the land by the use of best practicable options for sediment and erosion control appropriate to the nature and scale of the activity;
- (b) manage the amount of land being disturbed at any one time, particularly where the soil type, topography and location is likely to result in increased sediment runoff or discharge;
- *(c) avoid, remedy and<u>or</u> <i>mitigate adverse effects on accidentally discovered sensitive material; and*³⁵
- (d) maintain the cultural and spiritual values of Mana Whenua in terms of land and water quality, preservation of wāhi tapu, and kaimoana gathering.

AEE Comment

The AEE comments with respect to Objective E11.3(2) that:

The following measures will be implemented to manage land disturbance:

³⁵ As amended by the Decisions version of Plan Change 14 (22 August 2019)
- (a) The ESCP sets out the best practicable options for sediment and erosion control appropriate to the project.
- (b) Earthworks will be staged in order to reduce the sediment yield and ensure adequate controls are in place downslope of the earthworks site.
- (c) It is considered unlikely that any archaeological sites will be uncovered by the works, however an Accidental Discovery Protocol will be followed in this event.
- (d) Watercare has and will continue to engage with Mana Whenua and to identify and implement measures to maintain cultural and spiritual values

<u>Assessment</u>

Having regard to the amendments to proposed sediment control measures provided by Cook Costello through the s92 process and Mr Tutt's review and based on the imposition and adherence to the proposed conditions of consent, the applicant's assessment is generally agreed with. It is noted in respect of clause (d) and in the absence of a CVA that the extent to which the proposal maintains the cultural and spiritual values of Mana Whenua is not entirely clear. However at this stage it is not expected that the Project site involves any areas of wāhi tapu, nor affects any areas used for the gathering of kaimoana, and a condition is recommended requiring adherence to standard E11.6.1 in the event of any accidental discovery of kōiwi, archaeology and artefacts of Māori origin.

Policy E11.3(3)

Manage the impact on Mana Whenua cultural heritage that is discovered undertaking land disturbance by:

- (a) requiring a protocol for the accidental discovery of kōiwi, archaeology and artefacts of Māori origin;
- (b) undertaking appropriate actions in accordance with mātauranga and tikanga Māori; and
- (c) undertaking appropriate measures to avoid adverse effects. Where adverse effects cannot be avoided, effects are remedied or mitigated.

Assessment

This policy has not been directly addressed in the AEE. However, it is noted that the proposed conditions (Attachment 10) include a condition related to the Regional Accidental Discovery standard at E11.6.1 of the AUP(OP), which is considered to address the requirements of this policy, including defining the appropriate actions to be undertaken in the event of discovery of kōiwi, archaeology and artefacts of Māori origin.

Policy E11.3(4)

Enable land disturbance necessary for a range of activities undertaken to provide for people and communities social, economic and cultural well-being, and their health and safety.

AEE Comment

The AEE comments with respect to Policy E11.3(4) that:

Ensuring a quality potable water supply and resilient water supply infrastructure supports the existing and future well-being of Auckland. There are significant social, cultural and economic benefits at a local, regional and national level associated with the construction and operation of the replacement WTP and reservoirs. The proposal finds support from this enabling policy.

Assessment

The comments in the AEE underscore the purpose of the project, and it is agreed that the land disturbance is necessary in regard to providing for the region-wide benefits of the proposed infrastructure.

Policy E11.3(5)

Design and implement earthworks with recognition of existing environmental site constraints and opportunities, specific engineering requirements, and implementation of integrated water principles.

AEE Comment

The AEE comments with respect to Policy E11.3(5) that:

The earthworks and erosion and sediment control measures have been designed to respond to environmental site constraints; in particular, to avoid areas assessed as being of highest ecological integrity and to avoid permanent streams. The functional and operational requirements of the infrastructure have also been factored into design.

<u>Assessment</u>

Having regard to the amendments to the proposed earthworks management set out in the further information from the applicant, and based on the assessment by Mr Tutt, the applicant's assessment is agreed with.

Policy E11.3(6)

Require that earthworks are designed and undertaken in a manner that ensures the stability and safety of surrounding land, buildings and structures.

AEE Comment

The AEE comments with respect to Policy E11.3(6) that:

The Preliminary Land Stability Assessment concludes the proposed earthworks will not result in land instability or increase the hazard risk. Detailed design will ensure the stability and safety of surrounding land, buildings and structures.

Assessment

Having regard to the additional information provided by the applicant through the s92 stage and the assessment by Ms France, the applicant's assessment is agreed with. In particular, Ms France's assessment concludes that:

The technical information provided in support of the resource consent application, including in response to s92 questions, indicates that:

- There will be dewatering and groundwater drawdown during construction, which is likely to result in some consolidation settlement within the road reserves of Woodlands Park Road and Manuka Road.
- There is also the potential for some mechanical settlement in the road reserves of Woodlands Park Road and Manuka Road.
- Settlement is not expected to extend into any private third party properties.
- The risk of adverse effects on services and transport infrastructure is expected to be less than minor.
- The risk of adverse effects on any third party owned assets due to stability issues triggered by the proposed works is likely to be very low.

Overall, any adverse effects on the environment are likely to be less than minor.

Policy E11.3(6A)

<u>Recognise and provide for the management and control of kauri dieback disease as a</u> <u>means of maintaining indigenous biodiversity</u>.³⁶

AEE Comment

The AEE comments with respect to Policy E11.3(6A) that:

Kauri dieback is recognised as a serious threat to indigenous biodiversity, and a robust protocol has been development for the project to ensure the disease is not spread as a result of construction.

The understanding of Kauri dieback and protocols for managing and preventing the spread of it are continually evolving to reflect the latest research and scientific information available. It is expected that current protocols will be amended and updated in consultation with Council biosecurity specialists to ensure that when works commence, the most appropriate controls are in place in regards to Kauri dieback.

The WBMP proposed as compensation for the project includes Kauri Dieback measures which extends to tree health assessments and site specific management including on private property.

Assessment

It is not apparent that the application has included a "robust protocol" for the Project, and it is noted that no KDMP has yet been drafted by the applicant to demonstrate the details of how the kauri dieback disease will be managed and controlled during the earthworks process. Rather, the assessment provided by Boffa Miskell as part of the November 2019 s92 response comments that:

Given the extent of pressures on Kauri Forest in the Waitakere Ranges, we do not consider that an assessment of the impact of removing 3.5 ha of this forested area on the survivability of Kauri forest in the Waitakere Ranges is warranted as a result of the proposed project. We do consider that a multi-agency study on the survivability of Kauri Forest in the Waitakere Forest (and beyond) would be highly worthwhile, as there are many factors that will influence the outcome for Kauri.

³⁶ As amended by the Decisions version of Plan Change 14 (22 August 2019), which adds the word "disease" to the notified version of this policy referenced in the AEE.

It goes on to advise, however, that a draft KDMP will be prepared and submitted to Council for review prior to the hearing (and in this sense will define the 'kauri dieback protocols' that were proposed to be included in the EMP as set out in the applicant's conditions at Appendix Q to the AEE).

As noted in section 9.4.5, the effects of the proposal in terms of the control and management of kauri dieback has been assessed by the Council's specialist on this matter, Dr Fea. Dr Fea's assessment is that the risks are not able to be avoided or remedied within the Project site, and that mitigation will be difficult given the "pervasive, cryptic nature of the disease, the nature of the works, the location of the site and the proximity of high-value kauri stands and individuals". Dr Fea has nevertheless specified a number of conditions to be imposed should consent be granted in order to provide as high a level of control and management as possible, including the details of the matters that should be addressed by a KDMP at the pre-construction stage, and specific measures to be undertaken during construction.

Given the wording of the above policy, however, it is apparent that the policy does not seek complete avoidance of kauri dieback risk, and so a high level of management, through an agreed KDMP, could be seen as an appropriate response to the requirements of the AUP(OP). Further consideration of this matter will be possible once the applicant's draft KDMP has been reviewed.

At this stage it is considered that the proposal is in some conflict with this policy, albeit that this depends on whether the policy is read in absolute terms (i.e. avoidance of risk), or provides for control and management measures to be developed that seek to mitigate risks (to the extent that this is possible) in the context of a particular proposal.

Policy E11.3(7)

Require any land disturbance that will likely result in the discharge of sediment laden water to a surface water body or to coastal water to demonstrate that sediment discharge has been minimised to the extent practicable, having regard to the quality of the environment; with:

- (a) any significant adverse effects avoided, and other effects avoided, remedied or mitigated, particularly in areas where there is:
 - (i) high recreational use;
 - (ii) relevant initiatives by Mana Whenua, established under regulations relating to the conservation or management of fisheries, including taiāpure, rāhui or whakatupu areas;
 - (iii) the collection of fish and shellfish for consumption;
 - (iv) maintenance dredging; or
 - (v) a downstream receiving environment that is sensitive to sediment accumulation;
- (b) adverse effects avoided as far as practicable within areas identified as sensitive because of their ecological values, including terrestrial, freshwater and coastal ecological values; and
- (c) the receiving environments ability to assimilate the discharged sediment being taken into account.

AEE Comment

The AEE comments with respect to Policy E11.3(7) that:

The ESCP sets out the measures that will minimise the discharge of sediment laden water to the receiving streams, including staging the works, stabilisation, clean water diversions, and dirty water collection and treatment. Having regard to the quality of the environment, the effects of the discharge is assessed as being no more than minor with the implementation of the ESCP.

Assessment

Having regard to the assessment by Mr Tutt, the applicant's assessment is agreed with insofar as it relates to the effects of sediment discharges having been remedied and mitigated. It is not apparent that downstream environments are noted as areas providing for recreation or shellfish gathering, or maintenance dredging, but the receiving environment has been assessed by Mr Tutt as 'sensitive' notwithstanding, and conditions have been proposed in recognition of this.

Policy E11.3(8)

Monitor the quality of fresh and coastal water bodies across the region and the effects of land disturbance on water quality and receiving environments.

Assessment

The AEE does not comment on this policy. In this regard, it is considered important that the monitoring of the efficacy of the ESCP is implemented, in accordance with the adaptive management plan conditions recommended by Mr Tutt (required at the pre-commencement stage), and the s128 review condition (during construction).

Summary

Overall, it is considered that the proposal is generally in alignment with, and not contrary to, the objectives and policies under Chapter 11 that guide the management of earthworks on stability, hazard avoidance and protection of downstream environments. As noted above, there is an evident tension between the proposed land disturbance and new policy 11.3(6A) related to the control and management of kauri dieback. Having regard to the review by Dr Fea, and the lack of any specifically defined protocols (or a draft KDMP) to identify how this risk will be addressed, this is a considered to be a present area of uncertainty, and tempers a conclusion that the proposal would be otherwise consistent with these objectives and policies in overall terms. It is accepted that the degree of risk is unknown, and no definitive conclusions can be drawn as to the likely scale of effect that would arise on kauri trees outside the proposed works area, and so an unequivocal conclusion is difficult to reach in this regard, particularly if a precautionary approach is adopted. Nevertheless, it is not considered that any misalignment or uncertainty with respect to Policy 11.3(6A) would result in the proposal being contrary to the above provisions related to land disturbance when considered on an overall basis.

10.9 Chapter E26 - Infrastructure

10.9.1 Introduction

Chapter E26 addresses the provisions related to infrastructure. The Background (explanation) to this chapter states as follows:

Infrastructure is critical to the social, economic, and cultural well-being of people and communities and the quality of the environment. This section provides a framework for the development, operation, use, maintenance, repair, upgrading and removal of infrastructure.

As well as benefits infrastructure can have a range of adverse effects on the environment, visual amenity of an area, and public health and safety. The sensitivity of adjacent activities, particularly residential, to these effects can lead to complaints and ultimately constraints on the operation of infrastructure. Managing these reverse sensitivity effects is essential. Equally in some circumstances other activities and development need to be managed in a way that does not impede the operation of infrastructure.

Infrastructure is provided for on the basis of Auckland-wide provisions... Designations may also provide for infrastructure.

10.9.2 Assessment

Objectives E26.2.1

- (1) The benefits of infrastructure are recognised.
- (2) The value of investment in infrastructure is recognised.
- (3) Safe, efficient and secure infrastructure is enabled, to service the needs of existing and authorised proposed subdivision, use and development.
- (4) Development, operation, maintenance, repair, replacement, renewal, upgrading and removal of infrastructure is enabled.
- (5) The resilience of infrastructure is improved and continuity of service is enabled.
- (9) The adverse effects of infrastructure are avoided, remedied or mitigated.

AEE Comment

The AEE comments with respect to the above objectives as follows:

- The Huia WTP is the third most significant water treatment plant in Auckland and is a crucial component of Auckland's water supply network, treating approximately 20% of Auckland's water. Replacement of the existing Huia WTP is essential to ensuring the continued supply of water to the Auckland region, providing for the health and well-being of Auckland's people and communities. The proposal is supported by Objective E26.2.1 (1).
- The existing Huia WTP is an essential component of the existing infrastructure that supplies Auckland's water. The value of investment in the existing infrastructure, including connecting raw and treated water infrastructure and the western water supply dams, is significant. The proposal is supported by Objective E26.2.1 (2).
- The purpose of the works is to replace and upgrade the Huia WTP, which was identified as one of the top eight highest risk assets in Auckland's water supply system. The proposed replacement WTP and reservoirs will increase system efficiency and resilience. Significant growth is projected for Auckland's population over the next 30 years, Ensuring high quality potable water supply into the future is

a fundamental requirement of providing for this growth. It is considered that the proposal is enabled by Objective E26.2.1 (3).

- The proposal is to develop and operate a replacement WTP and new reservoirs, which is enabled by Objective E26.2.1 (4).
- The replacement of the ageing WTP with a new WTP of increased capacity will assist in meeting peak demand periods and improve the current system resilience. Its independence from other water sources and supply infrastructure provides resilience to Auckland's wider water supply in the event of disruption of the southern water sources (i.e. continuity of service). Resilience and efficiency within the WTP itself is provided through the use of gravity based systems that minimise the need for electricity-reliant pumping, being designed to meet modern seismic design requirements, and pipework and concrete structures designed for a life of 100 years. It is considered that the proposal is enabled by Objective E26.2.1 (5).
- The avoidance, remediation and mitigation of adverse effects as much as is practicable has been a key driver of the design of the project. The assessment in Section 7 of this AEE finds that the adverse effects of the proposal will be adequately avoided, remedied or mitigated by the measures proposed, with the exception of residual ecological effects. A comprehensive ecological compensation package is proposed to address these residual effects with the goal of achieving an overall net benefit in terms of ecological values. As set out in Section 7 of the AEE, adverse effects from construction and operation will be avoided, remedied or mitigated as far as practicable, with the residual adverse ecological effects of construction assessed as being compensated for via the WMBI which has been formulated to result in a net gain in biodiversity in the medium term.

Assessment

These provisions of the AUP(OP) recognise the benefits of infrastructure, and the need to provide for the development of infrastructure, while also seeking to ensure that adverse effects are avoided, remedied or mitigated. The assessment of these provisions within the AEE are therefore agreed with, noting that the proposal provides for the development of regionally-important or significant infrastructure, while adverse environmental effects are sought to be minimised and mitigated to the greatest extent practicable, but will nevertheless be more than minor overall (noting that clause (9) does not provide for consideration of compensation or offsetting).

Policy E26.2.2(1)

Recognise the social, economic, cultural and environmental benefits that infrastructure provides, including:

- (a) enabling enhancement of the quality of life and standard of living for people and communities;
- (b) providing for public health and safety;
- (c) enabling the functioning of businesses;
- (d) enabling economic growth;

- (e) enabling growth and development;
- (f) protecting and enhancing the environment;
- (g) enabling the transportation of freight, goods, people; and
- (h) enabling interaction and communication.

AEE Comment

The AEE comments with respect to Policy E26.2.2(1) as follows:

Watercare services about 1.5 million people living in Auckland providing 'Aa'-grade safe and reliable drinking water. Over the next 30 years the population will grow significantly. Replacement of the Huia WTP is vital to continue to provide a reliable long term water supply to service the north-west of Auckland.

The availability of safe drinking-water for all New Zealanders, irrespective of where they live, is a fundamental requirement for public health. Untreated or inadequately treated drinking-water contaminated with pathogens presents a significant risk to human health. Ensuring a quality potable water supply and resilient water supply infrastructure supports the existing and future well-being of Auckland. It is also fundamental to achieving the purpose of the RMA and in particular enabling 'people and communities to provide for their social, economic and cultural well-being and for their health and safety'.

The proposal finds support from Policy E26.2.2 (1) including sub-sections (a), (b), (c), (d), and (e).

Assessment

This policy focuses on recognition of the benefits of infrastructure, and the excerpt from the AEE above highlights the benefits of the proposal in that context and is agreed with. The policy also recognises infrastructural benefits in terms of "protecting and enhancing the environment" – in this regard the proposal has adverse effects on the environment that are more than minor in overall terms, but it is also recognised that the project will include implementation of the WBMP which offsets those effects and provides for some degree of enhancement beyond the present ecological 'baseline' of the Waima catchment in terms of biodiversity outcomes, notwithstanding the extent of SEA to be removed. Overall, and having regard to the alignment with (a) – (e) above, the proposal is considered to be consistent with, and not contrary to, this policy.

Policy E26.2.2(2)

Provide for the development, operation, maintenance, repair, upgrade and removal of infrastructure throughout Auckland by recognising:

- (a) functional and operational needs;
- (b) location, route and design needs and constraints;
- (c) the complexity and interconnectedness of infrastructure services;
- (d) the benefits of infrastructure to communities [within] Auckland and beyond;
- (e) the need to quickly restore disrupted services; and
- (f) its role in servicing existing, consented and planned development.

AEE Comment

The AEE comments with respect to Policy E26.2.2(2) as follows:

The replacement WTP and reservoirs have a functional and operational need to be located at a particular elevation band and in proximity to existing (and proposed) infrastructure including the raw and treated water network and the NH2 watermain, as well as the western water supply dams. This is demonstrated through the Huia WTP Site Selection Site Principles report prepared by CH2M Beca Ltd, Dec. 2015 and subsequent alternatives assessments and site layout development reports.

<u>Assessment</u>

The comments in the AEE are accepted and agreed with.

Policy E26.2.2(4)

Require the development, operation, maintenance, repair, upgrading and removal of infrastructure to avoid, remedy or mitigate adverse effects, including, on the:

- (a) health, well-being and safety of people and communities, including nuisance from noise, vibration, dust and odour emissions and light spill;
- (b) safe and efficient operation of other infrastructure;
- (c) amenity values of the streetscape and adjoining properties;
- (d) environment from temporary and ongoing discharges; and
- (e) values for which a site has been scheduled or incorporated in an overlay.

AEE Comment

The AEE comments with respect to Policy E26.2.2(4) as follows:

The management of adverse environmental effects has been central to the layout optimisation iterative process that has been undertaken, with a particular focus on avoiding the disturbance of areas with the highest ecological integrity. The assessment in Section 7 of the AEE finds that the adverse effects of the proposal will be adequately avoided, remedied or mitigated by the measures proposed, with residual effects on the SEA to be addressed through a comprehensive ecological compensation package which is designed to achieve an overall net benefit in biodiversity.

The effects of discharges to the environment of sediment laden water and stormwater will be avoided, remedied and mitigated through the application of best practice measures as set out in GD05 and GD01.

Note: The district plan related matters identified in this policy will be addressed through the OPW process.

<u>Assessment</u>

Having regard to the preceding assessments with respect to effects on the SEA, and biodiversity compensation through the WBMP, and the assessment of sediment management, the above comments are agreed with.

Policy E26.2.2(5)

Consider the following matters when assessing the effects of infrastructure:

- (a) the degree to which the environment has already been modified;
- (b) the nature, duration, timing and frequency of the adverse effects;
- (c) the impact on the network and levels of service if the work is not undertaken;
- (d) the need for the infrastructure in the context of the wider network; and
- (e) the benefits provided by the infrastructure to the communities within Auckland and beyond.

AEE Comment

The AEE comments with respect to Policy E26.2.2(5) as follows:

- (a) The environment of the Project Site has been subject to past modification through historical logging and partial clearance. Notwithstanding this, mature forest remnants are present on the Project Site, with well-advanced secondary forest on much of the remaining area. The project has been designed to avoid all areas assessed as being of highest ecological integrity, and minimise the development footprint as much as is practicable.
- (b) The adverse effects of the project are generally caused during the construction period. Some aspects of works will be timed to mitigate particular effects, for example vegetation assessed as potential lizard habitat will only be cleared during the season that provides the greatest likelihood of salvage.
- (c) Watercare services about 1.5 million people living in Auckland and over the next 30 years the population will grow significantly with a projected medium population growth of an additional 800,000 people and high population growth of over 2.3 million people for Auckland. The combined capacity of the western WTP's (Huia and Waitakere) alone cannot meet the demands of the northwestern water supply area without support from the southern sources (Waikato and Ardmore). Growth that is occurring to the north and west of Auckland will primarily be serviced by the replacement WTP. Replacement of the Huia WTP is critical to continue to provide a reliable long term water supply to service the north-west of Auckland.

The replacement WTP, additional reservoir storage capacity and NH2 watermain projects are all planned and sequenced for the next 10 years to ensure the water network continues to have sufficient capacity to meet demand and provide resilience during outages.

One of Watercare's strategic priorities is to supply the highest quality 'Aa'-graded drinking water. The existing Huia WTP was not designed to meet the current and short-term future source water quality challenges. To be able to continue to supply 'Aa'-graded drinking water to Aucklanders, the existing Huia WTP needs to be replaced.

On the basis of the above, there are significant impact on the network and levels of service if the work is not undertaken.

(d) The replacement of the ageing WTP with a new WTP of increased capacity will assist in meeting peak demand periods and improve the current system resilience. Its independence from other water sources and supply infrastructure provides resilience to Auckland's wider water supply in the event of disruption of the southern water sources. The assessment in relation to (c) above is also relevant to (d).

(e) The Huia WTP is the third most significant water treatment plant in Auckland and is a crucial component of Auckland's water supply network, treating approximately 20% of Auckland's water. Replacement of the existing Huia WTP is essential to ensuring the continued supply of water to the Auckland region, providing for the health and well-being of Auckland's people and communities.

Assessment

While all bush within an SEA is identified as being of quality, rather than including "mature forest remnants" per (a) above, having regard to the preceding assessments with respect to effects on the SEA, and biodiversity compensation through the WBMP, and the assessment of sediment management, the above comments and outline of the benefits of the proposed infrastructure are agreed with.

Policy E26.2.2(6)

Consider the following matters where new infrastructure or major upgrades to infrastructure are proposed within areas that have been scheduled in the Plan in relation to natural heritage, Mana Whenua, natural resources, coastal environment, historic heritage and special character:

- (a) the economic, cultural and social benefits derived from infrastructure and the adverse effects of not providing the infrastructure;
- (b) whether the infrastructure has a functional or operational need to be located in or traverse the proposed location;
- (c) the need for utility connections across or through such areas to enable an effective and efficient network;
- (d) whether there are any practicable alternative locations, routes or designs, which would avoid, or reduce adverse effects on the values of those places, while having regard to E26.2.2(6)(a) - (c);
- (e) the extent of existing adverse effects and potential cumulative adverse effects;
- (f) how the proposed infrastructure contributes to the strategic form or function, or enables the planned growth and intensification, of Auckland;
- (g) the type, scale and extent of adverse effects on the identified values of the area or feature, taking into account:

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- (v) natural ecosystems and habitats; and
- (vi) the extent to which the proposed infrastructure or upgrade can avoid adverse effects on the values of the area, and where these adverse effects cannot practicably be avoided, then the extent to which adverse effects on the values of the area can be appropriately remedied or mitigated.
- (h) whether adverse effects on the identified values of the area or feature must be avoided pursuant to any national policy statement, national environmental standard, or regional policy statement.

AEE Comment

The AEE comments with respect to Policy E26.2.2(6) as follows:

The proposed replacement WTP and reservoirs are located in an area scheduled for its significant natural resources (SEA overlay). In relation to the matters set out in Policy E26.2.2 (6):

- (a) The Huia WTP is a crucial component of Auckland's water supply network, and replacement of the existing Huia WTP is essential to ensuring the continued supply of high quality drinking water to the Auckland region, providing for the health and well-being of Auckland's people and communities. The adverse effects of not providing the infrastructure are outlined above.
- (b) The replacement WTP and reservoirs have an operational need to be located at a particular elevation and in proximity to the existing WTP and NH2 watermain. The consideration of alternatives in Section 5 of this AEE demonstrates that the subject site meets this operational need.
- (c) The replacement WTP and reservoirs have a functional and operational need to be located at a particular elevation band and in proximity to existing (and proposed) infrastructure including the raw and treated water network and the NH2 watermain, as well as the western water supply dams. This is demonstrated through the Huia WTP Site Selection Site Principles report prepared by CH2M Beca Ltd, Dec. 2015.
- (d) Watercare has assessed alternative locations and designs (Section 5 of the AEE Report), and found the proposal is the best practicable option.
- (e) The vegetation and habitats affected by the proposal have a history of past modification, and areas assessed as being of highest ecological integrity have been avoided. Limited cumulative effects from vegetation clearance are unavoidable, however the clearance represents 0.01 % of the 24,000 ha SEA and will be appropriately addressed by the comprehensive compensation package (WBMP).
- (f) Significant growth is projected for Auckland's population over the next 30 years, and the replacement WTP and reservoirs will be the primary source of water for growth in the north west of the region.
- (g) The development footprint has been designed to avoid the areas of highest ecological integrity, and to minimise the area of SEA clearance to the extent that is practicable. There will not be any effects on Exhibition Drive and associated recreation values.
- (h) Of most relevance, the RPS focuses on avoiding effects on SEA as far as practicable. Key RPS objectives and policies seek to enable infrastructure while managing adverse effects on an SEA, and avoiding, remedying or mitigating such effects (Obj. B3.2.1 (3), Obj. B3.2.1 (8), Pol. B3.2.2 (8)). RPS Policy B3.2.2 (6) requires that the adverse effects on the values of such areas are avoided where practicable or otherwise remedied or mitigated. No national policy statement or national environmental standard directs the avoidance of adverse effects relating to the project.

<u>Assessment</u>

Having regard to the preceding assessments with respect to effects on the SEA, and biodiversity compensation through the WBMP, and the assessment of sediment management, the above comments and outline of the benefits of the proposed infrastructure are agreed with.

Summary

In overall terms the objectives and policies seek to recognise and provide for the benefits of infrastructure, while addressing and minimising potential adverse effects. Having regard to the significance of the project in addressing an identified need for future security of water supply for the north-west area of the region, and the generally acknowledged benefits associated with the biodiversity offsetting proposed in this application, it is concluded that the proposal is consistent with, and not contrary to, these provisions.

10.10 Chapter E30 – Contaminated land

10.10.1 Introduction

Chapter E30 addresses the provisions related to Contaminated land. The Background (explanation) to this chapter states as follows

This section addresses the effects of the discharge of contaminants from contaminated land or land containing elevated levels of contaminants into air, or into water, or onto or into land pursuant to section 15 of the Resource Management Act 1991. This is separate from and different to the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011.

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This section focuses on all of the following:

- the direct discharges arising from investigation activities on land containing elevated levels of contaminants;
- discharges associated with soil disturbance that may liberate contaminants;
- longer term discharges occurring as a result of residual contaminants, often known as passive discharges;
- legacy discharges associated with past incidents; and
- the assessment of risk around ongoing discharges.

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10.10.2 Assessment

Objective E30.2

(1) The discharge of contaminants from contaminated land into air, or into water, or onto or into land are managed to protect the environment and human health and to enable land to be used for suitable activities now and in the future.

Policies E30.3

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- (2) Require any use or development of land containing elevated levels of contaminants resulting in discharges to air, land or water to manage or remediate the contamination to a level that:
 - (a) allows contaminants to remain in the ground/groundwater, where it can be demonstrated that the level of residual contamination is not reasonably likely to pose a significant adverse effect on human health or the environment; and
 - (b) avoids adverse effects on potable water supplies; and
 - (c) avoids, remedies or mitigates significant adverse effects on ecological values, water quality, human health and amenity values; while

taking into account all of the following:

- (d) the physical constraints of the site and operational practicalities;
- *(e) the financial implications of the investigation, remediation, management and monitoring options;*
- (f) the use of best practice contaminated land management, including the preparation and consideration of preliminary and detailed site investigations, remedial action plans, site validation reports and site management plans for the identification, monitoring and remediation of contaminated land; and
- (g) whether adequate measures are in place for the transport, disposal and tracking of contaminated soil and other contaminated material removed from a site to prevent adverse effects on the environment.

AEE Comment

The AEE comments with respect to these provisions as follows:

Watercare has taken a conservative approach to the management of contaminated land, as there is very limited information regarding the likelihood of contamination from a small number of residential buildings that were removed in the 1990s.

A SMP is included in Appendix K, which sets out appropriate controls to minimise potential discharges of contaminants to the environment that could result from the disturbance of potentially contaminated land.

Pre-works contamination testing will be undertaken to establish actual contamination concentrations, and the management procedures in the SMP will then be confirmed.

With these measures in place, the proposed development will meet the requirements of this objective and policy.

Assessment

The review by Ms Tang, as set out in section 9.4.7 of this report, confirms her general agreement with the applicant's assessment, subject to conditions. In particular, I note Ms Tang's assessment that:

... the SMP has been prepared in accordance with the Ministry for the Environment's with the requirements of Contaminated Land Management Guidelines No. 1 and 5 (revised 2011). Although the plan states it is prepared based on the assumption of low levels of contamination present at the site, the plan in general includes sufficient details and appropriate control measures to manage/mitigate effects of the proposed earthworks from potentially contaminated soil, stormwater runoff and unexpected discovery of contamination. The SMP will be updated by a condition should significant contamination is identified from the proposed further site investigation.

Accordingly, and with reference to Objective E30.2(1), it is concluded that contaminants will be appropriately managed to protect the environment and human health and will enable the subject land to be used in the manner proposed, and the proposal will not be contrary to the above provisions.

10.11 Conclusion

I conclude that while the proposal gives rise to some obvious areas of tension with respect to the relevant objectives and policies of the AUP(OP), having regard to the amendments to the proposal through the s92 process, the specialist reviews and advice provided by Council specialists and based on the imposition of, and adherence to, proposed conditions of consent, it is considered that the proposal will be consistent with, and not contrary to, the objectives and policies when viewed in overall terms. I therefore agree with the conclusion of the AEE, at 8.6.8, where it states with respect to the AUP(OP):

The proposal is supported and enabled by the objectives and policies that recognise the value of investment in infrastructure, the benefits it entails, and the functional and operational needs of the development to locate within the SEA. The management of adverse environmental effects has been central to the layout optimisation iterative process that has been undertaken, with a particular focus on avoiding the disturbance of areas with the highest ecological integrity. All other adverse environmental effects have been avoided, remedied or mitigated to the greatest degree that is practicable. Residual effects on the SEA will be addressed through a comprehensive ecological compensation package which is designed to achieve an overall net benefit in ecological values. This reflects the mitigation hierarchy established through the Regional Plan provisions in Chapters E26 and D9 which has been fundamental to the ecological assessment and site layout optimisation process.

Accordingly, it is my conclusion that the proposal is able to pass through this second limb of the s104D tests, so that an overall evaluation in terms of s104(1) can therefore be made. This is set out in section 11 below.

11. Section 104(1)(a) and (ab) – Actual and potential effects on the environment

11.1 Overview

Section 104(1) requires a consent authority to have regard to:

(a) Any actual and potential effects on the environment of allowing the activity; and

(ab) any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity; and

In terms of s104(1)(a), the actual and potential effects on the environment of the proposal have been assessed at section 9.4 of this report, in the context of an assessment against s104D(1)(a). In that respect, the "actual and potential effects" on the environment of allowing the activities proposed in the application are concluded to be more than minor. This finding is noted to be consistent with that set out in the AEE.

Under s104(1)(ab), however, it is necessary to consider the measures proposed by the applicant to ensure positive effects to offset or compensate for the adverse effects identified. These are summarised at section 8.1.2 of the AEE, as follows:

- The Yorke Gully Stream mitigation and compensation package is proposed to address the reclamation of approximately 53m of intermittent stream in the Yorke Gully. This encompasses both the creation of a stream diversion channel on the Project site, and erosion protection works within an off-site section of the Yorke Gully. Bank stabilisation and minor channel clearance works are proposed to address localised erosion in this area, reduce the fine sediment entering the stream and will reinstate some intermittent habitat. The AEE notes that the applicant's Ecological Assessment considers that these works will provide an overall ecological enhancement (while Mr Tutt has also recommended that a condition requiring covenanting of this mitigation to maintain these outcomes in perpetuity).
- The WBMP is proposed as a comprehensive ecological mitigation and compensation package, focused on achieving an overall net benefit in biodiversity. The proposed WBMP Management Area encompasses 990 ha of public and private land, approximately 720 ha of which is bush-covered and classified as SEA in the AUP(OP). Biodiversity values within the Management Area are considered comparable to that present within the Project Site. The AEE advises that the benefits of the WBMP include the following:
 - Effective vertebrate pest control throughout the Little Muddy Creek catchment will reduce predation on populations of birds, lizards and invertebrates, palatable plants and propagules, and increase food resources.
 - Comprehensive, catchment-wide possum control will reduce browsing impacts on forest canopy vegetation.
 - Improvement in forest habitat throughout the catchment.
 - Increased stewardship of kauri populations on private land throughout the catchment will enhance the health and long-term viability of kauri.
 - Significant buffer/ halo effect to the adjoining Waitakere Ranges regional parkland. In particular pest management through the WBMP will prevent migration of pests back into the parkland and diversify pest-free habitat to incorporate a portion of the Waitakere lowland environment. The importance of pest-suppression in forest habitats on the fringes of the Waitakere Ranges will increase as populations of re-introduced

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...

species (kokako, robin, whitehead, kakariki) reach carrying capacity and disperse from intensively managed habitats.

 Other off-site mitigation measures are described as including the repurposing of the Nihotupu Filter Station and a realignment of the Woodlands Park Road/ Scenic Drive intersection and relocation of the carpark that services Exhibition Drive. The AEE advises that "[t]hese initiatives acknowledge the community disruption associated with the construction of the replacement WTP and storage reservoirs and aim to provide some further benefit to the immediately impacted community beyond the provision of a quality potable water supply". As noted in the AEE, these initiatives will be more fully described the separate OPW required for the actual construction of the infrastructure.

There is a question in my view as to whether the "other" off-site mitigation measures can be considered as offsetting or compensatory measures having regard to the nature of the adverse effects that are at issue in this application. It is acknowledged that they may be supported by the community, and have received some specific support in several submissions, but I consider that the focus for the purposes of an assessment under s104(1)(ab) should relate to Yorke Gully Stream mitigation and compensation package and the WBMP.

11.2 Ecological Compensation

As noted in section 4.1 above, the AEE states that a key part of the project design is a comprehensive ecological mitigation and compensation package, which has the objective of achieving an overall net benefit in biodiversity. Proposed mitigation measures are described for each of the effects above, with residual ecological effects compensated by the establishment and implementation of a biodiversity management plan referred to as the WBMP.

The AEE advises WBMP Management Area encompasses 990 ha of public and private land, approximately 720 ha of which is bush-covered and classified as SEA in the AUP(OP) (as illustrated in Figure 7.1 of the AEE). Biodiversity values within the Management Area are considered comparable to that present within the Project Site. It states that the choice of the Little Muddy Creek catchment as the focus of proposed biodiversity management meets the AUP(OP) principle that offsetting/ compensation to address adverse ecological effects "should be undertaken close to the location of development, where this will result in the best ecological outcome".

The AEE further notes that:

the rationale for the proposed compensation is that management to protect and restore remaining indigenous ecosystems is a higher priority, and will provide greater biodiversity outcomes, than creation of new habitat though revegetation. This approach aligns with Auckland Council's Biodiversity Strategy, which prioritises protection and management of remnant existing ecosystems and habitats. The Management Area faces significant pressures on biodiversity associated with invasive species and human activity. Predation by vertebrate pests is the major threat to wildlife, while kauri dieback, browsing animals and competition from weeds all impact on the health, diversity and integrity of the plant community. Argentine ants are also an emerging biodiversity threat.

The AEE also identifies existing biodiversity funds and initiatives that already exist within the Little Muddy Creek catchment, and include:

- The Council's pest management programme, which is described as being intermittent and mainly focused on possum control. The AEE notes that the proposed Regional Pest Management Plan (2018) includes a 10-year budget to cover region-wide management of pest plants and animals (rats, stoats, possums, pigs and cats) on all parkland, although the AEE notes that specific details of how and where management will be implemented are not yet available.
- Funding allocated through the 10-year plan to construct tracks and hygiene stations to reduce the spread of kauri dieback disease on public land.
- Community-led pest management activity through the Waima-Laingholm Pest Free Zone and by individual landowners, which again is noted to focus mostly on possums with limited rat control. The AEE comments that the current level of control is not considered to be effective to suppress the possum population to the extent that significant biodiversity gains will be achieved.

The 2014 Muddy Creeks Local Area Plan is also noted as including ideas and visions for the future to provide a long-term direction for Council, iwi and community action in the area (as discussed further in section 13.4).

The AEE acknowledges that "for compensation to be real, it must be additional and deliver conservation gains beyond those that would be achieved by other ongoing or planned activities". It notes that the Council's 10-year budget provides funds for a substantial expansion in biosecurity management in parkland across the region but considers that the budget for this activity "will not be sufficient to undertake comprehensive pest control over all its parks and reserves".

The AEE records Boffa Miskell's view that, based on discussions with the Council:

funding of weed control work through the WBMP will provide a means for the Council to realistically achieve its objective of sustainable suppression of target species in the catchment, and the expansion of comprehensive vertebrate pest and argentine ant management into local parks and private land will achieve biodiversity benefits over and above the status quo. The eastern flank of the Waitakere Ranges regional parkland is intentionally included within the proposed WBMP Area, notwithstanding that Council is likely to prioritise biosecurity management in this area, as the intent of this 'overlap' in stewardship responsibility is to facilitate coordinated, complementary activities between the Trust and Council, and to ensure continuity of management effort if Council priorities shift away from this area. For these reasons, we consider that the proposed WBMP will achieve significant biodiversity benefits over and above the status quo.

The AEE goes on to detail the particulars of the proposed Waima Biodiversity Trust which will administer and implement the WBMP in terms of the expected representation of the Trust, funding and expected outcomes. A draft Trust Deed is included in the application documents at Appendix R. Further particulars about the way in which the Trust will be administered, and safeguards as to its allocation of funds and management are set out in the memorandum prepared by Simpson Grierson included with the applicant's August 2019 s92 response (memorandum dated 31 July 2019).

Section 7.5.9.3 of the AEE summarises the objectives of the proposed WBMP as follows:

• To coordinate and increase conservation efforts to protect and restore viability to populations of native flora and fauna within the Waima catchment by:

- undertaking multi-species vertebrate pest management throughout the Waima catchment to suppress pests below target thresholds, by contributing funding to an appropriate organisation or engaging suitably qualified contractors;
- undertaking weed management throughout land owned by the consent holder, public reserve land and private properties (where landowner consent has been obtained), by contributing funding to an appropriate organisation or engaging suitably qualified contractors; and
- monitoring of Argentine ants and effective eradication of localised populations (where assessed as viable).
- To repair and strengthen connective linkages throughout the catchment through promoting natural forest regeneration;
- To improve the health and resilience of remnant kauri forest through tree health assessments and site specific management including on private properties;
- To increase community-wide engagement in stewardship and sustainable environmental management of the Waima catchment by seeking acceptance of landowners and residents within the area for the Trust's activities on their properties; and
- To undertake biodiversity monitoring within the Waima catchment using key indicator species/ guilds.

The key actions to achieve these objectives, and the associated measurable targets, are set out in the Ecological Assessment Report. The AEE goes on to say the following about the expected outcomes of the WBMP, which due to its significance as a primary mitigation of the project is set out in full below:

Effective vertebrate pest control throughout the Little Muddy Creek catchment will reduce predation on populations of birds, lizards and invertebrates, palatable plants and propagules, and increase food resources. Comprehensive, catchment-wide possum control will reduce browsing impacts on forest canopy vegetation.

The improvement in forest habitat throughout the catchment will compensate for a reduction in the quality and extent of forest habitat within and immediately surrounding the Project Site, and for degraded ecosystem functions that may affect seed dispersal and movement of fauna within the forested corridor on the northern margin of the catchment. The increased viability of palatable plants, including secondary forest trees, throughout the catchment's forest ecosystem will provide partial compensation for the loss of 3.5 ha of ecological significant vegetation, including some mature secondary forest trees, within the Project Site.

Increased stewardship of kauri populations on private land throughout the catchment will enhance the health and long term viability of and will provide at least partial compensation for the loss of mature kauri trees within the Project Site.

The proposal offers a significant buffer/ halo to the adjoining Waitakere Ranges regional parkland, which will be particularly beneficial if Auckland Council uses its increased biodiversity funding to more intensively manage core areas such as Ark in the Park. Pest management through the WBMP will prevent migration of pests back into the parkland and diversify pest-free habitat to incorporate a portion of the Waitakere lowland environment. The importance of pest-suppression in forest habitats on the fringes of the

Waitakere Ranges will increase as populations of re-introduced species (kokako, robin, whitehead, kakariki) reach carrying capacity and disperse from intensively managed habitats.

The AEE concludes that, overall, "the Ecological Assessment concludes that the positive benefits on the environment from the proposed mitigation and compensation package appropriately compensate for the loss of forest extent".

The ecological compensation measures have been reviewed on behalf of the Council by Dr Graham Ussher (RMA Ecology Ltd), in a Technical Memorandum dated 12 December 2019. Dr Ussher's analysis includes reference to a number of principles to guide his review of the proposed compensation, including:

- The starting point that losses of ecological values are unavoidable;
- The limits to offsetting and compensation;
- Proximity to development losses;
- Additionality (whether compensation works would be carried out anyway);
- Priorities for funding;
- Equivalence;
- Assessing no-net-loss;
- Role of funding in determining project duration; and
- Duration of enhancement project and permanence of benefits.

His findings in respect of these topics also informs his consideration of the submissions related to the ecological compensation aspects of the proposal, which are addressed in respect of whether the ecological compensation is inappropriate, or inadequate.

Dr Ussher's report concludes as follows:

The proposed Huia WTP project will have significant residual adverse effects on terrestrial ecology values by removing 3.5 ha of indigenous vegetation that is mostly mid to late-successional stage kanuka forest with some older canopy trees. The loss of that forest will have effects on the connectivity of indigenous vegetation cover of the local catchment.

The package of enhancements offered by the Applicant includes a programme of at least 10 years of weed and animal pest control, as well as other conservation initiatives, within a proposed Waima Biodiversity Management Area, which covers at least 990 ha of the surrounding area and includes most of Little Muddy Creek catchment.

The scale of proposed weed and pest control is great; however, the duration of the programme is short and if the programme ceases, biodiversity gains for some species will erode over time. Some potential gains – especially to forest health and recruitment of long-lived forest trees - are likely to persist however and will accelerate a transition to mature forest throughout the management area (and in nearby areas).

The WBMA programme meets many of the key criteria by which a well-designed biodiversity offset is developed – in particular, proximity to impact area, work proposed is not being undertaken by others and is not required by law, and parts, but not all, of the enhancements to ecology values will persist. The package cannot be assessed against

the no-net-loss principle because of difficulty accounting for exchanges of loss of area against improvements to condition for such a complex proposed management area.

On the balance, I consider that the proposed WBMA compensation package will provide enhancements that are at least commensurate to the values proposed to be removed from within the project footprint.

A key component underlying my assessment of 'commensurate benefit' is the duration and effectiveness of weed and animal pest control within the WBMA area.

In this regard, there are several changes that I have suggested to the set of proposed resource consent conditions to ensure that weed and animal pest control will be undertaken to a high standard. My assessment of 'commensurate benefit' is contingent upon these changes to the set of consent conditions being adopted; if the changes are not adopted, I would consider that residual adverse effects on terrestrial ecology values will not have been adequately addressed, and that a significant residual adverse effect on ecology values will result from the Huia WTP project.

As noted in section 10.2, Dr Ussher has also commented on the issues of kauri dieback, in which there is a difference in opinion between the applicant's advisers, Boffa Miskell, and Dr Fea for the Council regarding the ability to control or manage the risk of the spread of this disease to vulnerable trees. That commentary is in respect of "the limits to offsetting and compensation", which adopts the premise that there are no species or ecosystem types identified that exhibit qualities of irreplaceability or vulnerability within the development footprint. The exception to that premise is kauri, and in this regard Dr Ussher notes the risks to kauri identified by Dr Fea (at section 9.4.5), and comments that:

Dr Fea identifies significant risk to kauri not proposed to be directly impacted at the site, as well as consequential risk to old-aged kauri specimens downslope of the site, as well as risks associated with possible importation of the kauri dieback pathogen into the site. Dr Fea concludes his report by stating that adverse effects on kauri cannot be avoided or remedied and are extremely difficult to mitigate. Loss of old-age kauri from the site or outside of the site as a consequence of this project would constitute an effect that is not possible to offset, and may not be socially or politically acceptable to attempt compensation. In any case, the issues identified in the report by Dr Fea, in my opinion, constitute potential risks to kauri, and the conditions propose mitigations of that risk (whether in full or not). If the consent conditions provide the means to alleviate risk, and if the potential for loss of kauri as a result of the proposed WTP is not certain, then there is no potential loss that needs to be addressed. If loss occurs or is certain, offsetting is not a viable avenue to alleviate that loss.

I adopt Dr Ussher's assessment and conclusions above, and subject to adherence to recommended conditions, including those set out by Dr Ussher, it is considered that the proposed WBMA compensation package will provide ecological enhancements within the Waima catchment that are at least commensurate to the values proposed to be removed from within the project footprint. It is noted that, based on Dr Ussher's comments set out above, that the compensation package would not address the loss of kauri within the site or in the immediate surrounds, and which will need to be addressed through imposition of those conditions proposed by Dr Fea, and the KDMP to be provided by the applicant for the hearing.

12. Section 104(1)(b) - Relevant statutory documents

12.1 Introduction

Section 104(1)(b) of the RMA sets out the statutory considerations to had regard to as part of the consideration of a resource consent, being:

any relevant provisions of-

- (i) a national environmental standard:
- (ii) other regulations:
- (iii) a national policy statement:
- (iv) a New Zealand coastal policy statement:
- (v) a regional policy statement or proposed regional policy statement:
- (vi) a plan or proposed plan; and

...

In terms of (ii), there are no 'other regulations' that apply to this application. With respect to (vi), the provisions of "a plan or proposed plan" (i.e. the AUP(OP)) have been assessed in section 10 above, but as also referred to in section 12.5.

Accordingly, only the relevant statutory documents and other matters are considered below. This analysis includes the relevant provisions of each statutory document, as well as the relevant commentary from the AEE (where addressed), which contributes to the length of the analysis. However, this approach was considered to provide a more easily read format than providing the relevant provision in a separate attachment, and also allows a direct comparison with the conclusions reached in the AEE.

12.2 Section 104(1)(b)(i) - National Environmental Standard (NES Soil)

The NES Soil establishes standards and management controls to prevent or mitigate any adverse effects of certain activities proposed on a piece of land which has been (potentially) impacted by previous and/or current activities identified on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL).

The review by Ms Tang (24 October 2019) also advises that:

The BRANZ guidelines provide a process of identifying, assessing and managing asbestos in soil aligning with asbestos regulations, the NESCS and the MfE's Contaminated Land Management Guidelines. The document adopts a Tier 1 soil guideline value for human health protection at 0.001% w/w (FA/AF). It provides a summary on the trigger levels and associated levels of controls for four types of earthwork involving asbestos/ACM contamination to manage and mitigate any health effects: Class A, Class B, Asbestos-Related Work or Unlicensed Asbestos Work.

Ms Tang's review advises that small volumes of soil disturbance (<25m³ per 500m² of land) requiring less than 5m³ of soil per 500m² of land to be removed from a site is a permitted activity under Regulation 8(3) of the NES Soil, provided that the duration of disturbance is less than two months and other provisions of Regulation 8(3) are also met. Disturbance or removal of greater volumes of soil requires consent if a detailed site investigation shows that contamination levels are above background concentrations. Ms Tang notes that she agrees with the applicant's assessment that the proposal is a discretionary activity under the NES Soil (Regulation 11) as a Detailed Site Investigation ("DSI") has not been prepared and the



earthworks are unlikely to meet the permitted activity criteria of the NES Soil such that a Site Management Plan ("SMP) is required.

The effects of contamination have been addressed in section 9.4.7 of this report and in terms of Chapter E30 of the AUP(OP) at section 10.10. Based on Ms Tang's assessment, as set out previously, it is considered that the proposal will be in accordance with the requirements of the NES Soil, subject to adherence to the conditions that Ms Tang has recommended.

12.3 Section 104(1)(b)(iii) - National Policy Statement (Freshwater Management)

The National Policy Statement for Freshwater Management 2014 ("NPS-FM") is the only national policy statement relevant to this application.³⁷ The NPS-FM sets out the objectives and policies for the management of water quality of freshwater systems, which are reflected in the objectives, policies and rules of the AUP(OP) (including with respect to Policy E2.3(13) of the AUP(OP)).

The following NPS-FM objectives are noted by the AEE as being particularly relevant to this application:

Objective A1

To safeguard:

- a) the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems, of fresh water; and
- b) the health of people and communities, as affected by contact with fresh water; in sustainably managing the use and development of land, and of discharges of contaminants.

Objective A4

To enable communities to provide for their economic well-being, including productive economic opportunities, in sustainably managing freshwater quality, within limits.

The AEE comments in respect of these provisions that:

The potential adverse effects of the proposed development on freshwater quality relate to construction runoff and ongoing discharge of stormwater to the Armstrong and Yorke Gully Streams. Within the Project Site, the Ecological Assessment (Appendix L) assesses the permanent sections of the Armstrong Gully Stream as being of moderatehigh ecological value, and the smaller intermittent watercourses of moderate-low ecological value. Downstream environments are assessed as being of high ecological value. As described in Section 7, the effects of the project will be appropriately avoided, remedied or mitigated to ensure the water quality in these streams is maintained or enhanced.

It concludes that "[t]he project is assessed as being consistent with the NPS-FM".

Based on the assessment by Mr Tutt with respect to earthworks management in terms of both erosion and sediment discharge, and in terms of streamworks, the applicant's assessment that

³⁷ Due to the distance of the Project site from the nearest coast, the New Zealand Coastal Policy Statement is not considered to be relevant.

the effects of the project on water quality in affected streams will be "appropriately avoided, remedied or mitigated" is agreed with.

12.4 Section 104(1)(b)(v) – Regional Policy Statement (Part 1 of the AUP(OP))

12.4.1 Introduction

Part 1, chapter B of the AUP(OP) sets out the strategic RMA framework for the identified issues of significance, and resultant priorities and outcomes sought, and is the Regional Policy Statement ("RPS") for the Auckland region. These align with the direction contained in the (original) Auckland Plan 2012. The following issues that form part of the RPS are relevant to this application:

- Urban growth and form (Chapter B2);
- Infrastructure, transport and energy (Chapter B3);
- Natural heritage (Chapter B4);
- Mana Whenua (Chapter B6); and
- Natural resources (Chapter B7).

The respective matters considered by the RPS under these topic headings are discussed below.

I note that in addressing these provisions, I have confined my assessment to the RPS objectives and policies. The AEE has addressed these alongside the applicable provisions of the AUP(OP) (for example, Chapter B3 with Chapter E26 in terms of the first topic, infrastructure), while also providing a separate assessment of the relevant provisions in Appendix P to the AEE. This differs from my approach which has been to consider the AUP(OP) provisions separately in terms of s104D(1)(b) requirements as set out in section 10 above, and to adopt the outcomes of that assessment for the purposes of s104(1)(b)(iv).

12.4.2 Chapter B2 - Urban growth and form

Chapter B2 contains the objectives and policies relating to the management of growth of the Auckland region. This is relevant to the provision of infrastructure as follows:

B2.2.1. Objectives

- (1) A quality compact urban form that enables all of the following:
 - ..
 - (c) better use of existing infrastructure and efficient provision of new infrastructure

•••

B2.2.2 Policies

•••

(2) Ensure the location or any relocation of the Rural Urban Boundary identifies land suitable for urbanisation in locations that:

(d) support the efficient provision of infrastructure;

...

. . .

The AEE comments with respect to the above objective (at Appendix P) that "the proposal to locate the replacement Huia WTP within the RUB [Rural Urban Boundary] adjacent to the existing WTP and on land designated for this purpose will result in the compact and efficient use of land and existing infrastructure". It also notes that "one of the key benefits of locating the replacement WTP at this site is the connection to the existing water supply network including raw and treated water supply. The location/elevation also supports gravity supply / minimising pumping".

I agree with those comments, and also consider that these are also applicable to the abovementioned policy.

12.4.3 Chapter B3 - Infrastructure, transport and energy (Chapter B3)

Chapter B3 of the RPS notes the issues relating to provision of infrastructure as relating to the need to address, inter alia, efficiency in developing, operating, maintaining and upgrading infrastructure; integrating the provision of infrastructure with urban growth; potential effects of incompatible land uses close to infrastructure; and traffic management.

The relevant objectives and policies of this chapter are considered to be primarily those related to the provision of infrastructure (B3.2.1 and B2.3.2), as follows:

B3.2.1 Objectives

- (1) Infrastructure is resilient, efficient and effective.
- (2) The benefits of infrastructure are recognised, including:
 - (a) providing essential services for the functioning of communities, businesses and industries within and beyond Auckland;
 - (b) enabling economic growth;
 - (c) contributing to the economy of Auckland and New Zealand;
 - (d) providing for public health, safety and the well-being of people and communities;
 - (e) protecting the quality of the natural environment; and
 - *(f) enabling interaction and communication, including national and international links for trade and tourism.*

• • •

- (4) The functional and operational needs of infrastructure are recognised.
- (5) Infrastructure planning and land use planning are integrated to service growth efficiently.
- (6) Infrastructure is protected from reverse sensitivity effects caused by incompatible subdivision, use and development.

- • •
- (8) The adverse effects of infrastructure are avoided, remedied or mitigated.

The associated policies (B3.2.2) are of a similar nature.

The AEE (at Appendix P) makes the following comments in respect of the objectives and policies related to infrastructure:

- The Huia WTP is a crucial component of Auckland's water supply network, and the resilience, efficiency and effectiveness of the proposed replacement WTP is therefore of utmost importance.
- The replacement of the ageing WTP with a new WTP of increased capacity will assist in meeting peak demand periods and improve the current system resilience. Its independence from other water sources and supply infrastructure provides resilience to Auckland's wider water supply in the event of disruption of the southern water sources. Resilience and efficiency within the WTP itself is provided through the use of gravity based systems that minimise the need for electricity-reliant pumping, being designed to meet modern seismic design requirements, and pipework and concrete structures designed for a life of 100 years.
- The proposal to locate the replacement WTP and reservoirs adjacent to the existing WTP is an efficient and effective use of existing infrastructure. The WTP will use new water treatment technology to meet current and future drinking water standards, continuing to provide for the well-being of people and communities.
- The Huia WTP is the third most significant water treatment plant in Auckland and is a crucial component of Auckland's water supply network, treating approximately 20% of Auckland's water. Replacement of the existing Huia WTP is essential to ensuring the continued supply of water to the Auckland region, providing for the health and well-being of Auckland's people and communities. The WTP is a critical part of the region's water supply to a third of the country's population so it has national significance as well.
- The proposed Huia WTP and reservoirs are crucial infrastructure to replace the existing ageing WTP and this enabling objective recognises this. The management of adverse environmental effects has been central to the layout optimisation iterative process that has been undertaken, with a particular focus on avoiding the disturbance of areas with the highest ecological integrity.
- The assessment in Section 7 of the AEE finds that the adverse effects of the proposal will be adequately avoided, remedied or mitigated by the measures proposed, with residual effects on the SEA to be addressed through a comprehensive ecological compensation package which is designed to achieve a net gain in ecological values.
- The replacement WTP and reservoirs have a functional and operational need to be located at a particular elevation band and in proximity to existing (and proposed) infrastructure including the raw and treated water network and the NH2 watermain, as well as the western water supply dams. This is demonstrated through the Huia



WTP Site Selection Site Principles report prepared by CH2M Beca Ltd, Dec. 2015 as well as the subsequent alternatives assessments and site layout reports.

The assessment in respect of policies B3.2.2 raises similar points, and so is not repeated here, other than to note the comments in respect of Policy B3.2.2(6) which is to:

Enable the development, operation, maintenance and upgrading of infrastructure in areas with natural and physical resources that have been scheduled in the Unitary Plan in relation to natural heritage, Mana Whenua, natural resources, coastal environment, historic heritage and special character while ensuring that the adverse effects on the values of such areas are avoided where practicable or otherwise remedied or mitigated.

In this regard, the AEE (Appendix P) comments that:

...The proposed development footprint has been designed to avoid areas assessed as of highest ecological integrity, including mature kauri forest, kauri-podocarp forest and swamp forest ecosystem units. However, development will result in the clearance of 2.5 ha of ecologically significant native forest and scrub from the WTP site, 0.6 ha from the Reservoir 1 site, and 0.4 ha from the existing WTP site (for Reservoir 2). In total, this is approximately 0.01 % of this 24,000 ha SEA. The following measures have and will be undertaken to avoid, remedy or mitigate adverse effects on the SEA overlay as far as practicable:

- Development footprint avoids permanent watercourses and areas with highest ecological integrity on the sites;
- Development footprint including laydown area has been limited in size to avoid and otherwise minimise the area of vegetation clearance as far as practicable;
- Protection of adjacent vegetation from construction effects;
- Implementation of a robust kauri dieback protocol as a means to help prevent the spread of the disease;
- Lizard, bat and bird management measures including pre-clearance monitoring and/ or translocation; and
- Weed and animal pest management and native planting across the remaining 9.5 ha of native vegetation within the Project Site.

These measures within the Project Site avoid where practicable, and otherwise remedy or mitigate adverse effects. However there will be residual adverse ecological effects. The comprehensive ecological compensation package (WBMP) described in the AEE Report has been designed to fully compensate the residual adverse ecological effects of the project that cannot practicably be avoided, remedied or mitigated. Overall, the proposed mitigation and compensation package is assessed as providing a net benefit to ecological values...

The general intent of this objective and associated policy is similar to those set out within Chapter E26 of the AUP(OP), and as discussed in section 10.9 above. In essence, the RPS in this regard seeks to recognise the benefits of infrastructure, and the need to provide for the development of infrastructure, while also seeking to ensure that adverse effects are avoided, remedied or mitigated (and this approach is then appropriately provided for through E26). For the reasons set out in section 10.9 of this report, the comments provided in the AEE are generally agreed with, with the exception of the above commentary that the intention to

implement a "robust kauri dieback protocol" is not yet matched by any particular or specific content within the application thus far. As previously noted, this is expected to be provided by the applicant for the hearing.

12.4.4 Chapter B4 - Natural heritage

B4.4 of the RPS relates to the Waitakere Ranges Heritage Area. The purpose and objectives of the Waitakere Ranges Heritage Area Act 2008 ("WRHAA"), as discussed in section 13.3 is given effect to in the AUP(OP) through the Waitakere Ranges Heritage Area Overlay and Section B4.4 of the RPS. The relevant objectives are as follows:

Objective B4.4.1

- (1) The natural and historic resources, including the significant environmental values and heritage features of the Waitākere Ranges, are protected, restored and enhanced for the benefit, use and enjoyment of the community.
- (8) The water supply catchments and their related supply functions are protected.

The relevant corresponding policies are as follows:

Policies B4.4.2

(1) Design and locate structures and impermeable surfaces and undertake activities in a way that does not impede or adversely affect the potential for the regeneration of native vegetation or reduce the extent and range of areas of native vegetation and linkages between them.

•••

- (3) Where clearing vegetation for infrastructure is necessary, it should be undertaken only where the vegetation is of lower value and there is no practicable alternative option.
- (4) Manage activities to minimise their adverse effects on water quality, soil, native vegetation and fauna habitats, mauri of the waterway, taiāpure and mahinga mātaitai.

. . .

- (6) Avoid non-residential activities:
 - (a) that are unrelated to the productive use of rural land;
 - (b) that require substantial earthworks or vegetation removal; or
 - (c) that are industrial and unrelated to rural activities

The AEE comments in regard to these provisions that:

The public water supply system is recognised by the WRHAA as a heritage feature that contributes to the national significance of the heritage area. However the proposed development will adversely affect other identified heritage features, including terrestrial and aquatic ecosystems of prominent indigenous vegetation, and, temporarily during construction, the quiet of this small localised part of the Waitakere Ranges. As described throughout this application, the adverse ecological effects of the project have been

avoided, remedied and mitigated as far as practicable, and any residual effects will be compensated for by the WBMP.

It is noted that the WRHA overlay is a district plan provision, and is therefore not considered in this regional application but will be addressed in the subsequent OPW. We consider that Objectives B4.4.1 (3) and (6) are focused on district plan matters and are not directly relevant to a site that has an existing, long standing designation for water supply purposes. This is supported by reference to the relevant District Plan provisions in Chapter D12 of the AUP which focus on subdivision and development within the WRHA and give effect to the RPS objectives and policies at a district plan level. In any case, ecological constraints have been the primary determinant of the WTP and reservoir footprint locations within the Project Site. As a priority, the footprint was developed to avoid areas with the highest ecological integrity, and the footprint was progressively reduced or moved away from more sensitive areas through a series of iterative design layouts. This involved assessing alternative layout options to minimise the area of vegetation clearance as much as practicable with a particular focus on the highest value vegetation.

The above comments are generally concurred with, except that I do not entirely agree with the characterisation of adverse ecological effects having been "avoided, remedied and mitigated" with "any residual effects" compensated for by the Waima BMP. More particularly, the ecological effects have been assessed (at section 9.4.5) to be more than minor, and the implementation of the Waima BMP is to offset those effects (in s104(1)(ab) terms). The comments regarding the 'district' nature of the WRHA overlay are acknowledged however, and I note that the corresponding parts under Chapter D12 of the AUP(OP) have not been assessed as part of the consideration of the relevant parts of the plan at section 10 above.

12.4.5 Chapter B6 - Mana Whenua

The relevant objectives and policies to the consideration of Mana Whenua interests are set out below:

B6.2.1. Objectives

- (1) The principles of the Treaty of Waitangi/Te Tiriti o Waitangi are recognised and provided for in the sustainable management of natural and physical resources including ancestral lands, water, air, coastal sites, wāhi tapu and other taonga.
- (2) The principles of the Treaty of Waitangi/Te Tiriti o Waitangi are recognised through Mana Whenua participation in resource management processes.

• • ••

B6.2.2. Policies

- (1) Provide opportunities for Mana Whenua to actively participate in the sustainable management of natural and physical resources including ancestral lands, water, sites, wāhi tapu and other taonga in a way that does all of the following:
 - (a) recognises the role of Mana Whenua as kaitiaki and provides for the practical expression of kaitiakitanga;
 - (b) builds and maintains partnerships and relationships with iwi authorities;
 - (c) provides for timely, effective and meaningful engagement with Mana Whenua at appropriate stages in the resource management process, including development of resource management policies and plans;

- (d) recognises the role of kaumātua and pūkenga;
- (e) recognises Mana Whenua as specialists in the tikanga of their hapū or iwi and as being best placed to convey their relationship with their ancestral lands, water, sites, wāhi tapu and other taonga;
- (f) acknowledges historical circumstances and impacts on resource needs;
- (g) recognises and provides for mātauranga and tikanga; and
- (*h*) recognises the role and rights of whānau and hapū to speak and act on matters that affect them.
- (2) Recognise and provide for all of the following matters in resource management processes, where a proposal affects land or resources subject to Treaty settlement legislation:
 - (a) the historical association of the claimant group with the area, and any historical, cultural or spiritual values associated with the site or area;
 - (b) any relevant memorandum of understanding between the Council and the claimant group;
 - (c) any joint management and co-governance arrangements established under Treaty settlement legislation; and
 - (d) any other specific requirements of Treaty settlement legislation

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The AEE comments in respect of these provisions that, in addition to the establishment of its Mana Whenua Kaitiaki Forum, which "ensures there is an opportunity for iwi input throughout the process of developing infrastructure" that:

Te Kawerau a Maki is currently preparing a CVA for the project. Through this engagement, any potential adverse cultural effects and measures to address these effects can be identified. Initial examples that have been discussed include the opportunity for cultural harvest of trees. There may also be opportunities for Mana Whenua to exercise their kaitiakitanga in assisting in the proposed ecological mitigation and compensation works.

The AEE comments that engagement with Mana Whenua will continue throughout the project lifecycle, and particularly with Te Kawerau following completion of their CVA. Having regard to the submission by Te Kawerau, it is not yet known whether the measures proposed by the applicant will be acceptable to Te Kawerau, or how their kaitiakitanga will be exercised. The alignment or otherwise of the proposal with these provisions cannot therefore be determined at this time.

B6.3.1. Objectives

- (1) Mana Whenua values, mātauranga and tikanga are properly reflected and accorded sufficient weight in resource management decision-making.
- (2) The mauri of, and the relationship of Mana Whenua with, natural and physical resources including freshwater, geothermal resources, land, air and coastal resources are enhanced overall.

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B6.3.2. Policies

(2) Integrate Mana Whenua values, mātauranga and tikanga:

- (a) in the management of natural and physical resources within the ancestral rohe of Mana Whenua, including:
 - (i) ancestral lands, water, sites, wāhi tapu and other taonga;
 - (ii) biodiversity; and
 - (iii) historic heritage places and areas.
- (b) in the management of freshwater and coastal resources, such as the use of rāhui to enhance ecosystem health;
- (c) in the development of innovative solutions to remedy the long-term adverse effects on historical, cultural and spiritual values from discharges to freshwater and coastal water; and
- (d) in resource management processes and decisions relating to freshwater, geothermal, land, air and coastal resources.
- (3) Ensure that any assessment of environmental effects for an activity that may affect Mana Whenua values includes an appropriate assessment of adverse effects on those values.
- (4) Provide opportunities for Mana Whenua to be involved in the integrated management of natural and physical resources in ways that do all of the following:
 - (a) recognise the holistic nature of the Mana Whenua world view;
 - (b) recognise any protected customary right in accordance with the Marine and Coastal Area (Takutai Moana) Act 2011; and
 - (c) restore or enhance the mauri of freshwater and coastal ecosystems.
- (6) Require resource management decisions to have particular regard to potential impacts on all of the following:
 - (a) the holistic nature of the Mana Whenua world view;
 - (b) the exercise of kaitiakitanga;
 - (c) mauri, particularly in relation to freshwater and coastal resources;
 - (d) customary activities, including mahinga kai;
 - (e) sites and areas with significant spiritual or cultural heritage value to Mana Whenua; and
 - (f) any protected customary right in accordance with the Marine and Coastal Area (Takutai Moana) Act 2011.

In addition to its previous references to consultation through the Mana Whenua Kaitiaki Forum, and the CVA to be prepared by Te Kawerau, the AEE comments in respect of these provisions that:

- A broad range of environmental management and mitigation measures are proposed to ensure that the adverse effects of the proposed works are appropriately avoided, remedied and mitigated. This includes stringent protocols and a best practise approach to managing and minimising the risk of kauri dieback. The proposed mitigation and compensation package also incorporates tree assessments and treatment, including on private property, to treat kauri dieback.
- In terms of earthworks and vegetation clearance, every effort has been made to refine the size/footprint of the proposed WTP and reservoirs and locate the footprint, wherever possible, away from permanent and intermittent streams and areas identified as having particularly high values. A broad range of management, mitigation and compensation measures is proposed to address the effects of the



proposed works. These include specific tree protection measures for trees outside of the construction footprint, kauri die-back protocols, and the comprehensive mitigation and biodiversity compensation package outlined above. Watercare is also investigating options with Mana Whenua for cultural use of the largest trunks. There may also be opportunities for Mana Whenua to exercise their kaitiakitanga in assisting in the proposed ecological mitigation and compensation works.

The Project Site is within a SEA overlay, which has been scheduled for its natural heritage value. As part of ongoing engagement with mana whenua, and in particular the CVA being prepared by Te Kawerau ā Maki, Watercare will seek opportunities to recognise and provide for their relationship with these natural and physical resources. Te Kawerau ā Maki consider the Waitakere Ranges a nationally significant taonga (treasure) for the people of New Zealand, with the death of the forest due to kauri dieback identified as an existential threat. Te Kawerau ā Maki subsequently have decided to place a rahui (customary prohibition) over the Waitākere forest to prevent and control human access until effective and appropriate research, planning and remedial work is completed to ensure the risks of kauri dieback are neutralised or controlled. A broad range of environmental management and mitigation measures are proposed including stringent protocols and a best practise approach to managing and minimising the risk of kauri dieback. The proposed mitigation and compensation package also incorporates tree assessments and treatment, including on private property, to contain and minimise harm from kauri dieback.

As has also been previously commented upon, contrasting views to those set out in the AEE have been expressed by Te Kawerau in their submission on the application. It is acknowledged that the measures undertaken by the applicant to address potential adverse effects on Mana Whenua values, which also seek to address other adverse environmental effects, are likely to align with the issues of interest to Mana Whenua generally, and Te Kawerau in particular.

However, in the absence of a CVA and subject to the outcome of any further consultation and associated resolution of the concerns expressed by Mana Whenua organisations, it is my view that it is unclear whether the proposal has appropriate or sufficient regard to the objectives and policies of Chapter B6.

12.4.6 Chapter B7 – Natural resources

(a) <u>B7.2 - Indigenous biodiversity</u>

The relevant objectives and policies to the consideration of significant indigenous biodiversity are set out below:

Objectives B7.2.1

(2) Areas of significant indigenous biodiversity value in terrestrial, freshwater, and coastal marine areas are protected from the adverse effects of subdivision use and development.

(3) Indigenous biodiversity is maintained through protection, restoration and enhancement in areas where ecological values are degraded, or where development is occurring.

The AEE comments in respect of these objectives:

The proposed development footprint has been designed to avoid areas assessed as of highest ecological integrity, including mature kauri forest, kauri-podocarp forest and swamp forest ecosystem units. The area of significant vegetation to be cleared has been minimised as much as practicable through a series of iterative design layouts.

The comprehensive ecological compensation package (WBMP) described in the AEE Report has been designed to fully compensate the residual adverse ecological effects of the project and provide an overall net benefit to ecological values.

Significant indigenous biodiversity areas to be retained will be protected from the adverse effects of development through the implementation of robust construction management measures including a kauri dieback protocol.

The AEE also re-states the overall approach to avoiding areas assessed as of highest indigenous biodiversity value as far as practicable, and their protection during construction, including with reference to kauri dieback protocols, as well as the pest management which is designed to provide an overall net ecological benefit. These comments are generally agreed with, other than in respect of the extent and rigour of kauri dieback protocols, including provision of a draft KDMP. This information is proposed to be provided at the hearing, but having regard to the review by Dr Fea, this aspect of the proposal is presently considered to represent a potential risk to indigenous biodiversity that is not presently resolved.

Policies B7.2.2

- (1) Identify and evaluate areas of indigenous vegetation and the habitats of indigenous fauna in terrestrial and freshwater environments considering the following factors in terms of the descriptors contained in Schedule 3 Significant Ecological Areas Terrestrial Schedule:
 - (a) representativeness;
 - (b) stepping stones, migration pathways and buffers;
 - (c) threat status and rarity;
 - (d) uniqueness or distinctiveness; and
 - (e) diversity.
- (5) Avoid adverse effects on areas listed in the Schedule 3 of Significant Ecological Areas – Terrestrial Schedule and Schedule 4 Significant Ecological Areas – Marine Schedule.

The AEE sets out the conclusions of the Ecological Assessment which has evaluated the site against the above factors in order to validate the SEA overlay and identify the specific features of the site that contribute to its ecological significance. Based on that summary, it advises that the indigenous vegetation and habitats on the site meet three of the four factors for the SEA overlay (the fourth factor, uniqueness or distinctiveness is not considered to be met).

In respect of Policy B7.2.2(5) it comments that:

While it has been possible to avoid areas assessed as of highest ecological integrity, due to the construction and operational requirements of establishing a WTP and reservoirs on the site it is not practicable to completely avoid adverse effects. Adverse effects on the SEA will be avoided, remedied, mitigated or compensated for so that there is an assessed net gain in ecological value as a result of the project. The broad suite of objectives and policies that apply to infrastructure within an SEA are assessed further in the AEE Report.

These comments are generally agreed with, other than in respect of the control and management of kauri dieback, as noted in respect of Objective B7.2.1 above.

(b) <u>B7.3 – Freshwater systems</u>

The relevant objectives and policies to the consideration of freshwater systems are set out below:

Objective B7.3.1(1)

- (1) Degraded freshwater systems are enhanced.
- (2) Loss of freshwater systems is minimised.
- (3) The adverse effects of changes in land use on freshwater are avoided, remedied or mitigated.

The AEE comments in respect of these objectives as follows:

Freshwater habitats within the project site are typically intermittent or ephemeral in nature, with the exception of the headwaters of the Armstrong Gully Stream in the Reservoir 1 and existing WTP sites. Through the iterative design process the footprint of the project was amended to avoid effects on this permanent stream and otherwise minimise impacts on other watercourses. The development footprint will also avoid the maire tawakepukatea-kahikatea wetland forest present on the reservoir site.

An intermittent section of the Yorke Gully stream towards the centre of the WTP site, that is assessed as being of moderate to low ecological value, will need to be reclaimed. However this will be replaced with at least 70m of intermittent stream that will be designed to provide a diversity and abundance of instream habitat features, and result in an overall aquatic ecological benefit. More broadly, freshwater systems within the site will be enhanced through restoration planting of the riparian buffer zones. Downstream water quality in these streams will be maintained through the implementation of erosion and sediment control measures during construction, and stormwater management measures on an ongoing basis.

Having regard to the assessment by Mr Tutt (as discussed in respect of Chapters E1 and E3 at sections 10.3 and 10.5 of this report), the above comments are agreed with.

Policy B7.3.2(4)

Avoid the permanent loss and significant modification or diversion of lakes, rivers, streams (excluding ephemeral streams), and wetlands and their margins, unless all of the following apply:

- (a) it is necessary to provide for:
 - (i) the health and safety of communities; or
 - (ii) the enhancement and restoration of freshwater systems and values; or
 - *(iii) the sustainable use of land and resources to provide for growth and development; or*
 - (iv) infrastructure;
- (b) no practicable alternative exists;
- (c) mitigation measures are implemented to address the adverse effects arising from the loss in freshwater system functions and values; and
- (d) where adverse effects cannot be adequately mitigated, environmental benefits including on-site or off-site works are provided.

The AEE comments in respect of this policy as follows:

As described above, the project results in the reclamation and diversion of an approximately 53 m long intermittent reach of the Yorke Gully Stream. Watercare has assessed alternatives through the layout design process, and has determined the reclamation and diversion of flows is the best practicable option to deliver this essential infrastructure. The reclaimed stream will be replaced with a 70 m reach of intermittent stream that will be designed to provide a diversity and abundance of instream habitat features, and result in an overall aquatic ecological benefit...

It is noted that this policy provides expressly for loss or modification of water bodies in respect of those matters provided for under (a) above, which includes infrastructure, and for the reasons expressed within the AEE I agree that items (b) – (d) are all applicable in respect of this proposal.

Policy B7.3.2(5)

Manage subdivision, use, development, including discharges and activities in the beds of lakes, rivers streams, and in wetlands, to do all of the following:

- (a) protect identified Natural Lake Management Areas, Natural Stream Management Areas, and Wetland Management Areas;
- (b) minimise erosion and modification of beds and banks of lakes, rivers, streams and wetlands;
- (c) limit the establishment of structures within the beds of lakes, rivers and streams and in wetlands to those that have a functional need or operational requirement to be located there; and
- (d) maintain or where appropriate enhance:
 - (i) freshwater systems not protected under Policy B7.3.2(5)(a);

- (ii) navigation along rivers and public access to and along lakes, rivers and streams;
- *(iii)* existing riparian vegetation located on the margins of lakes, rivers, streams and wetlands; and
- (iv) areas of significant indigenous biodiversity.

The AEE comments in respect of this policy as follows:

No Natural Lake Management Areas, Natural Stream Management Areas or Wetland Management Areas will be affected by the project.

Erosion and modification of streams will be minimised through the implementation of management measures during construction and operation. The majority of stormwater discharges will be to the Armstrong Gully via an existing attenuation basin, consistent with the existing situation (currently authorised by Watercare's Permit No. 26979). The balance of the discharge will be to Yorke Gully Stream. Appropriate stormwater detention, retention, and instream erosion protection measures will be in place to minimise erosion and modification of the stream bed and banks. The only structures proposed within streams are erosion protection structures (if required) in Yorke Gully Stream, which have a functional and operational need to be located there.

Freshwater systems will be maintained through the measures described above, and enhanced through the ecological features to be developed during design of the 70 m diversion channel and restoration planting of the riparian buffer zones...

Having regard to the assessment by Mr Tutt (as discussed in respect of Chapters E1 and E3 at sections 10.3 and 10.5 of this report), the above comments are agreed with.

(c) <u>B7.4 – Coastal water, freshwater and geothermal water</u>

Objective B7.4.1(4)

The adverse effects of point and non-point discharges, in particular stormwater runoff and wastewater discharges, on coastal waters, freshwater and geothermal water are minimised and existing adverse effects are progressively reduced.

The AEE comments in respect of this objective:

The proposal involves the discharge of stormwater to the Armstrong Gully and Yorke Gully Streams. The stormwater management system has been designed to provide the appropriate level of stormwater retention (volume reduction) and detention (temporary storage) to maintain predevelopment flows, and best practicable measures will manage stormwater quality and erosion potential. During construction, appropriate erosion and sediment control measures will be in place to ensure the quality of runoff into freshwater. The proposal is assessed as being consistent with RPS Policy B7.4.1 (4).

Having regard to the assessment by Ms Johnston (as discussed in respect of Chapter E10 at section 10.6 of this report), the above comments are agreed with.

Objective B7.4.1(5)

The adverse effects of changes in or intensification of land use on coastal water and freshwater quality are avoided, remedied or mitigated.
The AEE comments in respect of this objective

The adverse effects of the proposed development on freshwater quality relate to construction runoff and ongoing discharge of stormwater. As described above, these effects will be appropriately avoided, remedied or mitigated.

Having regard to the assessment by Ms Johnston and Mr Tutt, the above comments are agreed with.

Policy B7.4.2(1)

Integrate the management of subdivision, use and development and freshwater systems by undertaking all of the following:

- (a) ensuring water supply, stormwater and wastewater infrastructure is adequately provided for in areas of new growth or intensification;
- (b) ensuring catchment management plans form part of the structure planning process;
- (c) controlling the use of land and discharges to minimise the adverse effects of runoff on freshwater systems and progressively reduce existing adverse effects where those systems or water are degraded; and
- (d) avoiding development where it will significantly increase adverse effects on freshwater systems, unless these adverse effects can be adequately mitigated.

The AEE comments in respect of this policy:

Significant growth is projected for Auckland's population over the next 30 years. The replacement WTP and reservoirs are a critical component of Watercare's overall water supply network which needs to provide for this growth.

The adverse effects of the proposed development on freshwater systems relate to construction runoff and ongoing discharge of stormwater, and the reclamation and diversion of 53 m of intermittent stream. As described above, these effects will be appropriately avoided, remedied or mitigated, and the proposed diversion channel will mitigate the section of intermittent stream in the middle of the site which will be lost. The proposal is assessed as being consistent with and being enabled by RPS Policy B7.4.2 (1).

For reasons previously expressed, and with regard to the assessments by Ms Johnston and Mr Tutt, the above comments are agreed with.

Policy B7.4.2(2)

Give effect to the National Policy Statement for Freshwater Management 2014 by establishing all of the following:

- (a) freshwater objectives;
- (b) freshwater management units and, for each unit:
 - (i) values;
 - (ii) water quality limits;
 - (iii) environmental flows and/or levels; and

(c) Targets and implementation methods where freshwater units do not meet freshwater objectives.

The AEE comments in respect of this policy:

The [NPS-FM] is relevant to the proposal in relation to the water quality of freshwater systems. The adverse effects of the proposed development on freshwater quality relate to construction runoff and ongoing discharge of stormwater. As described above, these effects will be appropriately avoided, remedied or mitigated.

As noted with respect to the NPS-FM at section 12.3 above, and based on the assessment by Mr Tutt with respect to earthworks management in terms of both erosion and sediment discharge, and in terms of streamworks, the applicant's assessment that the effects of the project on freshwater quality in affected streams will be "appropriately avoided, remedied or mitigated" is agreed with.

Policy B7.4.2(8)

Minimise the loss of sediment from subdivision, use and development, and manage the discharge of sediment into freshwater and coastal water, by:

- (a) promoting the use of soil conservation and management measures to retain soil and sediment on land; and
- (b) requiring land disturbing activities to use industry best practice and standards appropriate to the nature and scale of the land disturbing activity and the sensitivity of the receiving environment.

The AEE comments in respect of this policy:

As set out in the Stormwater and ESC Report in Appendix G, the loss of sediment will be managed through staging and progressive stabilisation of earthworks, and land disturbing activities will be managed in accordance with GD05 and industry best practice to minimise the effects of erosion and sediment discharges. The proposal is assessed as being consistent with RPS Policy B7.4.2 (8).

For reasons previously expressed, and with regard to the assessment by Mr Tutt, the above comments are agreed with.

Policy B7.4.2(9)

Manage stormwater by all of the following:

- (a) requiring subdivision, use and development to:
 - (i) minimise the generation and discharge of contaminants; and
 - *(ii) minimise adverse effects on freshwater and coastal water and the capacity of the stormwater network;*
- (b) adopting the best practicable option for every stormwater diversion and discharge; and
- (c) controlling the diversion and discharge of stormwater outside of areas serviced by a public stormwater network.

The AEE comments in respect of this policy:

The Project Site is outside of an area serviced by a public stormwater network, and so stormwater will be managed onsite and discharged to receiving streams, as set out in the Stormwater and ESC Report in Appendix G. The proposal has been designed in accordance with GD01 and the best practicable option to minimise both the generation and discharge of contaminants in stormwater, in turn minimising the adverse effects of the discharge on freshwater. The proposal is assessed as being consistent with RPS Policy B7.4.2 (9).

For reasons previously expressed, and with regard to the assessment by Ms Johnston, the above comments are agreed with.

12.4.6 Chapter B10 – Environmental Risk

Objective B10.4.1(1)

Human health and the quality of air, land and water resources are protected by the identification, management and remediation of land that is contaminated.

Policies B10.4.2

- (2) Land which may be contaminated due to having supported contaminating land use activities in the past but has not been investigated will be identified as being potentially contaminated.
- (3) Manage or remediate land that is contaminated where:
 - (a) the level of contamination renders the land unsuitable for its existing or proposed use or
 - (b) the discharge of contaminants from the land is generating or is likely to generate significant adverse effects on the environment; or
 - (c) development or subdivision of land is proposed.

The AEE comments in respect of these provisions:

A very conservative approach has been taken to the management of contaminated land, as there is very limited information regarding the likelihood of contamination.

A SMP is included in Appendix K, which sets out appropriate controls to minimise potential discharges of contaminants to the environment that could result from the disturbance of potentially contaminated land. Pre-works contamination testing will be undertaken to establish actual contamination concentrations, and the management procedures in the SMP will then be confirmed. With these measures in place, the proposed development will meet the requirements of these provisions.

The effects of contamination and environmental risk have been addressed in section 9.4.7 of this report and in terms of Chapter E30 of the AUP(OP) at section 10.10 of this report. Based on Ms Tang's assessment, as set out previously, it is considered that the proposal will be in accordance with the above objective and policies (subject to adherence to the conditions that Ms Tang has recommended), and so the comments in the AEE in this regard are agreed with.

12.4.7 Conclusion

Based on the above assessment, it is my view that the proposal generally aligns with the relevant provisions set out in Part 1, Chapter B of the RPS in overall terms, while noting that there is some uncertainty or potential inconsistency with respect to effects on Mana Whenua values and with respect to the potential risk of construction works on kauri dieback disease.

12.5 Auckland Unitary Plan – section 104(1)(b)(vi): a plan or proposed plan

This section of the RMA requires an assessment against the objectives and policies of the AUP(OP). This exercise has been undertaken at section 10 of this report with reference to the second test of s104D(1). The conclusions of that assessment was that while the proposal involves some tension with respect to the relevant objectives and policies of the AUP(OP), having regard to the amendments to the proposal through the s92 process, the specialist reviews and advice provided by Council specialists and based on the imposition of, and adherence to, proposed conditions of consent, it is considered that the proposal will be consistent with, and not contrary to, the objectives and policies when viewed in overall terms. These conclusions are considered to be applicable in terms of s104(1)(b).

In addition, it is noted that the application requires consent for a number of matters under the AUP(OP), as set out in section 5 of this report. While the proposal is a non-complying activity overall, there are a number of components that are subject to particular rules or matters of discretion (as restricted discretionary activities), relating to earthworks, vegetation removal, and dewatering and groundwater diversion. The relevant matters have been summarised at section 6.3 of the AEE. However, in view of the non-complying activity status of the proposal, an assessment of the application is not limited or confined to those matters and there is nothing additional sought to be addressed through those matters that has not already been addressed through the assessment of the relevant effects by the Council's specialists and in the preceding effects and statutory assessment provided in this report.

12.6 Conclusion

Overall, it is considered that the proposal achieves general consistency with the relevant statutory matters under the national environmental standards and national and regional policy statements, and the AUP(OP) that are applicable to an assessment under s104(1)(b). I therefore generally adopt the conclusions in respect of these statutory matters as set out at section 8.6.8 of the AEE as referenced in section 10.10 of this report (with respect to specific AUP(OP) considerations) and from an RPS perspective that the RPS includes:

a suite of objectives and policies that recognise the benefits of infrastructure, and explicitly recognise the functional and operational needs of infrastructure to locate in scheduled areas such as an SEA. Objectives and policies set out an approach to managing the adverse effects of infrastructure on the environment, with specific objectives and policies relating to effects on significant biodiversity. In assessing the proposal against these objectives and policies, we have taken the contextual approach that was reiterated by the Environment Court³⁸, where provisions are read together as a suite. In particular, the RPS provisions in Chapter B3 Infrastructure explicitly recognises that infrastructure can have a need to be located in areas with scheduled resources such

³⁸ Royal Forest and Bird Protection Society of NZ Inc v Bay of Plenty Regional Council [2017] NZEnvC 045

as SEAs, and it is a natural consequence of such development that adverse effects may occur.

While there remain some issues in respect of matters associated with Mana Whenua values and management of kauri dieback, as arising through parts of the RPS provisions, the statement within the AEE that "[o]verall, we consider the proposal is not contrary to, and in many cases is supported by, the RPS and Regional Plan provisions relating to infrastructure and significant indigenous biodiversity" is, on balance, agreed with.

13. Section 104(1)(c) - Other matters

Section 104(1)(c) requires that any other matter the consent authority considers relevant and reasonably necessary to determine the application. In this case the following matters are considered relevant.

13.1 Watercare's responsibilities and obligations

Section 2.1 of the AEE includes reference to WSL's 'Statement of Intent 2018 – 2021' and its 'Asset Management Plan 2018 – 2038' which are also considered to be relevant "other matters" in respect of considerations under s104(1)(c). The AEE outlines that WSL's obligations to deliver water and wastewater services for Auckland are established under s57(1) of the Local Government (Auckland Council) Act 2009 ("LGA 2009"). The LGA 2009 requires that WSL "must manage its operations efficiently with a view to keeping the overall costs of water supply and wastewater services to a minimum", and that it "must give effect to the relevant aspects of the [Auckland Plan 2050] and must act consistently with other specified plans and strategies of the Council".

In this regard, the AEE states that:

- Replacement of the Huia WTP, construction of western reservoirs storage, and the NH 2 watermain duplication are identified in the Auckland Plan as strategic projects needed to be undertaken in Years 4-10 of the Auckland Plan (2021-2027) to increase the capacity of Auckland's water supply network.
- Watercare's Asset Management Plan 2018 to 2038 (AMP) identifies replacement of the ageing Huia Water Treatment Plant and additional treated water storage along with the NH 2 as key infrastructure required to help meet peak demand while improving resilience of supply.
- The Statement of Intent (SOI) 2017 2020 identifies key projects with regards to the western water supply network. This includes construction of the NH 2 duplication and replacement of the Huia WTP and the provision of improved treatment processes that will maintain supply and improve levels of service.
- The Ministry of Health (MoH) DWSNZ specifies relevant drinking water quality standards. One of Watercare's strategic priorities is to supply the highest quality 'Aa'-graded drinking water to all properties, compliant with the MoH DWSNZ. To be able to continue to supply 'Aa'-graded drinking water to Aucklanders, the existing Huia WTP needs to be replaced.

The above references are considered to underscore WSL's statutory obligations to maintain regional water supply, and the need for the Project. As with reference to the Auckland Plan 2050 ("AP 2050") below, this is not considered to provide direct support for the proposed location of the WTP as against other possible sites considered by WSL, except to the extent



that it can be demonstrated to best meet the requirements of the LGA 2009 and operational requirements, having regard to all other matters that need to be addressed, including the AUP(OP). In other words, the proposal is considered to give effect to WSL's statutory obligations and responsibilities, albeit that these could potentially also be achieved by provision of new WTP infrastructure in a different location. It is understood that this regard, however, that the Project site has been assessed favourably in terms of cost efficiency, and has been re-designed to avoid the most notable vegetation within the overall site, including kauri specimens, and it is the assessment of this report that it is generally acceptable when measured against the requirements of the AUP(OP) and the RMA in terms of environmental effects and compensation.

13.2 The Auckland Plan 2050

The initial Auckland Plan was adopted in 2012 by the Auckland Council after a special consultative process. This Plan addresses the requirements of s79 of the Local Government (Auckland Council) Act 2009, which requires the preparation of a long-term strategic plan for Auckland. It was required to be reviewed after six years, and the AP 2050, adopted in June 2018, is a more streamlined spatial plan with a simple structure and clear links between outcomes, directions and measures.

The AP 2050 is intended to set high level direction that contributes to Auckland's social, economic, environmental and cultural well-being. The Development Strategy which forms part of the AP 2050 provides a pathway for Auckland's future physical development, and a framework to prioritise and coordinate the required supporting infrastructure.

Section 2 of the AEE notes in this regard that one of the three key challenges that Auckland will face over the coming years is high population growth and its implications. It states that:

The rate and speed of Auckland's population growth means increasing demand for space, infrastructure and services and presents a number of challenges and opportunities in relation to infrastructure, including:

- Maintenance, renewal and replacement dealing with ageing and obsolete infrastructure and improving the performance of Auckland's infrastructure;
- Creating resilient infrastructure networks which cope with disruptive events and respond to on-going stresses; and
- The significant investment required to respond to these challenges.

The AEE highlights Direction 4 of the Environment and Cultural Heritage Outcome in the AP 2050, which is as follows:

Much of our infrastructure such as water supply, wastewater and stormwater networks, and power supply networks, is ageing and does not always meet modern requirements or expectations.

This can have negative impacts such as:

- poor water quality from ageing wastewater networks with insufficient capacity
- increased greenhouse gas emissions from fossil fuels-dependent transport
- reduced resilience to climate change.

New infrastructure involves significant time and investment. We have to start now to create the systems and services we want in the future.

This means that:

- we need to build flexibility and adaptability into infrastructure design to ensure it is easier to modify and respond to changing needs
- we must reduce and potentially eliminate the impacts of inefficient infrastructure through retrofits and upgrades and finding alternative ways to deliver core services.

The AEE comments in respect to this direction that "[r]eplacement of the Huia WTP, construction of additional treated water storage reservoirs, and NH2 watermain duplication are identified in the Auckland Plan as strategic projects needed to be undertaken in Years 4-10 of the Auckland Plan (2021-2027) to increase the capacity of Auckland's water supply network", as depicted on Map 22 ("Water Supply Map") of the AP 2050 (refer **Attachment 9**).

Having regard to the reasonably clear directions set out in AP 2050 in respect of the need to provide for additional treated water storage reservoirs, the proposal is considered to be in general accordance with the AP 2050, although I do not consider that the direction is so specific as to provide direct support for the proposed location of the WTP as against other possible sites considered by WSL. However, as noted above, it is accepted from the applicant's assessment of alternatives, and having regard to its obligations and requirements under the LGA 2009, that it will give effect to the strategic direction to the AP 2050 overall.

13.3 The Waitakere Ranges Heritage Area Act 2008

The WHRAA is referred to at section 8 of the AEE as part of its statutory assessment. Because the RMA includes no cross-reference to the WHRAA, and because it does not form one of the statutory documents that the consent authority is required to "have regard to" under s104(1)(b),³⁹ I have considered this as an "other matter" under s104(1)(c), in addition to consideration of B4.4 of the RPS at section 12.4.4 earlier.

The Project site is located within the Waitakere Ranges Heritage Area ("Heritage Area") that was created under the WRHAA. The purpose of the WRHAA (as set out in s3) is to recognise the national, regional, and local significance of the Heritage Area, and to promote the protection and enhancement of its heritage features for present and future generations.

Section 7 of the WRHAA identifies the heritage features that contribute individually or collectively to the national significance of the Heritage Area as including (as relevant to the application):

- terrestrial and aquatic ecosystems of prominent indigenous vegetation;
- streams that rise in the eastern foothills and contribute positively to downstream urban character, stormwater management, and flood protection;
- the historical, traditional, and cultural relationships of people and communities with the area; and
- the public water catchment and supply system, the operation, maintenance, and development of which serves the people of Auckland.

³⁹ Rather, the WHRAA requires consideration of its provisions when assessing a matter under the RMA, while providing that, if a conflict between the two statutes arises, the RMA prevails (per s9 WHRAA).

Section 13 of the WHRAA requires a consent authority, amongst other things, to have particular regard to the relevant objectives of the WHRAA. The objectives of establishing and maintaining the Heritage Area are set out in s8 of the WHRAA. These include the following provisions as relevant to the application:

- (a) to protect, restore, and enhance the area and its heritage features:
- (b) to ensure that impacts on the area as a whole are considered when decisions are made affecting any part of it:
- (c) to adopt the following approach when considering decisions that threaten serious or irreversible damage to a heritage feature:
 - *(i)* carefully consider the risks and uncertainties associated with any particular course of action; and
 - (ii) take into account the best information available; and
 - (iii) endeavour to protect the heritage feature:
- (d) to recognise and avoid adverse potential, or adverse cumulative, effects of activities on the area's environment (including its amenity) or its heritage features:

...

- (h) to manage aquatic and terrestrial ecosystems in the area to protect and enhance indigenous habitat values, landscape values, and amenity values:
- (i) to recognise that people live and work in the area in distinct communities, and to enable those people to provide for their social, economic, environmental, and cultural well-being:

•••

- (k) to protect those features of the area that relate to its water catchment and supply functions:
- (I) to protect in perpetuity the natural and historic resources of the Waitakere Ranges Regional Park for their intrinsic worth and for the benefit, use, and enjoyment of the people and communities of the Auckland region and New Zealand.

The AEE comments in regard to the WHRAA as follows:

The public water supply system including its operation, maintenance, and development is recognised by the WRHAA as a heritage feature that contributes to the national significance of the heritage area. However the proposed development will adversely affect other identified heritage features, including terrestrial and aquatic ecosystems of prominent indigenous vegetation, and, temporarily during construction, the quiet of the Waitakere Ranges. As described throughout this application, the adverse ecological effects of the project have been avoided, remedied and mitigated as far as practicable, and any residual effects will be compensated for by the WBMP. On this basis, and considering the nature and location of the proposed development (i.e. a replacement WTP and reservoirs which will be an essential part of the public water supply system located on a site long designated and used for such purposes), overall this application is not considered to be contrary to the WRHAA and finds support from Sections 7(2)(k) and (n) and Sections 8(i) and (k).

I generally agree with the above statement insofar that the Project will result in adverse effects on the environment of the Heritage Area that are more than minor, but that these effects are able to be remedied and mitigated though various measures inherent in the proposal, in general, and compensated for via implementation of the WBMP. Section 25 of the WHRAA provides for the Council to prepare a Local Area Plan in consultation with local communities to establish goals for the future amenity, character and environment of the local area. The Project site is within the area included in the Muddy Creeks Local Area Plan 2014 ("LAP"), which is addressed in 8.8.3 of the AEE and section 13.4 below, and which is considered to provide the basis on which the proposal can best be considered in terms of the WHRAA, and the objectives under s8 noted above.

13.4 Muddy Creeks Local Area Plan

The subject site falls within the north-eastern extremity of the boundary of the LAP. This LAP was prepared in accordance with the WRHAA through a public participation process, and seeks to:

- identify features important to and valued by the community;
- Describe the existing and future character and amenity; and
- Set out the objectives and actions proposed to achieve the desired future character and amenity.

In this regard, as noted in the AEE, it includes ideas and visions for the future to provide a longterm direction for the Council, iwi and community action in the area. The objective and "key actions" of the LAP related to ecology and ecosystems are as follows:

Objective

Foster healthy, safe and connected ecosystems, from the Manukau Harbour coastal edges through areas of high ecological value and along streams to the Waitakere Ranges Regional Park.

Key Actions

- 1. Work to reduce the spread of kauri dieback and foster protection of healthy kauri in partnership with local communities, iwi and external partner organisations.
- 2. Target support to ecological restoration efforts within ecological corridors and near the Waitakere Ranges Regional Park, and continue to support the restoration of the surrounding area.
- 3. Inform and educate residents on biodiversity values in the area, and ways to protect those values, including the control of pest plants and animals.
- 4. Develop and implement local strategies for the hygienic disposal of weeds and the local sourcing of native seedlings.
- 5. Advocate for improved weed management in the road corridor, in the water supply catchment and on Watercare land.
- 6. Promote riparian restoration within public and private land.
- 7. Advocate for pro-active identification and remediation of freshwater contamination issues within the area.

The AEE states in regard to these provisions that the project "includes robust kauri dieback protocols and the [WBMP] has a significant focus on pest management". I agree that in respect of the measures proposed under the WBMP, and by reference to the assessment of Dr Ussher, that the Project will be consistent with the pest (and weed) management outcomes sought by



the LAP, and is expected to provide net ecological benefits to the Waima catchment, including the LAP area, in overall terms. In terms of kauri dieback, and with respect to the assessment by Dr Fea, it is considered that the proposal presents some risks as to whether it will "reduce the spread of kauri dieback and foster protection of healthy kauri in partnership with local communities, iwi and external partner organisations", and so in my view that proposal does raises some uncertainties as to how it will achieve this particular key action of the LAP.

13.5 Auckland's Urban Ngahere (Forest) Strategy

Auckland's Urban Ngahere (Forest) Strategy was approved by the Council's Environment and Community Committee on 20 February 2018.⁴⁰ The introduction provides the purpose and rational for the Strategy as follows:

Our urban ngahere faces a number of pressures. Alongside the need for urban development, amendments to the [RMA] came into effect in 2015, lifting blanket tree protection in urban areas. As a result, the vast majority of trees on private urban properties are no longer protected. Threats from pests and diseases, as well as the impacts of climate change are further challenges. If we want to continue to benefit from the services provided by our urban ngahere it is essential that we better understand its status and value and plan to protect and grow it. Our urban ngahere has the mauri (life force) to care for us but needs our help to be sustainable and healthy.

The Project site is located in an area that is defined in the Strategy as a "Forested Suburb" with greater than 30% cover, based on 2013 Light Detection and Ranging (LiDAR) surveys, with the area of the Waitākere Ranges Local Board (within the Rural Urban boundary) having some 74% canopy cover. The LiDAR data indicates that the urban area has 10,130 ha of canopy cover belonging to trees over 3m tall.

The Strategy includes objectives (section 4.2) to increase knowledge as to the urban forest extent, provide for growth of forest cover, and protection of existing forests to safeguard:

the added values and benefits mature trees provide. Caring for saplings is critical for ensuring older trees are replenished before the end of their life, our urban ngahere grows over time, and publicly-funded planting is successful.

The implementation framework for the Strategy (section 6.1) includes "cross-council collaboration", which:

involves collaboration between internal stakeholders, interdepartmental cooperation and working closely with council controlled organisations. In the urban context, planners should work with foresters and arborists to effectively integrate policy and knowledge management tools to grow and protect the urban ngahere.

The proposed removal of some 3.5 ha of forest/bush from the Project site is considered to be contrary to the objectives and implementation process set out within the Strategy, and in simple quantitative terms would represent a not insignificant singular reduction to the existing forested cover of the site. While it remains a reasonably small fraction of the area within its surrounding SEA, and of the forest cover within the Waitākere Ranges Local Board area and wider Auckland urban area more generally, it nevertheless represents an expansive area of mature vegetation that will be difficult to recreate as part of future individual landowner (public or



⁴⁰ A copy of this Strategy document is attached to submission #5081

private) replanting efforts across the region. Indeed, it is unclear if such efforts can address the continued loss of urban trees and forest arising from the impacts of the loss of tree protection resulting from the 2015 changes to the RMA referred to in the Strategy.

While the proposal does include ecological compensation that seeks to improve the overall biological diversity and health of the Waima catchment, such actions are separate from the objectives of the Strategy, and so overall it is my view that the proposal can only be seen as contrary to it. It is recognised, however, that the Strategy is a non-statutory document, and has not yet resulted in any change to the statutory mechanisms or provisions within the AUP(OP)⁴¹ against which this application is required to be assessed.

13.6 Submissions

As previously noted, all of the submissions received by the Council that were made in accordance with s96 of the RMA have been reviewed and have been considered within this report and more specifically within the relevant assessments of the Council's technical specialists. Many of the submissions have raised similar issues and have been dealt with generically within these assessments. Those that have raised specific resource management matters and points of clarification have been addressed in the assessment of actual and potential effects contained in section 9.4 of this report, as well as in the technical reviews prepared by the Council's specialist advisers.

Those topics noted in section 7.2.2 and which have not yet been addressed in this report relate to amenity effects associated with tourism and property value impacts, and the proposal being contrary to the Council's declaration of a climate emergency. Amenity effects are not considered to be applicable to an assessment of regional consents, noting also that effects on property values are not matters that are within the ambit of the RMA. The issue of the climate emergency declaration is addressed in section 13.11 below.

It is expected that the applicant's evidence for the hearing will also address submissions as relevant to the expertise of the applicant's witnesses. Submitters will also have the opportunity to speak to their submissions at the hearing.

13.7 Local Board Consultation and Submission

Section 9.8 of the AEE outlines the consultation undertaken with the Waitākere Ranges Local Board ("Local Board") in respect of the proposal, and that the Local Board has been involved as part of workshop presentations since selection of the site in May 2017. The AEE comments that:

The discussions have focused on ecological and traffic effects, the level of public consultation, and potential mitigation measures, including the realignment of the Woodlands Park Road and Scenic Drive Intersection. The results of these discussions together with the input of the CLG has resulted in Watercare continuing to review aspects of the project, including the extent of the footprints, the level of vegetation removal and the future of the water treatment plants. The Board's concerns have been addressed in the suggested suite of conditions. One of the meetings focused on the future of the Nihotupu Filter Station building. The consensus was that the building should be repurposed as a historical/educational facility.



⁴¹ For example, no reference is made to the Strategy in Plan Change 29 relating to updates to the Notable Tree Schedule.

The submission from the Local Board (#5297) sets out a number of concerns with the proposal, as follows:

- a) We oppose the application in its current form.
- b) We note the proposed development is in the Waitakere Ranges Heritage Area and is adjacent to regional parkland and our view is that it is inconsistent with the objectives of the [WHRAA] as well as the [LAP].
- c) We invite Watercare to renew consultation with the Waima community to locate a site and a plant design that will satisfy local expectations.
- d) We invite Watercare to investigate repositioning of the plant to the sludge site close to the Nihotupu lake as identified in the Local Board's letter to Watercare dated October 9, 2018 a copy of which is attached.
- e) Alternatively, we invite Watercare to consider repositioning the site in an urban industrial area such as Spam Farm in Glendene which is more suitable for the location of a large industrial complex of this sort.
- f) We are concerned
 - a. the plant design requires the destruction of 3.5 hectares of regenerating sub tropical rainforest that is home to many indigenous species including a previously unidentified wasp.
 - b. The project will require up to 118 heavy vehicle movements a day on Titirangi's narrow and fragile roads.
- g) We support the restoration and repurposing of the Nihotupu Filter Station which is a scheduled heritage building at the entrance to Exhibition Drive
- *h)* We support a significant restoration fund being established should the new plant be constructed in the Waima area.

In summary, it is apparent that the concerns of the Local Board (items a - f) appear to be of a more fundamental nature than those that the applicant indicates can be addressed by conditions, including the issue of alternative sites (items c - e). In terms of the particular matters of concern (items f)(a) and (b)), it is considered that these have been addressed within the assessments at section 9 of this report, while the restoration fund sought under h) has been confirmed within the application and commented upon in Dr Ussher's assessment. The applicant may nevertheless wish to address these matters further at the hearing.

13.8 Te Kawerau ā Maki rāhui

Section 8.8.4 of the AEE refers to the rāhui (customary prohibition) placed by Te Kawerau over the Waitākere forest (within the Heritage Area) to prevent and control human access until effective and appropriate research, planning and remedial work is completed to ensure the risks of kauri dieback are neutralised or controlled. As noted in section 9.4.10 of this report, the purpose of the rāhui is to enable the environment to recuperate and regenerate without the presence and impacts of humans.

The AEE notes that the rāhui establishes a warrant system to allow for pest and weed management to continue within the rāhui area, and that:

small numbers of managed organisations whose core purpose is protecting the forest may be authorised by the iwi to continue operations in a controlled manner. The warrant system enables selected partner organisations to continue controlled operations in compliance with minimum kauri dieback standards.

The AEE comments that the proposal is in accordance with the intent of the rāhui because:

The broad range of management and mitigation measures proposed for the project includes stringent kauri die-back protocols for the duration of the construction activities and beyond. There may also be opportunities for Mana Whenua to exercise their kaitiakitanga through the proposed ecological mitigation and compensation works.

As previously noted, however, the inclusion of a "broad range of management and mitigation measures proposed for the project" are not apparent from the application documents provided to date (nor specified in any detail within the applicant's proposed conditions). Dr Fea has set out the types of conditions that will be required to address this issue to the extent that is possible, although advises that the increased risk of kauri dieback disease may not be able to be effectively mitigated having regard to the nature and scale of the works. This may be addressed further in part by provision of a draft KDMP by the applicant for consideration at the hearing. The effect of the proposal on the rāhui may be clarified through that additional information, and from the details to be provided through a CVA by Te Kawerau. At this stage, however, and on the basis of information as currently available, it is not apparent that the rāhui would be lifted prior to the intended commencement date of the Project.

13.9 Archaeological sites

The Heritage New Zealand Pouhere Taonga Act 2014 ("HNZ") provides overarching protection for archaeological sites, and in particular, stipulates that no person may modify or destroy, or cause to be modified or destroyed, the whole or any part of an archaeological site, without the express authority of HNZ. An archaeological site is defined as any place in New Zealand, including any structure, that was associated with human activity that occurred before 1900 where there is evidence relating to the history of New Zealand that can be investigated by archaeological methods.

In this regard, the AEE advises that an archaeological assessment has been undertaken for the Project and found that no archaeological sites are known to be present on the Project site and it is considered unlikely that any will be exposed during development. It notes that accidental discovery protocols will be followed should an archaeological site be discovered through the course of the works. As noted in section 10.7 of this report, this matter has been addressed by way of a proposed condition which defines the appropriate actions to be undertaken in the event of discovery of kōiwi, archaeology and artefacts of Māori origin.

13.10 Draft National Standard on Indigenous Biodiversity

The AEE has referred (at section 8.8.6) to the draft National Policy Statement on Indigenous Biodiversity, developed by the Biodiversity Collaborative Group ("BCG") established by the Minister for the Environment, which sets out the direction in relation to biodiversity offsetting and compensation that a future NPS may take. The AEE comments there has been no public consultation on this Policy to date and there are a number of provisions where agreement has not been reached by the BCG, and that it is currently in a recommended draft form and has no statutory weight. I agree with that statement, although I note that the Ministry has now recently

invited public feedback to the Policy (with public submissions open from 25 November 2019 to 14 March 2020).

13.11 Climate Emergency Declaration

In June 2019 the Council declared a climate emergency. Through this declaration the Council advised that it was committing to a range of actions and approved a public consultation process on a draft climate framework for Auckland '*Te Tāruke-ā-Tāwhiri*'. This framework is intended to be the main framework for delivering on Auckland's emissions reduction targets and increasing Auckland's resilience to climate change impacts through local action plans. The framework sets out 11 key moves and a range of short and long-term actions to deliver a dramatic reduction in emissions and a dramatic increase in resilience to climate impacts to create a better and climate-ready future for Auckland.

The framework identifies a phased delivery programme based on 11 "key moves".

'Key Move 1' seeks to provide for the enhancement of ecosystem services and connectivity, which includes the following actions:

- Grow and protect our urban and rural ngahere (forest) to capture emissions and build resilience.
- Assess climate change impacts on indigenous biodiversity, including biosecurity risks, followed by action to protect ecosystems and species vulnerable to climate change.

In this regard, the proposal can be seen as undermining the first action, through removal of 3.5 of forest and bush, where this removal would reduce the overall capacity of forested areas of the region to capture (CO₂) emissions. Conversely, the proposed ecological compensation will provide for improved ecological biodiversity through the Waima catchment. While the immediate outcome of the Project will be an impact that would be highly visible and antithetical to the management of forest and bush and its role in managing the climate, the longer term ecological benefits would offset this impact, albeit in terms of biodiversity outcomes rather than replicating the 'carbon sink' benefits that forest or bush provide.

'Key Move 2' seeks to "make development and infrastructure climate-compatible". This includes the following relevant actions:

- Ensure new infrastructure is climate-proof and resilient to the impacts of a changing climate.
- Identify and deliver alternative water supply options for the region to address climate change and population growth

It is considered that the Project has been conceived to be "climate-proof", being a significant structure/complex that will be designed and built in accordance with current engineering standards, while downstream stormwater impacts have been assessed in a manner that takes into account required storm frequency and/or intensity effects. In terms of the second action, it is noted that the Project has been designed to take into account population growth, and to replace an existing and ageing facility to ensure the security of water supply.

The Council's website for this framework advises that submissions closed on 30 September 2019, and that the Council is currently analysing the feedback received.

It is noted that the impact or applicability of the Council's declaration in resource management decision-making was recently considered by the Environment Court in *SKP Inc v Auckland Council & Ors*, where it stated that "the Council's declaration of climate change emergency on 11 June 2019 might be widely regarded as an important event, but it is a political statement and not a planning document".⁴²

Nevertheless, the applicant may wish to advise of the manner in which the framework is being addressed through its future planning for water supply infrastructure (and in terms of clause 1.1.8 of the Council's CCO Accountability Policy as noted by submitters) and any amendments that it may be considering in respect of the current Project to address the Council's policies in this regard.

14. Other relevant RMA provisions

14.1 Sections 105 & 107 - Matters relevant to discharge permits

The proposal requires a consent to discharge contaminants under s15. Under s105, the Council must have regard to additional matters for any application for a discharge permit that would contravene s15 or s15B of the RMA.

Section 107(1) restricts the granting of discharge permits in certain circumstances, namely if, after reasonable mixing the contaminant or water discharged (either by itself or in combination with other contaminants or water) is likely to give rise to any of the following effects in the receiving waters:

- the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
- any conspicuous change in the colour or visual clarity;
- any emission of objectionable odour;
- the rendering of fresh water unsuitable for consumption by farm animals; and
- any significant adverse effects on aquatic life.

The AEE comments that the above matters have been addressed by the application, including at section 3.6 which describes the receiving environments of Armstrong and Yorke Gully Streams and section 7 which assesses the effects on the environment. It states that:

While a range of options have been considered in relation to the diversion and discharge of stormwater, the selected option takes into account topographical and space constraints, particularly the desire to minimise vegetation clearance as far as practicable. In any case, discharges during construction and operation will be in accordance with best [practice], as reflected in Council technical publications GD01 and GD05, and will not give rise to any of the effects identified above.

The review by Ms Johnston also advises that the provisions of s105 have been met based on her conclusion that there will be no significant effects on the receiving environment, and that "[i]has been assessed that the applicant's reasons for the proposed choice of stormwater

^{42 [2019]} NZEnvC 199, at [66]

management are appropriate in the circumstances and regard has been had to alternative methods of discharge applicable in this case".

Ms Johnston further confirms that the proposal will not give rise to any of the effects listed in s107(1).

Having regard to the assessments provided in section 9.4 of this report, and the specialist reviews referred to therein, I concur with the above comments contained in the AEE.

14.2 Section 108 - Conditions of resource consents

14.2.1 Overview of proposed conditions

In the event that the hearing commissioners determine, having heard evidence from the applicant, submitters and Council officers, that consent can be granted, the following discussion addresses suggested conditions, in accordance with s108 of the RMA, that will be relevant to consider as part of the overall decision. This includes an assessment of the appropriate duration of such a consent, as well as conditions (noting that in respect of an unrestricted discretionary activity, conditions can be imposed to offset any adverse effects associated with such a consent).

Section 108AA(1) sets out the requirements for conditions of resource consents as follows:

A consent authority must not include a condition in a resource consent for an activity unless—

- (a) the applicant for the resource consent agrees to the condition; or
- (b) the condition is directly connected to 1 or both of the following:
 - (*i*) an adverse effect of the activity on the environment:
 - (ii) an applicable district or regional rule, or a national environmental standard; or
- (c) the condition relates to administrative matters that are essential for the efficient implementation of the relevant resource consent.

Development of the recommended conditions has adopted in the first instance the general or specific intent of the conditions proposed by the applicant as set out in Attachment Q to the AEE, as discussed in section 4.3 of this report, but have been significantly amended and/or supplemented by those conditions that (a) are typically imposed by the Council in respect of applications for regional consents, and (b) are recommended by the Council's technical specialists.

The recommended conditions have been structured in the following manner:

- 'General' conditions: these establish the consent duration periods (per s123 and the discussion at 14.2.3 below), the lapse date (per s125 and the discussion at section 14.2.4 below) and requiring the application to be constructed in general accordance with the information and plans provided with the application, along with the Council's normal administrative conditions, including the requirement for monitoring (per the discussion at section 14.2.2 below).
- 'Pre-commencement' conditions: these set out the various matters that the applicant/consent holder is required to address before commencing the development, and in particular the preparation of new or final versions of the relevant management plans and processes for notification of the commencement of works.



- 'During construction' conditions: these set out the conditions to be adhered to during the construction phase, including adherence to the management plans, monitoring of effects and construction parameters (noise and vibration limits and construction hours) and the standards to be complied with in terms of any accidental discovery of archaeology.
- 'Post-construction' conditions: these set out the completion processes associated with the requirement for a Site Validation Report.
- Conditions specific to the groundwater diversion activity (WAT60339409) based on those conditions recommended by Ms France.

It is noted that the application includes a number of management plans in draft form (e.g. the ESCP, the SEVP and the CTMP). However, no EMP has been provided, nor a GSMCP, CNVMP or KDMP. In my view, draft versions of these management plans should be provided for the information of the hearing commissioners, as they deal with important environmental effects that in my view should not be left to a post-consent approval or certification stage. The applicant has advised in its second s92 response that draft management plans addressing these topics will be provided for the hearing.

The proposed conditions are attached as Attachment 10.

14.2.2 Section 35 - Monitoring

Local authorities are also required to monitor the exercise of resource consents under s35 of the RMA. In this regard, the abovementioned conditions include a number of monitoring requirements, and which will require review by the Council's monitoring team.

A local authority may fix a charge under s36 payable by the consent holder in order to carry out its monitoring functions under s35. The amount that can be charged is based on actual and reasonable costs associated with monitoring and covers such tasks as site inspections, carrying out tests and administration. Normal practice is for a deposit to be calculated as part of the assessment of an application, and that the deposit is paid as part of the overall fees attached to a resource consent.

It is considered that for the present application, the level of monitoring by the Council is expected to be reasonably extensive and will involve the review and monitoring of various preconstruction management plans (final versions) as well confirming adherence with those plans and environmental management methods during the construction period.

An initial monitoring fee deposit of \$5,000 has been proposed given the complex nature of the application.

14.2.3 Section 123 - Duration of resource consents

The default duration period for a discharge permit under s123(c) of the RMA is five years from commencement of the consent,⁴³ while the maximum period is 35 years. Through its draft conditions included with the application (Appendix Q to the AEE), the applicant has sought the following amendments to the standard lapse date provision as follows:

⁴³ A notified resource consent commences when (a) the time for lodging appeals against a grant of the consent expires and no appeals have been lodged; or (b) when the Environment Court determines the appeals or all appellants withdraw their appeals (per s116 of the RMA).

- 15 years from commencement for:
 - Land use consents for land disturbance activities including earthworks, NES consent for disturbance of contaminated soils, and vegetation removal associated with replacement WTP and Reservoir 1;
 - Land use consents for works in the bed of a watercourse including disturbance, structures, reclamation and drainage;
 - Consent to divert a river or stream to a new course; and
 - Consents for diversion and discharge of groundwater.
- 35 years for diversion and discharge of stormwater.⁴⁴
- 20 years for land use consents for land disturbance activities including earthworks,⁴⁵ NES consent for disturbance of contaminated soils, and vegetation removal associated with Reservoir 2.
- 25 years for consent to discharge contaminants to land associated with the disturbance of potentially contaminated soil (WTP and Reservoirs 1 and 2).

It is noted that a ten year period for the diversion and discharge of groundwater has been recommended by Ms France,⁴⁶ and that duration has been adopted in the recommended conditions. The applicant may wish to address this aspect at the hearing.

In all other respects, and having regard to the need for ongoing discharges of stormwater over the life of the WTP, and the deferral of the construction of Reservoir 2, it is considered that these duration periods dates are appropriate, and are recommended to be included as part of the proposed conditions to be imposed, should consent be granted.

14.2.4 Section 125 - Lapse of consent

Under s125, if a resource consent is not given effect to within five years of the date of the commencement (or any other time as specified) it lapses automatically, unless the Council has granted an extension. As with the question of duration (s123 RMA), the applicant has sought amendments to the standard lapse date provisions as follows:

- 10 years for:
 - Land use consents for land disturbance activities including earthworks, NES consent for disturbance of contaminated soils, and vegetation removal associated with replacement WTP and Reservoir 1;
 - Land use consents for works in the bed of a watercourse including disturbance, structures, reclamation and drainage;
 - Consent to divert a river or stream to a new course;
 - Consents for diversion and discharge of stormwater; and
 - Consents for diversion and discharge of groundwater.
- 15 years for land use consents for land disturbance activities including earthworks, NES consent for disturbance of contaminated soils, and vegetation removal associated with Reservoir 2.
- 20 years for consent to discharge contaminants to land associated with the disturbance of potentially contaminated soil (WTP and Reservoirs 1 and 2) (amended to ten years as noted below).

⁴⁴ Technical memorandum, H Johnston, section 5.4

⁴⁵ Technical memorandum, C Tutt, section 5.2

⁴⁶ Technical memorandum, S France, section 7.3

The applicant's s92 response of 8 November 2019 further advises in respect of the requested lapse dates that:

Considering the nature and scale of the works, the applicant has sought extended lapse dates of 10 years. This approach is not unusual for large-scale infrastructure works such as these and reflect the significant cost and complexities of undertaking such a project whilst allowing for unforeseen delays.

The exception to this is the land use consents for land disturbance activities including earthworks, NES consent for disturbance of contaminated soils, and vegetation removal associated with Reservoir 2 where a lapse period of 15 years is sought. This simply reflects the construction programme, whereby work on the second reservoir located on the existing WTP site can only commence once the replacement WTP is commissioned and the existing WTP is decommissioned. This work is therefore currently programmed to commence from around March 2026.

We note in the current draft proposed set of conditions contained in Appendix Q we have indicated a lapse date of 20 years for the contaminated land discharge consent. On review we do not consider this is necessary and instead consider this should be revised back to 10 years. The updated suite of draft conditions will reflect this change.

Having regard to the scale of the Project, and the deferral of the construction of Reservoir 2, it is considered that these amended lapse dates are appropriate. It is noted that Mr Tutt has, however, recommended a lapse date of 10 years for the earthworks for Reservoir 2 and the applicant is invited to comment on this aspect at the hearing.⁴⁷ Otherwise, the above lapse periods are recommended to be included as part of the proposed conditions to be imposed, should consent be granted.

14.2.5 Section 128 - Review conditions

Section 128 of the RMA provides for a consent authority to review the conditions of a resource consent at any time specified for that purpose in the consent. A consent may specify a time for review of the conditions of a consent to deal with any adverse effects on the environment which may arise from the exercise of consent and which are appropriate to deal with at a later stage or for any other purpose.

This provision will enable the Council to review any of the proposed resource consent conditions set out in the recommendation section of this report in accordance with the above.

Specific review conditions have been proposed in regard to the earthworks consent and for those related to WAT60339409⁴⁸ to address potential effects arising from the exercise of the consents in relation to the commencement of dewatering, in order to vary the monitoring and reporting requirements, and performance standards, in order to take account of information, including the results of previous monitoring and changed environmental knowledge.

14.2.6 Advice notes

Advice notes have also been included at the end of the conditions. While these have no statutory force, they provide information to the applicant/consent holder to highlight certain

⁴⁷ Technical memorandum, C Tutt, section 5.2

⁴⁸ Technical memorandum, S France, p29

relevant matters and highlight potential obligations under other authorities or statutes. In this case, these include reference to:

- the need to obtain the necessary building consents for the proposed buildings and structures, following completion of detailed design, in accordance with the Building Act 2004;
- the need to obtain an authority under the Wildlife Act 1953 from the Department of Conservation, prior to the salvage and translocation of lizards (proposed as ecological mitigation);
- the need to submit a Corridor Access Request to Auckland Transport prior to work commencing; and
- the need for an OPW in accordance with s176A of the RMA for those matters for which land use consents under s9(3) would otherwise apply (while the OPW has been submitted, an advice note to this effect is recommended to be retained until such time as the OPW has been approved, and any Council recommendations for changes have been either accepted or rejected by WSL).

15. Section 104B - Requirements for discretionary and noncomplying activities

Section 104B of the RMA states that a consent authority may grant or refuse consent to a discretionary (or non-complying) activity, and if granted impose conditions under s108.

Having assessed the proposal in terms of:

- the effects on the environment in terms of s104(1)(a) and (ab);
- the relevant objectives and policies of the RPS and the AUP(OP) in terms of s104(1)(b); and
- other relevant matters in terms of s104(1)(c),

it is my view that consent can be granted consent pursuant to s104B, subject to conditions under s108.

16. Consideration of Part 2

16.1 Introduction

The requirement to refer to Part 2 as part of the assessment of a resource consent application has been subject to some uncertainty since 2016 as a result of decisions of the Environment Court and the High Court in *RJ Davidson Trust v Marlborough District Council*. However, a recent decision on this case by the Court of Appeal⁴⁹ as provided legal certainty in this regard. The definitive paragraphs of the Court's decision are as follows:

[74] It may be, of course, that a fair appraisal of the policies means the appropriate response to an application is obvious, it effectively presents itself. Other cases will be more difficult. If it is clear that a plan has been prepared having regard to pt 2 and with a coherent set of policies designed to achieve clear environmental outcomes, the result of a genuine process that has regard to those policies in



⁴⁹ RJ Davidson Trust v Marlborough District Council [2018] NZCA 316

accordance with s 104(1) should be to implement those policies in evaluating a resource consent application. Reference to pt 2 in such a case would likely not add anything. It could not justify an outcome contrary to the thrust of the policies. Equally, if it appears the plan has not been prepared in a manner that appropriately reflects the provisions of pt 2, that will be a case where the consent authority will be required to give emphasis to pt 2.

- [75] If a plan that has been competently prepared under the Act it may be that in many cases the consent authority will feel assured in taking the view that there is no need to refer to pt 2 because doing so would not add anything to the evaluative exercise. Absent such assurance, or if in doubt, it will be appropriate and necessary to do so. That is the implication of the words "subject to Part 2" in s 104(1), the statement of the Act's purpose in s 5, and the mandatory, albeit general, language of ss 6, 7 and 8.
- . . .
- [82] ... it would be inconsistent with the scheme of the Act to allow regional or district plans to be "rendered ineffective" by general recourse to pt 2 in deciding resource consent applications, providing the plans have been properly prepared in accordance with pt 2. We do not consider however that King Salmon prevents recourse to pt 2 in the case of applications for resource consent. Its implications in this context are rather that genuine consideration and application of relevant plan considerations may leave little room for pt 2 to influence the outcome...

This new legal principle was considered by the Environment Court in its AC36 decision, where it concluded that:

- [677] Possibly as a result of the extent of agreements reached among parties in this case, we were faced with no debate about whether resort should expressly be had to Part 2. We find it is not necessary to do so on this occasion....
- [678] Having regard to our findings earlier in this decision assessing the proposal against all relevant provisions of those instruments, we find that an assessment against Part 2 would not add anything to the evaluative exercise, and is not necessary. This is particularly so because grant of resource consent would not be contrary to the relevant objectives and policies.

In this case, it is considered that the proposal is able to be appropriately assessed against the relevant plans that have been prepared having regard to Part 2. It is not therefore apparent that an assessment against Part 2 would add anything substantive to the evaluative exercise that has already been carried out. The AEE also comments in this regard:⁵⁰

The AUP has only recently been made operative in part. It is considered to contain provisions prepared having regard to Part 2, and a coherent set of policies designed to achieve clear environmental outcomes. Based on the direction established by the Court of Appeal, it is considered that an assessment against Part 2 therefore adds little, if anything to the overall evaluation.

⁵⁰ AEE, section 8.2.1

However, for completeness I have included an assessment against Part 2 below.

I note that the AEE also considers, with reference to the direction provided by the Court of Appeal, that it is appropriate to have regard to Part 2 in assessing this application, and an assessment has therefore been provided therein (section 8.2.2).

16.2 Assessment

The purpose and principles of the RMA under Part 2 are expressed through ss 5-8. These are summarised and commented on below.

Section 5 identifies the purpose of the RMA as the sustainable management of natural and physical resources. This means managing the use of natural and physical resources in a way that enables people and communities to provide for their social, cultural and economic wellbeing while sustaining those resources for future generations, protecting the life supporting capacity of ecosystems, and avoiding, remedying or mitigating adverse effects on the environment.

Section 6 sets out a number of matters of national importance which need to be recognised and provided for. These include, in particular, the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna (s6(c)), while s7 includes intrinsic values of ecosystems, and maintenance and enhancement of the quality. As noted by the AEE, these provisions "complement the environmental obligations contained within the definition of sustainable management in section 5(2), particularly the objective in section 5(2)(b) of safeguarding the life-supporting capacity of ecosystems".

The extent of vegetation clearance proposed by the application raises the potential for direct conflict with the above provisions, but is addressed by the AEE in the following terms:

While the proposal involves the clearance of 3.3 ha of ecologically significant native forest and scrub, the development has been designed to avoid areas with the highest ecological integrity, and the footprint was progressively moved and reduced through a series of iterative design layouts to minimise the area of vegetation clearance as much as practicable. An extensive compensation package (the WMBI) will be implemented to address adverse ecological effects that cannot practicably be avoided, remedied or mitigated. The WMBI involves ecological enhancement of a 990ha area, including approximately 720 ha of forested SEA, which is assessed to appropriately compensate for the loss of forest extent.

In considering these effects, and proposed compensation, the AEE also highlights that the location of the proposed WTP represents an efficient use and development of the western water supply dams, that form a critical component of Auckland's water supply system. It also notes that the proposed WTP is also in close proximity the existing WTP and makes use of existing water supply and the existing attenuation lagoon on the Reservoir 2 site. The AEE goes on to emphasise the importance of the proposal in terms of its contribution to the ongoing security of supply of treated water to the region, and in this respect represents "both regionally and nationally significant infrastructure". It states that "[m]aintenance and replacement of the existing water supply network, and the provision for future water supply security is essential to support [Auckland's] growth, and to continue to provide for the well-being of Aucklanders".

Section 8 also requires the Council to take into account the principles of the Treaty of Waitangi. The AEE comments in regard to s8 that:

In addition, the relationship of Māori to this area is acknowledged (section 6(e)), along with Mana Whenua kaitiaki responsibilities in the area. Mana Whenua have been engaged through Watercare's Mana Whenua Kaitiaki Forum, which has been set up in a manner consistent with the principles of the Treaty of Waitangi (section 8). Te Kawerau is currently preparing a Cultural Values Assessment to assess the cultural implications of the proposal and identify opportunities for kaitiakitanga.

As noted in section 9.4.10, and elsewhere in respect of relevant objectives and policies, Te Kawerau have lodged a submission in opposition and their CVA outlining the particular cultural values of the Project site has not yet been sighted. While it is apparent that the applicant has undertaken consultation with Te Kawerau and other Mana Whenua through their Kaitiaki Forum, it is not apparent that the consultation processes with Mana Whenua have yet reached a point where it can be said that, from the perspective of Te Kawerau, the issues associated with the proposal have addressed potential effects on cultural values. I nevertheless consider that the applicant has endeavoured to consult with Te Kawerau in a manner that takes appropriate account of, and regard to, the principles of the Treaty of Waitangi (per s8).

In overall terms, it is noted that the construction of the proposal will have adverse effects, and in some respects these will of some magnitude, although this should in my view be considered against the positive effects associated with the operation of the replacement WTP and reservoirs and their provision for the growth of the Auckland region, and the ecological compensation measures proposed as part of the application. On balance, and having regard to the manner in which these are required to be assessed against s104D and the relevant provisions of the AUP(OP) and other relevant matters, it is considered that the proposed replacement WTP and reservoirs is broadly in accordance with Part 2 of the RMA and does appropriately provide for the sustainable management of natural and physical resources (subject to further resolution of s8 matters).

Finally, and in terms of the guidance provided by the Court of Appeal in the consideration of Part 2, I note that this conclusion is consistent with that which has been reached against the relevant statutory provisions, and the AUP(OP) in particular, that have been assessed in section 10 of this report, and it is not therefore necessary to "give emphasis to pt 2" as part of the overall determination.

17. Conclusion

Overall, and for the reasons set out in preceding sections of this report, I consider that the proposal gives rise to adverse effects on the environment that will be more than minor in overall terms, but will be, on balance and in overall terms, consistent with the relevant objectives and policies of the AUP(OP) such that it is able to be considered on its merits in terms of s104. In that respect, it is considered appropriate to have regard to the ecological compensation measures proposed by the proposal in assessing the proposal against the relevant statutory planning documents and regulatory tests, and with respect to the matters arising under other non-statutory documents.

The proposal is also considered to be broadly in accordance with the matters to be assessed under Part 2.

In reaching this conclusion there are two particular matters on which some uncertainty or doubt exist, in respect of potential risks associated with kauri dieback disease and effects on Mana Whenua values (as they ae to be expressed by Te Kawerau). The former can be addressed to some extent by the imposition of and adherence to specific conditions, and which will be further detailed by the applicant at the hearing. The latter may be addressed through the provision of a CVA by Te Kawerau, and the subsequent response to that document by the applicant.

My conclusions are therefore made on a provisional basis and on the expectation that these matters can be satisfactorily addressed as part of the hearing.

18. Summary of matters unresolved or for clarification

This section of the report provides a summary of the matters that are unresolved, including relatively minor technical matters, and those matters of further clarification or detail which have been highlighted throughout the report, and which the applicant may wish to comment on as part of its evidence and/or at the hearing. Report section numbers are included for ease of reference to the main area of discussion of the relevant matter:

- (a) Provision of a draft EMP and SVP, including riparian management plan (per section 9.4.5(b));
- (b) Provision of further detailed assessments of:
 - potential adverse effects on individual trees in close proximity to and with root zones within the Project site, including a major stand of kauri near Reservoir 1 and individual kauri near the proposed treatment plant footprint; and
 - the extent of encroachment into the riparian margins and measures to mitigate effects on the Armstrong-Manuka stream south of Woodlands Park Road, which may be addressed by way of a full EMP and SVP noted in (a) above (per section 9.4.5(b)),
- (c) Provision of proposed kauri dieback protocols and a draft KDMP (per section 9.4.5(d));
- (d) Provision of details of further surveys of taxa identified by Dr Bergquist at 6.4 of her technical memorandum (per section 9.4.5(e));
- (e) Provision of a draft GSMCP (per section 9.4.8);
- (f) Clarification as to whether green roofs are proposed (per section 9.4.9);
- (g) Update regarding the provision of a CVA by Te Kawerau (per section 9.4.10 and elsewhere), and the manner in which the applicant will address the restrictions to activities under the existing Te Kawerau ā Maki rāhui (per section 13.8);
- (h) Comment on proposed restrictions in the CTMP conditions relating to the restriction on use of Woodlands Park Road, Atkinson Road and Golf Road (per section 9.4.11);
- Provision of a draft CNVMP and clarification as to the expected duration of noise effects (per section 9.4.12);
- (j) Comment on the applicant's approach to addressing the Council's climate change declaration through its future infrastructure programme planning (per section 13.11); and
- (k) The s123 duration for the groundwater diversion and discharge (per section 14.2.3).

19. Recommendations

19.1 Recommendation 1

That pursuant to s37 of the RMA, the submission from Waima to Laingholm Pest Free that was received outside the submission timeframe, being submission #9003 be <u>accepted</u>.

The reason for this recommendation is that while the submission was received 14 days beyond the submission close-off period, it does not raise substantive new matters for consideration, and the applicant does not oppose its acceptance. It can therefore be said that, in terms of s37A(1):

- no persons will be adversely affected by acceptance of the submission (noting that WSL does not oppose its acceptance);
- the interests of the community in achieving adequate assessment of the effects of a proposal, policy statement, or plan will be better served; and
- acceptance of the late submission has not resulted in any delay in this matter being heard.

19.1 Recommendation 2

Subject to new or contrary evidence being presented at the hearing, I recommend that under ss 104, 104B, 104D, and 108, the application by Watercare Services Limited for regional resource consents and a land use consent under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 for enabling earthworks, vegetation removal and associated activities related to the Huia Replacement WTP project, and the following matters under the AUP(OP) for:

- diversion of an intermittent section of the Yorke Stream;
- erosion control structures in Yorke Gully Stream;
- reclamation of a small reach of the Yorke Stream classified as an intermittent stream;
- management of groundwater during excavation works (Reservoir 1 site), including water take for more than 30 days;
- the development of approximately 2.84 ha of impervious area within a SMAF1, and stormwater discharge from this area to the Yorke Gully Stream;
- removal of approximately 3.5 ha of vegetation within a SEA;
- earthworks for infrastructure, including within a SCPA and a SEA; and
- the removal of contaminated soil,

is granted, subject to conditions.

The reasons for this recommendation are:

(a) The proposal is able to pass the second "gateway" of the s104D threshold effect for noncomplying activities. While the adverse effects of the proposal on the environment are assessed to be more than minor, it is considered that the proposal will not be contrary to the objectives and policies of the AUP(OP) in overall terms, and taking into account ecological offsetting provided for under those provisions, and the manner in which effects addressed under the objectives and policies will be controlled and managed. It is noted that there remain some uncertainties with respect to kauri dieback disease risk and potential impacts on Mana Whenua values but these are not considered to affect this assessment when the objectives and policies are considered "in the round" and in the context of the site's designated purpose.

- (b) In terms of s104(1)(ab), the proposed WBMA compensation package will provide ecological enhancements within the Waima catchment that are at least commensurate to the values proposed to be removed from within the project footprint.
- (c) With respect to s104(1)(b) the proposal generally aligns with the provisions set out in the relevant national environmental standard (NES Soil) and national policy statement (NPS:FM) and Part 1, Chapter B of the RPS in overall terms, while noting that there is some uncertainty or potential inconsistency with respect to effects on Mana Whenua values and with respect to the potential risk of construction works on kauri dieback disease.
- (d) In terms of 'other matters' under s104(1)(c), the proposal is generally consistent with, or does not offend, the outcomes sought within the relevant non-statutory planning documents, other than in respect of the Urban Ngahere (Forest) Strategy, while being reasonably neutral overall in terms of the Council's climate emergency declaration. The key issues raised in submissions, and including that from the Local Board, have been addressed through the various technical assessments and within this report. It is recognised that the proposal may not be permitted through the current rāhui but as a non-statutory management method this is a matter that will need to be addressed between the applicant and Te Kawerau.
- (e) The proposal is, on balance, considered to be consistent with the purpose and principles set out in Part 2 of the RMA. While it does not avoid the creation of adverse effects on the environment including those that result in some associated social disbenefits for the surrounding community, and potential effects for local Mana Whenua, it will provide for a measure of additional social and economic wellbeing for the region as a whole, and includes enhancement measures for the surrounding catchment that will provide an appropriate level of compensation for the adverse effects on the ecology of the site.

ATTACHMENT ONE

APPLICATION DOCUMENTS

Please note that only the site management plan (attachment K) has been included here. The full application documents are available at this link:

https://www.aucklandcouncil.govt.nz/have-your-say/have-your-say-notified-resourceconsent/notified-resource-consent-applications-opensubmissions/Pages/ResourceConsentApplication.aspx?itemId=328&applNum=BUN6 0339273

REPORT

Tonkin+Taylor

Site Management Plan for Ground Contamination

Replacement Huia Water Treatment Plant

Prepared for Watercare services Ltd Prepared by Tonkin & Taylor Ltd Date May 2019 Job Number 30848.2000.v2





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Document Control

Title: Site Management Plan for Ground Contamination							
Date	Version	Description	Prepared by:	Reviewed by:	Authorised by:		
May 2019	1.0	Final	P. Walker	L. Phuah	P. Roan		

Applicability

This report has been prepared for the exclusive use of our client, Watercare services Ltd, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Report prepared and certified by a suitably qualified and experienced practitioner as prescribed under the NES Soil:

pp

Report prepared by:

Paul Walker Senior Contaminated Land Specialist

.....

Authorised for Tonkin & Taylor Ltd by:

......

Peter Roan Project Director

Report reviewed by a suitably qualified and experienced practitioner as defined in the NES Soil Users Guide (April 2012):

.....

Lean Phuah Principal Contaminated Land Specialist

PEW

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Appendix B : Contractor Checklist

1 Introduction

Tonkin & Taylor Ltd (T+T) has been commissioned by Watercare Services Ltd (Watercare) to prepare this Site Management Plan (SMP) to manage ground contamination associated with the development of the replacement Water Treatment Plant (WTP) on Scenic Drive (Woodlands Park Road), in Titirangi, Auckland (herein referred to as the site, Figure 1.1).



Figure 1.1: Site Location (Source: LINZ, copyright reserved)

This SMP has been prepared in accordance with our proposal of 30 June 2017.

1.1 Background

Watercare Services Limited (Watercare) is responsible for the treatment and supply of potable water and for the collection, treatment and disposal of wastewater to around 1.5 million people in Auckland. Watercare is a Council Controlled Organisation (CCO), wholly owned by the Auckland Council.

Watercare operates five dams within the Waitākere Ranges, including the Upper and Lower Huia Dams and the Upper and Lower Nihotupu Dams. Water from these western water supply dams is treated at the Huia and Waitākere Water Treatment Plants before being distributed via the water transmission network, primarily to west and north Auckland. The Huia Water Treatment Plant (Huia WTP) is the third largest water treatment plant in Auckland and is a crucial component of Auckland's water supply network, treating approximately 20% of Auckland's water.

The Huia WTP was constructed in 1929 and is now nearing the end of its operational life (90 years old). Watercare therefore proposes to construct a new WTP to replace the aging Huia WTP. As part of this project Watercare is also proposing to construct two treated water reservoirs (50 ML total capacity) to increase treated water storage within the western supply zone.

The proposed works are located within an area of land that encompasses three properties that are designated by Watercare for 'water supply purposes – water treatment plants and associated structures'. The replacement WTP will be constructed on the corner of Manuka Road and Woodlands Park Road directly across from the existing Huia WTP site. The replacement WTP will have a treatment capacity of 140 mega-litres per day (MLD).

A new 25ML treated water reservoir will be located on the northern side of Woodlands Park Road (Reservoir 1), with another 25 ML reservoir (Reservoir 2) subsequently constructed on the existing Huia WTP site once the existing plant has been decommissioned. The proposed works also includes construction of the North Harbour 2 watermain (NH2) valve chamber and tunnelling reception shaft within the Reservoir 1 site.

Extensive earthworks will be required for the WTP, reservoirs and associated infrastructure.

T+T has completed a preliminary site investigation¹ (PSI) for the site which has identified that housing that may have used asbestos containing materials and lead-based paints were present on the Reservoir 1 and replacement WTP sites from the 1940s until the 1990s. The removal/demolition of these building could have resulted in localised ground contamination by asbestos and lead.

1.2 Proposed works

This SMP relates to pre-construction enabling works that are anticipated to include:

- Vegetation removal;
- Site establishment including the construction of site access and haul roads;
- Diversion of services;
- Establishment of erosion and sediment controls;
- Stream diversion and reclamation works;
- Construction of retaining walls and slope stabilisation;
- Bulk earthworks; and
- Placement of engineered fill.

1.3 Objectives and Scope of SMP

Given the potential presence of ground contamination at the site, this SMP has been prepared to detail earthworks procedures and controls which will be appropriate for mitigating potential contamination effects during the proposed earthworks, and to provide procedures for unexpected contamination should it be encountered during the works. The SMP also provides an outline for contamination investigations which will occur prior to earthworks commencing.

1.4 Regulatory compliance

This SMP has been prepared in general accordance with Ministry for the Environment (MfE) Contamination Land Management Guidelines (CLMG) No.1 "*Guidelines for Consultants Reporting on Contaminated Sites in New Zealand*" (revised 2011). Sampling procedures provided in the plan generally comply with the MfE CLMG No.5 "*Site Investigation and Analysis of Soils*" (revised 2011).

This plan considers the requirements of the Health and Safety at Work (Asbestos) Regulations (2016), the WorkSafe NZ *Approved Code of Practice (ACOP): Management and Removal of Asbestos* (September 2016) and the BRANZ document *New Zealand Guidelines for Assessing and Managing Asbestos in Soil* (November 2017).

¹ Preliminary Site Investigation – Huia Water Treatment Plant. Tonkin & Taylor Ltd. July 2018.

This plan is also prepared in general accordance with the soil disturbance related controls referred in the Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES Soil). The persons preparing and certifying this SMP are suitably qualified and experienced practitioners (SQEP)as required by the NES Soil and defined in the NES Soil Users' Guide (April 2012)².

This SMP has been produced to support resource consent applications for soil disturbance works as a discretionary activity under the NES Soil³ and Section E.30 of the Auckland Unitary Plan Operative in Part (AUP).

² MfE (2012). User's Guide: National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health.

³ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011

2 Roles and responsibilities

This SMP provides a framework for managing contamination hazards on site by identifying potential hazards and suggesting mitigation measures. It provides information and recommendations to augment this process but is not intended to relieve the person conducting business or undertaking (PCBU) of either their responsibility for the health and safety of their workers, Contractors and the public, or their responsibility for protection of the environment.

The provisions of this SMP are mandatory for all persons (employees, contractor and subcontractors) involved in undertaking any of the proposed ground disturbance works (excavation, piling etc.).

2.1 General

The proposed roles and responsibilities under the SMP are provided in Table 2.1.

Company/Organisation	Role and responsibilities		
Watercare services Ltd	Project owner		
Main Contractor (Contractor)	Responsible for implementation of SMP		
Subcontractor(s)	Responsible for undertaking works in accordance with requirements of the SMP		
Contaminated Land Specialist	Soil testing, pre and during works, and validation reporting. Provision of ground contamination advice during the works.		

Table 2.1: Organisational involvement

2.2 Distribution

A copy of the SMP shall be kept onsite at all times. It is the responsibility of Watercare to distribute the plan to the Contractor appointed to carry out the work. It is the responsibility of Watercare's nominated Contractor to distribute the SMP to any other sub-contractors or parties carrying out earthworks.

2.3 Review and update

Statutory requirements, operating procedures or site conditions may vary and may require that this plan be amended or updated.

Any variations to the SMP proposed by the Contractor must be approved by the Contaminated Land Specialist prior to works commencing, or the variation being implemented if works have already commenced. If the changes are substantive they may need to be approved by Council prior to implementation.

It is the responsibility of the appointed Contractor to distribute any changes to the plan to the relevant parties involved in the construction works and update the site copy.

2.4 Implementation

Responsibility for the implementation of the SMP lies with the appointed Contractor and their subcontractors. In the case of unexpected contamination the Contractor shall notify Watercare (or its designated project manager) immediately. Further information regarding first response is provided in Section 7.
Watercare shall engage a Contaminated Land Specialist to carry out inspection and provide advice as required during the works (refer Sections 4 to 6). The Contaminated Land Specialist shall be sufficiently experienced to comply with the "suitably experienced practitioner" as described in and required by the NES Soil Regulation (2011) Users Guide (April 2012).

3 Site characterisation

3.1 Site identification

The replacement Huia WTP is proposed to be located adjacent to the existing Huia WTP site on the corner of Woodlands Park Road and Manuka Road. The first 25 ML reservoir (Reservoir 1) will be located on the northern side of Woodlands Park Road below Exhibition Drive directly across from the existing Huia WTP. The second 25 ML reservoir (Reservoir 2) will be located on the existing Huia WTP sites. The sites are all accessed from Woodlands Park Road. These three sites are collectively referred to as "the project site".

The project spans three sites owned by Watercare which have a total site area of approximately 145,700 m². The site on which the proposed replacement Huia WTP is located has an area of approximately 42,000 m², the proposed Reservoir 1 site has an area of approximately 63,600 m², and the existing WTP site (on which Reservoir 2 is proposed) has an area of approximately 40,100 m².

The project site is located approximately 1 km from Titirangi Village and approximately 1.5 km north of the closest reach of the Manukau Harbour.

3.2 Site layout

The replacement WTP site slopes gently from the Woodlands Park Road to the south with gullies located at the southern boundary running north to south. The eastern extent of this site features steep slopes which rise up towards Scenic Drive. A section of the Yorke Gully Stream traverses the south eastern part of the replacement WTP site and a small tributary of the Armstrong Gully Stream is located in the north-western corner of the site.

The Reservoir 1 site is relatively hummocky with a knoll located in the middle of the site near the southern boundary, and a small gully feature (Armstrong Gully) runs through the site. Extremely steep slopes are present along the northern boundary beneath and above Exhibition Drive. A permanent section of Armstrong Gully stream is located to the west of Reservoir 1.

The existing WTP site where Reservoir 2 will be located has been developed as a WTP for the last 90 years. The site has a generally moderate to steep slope towards the south, with very steep slopes along the eastern and southern site boundaries. The Armstrong Gully watercourses are piped beneath the centre of the site, discharging into an open channel near the southern boundary. A small tributary of the Armstrong Gully Stream extends from the replacement WTP site into the north-eastern corner of the existing Huia WTP site.

Both the WTP and Reservoir 1 sites are almost completely vegetated in native bush, while the existing WTP site is partly covered in native bush with the remainder developed as part of the existing Huia WTP.

There are a number of features that are currently present on site which include:

- An upwash tank located in the western part of the Reservoir 1 site;
- An area of cleared ground evident on aerial photographs of the replacement WTP site.

3.3 Geology and hydrogeology

The published geological information^{4,5} indicates the site is located on the boundary between two geologic groups; the Waitemata and Waitakere Groups, and underlain by both the Nihotupu Formation to the east and the Cornwallis Formation to the west (see **Figure 3.3** below).

The Nihotupu Formation of the Waitakere Group is composed of basaltic, andesitic sandstone and is underlain by the Cornwallis Formation of the Waitemata Group. The Nihotupu Formation forms the bluffs to north of the site. The Cornwallis Formation is an alternating, thick bedded sandstone and thin bedded mudstone (volcanogenic flysch) underlain by the East Coast Bays Formation.

Geotechnical borehole logs indicate that the replacement WTP site and the Reservoir 1 site are underlain by fill material in areas of previous development, and generally underlain by colluvial landslide slope deposits and potentially buried alluvial deposits overlying bedrock containing slickenside layers indicative of possible deep seated slope movement⁶.

The available data indicates that two groundwater levels are present within the Reservoir 1 site: a groundwater level of approximately 6.5 m below ground level (mbgl) for shallow-screened piezometers and approximately 10 mbgl for the deeper screened piezometers. Similar groundwater levels were recorded in the existing WTP, where available data indicate a mean groundwater level of 5.5 mbgl for shallow or single piezometers and 8.5 mbgl for deeper screened piezometers⁷.



Figure 3.3: Published geology (source: Kermode, 1992). The yellow line has been added to distinguish the Nihotupu Formation (left) from the Cornwallis Formation (right)

⁵ Edbrooke, S. W. (2001). Geology of the Auckland Area. Scale 1:250,000. Institute of Geological & Nuclear Sciences, Geological map 3. Institute of Geological & Nuclear Sciences Ltd., Lower Hutt, New Zealand

⁴ Kermode, L. O. (1992) *Geology of the Auckland urban area*. Scale 1:50,000. Institute of Geological & Nuclear Sciences, Geological map 2. Institute of Geological & Nuclear Sciences Ltd., Lower Hutt, New Zealand

⁶ GHD (2016). *Huia WTP Site Selection Study Shortlist Site Development Report* – prepared for Watercare Services Ltd. September 2016.

⁷ Site Management Plan for Ground Contamination - Replacement Huia Water Treatment Plant. Prepared for Watercare services Ltd by Tonkin & Taylor Ltd, May 2019.

3.4 Hydrology

The replacement WTP is situated at the head of the Little Muddy Creek catchment within the wider Manukau Harbour catchment. There are numerous surface water channels and several flood prone areas on site. Streams on the site discharge into the Warituna Stream.

The Armstrong Stream runs through the Reservoir 1 site. Largely, this is a permanent stream with varying water levels and is in generally good condition. Overland flow paths are also identified on the western side of the replacement reservoir site and along its southern boundary. Potentially flood prone areas are identified alongside the permanent stream on the Reservoir 1 site.

3.5 Site history and potential for contamination

The T+T PSI (2018) includes a detailed account of the site history as obtained from a desk-based review of available information. The historical review has identified one activity on site that could cause ground contamination, this being the removal and/or demolition of the former houses on the Reservoir 1 site and the replacement WTP site that were present between the 1940s and 1990s. Table 3.1 summarises the potentially applicable HAIL reference for this activity, the nature, and potential magnitude and extent of contamination that may be associated with this activity.

Land use/activity	Potential contaminants	Magnitude and possible extent of contamination	HAIL Activity reference
Asbestos containing materials (ACM) and lead-based paints within former residential dwellings (Reservoir 1 and replacement WTP sites)	The various forms of asbestos as fragments and free fibres. Lead associated with lead- based paints.	Buildings (six dwellings and associated structures/garages etc) were constructed, altered and removed from the site during the period when use of ACM and lead-based paint was common. If ACM and/or lead based paints were used in the buildings and not handled appropriately during previous alteration or removal/demolition works there is potential for these contaminants to contaminate the surrounding ground. Localised ground contamination may have also occurred due to the degradation of painted surfaces and asbestos materials prior to removal. The extent of contamination is likely to be limited to the building footprint plus a buffer (nominally 100m ² per dwelling).	Activity not specifically included in HAIL but could be captured under Category I – Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment, if contaminant concentrations exceed risk based assessment criteria.

Table 3.1: Potential for contamination

Ground contamination (if any) is likely to be limited to the near surface, dependent on how deep the filling activities have occurred.

Depending on contaminant concentrations, the contaminants can pose a risk to:

- Human health of the workers undertaking the development works, future workers of the WTP if they come into contact with, ingest or inhale the contaminants;
- Wider environment particularly via stormwater, if the contaminants are mobilised during earthworks.

To the best of T+Ts knowledge, there has been no previous sampling and analysis completed to confirm (or otherwise) the presence of contamination associated with the above on-site activities. Consequently, this work is proposed to be undertaken prior to bulk earthworks (refer Section 4).

4 Pre-works testing

Prior to earthworks commencing, pre-works contamination testing will be undertaken to establish actual contamination concentrations within materials that will likely be disturbed during development earthworks on the site. The sampling programme is outlined below.

4.1 Confirmation of sampling regime

Prior to sampling taking place, a site walkover assessment shall be carried out by the Contaminated Land Specialist to confirm there are no other potential sources of contamination present at the site. The following pre-works testing outline can then be confirmed.

4.2 Sampling rationale

Sampling shall be undertaken where proposed ground disturbance (indicatively shown in the plan included in Appendix A of this SMP) intersects former building areas. Based on the likely distribution of contamination, sampling shall occur on a grid basis. To meet the minimum number of samples set out within the MfE Guideline No 5⁸ and New Zealand Asbestos Guidelines⁹, samples shall be collected at 20 m – 30 m spacing across the proposed soil disturbance area. The number of samples collected shall at least comply with the minimum sampling numbers set out within the MfE Guideline No 5¹⁰ and New Zealand Asbestos Guidelines¹¹.

Samples shall be collected using a hand auger or machine-excavated test pits, whichever is more appropriate given site access constraints at the time.

Samples shall therefore be collected to the maximum depth of cut, or to 0.5 m into natural soils, whichever is reached first. Samples shall be collected every 0.5 m, or at changes in lithology.

4.3 Sampling methodology

Soil samples for chemical testing shall be collected in general accordance with the MfE Guideline No. 5:

- Materials encountered shall be logged in accordance with the NZ Geotechnical Society "Guidelines for the classification and field description of soils and rocks for engineering purposes";
- Freshly gloved hands shall be used to collect soil samples from the recovered core or test pit walls. All samples will be placed immediately into 300 ml glass jars.

Samples for asbestos testing shall be collected in general accordance with the methods for semiquantitative analysis of asbestos in soil as set out in the New Zealand Asbestos Guidelines as follows:

- Inspect a 10 L volume of soil for potential ACM fragments. Collect all suspected ACM into a zip-lock plastic bag;
- Collect a 500 mL sample of the soil in a separate zip-lock plastic bag using freshly gloved hand;
- Decontamination of the shovel and hand auger between samples was achieved using decon-90 and water.

⁸ Contaminated Land Management Guideline No 5. Site investigation and analysis of soils. Ministry for Environment, revised 2011.

⁹ New Zealand Guidelines for Assessing and Managing Asbestos in Soil. BRANZ. November 2017.

¹⁰ Contaminated Land Management Guideline No 5. Site investigation and analysis of soils. Ministry for Environment, revised 2011.

¹¹ New Zealand Guidelines for Assessing and Managing Asbestos in Soil. BRANZ. November 2017.

Any equipment used to collect the samples shall be decontaminated between sample locations using clean water and Decon 90 (a phosphate-free detergent).

Samples shall be shipped in chilled conditions to an IANZ accredited laboratory under chain of custody documentation.

4.4 Testing suite and evaluation criteria

It is expected that one sample of fill and one of natural soil shall be collected from each of the sampling locations. Analysis will be determined by the Contaminated Land Specialist but would be expected to include metals (arsenic, cadmium, chromium, copper, lead, nickel and zinc) and asbestos (semi-quantitative analysis in accordance with New Zealand Asbestos Guidelines). If there is evidence of ash, coal or other contamination such as hydrocarbons, additional testing for the observed contaminant of concern shall also be included.

Samples shall be compared against the following evaluation criteria:

- To assess potential human health risks, the NES Soil contamination standards for commercial/ industrial use (for site workers during construction and future site use);
- To assess environmental discharge risks, the Auckland Unitary Plan (Operative in Part) permitted activity discharge criteria; and
- Background values for non-volcanic soils in the Auckland Region. This will allow assessment against default cleanfill criteria.

4.5 Reporting

Results from the above pre-works testing shall be reported in a letter report to Watercare and a copy of the report provided to Auckland Council prior to works commencing.

If required, this SMP shall be updated to reflect the findings of the soil sampling, and a new version issued prior to works commencing.

If sampling demonstrates that the investigation areas are not contaminated then it is considered that the contamination-related earthworks controls set out in this SMP would not apply to the earthworks, which could then be undertaken with standard earthworks controls in place.

5 Site condition and management rationale

5.1 Soil contamination

Metals are the most likely contaminants to be encountered within fill materials at the site. Asbestos contamination may also be present.

The management rationale below, and site management procedures that follow, are based on low levels of asbestos and metal contamination being present in fill materials (i.e. below criteria for the protection of site workers). Natural soils are expected to be at background concentrations for non-volcanic soils in Auckland. The management procedures in this SMP shall be confirmed on completion of pre-works testing.

Preliminary asbestos controls have been included due to the current uncertainty with regard to actual asbestos contamination at the site. For the purposes of this plan, it is assumed that asbestos is present in fill in the development footprints, but at levels that are sufficiently low that earthworks in fill can be undertaken as *unlicensed asbestos works*.

5.2 Management rationale

The replacement WTP development will require a significant volume of cut to allow the construction of the proposed reservoirs and WTP and fill to form building and site access platforms. If contaminated materials are retained on site, encapsulation beneath hard standing or landscaping will occur.

Based on the above, the objectives of the management plan are to:

- Remove or encapsulate contaminated soils as required to enable safe occupation of the WTP;
- Mitigate effects of contamination on site workers and neighbouring residents/ the general public during and following earthworks, including from asbestos-contaminated soils;
- Ensure appropriate disposal of potentially contaminated materials; and
- Avoid discharges of sediment and dust to the surrounding environment.

With respect to the potential for ACM and asbestos fibres to be present in soil in the development areas, the Health and Safety at Work (Asbestos) Regulations (2016) enacted on 1 April 2016 are relevant. Worksafe New Zealand has prepared an Approved Code of Practice (ACOP): Management and Removal of Asbestos (November 2016). The key requirements of the regulations and ACoP are that works involving asbestos contaminated soils must be undertaken with appropriate asbestos controls in place and that contaminated soil removed from site must be taken to an approved disposal site. Details relating to the standards and controls that apply to asbestos-in-soils, are outlined in BRANZ (*New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017*) which is incorporated by reference into the Worksafe ACOP.

The management rationale shall be reviewed on completion of pre-works testing to ensure the appropriate level of control is implemented for the contamination identified (if any).

Watercare services Ltd

6 Site Management Procedures

The following earthworks controls and procedures will be implemented to manage potential contamination during works. These are expected to comply with consent conditions and with best practice guidance for the Auckland Region, including *Guidance Document 05: Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (June 2016)*. The procedures below will be reviewed and updated following pre-works testing. As noted above, if sampling demonstrates that the investigation areas are not contaminated then it is considered that the contamination-related earthworks controls set out in this SMP would not apply to the earthworks, which could then be undertaken with standard earthworks controls in place.

Also refer to the following sections:

- Contingency procedures are outlined in Section 7. These should be followed in the event of unexpected contamination;
- Health and safety procedures relating to contaminated soils are outlined in Section 8;
- Validation procedures are outlined in Section 9.

All procedures employed by the Contractor shall comply with the relevant Council bylaws and conditions of any resource/building consent(s).

Earthworks practice	Contamination-specific management
Site establishment	• If identified in pre-works testing, the site hazard board shall state that there is a risk from contamination on the site, including asbestos if applicable.
	• Decontamination facilities shall be established if asbestos is confirmed on the site.
	 Personal protective equipment shall be purchased and held on site. This includes disposable gloves, overalls and P2/P3 dust masks.
	 All staff undertaking disturbance work shall be inducted so they are aware of contamination risks.
	 If off-site disposal is required, approval must be received from fill site prior to commencing work.
Excavation and transport	• Trucks shall be loaded directly with stockpiling avoided where possible.
	 Where stockpiling of fill is necessary, stockpiles shall be kept damp during works and covered with polythene or similar overnight and during weekends.
	 Fill stockpiles shall be placed on hard standing or polythene to prevent contamination of underlying soils. Alternatively, the stockpile areas need to be validated following removal.
	 Trucks are to be lined and covered when transporting asbestos- contaminated material off the site.
	 Soil disposal records (summaries) shall be kept for later validation reporting, if necessary.

Table 6.1: General earthworks procedures

Earthworks practice	Contamination-specific management	
Soil disposal	• All fill/contaminated material must be disposed of to an appropriately licenced landfill facility. If asbestos is present, the landfill must be made aware that the soils contain asbestos.	
	 Natural soils are expected to be suitable for disposal to cleanfill if earthworks methods allow clear separation of natural soils from fill. 	
	 The Contaminated Land Specialist must review the site prior to any material being disposed of to a cleanfill site. 	
Water disposal	 Groundwater may be encountered during excavations, however, it is unlikely that groundwater will be encountered within fill. Groundwater removed from excavations may require treatment to remove suspended solid before discharge to stormwater or sewer. The Contaminated Land Specialist shall determine testing and discharge consent requirements prior to discharge being undertaken. Surface water that accumulates within the excavation and has been in contact with fill material shall be allowed to drain to ground. 	
	 No water that has been in contact with fill material shall be disposed to stormwater or sewer prior to a Contaminated Land Specialist providing advice and if required, undertaking testing to determine disposal requirements. Water may need to be treated prior to disposal. 	
Encapsulation procedures	• If contaminated soils are to be encapsulated on site, the encapsulation method shall be advised by the Contaminated Land Specialist to suit the type and level of contamination that is to remain.	
	 Encapsulation generally requires placement of geotextile or similar over the remaining contamination, followed by a minimum thickness of soil or hardstanding. Specific encapsulation is required for odorous/ volatile material and for asbestos. 	
Imported material	• All soils imported to site must be either hardfill direct from a quarry (no recycled hardfill) or the following:	
	 Be derived from a source, which is previously verified in accordance with the methods described in the NES Soil Regulations, as being a piece of land to which the NES Soil Regulations do not apply; or 	
	 Have been adequately investigated in accordance with MfE Contamination Land Management Guidelines No.5 – Site Investigation and Analysis of Soils (Revised 2011) by a SQEP to meet the 'cleanfill' definition and comply with the published background concentrations for Auckland non-volcanic soils. Testing will depend on the potential contamination sources and may include metals, PAH, organochlorine pesticides (OCPs) and asbestos content. 	
	 It is preferable that the material is tested at its source prior to its importation. However, if this is not possible, then the Contractor shall stockpile the material in a clean area of the site until test results are available. 	

Earthworks practice	Contamination-specific management	
Asbestos management	 Asbestos controls shall be confirmed with Worksafe NZ prior to works commencing. 	
	 Any soils containing asbestos shall be separated from and managed independently to natural soils to prevent cross-contamination. 	
	 Stockpiling of asbestos-containing material shall be avoided at all times if possible. If stockpiling is required, it shall be covered with geotextile or a polythene cover to prevent dust and erosion. 	
	• Equipment used for disturbance of asbestos-containing material shall be decontaminated before leaving site or moving to an area of site that is not contaminated.	
	 All workers must go through a decontamination process before leaving the asbestos works area. This will vary depending on the level of asbestos present. 	
	 Dust shall be maintained with frequent spraying of water over the excavation and truck loading area when disturbing asbestos- contaminated soils. Works shall cease if the wind conditions are too strong to continue in a safe manner. 	
	 Air monitoring may be required to monitor for dust discharges during asbestos-removal works. 	

7 Contingency procedures

The following actions are proposed in the event that unexpected conditions are encountered, discharges occur and/or complaints are received in relation to the works. Mitigation measures should be applied in accordance with the hierarchy of control described in the Health and Safety at Work Act 2015 – eliminate or minimise.

As described in Section 2, the Contractor shall be responsible for implementation of all aspects of this SMP, including contingency procedures.

7.1 Unexpected contamination conditions

The onus is on the Contractor to note where visual and olfactory indicators of contamination exist and liaise with the Contaminated Land Specialist to ensure the controls in place remain appropriate to the type and level of contamination encountered. Typical visual and olfactory indicators of contamination could include the following:

- Odour (petroleum hydrocarbons, oil);
- Black staining coupled with an odour may indicate heavy oil/hydrocarbon contamination;
- Green/yellow discoloured soil may indicate high levels of copper and chromium;
- Suspected or confirmed asbestos containing material (ACM); and
- Black gravel/sand may be boiler ash materials that could be high in metals and PAHs.

The following is a "first response" checklist for the Contractor to follow should visual or olfactory evidence of contamination be encountered during the works onsite.

The presence of other contaminants in high levels may dictate further controls be implemented and additional or difference containment/disposal be required. The first response procedures are to ensure contamination is appropriately contained while decisions about its management are being undertaken.

Table 7.1: Potential contaminated materials first response checklist

First Response Checklist:	
Stop work in the immediate vicinity of the contamination discovery and isolate the area by taping, coning or fencing off.	
Advise Watercare services Ltd (or the designated project manager).	
Update the site Hazard Board and prevent access to the area by unnecessary personnel.	
Ensure appropriate personal protective equipment is available to all staff entering the isolated area.	
If odours are present cover the material over with non-odorous soil or hay/straw and lime to prevent nuisance odour.	
Watercare services Ltd must advise the Contaminated Land Specialist to inspect and advise of specific controls if appropriate. No materials shall be removed from the affected area until approval has been provided by the Contaminated Land Specialist.	

7.2 Emergency response procedures

Should an incident occur on site which may result in any unauthorised discharges (vapour, odour, water, soil, separate phase hydrocarbon etc.), the Contractor will take control of the situation and

coordinate the efforts of all on site to minimise the impact as per First Response procedures in Table 7.1.

In the event that sustained and uncontrollable discharges occur from the site, emergency response and evacuation procedures, including provisions for notifying and managing neighbouring site users, shall be implemented. The emergency response and evacuation procedures shall be specified in the Contractors JSA.

7.3 Complaints procedure

The contact details for occupants of the neighbouring sites will be obtained by the Contractor prior to commencement of the works. These parties will be advised of the 24 hour emergency contact number for the project and the associated complaints procedure at this time.

In regard to the general public, signage advising the 24 hour emergency contact number for the project will be posted around the fenced site frontages.

A written record of all complaints received will be maintained. The Contractor will initiate an investigation as soon as practicable on receipt of a complaint. The Contractor will provide appropriate feedback to the complainant, such as the response made and any corrective actions taken in response to the complaint.

8 Health and safety procedures

The contractor shall prepare and implement a risk assessment in compliance with the Health and Safety at Work Act, 2015 and associated regulations, and other applicable legislation, regulations, codes and guidelines. This is likely to comprise a Job Safety Environmental Analysis (JSEA) or similar document. The contractor's assessment shall also cover measures related to the presence of potentially contaminated material.

The expected minimum procedures for handling asbestos-contaminated materials are set out in Section 6 of this document. Additional procedures may be required by Worksafe NZ at the time of earthworks, depending on the level of asbestos contamination identified during site investigation (Section 4).

Specific contamination-related health and safety procedures that should be included in the Contractor's health and safety plan are outlined below:

- Procedures for the safe handling of asbestos, if required, as outlined in Section 6. This includes decontamination procedures and facilities on site;
- Provision for PPE appropriate to the contamination on site for all workers. Whilst no asbestosspecific PPE is required for *Unlicensed Asbestos Works*, it would be prudent to hold stocks of include disposable gloves and overalls, respiratory protection, Tyvek suits and boot covers;
- All workers shall be required to undergo a contaminated soil safety inducted prior to carrying out works at the site. The inductions shall describe the PPE requirements and outline the potential contamination that could be encountered at the site and procedures specified in this SMP before commencement of site work. For staff involved directly with the earthworks the induction shall be conducted by the Contaminated Land Specialist;
- Avoidance of hand-to-mouth contact when working with contaminated soils;
- Workers that come into contact with contaminated soil (if discovered) shall be required to wash hands with soap and water as soon as possible. Eating, drinking and smoking shall only be allowed within designated areas away from those contaminated areas.

Once contaminated materials have been removed from site or encapsulated to the satisfaction of the Contaminated Land Specialist, it is expected that standard health and safety procedures for earthworks and construction sites will be implemented.

9 Validation and reporting

Validation is the process of confirming the objectives of the works have been achieved, confirming works were undertaken according to agreed procedures and reporting on any incidents.

Validation of the site shall be conducted by the Contaminated Land Specialist. The validation programme recommended includes observation of the ground works and collection of soil samples to record the level of any remaining contamination (if required).

Validation will not be required if contamination concentrations in fill are below relevant human health and environmental standards. The following sections outline the requirements if validation of the site is required.

9.1 Information required from the contractor

Information is required from the contractor for inclusion in the validation report as indicated in the contractor checklist (Appendix B). The information requirements are:

- Copies of weigh bridge summaries for the disposal destination for contaminated soil;
- Disposal volumes for natural soil removed and disposed;
- Records of visits by council representatives;
- Details of any contamination-related complaints; and
- Details of any health and safety incident related to the contamination and how they were resolved.

The contractor shall provide the required information within one month of completion of the works to which the information relates.

9.2 Validation method

Depending on the contamination levels within fill material, for any areas of the site where fill is completely removed from site, soil validation sampling may be undertaken to update the site condition post redevelopment.

The validation process may involve:

- Visual inspection of the excavated surface for any evidence of contamination, such as the presence of fill or discoloured materials;
- Collection of samples from the final exposed subgrade (if required);
- If samples are collected and tested, testing shall be as per the procedures outlined in Section 4;
- Sampling shall be undertaken by a suitably qualified Contaminated Land Specialist.

9.3 Reporting

On completion of the soil disturbance works, if validation is required, a validation report shall be prepared and provided to Auckland Council. The report shall include, as a minimum:

- Confirmation that soil disturbance works were completed according to this SMP and that there were no variations during the works;
- Volumes of soil removed from the site, associated chemical test results (if any), disposal destination of surplus soils and waste disposal acceptance receipts; and

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• Confirmation that there were no environmental incidents during the works. If there was an environmental incident then the letter shall detail the nature of the incident and the measures taken to mitigate effects.

This report shall be provided to Auckland Council within 3 months of completion of the soil disturbance works.

The validation report shall comply with the Ministry for the Environment *Contaminated Land Management Guideline No. 1: Guidelines for Reporting on Contaminated Sites in New Zealand.*

9.4 Ongoing monitoring and management

The requirement for ongoing for monitoring or management with respect to ground contamination will be assessed on completion of the earthworks.



Plot Date: 14 November 2018 - 4:24 p.m. Plotted by: Catherine Shen

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NOTES:

- 1. EARTHWORKS SHOWN ARE TO ESTABLISH FINAL WTP
- PLATFORM ONLY.
- 2. STAGING AND POSSIBLE ENABLING EARTHWORKS **REQUIRED NOT SHOWN**

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Tonkin+Taylor

Contractor checklist

Watercare services Ltd– Summary of key SMP requirements

The Contractor shall undertake the following during earth works for the Proposed Huia Water Treatment Plant

Timing	Key task	Details		
Prior to ground works commencing	Site set up	 a Watercare to appoint a contaminated land specialist: Name: b Contact 		
		c Contaminated land specialist to conduct pre-works testing		
		d Contaminated land specialist to review and update this SMP		
		e Watercare services Ltd to advise Auckland Council of works commencing;		
		f If required, engage with WorkSafe NZ and appoint a Licensed Asbestos Removalist		
		g Establish earthworks (dust, erosion, sediment, stormwater) controls and asbestos controls as per SMP Section 6;		
		 Hazard board to state contaminated soil may be present and indicating health and safety requirements for workers; 		
		i Obtain PPE;		
		j Arrange disposal permits		
During the works	General SMP Compliance	k Maintain earthworks (dust, erosion, sediment, stormwater) controls as per SMP Section 6;		
		I Implement health and safety procedures in Section 8;		
		m Retain all weighbridge and disposal dockets and provide to Contractor;		
		n Ensure imported material meets requirements in Section 6;		
		o Undertake air monitoring if required for asbestos/ dust monitoring;		
		If any of the following situations arise:		
	Alert Watercare Project Manager and Contaminated Land Specialist	p Contaminated soil is encountered that includes:		
		- odours (petroleum, oil)		
		 Discolouration (black, green, blue staining most common) Groundwater with an oil sheen, odour or discolouration 		
Within one	Provide	r Details of any complaints relating to odour or dust made during the works		
month of	contaminated land-	s Details of unexpected encounters/events and the action taken:		
completion of the relevant	related information to Watercare	t Details of visits made by Council representatives;		
works		u Summary of weighbridge information for disposal verification;		

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ATTACHMENT TWO

FURTHER INFORMATION – AUGUST 2019



Job No: 30848.2000 13 August 2019

Auckland Council Private Bag 92300 Auckland 1142

Attention: Raul Galimidi

Dear Raul

Huia Replacement WTP - BUN60339273, Response to Section 92 Request for Further Information

Further to your letter dated 25 July 2019 requesting further information pursuant to section 92 of the Resource Management Act 1991 (RMA), we write to provide a response to the matters outlined therein. The information requested is shown in italics, followed by our response. For ease of reference our numbering corresponds to the numbering set out in your letter.

1 Regional Stormwater

1.1 Water quality treatment

The options analysis for water quality treatment requires more detail, particularly in terms of rejecting biofiltration or permeable paving as options for stormwater quality management vs. proprietary filtration. Please provide a more detailed analysis of alternative options particularly with reference to the Best Practicable Option criteria outlined within the RMA and referenced through relevant AUP objectives and policies.

Please refer to the attached letter prepared by Cook Costello, dated 9 August 2019 (Appendix A) which responds to item 1.1 above.

1.2 Hydrology Mitigation

Please provide the following information that the proposal to achieve retention by means of infiltration to ground, through the base of the dry ponds/dam:

- a *Preliminary calculations indicating that the base of the ponds can achieve retention for the intended catchment.*
- b Potential infiltration rates for the base of both of the ponds needs to be identified.

Please refer to the attached letter prepared by Cook Costello, dated 9 August 2019 (Appendix A) which addresses items 1.2 (a) - 1.2 (b) above.

c Confirm that WSL are comfortable with infiltration through the base of the dry pond/dam (in terms of increased risk relative to geotechnical stability).

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Please refer to the attached letter prepared by Tonkin & Taylor Ltd (T+T), dated 8 August 2019 (Appendix B) which responds to item 1.2 (c) above.

1.3 Green Roofs (sic – should read Design Details)

- a Please provide a summary of the key design features of the existing dry pond, with reference to the appropriateness of the pond's use as a hydrology mitigation device for the replacement WTP.
- b Drawings for the new dry pond and preliminary supporting calculations. It is understood that calculations for inlet/outlet orifice and spillway specifically will be finalised at detail designed stage as these are subject to change and are reliant of final impervious area of plant. However, please provide preliminary pond design calculations to validate the concept design and footprint.

Please refer to the letter prepared by Cook Costello, dated 9 August 2019 (Appendix A) which responds to items 1.3 (a) -1.3(b) above.

1.4 Outfall

A new outfall is proposed to the Yorke Gully Stream and the proposed design is a standard engineered wingwall structure. Please provide a supporting ecological impact assessment regarding the new outfall and include an investigation of alternative design solutions.

The new stormwater outfall structure will be located in the proposed stream diversion channel, and not within an existing/ natural section of the Yorke Gully Stream. As the new outfall will not be constructed in an existing stream we do not consider an ecological impact assessment is warranted. The application provides an indicative design for the new stream channel and outfall structure. Finalised designs will ensure that the outfall incorporates ecological principals that respond to the particular characteristics of the new channel, and will be provided to Council prior to the works commencing.

2 Streamworks and Earthworks

2.1 Streamworks

- a The current SEV calculations indicate that 71% of the stream loss will be addressed via the diversion channel. The Armstrong Manuka stream contains a piped section. It is understood that a feasibility study of daylighting this section of stream is being undertaken. An estimated ECR calculation has been provided for daylighting a section of the Armstrong Manuka stream which shows that this could potentially address the remaining 29% of the stream impacts. If daylighting is to be pursued, please include this in the ecological report along with accompanying SEV data, and anticipated timeframes for when the daylighting would occur in relation to when the stream impact is to occur. If there is a large time lag between impact and restoration activities, how will this be accounted for?
- b While specific design details of the stream diversion are yet to be decided, the SEV assumptions need to be included in the final design. Please provide a draft condition under the Augier principle for the stream diversion channel design.
- c SEVm-P score for Vlining is still a natural channel with no modification. While the constructed stream channel will be as natural as possible there will still be some sections of rip rap similar to as shown in the engineering drawings.
- d Please provide all updated SEV spreadsheets.

Please refer to the letter prepared by Boffa Miskell, dated 9 August 2019 (Appendix C) which responds to items 2.1 (a)-(d) above. We note however the SEV spreadsheets are not included in

Appendix C as they have previously been provided to Auckland Council in our letter dated 21 June 2019.

2.2 Earthworks

While SRP1 has an odd shape, it could operate efficiently provided the baffles are installed correctly to increase the retention time. These baffles would need to be the full height of the pond (up to the primary spillway level). Please provide an enlarged plan view of SRP1 showing the baffles positioned appropriately to increase the retention time.

Please refer to the letter prepared by Cook Costello, dated 9 August 2019 (Appendix A) which responds to item 2.2 above.

3 Geotechnical and Groundwater

3.1 Mechanical settlement due to excavations

- a Please confirm the expected extent of any mechanical settlement, and the magnitude of any settlement in the vicinity of third party assets (e.g. Woodlands Park Road, Manuka Road and / or the 375 mm stormwater line in Manuka Road). In the absence of any quantitative assessment beyond the site boundary, the total settlement limits in the consent conditions will be based on consolidation settlement only.
- Please confirm the total cumulative settlement in the vicinity of third party assets (e.g. Woodlands Park Road, Manuka Road, and / or the 375 mm stormwater line in Manuka Road). Please confirm the expected effect of the calculated levels of settlement in terms of risk of damage.

Please refer to the attached letter prepared by T+T dated 8 August 2019 (Appendix B) which responds to items 3.1 (a) to (b) above.

3.2 Monitoring Plan

Please provide an updated plan which includes unique identifiers for each instrument, and, provide recommended trigger levels based on the assessment of effects presented here.¹

Please refer to the attached letter prepared by T+T dated 8 August 2019 (Appendix B) which responds to item 3.2 above.

4 Terrestrial Ecology

4.1 The indicative construction methodology mentions the use of stockpiles during earthworks. Please provide locations for potential stockpiles to confirm that no further vegetation clearance will be required than is already documented and mapped in the application documents.

Please refer to the letter prepared by Boffa Miskell, dated 9 August (Appendix C) which responds to item 4.1 above. As set out in the AEE and further confirmed in Appendix C, all earthworks activities including stockpiles will be contained within the construction footprint.

4.2 There are a number of mature trees in close proximity to the proposed works (WTP and Reservoirs 1 and 2) that may need specific methodologies to work around in order to retain

¹ Please note that further amendments to the monitoring plan may be recommended subject to the close of out mechanical settlement effects (if any).

these trees. In addition, new bush margins will be exposed and tree roots potentially affected. Please provide an arborist's assessment of the effects on trees and bush areas remaining in the surrounds of the proposed works, and provide protection methodologies to minimise accidental damage.

4.3 The kauri knoll that is now being retained adjacent to Reservoir 1 will be subject to potential draining of groundwater, and the long term survival of these trees under the altered soil-water regime and removal of their surrounding vegetation needs to be addressed. Mature trees under stress become susceptible to pathogens such as kauri dieback. Please provide an arborist's assessment of these matters together with mitigation measures.

Please refer to the letter prepared by Greenscene NZ, dated 9 August 2019 (Appendix D) which responds to items 4.2 - 4.3 above.

4.4 Mitigation for the removal of 0.03ha of riparian vegetation, including a mature kahikatea from the Armstrong Gully stream, and removal of 0.07 ha of riparian vegetation from the Armstrong_Manuka stream, is stated to be "riparian planting". Please provide details on appropriate mitigation for this loss of riparian vegetation function as well as bank profiles, a planting plan and planting schedule for where this mitigation planting will be located. If not in situ, please advise how will it benefit the affected stream reaches, and whether other mitigation beneficial for the stream is proposed (e.g. removal of barriers to fish passage, enhancement of in-stream habitat), or are there stream reaches that are devoid of riparian vegetation and require planting?

Please refer to the letter prepared by Boffa Miskell, dated 9 August 2019 (Appendix C) which responds to item 4.4 above.

5 Kauri Dieback

5.1 Section 6.2.4 Spread of Kauri Dieback Disease

The application does not go into sufficient detail in relation to hygiene measures required for activities within areas where kauri trees are present. As with other large construction works, it is requested that a Kauri Dieback Management Plan is developed for all activities related to the construction works to be approved by the Senior Advisor – Kauri Dieback.

5.2 Section 7.3: Mitigation

The 'Erosion and Sediment Control' section is silent in relation to the potential for Phytophthora Agathidicida to be transported via sediment entering streams/water courses and information describing how it is proposed to mitigate against this potentially occurring is required.

5.3 Section 7.4: Management of Significant Residual Effects

a The 'Project Goals and Objectives' section discusses the establishment of an accountable administrative structure that coordinates and implements conservation work on public and private land by way of a charitable trust for the Little Muddy Creek catchment (see item 7 below also). Such a trust would need to align closely with the Council's priorities for this catchment area. Although the development of such a trust does discuss employing administrative functions, there is no discussion on other resources being employed to assist in undertaking works which leaves the reader to assume that the trust would be reliable on volunteer and Council resources to undertake any works.

- b Additionally, the proposal is already setting out targets for its first initial two years of operation. There is no discussion as to what occurs should the trust be unable to meet these commitments. Would the onus fall back on the Council if any commitments were not met?
- c In relation to the specific remediation for kauri dieback, it is suggested that a 'kauri rescue' be initiated whereby Little Muddy Creek catchment residents would receive tree health assessment, installation of protective matting around kauri roots and phosphite treatment with ongoing monitoring and reporting on ongoing effectiveness. A few points of note:
 - *i 'Kauri Rescue' is an organisation with whom the Council has a close working relationship. The Council is currently providing funding for the organisation to assist in supporting its ratepayers. Was the intent to support the organisation or was it just coincidence that the term 'kauri rescue' was used?*
 - *ii* Tree health assessments are a service that the Council offers free of charge to all ratepayers and involves taking soil samples from around the base of kauri trees. This initiative would not add value to either the ratepayers or the Council.
 - *iii* The Council would not support protective matting for ratepayers' kauri trees as this would, long-term, have an adverse impact on tree health through interference with trees' natural processes.
 - *iv* Footnote #19 references a specific dosing regime for the application of phosphite. Please note that phosphite treatment is still being trialled and there is no one-dose regime applicable for all trees.

Please refer to the letter prepared by Boffa Miskell, dated 9 August 2019 (Appendix C) which responds to the items 5.1-5.3 above.

6 Ecology (Mitigation)

6.1 The effects assessment and draft Trust Deed make repeated reference to a Waima Biodiversity Management Plan ("Waima BMP"). Both documents state a number of broad objectives, however no details of targets, methods, strategy or contingency should targets not be met are provided in either document. It is not possible to assess the potential effectiveness of the proposed Waima Biodiversity Management Area ("Waima BMA") programme without review of a Waima BMP - even if in outline only – that provides a greater level of detail. Please provide an outline or draft version of the Waima BMP that provides the detail referred to above.

6.2 The loss of 3.5 ha of native forest and shrubland within the project development area is assumed to be permanent, or for at least as long as the design life of the infrastructure proposed. Please explain whether and how the proposed compensation programme as administered by the Trust Deed will provide for enhancements to biodiversity that last at least as long as the residual impacts of the development.

6.3 The compensation package is set at a sum of \$5M. To properly assess the appropriateness of this sum at providing the biodiversity enhancements anticipated by the applicant, information is required as to how this sum is intended to be apportioned between all of the anticipated costs of developing and implementing the programme, including for example (but not limited to) administration, Trust costs, monitoring and reporting, and in particular the portion anticipated to be spent on activities that will directly result in action on the ground (pest animal and weed control). Please provide this information.

Further matters of interest in respect of the above are as follows:

• The apportionment of costs on an annual basis for possum and rodent control compared to all other aspects of control on the ground; and

• The portion of estimated costs that may be spent on undertaking control of weed or animal pests where that control is already assumed to be undertaken by others on private or public land (for example, RPMP weeds), but which is being volunteered by the applicant as part of the Waima BMP programme.

6.4 The Applicant notes that one vulnerability of the proposed Waima BMA programme is that it relies upon community engagement. Please provide a copy of the "Community willingness to participate" survey.

6.5 The success of the programme relies in part on achieving pest control targets. These are not provided by the Applicant, however are central to our assessment of the validity and achievability of the proposed biodiversity management programme. Please provide the targets that will be set for animal and plant pest control.

6.6 The Waima BMA programme includes a range of activities. Some of these activities may already be funded, under way or included in future works programmes by the Council. Please provide a breakdown of the range of activities proposed by the Waima BMA programme, an indicative cost or percentage of the overall \$5M Deed funding and whether the applicant regards each of those activities as being additional to work already undertaken by others.

6.7 What is the contingency should the work of the proposed Trust fail to meet the minimum participation threshold or minimum pest control targets (as requested in query 6.5 above)? How will effective outcomes for biodiversity be provided for in such a case?

6.8 The draft Trust Deed states that the Trust will operate for a minimum of 10 years, however the Deed does not appear to commit the Trust to action on the ground over that period. Please explain how the intention to undertake effective pest weed and animal control work will be provided for over a minimum 10 year period given the Trust Deed does not necessarily support this.

6.9 The Trust Deed would seem to allow funds in the Trust to be directed to a purpose other than for environmental management that is the focus of the Trust objective (Clause 19.2.2. and Clause 20.4.2). Please explain how this will be prevented.

Please refer to the letter prepared by Boffa Miskell, dated 9 August 2019 (Appendix C) which responds to items 6.1 - 6.9 above along with the addendum to the Trust Deed previously provided to AC and attached to Appendix C.

7 Transportation

The adequacy of route widths to carry significantly increased volumes of heavy vehicles does not appear to be adequately addressed in Section 4.1.1. For example, page 36 notes that on both Titirangi Road and Atkinson Road South "interaction of construction vehicles with adjacent land use activities will need to be managed", but no detail is given of the type of management required or its local impacts. Page 12 of the CTMP suggests that some temporary prohibition of on-street parking may be necessary. This would potentially have a significant impact on parking supply for adjacent land uses, e.g. Titirangi village. The necessary traffic management measures at pinch points on construction truck routes should be identified so that they can be assessed and mitigated if necessary.

Please refer to the letter prepared by Beca, dated 9 August 2019 (Appendix E) which responds to item 7 above.

8 Contamination

8.1 Clarification of the comments in Section 3.5 of the Preliminary Site Investigation ("PSI") regarding unauthorised fill is requested. The PSI stated "there were reports of unauthorised fill

which appears to be related to an area of land in the Nihotupu catchment and not associated with the project site (and reported by AC in error)". It also stated that "the HAIL information request did not identify the location of the fill, however based in aerial photography it is inferred that this is on the replacement WTP site, as identified in the Archaeological Report and in the Google Street View images". Please confirm whether the 'fill' mentioned above referred to the same matter.

8.2 Please clarify the location of the 'Nihotupu catchment'. If the fill is within the replacement WTP site, please justify the reason that the PSI did not identify the fill as a potential HAIL and subsequently the SMP did not address it in the proposed pre-works sampling plan.

8.3 The PSI presumed that the maintenance workshop and chemical storage were associated with the current Huia WTP. However, the PSI did not consider it as a potential HAIL activity. Please justify this.

8.4 Please confirm whether the existing WTP on the site will be demolished. If so, please confirm whether there is any risk of asbestos containing material within the onsite buildings and structures and the control measures to prevent soil contamination during demolishment works.

8.5 Please update the PSI and SMP to address the above if required.

The matters raised in points 8.1 and 8.2 have been clarified in the updated PSI which states:

'Reports of unauthorised fill deposited in an unknown area within the Water Catchment area of this site in 2009. The HAIL information request did not identify the location of the fill. However, based on discussions with Watercare, this appears to be related to an area of land in the Nihotupu catchment (the next catchment to the west) and not associated with the project Site...'

Therefore this does not relate to the land where the proposed replacement WTP and reservoirs are to be located. It is therefore not included within the PSI for the site or addressed in the SMP.

In terms of point 8.3, the maintenance workshop and chemical storage were located on the existing Huia WTP site. They were demolished in 2008 and the new chlorine building was erected in the same location. They are not included within the PSI as there are no works within the vicinity of the existing chlorine building / it is not affected by the proposed reservoir.

In response to point 8.4, there is no intention to demolish the existing WTP on the site - as clearly set out in the AEE this does not form part of the application.

An updated PSI has recently been provided to Auckland Council. On the basis of the above, no further changes to the PSI or SMP are considered to be required.

9 Conclusion

We trust that there is now sufficient information available for you to continue processing the application. Please do not hesitate to contact Karen Baverstock on 09 3592735 or <u>KBaverstock@tonkintaylor.co.nz</u> if you require further clarification on any aspects of this letter.

Tonkin & Taylor Ltd Environmental and Engineering Consultants Report prepared by:

Authorised for Tonkin & Taylor Ltd by:

.....

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Sara McMillan / Karen Baverstock Senior Planner / Principal Planner

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Peter Roan Project Director

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9

Our Ref: 14191

9/08/2019

Watercare Services Limited

Private Bag 92521 Wellesley Street Auckland 1141 New Zealand

Attention: Mr Paul Jones

Dear Paul,

Huia WTP - Stormwater Queries from Council S92

Cook Costello are pleased to see such detailed consideration from Council and consider this will assist with the robustness of the application.

We provided the snippets of each query with corresponding responses as below.

1.2 (a) and 1.2 (b)

Please provide the following information that the proposal to achieve retention by means of infiltration to ground, through the base of the dry ponds/dam:

- (a) Preliminary calculations indicating that the base of the ponds can achieve retention for the intended catchment.
- (b) Potential infiltration rates for the base of both of the ponds needs to be identified.

RESPONSE

Please find attached calculations in Appendix A showing the retention achieved by the existing ponds and potential infiltration rates at the base of pond is considered conservative.

Infiltration rates are conservatively taken from saturated permeability k_{sat} from NZS1547 ksat 60 mm/day medium clay moderately structured.

The proposed new pond while some retention through infiltration does occur the balance of the retention no longer meets SMAF rules Table E10.6.3.1.1 for the conservative infiltration rate. E10..1(a) as retention of 5mm cannot be infiltrated through the base of the in the new dry pond E10..2(c)(i) is applied as follows.

The requirements of 2 (c)(i) of having the retention volume taken up by detention and in this particular case:

- reuse some of the water volume to supply Auckland water. This will be 29m³.
- some will infiltrate through the base of the ponds and, This is 4m³
- the residual will be detained through the pond. This is 66m³
- the required detention volume for the dry pond is 401m³ plus the shortfall in retention of 66m³. Gives a total detention volume of 467m³. The proposed pond exceeds this volume (excluding emergency overflow depth and freeboard).
- Assessment of the drawdown shows this volume can be drawn down from a suitably sized orifice over 24 hours.

Whangarei 09 438 9529 Auckland 09 373 5357

Wellington 04 472 7282 **Christchurch** 03 365 5960








Soakage testing will be undertaken during detailed design.

1.3 (a)

Please provide a summary of the key design features of the existing dry pond, with reference to the appropriateness of the pond's use as a hydrology mitigation device for the replacement WTP.

RESPONSE:

The existing dry pond will act as a hydrology mitigation device for the Armstrong catchment. The pond has an existing consent and this will remain in place. The discharge conditions of this consent will continue to be met.

Retention and detention requirements are with accordance with E10 of the AUP and GD01 technical guidance, SMAF1.

In considering the SMAF rules the change from predevelopment runoff volume from 37mm of rainfall of 1430m³ to the post development volume from the 37mm of rainfall is 1824m³. This is an increase of 316m³.

The existing pond has a storage volume of 3490m³ up to the level of the emergency spillway, which is well in excess of the retention and detention requirements.

A pipe reticulation system collects runoff from the development and conveys flows to an existing dry pond that has a controlled discharge to the Armstrong Gully of 0.25m³/s (21,600m³/day). For the overall site layout refer to Figure 1 of Appendix B.

Embankments of the dry pond (East and West Detention Dams) are homogenous earth fill generally comprising of stiff to very stiff, clayey silt or silty clay.

Both the embankments and base of the existing dry ponds are currently grassed. Below the foundation consists of clayey silt near the surface and the formation becomes sandier and less silty with increase in depth.

An outlet structure is situated at the East Dam. The outlet structure is 600mm diameter at the upstream end and 750mm diameter downstream of the junction of the left abutment storm water / runoff pipe. An actuator and gate valve is currently installed at the upstream end to limit the flow rates of the structure. Refer to Figures 2 and 3 of Appendix B.

A concrete emergency overflow spillway is constructed on the crest of the West Dam. The level to the top of the spillway is at RL 106.75. At the outfall of the spillway approximately 500mm thick rip rap. Refer to Figure 4 of Appendix B.

1.3 (b)

Drawings for the new dry pond and preliminary supporting calculations. It is understood that calculations for inlet/outlet orifice and spillway specifically will be finalised at detail designed stage as these are subject to change and are reliant of final impervious area of plant. However, please provide preliminary pond design calculations to validate the concept design and footprint.

RESPONSE:

Calculations for the outlet are included in the stormwater and erosion and sediment control report, Appendix B9 for the preliminary pond design. Design drawings are shown on C460, C461, C462 Appendix A of the stormwater and erosion and sediment control report.

2.2

While SRP1 has an odd shape, it could operate efficiently provided the baffles are installed correctly to increase the retention time. These baffles would need to be the full height of the pond (up to the primary spillway level). Please provide an enlarged plan view of SRP1 showing the baffles positioned appropriately to increase the retention time.

RESPONSE:

The baffles in the SRP1 have been specified to full height and connects to the bund to the north of the sediment retention pond. We consider the positioning of the baffle, dimensions and enlarged plan view of SRP1 to be part of the detailed design, which will be provided at a later stage.

If you have any further queries please do not hesitate to call.



Yours sincerely,

PJ Cook Chartered Professional Engineer MACENZ, CMEngNZ, MInstD, CPEng, IntPE (NZ) BE (Hons), Dip Ag.

Appendix A



Existing Pond:

Base Area	=	1633	m2	(measured from supplied drawings)
24hr vol	=	78.92	m3	(previous calculations)
required Height (H)	=	0.048	m	(assumed vertical sides)
Assumed Permeablility (k)	=	0.06	m/day	(conservatively assumed based on NZS1547 ksat 60mm/day medium clay moderatly strucutres)
Drainage Time (t)	=	H/k*24	(hrs)	
	=	19.3	hrs	

Drainage time of 19.3 hours is less than requirement that volume is drained within 24 hours, therefore the design is satisfactory. Soakage testing should be conducted as part of detailed design stage. Reservoir is capable of storing the retention volume.

New Pond:

Base Area	=	64.8	m2	(measured from supplied drawings)
24hr vol	=	61	m3	(previous calculations)
required Height (H)	=	0.490	m	(previous calculations)
Assumed Permeablility (k)	=	0.06	m/day	(conservatively assumed based on NZS1547 ksat 60mm/day medium clay moderatly strucutres)
Drainage Time (t)	=	H/k*24	hrs	
	=	196.0	hrs	

Drainage time of 196 hours is more than requirement that volume is drained within 24 hours. The design relies on the reuse storage on site in accordance with the SMAF rules .



Appendix **B**





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Appendix B: Groundwater and Earthworks Response





Job No: 30848.2000 13 August 2019

Auckland Council Private Bag 92300 Auckland 1142

Attention: Raul Galimidi

Dear Raul

Huia WTP Replacement Project - Response to Section 92: Groundwater and Earthworks

Auckland Council (AC) issued a Request for Further Information (s92) for the Replacement Huia Water Treatment Plant Project on 25 July 2019. This letter provides the required responses with respect to the Geotechnical and Groundwater issues.

The requests are presented below together with the original numbering used by AC.

1 Request No. 1

1.2 Hydrology Mitigation

Please provide the following information that the proposal to achieve retention by means of infiltration to ground, through the base of the dry ponds/dam:

(c) Confirm that WSL are comfortable with infiltration through the base of the dry pond/dam (in terms of increased risk relative to geotechnical stability).

Response No. 1

Watercare Services Limited (WSL) will provide their acceptance of infiltration from the pond. The following geotechnical assessment has been made to support WSL's position.

In order to demonstrate that infiltration of stormwater through the base of the pond will not pose a geotechnical risk, it has been assumed that:

- The pond is full;
- Seepage from the pond has fully saturated the impounding embankment;
- The volume of water infiltrating through the base of the pond is sufficient to raise the groundwater from its current depth of approximately 5 m up to the ground surface, saturating not only the soil beneath the pond but the entirety of the slope below it; and
- The soil profile is conservatively assumed to consist entirely of colluvium which is the weakest material present;

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• The geotechnical parameters used in the analysis are the same as those previously presented in the Land Stability Assessment¹.

The results of the analyses (Figure 1) show that the pond and the slope that supports it has a factor of safety of 1.95 under the extreme assumed conditions, well in excess of both the required minimum factor of safety for a transient condition of 1.2 and the long-term condition of 1.5.



We therefore conclude that the pond and the slope below it will be stable.

Figure 1: Output from slope stability analyses undertaken on the stormwater pond and adjacent slope. Under fully saturated conditions the factor of safety is 1.95.



¹ Tonkin & Taylor, 2019. Huia Water Treatment Plant Replacement Project. Addendum to the Preliminary Land Stability Assessment Report. Dated July 2019.

2 Request No. 2

- 3.1 <u>Mechanical settlement due to excavations</u>
- (a) Please confirm the expected extent of any mechanical settlement, and the magnitude of any settlement in the vicinity of third party assets (e.g. Woodlands Park Road, Manuka Road and / or the 375 mm stormwater line in Manuka Road). In the absence of any quantitative assessment beyond the site boundary, the total settlement limits in the consent conditions will be based on consolidation settlement only.

Mechanical settlements are those that derive from the physical deflection of the ground due to the presence of an excavation and are separate (and additive) to any settlement induced by groundwater drawdown. Mechanical settlements occur only during construction and derive from the following:

- Deflection of retaining walls supporting deep excavations;
- Excavation of the North Harbour No. 2 (NH2) tunnel; and
- Movement around unsupported shallow excavations.

2.1 Deep Excavation Retaining Wall Deflection

Retaining walls regardless of their type will deflect to some extent as the adjacent excavation is made. This generally horizontal movement results in settling of the soil behind the wall. The magnitude of the deflection (and therefore the settlement) depends greatly on the stiffness of the retaining wall. The nature of the walls support (props, walers, anchors etc.) also affect the location of maximum settlement.

Four deep retained excavations are proposed for the project: Reservoir No. 1, NH2 tunnel shaft, DAF structure and the BAC structure. The DAF and BAC are located in the centre of the replacement WTP site. The mechanical settlement that is expected to derive from each of these structures is assessed in turn below.

2.1.1 Reservoir No. 1

Reservoir No. 1 will require an excavation of up to 15 m in depth. Section E attached (Dwg No. 3255336-K114) shows that at its closest point, the reservoir's southern wall is 4 m from the property boundary with Woodlands Park Road and 10 m from the actual road itself. Reservoir No. 1 is the only significant in-ground structure located in close proximity to a WSL property boundary.

Although the method of excavation retention has yet to be finalised, it is expected that it will be in the form of secant pile walls, which are stiff structural elements that form part of the permanent structure.

Guidance on the estimation of settlement due to wall deflection is provided CIRIA C580² based on actual construction experience. For a stiff wall that is supported in a manner such as anchors or ring beams rather than a simple cantilever, a 15 m deep excavation can be expected to result in a maximum wall deflection of approximately 20 to 40 mm. This matches with numerous detailed secant pile wall designs undertaken previously by T+T using software such as WALLAP. With surface settlement being approximately half of wall deflection, a maximum surface settlement of 10 to 20 mm is estimated.

² CIRIA C580, 2003. Embedded retaining walls – guidance for economic design.

The above assessment does not provide an estimate of lateral extent of settlement nor the distance back from the wall where the maximum settlement may be located. If it conservatively assumed that the retention system is not stiff as expected, but flexible, then Peck (1969) estimates that the lateral extent of ground settlement is between two and three times the depth of excavation. Given the stiffness of the walls that are fully expected to be installed, a depth to lateral extent ratio of 2 appears reasonable and has been adopted for the purposes of this assessment.

On this basis it is estimated that the excavation of Reservoir No. 1 will result in a maximum settlement of 20 mm and a maximum lateral extent of 30 m. Because of the top of the secant pile wall being supported by a ring beam (or potentially anchors) the maximum settlement of a is not located immediately adjacent to the wall but some distance back. This is illustrated in Figure 2 which presents the results of detailed deflection and settlement analyses undertaken on two secant pile walls formed within Tauranga Group soils. This shows that the maximum settlement is located at a distance away from the wall approximately equivalent to the depth of the excavation.

Based on the above, it has been assumed that for Reservoir No. 1:

- The maximum mechanical settlement is 20 mm;
- The lateral extent of settlement is 30 m; and
- The maximum settlement occurs midway between the wall and the outer limits of effects, placing it almost entirely within the middle of Woodlands Park Road.



The extent of mechanical settlement is shown on Figure A1 attached.

Figure 2: Settlement-distance estimates from another project for secant pile walls in Tauranga Group

2.1.2 NH2 Tunnel Shaft

The shaft for the NH2 tunnel will likely be constructed using secant pile walls in the same ground conditions as Reservoir No. 1. The shaft excavation will be slightly shallower (13 m) than Reservoir No. 1. For the purposes of this assessment it is assumed that the magnitude and lateral extent of the mechanical settlements arising from construction of the tunnel haft are the same as those determined above for Reservoir No. 1.

The extent of mechanical settlement is shown on Figure A1 attached. This shows that mechanical settlement is limited to WSL property.

2.1.3 DAF and BAC Structures

The excavations for the DAF and BAC structures are significantly less than those at Reservoir No. 1 (4 m and 9 m respectively). It is uncertain at this time what form of retention these excavations will have. For the sake of conservatism, the method of Peck (1969) for flexible walls within soft soils has been used to estimate settlement and lateral extent of deformation. A high settlement-excavation depth ratio of 2% has been adopted. The results are presented in Table 1.

Structure	Excavation Depth (m)	Maximum Settlement (mm)	Lateral Extent (m)
DAF	4	80	10
BAC	9	180	23

Table 1: Results of Mechanical Settlement Calculations for DAF and BAC str	ructures
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The magnitude of wall deflection indicated by the settlements in Table 1 would in fact be intolerable with respect to construction, so the actual wall design would be modified to limit wall deflections and settlements to a fraction of these values. It is important to note that wall design can be used effectively to achieve any desired level of mechanical settlement.

The extent of mechanical settlement is shown on Figure A1 attached. This shows that mechanical settlement is limited to WSL property.

2.2 Unretained excavations

Shallow unretained (battered or sloped) excavations will be mostly be limited to the replacement WTP site and a sloped cutting located between the North Harbour No. 2 (NH2) tunnel shaft and Reservoir No. 1. These shallow excavations will be required for the construction of smaller structures such as tanks or their foundations.

Given that any unretained excavation will necessarily be shallow and a significant distance from the property boundary it is considered reasonable to assume that any settlement will be limited to the immediate vicinity of the excavation (say one to two times the excavation depth) and will therefore only affect the WTP site during active construction activities. The cut slope between the tunnel shaft and Reservoir No. 1 is located some 60 m from Woodlands Park Road and is therefore not expected to induce any settlement within it, nor the rock escarpment to the north.

It is therefore concluded that these shallow excavations will not affect third parties.

2.3 Tunnel Settlements

A tunnel is proposed to be constructed to carry the NH2 watermain from near Reservoir No. 1 to the north-west under the rock escarpment that forms the northern boundary of the site. Mechanical settlements of the ground surface will be induced as a result of volume loss associated with the excavation. The volume loss will likely originate primarily from the partial closure of the annulus between the pipe and the excavation. Some additional volume loss may result at the excavation face, however this is likely to be very limited in magnitude as tunnelling will likely be undertaken using an Earth Pressure Balance or slurry TBM.

Based on previous projects the maximum settlement induced by the tunnel excavation will be in the order of 10 to 15 mm and extend up to 30 m laterally from the centreline. As the nearest private properties are located on the rock escarpment, no mechanical settlements will be induced. The nearest third party asset not on the escarpment is Woodlands Park Road, which is located some 70



m from the tunnel. As such all mechanical settlement induced by tunnel excavation will be limited to the WSL property and not affect third parties.

2.4 Summary

Estimates of the extent of mechanical settlement for the relevant excavations have been presented above. Figure A1 presents a compilation of these. This shows:

- Mechanical settlement from the construction of the NH2 tunnel shaft, NH2 tunnel and DAF and BAC structures will not extent into non-WSL property; and
- Mechanical settlement originating from the southern and eastern walls of Reservoir No. 1 will potentially affect Woodlands Park Road.

The cumulative settlement resulting from both mechanical sources and groundwater lowering is addressed in Response No. 3.

3 Request No. 3

- 3.1 <u>Mechanical settlement due to excavations</u>
- (b) Please confirm the total cumulative settlement in the vicinity of third party assets (e.g. Woodlands Park Road, Manuka Road, and / or the 375 mm stormwater line in Manuka Road). Please confirm the expected effect of the calculated levels of settlement in terms of risk of damage.

Previously T+T provided a plan showing the groundwater-induced settlement and differential settlement estimates for Woodlands Park Road and Manuka Road³. This has been updated to include the mechanical settlements arising from Reservoir No. 1 and is attached as Figure A2. This presents our assessment of cumulative settlement for non-WSL properties, as no private properties are affected.

A number of underground services are present on Woodlands Park Road and Manuka Road (Figure 3). All but a single 375 mm stormwater pipe crossing Manuka Road are Watercare water pipes. There are no wastewater assets within the area of interest. The stormwater pipe and the roads represent the only third party assets within the zone of potential influence.

Referring to Figure A2, the stormwater pipe lies outside of the zone of mechanical settlement but towards the distal edge of groundwater drawdown. Total settlement estimated at this location is between 65 and 50 mm (conservatively assuming unrestricted groundwater flows into the Reservoir No. 1 excavation). The cross-road orientation of the stormwater pipe is parallel to the settlement contours, meaning that there will be no differential settlement.

If the full 65 mm of settlement was to occur, the stormwater pipe would move vertically within the road and the surrounding land which would move with it, meaning that net settlement will be zero and no damage would result.

³ Tonkin & Taylor, 2019. *Huia Water Treatment Plant Replacement Project. Response to s92 request for further information* – *groundwater effects.* Letter to Auckland Council dated 15 July 2019.



Figure 3: Underground Services along Woodlands Park Road and Manuka Road. Blue services are WSL water assets whereas the green pipe is stormwater (Auckland Council/AT). No wastewater services are present (red pipelines)

With respect to damage to Auckland Transport assets, Figure A2 presents the total and differential settlement estimates for Woodlands Park Road and Manuka Road. Differential settlements are small, being less than 1:500 and commonly much less. Although absolute settlements of the order predicted would be unacceptable for buildings, the flexible nature of the road construction and the small differential settlements means that road damage is not expected.

Woodlands Park Road has a reasonably consistent gradient of 6% between Reservoir No. 2 and the former filter station located opposite the replacement WTP (Figure 4), with a 15.2 m increase in elevation over a horizontal distance of 256 m. This means that for every 25 m of west to east travel there is an increase in road elevation of approximately 1,490 mm. With the total vertical settlement of the road typically less than 20 mm over 25 m distance (Figure A2) the settlement should have no significant effect on either road shape or drainage.



Figure 4: Gradient of Woodlands Park Road within the project area

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4 Request No. 4

3.2 Monitoring Plan

Please provide an updated plan which includes unique identifiers for each instrument, and, provide recommended trigger levels based on the assessment of effects presented here.

Request No. 4 refers to a plan previously provided to indicate a conceptual layout of ground, building and groundwater monitoring points. The purpose of the monitoring is to compare actual surface settlements and groundwater drawdown with those estimated. Having reviewed the provisional monitoring layout on the basis of the requests above, a revised monitoring layout is proposed. This is attached as Figure A3.

The basis for the proposed revised monitoring layout is as follows:

- The extent of surface settlement and groundwater drawdown within WSL property is not limited in quantity and therefore does not require monitoring;
- The monitoring points have been selected to allow assessments of effects at the property boundary between WSL and third parties;
- The maximum groundwater drawdown that may occur at the WSL property boundary is 2 m (AUP Rule E7.6.1.10 (3));
- The maximum ground surface settlement should not exceed a level that might result in damage to third party assets.

The extent of potential effects on third party property is shown on Figure A3. It is limited to a 300 m section of Woodlands Park Road and a 50 m section of Manuka Road. No private properties, either on Manuka Road or Scenic Drive are within an area considered to have the potential of being affected.

As such, no building monitoring pins are proposed.

A network of 18 No. ground monitoring pins to determine settlement along WSL property boundaries. Monitoring is also proposed for Exhibition Drive, even though this is a WSL asset. The intent here is to monitor for any movement in the escarpment below Scenic Drive. The proposed trigger levels, based on predicted values, are presented in Table 1.

A network of six groundwater monitoring piezometers located on the WSL property boundary where work is to be undertaken in close proximity to the boundary. An additional piezometer is proposed for monitoring of ground water drawdown beneath Exhibition Drive and the rock escarpment. It is proposed that all of the piezometers have an Alarm Level of 2 m below the recorded preconstruction summer low and an Alert Level of 1.5m.



		Trigger Levels			
		Total Settlement (mm)		Differential Settlement (mm)	
Location	Monitoring Pin ID	Alert	Alarm	Alert	Alarm
Exhibition Drive	G1	20	25	N/A	N/A
Exhibition Drive	G2	20	25	N/A	N/A
Tunnel Shaft	G3	40	50	500	750
Reservoir No. 1	G4	40	50	500	750
Reservoir No. 1	G5	80	95	500	750
WTP	G6	80	95	500	750
Reservoir No. 1	G7	80	95	500	750
WTP	G8	40	50	500	750
Reservoir No. 1	G9	40	50	500	750
WTP	G10	20	25	500	750
WTP	G11	20	25	500	750
WTP	G12	20	25	500	750
WTP	G13	20	25	500	750
WTP	G14	20	25	500	750
WTP	G15	20	25	500	750
WTP	G16	20	25	500	750
WTP	G17	20	25	500	750
WTP	G18	20	25	500	750

Table 1: Proposed ground surface trigger levels

Auckland Council

5 Applicability

This report has been prepared for the exclusive use of our client Watercare Services Ltd, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement. We understand and agree that our client will submit this report as part of an application for resource consent and that Auckland Council as the consenting authority will use this report for the purpose of assessing that application.

Tonkin & Taylor Ltd Environmental and Engineering Consultants Report prepared by:

Kevin J. Hind Technical Director, CMEngNZ (PEngGeol)

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Authorised for Tonkin & Taylor Ltd by:

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Peter Roan Project Director

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То	Paul Jones, Watercare Services Limited	31 July 2019	
From	Bill Loutit and Bronwen Norrie		
Subject	Waima Biodiversity Trust – Board/Trustee Duties & Other Con under the Draft Trust Deed	trols/Protections	

Introduction and summary

- 1. A draft Deed of Trust (**Draft Trust Deed**) was lodged as Appendix R with the application for a replacement water treatment plant and reservoirs project in Huia. This Draft Trust Deed sets out the terms of the Waima Biodiversity Trust (**Trust**), in accordance with the proposed conditions of consent.
- 2. At a recent meeting, Auckland Council's (**Council**) ecological compensation expert, Mr Graham Usher, raised some questions in relation to the structure and operation of the Trust, namely:
 - (a) What mechanisms are included in the Draft Trust Deed to ensure that Trust funds are not squandered (i.e. spent on the Trustees, consultants, etc.)?
 - (b) What stops the board of Trustees (**Board**) from collapsing or failing?
- 3. In summary, our response to these questions is as follows:
 - (a) The terms set out in the Draft Trust Deed include a number of mechanisms to ensure that the Board and the Trustees are aware of their core duties, must act in the best interests of the Trust at all times, and are subject to reporting and accountability requirements and external oversight.
 - (b) There are also specific terms relating to the Trust operating exclusively to advance its charitable purposes and not for private profit, managing and avoiding conflicts of interest, and substantive and procedural requirements in relation to major transactions, remuneration of Trustees and other matters.
 - (c) These terms buttress the general trust law duties applicable to the Board and the Trustees, and substantially mitigate the risk of Trust funds being squandered or the Board collapsing or failing. The terms also maximise the prospects of identifying and addressing any such risk if it were to arise.
 - (d) The Trust is also expected to be registered with the Companies Office, Inland Revenue and Charities Services, and would be subject to the jurisdiction and inquiry powers of the Attorney General (as protector of charities) and Charities Services (under the Charities Act 2005) and the jurisdiction of the Courts.
 - (e) If necessary or appropriate, such authorities, and also the Settlor, any other Stakeholder, or any member of the public, could initiate action in relation to the conduct and position of the Board, the Trustees and the Trust.
- 4. The relevant terms set out in the Draft Trust Deed are discussed in further detail below.

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What mechanisms are included in the Draft Trust Deed to ensure that Trust funds are not squandered?

5. In the following paragraphs, we identify the key terms set out in the Draft Trust Deed relevant to ensuring that funds are spent on advancing the charitable purposes of the Trust and are not squandered.

Trust to operate for charitable purposes and not for private profit

- 6. The Draft Trust Deed provides that the Board must hold and administer the Trust Fund for the Trust's charitable purposes set out in clause 4.2, and also expressly provides that the activities of the Trust must not be carried on for the private profit of any person and the consideration provided for any supply of goods or services must not be more than fair market value for the relevant supply.¹
- 7. These charitable purpose and not-for-profit constraints cannot be varied, and apply not only in relation to the operation of the Trust but also in relation to any resettlement or winding up proposal.²

Role and duties of the Board and the Trustees

- 8. The role of the Board and each Trustee is to act in the best interests of the Trust in relation to the advancement of the Trust's charitable purposes as set out in clause 4.2. The Board will have overall control of, and responsibility for, the Trust fund and the administration of the Trust, and the affairs of the Trust will be managed by, or under the direction or supervision of, the Board.³
- 9. The Board and each Trustee must exercise their powers and discretions (including the power to invest any part of the Trust fund) for the advancement of charitable purposes (as set out in clause 4.2) and in accordance with the prudent person standard.⁴
- 10. No delegation of the Board's powers or discretions will release the Trustees from their responsibilities in relation to the Trust.⁵
- 11. Board decisions must also generally be approved by more than 50% of the total number of Trustees,⁶ and in relation to significant matters (e.g. major transactions) a 75% threshold applies.⁷

Composition of the Board and disqualification criteria

- 12. The Draft Trust Deed provides for there to be not less than seven and not more than nine Trustees, ⁸ and for those Trustees to include, in particular:
 - (a) stakeholder representation;⁹ and

⁹ Draft Trust Deed at cl 10.2.2.



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¹ Waima Biodiversity Trust - Draft Trust Deed at cl 4 and 7 [Draft Trust Deed].

² Draft Trust Deed at cls 18.2, 19.2 and 20.4.

³ Draft Trust Deed at cl 5.1.

⁴ Draft Trust Deed at cls 5.4 and 16.1.

⁵ Draft Trust Deed at cl 5.6.3.

⁶ Draft Trust Deed at cl 12.1.5.

⁷ Draft Trust Deed at cls 10.2.3, 9.1, 18.1, 19.1 and 20.2.

⁸ Draft Trust Deed at cl 10.1.

- (b) an appropriately qualified Trustee responsible for overseeing the Trust's financial reporting.¹⁰
- To ensure that the Trustees (and also Officers) meet basic 'good character' requirements, 13. the Draft Trust Deed also incorporates and expands upon the disqualification criteria for officers of charitable entities under the Charities Act 2005.11

External oversight by Settlor, Council and other Stakeholders

- 14. The Draft Trust Deed facilitates external oversight of the Board and the Trustees, by the Settlor (initially Watercare), the Council and other Stakeholders. Relevant terms include:
 - The composition of the Board, which includes provision for Stakeholder (a) representation (including appointment of Settlor and Council nominees).¹²
 - (b) Provisions relating to the Board's relationship with the Settlor and with identified Stakeholders.13
 - (c) Requirements for Settlor approval (and generally also Board special resolution approval) of significant matters, including Board removal of any Trustee, major transactions, remuneration of any Trustee, variation of the Trust's terms, and any resettlement or winding up.14
 - (d) Settlor access to Trust records, including conflict of interest and general records.15
 - Provision for the Trust's annual strategies and reports (including its financial (e) statements) to be provided to the Settlor, the Council and other Stakeholders.¹⁶

Approval of major transactions and other significant matters

- 15. The Board must not enter into any major transaction unless it is both approved by a special resolution (resolution of the Board passed at a meeting of the Board by a number of Trustees that equals or exceeds 75% of the total number of Trustees for the time being or by a written resolution under clause 12.2.2) and approved by the Settlor in writing.¹⁷
- 16. Similar provisions apply in relation to other various other significant matters, namely Board removal of any Trustee, major transactions, remuneration of any Trustee, variation of the Trust's terms, and any resettlement or winding up.¹⁸

Managing and avoiding Trustee/Officer conflicts of interest

17. If an officer or Trustee is interested in a transaction he/she must disclose the interest to the Board and the Board must keep a record of the interest.¹⁹

¹⁸ Draft Trust Deed at cls 10.2.3, 9.1, 15.2, 18.1, 19.1 and 20.2. 19 Draft Trust Deed at cl 11.2.



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¹⁰ Draft Trust Deed at cl 10.2.2(b).

Draft Trust Deed at cl 10.2.
 Draft Trust Deed at cl 10.3.
 Draft Trust Deed at cl 10.2.

¹³ Draft Trust Deed at cl 6.

¹⁴ Draft Trust Deed at cls 10.2.3, 9.1, 15.2, 18.1, 19.1 and 20.2.

¹⁵ Draft Trust Deed at cls 11.2.2 and 14.1.

¹⁶ Draft Trust Deed at cls 13.1 and 13.3.

¹⁷ Draft Trust Deed at cl 9.1.

- 18. The officer or Trustee's involvement in the transaction that he/she is interested in is limited, in particular by preventing their involvement in deliberations and voting in relation to the transaction.²⁰
- 19. If a Trustee is interested in a transaction and the Board is unable to establish a quorum and/or decide on a resolution, the Board must either change its composition or authorise independent Trustees or independent advice to determine the Board's position on the transaction.²¹
- 20. The definition of "interested" is broad and includes direct/indirect financial interest and any other material personal interest in relation to a transaction.²²

Annual reporting and accountability requirements

- 21. The Board must prepare annual strategies, financial statements and reports, and must ensure that the annual financial statements are:
 - (a) prepared accurately with the required information;
 - (b) independently reviewed or audited; and
 - (c) recorded and filed with any relevant authority (e.g. Charities Services under the Charities Act 2005).²³
- 22. The Board must also prepare an annual report on the Trust's activities, which must include a copy of the financial statements for that financial year.²⁴
- 23. As noted, there is also provision for the Trust's annual strategies and reports (including its financial statements) to be provided to the Settlor, the Council and other Stakeholders.

Requirements relating to record-keeping and financial matters

- 24. The Board must ensure that full and accurate financial and other records are kept and maintained in respect of the Trust, and the Trustees and also the Settlor are entitled to inspect these records.²⁵
- 25. Specific requirements also apply in relation to financial matters, namely:
 - (a) any actions regarding any Trust bank account must be signed or endorsed by a person acting under the written authority of the Board;²⁶ and
 - (b) the Board must ensure that there are appropriate procedures in place in relation to the Board's receipt, administration and expenditure of Trust funds.²⁷

²⁷ Draft Trust Deed at cl 14.2.2.



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²⁰ Draft Trust Deed at cl 11.3.

²¹ Draft Trust Deed at cl 11.4.

²² Draft Trust Deed at cl 11.5. 23 Draft Trust Deed at cl 13.2.

²⁴ Draft Trust Deed at cl 13.3.

²⁵ Draft Trust Deed at cl 14.1.

²⁶ Draft Trust Deed at cl 14.2.1.

Remuneration and reimbursement

- 26. Strict terms apply in relation to remuneration for services provided, and reimbursement of expenses properly incurred, by the Trustees and other remuneration (i.e. payment for professional, business or trade services) under clause 15 of the Draft Trust Deed, as follows:
 - (a) Any remuneration for acting as a Trustee must be reasonable having regard to the Trustee's duties and responsibilities, and the services provided by the Trustee.²⁸
 - (b) The amount of any such remuneration, and any professional remuneration, must not exceed fair market value for the services provided.²⁹
 - (c) The Settlor must approve in writing the amount and/or the rate(s) of any such remuneration, and the circumstances in which the remuneration is provided.³⁰
 - (d) If the relevant remuneration is a benefit or advantage in respect of which clause 7.3 applies (which relates to ensuring that any business income derived by the Trust is tax-exempt), neither the Trustee receiving the remuneration nor any person associated with the Trustee may directly/indirectly determine or materially influence the nature or amount of the remuneration or the circumstances in which it is to be provided.³¹
 - (e) A tTustee is entitled to be indemnified against and reimbursed for expenses if they are properly incurred by the Trustee in connection with the Trust, including travel and other expenses.³²

What stops the Board from collapsing or failing?

- 27. The key terms set out in the Draft Trust Deed that have been identified above are also relevant in relation to substantially mitigating any risk of the Board collapsing or failing, as well as enabling any such risk to be identified and addressed.
- 28. If the Board and the Trustees fulfil their role and comply with their duties as set out in the Draft Trust Deed, as outlined above, the risk of any Board 'collapse' or 'failure' once the Trust has been established should be extremely low. The involvement and oversight of the Settlor, the Council and other Stakeholders, and the Trust's expected registrations and oversight by various authorities, also provide additional protection in this regard.
- 29. In exceptional circumstances, the assistance of the Attorney-General, Charities Services and/or the Courts could also be sought to prevent or address any such 'collapse' or 'failure'.
- 30. Subject to appropriate protections (e.g. charitable purpose and non-for-profit constraints, Board special resolution and Settlor approval requirements), the Draft Trust Deed also provides flexibility for the Trust to adapt to changing circumstances, if necessary or expedient. This includes provision for variation of the Trust's terms, resettlement of Trust funds and, if appropriate, an orderly winding up of the Trust.³³

³³ Draft Trust Deed at cl 15.5.33 Draft Trust Deed at cls 18, 19 and 20.



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²⁸ Draft Trust Deed at cl 15.1.1.

²⁹ Draft Trust Deed at cl 15.2.1.

³⁰ Draft Trust Deed at cl 15.2.2.31 Draft Trust Deed at cl 15.2.3.

³¹ Draft Trust Deed at cl 15.2.3 32 Draft Trust Deed at cl 15.3.



The following memorandum addresses questions raised by Council in relation to freshwater and terrestrial ecology matters.

1. Streamworks and Earthworks

2.1 Streamworks

(a) The current SEV calculations indicate that 71% of the stream loss will be addressed via the diversion channel. The Armstrong_Manuka stream contains a piped section. It is understood that a feasibility study of daylighting this section of stream is being undertaken. An estimated ECR calculation has been provided for daylighting a section of the Armstrong_Manuka stream which shows that this could potentially address the remaining 29% of the stream impacts. If daylighting is to be pursued, please include this in the ecological report along with accompanying SEV data, and anticipated timeframes for when the daylighting would occur in relation to when the stream impact is to occur. If there is a large time lag between impact and restoration activities, how will this be accounted for?

An SEV has not been undertaken within the Armstrong_Manuka watercourse. Rather the SEV attribute scores were used from the Armstrong_Impact watercourse SEV to provide estimated score for the ECR calculations. That data is included in the spreadsheet.

The timeframes for construction are unknown at present but the daylighting can occur independent of the construction activities (notwithstanding access to the location) and could occur prior to the loss of the intermittent stream. Project staging is unclear at this stage.

A time lag is likely to occur between the loss of the intermittent stream and the creation of a fully functioning diversion. This is factored into the ECR calculations, and we consider that there is a buffer of excess stream compensation through the daylighting of additional length of piping than required by the ECR, based on our recordings and assumptions. Further, as outlined above, there is an opportunity for the daylighting of Armstrong_Manuka watercourse early in the project implementation. The time lag can also be accounted for through erosion protection works downstream in the Armstrong and /or Yorke Stream. We note that SEVs have been carried out downstream in both the Armstrong and Yorke Streams, but no ECR has been calculated. This component would be a compensation measure.

(b) While specific design details of the stream diversion are yet to be decided, the SEV assumptions need to be included in the final design. Please provide a draft condition under the Augier principle for the stream diversion channel design.

Draft Streamworks Monitoring Conditions

- 29 The Consent Holder shall prepare a Stream Ecological Valuation Plan (SEVP) for the Project. The SEVP shall be in general accordance with the Draft SEVP submitted with the application. The objectives of the SEVP are to ensure that:
- The proposed diversion channel mimics, where practicable, the existing stream morphology and intermittent nature of the existing stream (including a minimum length of 70 m); and
- The design of the proposed diversion channel and the daylighted sections of the Armstrong_Manuka Stream includes the respective SEV attributes as estimated in the SEVP.
- 30 The SEVP shall include:
- Detailed design for the proposed stream diversion and sections of stream daylighting, including typical long sections and cross-sections;
- Details of design that enhances instream ecological values;
- A Riparian Planting Plan that includes species, size and spacing of planting;
- A programme to monitor scour and erosion at the downstream extent of the proposed diversion channel. If monitoring identifies new erosion that is attributable to the Project by a suitably qualified engineer, the Consent Holder shall implement remedial action in the form of stream stabilisation measures or similar;
- Detailed design of any energy-reducing engineered structures required to minimise scour and erosion within the diversion channel, and at the downstream extent of the diversion channel should monitoring indicate that this is required;
- A staging plan for the development of the proposed diversion channel and the daylighted sections of the Armstrong_Manuka Stream; and
- A monitoring programme to confirm that the estimated SEV values as outlined in the SEVP have been achieved for the completed diversion channel and the daylighted sections of the Armstrong_Manuka Stream.
- 31 Within two years of the completion of the proposed diversion channel and the daylighted sections of the Armstring_Manuka Stream, the Consent Holder shall submit a final SEVP report confirming that the completed diversion channel and the daylighted sections of the Armstrong_Manuka Stream meet the estimated SEV values as outlined in the SEVP. The final SEVP report shall be prepared by a suitably qualified engineer or scientist.
- (c) SEVm-P score for Vlining is still a natural channel with no modification. While the constructed stream channel will be as natural as possible there will still be some sections of rip rap similar to as shown in the engineering drawings.

This was revised and included in new ECR calculations. See SEV spreadsheet previously provided.

(d) Please provide all updated SEV spreadsheets.

Previously provided (21 June 2019).

4. Terrestrial Ecology

4.1 The indicative construction methodology mentions the use of stockpiles during earthworks. Please provide locations for potential stockpiles to confirm that no further vegetation clearance will be required than is already documented and mapped in the application documents.

All stockpiles will be within the construction footprint. No additional vegetation clearance will be required.

4.2 There are a number of mature trees in close proximity to the proposed works (WTP and Reservoirs 1 and 2) that may need specific methodologies to work around in order to retain these trees. In addition, new bush margins will be exposed and tree roots potentially affected. Please provide an arborist's assessment of the effects on trees and bush areas remaining in the surrounds of the proposed works, and provide protection methodologies to minimise accidental damage.

Addressed in the memorandum from Greenscene (attached).

4.3 The kauri knoll that is now being retained adjacent to Reservoir 1 will be subject to potential draining of groundwater, and the long term survival of these trees under the altered soil-water regime and removal of their surrounding vegetation needs to be addressed. Mature trees under stress become susceptible to pathogens such as kauri dieback. Please provide an arborist's assessment of these matters together with mitigation measures.

Addressed in the memorandum from Greenscene (attached). We note that groundwater drawdown will only occur during excavation for Reservoir 1, not on an ongoing basis.

4.4 Mitigation for the removal of 0.03ha of riparian vegetation, including a mature kahikatea from the Armstrong Gully stream, and removal of 0.07ha of riparian vegetation from the Armstrong_Manuka stream, is stated to be "riparian planting". Please provide details on appropriate mitigation for this loss of riparian vegetation function as well as bank profiles, a planting plan and planting schedule for where this mitigation planting will be located. If not in situ, please advise how will it benefit the affected stream reaches, and whether other mitigation beneficial for the stream is proposed (e.g. removal of barriers to fish passage, enhancement of in-stream habitat), or are there stream reaches that are devoid of riparian vegetation and require planting?

The loss of 0.03 ha of low quality riparian vegetation at the SH2 site in the Armstrong Gully Stream will be mitigated through a weed management and planting plan to enhance the riparian margins of this waterway within the SEA. The planting will include Kahikateas. No plan has been forwarded but a proposed condition of consent will be required to ensure that this enhancement and riparian improvement planting occurs.



The estimated loss of 0.07 ha of riparian vegetation from the margins of the Armstrong_Manuka Stream results from the positioning of Reservoir 2. The nature of the construction and operation of the reservoir means it will not be possible to replace the riparian vegetation at the site of loss. However, as detailed in the Stream Valuation Plan, part of the compensation for the diversion of the intermittent stream is the daylighting of the currently piped components of the Armstrong_Manuka Stream. We estimate that the daylighting will be in excess of the compensation requirement and the additional length of daylighting will be beneficial for the stream and provide for the loss riparian vegetation. A condition requiring a SEVP has been proposed to provide for the daylighting.

5. Kauri Dieback

5.1 Section 6.2.4: Spread of Kauri Dieback Disease

The application does not go into sufficient detail in relation to hygiene measures required for activities within areas where kauri trees are present. As with other large construction works, it is requested that a Kauri Dieback Management Plan is developed for all activities related to the construction works to be approved by the Senior Advisor – Kauri Dieback.

Details would be developed with the appointed contractor, and a Kauri Dieback Management Plan for construction works provided for Council approval as a condition of consent. We note that proposed condition 26 requires that the Ecological Management Plan sets out Kauri Dieback management protocols for the site.

5.2 <u>Section 7.3: Mitigation</u>

The 'Erosion and Sediment Control' section is silent in relation to the potential for Phytophthora Agathidicida to be transported via sediment entering streams/water courses and information describing how it is proposed to mitigate against this potentially occurring is required.

Appropriate controls to prevent discharges of sediment to waterways is a requirement of construction. Sediment control measures are set out in Cook Costello's Stormwater and Erosion and Sediment Control Report (Appendix G of the AEE). No specific response to management of potentially *P. agathicida* – contaminated sediment over and above standard Best Practice controls is proposed. No mature kauri trees are present within the construction footprint, so in our assessment there is minimal likelihood that sediment generated on-site would contain a high pathogen load.

5.3 Section 7.4: Management of Significant Residual Effects

(a) The 'Project Goals and Objectives' section discusses the establishment of an accountable administrative structure that coordinates and implements conservation work on public and private land by way of a charitable trust for the Little Muddy Creek catchment (see item 7 below also). Such a trust would need to align closely with the Council's priorities for this catchment area. Although the development of such a trust does discuss employing administrative functions, there is no discussion on other resources being employed to assist in undertaking





works which leaves the reader to assume that the trust would be reliable on volunteer and Council resources to undertake any works.

We agree that the Trust goals and objectives should align closely with Council's. We envisage that the Trust Board will include a representative from Auckland Council's Biodiversity/ Biosecurity team, to ensure that target species and strategies for control are coordinated and comprehensive across public and private land. This is the rationale for including public land within the Trust management area.

Reference to the Trust being established to "administer the project" is not intended to imply a simple advisory role, but rather formal oversight of spending from the endowment provided to fund the project. Professional contractors will undertake the work except in instances where landowners are willing and competent to undertake the work themselves. The role and purpose of the Trust's Board and Deed is further clarified in the Simpson Grierson memorandum dated 31 July 2019.

(b) Additionally, the proposal is already setting out targets for its first initial two years of operation. There is no discussion as to what occurs should the trust be unable to meet these commitments. Would the onus fall back on the Council if any commitments were not met?

No. Terms are set out in the Trust Deed to identify and mitigate the risk of the Board failing. In the exceptional circumstance that the Board does not exercise its duties, the Trust would be subject to the jurisdiction and inquiry powers of the Attorney General (as protector of charities) and Charities Services (under the Charities Act 2005) and the jurisdiction of the Courts. These authorities, any Stakeholder, or any member of the public, could initiate action in relation to the conduct and position of the Board, the Trustees and the Trust.

- (c) In relation to the specific remediation for kauri dieback, it is suggested that a 'kauri rescue' be initiated whereby Little Muddy Creek catchment residents would receive tree health assessment, installation of protective matting around kauri roots and phosphite treatment with ongoing monitoring and reporting on ongoing effectiveness. A few points of note:
 - (i) 'Kauri Rescue' is an organisation with whom the Council has a close working relationship. The Council is currently providing funding for the organisation to assist in supporting its ratepayers. Was the intent to support the organisation or was it just coincidence that the term 'kauri rescue' was used?
 - (ii) Tree health assessments are a service that the Council offers free of charge to all ratepayers and involves taking soil samples from around the base of kauri trees. This initiative would not add value to either the ratepayers or the Council.
 - (iii) The Council would not support protective matting for ratepayers' kauri trees as this would, long-term, have an adverse impact on tree health through interference with trees' natural processes.
 - (iv) Footnote #19 references a specific dosing regime for the application of phosphite. Please note that phosphite treatment is still being trialled and there is no one-dose regime applicable for all trees.

Kauri dieback management is specified as a component of the Waima BMP work to allow the Trust scope to fund any shortfall that may limit a comprehensive response to kauri dieback



management on private property within the catchment. Work may include funding services provided by Kauri Rescue if appropriate but is more broadly to assist landowners to develop and implement site-specific management of both healthy and diseased stands on their properties.

Kauri dieback management is an emerging field, and methods and targets specified in the AEE were based on the best available advice at the time of writing, derived from discussions with Council and external biosecurity professionals. Consent conditions shall specify that kauri dieback management measures are to be based on current best practice, and align with Council Biosecurity Team advice.

6. Ecology (Mitigation)

6.1 The effects assessment and draft Trust Deed make repeated reference to a Waima Biodiversity Management Plan ("Waima BMP"). Both documents state a number of broad objectives, however no details of targets, methods, strategy or contingency should targets not be met are provided in either document. It is not possible to assess the potential effectiveness of the proposed Waima Biodiversity Management Area ("Waima BMA") programme without review of a Waima BMP - even if in outline only – that provides a greater level of detail. Please provide an outline or draft version of the Waima BMP that provides the detail referred to above.

We disagree that "no details of targets, methods, strategy or contingency" have been provided. An outline of the proposed Waima Biodiversity Management Plan (Waima BMP) is set out in Section 7.4.1 of the Ecological Assessment report, and includes explicit targets, methods, strategy and contingency measures. Key components are summarised as follows:

The Waima BMP management area is defined in Figure 21 and encompasses 990 ha in total, approximately 720 ha of which is bush-covered and classified as SEA in the AUP. To ensure coordinated and effective management of the whole catchment, the Waima BMP encompasses both public and private land including:

- 320 ha of regional parkland and Council reserves;
- 608 ha of private land (1,976 properties);
- 53 ha of forested land owned by Watercare.

Goals of the proposed Waima BMP are:

- Community-wide engagement.
- Coordinate and increase conservation effort on private land in the catchment.
- Strengthen connective linkages through promoting forest health and resilience.

Actions to achieve specified goals include:

1. Establish an accountable administrative structure that coordinates and implements conservation work on public and private land.

Targets include:

• Establish a charitable trust



- Permission from a minimum 20% of landowners and residents to undertake pest control on their properties;
- Delivery of annual report to stakeholder groups.
- 2. Multi-species vertebrate pest management throughout the Little Muddy Creek catchment.

Targets include:

- Within 2 years of the Trust's establishment, implementation of pest control in at least 400 private properties, appropriately dispersed across the whole of the catchment. Possums, rats and mustelids are the primary focus of control.
- Suppression of pests below threshold values derived from density-impact functions (e.g., Norbury et al. 2015). Targets may be seasonal and will be set and revised in accordance with biodiversity trends.
- Specific configuration of trap / bait station locations, and control thresholds for measuring performance are to be determined through the process of management plan development.

Weed management throughout Watercare-owned land (and public reserve land as required); and funding for contractors to control selected priority weed species on private land. Target species will be consistent with Auckland Council priorities.

Targets include:

- Permission from landowners of private properties containing native forest (e.g., at a minimum target rate of 20% per year) to allow access for weed control;
- Suppression of target species to the extent that infestations are contained (i.e., no mature plants).
- 3. "Kauri rescue", including (but not limited to) tree health assessment, protection of kauri tree roots from damage, and phosphite treatment1 of diseased kauri, with monitoring and reporting on the ongoing effectiveness of these initiatives.

Targets include:

- Within 1 year of the Trust's establishment, identify and contact all landowners/ residents in properties with mature kauri and seek permission for access.
- Identification, containment and surveillance of all symptomatic trees in the catchment where access is granted.
- 4. Surveillance for Argentine ants, and evaluation of control feasibility if detected.

The rationale for this action is that Argentine ants do not naturally disperse widely or rapidly (i.e., <150 m /year), and their invasive spread is generally human-mediated (Ward et al 2005). Early detection substantially improves the likelihood of effective control.

Targets include:

- Implementation of a surveillance framework for Argentine ants throughout the catchment within two years of the Trust's establishment.
- Eradication of localised populations, where assessed as viable.

- A specific surveillance framework will depend on the layout and characteristics of properties recruited into the scheme, as will the control viability assessment. Landcare Research advice² identifies that a flexible surveillance strategy with a variety of detection methods with regular review is likely to be the most effective for detecting Argentine ants. Specific monitoring methods, control targets and thresholds to be detailed in the Waima Biodiversity Management Plan.
- 5. Biodiversity monitoring using key indicator species / guilds.

Targets include:

- Implementation of a monitoring plan and framework within 6 months of the Trust establishment that delivers quantitative data on trends in forest condition and observation frequency of indicator species;
- Delivery of baseline monitoring report within 1 year of the Trust's establishment.
- Auckland Council is currently developing a suite of biodiversity health indicators for the purpose of evaluating biosecurity management measures. The monitoring framework will use these methods to align with Council's approach.
- 6. Annual review and update the WBMP and Annual Plan.

Targets include:

• Deliver annual report of results and trends, including recommendations of revisions to management actions or monitoring methods as required.

The proposed strategy relies on governance and oversight of a qualified and experienced Trust Board with a vested interest in achieving the proposed objectives and targets.

As noted in the AEE, the Trust will employ an operations manager and project coordinator to undertake strategic and operational planning, facilitate implementation of project initiatives, and undertake ongoing evaluation against targets.

We acknowledge that some targets are more measurable and certain than others, for example, hedgehogs and pigs are specified for control, but we recognize that impacts, effective control methods, thresholds and targets for these species are not well established. In a similar vein, surveillance of Argentine ants is specified but control is only proposed where infestations are found to be localised and feasible to contain or eradicate.

The purpose of including these species in the Waima BMP is to allow discretion for the Waima BM Trust Board to innovate and use initiative in the use of the fund in order to achieve the best biodiversity outcomes possible, while providing certainty that impacts will be offset.

We propose that consent conditions include specific targets for pest and weed species to be agreed on with Council experts, while allowing the Trust Board discretion to implement surveillance and management of other species with remaining funds.

6.2 The loss of 3.5 ha of native forest and shrubland within the project development area is assumed to be permanent, or for at least as long as the design life of the infrastructure

proposed. Please explain whether and how the proposed compensation programme as administered by the Trust Deed will provide for enhancements to biodiversity that last at least as long as the residual impacts of the development.

Effective vertebrate predator management is the primary intervention to achieve biodiversity gains in exchange for losses due to the proposed development. The premise of the proposed approach is based around the well-proven and accepted impacts that introduced mammals have on vulnerable indigenous species (birds, lizards and invertebrates).

Available data on vertebrate pest populations indicates possums, rats and probably stoats are well established and reasonably abundant in the Waima catchment. Therefore, effective pest control will have an immediate benefit on native fauna, including increased reproductive success (due to lower instances of nest predation), a decrease in direct predation of adult and juvenile birds, lizards and invertebrates and a decrease on impact on native flora due to decreased browse. Proof of these benefits are well supported in recent literature¹.

We anticipate that ten years of reproductive success throughout ~720 ha of native forest within the Waima catchment has the potential to produce a significant increase in the abundance of vulnerable native fauna present. However, no scientific research we have encountered to date is able to provide precise, reliable prediction of long term population dynamics as a result of pest management. Instead, we have assumed (based on the considerable body of scientific evidence of the demonstrable benefits of pest control), that cumulative population growth will occur over successive years.

Figure 1 illustrates simple cumulative growth models for a given species over 10 years assuming a) a 20% annual population increase, and b) 50% annual population increase. In either scenario, the population increase exceeds 1000% after 10 years. Even at an increase of 10% per annum, the population would double after approximately 7 years. We consider that this range of population increase is in line with results of management programmes. Results for individual species would depend on the size of founder populations and demographic characteristics (life expectancy, reproductive rates, etc), while site carrying capacity, dispersal and immigration rates are important factors in evaluating outcomes for specific sites.





¹ Byrom AE, Innes J & Binny RN 2016: A review of biodiversity outcomes from possum-focused pest control in New Zealand. Wildlife Research.

For example:

- Recent results² of DOC monitoring in Landsborough Valley (DOC's longest study charting the response of birds to pest control) found numbers of mohua (yellowhead), tuī, bellbird, brown creeper, rifleman), grey warbler and kākāriki all steadily increased over the last 20 years in response to a sustained programme to suppress rats, stoats and possums. Mohua numbers increased 24-fold over the time of the study, from 14 (a small founder population) to 338 birds in the monitoring area (approximately 10% per annum increase).
- Pest control over 942 ha at Pukaha Mount Bruce in Masterton has led to increases in forest birds species including kaka, which had a known population of 14 individuals in 1997, to an estimated population of 82 in 2007³ and approximately 166 individuals in 2011^{4,5}, a population increase of approximately 17% per annum.
- Aerial 1080 application improved fantail nest survival to fledging in Tongariro Forest⁶ by a factor of three (23.5% versus 6.8%) compared to unmanaged areas, and survivorship was more than 8 times higher in the season following 1080 application in Rotoaira Forest (57.1% compared to 6.8%).
- Intensive possum control carried out in a residential area on Napier Hill as an urban biodiversity initiative⁷ reported significant increases in bellbird, tui and fantail populations over the next 6 years (rats were poisoned but may not have been effectively controlled because the distance between bait stations was large relative to rat home range size).
- Similar results are shown for invertebrates, with weta populations known to increase three-fold with three years of predator control⁸, and for lizard populations⁹.
- Seed predation and selective browsing by possums of fruit, flowers and new growth on plants can constrain productivity and recruitment of palatable species, altering their representation in the community assemblage and ultimately changing forest structure and diversity. Releasing the productive potential of suppressed plants allows new recruitment and reduces tree mortality¹.



² O'Donnell, CFJ and Hoare, JM. 2012: Quantifying the benefits of long-term integrated pest control for forest bird populations in a New Zealand temperate rainforest. New Zealand Journal of Ecology 36 (2), 131

³ Preston, S. 2008: Using distance sampling to estimate the abundance of kaka (Nestor meridionalis) in the Mount Bruce Reserve. Otago University Wildlife Management Thesis.

⁴ Flux, I. May 2011: Pukaha: Pest Management and Outcome Monitoring, A review. Report prepared for the Department of Conservation, Wellington Hawkes Bay Conservancy. Pp. 38.

⁵ Boffa Miskell, 2014: Pukaha Mount Bruce Restoration Review 2001 – 2014. Report prepared by Boffa Miskell Ltd for Pukaha Mount Bruce Board.

⁶ Robertson, H. A., Guillotel, J., Lawson, T., & Sutton, N. (2019). Landscape-scale applications of 1080 pesticide benefit North Island brown kiwi (Apteryx mantelli) and New Zealand fantail (Rhipidura fuliginosa) in Tongariro Forest, New Zealand. *Notornis*, *66*, 1-15.

⁷ MacLeod, L. J., Dickson, R., Leckie, C., Stephenson, B. M., & Glen, A. S. (2015). Possum control and bird recovery in an urban landscape, New Zealand. Conserv. Evidence, 12, 44-47.

⁸ Ruscoe W, Sweetapple P, Perry M, Duncan R 2012. Effects of spatially extensive control of invasive rats on abundance of native invertebrates in mainland New Zealand forests. Conservation Biology 27: 74–82.

⁹ Reardon JT, Whitmore N, Holmes KM, Judd LM, Hutcheon AD, Norbury G, Mackenzie DI 2012. Predator control allows critically endangered lizards to recover on mainland New Zealand. New Zealand Journal of Ecology 36: 141–150.

Recovery of the flora will also support fauna recovery through increased food abundance, and an increase in availability of 'safe sites', may improve the carrying capacity of the area for some fauna. We consider that the outcomes achieved through ten years of management will build resilience throughout the ecosystem, extend the window of population viability for some species even if management declines in intensity in the long term.

Weed management is also a substantial component of the proposed compensation programme, though we are aware of no published examples that quantify biodiversity gains as a result removing weed infestations. The proposed compensation measure relies on the generally accepted professional judgement that weed management will facilitate establishment of native plants and support forest succession in areas where invasive plants currently inhibit these processes.

We emphasise that our compensation framework trades time for area, so that the flora and fauna populations and 'safe sites' lost from the site would be replaced at a rate of one or more orders of magnitude across the catchment, where vulnerable populations are likely to be suppressed to low numbers, and/ or in decline. We consider that the outcome envisaged is a net ecological benefit.

We acknowledge that ongoing management of the area will be required after the 10 year implementation phase of the compensation programme to maintain an ongoing trend of population growth and habitat improvement. We consider that this is a reasonable expectation, given Auckland Council's stated long term biosecurity objectives. However, the purpose of the compensation programme is to regenerate lost biodiversity, not to achieve standalone, permanent forest restoration in the catchment.

6.3 The compensation package is set at a sum of \$5M. To properly assess the appropriateness of this sum at providing the biodiversity enhancements anticipated by the applicant, information is required as to how this sum is intended to be apportioned between all of the anticipated costs of developing and implementing the programme, including for example (but not limited to) administration, Trust costs, monitoring and reporting, and in particular the portion anticipated to be spent on activities that will directly result in action on the ground (pest animal and weed control). Please provide this information.

We have consulted with several professional contractors who undertake biodiversity-related to obtain a reliable, indicative estimate for catchment-wide pest control. We have costed our estimate at a rate of \$200/ ha/ annum, recognizing that this rate can vary widely depending on access, and is likely to be higher during initial stages and when pest numbers are high, and will drop as catch rates decline.

We have assumed that all private land and will require vertebrate pest management, funded through the Trust, along with Council reserves other than regional parkland.

- 6.4 Further matters of interest in respect of the above are as follows:
 - The apportionment of costs on an annual basis for possum and rodent control compared to all other aspects of control on the ground; and

• The portion of estimated costs that may be spent on undertaking control of weed or animal pests where that control is already assumed to be undertaken by others on private or public land (for example, RPMP weeds), but which is being volunteered by the applicant as part of the Waima BMP programme.

Possum, rodent and stoat control are estimated at 30% of the total fund budget. For the purposes of ensuring the anticipated management outcome is achieved, estimated costs include funding of work that is being undertaken in some capacity (for example, voluntary animal pest control), or is required under the current regulatory framework (for example, RPMP weeds).

We note that the Trust Board will administer the fund, and will have the discretion to allocate funding to work that requires resourcing, and conserve funds where voluntary effort or regulatory enforcement is available. In this way the Trust can adaptively reprioritise funds to areas that may have been under-budgeted for, or may be able to expand its operational life.

We emphasise that the benefit of the proposed compensation programme should be evaluated on the extent to which it delivers improved biodiversity outcomes for the Waima catchment over the 'business-as-usual' approach, which relies on layperson landowners to undertake pest and weed control on private land (either through compulsion or on a voluntary basis), with limited management of low-priority public land. The proposed compensation programme does not seek to replace existing efforts, but to make them effective through coordinating work, providing professional expertise, and closing gaps in the management framework.

6.5 The Applicant notes that one vulnerability of the proposed Waima BMA programme is that it relies upon community engagement. Please provide a copy of the "Community willingness to participate" survey.

Survey results will be provided.

6.6 The success of the programme relies in part on achieving pest control targets. These are not provided by the Applicant, however are central to our assessment of the validity and achievability of the proposed biodiversity management programme. Please provide the targets that will be set for animal and plant pest control.

Table 1 provides proposed management targets for pest species, as well as the thresholds for initiating additional control practices. Note: pest control objectives and targets are to be coordinated with any Auckland Council operations undertaken in adjacent parkland.

Plant pest control targets comprise an absence of sexually mature individuals of target species at treated sites. Target species are to be agreed in consultation with Auckland Council but will include species regarded as a threat to closed forest ecosystems, including (but not limited to) wild ginger, *Asparagus* species, privet species, exotic palms, exotic *Syzygium* species, Madeira vine and moth plant. Where infestations are large, consideration will be given to ecological effects of vegetation clearance, and management methods altered as appropriate.

We note that the proposed WBMA encompasses a portion of the Nihotupu Reservoir catchment. Herbicide use is restricted within water supply catchments due to the risk of


contamination, and weed control targets in this area would not be achievable in the absence of a policy change by Watercare. Hence this part of the catchment will be excluded from the WBMA for the purposes of weed control.

Pest species	Management Target	Threshold for initiating additional control	Monitoring frequency ⁱ
Mustelids	Maintaining mustelid species to below ≤ 5% tracking on monitoring lines.	Tracking results >10%	Quarterly
Rats	A targeted tracking tunnel index of ≤ 10% from the start of August to the end of December, higher tracking rates are more acceptable at other times of the year when birds are not breeding, but tracking rates should not exceed 40% at any stage.	Tracking results >30% (>10% August – December)	Quarterly
Possums	Controlled to below 20% abundance (as measured by the Waxtag Index), with 40% as a threshold for initiating another control operation. This is based on a standard seven-night monitor.	>40%	Twice per year

Table 1 Summary of pest and predator monitoing targets.

¹ Note that additional monitoring should be conducted pre and post toxic control operations as per standard best practice regimes.

6.7 The Waima BMA programme includes a range of activities. Some of these activities may already be funded, under way or included in future works programmes by the Council. Please provide a breakdown of the range of activities proposed by the Waima BMA programme, an indicative cost or percentage of the overall \$5M Deed funding and whether the applicant regards each of those activities as being additional to work already undertaken by others.

A budget breakdown is provided in Table 2. Funding covers some "non-additional" work in order to provide certainty that management is comprehensive, however the Trust Board will have the discretion to reallocate funds to better support project objectives where other sources of funding or labour are available to undertake the work.

Table 2 Indicative Trust fund budget allocation.

Component	Total cost	Rate (approx.)	Factors
Annual vertebrate pest control (including monitoring)	\$1,590,000	~\$200/ha p/a	Rate varies depending on pest densities, accessibility and need to supplement control on public land. Costed for SEA (including public land). + buffer. Budget assumes no volunteer support.
Staged weed control across WBMA over 10 years.	\$2,300,000	~\$5,575 /ha	Rate varies depending on difficulty. Costed for SEA on private land only (~400 ha). Budget assumes no volunteer support or control by landowners under RPMP.
Other initiatives (kauri dieback, Argentine ant and other pest management)	\$275,000	\$27,500 p/a	Discretionary sum to allocate these initiatives as required.
Biodiversity monitoring	\$185,000	\$18,500 p/a	Allowance for technical assistance and equipment hire.
Project coordinator	\$650,000	\$65,000 p/a	Contract salary
Total Budget (excl. GST)	\$5,000,000		

6.8 What is the contingency should the work of the proposed Trust fail to meet the minimum participation threshold or minimum pest control targets (as requested in query 6.5 above)? How will effective outcomes for biodiversity be provided for in such a case?

If monitoring identifies that pest and weed targets are not met, this will trigger a requirement for further control (as per Table 1).

If a proportion of landowners unwilling to allow weed and pest management on their land is so high that objectives and targets cannot be met the Trust Board must review and identify existing conservation projects that rely on donor funding and have a high likelihood of success, and direct funds to these areas.

6.9 The draft Trust Deed states that the Trust will operate for a minimum of 10 years, however the Deed does not appear to commit the Trust to action on the ground over that period. Please explain how the intention to undertake effective pest weed and animal control work will be provided for over a minimum 10 year period given the Trust Deed does not necessarily support this.

Refer to addendum to Trust Deed.

6.10 The Trust Deed would seem to allow funds in the Trust to be directed to a purpose other than for environmental management that is the focus of the Trust objective (Clause 19.2.2. and Clause 20.4.2). Please explain how this will be prevented.

Refer to addendum to Trust Deed.





MEMORANDUM



TO:	Sara McMillan Tonkin + Taylor - smcmillan@tonkintaylor.co.nz
FROM:	Ken Scarlett – GreensceneNZ Limited – ken.scarlett@greenscenenz.com
DATE:	9 August 2019
ADDRESS:	Huia WTP S92 Response
SUBJECT:	Response to S92

4.2 There are a number of mature trees in close proximity to the proposed works (WTP and Reservoirs 1 and 2) that may need specific methodologies to work around in order to retain these trees. In addition, new bush margins will be exposed and tree roots potentially affected. Please provide an arborist's assessment of the effects on trees and bush areas remaining in the surrounds of the proposed works, and provide protection methodologies to minimise accidental damage.

Response:

GreensceneNZ has undertaken an arboricultural assessment of trees that may be affected by the project. The extent of the proposed construction footprint incursion into the tree protection zone (TPZ) informs the action to avoid, mitigate or remedy negative effects:

• Major incursions of over 20% in to the TPZ are likely to have a severe effect on the long term vitality of the tree and therefore the design has been changed where practicable to avoid any impacts, particularly for high value category A or B trees¹. Where design changes cannot practicably be made, specific mitigation measures are recommended before considering tree removal. In areas where hard surfacing or fill is likely to limit the roots gaseous exchange within the TPZ methods like the Stockholm structural aerated soil method are recommended. In areas where cuts or incursions are to be made into the TPZ of a tree to be retained, onsite arborist supervision will be required. In line with arboricultural standards the arborist will guide the earthworks and prune non structural roots less than 50mm in diameter, wrap with moisture retaining hessian and protect all roots from excessive damage. If the tree then cannot be retained as it poses a significant enough risk to an asset or risk of injury or death to people occupying the area then the tree may be subject to removal.

Where the tree is of a marginal or lower value category C or U respectively then tree removal can offer the most resilient result.

• Moderate incursions of between 10% to 20% into the TPZ can have a significant effect on the long term vitality of the tree but can be mitigated by employing a qualified arborist to supervise



¹ Tree categories are in accordance with British Standard (BS5837:2012) as approved by the New Zealand Arboricultural Society

earthworks within the TPZ. In line with arboricultural standards the arborist will guide the earthworks and also prune non structural roots less than 50mm in diameter, wrap with moisture retaining hessian and protect roots from excessive damage. Methodologies to increase the likelihood of tree survival during and after construction should also be used, including the use of structural soils, mulching and conservation aboriculture crown reductions, where appropriate.

 Minor incursions of up to 10% into the TPZ are likely to have a slight effect on the long term vitality but still require mitigation by employing a qualified arborist to supervise earthworks within the TPZ. In line with arboricultural standards the arborist will guide the earthworks and also prune non structural roots less than 50mm in diameter, wrap with moisture retaining hessian and protect roots from excessive damage.

All tree protection zones will require tree protection fencing and ground matting for construction access. Where plant or vehicle access is required within a TPZ permeable geo grid cells with metal rock are recommended to negate any compaction, designed to arboricultural best practice.

Incursions have been assessed for all upper canopy, large stature trees in relation to the proposed construction footprint. Low canopy small stature and mid canopy medium stature trees at the margins should be assessed on a case by case basis by a works arborist during construction of the site boundaries. Here many trees have the potential to be retained.

The new bush margins exposed at the edges of the proposed construction will lead to increased wind loading and light levels. All upper canopy large stature trees are unlikely to be affected by the neighbouring lower to mid canopy tree removal. These larger trees were already established when the land use was residential /commercial before the more recent forest regeneration occurred. The lower and mid canopy trees that will be retained at the bush margin should be assessed individually for wind loading and removed if only necessary. If removed, shade trees, ferns or plants that provide soil armour or ground anchoring should be replanted with eco sourced species and a weed management plan followed.

4.3 The kauri knoll that is now being retained adjacent to Reservoir 1 will be subject to potential draining of groundwater, and the long term survival of these trees under the altered soil-water regime and removal of their surrounding vegetation needs to be addressed. Mature trees under stress become susceptible to pathogens such as kauri dieback. Please provide an arborist's assessment of these matters together with mitigation measures.

Response:

Kauri trees are long lived species that rely upon their water efficient strategy to successfully populate ridgelines and landslide colluvium deposits in the Waitakere area. The regeneration of kauri trees appears to depend on landslides and tree fall gaps (*Claessens et al 2006*). It is assumed that their water efficient strategy has evolved due to the Kauri trees vulnerability to xylem embolism (the formation of air bubbles in the conducting system of plants). During a drought Kauri trees will increase its leaf litter by up to 72% and self prune it branches, putting valuable energy resources into root growth and reducing hydraulic requirements (*Cate Macinnis-Ng 2014*).

Kauri trees have large shallow root plates mostly in the upper layer of the soil with slender branching feeding roots. Kauri trees can have the ability to hydraulically move water from one area to another through its conducting root system. They use little nutrients from the soil and create hard imperious podzol soil slowing the movement infiltrated water. Kauri trees also store around 20% of their water in their trunks, perhaps as a long term drought strategy. They also have peg roots that descend several metres and help to anchor the tree, there is anecdotal evidence that the peg roots are for anchoring only



as no fine roots are found. Kauri are predominantly found on ridgelines indicating that the descended roots are not tapping ground water moisture but are acting as anchors only.

Kauri have a positive feedback on retaining kauri dominance in a area, upon the death of a mature kauri through wind throw or landslides the increased light from newly formed gap promotes kauri seedling regeneration. Kauri trees are early colonisers and are long lived, their combination of traits and the return intervals of landslides occurring within the lifetime of kauri trees, establish their dominance long-term over thousands of years competitively excluding angiosperms (Enright et al. 1999).

The affect of the temporary drawdown of groundwater during excavation of Reservoir 1 is unlikely to affect the Kauri trees in the long term due to their evolved adaptive features to deal with drought. Mitigation measures that increase the available surface water by artificial means should be avoided as this may increase the Kauri trees susceptibility to Phytophthora, a water-borne pathogen. Therefore it is recommended that the Kauri are monitored regularly throughout the process of drawdown to record any negative effects or drought response behaviour. If any drought effects are discovered then further monitoring after construction and drawdown should ascertain whether the Kauri have returned to their pre drought phase.

The Kauri dominate the upper ridges and knoll areas and are exposed to the stronger winds above the lower canopies. Kauri are wind firm trees are unlikely to experience any significant increase due to the neighbouring vegetation removal. The removal of vegetation will increase the available light to the forest floor and create changes in the ecological succession. Here Kauri will tend to dominate and out compete neighbouring trees but not weed species without a robust weed management plan in place.

Ken Scarlett Consultant Arborist GreensceneNZ Ltd

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Watercare Services Limited 73 Remuera Road Remuera Auckland 1050

9 August 2019

Attention: Mr. Paul Jones

Dear Paul

Huia Replacement Water Treatment Plant – Section 92 Response – Transportation Matters

CH2M Beca Ltd (Beca) was commissioned by the Watercare Services Ltd (Watercare) to consider the potential transport effects arising from the enabling works, construction and operation for the replacement Huia Water Treatment Plant (WTP) and the associated proposed reservoirs (the Project). A Transport Assessment report (TAR) has been prepared by Beca, dated 10 July 2019, which was submitted with the regional consents application. A request for further information under Section 92 of the Resource Management Act 1991 has been received from Auckland Council, dated 25 July 2019, following its review of the TAR. In relation to 'Transportation' matters, this stated:

"The adequacy of route widths to carry significantly increased volumes of heavy vehicles does not appear to be adequately addressed in Section 4.1.1. For example, page 36 notes that on both Titirangi Road and Atkinson Road South "interaction of construction vehicles with adjacent land use activities will need to be managed", but no detail is given of the type of management required or its local impacts. Page 12 of the CTMP suggests that some temporary prohibition of on-street parking may be necessary. This would potentially have a significant impact on parking supply for adjacent land uses, e.g. Titirangi village. The necessary traffic management measures at pinch points on construction truck routes should be identified so that they can be assessed and mitigated if necessary."

This letter provides the Beca response to the Section 92 request including identifying any mitigation measures necessary to address the transport-related effects of the Project. As part of this response, it also addresses the 'placeholder' provided on Page 41 of the TAR relating to the heavy vehicle demonstration.

Heavy Truck Access Routes

As discussed in Section 4 of the TAR, it is identified that the primary route for heavy vehicles accessing the Project sites will be along Woodlands Park Road, Scenic Drive and Titirangi Road. However, to assist in managing the predicted adverse effects of heavy vehicles, the following routes have also been identified to distribute the predicted heavy vehicle demands across the transport network. This also provides flexibility in heavy vehicle routing, particularly during the busier periods of the construction programme.

- Atkinson Road (South), Kaurilands Road and Glendale Road
- Titirangi Road, Golf Road and Portage Road.

The route along Woodlands Park Road and Scenic Drive is common to all routing options.

As set out in Sections 4 and 6 of the TAR, it is recognised that to address the predicted adverse effects of the Project, it will be necessary to implement mitigation measures. These measures include operating articulated and oversize trucks under a one-way arrangement on the Atkinson Road (South) / Kaurilands Road / Glendale Road route and preventing or limiting heavy vehicle movements on this and the other routes at certain times of days and days of the week.

This is discussed further in the draft Construction Traffic Management Plan (CTMP) in Appendix E of the TAR. For example, Section 4.2 of the draft CTMP, identifies:

- For the Titirangi Road routes, this includes limiting heavy trucks in the following periods, where practicable, to address the potential adverse effects in Titirangi Village:
 - During the weekday peak hours (07:30 to 08:30 and 17:00 to 18:00), excluding public holidays
 - Around midday on Saturdays (12:00 to 14:00).
- For the Atkinson Road (South), Kaurilands Road and Glendale Road route, as well as the Parau Landfill site route, this includes no heavy trucks, where practicable, in the following periods to address the potential adverse effects on kindergartens and schools on these routes:
 - During the weekday morning and evening pick-up / drop-off periods in school term times (08:00 to 09:00 and 14:30 to 15:30), excluding public holidays.

Heavy Vehicle Demonstration Summary

In order to confirm the adequacy of the routes to accommodate the increase in heavy vehicles, particularly articulated / truck and trailer vehicles, and to review interaction between construction vehicles, Beca has coordinated a vehicle demonstration. The demonstration used a truck and trailer vehicle (see **Figure 1**) similar to the vehicles anticipated for cut/fill (earthworks) transport to and from the Project sites. The demonstration was undertaken on the morning of Wednesday 17 July 2019. The demonstration was recorded by taking video from vehicles in front and behind the truck and trailer vehicle.



Figure 1: Typical Truck and Trailer Vehicle

Figure 2 illustrates the routes that were driven (in both directions) by the truck and trailer vehicle on the day of the demonstration, which included:

- Route 1 Woodlands Park Road, Scenic Drive, Titirangi Road
- Route 2 Woodlands Park Road, Scenic Drive, Atkinson Road (South), Kaurilands Road, Glendale Road.



Figure 2: Vehicle Demonstration Routes

The heavy vehicle demonstration summary and associated images along the route are attached to this letter in **Appendix A**. In summary, the vehicle demonstration has indicated that the majority of the proposed routes, including the intersections, are adequate for use by heavy vehicles (including articulated trucks / truck and trailers). As noted in the TAR, it is only recommended to operate articulated / truck and trailer vehicles under a one-way arrangement on the Atkinson Road (South) / Kaurilands Road / Glendale Road route. The sections below provide further information on sections of the routes that are considered to require further discussion.



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Route 1: Titirangi Road

The vehicle demonstration has identified that the section of Titirangi Road, immediately to the north of the Titirangi Village would benefit from some mitigation, as a result of the proposed heavy vehicles interacting with other vehicles and the on-street parking on the western side of the road.

On this section of Titirangi Road, the existing on-street parking results in a reduced width for the existing two traffic lanes. The vehicle demonstration has indicated that heavy vehicles travelling north would run along the centre line markings in some sections, when providing clearance to the adjacent on-street car parking, as shown in **Figure 3**.



Figure 3: Heavy Vehicle Demonstration (Titirangi Road – North of Village)

The width constraint not only affects the truck and trailer vehicle used in the heavy vehicle demonstration, but also affects existing heavy vehicles and buses using Titirangi Road northbound. As shown in **Figure 4**, buses are also observed to run along the centre line markings in order to provide clearance to the adjacent parked cars. However, as shown in **Appendix A**, the southbound demonstration vehicle travelling toward the Village along this section Titirangi Road had sufficient width, therefore allowing two heavy vehicles to pass each other.



Figure 4: Northbound Bus (Titirangi Road – North of Village)



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As discussed in Section 2.8 of the TAR, six bus services currently operate along this section of Titirangi Road, in addition to school bus services, which means this section of Titirangi Road is already a regular pinch point for bus services and heavy trucks. The traffic surveys undertaken indicate that around 350 heavy vehicles (including buses) currently operate northbound on Titirangi Road on weekdays.¹

Notwithstanding this existing situation, the use of Titirangi Road as the primary heavy vehicle route for the Project will mean an increase in two-way heavy vehicle movements on this section of Titirangi Road, potentially up to an additional 118 daily two-way vehicles per day in the busiest 11 months. As such, the probability that heavy vehicles and buses will need to pass one another is increased. Albeit during these months, it is expected that Titirangi Road would only be used one-way, in combination with the Atkinson Road (South), Kaurilands Road and Glendale Road route. Hence, at the busiest times of the construction, heavy vehicles operating on either route would generally only be passing existing traffic, not each other.

Route 2: Atkinson Road (South) / Glendale Road / Kaurilands Road

The vehicle demonstration has identified that there are sections along Atkinson Road and Kaurilands Road, where there is existing on-street parking, where it was necessary for the demonstration vehicle to cross the centre line markings (see **Appendix A**) to avoid parked cars. However, similarly to the section of Titirangi Road discussed above, this has also been observed to be necessary for existing buses and other heavy trucks already using these roads.

As shown in **Figure 5**, on Glendale Road, the demonstration identified the truck and trailer vehicle passing a bus (driving in the opposite direction) with on-street parked cars on both sides of the road (near the Levy Road intersection). This demonstrates that, although there are some narrower sections along this route, for the most part heavy vehicles and buses are able to pass each other adequately.



Figure 5: Heavy Truck and Bus Passing (Glendale Road)

Moreover, as recommended in the TAR, this route would be used as part of a one-way circulation to/from the Project sites (in combination with the Titirangi Road route). Therefore, the proposed heavy truck movements will generally only be passing existing traffic (including buses), not each other. Section 2.8 of the TAR identified that only one bus service operates along either Atkinson Road (South) (172/172X) or Kaurilands Road (151X), with both these services being at a frequency of no more than every 30 to 60 minutes throughout the day. As such, any potential conflicts are not be predicted to occur frequently, particularly as outside school drop-off / pick-up periods on weekdays, on-street parking on these roads is more intermittent providing opportunities for vehicles to wait and pass other vehicles.

¹ Average daily heavy vehicles from 5 day weekday count, northbound only

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As discussed in the TAR, it is recognised that during school drop-off / pick-up periods, there is significantly increased demand for on-street parking along Atkinson Road (South) and Kaurilands Road in the vicinity of the schools and kindergartens. As such, as discussed earlier, the TAR and the draft CTMP have identified that no heavy trucks use the Atkinson Road (South), Kaurilands Road and Glendale Road route during these periods in school term times, where practicable. In combination with the one-way operation, it is considered that this would sufficiently address the identified adverse effects of heavy vehicles using this route.

Parking Survey

To further inform the understanding of the potential effects of heavy trucks using the section of Titirangi Road to the north of the Village, Beca commissioned a parking occupancy survey, illustrated in **Figure 6**. There is currently space for unrestricted parking of approximately 26 cars along the western side of Titirangi Road in this section. There is no parking allowed on the eastern side. The parking is broken up by existing property driveways. The parking occupancy surveys was undertaken for 24 hours during the following periods:

- Weekdays (Average of Tuesday 21 and Thursday 23 May 2019)
- Weekend (Saturday 25 May 2019).



Figure 6: Parking Survey Areas – Titirangi Road

The observed occupancy for all parking spaces on the weekday and weekend (Saturday) is as follows:

- The weekday survey indicates a higher occupancy than over the weekend period (shown in Figure 7)
- However, the weekday occupancy is still observed to peak at around 14 spaces only, just slightly more than 50% of the total spaces
- From around 9am to 5pm on weekdays the parking demands exceeded 10 vehicles
- On the Saturday, there is an even spread of parking demand over the day, with a maximum demand of five vehicles observed.



Figure 7: Parking Survey Occupancy

The parking occupancy per zone is shown on the graphs in **Appendix B**. This has focussed on the weekdays, given these periods were observed to have the higher parking demand. It is noted that Zone A includes five indented parking spaces, closest to the Titirangi Village, where the vehicle demonstration has shown there is more than sufficient width for heavy vehicles.

The zonal occupancy survey indicates that Zones A, B and C have the highest occupancy levels, with there being little demand for the nine spaces in Zone D. It is considered that as Zones A to C are in closer proximity to Titirangi Village, this is the most likely reason for the higher demand in these zones.

0 1.0

Potential Mitigation Options

It has been identified that the predicted heavy vehicles associated with the Project, would potentially have adverse effects, due the current situation for existing buses and heavy trucks travelling northbound on Titirangi Road passing on-street parking. As such, it is considered that this section of Titirangi Road would benefit from the following potential mitigation options (or a combination of these options).

The mitigation options identified at this stage include:

- An adjustment to the current centre line marking (adjacent to the on-street parking) to visually indicate a lane that better accommodates heavy vehicles and buses travelling northbound on Titirangi Road. This would more clearly provide the necessary width for northbound heavy vehicles, while still providing sufficient width for heavy vehicles and buses travelling southbound.
- 2. Restrict parking on those sections that are most affected by the northbound heavy vehicle or bus movements (mainly where the road is not straight) or where there is lower parking demand to reduce the potential and extent of the potential areas of conflict. Noting that:
 - a. The zonal occupancy shows not all the zones are well-used, so by restricting some parking potentially in Zones A, B and C, vehicles can make use of the under-utilised parking in Zone D (which is generally on a straighter section).
 - b. Removing under-utilised parking in Zone D, reducing the overall length of parking that could occur at any time, so reducing the extent or length of the potential conflict area.
- 3. Reduce the footpath width (where practicable) to create more separation of parked cars to heavy vehicles and buses travelling northbound. This would need to be limited to the southern section, where there is currently a wider footpath.
- 4. Use the identified one-way routing for the Project heavy vehicles over a longer period to reduce twoway heavy vehicles in this section. This still needs to consider limiting the duration of the programme that heavy vehicles will operate along the Atkinson/ Kaurilands/ Glendale Roads route during the Project works, so is less preferable.
- 5. The option of taking excess spoil the Parau landfill site will reduce heavy vehicle movements using both the Titirangi Road and the Atkinson/ Kaurilands/ Glendale Roads routes during the Project works. The reduction would relate to truck and trailer vehicles associated with the removal of spoil from the Project sites to the Parau landfill. The potential reduction in heavy vehicles on Titirangi Road would be around 24 to 36 heavy vehicle movements per day associated with those activities.

It is considered that any of the potential mitigation options (or a combination of these options) would reduce the risk to existing road users and Project staff vehicles in this area to an acceptable level. It is considered this package of measures should be recognised in the measures identified in Proposed Condition 43 and the draft CTMP. The package of measures and their implementation during the Project works can be developed through further discussion between contractor (once appointed) and Auckland Transport, as required through the proposed conditions.

Our Ref: 6513515/s92/BUN60339273 N21-6627707 1.0

Page 9 9 August 2019

Summary

In summary, the vehicle demonstration has confirmed that the majority of the routes are adequate to accommodate the predicted increase in heavy vehicle movements associated with the Project.

However, it has been identified that the predicted heavy vehicles associated with the Project, would potentially have adverse effects, due the current situation for existing buses and heavy trucks travelling northbound on Titirangi Road passing on-street parking, between Titirangi Village and Park Road. As such, it is considered that this section of Titirangi Road would benefit from the potential mitigation options (or a combination of these options) identified in this letter to reduce the safety risks for to existing road users and Project staff vehicles in the identified area.

It is considered that the proposed package of measures would improve the current situation on this section of Titirangi Road and can be implemented with no more than minor adverse effects on the use and supply of the on-street parking in the identified area.

It is considered this package of measures should be recognised in the measures identified in Proposed Condition 43 and the draft CTMP. The package of measures and their implementation during the Project works can be developed through further discussion between contractor (once appointed) and Auckland Transport, as required through the proposed conditions.

We trust the above is in order, should you have any queries please do not hesitate to contact us.

Yours sincerely

Scheepers Fourie

Senior Transportation Planner on behalf of

Beca Limited Direct Dial: +64 9 300 9000 Email: Scheepers.Fourie@beca.com





Appendix A – Vehicle Demonstration





Design Vehicle:



Gleeson Cox Truck And Trailer – Bulk Haulage

- Date of Survey
 17/07/2019
 Time of Survey
 10:30 11:30 Am
 - Route 1
- Scenic / Woodlands and Titirangi Road
- Route 2 270
- Scenic / Woodlands and Atkinson / Kaurilands / **Glendale Road**











Ζ











Atkinson Park



W Coast Rd















Appendix B – Parking Occupancy Tables





TITRANGI ROAD PARKING OCCUPANCY - ZONES



















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Watercare Services Limited 73 Remuera Road Remuera Auckland 1050

26 September 2019

Attention: Mr. Paul Jones

Dear Paul

Huia Replacement WTP: Rigid Heavy Vehicle Demonstration

CH2M Beca Ltd (Beca) was commissioned by the Watercare Services Ltd (Watercare) to consider the potential transport effects arising from the enabling works, construction and operation for the replacement Huia Water Treatment Plant (WTP) and the associated proposed reservoirs (the Project). A Transport Assessment report (TAR) has been prepared by Beca, dated 10 July 2019, which was submitted with the regional consents application.

A request for further information under section 92 of the Resource Management Act 1991 was received from Auckland Council, dated 25 July 2019, following its review of the TAR. A response was provided to the Section 92 request in the Beca letter dated 9 August 2019, describing the findings of a truck and trailer vehicle demonstration along the identified heavy truck routes via Titirangi Road and Atkinson Road. That letter suggested mitigation measures necessary to address the transport-related effects of the along Titirangi Road and Kaurilands Road routes.

Following that Beca letter, Council requested that a similar vehicle demonstration be undertaken in order to understand the adequacy of the Parau landfill site route to accommodate the anticipated heavy truck movements and identify any additional mitigation needed along this route.

Heavy Truck Access Routes

As discussed in Section 4 of the TAR, it is identified that the primary route for heavy vehicles accessing the Project sites will be along Woodlands Park Road, Scenic Drive and Titirangi Road. However, a possible alternative landfill site for the disposal cut material has been identified as the Parau Landfill site to the south west of the proposed WTP.¹ The route to and from the Parau landfill is identified along Woodlands Park Road through the Woodlands Park village and then along Huia Road.

The TAR identified that, given the route and transport environment, there would be limitations on the heavy truck types that could operate along this route to dispose of the cut material. As such, the TAR already recommended that the heavy vehicle type for the transport of cut material be restricted to a rigid truck only, rather than a truck and trailer combination vehicle. The TAR identified that there would be around 61 to 90 daily heavy rigid vehicle movements during the anticipated intensive earthworks periods on this route. This is based on the maximum scenario of all cut material having to be disposed of off-site and not being suitable for re-use on the site).



¹ Section 4.1.6 of the TAR

The TAR identified the Parau site as a potentially feasible option for the disposal of cut material during the earthworks, subject to implementation of the recommended measures through the Construction Traffic Management Plan (CTMP) to manage the predicted effects.

The TAR also noted that the benefits of using the Parau site for disposal of a large proportion, if not all, of the cut material, from a transport perspective are:

- Movements to the Parau site would mean that these movements did not need to occur along the Titirangi Road or Atkinson/ Kaurilands Roads routes, reducing the adverse traffic effects on those corridors, and distributing adverse effects over a wider network area
- Overall shorter trip distance (3.6km), less distance travelled by heavy vehicles on the public road network, when compared to the longer route via Titirangi Road to Great North Road or Atkinson/ Kaurilands Roads to West Coast Road. The latter routes would also result in further travel distance to and from disposal sites, beyond the point of reaching Great North Road or West Coast Road
- Shorter trip durations, less time for heavy vehicles on roads, improving the turnaround for material disposal, and reliability of arrivals and departures from the site.

The use of Parau landfill would ultimately mean that there is a reduced duration of activities for heavy vehicle movements due to the shorter travel distance and quicker turnaround time.

Heavy Vehicle Demonstration Summary

In order to confirm the adequacy of the Parau site route to accommodate heavy vehicles and to review interaction between construction vehicles, Beca has coordinated a vehicle demonstration. The demonstration used a rigid truck (Six Wheeler, see **Figure 1**) similar to the vehicles recommended in the TAR for cut/fill (earthworks) transport to and from the Parau site. The demonstration was undertaken on the morning of Tuesday 10 September 2019 and was recorded by taking video from vehicles in front and behind the rigid heavy vehicle.



Figure 1: Rigid Heavy Vehicle – Six Wheeler



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Figure 2: Vehicle Demonstration Route - Parau Landfill Site

Figure 2 illustrates the route that was driven (in both directions) by the rigid heavy vehicle, which included Woodlands Park Road and Huia Road. The demonstration assessment summary with associated images along the route are attached to this letter in **Appendix A**, with two separate sheets illustrating the northbound and southbound journeys respectively with images of the front and rear of the rigid heavy vehicle at each location. Whilst the demonstration considered the whole route, in both directions, the images shown in **Appendix A** represent the key locations that were identified to be potential constraints, for example, at intersections or on bends in the road.

In summary, the vehicle demonstration indicates that the proposed route is geometrically adequate for the safe use by rigid heavy vehicles in a two-way arrangement on both Woodlands Park Road and Huia Road.



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Figure 3: Heavy Vehicle Demonstration (Woodlands Park Road)

The demonstration shows (**Figure 3** and **Appendix A**) that the rigid vehicle is able to stay within the traffic lanes, where parked vehicles did not obstruct movements. In locations where parked vehicles were occasionally encountered (**Figure 4**), the rigid heavy vehicle needed to cross the centreline in order to avoid the parked vehicles. However, this would have also been the case for any car, bus or other heavy vehicle travelling along this route, passing the parked vehicles. As such, as for any other vehicle, it would be necessary for rigid heavy vehicles transporting cut material pass a parked vehicle in a safe manner.



Figure 4: Woodlands Park Road (Parked Vehicle)

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The route passes Woodlands Park Primary School. As with the schools along Atkinson Road and Kaurilands Road, the TAR and the Draft CTMP have identified that there shall be no trucks operating past the School during the busy weekday school pick-up and drop-off periods, where practicable. It is considered that this will address the potential adverse effects of the Project on the safety of children and parents travelling to and from the school.

On the day of the vehicle demonstration, it was identified that there was a high parking demand on the route near the school, within defined parking areas. The demonstration did not identify major conflicts along this section. The rigid heavy vehicle could safely travel within the lane widths and did not cross the centreline or edge lines at any point as shown in **Figure 5** (also refer to **Appendix A**). An existing zebra crossing, which is raised, provides a safe crossing point for people, near the school pedestrian access.







Figure 5: Woodlands Park Road Bus (Woodlands Park School)

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Summary

In summary, the vehicle demonstration has confirmed that the Parau site route is adequate to accommodate the predicted increase in rigid heavy vehicle movements associated with the Project. The heavy rigid vehicles would mainly be operating in non-peak hour periods, where there would generally be less parked cars and other vehicles using these roads.

As such, as already identified in the TAR and Draft CTMP, it is considered that by having no heavy trucks operating past the school during the busy weekday school pick-up and drop-off periods, where practicable, the potential operational and safety effects can be satisfactorily addressed. The TAR and Draft CTMP also identified the need for a Site-Specific Traffic Management Plan (SSTMP) to be implemented at the Parau Landfill site access off Huia Road to manage the effects of heavy vehicles entering and exiting the site, which may include some localised widening of this access off Huia Road.

The package of measures outlined in the Draft CTMP and their implementation during the Project works will be refined through further discussion between contractor (once appointed) and Auckland Transport.

We trust the above is in order, should you have any queries please do not hesitate to contact us.

Yours sincerely

Scheepers Fourie Senior Transportation Engineer

on behalf of **CH2M Beca Ltd** Direct Dial: +64 7 577 7979 Email: scheepers.fourie@beca.com

Copy Karen Baverstock, Tonkin and Taylor




Design Vehicle:



- Gleeson Cox 6 Wheeler Bulk Haulage
- **Date of Survey** 10/09/2019
- **Time of Survey** 10:30 11:30 Am
 - Route
- Woodlands Park Rd / Huia Rd







SURVEY OF RESIDENTS IN THE WAIMA, WOODLANDS PARK AND LAINGHOLM STUDY AREA

RESEARCH REPORT FOR

WATERCARE

MAY 2019

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1 INTRODUCTION

Watercare commissioned Phoenix Research to conduct a survey of people living in a well-defined specific study area in west Auckland, addressing the following topics:

- How residents of this area describe the features of the area, in terms of its "best things", challenges and what they value about living in the area
- The relative levels of concern residents have about challenges for protecting and enhancing the natural environment in the study area
- The extent and nature of residents' involvement in remedial actions for protecting and enhancing the natural environment
- What organisations residents know of that address environmental and ecological challenges in the area, including both formal bodies such as government agencies, and voluntary groups
- The level of support for more to be done to protect and enhance the natural environment in the area, and priorities for such interventions
- Willingness of residents to allow personnel access to their properties for the purpose of managing environmental and ecological challenges

This survey was needed to inform an application to be made by Watercare to develop a site within the study area with a new water treatment facility. This site has been selected after detailed consideration of a number of other potential sites for this facility, in the context that an upgrade of water treatment facilities and capability is critical to ensuring continuity of supply of water to Auckland.

Watercare is considering supporting a trust which would help fund and manage remedial actions on environmental and ecological challenges in this area, as an offset to the environmental impact of developing the site. One critical part of planning the implementation of this work was to estimate the proportion of residents in the area that would be willing to allow personnel from this trust access to their properties for the purpose of that remedial work.

Thus a priority of this research was to determine the proportion of residents in the area that would be willing to allow that access to their properties. (This point is listed above as the last of the topics for the survey to cover.) The offset clearly would only be workable and effective if residents at some minimum percentage of properties in the area would allow access: modelling of impacts has been done that shows that the minimum percentage of properties allowing access for this to be viable and ecologically effective is of the order of 20% of properties.

The questionnaire for the survey was developed drawing on Watercare's brief and requirements, on previous research done by Phoenix Research in analogous situations, and on reporting on the community consultation that has already been undertaken.

A telephone survey of 200 residents of this area was undertaken over the period 25th February to 24th March. The interviews were conducted on a mix of mobile and landline telephones, as one of a number of steps to help ensure representative coverage of all households in the study area. All interviews were undertaken with people aged 18 years or over. Where the contact seeking an interview was made by calling a landline telephone number, one person aged 18 years or over in the household was randomly selected for interview, a further step to help ensure the representativeness of the sampling for the survey.

Although no controls were set in the survey for pro-rata coverage of sub-areas within the study area, statistical analysis was done post hoc (i.e. after the survey was completed), comparing the spread of interviews undertaken with the spread of all households in the study area. These statistical tests showed that the spread of interviews throughout the study area was a good match to the spread of households.



The study area for this survey is defined by this map:



Further details of the research methods used for the survey (including the statistical tests of the validity of the spread of the sample mentioned above) are set out in Appendix A, along with a profile of the sample in terms of demographic make-up, and other details about the research and findings.

The presentation of the results of the survey that follows focuses on the results for the study area as a whole. In addition, all results have been examined to determine whether there are any statistically significant differences between the following sub-groups within the overall survey sample. Such differences, where they occur, are described in the commentary on the findings:

• The two sub-areas within the overall study area, Waima/Woodlands Park compared with Laingholm

In addition, results from all structured questions (i.e. not the open-ended questions), have also been examined for trends by the following sub-groups:

- Men compared with women
- People of different age groups

The following chapters of the report cover in turn:

- An executive summary of the findings
- The detailed findings, presented for context in the same order that questions were asked in the survey

2 EXECUTIVE SUMMARY

Residents living in the study area describe the best things about living in the area as being the peacefulness and tranquillity of the area, access to beaches, and the area's bush and native plants. Further main themes, including what people value about the area, are its community spirit and the beauty of the area.

The challenges for their area that residents most often cite are often not related to environmental or ecological challenges, with limited public transport and roading issues the challenges most often mentioned. That is followed (in order of frequency of mention) by kauri dieback. The themes of weed and pest control, and storm water/erosion/water quality, are those next most often mentioned.

A minority of residents (less than those mentioning the challenges described in the previous paragraph) describe Watercare's plans for the new filter station as one of the challenges in their area (initially 12%, but rising to 19% after people had been asked a number of intervening questions including about water quality). Among those living specifically in the Waima/Woodlands Park sub-area of the full study area, those proportions are 20% and 28% respectively. Those are clearly higher proportions, making the plans for the new filter station more prominent among the challenges identified by people living in Waima/Woodlands Park.

As well as asking people to identify the best things and challenges themselves about living in their area, the survey also asked them to rate a number of features of their area. All the positive features asked about were rated highly. Those rated highest were the natural environment, living close to nature, and being a great area to bring up children.

The majority of residents living in the study area also agreed that a range of seven challenges, covering both flora and fauna, are significant for protecting and enhancing the natural environment in their area. Those most agreed with are kauri dieback, invasive weeds and retaining water quality in streams, bays and the coastal environment.

The remedial actions residents in the study area are most involved in strongly feature invasive weeds, with over 70% involved in some remedial actions on this challenge. In order, that is followed by rats, possums, kauri dieback then retaining water quality. Most of these remedial actions are undertaken personally (rather than as part of a group), more often on their own properties rather than on public land. Remedial actions on kauri dieback is the only topic where this is done relatively often on public land, not only residents' own properties.

Approximately half the residents in the study area get or use advice or support to help them manage environmental or ecological challenges in their area. People most often turn to Auckland Council for this advice or support, although they also use a wide range of other sources.

Auckland Council is also the organisation most often known of as addressing environmental or ecological challenges in their area, although a wide and diverse range of other groups are also known. These include Forest and Bird, Ecomatters and the Waitakere Ranges Protection Society, and two main general categories of organisations: those addressing kauri dieback and those addressing weeds.

The large majority of residents in the study area (86%) would like to see more done to protect and enhance the natural environment of their area. If additional funds were available to protect and enhance the natural environment of their area, weed and pest control collectively are the most chosen issues to be addressed. Addressing water quality and kauri dieback specifically are also often chosen.

A large majority of residents in the study area say they would be willing to allow access to their property for a dedicated organisation to help manage environmental and ecological challenges in their area. The proportions are 73% allowing access given a short description of this possible organisation, rising to 82% when a slightly more detailed explanation is provided.

3

FINDINGS

3.1 BEST THINGS ABOUT LIVING IN THIS AREA

Q: Please summarise what, if anything, you feel are the **best things** about living in your area?

The results from this question are presented in the tables on the following pages. There are a number of points about the way these results are presented that are useful to explain and introduce.

First, because people in the survey could identify multiple "best things" about the area they live in, the percentage results for this type of question add to more than 100%.

The first of the following tables shows the results with the answer categories sorted starting with the answers given most frequently. This table shows only the answers given by 4% of people in the survey or more. Appendix B contains the same table, but extended to show every category of answer, including those given by smaller proportions of people, right down to answers given by only one person (0.5%). It is unusual for the report on a survey to include that level of detail, but this was considered useful and appropriate for this particular survey, for complete transparency.

The second of the tables following (which continues onto a further page), shows the same results again but this time with answer categories conceptually grouped into "themes". This table shows the total percentage of people giving any of the answers in the grouped category or theme. For clarity, the individual answer categories that have been included in the conceptual groupings of themes, are also repeated in this table. I.e. this table contains the same results as in the first table, just differently ordered, and including the percentage results for each theme.

Just as overall percentages for this type of table can add to more than 100%, so too can the percentages for the individual answer categories add to more than the percentage for that theme, because people could have given more than one answer that fits within that theme.

One reason to provide the results at this level of detail is that making the conceptual groupings of answers into themes involves more conceptual assessment by the researchers, whereas the more granular data shown in the first of the tables is close to the exact answers people in the survey gave.

It is critically important to note in reading the "theme" tables that some answer categories stand alone and do not obviously belong in a group with other answers. Consequently that type of answer is NOT repeated in the theme tables. This does not occur in the following pair of tables, but occurs for example in section 3.2.

Finally, a third table of these results is presented. This table shows the results just where there are statistically significant differences in the results between residents of Waima/Woodlands Park, compared with residents of Laingholm.

The approach set out above has also been used for presenting the results from the other open-ended questions in this survey. That is, the results from each of these questions are presented in a series of three tables:

- First as specific answer categories
- Then as themes
- Then showing just the results where there are significant differences for residents of Waima/Woodlands Park compared with Laingholm

One further general observation about the presentation of results is that all results have been presented, without selection of those arguably more relevant to Watercare's plans for the new filter station. That is because there is some value in being able to compare the significance of points more directly related to Watercare's interests in the area (such as the extent to which residents see Watercare's plans for the new filter station as a problem, shown in the next section), with other unrelated issues such as concerns about roading or footpaths in the area. The latter types of concerns provide context and relativity, putting comments related to Watercare in perspective.

The key findings from this question are that, first at the more granular level, the best things about the area that residents most often mentioned are:

- The peacefulness of the area, being tranquil, quiet, restful, calming and like a sanctuary
- Access to beaches
- The bush and native plants

A similar series of themes are evident in the more conceptual groupings of answers, with the following two themes most often mentioned, each by a majority of people in the survey:

- The bush, trees and natural environment
- The peaceful country feel

Those two most-often mentioned themes are followed by three further themes each mentioned by a similar though lesser proportion of people:

- The community spirit, the people and the nature-aware community
- Access to beaches and lots of beaches
- The beauty of the area, it being unspoilt, with beautiful views, a paradise

Residents of Laingholm are more likely to mention the community spirit and close community in their area, and the views, than residents of Waima and Woodlands Park. Conversely those living in Waima and Woodlands Park are more likely to mention the natural environment and living close to nature, with links to the environment, among the best things about living in their area.

	Total
BEST THINGS ABOUT LIVING IN AREA	(200)
	%
CATEGORIES OF ANSWERS	
Peaceful: tranquil/ quiet/ restful/ calming/ like sanctuary	35.5
Access to beaches	35
Bush/ native plants	35
Community spirit: close community/ look out for each other/ support network	25
Trees/ forest/ kauri	25
Birdlife: native birds/ wood pigeons/ quail/ birdsong	24.5
Beauty: unspoilt/ just beautiful/ pristine wilderness	20
Walking tracks/ bush walks	20
Natural environment: close to nature/ links to environment	19
Views/ scenery, beautiful harbours/ city views	17
The people: friendly/ laid back/ good/ nice/ respectful	14.5
Close to Auckland: close enough/ 25 mins to CBD	14
Large sections/ not sub-dividable/ no infill housing/ distance from neighbours	13.5
Privacy/ space	13.5
Semi-rural/ country feel/ village feel	11
Air quality: fresh air/ no pollution	10
Less populated	7.5
Lush/ green	7
Nature-aware community: focus on conservation/ everyone on same page/ like-minded/ stewards of the land	7
Not too close to Auckland: not right in city/ removed from rat race	7
Wildlife	6
Good schools/ great primary	5.5
Less traffic	5.5
Waitakere Ranges	5
Good place to bring up children	4.5
Beaches: lots of beaches/ 22 different beaches	4

Categories of answers given most often are shown above: see also next table for grouped categories of answers, and the full table of these results in Appendix B.

Results are presented in all tables in this report for the total of 200 people interviewed, showing percentages to one decimal place of accuracy, where applicable. Appendix A contains more details on this point.

	Total
BEST THINGS ABOUT LIVING IN AREA	(200)
	%
THEMES/GROUPED CATEGORIES OF ANSWERS	
Bush/trees/natural environment	68
Bush/ native plants	35
Trees/ forest/ kauri	25
Natural environment: close to nature/ links to environment	19
Lush/ green	7
Peaceful country feel	60
Peaceful: tranquil/ quiet/ restful/ calming/ like sanctuary	35.5
Large sections/ not sub-dividable/ no infill housing/ distance from neighbours	13.5
Privacy/ space	13.5
Semi-rural/ country feel/ village feel	11
Less populated	7.5
Less traffic	5.5
Community spirit/the people/nature-aware community	38
Community spirit: close community/ look out for each other/ support network	25
The people: friendly/ laid back/ good/ nice/ respectful	14.5
Nature-aware community: focus on conservation/ everyone on same page/ like-minded/ stewards of the land	7
Access to beaches/lots of beaches	37
Access to beaches	35
Beaches: lots of beaches/ 22 different beaches	4
Beauty/unspoilt/views/paradise	35
Beauty: unspoilt/ just beautiful/ pristine wilderness	20
Views/ scenery, beautiful harbours/ city views	17
Paradise/ bliss	3
Views of stars	1
Birdlife/wildlife	28.5
Birdlife: native birds/ wood pigeons/ quail/ birdsong	24.5
Wildlife	6
Walking tracks/bush walks/Waitakere Ranges	24
Walking tracks/ bush walks	20
Waitakere Ranges	5
Arataki Visitors Centre/ rangers	1
Relationship to Auckland	18
Close to Auckland: close enough/ 25 mins to CBD	14
Not too close to Auckland: not right in city/ removed from rat race	7

BEST THINGS ABOUT LIVING IN AREA	Total (200) <u>%</u>
THEMES/GROUPED CATEGORIES OF ANSWERS	
Air quality/clean/fresh water	11.5
Air quality: fresh air/ no pollution	10
Clean	1.5
Fresh water	1
Good schools/good for children/parks	10.5
Good schools/ great primary	5.5
Good place to bring up children	4.5
Good parks/ playgrounds	1.5
Arts/village/shops/cafes	7.5
Focus on arts: events/ markets/ Lopdell House	3.5
Titirangi village	3
Good shops/ cafes/ restaurants locally	2
Transport	3
Public transport	1.5
Well maintained roads	1
Parking	0.5

Table 3: Best things about living in the area (answers where significant area differences)

BEST THINGS ABOUT LIVING IN AREA	Total	Waima/ Woodlands Park	Laingholm
	(200)	(112)	(88)
	%	%	%
CATEGORIES OF ANSWERS		_	
Community spirit: close community/ look out for each other/ support network	25	20	32↑
Natural environment: close to nature/ links to environment	19	24 ↑	13
Views/ scenery, beautiful harbours/ city views	17	11	25↑

In this table (and other following tables showing differences by area) the higher results are marked as \uparrow for quick easy identification. Naturally the converse is that the result for the other area is lower, though to minimise clutter, this is not marked \downarrow .

3.2 CHALLENGES FOR THE AREA

Q: And please summarise what, if anything, you feel are the **challenges** for the area you live in?

The results from this question are presented in the tables on the following pages, following the sequence described in the previous section.

At the more granular level, the specific categories of answers residents most often gave to this question were:

- Limited public transport/ infrequent/ no trains/ lack of park and ride/ school bus service discontinued/ 1³/₄ hours to Newmarket
- Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes
- Kauri dieback

The conceptually grouped answers identify the following as main grouped themes:

- Roading, traffic and footpaths
- Kauri dieback and track closures
- Weed and pest control
- Storm water, erosion and water quality

As discussed in section 3.1, the answers grouped by theme do not include single stand-alone answers, which can be an important part of the overall picture. For this question it is important not to rely on the grouped theme answers without also taking into account the following challenges, also mentioned by sizeable percentages, though these concerns have not been included in grouped themes:

- Limited public transport/ infrequent/ no trains/ lack of park and ride/ school bus service discontinued/ 1³/₄ hours to Newmarket
- Watercare plans for the new filter station
- Protection of nature: deforestation/ destruction of bush/ preservation of natural beauty
- Urbanisation: development/ subdivision/ population intensification/ changes to zoning

There are a number of marked differences in the extent of mention of challenges between residents living in Waima/Woodlands Park and Laingholm. It is noteworthy that those living in Waima/Woodlands Park are much more likely to mention Watercare's plans for the new filter station as a challenge, than those living in Laingholm. Possibly related, they are also particularly inclined to mention as a challenge the protection of nature, deforestation, destruction of bush and preservation of natural beauty.

	Total
CHALLENGES FOR THE AREA LIVED IN	(200)
	%
CATEGORIES OF ANSWERS	
Limited public transport/ infrequent/ no trains/ lack of park and ride/ school bus service discontinued/ 1¾ hours to Newmarket	27
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	24
Kauri dieback	20
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	13.5
Lack of footpaths	13
Track closures	13
Watercare plans for new filter station	12
Protection of nature: deforestation/ destruction of bush/ preservation of natural beauty	11.5
Remoteness: distance to city/ work/ commute	11.5
Traffic issues: congestion/ increased volume/ too fast for conditions	11.5
Urbanisation: development/ subdivision/ population intensification/ changes to zoning	11.5
Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons	10.5
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	10.5
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9
Power outages/ overhead lines / damage in storms	9
Storm water issues: lack of drains/ open drains/ blocked drains causing flooding	9
Lack of conservation mind-set/ understanding environmental issues	7
Internet reception	6.5
Cell phone reception	5
Healthy homes: lack of sun/ dampness/ mould/ colder in winter/ more rainfall here	5
Lack of council tree management: roadside trees not trimmed/ overgrown	5
Bureaucracy: consent process/ not permitted to build	4
Council neglect of West Auckland/ forgotten us/ reduced council services/ Langholm forgotten suburb	3.5
Distance to shops/ supermarket	3
Dogs off leash	3
Littering/ dumping of rubbish/ plastic/ rubbish on beaches	3

Categories of answers given most often are shown above: see also next table for grouped categories of answers, and the full table of these results in Appendix B.

	Total
CHALLENGES FOR THE AREA LIVED IN	(200)
	%
THEMES/GROUPED CATEGORIES OF ANSWERS	
Roading/traffic/footpaths	41
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	24
Lack of footpaths	13
Traffic issues: congestion/ increased volume/ too fast for conditions	11.5
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9
Kauri dieback and track closures	25
Kauri dieback	20
Track closures	13
Weed and pest control	20
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	13.5
Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons	10.5
Storm water/erosion/water quality	18.5
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	10.5
Storm water issues: lack of drains/ open drains/ blocked drains causing flooding	9
Erosion/ subsidence/ landslips/ unstable land	2
Remoteness	15
Remoteness: distance to city/ work/ commute	11.5
Distance to shops/ supermarket	3
Distance to sports/ amenities/ schools	1.5
Slow police response	0
Home-related issues	8.5
Healthy homes: lack of sun/ dampness/ mould/ colder in winter/ more rainfall here	5
Climate change: very dry summer/ bush fire threat/ too much rain/ weather events	2.5
Home maintenance issues: roof maintenance/ leaves and debris/ blocked gutters/ trees too big	2.5
Littering and rubbish	5
Littering/ dumping of rubbish/ plastic/ rubbish on beaches	3
Rubbish collection	1.5
Lack of rubbish bins	1

able 6: Challenges for the area lived in (answers where significant area differences)					
CHALLENGES FOR THE AREA LIVED IN	Total	Waima/ Woodlands Park	Laingholm		
	(200)	(112)	(88)		
	%	%	%		
CATEGORIES OF ANSWERS					
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	24	18	32↑		
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	13.5	7	22↑		
Watercare plans for new filter station	12	20 ↑	2		
Protection of nature: deforestation/ destruction of bush/ preservation of natural beauty	11.5	16 ↑	6		
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9	4	14 🕈		
THEMES/GROUPED CATEGORIES OF ANSWERS					
Roading/traffic/footpaths	41	34	49 ↑		
Weed and pest control	20	14	28♠		
Remoteness	15	10	21 ↑		

3.3 BEST THINGS INCLUDING WHAT ESPECIALLY VALUED ABOUT LIVING IN THIS AREA

Q: Is there anything you'd like to add to what you've told me, about what you may especially **value** about living in your area?

The following tables show the results from the question above added into the results shown for the "best things about living in the area" shown in section 3.1. The results in these tables are sorted in descending order of the percentages of the combined results (making the order different from that shown in section 3.1).

The key findings from this additional question, complementing and extending the first question about the best things about living in the area, are that, first at the more granular level, there is a very similar pattern of answers most often given:

- The peacefulness of the area, being tranquil, quiet, restful, calming and like a sanctuary
- The bush and native plants
- Access to beaches

However it is also noteworthy that asking people about what they especially value about living in the area results in a marked increase of this answer:

• Community spirit: close community/ look out for each other/ support network

Similar themes are also evident in the themes/more conceptual groupings of answers, when people are also asked about what they especially value about living in the area. Again the following two themes most often mentioned, each by a majority of people in the survey:

- The bush, trees and natural environment
- The peaceful country feel

Consistent with the observation above, asking people about what they especially value has resulted in a marked increase of mention of this theme (that is, in addition to the specific answer above):

• Community spirit/the people/nature-aware community

Consistently with findings presented earlier, residents living in Waima/Woodlands Park particularly often mention the natural environment, being close to nature and having links to the environment among the best and valued things about living in their area. Conversely those living in Laingholm more often mention their views, the scenery, beautiful harbours and city views.

Table 7: Best things about living in area, plus anything else especially valued (categories of answers)

		Total	
BEST THINGS ABOUT LIVING IN AREA, PLUS		(200)	
		%	
CATEGORIES OF ANSWERS	Best things	Best + valued	Difference
Peaceful: tranquil/ quiet/ restful/ calming/ like sanctuary	35.5	42.5	7
Bush/ native plants	35	41	6
Access to beaches	35	38	3
Community spirit: close community/ look out for each other/ support network	25	35	10
Trees/ forest/ kauri	25	29.5	4.5
Birdlife: native birds/ wood pigeons/ quail/ birdsong	24.5	28	3.5
Natural environment: close to nature/ links to environment	19	24	5
Beauty: unspoilt/ just beautiful/ pristine wilderness	20	22.5	2.5
Walking tracks/ bush walks	20	22.5	2.5
Views/ scenery, beautiful harbours/ city views	17	20.5	3.5
The people: friendly/ laid back/ good/ nice/ respectful	14.5	19	4.5
Privacy/ space	13.5	17	3.5
Close to Auckland: close enough/ 25 mins to CBD	14	16	2
Large sections/ not sub-dividable/ no infill housing/ distance from neighbours	13.5	15.5	2
Semi-rural/ country feel/ village feel	11	12	1
Air quality: fresh air/ no pollution	10	12	2
Wildlife	6	10	4
Less populated	7.5	9.5	2
Nature-aware community: focus on conservation/ everyone on same page/ like-minded/ stewards of the land	7	9	2
Not too close to Auckland: not right in city/ removed from rat race	7	8.5	1.5
Lush/ green	7	7.5	0.5
Good schools/ great primary	5.5	7.5	2
Waitakere Ranges	5	6.5	1.5
Safety: safe place to live/ feel secure	3.5	6.5	3
Beaches: lots of beaches/ 22 different beaches	4	6	2
Less traffic	5.5	5.5	0
Focus on arts: events/ markets/ Lopdell House	3.5	5.5	2
Good place to bring up children	4.5	5	0.5
Climate: cool in summer/ warmer in winter/ lower humidity	3.5	4	0.5
Paradise/ bliss	3	4	1
Good shops/ cafes/ restaurants locally	2	4	2

Categories of answers given most often are shown above: see also next table for grouped categories of answers, and the full table of these results in Appendix B.

Table 8: Best things about living in area, plus anything else especially valued (themes/grouped categories of answers)

		Total	
BEST THINGS ABOUT LIVING IN AREA, PLUS ANYTHING ELSE ESPECIALLY VALUED		(200)	
		%	
THEMES/GROUPED CATEGORIES OF ANSWERS	Best things	Best + valued	Difference
Bush/trees/natural environment	68	74.5	6.5
Bush/ native plants	35	41	6
Trees/ forest/ kauri	25	29.5	4.5
Natural environment: close to nature/ links to environment	19	24	5
Lush/ green	7	7.5	0.5
Peaceful country feel	60	68	8
Peaceful: tranquil/ quiet/ restful/ calming/ like sanctuary	35.5	42.5	7
Privacy/ space	13.5	17	3.5
Large sections/ not sub-dividable/ no infill housing/ distance from neighbours	13.5	15.5	2
Semi-rural/ country feel/ village feel	11	12	1
Less populated	7.5	9.5	2
Less traffic	5.5	5.5	0
Community spirit/the people/nature-aware community	38	48	10
Community spirit: close community/ look out for each other/ support network	25	35	10
The people: friendly/ laid back/ good/ nice/ respectful	14.5	19	4.5
Nature-aware community: focus on conservation/ everyone on same page/ like-minded/ stewards of the land	7	9	2
Beauty/unspoilt/views/paradise	35	42.5	7.5
Beauty: unspoilt/ just beautiful/ pristine wilderness	20	22.5	2.5
Views/ scenery, beautiful harbours/ city views	17	20.5	3.5
Paradise/ bliss	3	4	1
Privilege to live here/ fortunate	0	4	4
Views of stars	1	1.5	0.5
Access to beaches/lots of beaches	37	42	5
Access to beaches	35	38	3
Beaches: lots of beaches/ 22 different beaches	4	6	2
Birdlife/wildlife	28.5	33	4.5
Birdlife: native birds/ wood pigeons/ quail/ birdsong	24.5	28	3.5
Wildlife	6	10	4
Walking tracks/bush walks/Waitakere Ranges	24	27.5	3.5
Walking tracks/ bush walks	20	22.5	2.5
Waitakere Ranges	5	6.5	1.5
Arataki Visitors Centre/ rangers	1	1	0

BEST THINGS ABOUT LIVING IN AREA, PLUS ANYTHING ELSE ESPECIALLY VALUED		Total (200) %	
THEMES/GROUPED CATEGORIES OF ANSWERS	Best things	Best + valued	Difference
Relationship to Auckland	18	20.5	2.5
Close to Auckland: close enough/ 25 mins to CBD	14	16	2
Not too close to Auckland: not right in city/ removed from rat race	7	8.5	1.5
Air quality/clean/fresh water	11.5	13.5	2
Air quality: fresh air/ no pollution	10	12	2
Clean	1.5	1.5	0
Fresh water	1	1.5	0.5
Good schools/good for children/parks	10.5	12.5	2
Good schools/ great primary	5.5	7.5	2
Good place to bring up children	4.5	5	0.5
Good parks/ playgrounds	1.5	1.5	0
Arts/village/shops/cafes	7.5	10	2.5
Focus on arts: events/ markets/ Lopdell House	3.5	5.5	2
Good shops/ cafes/ restaurants locally	2	4	2
Titirangi village	3	3.5	0.5
Transport	3	3.5	0.5
Public transport	1.5	1.5	0
Well maintained roads	1	1	0
Parking	0.5	0.5	0
Cycling tracks	0	0.5	0.5

Table 9: Best things including what especially valued about living in the area (answers where significant area differences)

BEST THINGS ABOUT LIVING IN AREA	Total	Waima/ Woodlands Park	Laingholm
BEOT MINOC ABOOT EIVING IN AREA	(200)	(112)	(88)
	%	%	%
CATEGORIES OF ANSWERS			
Natural environment: close to nature/ links to			
environment	24	30↑	16
Views/ scenery, beautiful harbours/ city views	20.5	15	27 🕈

3.4 FEATURES OF LIVING IN THE AREA

Q: Now I'm going to read you a list of features of living in your area that people sometimes talk about. For each one, please give this a rating of how much you **agree** or **disagree** with this statement. 7 would mean you **agree** strongly, down to 1 which would mean you **disagree** strongly with that statement. 4 is a neutral rating, and of course you can use any number you like from 1 to 7 for each statement, to tell us your opinions about living in that area.

List read out in random order



All of the positive features of living in the area that people rated in the survey were agreed with by the large majority of residents. The features most strongly agreed with, in order, were:

- The natural environment a great feature of our area
- · Living close to nature is a great feature of our area
- It's a great area for children to grow up

There is little variation in the levels of agreement with these features of the area by sub-groups within the sample. That is partly because the agreement with all these statements is very high, leaving little room for variations to be evident. The significant differences for sub-groups are:

- There is small trend for people living in Laingholm to agree that there is a strong sense of community in their area, more than those living in Waima/Woodlands Park: the average ratings are 6.2 compared with 5.8 respectively, on the 7-point scale documented in the graph above
- There are no significant differences between the extent to which men compared with women agree that the positive features apply to their area

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• People in the age group 30 to 44 years are more inclined to agree that "living close to nature is a great feature of the area" (average rating 7 compared with 6.8 for everyone in the survey), and less inclined than others to agree that "there is a strong sense of arts, culture and heritage" in their area (average rating 5.7 compared with 5.9 for everyone in the survey)



All the challenges asked about in the survey were agreed to be significant for protecting and enhancing the natural environment in their area, by more than half of those surveyed, ranging up to around 90% agreeing with the three top-rated challenges:

- Kauri dieback (89% agree this is a significant challenge, average rating 6.2 on the 7-point scale)
- Invasive weeds (94% agree, average rating 6.2)
- Retaining water quality in streams, bays and the coastal environment (87% agree, average rating 6.0)

The challenges related to flora rather than fauna are the ones residents in the study area most agree are significant for protecting and enhancing the natural environment in their area. However among the fauna challenges, rats are most often seen as significant challenges, followed by possums, with stoats and other animal pests of less concern (though even so, agreed to be a significant challenge by over 50% of residents).

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As with the ratings of the positive features of living in the area, the high levels of agreement that the topics covered in the survey are significant challenges, make variations by sub-groups less likely to be notable:

- The only marked difference in terms of the parts of the study area where people live, is that residents of Laingholm are more inclined to see "invasive weeds" as a significant challenge to the natural environment in their area, compared with residents living in Waima/Woodlands Park (average ratings 6.4 versus 6.0 respectively)
- While men and women generally have similar levels of agreement about the significant challenges in their area, there is just one topic where they tend to differ, with women more than men concerned about "other introduced plants" in their area (average rating 5.2 for women versus 4.8 for men)
- The main trend in these results by age concerns residents in the age band 18 to 29 years: these people are less inclined than others to agree that several of the challenges asked about in the survey are significant in their area:
 - Kauri dieback (average rating 5.9 for 18 to 29 year olds, compared with 6.2 for everyone in the survey)
 - Invasive weeds (average ratings 5.5 and 6.2 respectively)
 - Other introduced plants (average ratings 4.4 and 5.1 respectively)
 - Rats (average ratings 4.9 and 5.6 respectively)
 - Possums (average ratings 4.7 and 5.4 respectively)
 - Retaining water quality in streams, bays and the coastal environment (average ratings 5.6 and 6.0 respectively)

Q: Are there any other environmental or ecological challenges for protecting and enhancing the natural environment in your area that you are concerned about?

The results from this question have been accumulated with those from the earlier open-ended question reported in section 3.2. The following tables show the results for the previous question, then also the accumulated results including answers to the question above.

Results are presented in the following tables in order starting from those most often mentioned, after this additional question: that has resulted in minor changes to the order in which the answers are presented.

The point of asking this follow-up question was to allow that the other questions people had answered in the meantime might have stimulated them to identify additional issues they saw as challenges: this is most evident in the columns in the tables that follow showing the differences/increases in mentions of each answer.

While the results for answers most often given remain very similar to those reported in section 3.2, the answers with the biggest increases from the earlier question were:

- Watercare plans for new filter station (mentioned by 12% as a challenge for their area initially, rising to 19% when accumulated to include answers to the futher question above)
- Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams

The comment above about Watercare's plans is too specific to carry over into the table identifying themes and grouped categories of answers, though it is clearly an important point to note. The themes table below shows that concerns about water quality in the area are mentioned markedly more often at this stage in the survey: it would appear this must be largely because "retaining water quality" was in the list of challenges people rated in the question before.

This indicates that the theme of "retaining water quality" is clearly moderately prominent among people's concerns, yet less "top of mind" than their other environmental concerns. That factor may also have carried over to the increase in mentions of Watercare's plans as a concern.

The third of the following tables shows that there are marked differences in the perceived challenges for their area between residents of Waima/Woodlands Park compared with Laingholm. Residents of Waima/ Woodlands Park are more inclined to be concerned about:

- Watercare plans for the new filter station
- Protection of nature: deforestation/ destruction of bush/ preservation of natural beauty

This is consistent with the trends reported in section 3.2. As was noted there, there are also a number of other marked differences in the extent of mention of challenges between residents living in Waima/Woodlands Park and Laingholm, for example with Laingholm residents being particularly inclined to mention roading, water quality and weed control as challenges in their area.

CHALLENGES FOR THE AREA LIVE IN, PLUS ANY OTHER CHALLENGES		Total (200)	
CATEGORIES OF ANSWERS	Challenges	% + Other challenges	Difference
Limited public transport/ infrequent/ no trains/ lack of park and ride/ school bus service discontinued/ 1 ³ / ₄ hours to Newmarket	27	27	0
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	24	25.5	1.5
Kauri dieback	20	21.5	1.5
Watercare plans for new filter station	12	19	7
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	10.5	18.5	8
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	13.5	15	1.5
Protection of nature: deforestation/ destruction of bush/ preservation of natural beauty	11.5	15	3.5
Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons	10.5	15	4.5
Track closures	13	14	1
Storm water issues: lack of drains/ open drains/ blocked drains causing flooding	9	14	5
Lack of footpaths	13	13.5	0.5
Urbanisation: development/ subdivision/ population intensification/ changes to zoning	11.5	13	1.5
Traffic issues: congestion/ increased volume/ too fast for conditions	11.5	12.5	1
Remoteness: distance to city/ work/ commute	11.5	11.5	0
Power outages/ overhead lines / damage in storms	9	9.5	0.5
Lack of conservation mind-set/ understanding environmental issues	7	9.5	2.5
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9	9	0
Littering/ dumping of rubbish/ plastic/ rubbish on beaches	3	8.5	5.5
Erosion/ subsidence/ landslips/ unstable land	2	7.5	5.5
Internet reception	6.5	7	0.5
Lack of council tree management: roadside trees not trimmed/ overgrown	5	7	2
Healthy homes: lack of sun/ dampness/ mould/ colder in winter/ more rainfall here	5	5.5	0.5
Council neglect of West Auckland/ forgotten us/ reduced council services/ Langholm forgotten suburb	3.5	5.5	2
Cell phone reception	5	5	0
Bureaucracy: consent process/ not permitted to build	4	5	1

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Categories of answers given most often are shown above: see also next table for grouped categories of answers, and the full table of these results in Appendix B.

Table 11: Challenges for the area live in, plus any other challenges (themes/grouped categories of answers)

		Total	
CHALLENGES FOR THE AREA LIVE IN, PLUS ANY OTHER CHALLENGES		(200)	
		%	
THEMES/GROUPED CATEGORIES OF ANSWERS	Challenges	+ Other challenges	Difference
Roading/traffic/footpaths	41	43	2
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	24	25.5	1.5
Lack of footpaths	13	13.5	0.5
Traffic issues: congestion/ increased volume/ too fast for conditions	11.5	12.5	1
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9	9	0
Storm water/erosion/water quality	18.5	33.5	15
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	10.5	18.5	8
Storm water issues: lack of drains/ open drains/ blocked drains causing flooding	9	14	5
Erosion/ subsidence/ landslips/ unstable land	2	7.5	5.5
Kauri dieback and track closures	25	27	2
Kauri dieback	20	21.5	1.5
Track closures	13	14	1
Weed and pest control	20	25.5	5.5
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	13.5	15	1.5
Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons	10.5	15	4.5
Remoteness	15	15	0
Remoteness: distance to city/ work/ commute	11.5	11.5	0
Distance to shops/ supermarket	3	3	0
Distance to sports/ amenities/ schools	1.5	1.5	0
Slow police response	0	0.5	0.5
Home-related issues	8.5	10.5	2
Healthy homes: lack of sun/ dampness/ mould/ colder in winter/ more rainfall here	5	5.5	0.5
Climate change: very dry summer/ bush fire threat/ too much rain/ weather events	2.5	4	1.5
Home maintenance issues: roof maintenance/ leaves and debris/ blocked gutters/ trees too big	2.5	2.5	0
Littering and rubbish	5	10.5	5.5
Littering/ dumping of rubbish/ plastic/ rubbish on beaches	3	8.5	1.5
Lack of rubbish bins	1	1.5	0
Rubbish collection	1.5	1.5	0

 Table 12: Challenges for the area lived in, including after question about any other challenges (answers where significant area differences)

CHALLENGES FOR THE AREA LIVED IN	Total	Waima/ Woodlands Park	Laingholm
	(200)	(112)	(88)
	%	%	%
CATEGORIES OF ANSWERS			
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	25.5	19	35 ↑
Watercare plans for new filter station	19	28↑	8
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	18 5	13	26♠
Weed control: dorse/ dinder/ wattle/ hamboo/	10.0		201
wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	15	7	25↑
Protection of nature: deforestation/ destruction of bush/ preservation of natural beauty	11.5	20↑	9
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9	4	14 🕈
THEMES/GROUPED CATEGORIES OF ANSWERS			
Roading/traffic/footpaths	43	36	52 ↑
Storm water/erosion/water quality	33.5	23	47 ↑
Weed and pest control	25.5	19	35 ↑
Remoteness	15	10	21 ↑

3.6 INVOLVEMENT IN REMEDIAL ACTIONS FOR PROTECTING AND ENHANCING THE NATURAL ENVIRONMENT IN THE AREA

Q: Are you personally involved in any remedial actions about (concern)? If yes: Would you describe your level of personal involvement as: Actively or regularly involved; Involved to some degree; Not involved

For each "yes/involved": Are you involved in this: In a personal or individual capacity; As part of a voluntary group; Both?

Are you involved in remedial action about ... (concern) on: Your own property/the property where you live?; Any public land such as parks, reserves, beaches? Any other property/ properties?

The graphs on the following page show the results from these questions juxtaposed to enable comparisons. However since that makes for a substantial amount of information, it is useful to comment on and introduce the graphs.

There is one cluster of results for each of the seven types of ecological and environmental challenges listed in the survey. These are presented in the same order as in the previous graph in section 3.5, reflecting the extent to which people living in the study area agree that each of these are a challenge (though in order separately for flora then fauna challenges, followed by water quality).

Within the cluster for each of these challenges, results are shown for the three questions above:

- The extent, if any, of the person's involvement in remedial actions
- Whether that involvement is in a personal/individual capacity, as part of a voluntary group, or both
- Whether that involvement is on the person's own property (where they live), on public land, or elsewhere

Results for the second dot point above are shown in the order personal, both, then group. This is to make it easy to see the total of "personal" (the sum of the "personal" and "both" bars), or the total of "group" (the sum of the "both" and "part of a voluntary group" bars).



Invasive weeds attract the highest levels of involvement in remedial actions by residents in the study area, with close to three-quarters of residents involved, most often in a personal/individual rather than group capacity, and most often on their own properties.

Dealing with rats, possums then kauri dieback are the remedial action areas that residents are next most often involved in.

Extent of involvement in remedial actions

- There are no marked differences in the extent of residents being involved in remedial actions between those living in Waima/Woodlands Park compared with Laingholm, nor by gender
- Older people (aged 65 years and over) are less likely to be involved in remedial actions about kauri dieback, compared with residents in other age groups, while residents aged 30 to 44 years stand out for being less involved than others in remedial actions concerning invasive weeds (an activity also rarely participated in by those aged 18 to 29 years), other introduced plants, and water quality

Personal and group involvement in remedial actions

- There are no marked differences in the extent of residents being involved in remedial actions in a personal/individual capacity compared with as part of a voluntary group, between those living in Waima/Woodlands Park compared with Laingholm, nor by gender
- Those aged 65 years and over are particularly likely to be involved in action on invasive weeds in a personal/individual capacity, rather than as part of a voluntary group
- Those aged 18 to 39 years are less likely than older people to be involved in a personal/individual capacity in action on invasive weeds or water quality

Where undertake remedial actions

- There is just one marked difference in the extent of residents being involved in remedial actions on their own property compared with public land, between those living in Laingholm compared with Waima/Woodlands Park. This is in terms of actions on invasive weeds, where people living in Laingholm are more inclined to do this on their own property, compared with people living in Waima/Woodlands Park
- There are no marked differences in the extent of residents being involved in remedial actions on their own property compared with public land, by gender
- Residents aged 65 years or over are more often involved in remedial action on possums on their own properties compared with younger people

3.7 ADVICE AND SUPPORT TO HELP MANAGE ENVIRONMENTAL OR ECOLOGICAL CHALLENGES IN THE AREA

- Q: Do you get or use any advice or support to help you manage environmental or ecological challenges in your area?
- Q: Where do you get that advice or support?

Very close to half of residents in the study area get or use advice or support to help them manage environmental or ecological challenges in their area (49%, a simple result so not shown as a graph). There is little variation in this finding across sub-groups, except in that 18 to 29 year olds are particularly uninclined to seek this type of advice or support (just 13% of them do so).

The table of results from the second question above is shown on the follow page. (Note that unlike most other tables of results in this report, this table shows all answers given. Hence there is no corresponding table in Appendix B, which for other questions, shows the totality of answers given. In addition, this is a table where it would not be appropriate to provide grouped answers, as for most other questions. Grouped answers are also not appropriate for some of the following questions concerning groups and organisations.)

Clearly Auckland Council is the source of advice or support people use most often when they are seeking help to manage environmental or ecological challenges in their area, although a wide range of other sources are also used.

The only significant difference in sources of advice or support by area is that residents of Laingholm are much more likely than others to get this from "The Roundabout", a monthly publication put out in Laingholm. Nine percent of Laingholm residents cite this publication as a source of advice or support. (With just that single difference of any note, the equivalent table has not been presented below.)

	Total	
WHERE GOT ADVICE OR SUPPORT	(200) %	
Auckland Council	20	
Community word-of-mouth/ friends/ neighbours	12	
Leaflets/ flyers/ brochures	7	
Arataki Visitors Centre	5.5	
Ecomatters New Lynn	5	
Mail/ post drop	4.5	
The Roundabout	4.5	
Public meetings	3.5	
Community publication/ local magazine (unspecified)	3	
Colleagues/ employer	2.5	
Support groups (unspecified)	2.5	
DOC	2	
Forest and Bird	2	
Library/ books	2	
Media (unspecified)/ newspaper/ TV/ radio	2	
The Fringe	2	
Titirangi Protection Group	2	
Kauri Rescue	1.5	
Native plant specialist/ garden centre/ kauri festival/ garden show	1.5	
School/ kindergarten/ Playcentre	1.5	
Neighbourly	1	
Park Rangers	1	
Waitakere Protection Society	1	
Ark Project	0.5	
Auckland Biodiversity	0.5	
Citizens Advice Bureau	0.5	
Engineers	0.5	
EQC	0.5	
Gecko NZ Trust	0.5	
Landcare Research	0.5	
North-West Wild Link Conservation Network	0.5	
QE2 Trust	0.5	
Sea Shepherd NZ	0.5	
Seaweek	0.5	
Tahura Recreational Trust	0.5	
Treescape	0.5	
Waimana Action Group	0.5	
Watercare	0.5	
Western Leader	0.5	


Most residents could name at least one organisation that addresses environmental and ecological challenges in their area, although 30% were unable to do so.

Auckland Council stands out as the formal body most known as addressing environmental and ecological challenges in the area, though that is identified by just 25% of residents as doing so. It is a striking feature of these findings that residents identify "other" organisations (44%) markedly more often than even Auckland Council, and that "voluntary groups" (22%) are identified almost as often as Auckland Council.

The names of these "voluntary groups" and "other" organisations that were identified by residents in response to this question are listed below.

There is little variation in this information by the sub-groups examined in this analysis. One trend that could be useful to note is that residents living in Laingholm were somewhat more inclined to mention "other" organisations than residents of Waima/Woodlands Park: this is consistent with Laingholm residents also seeing their area as having a particularly strong sense of community. (51% of Laingholm residents named "other" organisations compared with just 38% of Waima/Woodlands Park residents, a difference that is statistically significant at the 90% level of confidence only, falling short of the standard

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minimum of 95% confidence.) Laingholm residents are particularly inclined to mention weed and weedfree groups as organisations addressing environmental or ecological challenges in their area, more so than residents of Waima/Woodlands Park (9% vs 2%). (That is the only area-based difference that is statistically significant, so the equivalent table is not presented below.)

Other organisations	Total (200) %	
	Other voluntary groups	Other organisa- tions
Forest and Bird	4	9.5
Kauri dieback groups: Kauri Rescue/ Save our Kauri/ Keep Kauri Standing	2.5	7
Weedfree Groups/ weed collective/ war on weeds/ weedbusters/ Weedfree Trust	3.5	6.5
Ecomatters	0	5
Waitakere Ranges Protection Society	2.5	4
Arataki Visitor Centre/ park rangers	1	3
Waima 2 Laingholm Pest Free Group/ W2L Possum Control	2	3
Ratepayers Association/ Huia/ Titirangi/ LDCA	0.5	2.5
Titirangi Protection Group	2.5	2.5
Watercare	0	2.5
Friends of Waitakeres/ Ranges	1	2
Twin Streams Project	0	2
Waituna Action/ Waituna group/ Waituna Stream	2.5	2
Local volunteer groups/ small initiatives (unspecified)/ Laingholm group	2	1.5
Local possum groups: Volunteer possum control/ possum blitz/ possum headquarters/ neighbourhood possum trapping group	2	1

Table 14: Other organisations that address environmental and ecological challenges in the area – most often mentioned

Note: groups and organisations are included in this table if mentioned by 2% of residents or more, in response to either question. The full list of all groups and organisations mentioned by residents in the survey is shown in Appendix B.

Q: Now thinking just about VOLUNTARY groups and organisations, are there any (other) VOLUNTARY groups or organisations you know of that are addressing environmental and ecological challenges in your area?

The table on the following page shows the answers to the question above in the right-most column. These answers have been accumulated with answers previously given for voluntary organisations.

The results for organisations people named earlier in the survey (see previous pages) are also shown in this table, for comparison and context.

Clearly people identify a very wide range of voluntary groups and organisations that are addressing environmental and ecological challenges in the area. That is apparent from the table following, but even more so in the full results from these questions shown in Appendix B. The specific organisations that stand out in this list (though even then with small percentage results) are:

- Forest and Bird
- Waitakere Ranges Protection Society
- Titirangi Protection Group

As noted in response to an earlier question, residents living in Laingholm are particularly likely to mention weed and weed-free groups in their area (18% compared with just 7% mention by residents of Waima/Woodlands Park, after the additional prompt of asking about voluntary organisations). The only other area-based difference is that residents of Waima/ Woodlands Park more often mention "Waituna Action" (5%), compared with how often this is mentioned by residents of Laingholm (0%).

Table 15: Organisations that address environmental and ecological challenges in the area – short list

ORGANISATIONS		Total (200) %	
	Other voluntary groups	Other organisa- tions	Other voluntary including when prompted
Forest and Bird	4	9.5	9
Weedfree Groups/ weed collective/ war on weeds/ weedbusters/ Weedfree Trust	3.5	6.5	9
Kauri dieback groups: Kauri Rescue/ Save our Kauri/ Keep Kauri Standing	2.5	7	7.5
Local volunteer groups/ small initiatives (unspecified)/ Laingholm group	2	1.5	5
Waitakere Ranges Protection Society	2.5	4	4.5
Local possum groups: Volunteer possum control/ possum blitz/ possum headquarters/ neighbourhood possum trapping group	2	1	4
Titirangi Protection Group	2.5	2.5	4
Ark in the Park	1	1	3.5
Action group about Watercare proposal/ Titirangi community organisation fighting Watercare	0.5	1	3
Non-voluntary organisations and council/ DOC/ Arataki Centre	0	0	3
Waituna Action/ Waituna group/ Waituna Stream	2.5	2	3
Laingholm weed groups/ Laingholm weed free/ Laingholm weed out	1	1.5	2.5
Coastal clean-up groups: Seaweed clean-up	1	0.5	2
Waima 2 Laingholm Pest Free Group/ W2L Possum Control	2	3	2
Ecomatters	0	5	1.5
Little Muddy Creek Estuary Rehabilitation Project	1	0.5	1.5
Local schools	0	0.5	1.5
Ratepayers Association/ Huia/ Titirangi/ LDCA	0.5	2.5	1.5
Twin Streams Project	0	2	1.5
Whau Stream people	0	0	1.5

Note: this short list of organisations shows all those mentioned by residents in response to questions about voluntary organisations. Only those mentioned by 1.5% (3 people) or more are shown in this table. The equivalent full list is shown in Appendix B. In this table, the rows are sorted by the last column, i.e. based on how often each voluntary organisation was mentioned, including when people were prompted to think about voluntary organisations specifically. That is the reason the order above is marginally different from the table in the section before.

3.9 DOING MORE TO PROTECT AND ENHANCE THE NATURAL ENVIRONMENT IN THE AREA

- *Q:* Would you like to see more done to protect and enhance the natural environment in your area?
- Q: If additional funds were available to protect and enhance the natural environment in your area, what ONE challenge or ecological issue would you MOST like to see those funds used to address?

A strong majority of residents would like to see more done to protect and enhance the natural environment in their area (86%, a simple result that is not shown as a graph). That strong majority is consistent across the sub-groups, i.e. for residents of both Waima/Woodlands Park and Laingholm, men and women, and across the age groups.

The table on the following page shows the issues people would most like to see additional funds used to address. For context and comparability, the results for that question are shown in the right-most column, with results from earlier comparable questions also shown. (Those are the results from questions about the challenges people identify in their area, presented and discussed in sections 3.2 and 3.5.)

Four of the specific challenges residents had identified earlier in the survey stand out strongly as those they would most like to see addressed should additional funding be available to do so:

- Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy
- Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams
- Kauri dieback
- Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons

When the results are grouped by theme rather than specific challenges, a very similar pattern of priorities emerges as people's main priorities:

- Weed and pest control
- Water quality/storm water/erosion (however the specific concern above about water quality of beaches and streams stands out strongly within this group, with much less emphasis on erosion or storm water)
- Kauri dieback and track closures (however the specific concern above about Kauri dieback stands out within this group, with much less emphasis on track closures)

It is a striking finding from the following two tables that people's preferences for use of additional funds to protect and enhance the natural environment in their area, are so focussed on the points above. That is in strong contrast to the much wider spread of issues they consider challenges in their area.

The last of the three tables in the following series shows that there are no differences between the opinions of residents of Waima/Woodlands Park compared with Laingholm that are statistically significant. Even so all of the topics above vary to a moderate extent between the two areas.

Table 16: One challenge or ecological issue would most like to see addressed if additional funds available (categories of answers)

ONE CHALLENGE OR ECOLOGICAL ISSUE WOULD		Total	
MOST LIKE TO SEE ADDRESSED IF ADDITIONAL		(200)	
FUNDS AVAILABLE		%	
CATEGORIES OF ANSWERS	Challenges	+ Other challenges	One to address
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	13.5	15	20
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	10.5	18.5	19.5
Kauri dieback	20	21.5	16
Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons	10.5	15	15.5
Watercare plans for new filter station	12	19	4.5
Protection of nature: deforestation/ destruction of bush/ preservation of natural beauty	11.5	15	4.5
Track closures	13	14	3.5
Littering/ dumping of rubbish/ plastic/ rubbish on beaches	3	8.5	1.5
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	24	25.5	1
Erosion/ subsidence/ landslips/ unstable land	2	7.5	1
Lack of council tree management: roadside trees not trimmed/ overgrown	5	7	1
Establish wildlife sanctuary: predator free/ decline of native birds/ establish marine sanctuary	0	2.5	1
Storm water issues: lack of drains/ open drains/ blocked drains causing flooding	9	14	0.5
Lack of footpaths	13	13.5	0.5
Lack of conservation mind-set/ understanding environmental issues	7	9.5	0.5
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9	9	0.5
Council neglect of West Auckland/ forgotten us/ reduced council services/ Langholm forgotten suburb	3.5	5.5	0.5
Bureaucracy: consent process/ not permitted to build	4	5	0.5
Over fishing/ undersized/ stripping shell fish beds	1	2.5	0.5
Lack of playgrounds/ amenities for children	1.5	1.5	0.5
Track maintenance: widen tracks/ extend walkways	0	1	0.5

Categories of answers given most often are shown above: see also next table for grouped categories of answers, and the full table of these results in Appendix B.

Table 17: One challenge or ecological issue would most like to see addressed if additional funds available (themes/grouped categories of answers)

ONE CHALLENGE OR ECOLOGICAL ISSUE WOULD		Total	
MOST LIKE TO SEE ADDRESSED IF ADDITIONAL FUNDS AVAILABLE		(200)	
		%	Oracta
THEMES/GROUPED CATEGORIES OF ANSWERS	Challenges	+ Other challenges	One to address
Weed and pest control	20	25.5	32.5
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	13.5	15	20
Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons	10.5	15	15.5
Water quality/storm water/erosion	18.5	33.5	21
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	10.5	18.5	19.5
Erosion/ subsidence/ landslips/ unstable land	2	7.5	1
Storm water issues: lack of drains/ open drains/ blocked drains causing flooding	9	14	0.5
Kauri dieback and track closures	25	27	18.5
Kauri dieback	20	21.5	16
Track closures	13	14	3.5
Littering and rubbish	5	10.5	1.5
Lack of rubbish bins	1	1.5	0
Littering/ dumping of rubbish/ plastic/ rubbish on beaches	3	8.5	1.5
Rubbish collection	1.5	1.5	0
Roading/traffic/footpaths	41	43	1
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	24	25.5	1
Lack of footpaths	13	13.5	0.5
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9	9	0.5
Traffic issues: congestion/ increased volume/ too fast for conditions	11.5	12.5	0
Remoteness	15	15	0
Remoteness: distance to city/ work/ commute	11.5	11.5	0
Distance to shops/ supermarket	3	3	0
Distance to sports/ amenities/ schools	1.5	1.5	0
Slow police response	0	0.5	0
Home-related issues	8.5	10.5	0
Healthy homes: lack of sun/ dampness/ mould/ colder in winter/ more rainfall here	5	5.5	0
Climate change: very dry summer/ bush fire threat/ too much rain/ weather events	2.5	4	0
Home maintenance issues: roof maintenance/ leaves and debris/ blocked gutters/ trees too big	2.5	2.5	0

The following table shows differences in results above for residents of Waima and Woodlands Park, compared with those in Laingholm, for the answers most often given above. This table is fundamentally different from the earlier tables that contrast these groups, in that none of the differences shown below are large enough to be statistically significant. (Earlier similar tables only show results where there is a significant difference.) Although not significant, the differences shown in this table are all moderately large, the reason this table has been included.

CHALLENGES FOR THE AREA LIVED IN	Total	Waima/ Woodlands Park	Laingholm
	(200)	(112)	(88)
	%	%	%
CATEGORIES OF ANSWERS			
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	20	16	24(↑)
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	19.5	15	25(↑)
Kauri dieback	16	18(♠)	14
Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons	15.5	17(♠)	14
THEMES/GROUPED CATEGORIES OF ANSWERS			
Weed and pest control	32.5	29	37(♠)
Storm water/erosion/water quality	21	17	26(†)
Kauri dieback and track closures	18.5	22(†)	14

Table 18: Challenges or ecological issues would most like to see additional funds used to address by area (all answers most often given, no differences statistically significant)

The symbol (\uparrow) is used in this table to emphasise the results that are higher than for the other area. The arrows are shown bracketed to make the distinction from the use of arrows in the earlier tables, with none of these differences being statistically significant, though somewhat noteworthy even so.

3.10 ALLOWING ACCESS TO OWN PROPERTY FOR DEDICATED ENVIRONMENTAL ORGANISATION

Q: If a dedicated organisation was set up to help fund and manage environmental and ecological challenges in your area, would you be willing to allow them access to your property to do this work?

If "Depends" or "Not sure" or "Don't know" above, explain and ask:

Q: This would most likely involve suitably trained people coming onto your property just a few times a year. They would let you know in advance each time they wanted access to your property. They would do things like rat and possum control, weed control, or assessing for kauri dieback and undertaking treatment if needed.

In view of those points, would you be willing to allow people from the dedicated organisation access to your property to help manage environmental and ecological challenges?

Willingness to allow people from dedicated organization access to your property



Clearly very high proportions of residents in the study area would be willing to allow access to their properties for the purposes explained in the survey of managing environmental and ecological challenges in their area.

These high levels of people willing to provide access to their properties are not markedly (or statistically significant) different by area, although there is a small trend for residents of Laingholm to be more willing than residents of Waima/Woodlands Park after the first simpler explanation (77% vs 70% from the first part of the question above). However that difference drops to almost nothing when the fuller

explanation is given, that is, residents of Waima/Woodlands Park relatively often warm to providing access to their properties once the further explanation is given.

There are no significant differences in these results by gender or age group.

One further analysis was done just on these questions, examining whether the results from these questions may vary depending on whether people named Watercare's plan for the filter station as a challenge in their area. (Refer sections 3.2 and 3.5.)

While it could be argued that there is no reason to anticipate any connection between those two sets of results, even so, it is of some interest that those who named Watercare's plan for the filter station were almost exactly equally willing to allow access to their properties, as other residents, or if anything, slightly more inclined to allow access.

APPENDIX A: FURTHER DETAILS OF SURVEY METHODS, SAMPLE AND RESULTS

The introduction chapter in this report provides an overview of the methods used in this survey. Supplementary details are provided below.

Conduct of the interviews

Phoenix subcontracted Infield International Limited to undertake the interviewing for this survey. Infield is a specialist provider of telephone interviewing services, and is used by a number of leading New Zealand market and survey research firms. The Phoenix director of this project briefed the Infield interviewers working on this project and their supervisors, monitored the progress of the survey (as frequently as daily in the first few days the survey was running, when close monitoring is especially appropriate), and was available for guidance to the interviewing team as the survey proceeded.

Interviewing was done from the Infield International call centre, where a number of quality assurance procedures apply:

- Full training, supervision and live monitoring of interviewers
- Interviews are undertaken using a CATI system (computer assisted telephone interviewing), which faciltates interviewers focusing on their key tasks of following their instructions and question wording exactly, establishing raport with respondents, and accurately recording their answers to the survey questions
- All interviews are audio-recorded for later auditing, feedback to interviewers, and for use in further training
- All call management (of random sampling from sample lists, planning and scheduling call-backs, keeping records of all survey contact attempts and their outcomes, and interview durations, etc), is done by the CATI system, for comprehensive and accurate recording
- The entire Infield interviewing operation is ISO accredited

Up to six calls were made to each property that the interviewers attempted to contact for the survey, or up to ten calls if some contact had been established (for example if a call-back had been scheduled but then no-one turned out to be available for interview when the call-back was made). This procedure helps ensure the representativeness of the survey, in particular by minimising the bias that would otherwise be present in the sample, towards people who are more readily available to be interviewed.

The average duration of the interviews was 20 minutes.

Sample

Obtaining a comprehensive listing of households and residents living in the study area was not straightforward. Several options were considered. For example, it was not workable to use the published Auckland telephone directory for this purpose, because the proportion of those listings that are relevant to the study area is extremely small. That method would have required electronic screening of the listings (since the number of streets needing to be included is much too large for manual processing, and in addition some streets needed number checks to determine whether the property is within the study area, e.g. Huia Road). Whereas it was possible to access the published Auckland telephone directory as an electronic file in the past, the publishers of the directory have not allowed that for some years.

Finally, the published telephone directory obviously only covers landlines, which would have been an undue limitation on the coverage provided by the survey.

Consequently it was decided to rely on listings of households in the area provided by two leading providers of this type of information, both of whom were able to provide both landline and mobile numbers associated with a number of properties in the study area. These two providers used for this survey were Egentic and Equifax. Egentic provided a total of 365 numbers in the study area (59 landlines and 306 mobile numbers), and Equifax provide a total of 582 numbers in the study area (536 landlines and 46 mobile numbers). After removing duplicate entries on the lists from these two sources, and amalgamating data where both a landline and mobile number were available for the same property, a total of 810 properties were available for calling to conduct this survey: this was a mix of properties where either a landline or mobile phone number, or both, were available.

That number can usefully be compared with a total household count for the study area quoted by Boffa Miskell as 1976 properties. A small detail about the sampling for the survey is that the survey included people in properties on the north side of Scenic Drive, even though the study area strictly includes only those on the south side. There are about 100 of these properties, so the total number of properties the survey would have ideally been able to cover would be close to 2076. That is, the survey had available as potential participants in the survey, 810 / 2076 = 39% of properties in the study area.

The 200 interviews conducted comprise close to 10% of all households in the study area. That is a very high proportion by the standards of most surveys.

By the time the full quota of 200 interviews had been completed, attempts had been made to contact all 810 properties on the combined list. For most of these properties (86%), calls had been completed to the end of the calling cycles, i.e. the full six or ten calls to each property described above had been made. However for 113 properties, although a number of attempts had been made to get an interview for that property, the full cycle of contact attempts had not yet been completed.

The outcomes of contacting the other properties where an interview was not obtained included where the contacted person refused to be interviewed, where an answering machine was repeatedly encountered, or where the number was disconnected.

The net result of the contacting for the survey was that 72 interviews were conducted on mobile phones and 128 on landlines.

Sample profile

The Introduction chapter of this report mentions that tests were run to compare the geographic spread of the sample with the spread of all properties/households in the study area. These tests were run at three complementary levels of "granularity":

- Using the counts of the numbers of properties in all streets in the study area
- Using the counts of the numbers of properties in all streets in the study area that have above the threshhold minimum counts that some statisticians argue makes this test more robust
- As described below, using a simple two-way split distinguishing properties in Laingholm versus Waima
 and Woodlands Park

At all three of these levels of "granularity", the relevant statistical test (the Chi square test) showed the sample spread to be a good match to the spread of the "population" for this study, i.e. all properties in the study area.

For the purposes of analysis, as explained in the Introduction chapter, results have been broken down into a two-way split of these sub-areas within the overall study area:

- Waima and Woodlands Park (56% of the sample, which compares with 62% of all households in the study area)
- Laingholm (44% of the sample, which compares with 38% of all households in the study area)

This shows that the sample contains a modest over-representation of people and their households living in Laingholm rather than Waima/Woodlands Park. However the difference is not large enough to be statistically significant. That point can also be expressed as its converse, i.e. that the sample contains a mix of people living in the two sub-areas, that is a good match to the mix of all households in the study area, when using the two-way split of sub-areas.

The demographic composition of the sample is shown in the following tables. For some surveys, this information can usefully be compared with other demographic data, as a way to determine how representative the sample is of the population the survey aims to represent, in this case all those living in the study area. However for this survey, that comparing of the demographics of the sample compared with the population has not been undertaken, for these reasons:

- The study area does not match any area definitions used for publishing Census results
- The most recent Census results available are from the 2013 Census (since the results from the 2018 Census have not yet been published)
- The demographic profile of those who would or might decide whether to give permission for access to their property for remedial environmental work, is likely to be different from the demographic profile of the full population of the area

Consequently the following demographic profiles of the sample are presented simply to show the mix of people in the survey sample. It is left to the reader to estimate the apparent "reasonableness" of this sample as representative of those in the study area making decisions about access to their property.

Table 19: Gender

	Total
GENDER	(200)
	%
Male	40.5
Female	59.5

Table 20: Age group

	Total
AGE GROUP	(200)
	%
18 – 29 years	7.5
30 – 44 years	15.5
45 - 64 years	43.5
_65 years or over	33.5

Table 21: Number of people in household

NUMBER OF PEOPLE IN HOUSEHOLD	Total (200) %
One	12.5
Тwo	33
Three	15.5
Four	25
Five or more	13.5
Declined to answer	0.5

Table 22: Involvement in household decision-making	
	Total
INVOLVEMENT IN HOUSEHOLD DECISION-MAKING	(200)
	%
Make decisions without involving anyone else	17.5
Make decisions jointly with one or more others	75.5
Provide input to decisions that others make	4
Not involved in household decision-making	1
Don't know/not sure/refused	2

Table 23: Property tenure

	Total
PROPERTY TENURE	(200)
	%
Owned with or without a mortgage	95
Rented	3.5
Trust/family trust	0.5
Other	1

(Note that it was known in advance that the companies providing the sample lists for this survey assemble their lists in ways that are particularly likely to include people living in their own homes, and with low proportions of people living in rented accommodation. This is one reason for the scenario modelling shown at the end of this appendix.)

Respondent willingness to be interviewed again

Phoenix surveys sometimes ask those interviewed, at the end of the survey, if they are willing for us to call them again if needed. This is done for two reasons:

- So we have permission to recontact people should we wish to clarify any of their answers or ask them to expand on them (almost never used)
- As a measure of the satisfaction of the respondent with the interview procedure

In this survey 97.5% gave their permission for us to call them again if needed. That is a very high level, an indication that respondents felt the survey was worthwhile or at least reasonable.

Analysis and presentation of results

With this survey having a sample size of 200, percentage results based on the total sample of people interviewed are always either an exact round number of percentage points (e.g. 20.0%) or else a percentage ending with ".5%" (e.g. 20.5%).

The mathematically correct way to round the latter type of result is to round it up to the nearest percentage (e.g. 21%). If results were presented from this survey as simply rounded percentages (i.e. in the form 21%), on average, half of the results presented would be 0.5% too high.

In the interests of accuracy, results in this survey are all presented to show that 0.5% if applicable, in the main tabulated results. In the interests of clarity, readability and simplicity, results are shown either in the form 20% or 20.5% if applicable. That departs from a convention by which in such circumstances result of 20% should be shown as 20.0%, as a way to indicate the level of accuracy of reporting (not used in this case for clarity, readability and simplicity).

Note that again in the interests of clarity and simplicity, only rounded percentages are shown in both the graphs and the columns of tabulated results showing the contrasts between residents of Waima/ Woodlands Park compared with Laingholm.

Margins of error

Margins of error are widely quoted with survey results, to show the extent to which any result from a survey can be generalised to the population the survey represents.

These are routinely quoted as being at the "95% level of confidence", which (in lay terms) asserts that the results if the full population under inquiry had been surveyed instead of just a sample of them, the population-based results would be 95% likely to lie within the range indicated by the error margins.

These error margins are derived from mathematical statistics, and are subject to assumptions, a key one of which is that the sample for the survey is a simple random sample. That assumption is virtually never met in survey research, but this approach is widely accepted even so as providing a sound indication of the "reliability" or "statistical validity" of the results. (This can more formally be expressed as the extent to which the survey results can be taken to represent the answers from the relevant population.)

Margins of error are typically expressed as " \pm " or "plus-or-minus". That is, the range of likely results for the relevant population is between:

- The survey result MINUS the margin of error, and
- The survey result PLUS the margin of error

Margins of error depend on both the size of the sample, and the percentage being examined.

The following table shows the margins of error for a range of percentage results that could be examined, for the total sample interviewed for this survey (200 people), and for results based on close to half the sample (100 people) or a quarter of the sample (50 people). (The margins of error for sub-groups of the sample are shown only because that type of analysis has been undertaken to identify when sub-groups have markedly different results from the full survey sample. Any such differences are commented on in the text.)

Table 24: Margins of error

	SAMPLE A	SAMPLE AND SUB-SAMPLE SIZES		
BEING ASSESSED	200	100	50	
	%	%	%	
50%	<u>+</u> 6.9	<u>+</u> 9.8	<u>+</u> 13.9	
70%	<u>+</u> 6.4	<u>+</u> 9.0	<u>+</u> 12.7	
30%	<u>+</u> 6.4	<u>+</u> 9.0	<u>+</u> 12.7	
80%	<u>+</u> 5.5	<u>+</u> 7.8	<u>+</u> 11.1	
20%	<u>+</u> 5.5	<u>+</u> 7.8	<u>+</u> 11.1	
90%	<u>+</u> 4.2	<u>+</u> 5.9	<u>+</u> 8.3	
10%	<u>+</u> 4.2	<u>+</u> 5.9	<u>+</u> 8.3	
95%	<u>+</u> 3.0	<u>+</u> 4.3	<u>+</u> 6.0	
5%	<u>+</u> 3.0	<u>+</u> 4.3	<u>+</u> 6.0	

Examples of how to apply the above table of margins of error are shown in the discussion below.

Further calculations about how key survey results apply to the full population of the study area

As explained in the Introduction chapter of this report, the primary objective of this survey was to determine the proportion of properties in the study area where residents would give permission for access to their properties for environmentally remedial work. The survey result is that 73% would be willing to allow this access based on a very simple explanation, building to 82% once given a slightly fuller explanation.

The table of margins of error, using the margins of error quoted for results of 70% and 80% respectively (close enough approximations for this purpose), gives rise to the following:

- The survey result of 73% giving permission indicates that the range of likely results for the entire study area is between:
 - 73% MINUS the margin of error of 6.4%, i.e. 66.6%, and
 - 73% PLUS the margin of error, i.e. 79.4%
- The survey result of 82% giving permission (after they had been given a slightly fuller explanation) indicates that the range of likely results for the entire study area is between:
 - 82% MINUS the margin of error of 5.5%, i.e. 76.5%, and
 - 82% PLUS the margin of error, i.e. 87.5%

Those ranges of likely results for the full study area apply if the sample can reasonably be taken to represent the full population, or technically, if the sample is or was a pure random sample of the full population (or a good approximation to a pure random sample).

It is useful to examine some worst-case scenarios, based on the survey sample conceivably giving a biased result, i.e. deviating markedly from a pure random sample. For example it could be argued (this

is entirely hypothetical but useful to explore even so) that those who answered the survey are more amicable and generally co-operative than those who did not participate in the survey. The following analysis shows the impacts of making some quite extreme assumptions about the differences between those who answered the survey and those who did not, about their willingness to allow access to their properties, and calculates the result for the study area as a whole given those assumptions.

The following calculations are based on the proportion set out earlier in this appendix, that the survey has assessed the opinions of very close to 10% of all households in the study area.

1. Starting from the 73% in the survey who would allow access given only a simple explanation

Scenario 1: Only half that proportion of the other people living in the study area would allow access, i.e. 36.5%. The result for the full study area would then be 40.2%.

Scenario 2: Only a quarter of that proportion of the other people living in the study area would allow access, i.e. 18.3%. The result for the full study area would then be 23.7%.

2. Starting from the 82% in the survey who would allow access given a slightly fuller explanation

Scenario 1: Only half that proportion of the other people living in the study area would allow access, i.e. 41%. The result for the full study area would then be 45.1%.

Scenario 2: Only a quarter half that proportion of the other people living in the study area would allow access, i.e. 20.5%. The result for the full study area would then be 26.7%.

It is stressed that the scenarios modelled above are quite extreme. Even so, it is clear that under even those very extreme conditions, the survey shows that the proportion of properties where residents would allow access to their properties for environmentally remedial work is well clear of the 20% threshold described in the Introduction to this report.

To conclude on this point, it is useful to reiterate that the standard way to interpret survey results is to assume that they accurately represent the views of the full population the survey is designed to represent. That is, the standard interpretation is that the access permission results of 73% and 82% are the best estimates for the full population in the study area, not the reduced levels calculated in the worst-case scenarios above.

APPENDIX B: TABLES INCLUDING ALL ANSWERS TO OPEN-ENDED QUESTIONS

As discussed at the beginning of chapter 3, the following tables are the same of those shown in Chapter 3, except that the tables in this appendix show all answers given, not just those given more often, as shown in Chapter 3.

Note that most of these tables run over more than one page.

	Total
BEST THINGS ABOUT LIVING IN AREA	(200)
	%
ALL CATEGORIES OF ANSWERS	
Peaceful: tranquil/ quiet/ restful/ calming/ like sanctuary	35.5
Access to beaches	35
Bush/ native plants	35
Community spirit: close community/ look out for each other/ support network	25
Trees/ forest/ kauri	25
Birdlife: native birds/ wood pigeons/ quail/ birdsong	24.5
Beauty: unspoilt/ just beautiful/ pristine wilderness	20
Walking tracks/ bush walks	20
Natural environment: close to nature/ links to environment	19
Views/ scenery, beautiful harbours/ city views	17
The people: friendly/ laid back/ good/ nice/ respectful	14.5
Close to Auckland: close enough/ 25 mins to CBD	14
Large sections/ not sub-dividable/ no infill housing/ distance from neighbours	13.5
Privacy/ space	13.5
Semi-rural/ country feel/ village feel	11
Air quality: fresh air/ no pollution	10
Less populated	7.5
Lush/ green	7
Nature-aware community: focus on conservation/ everyone on same page/ like-minded/ stewards of the land	7
Not too close to Auckland: not right in city/ removed from rat race	7
Wildlife	6
Good schools/ great primary	5.5
Less traffic	5.5
Waitakere Ranges	5
Good place to bring up children	4.5
Beaches: lots of beaches/ 22 different beaches	4
Climate: cool in summer/ warmer in winter/ lower humidity	3.5
Focus on arts: events/ markets/ Lopdell House	3.5
Safety: safe place to live/ feel secure	3.5
Paradise/ bliss	3
Titirangi village	3
Dog friendly: lots of off-leash areas	2
Good shops/ cafes/ restaurants locally	2
Clean	1.5
Good parks/ playgrounds	1.5

BEST THINGS ABOUT LIVING IN AREA	Total (200) %
ALL CATEGORIES OF ANSWERS	
Public transport	1.5
Uniqueness	1.5
Access to fishing	1
Arataki Visitors Centre/ rangers	1
Fresh water	1
Housing cheaper than city	1
Views of stars	1
Well maintained roads	1
Wind protection/ shelter	1
Access to hunting	0.5
No vandalism/ no graffiti	0.5
Parking	0.5
Pest control initiatives	0.5
Nothing	0.5

CHALLENGES FOR THE AREA LIVED IN	Total (200)
	(<u>2</u> 00) %
ALL CATEGORIES OF ANSWERS	
Limited public transport/ infrequent/ no trains/ lack of park and ride/ school bus service discontinued/ 1¾ hours to Newmarket	27
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	24
Kauri dieback	20
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	13.5
Lack of footpaths	13
Track closures	13
Watercare plans for new filter station	12
Protection of nature: deforestation/ destruction of bush/ preservation of natural beauty	11.5
Remoteness: distance to city/ work/ commute	11.5
Traffic issues: congestion/ increased volume/ too fast for conditions	11.5
Urbanisation: development/ subdivision/ population intensification/ changes to zoning	11.5
Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons	10.5
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	10.5
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9
Power outages/ overhead lines / damage in storms	9
Storm water issues: lack of drains/ open drains/ blocked drains causing flooding	9
Lack of conservation mind-set/ understanding environmental issues	7
nternet reception	6.5
Cell phone reception	5
Healthy homes: lack of sun/ dampness/ mould/ colder in winter/ more rainfall here	5
Lack of council tree management: roadside trees not trimmed/ overgrown	5
Bureaucracy: consent process/ not permitted to build	4
Council neglect of West Auckland/ forgotten us/ reduced council services/ Langholm forgotten suburb	3.5
Distance to shops/ supermarket	3
Dogs off leash	3
Littering/ dumping of rubbish/ plastic/ rubbish on beaches	3
Climate change: very dry summer/ bush fire threat/ too much rain/ weather events	2.5
Home maintenance issues: roof maintenance/ leaves and debris/ blocked gutters/ trees too big	2.5
Lack of street lighting	2.5

CHALLENGES FOR THE AREA LIVED IN	Total (200) %
ALL CATEGORIES OF ANSWERS	
Water supply infrastructure	2.5
Erosion/ subsidence/ landslips/ unstable land	2
Titirangi village developments: parking/ loss of toilets/ loss of village feel	2
Distance to sports/ amenities/ schools	1.5
Lack of playgrounds/ amenities for children	1.5
Portage Licensing Trust	1.5
Rubbish collection	1.5
Increase in crime/ car break-ins	1
Lack of rubbish bins	1
Over fishing/ undersized/ stripping shell fish beds	1
Population pressure on schools	1
Airport flight path – low flying planes	0.5
Cost of housing	0.5
Lack of dog friendly areas	0.5
Loss of council tree protection	0.5
Old septic tanks	0.5
Rates increase	0.5
Don't know	1.5
Nothing	3

Table 27: Best things about living in area, plus anything else especially valued (all categories of answers)

		Total	
BEST THINGS ABOUT LIVING IN AREA, PLUS		(200)	
		%	
ALL CATEGORIES OF ANSWERS	Best things	Best + valued	Difference
Peaceful: tranquil/ quiet/ restful/ calming/ like sanctuary	35.5	42.5	7
Bush/ native plants	35	41	6
Access to beaches	35	38	3
Community spirit: close community/ look out for each other/ support network	25	35	10
Trees/ forest/ kauri	25	29.5	4.5
Birdlife: native birds/ wood pigeons/ quail/ birdsong	24.5	28	3.5
Natural environment: close to nature/ links to environment	19	24	5
Beauty: unspoilt/ just beautiful/ pristine wilderness	20	22.5	2.5
Walking tracks/ bush walks	20	22.5	2.5
Views/ scenery, beautiful harbours/ city views	17	20.5	3.5
The people: friendly/ laid back/ good/ nice/ respectful	14.5	19	4.5
Privacy/ space	13.5	17	3.5
Close to Auckland: close enough/ 25 mins to CBD	14	16	2
Large sections/ not sub-dividable/ no infill housing/ distance from neighbours	13.5	15.5	2
Semi-rural/ country feel/ village feel	11	12	1
Air quality: fresh air/ no pollution	10	12	2
Wildlife	6	10	4
Less populated	7.5	9.5	2
Nature-aware community: focus on conservation/ everyone on same page/ like-minded/ stewards of the land	7	9	2
Not too close to Auckland: not right in city/ removed from rat race	7	8.5	1.5
Lush/ green	7	7.5	0.5
Good schools/ great primary	5.5	7.5	2
Waitakere Ranges	5	6.5	1.5
Safety: safe place to live/ feel secure	3.5	6.5	3
Beaches: lots of beaches/ 22 different beaches	4	6	2
Less traffic	5.5	5.5	0
Focus on arts: events/ markets/ Lopdell House	3.5	5.5	2
Good place to bring up children	4.5	5	0.5
Climate: cool in summer/ warmer in winter/ lower humidity	3.5	4	0.5
Paradise/ bliss	3	4	1
Good shops/ cafes/ restaurants locally	2	4	2
Privilege to live here/ fortunate	0	4	4
Titirangi village	3	3.5	0.5

BEST THINGS ABOUT LIVING IN AREA, PLUS ANYTHING ELSE ESPECIALLY VALUED	-	Total (200) %	
ALL CATEGORIES OF ANSWERS	Best things	Best + valued	Difference
Uniqueness	1.5	2.5	1
Dog friendly: lots of off-leash areas	2	2	0
Protected/ conservation area	0	2	2
Clean	1.5	1.5	0
Good parks/ playgrounds	1.5	1.5	0
Public transport	1.5	1.5	0
Access to fishing	1	1.5	0.5
Fresh water	1	1.5	0.5
Housing cheaper than city	1	1.5	0.5
Views of stars	1	1.5	0.5
Arataki Visitors Centre/ rangers	1	1	0
Well maintained roads	1	1	0
Wind protection/ shelter	1	1	0
Access to hunting	0.5	0.5	0
No vandalism/ no graffiti	0.5	0.5	0
Parking	0.5	0.5	0
Pest control initiatives	0.5	0.5	0
Can work from home	0	0.5	0.5
Cycling tracks	0	0.5	0.5
Local politicians – working hard for area	0	0.5	0.5
Nothing/nothing to add when asked about what especially value	0.5	38	37.5

		Total	
CHALLENGES FOR THE AREA LIVE IN, PLUS ANY OTHER CHALLENGES		(200)	
		%	
ALL CATEGORIES OF ANSWERS	Challenges	+ Other challenges	Difference
Limited public transport/ infrequent/ no trains/ lack of park and ride/ school bus service discontinued/ 1¾ hours to Newmarket	27	27	0
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	24	25.5	1.5
Kauri dieback	20	21.5	1.5
Watercare plans for new filter station	12	19	7
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	10.5	18.5	8
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	13.5	15	1.5
Protection of nature: deforestation/ destruction of bush/ preservation of natural beauty	11.5	15	3.5
Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons	10.5	15	4.5
Track closures	13	14	1
Storm water issues: lack of drains/ open drains/ blocked drains causing flooding	9	14	5
Lack of footpaths	13	13.5	0.5
Urbanisation: development/ subdivision/ population intensification/ changes to zoning	11.5	13	1.5
Traffic issues: congestion/ increased volume/ too fast for conditions	11.5	12.5	1
Remoteness: distance to city/ work/ commute	11.5	11.5	0
Power outages/ overhead lines / damage in storms	9	9.5	0.5
Lack of conservation mind-set/ understanding environmental issues	7	9.5	2.5
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9	9	0
Littering/ dumping of rubbish/ plastic/ rubbish on beaches	3	8.5	5.5
Erosion/ subsidence/ landslips/ unstable land	2	7.5	5.5
Internet reception	6.5	7	0.5
Lack of council tree management: roadside trees not trimmed/ overgrown	5	7	2
Healthy homes: lack of sun/ dampness/ mould/ colder in winter/ more rainfall here	5	5.5	0.5
Council neglect of West Auckland/ forgotten us/ reduced council services/ Langholm forgotten suburb	3.5	5.5	2
Cell phone reception	5	5	0
Bureaucracy: consent process/ not permitted to build	4	5	1

Table 28: Challenges for the area live in, plus any other challenges (all categories of answers)

		Total	
CHALLENGES FOR THE AREA LIVE IN, PLUS ANY OTHER CHALLENGES		(200)	
		%	
ALL CATEGORIES OF ANSWERS	Challenges	+ Other challenges	Difference
Climate change: very dry summer/ bush fire threat/ too much rain/ weather events	2.5	4	1.5
People overload: too many visitors/ overuse of beaches/ manage visitors	0	3.5	3.5
Distance to shops/ supermarket	3	3	0
Dogs off leash	3	3	0
Home maintenance issues: roof maintenance/ leaves and debris/ blocked gutters/ trees too big	2.5	2.5	0
Lack of street lighting	2.5	2.5	0
Water supply infrastructure	2.5	2.5	0
Over fishing/ undersized/ stripping shell fish beds	1	2.5	1.5
Establish wildlife sanctuary: predator free/ decline of native birds/ establish marine sanctuary	0	2.5	2.5
Use of pesticides/ chemical spraying/ 1080	0	2.5	2.5
Titirangi village developments: parking/ loss of toilets/ loss of village feel	2	2	0
Distance to sports/ amenities/ schools	1.5	1.5	0
Lack of playgrounds/ amenities for children	1.5	1.5	0
Portage Licensing Trust	1.5	1.5	0
Rubbish collection	1.5	1.5	0
Lack of rubbish bins	1	1.5	0.5
Increase in crime/ car break-ins	1	1	0
Population pressure on schools	1	1	0
Airport flight path – low flying planes	0.5	1	0.5
Loss of council tree protection	0.5	1	0.5
Leadership: lack of/ decision-makers inexperienced	0	1	1
Track maintenance: widen tracks/ extend walkways	0	1	1
Cost of housing	0.5	0.5	0
Lack of dog friendly areas	0.5	0.5	0
Old septic tanks	0.5	0.5	0
Rates increase	0.5	0.5	0
Cell phone towers	0	0.5	0.5
Vehicle pollution, not enough electric vehicles	0	0.5	0.5
Slow police response	0	0.5	0.5
Don't know	1.5	2	0.5
Nothing/no other challenges	3	44	

Table 29: Other organisations that address environmental and ecological challenges in the area – full list

		Total	
Other organisations		(200)	
		%	
	Other voluntary groups	Other organisa- tions	Other voluntary including when prompted
1080 spraying	0.5	0	0.5
Action group about Watercare proposal/ Titirangi community organisation fighting Watercare	0.5	1	3
Arataki Visitor Centre/ park rangers	1	3	1
Ark in the Park	1	1	3.5
AT	0	0.5	0
Bird Protection Society	0.5	1	0.5
Bird Rescue	0	0.5	0
Coast Guards	0	0.5	0
Coastal clean-up groups: Seaweed clean-up	1	0.5	2
Community newspaper	0	0.5	0
DTEK – Down to Earth Kiwis	0.5	0	0.5
Ecological Society	0.5	0	0.5
Ecomatters	0	5	1.5
Ecowest	0.5	0	0.5
Environmental Defence Society	0	0.5	0
Forest and Bird	4	9.5	9
Friends of Arataki	0.5	0	0.5
Friends of Waitakeres/ Ranges	1	2	1
Gecko Trust	0	0.5	0
Green Party	0	1	1
Greenpeace	0	1.5	1
Huia weed group	1	0	1
Kauri dieback groups: Kauri Rescue/ Save our Kauri/ Keep Kauri Standing	2.5	7	7.5
Laingholm weed groups/ Laingholm weed free/ Laingholm weed out	1	1.5	2.5
Laingholm Working Group	0	0	0.5
LANDS	0	0.5	0
Lions	0	0	0.5
Little Muddy Creek Estuary Rehabilitation Project	1	0.5	1.5
Local fire brigade	0	0	0.5
Local iwi	0	0.5	0.5

Other organisations		Total (200)	
	Other voluntary groups	Other organisa- tions	Other voluntary including when prompted
Local possum groups: Volunteer possum control/ possum blitz/ possum headquarters/ neighbourhood possum trapping group	2	1	4
Local schools	0	0.5	1.5
Local volunteer groups/ small initiatives (unspecified)/ Laingholm group	2	1.5	5
Manukau Harbour Group	0	0.5	0.5
Marcus – environmentalist on Facebook	0	0.5	0
Matuku Link	0	0.5	0
Neighbourly (Facebook)	0	0.5	0
Non-voluntary organisations and council/ DOC/ Arataki Centre	0	0	3
Owens Green Group	0	0	0.5
Paper Up Recycling	0.5	0	0.5
Periodic Detention people	0	0.5	0
Pest free (unspecified)	0	0.5	0
Pest free Huia	0	0.5	0
Pest free Laingholm	0.5	1	1
Pest free Piha	0	0.5	0
Pest Free South Titirangi	0.5	0	1
Pony Club	0	0.5	0
Project Crimson	0	0.5	0
Ratepayers Association/ Huia/ Titirangi/ LDCA	0.5	2.5	1.5
Safe swim network	0	1	0
Save Cornwallis Wharf/ Friends of Cornwallis Wharf	0	1	0
Sea Shepherd	0	0.5	0
South Titirangi neighbourhood network	0.5	0.5	0.5
Sustainable community group	0.5	0	0.5
Titirangi Protection Group	2.5	2.5	4
Titirangi Road group	0.5	0	0.5
Tree Council	0	0.5	0
Tree Croppers Association	0	0.5	0
Tree protection people against felling native trees	0	0	0.5
Treescape	0	0.5	0
Twin Streams Project	0	2	1.5
Waima 2 Laingholm Pest Free Group/ W2L Possum Control	2	3	2

Other organisations	_	Total (200) %	
	Other voluntary groups	Other organisa- tions	Other voluntary including when prompted
Waima community	1	0	1
Waimata Weed Free Titirangi	0	0.5	0
Waitakere Birds	0	0.5	0
Waitakere Community Board	0	0.5	0
Waitakere Ranges Foothills Society	0	0.5	0
Waitakere Ranges Protection Society	2.5	4	4.5
Waituna Action/ Waituna group/ Waituna Stream	2.5	2	3
Watercare	0	2.5	0
Weedfree Groups/ weed collective/ war on weeds/ weedbusters/ Weedfree Trust	3.5	6.5	9
Weed-free Waitakere	0	1	0
Whau Stream people	0	0	1.5
Zero Waste	0	0.5	0.5
Can't recall name			12
Cannot name any (other) voluntary groups or organisations			48.5

Table 30: One challenge or ecological issue would most like to see addressed if additional funds available (all categories of answers)

ONE CHALLENGE OR ECOLOGICAL ISSUE WOULD		Total	
MOST LIKE TO SEE ADDRESSED IF ADDITIONAL FUNDS AVAILABLE		(200)	
		+ Other	One to
ALL CATEGORIES OF ANSWERS	Challenges	challenges	address
Weed control: gorse/ ginger/ wattle/ bamboo/ wandering dew/ agapanthus/ jasmine/ mangroves/ ivy	13.5	15	20
Water quality of beaches and streams: pollution/ sewage overflow/ beaches closed/ old infrastructure/ clearing of streams	10 5	18 5	19 5
Kauri dieback	20	21.5	16
Pest control: possums/ rats/ wasps/ stoats/ wild boar/ ferrets/ rosella/ cats/ Argentinian ants/ pigeons		15	15.5
Watercare plans for new filter station	12	19	4.5
Protection of nature: deforestation/ destruction of bush/			
preservation of natural beauty	11.5	15	4.5
Track closures	13	14	3.5
Littering/ dumping of rubbish/ plastic/ rubbish on beaches	3	8.5	1.5
Roading issues: design and maintenance/ narrow/ blind corners/ neglected/ pot holes	24	25.5	1
Erosion/ subsidence/ landslips/ unstable land	2	7.5	1
Lack of council tree management: roadside trees not trimmed/ overgrown	5	7	1
Establish wildlife sanctuary: predator free/ decline of native birds/ establish marine sanctuary	0	2.5	1
Storm water issues: lack of drains/ open drains/ blocked drains causing flooding	9	14	0.5
Lack of footpaths	13	13.5	0.5
Lack of conservation mind-set/ understanding environmental issues	7	9.5	0.5
Poor maintenance of footpaths/ neglected/ weeds and leaves not cleared	9	9	0.5
Council neglect of West Auckland/ forgotten us/ reduced council services/ Langholm forgotten suburb	3.5	5.5	0.5
Bureaucracy: consent process/ not permitted to build	4	5	0.5
Over fishing/ undersized/ stripping shell fish beds	1	2.5	0.5
Lack of playgrounds/ amenities for children	1.5	1.5	0.5
Track maintenance: widen tracks/ extend walkways	0	1	0.5
Limited public transport/ infrequent/ no trains/ lack of park and ride/ school bus service discontinued/ 1 ³ / ₄ hours to Newmarket	27	27	0
Urbanisation: development/ subdivision/ population intensification/ changes to zoning	11.5	13	0
Traffic issues: congestion/ increased volume/ too fast for conditions	11.5	12.5	0
Remoteness: distance to city/ work/ commute	11.5	11.5	0

ONE CHALLENGE OR ECOLOGICAL ISSUE WOULD MOST LIKE TO SEE ADDRESSED IF ADDITIONAL FUNDS AVAILABLE		Total (200) %	
ALL CATEGORIES OF ANSWERS	Challenges	+ Other challenges	One to address
Power outages/ overhead lines / damage in storms	9	9.5	0
Internet reception	6.5	7	0
Healthy homes: lack of sun/ dampness/ mould/ colder in winter/ more rainfall here	5	5.5	0
Cell phone reception	5	5	0
Climate change: very dry summer/ bush fire threat/ too much rain/ weather events	2.5	4	0
People overload: too many visitors/ overuse of beaches/ manage visitors	0	3.5	0
Distance to shops/ supermarket	3	3	0
Dogs off leash	3	3	0
Home maintenance issues: roof maintenance/ leaves and debris/ blocked gutters/ trees too big	2.5	2.5	0
Lack of street lighting	2.5	2.5	0
Water supply infrastructure	2.5	2.5	0
Use of pesticides/ chemical spraying/ 1080	0	2.5	0
Titirangi village developments: parking/ loss of toilets/ loss of village feel	2	2	0
Distance to sports/ amenities/ schools	1.5	1.5	0
Portage Licensing Trust	1.5	1.5	0
Rubbish collection	1.5	1.5	0
Lack of rubbish bins	1	1.5	0
Increase in crime/ car break-ins	1	1	0
Population pressure on schools	1	1	0
Airport flight path – low flying planes	0.5	1	0
Loss of council tree protection	0.5	1	0
Leadership: lack of/ decision-makers inexperienced	0	1	0
Cost of housing	0.5	0.5	0
Lack of dog friendly areas	0.5	0.5	0
Old septic tanks	0.5	0.5	0
Rates increase	0.5	0.5	0
Cell phone towers	0	0.5	0
Vehicle pollution, not enough electric vehicles	0	0.5	0
Slow police response	0	0.5	0
Don't know	1.5	2	3
Nothing/Nothing more	3	44	
Would not like to see more done			13.5

REPORT

Tonkin+Taylor

Preliminary Site Investigation

Replacement Huia Water Treatment Plant and Reservoirs

Prepared for Watercare Services Limited Prepared by Tonkin & Taylor Ltd Date September 2019 Job Number 30848.2000.v1.1





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Document Control

Title: Preliminary Site Investigation							
Date	Version	Description	Prepared by:	Reviewed by:	Authorised by:		
September 2019	1.1	Final	K. Clayton	P. Walker	P. Roan		

Distribution:
Watercare Services Limited
Tonkin & Taylor Ltd (FILE)

1 copies 1 copy

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1 Introduction

Tonkin & Taylor Ltd (T+T) has been commissioned by Watercare Services Limited (Watercare) to undertake a Preliminary Site Investigation (PSI) for the enabling works required to establish the replacement Huia Water Treatment Plant and reservoirs.

This report has been prepared in general accordance with the requirements for a PSI as referred to in the NES Soil regulations¹, and as outlined in the Ministry for the Environment's (MfE) Contaminated Land Management Guidelines².

The persons managing reviewing and certifying this investigation are suitably qualified and experienced practitioners (SQEP), as required by the NES Soil and defined in the NES Soil Users' Guide (April 2012).

1.1 Background and objectives

Watercare is responsible for the treatment and supply of potable water and for the collection, treatment and disposal of wastewater to around 1.5 million people in Auckland. Watercare is a Council Controlled Organisation (CCO), wholly owned by the Auckland Council.

Watercare operates five dams within the Waitākere Ranges, including the Upper and Lower Huia Dams and the Upper and Lower Nihotupu Dams. Water from these western water supply dams is treated at the Huia and Waitākere Water Treatment Plants before being distributed via the water transmission network, primarily to west and north Auckland. The Huia Water Treatment Plant (Huia WTP) is the third largest water treatment plant in Auckland and is a crucial component of Auckland's water supply network, treating approximately 20% of Auckland's water.

The Huia WTP was constructed in 1929 and is now nearing the end of its operational life (90 years old). Watercare therefore proposes to construct a new WTP to replace the aging Huia WTP. As part of this project Watercare is also proposing to construct two treated water reservoirs (50 ML total capacity) to increase treated water storage within the western supply zone.

The proposed works are located within an area of land that encompasses three properties that are designated by Watercare for 'water supply purposes – water treatment plants and associated structures' as shown in Figure 1 outlined in green. The replacement WTP will be constructed on the corner of Manuka Road and Woodlands Park Road directly across from the existing Huia WTP site. The replacement WTP will have a treatment capacity of 140 mega-litres per day (MLD).

A new 25ML treated water reservoir will be located on the northern side of Woodlands Park Road (Reservoir 1), with another 25ML reservoir (Reservoir 2) subsequently constructed on the existing Huia WTP site once the existing plant has been decommissioned. The proposed works also includes construction of the North Harbour 2 watermain (NH2) valve chamber and tunnelling reception shaft within the Reservoir 1 site.

The past land uses at the project site may have included activities which have the potential to cause land contamination. These activities are defined by the MfE in the Hazardous Activities and Industries List (HAIL). If an activity or industry on the HAIL is, or has occurred on a site, the NES Soil applies to proposed soil disturbance and/or land development activities.

T+T has undertaken this investigation to assess whether HAIL activities have occurred at the site, and the potential for these activities to have resulted in ground contamination. This report also assesses



September 2019

¹ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

² Ministry for the Environment, updated 2011, Contaminated land management guidelines No. 1: *Reporting on Contaminated Sites in New Zealand*.
the need for further investigation and resource consents for the proposed soil disturbance and/or land development activities with regard to ground contamination as required under the NES Soil, and other relevant regulations.

1.2 Scope of work

The scope of work for this investigation comprised the review of:

- Council property files;
- An Auckland Council "Site Contamination Enquiry" including Council records of pollution incidents;
- An Auckland Council HAIL report;
- Selected historical aerial photographs;
- Current and historical certificates of title; and
- An Archaeological Assessment completed by Clough & Associates.
- Discussions with Watercare staff.

This report documents our findings and comments on the potential for ground contamination at the site, in the context of the proposed development, including potential resource consent implications with regard to ground contamination.





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2 Site description

2.1 Site identification

The replacement Huia WTP is proposed to be located adjacent to the existing Huia WTP site on the corner of Woodlands Park Road and Manuka Road. The first 25ML reservoir (Reservoir 1) will be located on the northern side of Woodlands Park Road below Exhibition Drive directly across from the existing Huia WTP. The second 25 ML reservoir (Reservoir 2) will be located on the existing Huia WTP sites. The sites are all accessed from Woodlands Park Road. These three sites are collectively referred to as "the project site".

The project spans three sites owned by Watercare which have a total site area of approximately 145,700 m². The site on which the proposed replacement Huia WTP is located has an area of approximately 42,000 m², the proposed Reservoir 1 site has an area of approximately 63,600 m², and the existing WTP site (on which Reservoir 2 is proposed) has an area of approximately 40,100 m².

The project site is located approximately 1 km from Titirangi Village and approximately 1.5 km north of the closest reach of the Manukau Harbour. The project site is predominately surrounded by residential (large lot) zones in all directions other than to the south-east of the proposed WTP site which adjoins land zoned Open Space – Conservation and designated by Auckland Council for Regional Park purposes.

2.2 Site layout

Relevant observations have been made through inspection of the information reviewed as outlined in Section 1.3. These observations are summarised below.

The replacement WTP site slopes gently from the Woodlands Park Road to the south with gullies located at the southern boundary running north to south. The eastern extent of this site features steep slopes which rise up towards Scenic Drive. An intermittent section of the Yorke Gully Stream traverses the south eastern part of the replacement WTP site and a small tributary of the Armstrong Gully Stream is located in the north-western corner of the site.

The Reservoir 1 site is relatively hummocky with a knoll located in the middle of the site near the southern boundary, and a small gully feature (Armstrong Gully) runs through the site. Extremely steep slopes are present along the northern boundary beneath and above Exhibition Drive. A permanent section of Armstrong Gully stream is located to the west of Reservoir 1.

The existing WTP site where Reservoir 2 will be located has been developed as a WTP for the last 90 years. The site has a generally moderate to steep slope towards the south, with very steep slopes along the eastern and southern site boundaries. The Armstrong Gully watercourses are piped beneath the centre of the site, discharging into an open channel near the southern boundary. A small tributary of the Armstrong Gully Stream extends from the replacement WTP site into the north-eastern corner of the existing Huia WTP site.

Both the WTP and Reservoir 1 sites are almost completely vegetated in native bush, while the existing WTP site is approximately half vegetated in native bush with the remainder developed as part of the existing Huia WTP.

Along with the existing WTP, there are a number of features that are currently present on the project site which include:

• An upwash tank located in the centre of the Reservoir 1 site (Figure 2.1). The tank holds water that used to backwash the sand filter beds. According to council files this tank was

constructed in approximately 2003 together with associated infrastructure from the water treatment plant across to the south of Woodland Park Road, including underground pipes and a new access way onto the site.

• On the replacement WTP site, a small area of clearance is evident in the current Google Maps aerial photograph (Figure 2.2) directly south of Woodlands Park Road. The potential origins of this cleared area is discussed in Section 3. This area was cleared in the 1940's aerial and has since been gradually reverting back into scrub. The removal of the houses has accelerated this transition.



Figure 2.1: Upwash tank at Reservoir 1 site (Source: Google Maps)



Figure 2.2: 2017 Aerial Image showing the area of previous disturbance (source: Google Maps)

2.3 Geology and hydrogeology

The published geological information^{3,4} indicates that the project site is located on the boundary between two geologic groups; the Waitemata and Waitakere Groups, and underlain by both the Nihotupu Formation to the east and the Cornwallis Formation to the west (see Figure 2.3 below).

The Nihotupu Formation of the Waitakere Group is composed of basaltic, andesitic sandstone and is underlain by the Cornwallis Formation of the Waitemata Group. The Nihotupu Formation forms the bluffs to north of the site. The Cornwallis Formation is an alternating, thick bedded sandstone and thin bedded mudstone (volcanogenic flysch) underlain by the East Coast Bays Formation.

Geotechnical borehole logs indicate that the replacement WTP site and the Reservoir 1 site are underlain by fill material in areas of previous development, and generally underlain by colluvial landslide slope deposits and potentially buried alluvial deposits overlying bedrock containing slickenside layers indicative of possible deep seated slope movement⁵.

The available data indicates that two groundwater levels are present within the Reservoir 1 site: a groundwater level of approximately 6.5 m below ground level (mbgl) for shallow-screened piezometers and approximately 10 mbgl for the deeper screened piezometers. Similar groundwater

⁴ Edbrooke, S. W. (2001). Geology of the Auckland Area. Scale 1:250,000. Institute of Geological & Nuclear Sciences, Geological map 3. Institute of Geological & Nuclear Sciences Ltd., Lower Hutt, New Zealand

³ Kermode, L. O. (1992) *Geology of the Auckland urban area*. Scale 1:50,000. Institute of Geological & Nuclear Sciences, Geological map 2. Institute of Geological & Nuclear Sciences Ltd., Lower Hutt, New Zealand

⁵ GHD (2016). *Huia WTP Site Selection Study Shortlist Site Development Report* – prepared for Watercare Services Ltd. September 2016.

levels were recorded in the existing WTP, where available data indicate a mean groundwater level of 5.5 mbgl for shallow or single piezometers and 8.5 mbgl for deeper screened piezometers.



Figure 2.3: Published geology (source: Kermode, 1992). The yellow line has been added to distinguish the Nihotupu Formation (left) from the Cornwallis Formation (right)

2.4 Hydrology

The replacement WTP is situated at the head of the Little Muddy Creek catchment within the wider Manukau Harbour catchment. There are numerous surface water channels and several flood prone areas on site. Streams on the site discharge into the Warituna Stream.

The Armstrong Stream runs through the Reservoir 1 site. Largely, this is a permanent stream with varying water levels and is in poor condition through the subject area of the site. The channel is difficult to determine and the area is heavily vegetated with weed species. Overland flow paths are also identified on the western side of the replacement reservoir site and along its southern boundary. Potentially flood prone areas are identified alongside the permanent stream on the Reservoir 1 site. In reality the slope of the site would reduce the potential for flooding.

3 Site history

Historical information relating to the site was collected from a variety of sources. The information presented documents on-site activities, discussions with Watercare staff and review of aerial photographs. The information that has been reviewed is summarised in this section. A more detailed review of the available information is included in **Appendix B** and information included in **Appendix C** to **Appendix G**.

3.1 Archaeological information

Archaeological assessments completed by Clough & Associates⁶ has provided a detailed account of the history of the project site. The key findings, where relevant to ground contamination issues, are summarised below:

- There were five timber cottages built between 1927 and 1940 located to the north (Reservoir 1 site) and south of Woodlands Park Road (replacement WTP site) shown in aerial photographs attached in **Appendix C** with additions made to these (e.g. garages, outbuildings, retaining walls) up until 1974. These have since been removed from the site. Watercare has advised that a sixth cottage, constructed from concrete, was subsequently erected (this is visible in the 1959 photo) but has since been demolished and the material removed from site.
- Areas of disturbance are evident on the replacement WTP site. This was in the area of the timber cottages in the centre of the replacement WTP site, directly south of Woodlands Park Road. The areas around the houses were all cleared in the 1940's, these areas have gradually reverted back to native vegetation since. The rate of revegetation has varied across the sites.
- The Clough & Associates report indicates that timber cottages were demolished in the 1990s. Watercare has advised that the timber cottages were in fact removed from site rather than demolished.

3.2 Historical photographs

Historical aerial photographs from Auckland Council Geomaps, Retrolens and Google Earth Pro and Google Street view photos from 2008 and 2009 were reviewed. These cover the years 2017, 2016/2015, 2010/2011, 2008, 2006, 2003, 2001, 2000, 1996, 1988, 1981, 1980, 1972, 1960, 1959, 1955 and 1940. Copies of the aerial photographs reviewed are provided in **Appendix C** of this report.

The earliest photo available (from 1940) shows that the Reservoir 1 and replacement WTP parts of the project site were predominantly covered in vegetation, however there are five dwellings; two on the Reservoir 1 site and three on the replacement WTP site. These dwellings are still visible in the 1988 photograph but none are visible in the 1996 photograph. Subsequent photographs show cleared areas where dwellings were formerly located.

Watercare has advised the houses were erected by Auckland City Council to provide accommodation to those that worked at the treatment plants. The houses were removed in the 1990's as the standard of accommodation, vehicles and roading improved to the point that 'workers accommodation' was no longer necessary to attract and retain staff at the treatment plants.

In the 1940s there was a cleared area over a large portion of the eastern part of the replacement WTP site. This has since been covered over with a mix of native and exotic vegetation. During this time there is no information to suggest that any filling of earthworks were undertaken at the site, however it is unclear what this area was used for.

⁶ Clough & Associates (2018). Draft Huia Water Treatment Plant Replacement, Manuka Road, Titirangi, Auckland: Historic Heritage Assessment – prepared for Watercare Services Ltd.

From 1959, there is a small clearance on the replacement WTP site in the centre of the vegetated area that is visible up until the 2000 aerial and disappears by 2001. There appears to have been some ground disturbance in this area, however it is unclear as to whether this has been caused by a natural activity (e.g. landslip) or human activity (e.g. cleared for construction activity, storage or disposal to land). The is no knowledge of any construction activity in this area and there are no pipes, etc. – in the 1959 photo two concrete chambers are visible slightly to the north west and a pipe line going directly south of the concrete chambers. However, according to Watercare this pipeline has since been abandoned and is in disrepair.

The Huia WTP was constructed in 1929. The aerial photographs show that it has subsequently been expanded with the most significant development occurring in the 1970s and 1980s.

In 2006 the area of the historical houses on the replacement WTP site immediately south of Woodlands Park Road appears to be cleared of vegetation. The 2008 photograph shows what appears to be coarse material on the surface of the clearing, which could have been filling or temporary stockpiling since the area appears to have been partially revegetated by the 2010/2011 photographs. By 2010 these works appear finished in the photos and the area become partially revegetated by 2015/2016. Watercare has advised that the material visible in the clearing in the 2006 photograph is rocks used by a contractor in the enlargement of an attenuation pond – Watercare has also pointed out that these rocks are visible on the 2008 photograph, having been placed around the edges of the attenuation pond.

Google Maps street view images also identified these activities on the replacement WTP site. These are included in **Appendix H**. In 2008 a digger is shown on site in a Google street view image with material (rocks) which have been stockpiled here. This is no longer visible in the Google Street View 2009 images and the area appears to be flat with some material on site.

3.3 Council property files

Property files were obtained from Auckland Council on 30 May 2018. These date back to the early 1970s and generally relate to the existing WTP (Reservoir 2 site). The files predominately contain building consent information covering alterations and additions to the existing WTP.

The files that specifically relate to the Reservoir 1 and replacement WTP sites relate to the houses that were built on site for the workers at the WTP. These indicate the size and the additions of the houses that included outhouses and garages. The structures are identified as constructed from timber, with building plans noting that Fibrolite (asbestos cement sheet) could be used as a form of building sheathing.

3.4 Site contamination enquiry

A contamination enquiry was placed with Auckland Council on the 28 May 2018. The information provided is included in **Appendix E** and states that no pollution incident files regarding spills/contamination were found for the project site.

3.5 HAIL information request

A HAIL information request was sent to Auckland Council on 29 May 2018, with a response received on 1 June 2018. The information provided is included in **Appendix F** and relates to the designated area, not just the Reservoir 1, Reservoir 2 and replacement WTP sites. Two potential land use activities that could fall within the HAIL list were identified:

• Reports of unauthorised fill deposited in an unknown area within the Water Catchment area of this site in 2009. The HAIL information request did not identify the location of the fill. However, based on discussions with Watercare, this appears to be related to an area of land in

the Nihotupu catchment (the next catchment to the west) and not associated with the project site (and reported by AC in error);

• A maintenance workshop and chemical storeroom. These are located on the existing Huia WTP site, and Watercare has advised these were demolished in 2008 when the chlorine building was erected in the same location.

3.6 Certificates of Title

A certificate of title search was carried out on 29 May 2018. The information in these titles is included in **Appendix G**. There were no land uses evident on these that suggested that a HAIL activity occurred on site.

3.7 Summary

The Reservoir 1 and replacement WTP sites are predominantly vegetated with the only notable structure apparent being a wash water tank on the Reservoir 1 site.

Historically there have been two dwellings on the Reservoir 1 site and four dwellings/structures on the replacement WTP site which were constructed around the 1940s and removed (timber houses) or demolished (concrete house) in the 1990s. While there were no records to indicate how these houses and associated outbuildings were removed or demolished, Watercare has advised that the timber houses were relocated for use elsewhere, and the concrete house was demolished with the material removed from site.

A maintenance workshop and chemical storeroom were located on the existing Huia WTP site. These were demolished in 2008 when the chlorine building was erected in the same location. The chlorine building along with other existing structures will need to be demolished to make room for Reservoir 2.

4 Site characterisation

This section characterises the likely and potential contamination status of the site based on the available information as presented in Sections 3 of this report.

4.1 Potential for contamination

The historical review has identified one activity on site that could cause ground contamination, this being the removal and/or demolition of the former houses on the Reservoir 1 site and the replacement WTP site that were present between the 1940s and 1990s. Table 4.1 summarises the potentially applicable HAIL reference for this activity, the nature, and potential magnitude and extent of contamination that may be associated with this activity.

Land use/activity	Potential contaminants	Magnitude and possible extent of contamination	HAIL Activity reference
Asbestos containing materials (ACM) and lead-based paints within former residential dwellings (Reservoir 1 and replacement WTP sites)	The various forms of asbestos as fragments and free fibres. Lead associated with lead- based paints.	Buildings (six dwellings and associated structures) were constructed, altered and removed from the site during the period when use of ACM and lead- based paint was common. If ACM and/or lead based paints were used in the buildings and not handled appropriately during previous alteration or removal/demolition works there is potential for these contaminants to contaminate the surrounding ground. Localised ground contamination may have also occurred due to the degradation of painted surfaces and asbestos materials prior to removal. The extent of contamination (if any) is likely to be limited to the building footprint plus a buffer (nominally 100m ² per dwelling).	Activity not specifically included in HAIL but could be captured under Category I – Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment, if contaminant concentrations exceed risk based assessment criteria.

Table 4.1: Potential for contamination

Land use/activity	Potential contaminants	Magnitude and possible extent of contamination	HAIL Activity reference
A maintenance workshop and chemical storeroom on the existing WTP site (Reservoir 2 site).	Petroleum hydrocarbons and metals associated with historic workshop activities. The chemical storeroom is likely to have contained water treatment chemicals which are unlikely to be environmentally persistent and therefore have resulted in ground contamination.	It is possible that workshop activities may have resulted in localised shallow ground contamination, though a large proportion of this contamination would likely have been removed for the construction of the chlorine building. Some localised hydrocarbon contamination may remain beneath the chlorine building.	D5 – Engineering Workshops
Site development and redevelopment (existing WTP)	Potentially metals, hydrocarbons and asbestos, depending on source of fill materials used, building construction and demolition methods used.	Unknown.	Activity not specifically included in HAIL but could be captured under Category I – Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment, if contaminant concentrations exceed risk based assessment criteria.

4.2 Preliminary conceptual site model

A conceptual model as defined by the MfE in the contaminated land management guidelines⁷, sets out known and potential sources of contamination, potential exposure pathways, and potential receptors. For there to be an effect from the proposed activity there has to be a contamination source and a mechanism (pathway) for contamination to affect human health or the environment (receptor).

A preliminary conceptual site model has been developed for the proposed activity which takes into account the available information about the site, and our understanding of the potential effects on human health and the

⁷ Ministry for the Environment, updated 2011, *Contaminated Land Management Guidelines No. 5 Site Investigation and Analysis of Soils*

environment (





Figure 4.1). The model is presented below.

Historical information suggests that some parts of the site could be subject to soil contamination in locations where asbestos and lead based paints may have been used in historic housing that was located on site.

Asbestos and lead-based paint contamination in soil (if any), that may be derived from the removal of former dwellings is likely to be restricted to shallow soils and within close proximity of their previous locations.

A maintenance workshop and chemical storeroom were located on the existing Huia WTP site where the second reservoir is to be located. It is possible that localised soil contamination could be present in the footprint of the former workshop, if not previously removed during development earthworks for the current chlorine building.





Figure 4.1: Preliminary conceptual site model for the proposed activity

5 Regulatory implications

The rules and associated assessment criteria relating to the control of contaminated sites in the Auckland region are specified in the following documents:

- The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES Soil) regulations;
- Auckland Unitary Plan.

The need, or otherwise, for contamination related resource consents for the site development has been evaluated against these regulatory requirements.

5.1 NES Soil

5.1.1 Applicability

This legislation sets out nationally consistent planning controls appropriate to district and city councils for assessing contaminants in soil with regard to human health. As a result, the NES Soil prevails over the rules in the District Plan, except where the rules permit or restrict effects that are not dealt with in the NES Soil.

The NES Soil applies to specific activities on land where a HAIL activity has, or is more likely than not to have occurred. Activities covered under the NES Soil include soil disturbance, soil sampling, fuel systems removal, subdivision and land use change.

NES Soil Requirement	Applicable to site?	
Is an activity described on the HAIL currently being undertaken on the piece of land to which this application applies?	No	
Has an activity described on the HAIL ever been undertaken on the piece of land to which this application applies?	Yes	
Is it more likely than not that an activity described on HAIL is being or has been undertaken on the piece of land to which this application applies?	Yes	
If 'Yes' to any of the above, then the NES Soil may apply.		
The five activities to which the NES applies are:		
Is the activity you propose to undertake removing or replacing a fuel storage system or parts of it?	No	
Is the activity you propose to undertake sampling soil?	No	
Is the activity you propose to undertake disturbing soil?	Yes	
Is the activity you propose to undertake subdividing land?	No	
Is the activity you propose to undertake changing the use of the land?	Yes	
Conclusion: The NES Soil potentially applies to soil disturbance to be undertaken as part of the		

Table 5.1: PSI checklist

Conclusion: The NES Soil potentially applies to soil disturbance to be undertaken as part of the replacement WTP and Reservoir 1 and Reservoir 2 development (i.e. if contamination is present at the site which could present a risk to human health). The NES Soil applies to soil disturbance undertaken in the footprint of the former workshop on the Reservoir 2 site.

5.1.2 NES Soil activity status

A summary of the relevant permitted activity (PA) standards of the NES Soil for the activity of soil disturbance is provided in Table 5.2.

NES Soil – Soil disturbance permitted activity conditions (Regulation 8(3))			
а	Implementation of controls to minimise exposure of humans to mobilised contaminants.		
b	The soil must be reinstated to an erosion free state within one month of completing the land disturbance.		
с	The volume of the disturbance of the piece of land must be no more than 25 m ³ per 500 m ² .		
d	Soil must not be taken away unless it is for laboratory testing or, for all other purposes combined, a maximum of 5 m ³ per 500 m ² of soil may be taken away per year.		
е	Soil taken away must be disposed of at an appropriately licensed facility.		
f	The duration of land disturbance must be no longer than two months.		
g	The integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.		

Table 5.2: NES Soil Permitted Activity assessment for soil disturbance

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The NES Soil (and therefore permitted volumes) apply only to the 'piece of land' – that is the area upon which HAIL activities have taken place, are taking place or are more likely than not to have taken place. The volumes of disturbed soil and soil to be disposed of in the HAIL areas are expected to exceed the permitted amounts under the NES. As such where the NES applies to the proposed works (see Table 5.1), it is likely that an NES consent will be required as proposed earthworks works will not meet the provisions of a PA under the NES Soil Regulation 8(3).

The status of the resource consent required (controlled or restricted discretionary) depends on the concentrations of contaminants in soil onsite as characterised by sampling and testing (Detailed Site Investigation). Where no Detailed Site Investigation (DSI) has been completed, resource consent for soil disturbance under the NES Soil is considered as a Discretionary Activity.

A Site Management Plan (SMP) will be required to be submitted as part of the application. The SMP should demonstrate the controls that will be in place during the works to minimise the discharge of contaminants during the works. The SMP will also outline the requirement for any soil contamination testing to be undertaken during the works.

5.2 Auckland Unitary Plan

The AUP contains rules around the discharge of contaminants during disturbance of contaminated soil and for ongoing discharges of contaminants from land containing contaminants under Chapter E30 of the AUP. The requirement for resource consent is dependent in part on the concentrations of contaminants in the soil with contamination in the soil exceeding threshold standards in AUP Table E30.6.1.4.1 and the amount of soil that is disturbed. The amount of soil containing elevated levels of contaminants that is permitted to be disturbed under the AUP is 200 m³ per site.

If the soil contains contaminants above those levels included in the AUP table and exceed the permitted disturbance volumes, resource consent would be required for soil disturbance. Without completion of a Detailed Site Investigation to identify potential contaminants in the soil, soil disturbance would be considered as a Discretionary Activity. An SMP will be required to be submitted to demonstrate the controls that will be in place during the works to minimise the discharge of contaminants during the works. The SMP will also outline the requirement for any soil contamination testing to be undertaken during the works.

With regards to ongoing discharges of contaminants from the site, a resource consent would be required if the soil remaining on site contains contaminant concentrations above the PA soil acceptance criteria as outlined in Section E30.3.1.4.1 of the AUP. The requirement for resource consent for ongoing discharge will need to be assessed once investigation data is available. However

if contaminated material is discovered on site, provided that it is completely removed during excavation further consents are unlikely to be required. Proof of this should be provided to Auckland Council upon completion of works and soil condition.

5.3 Health and Safety at Work (Asbestos) regulations

The Health and Safety at Work (Asbestos) Regulation (2016) was enacted on 1 April 2016. The regulation sets out requirements for manufacturing, supplying, transporting, storing, removing, using, installing, handling, treating, disposing of, or disturbing asbestos or asbestos-containing material (ACM). Worksafe New Zealand has prepared a Code of Practice: Management and Removal of Asbestos (April 2016) which includes preliminary provisions related to asbestos in soils.

The key requirements of the regulations and Asbestos Code of Practice (ACOP) are that works involving asbestos contaminated soils must be undertaken with appropriate asbestos controls in place and that contaminated soil removed from site must be taken to an approved disposal site. Further guidance for asbestos in soils (NZ Asbestos Guidelines) was released by BRANZ on 6 November 2017⁸. The document refers to the health investigation levels for ACM, Asbestos Fines (AF) and Fibrous Asbestos (FA) as outlined in the Western Australian (WA) Guidelines. Controls for works involving asbestos in soils depends on the contaminant concentrations. Table 5.4 below provides a summary of implications for sites contaminated with FA+AF, the most common form of asbestos found in soils.

⁸ BRANZ, 2017, NZ Guidelines for Assessing and Managing Asbestos in Soils

Asbestos fines/fibres in soil (i.e. FA + AF)	Airborne contamination	Summary of requirements as outlined in the NZ Asbestos Guidelines
Greater than 1% w/w	May to lead to airborne contamination that exceeds trace level (i.e. >0.01 fibres/mL)	Class A asbestos removal works Work must be carried out by a Class A licenced asbestos removalist. Works are subject to an Asbestos Management Plan, asbestos controls, air monitoring, and clearance. Resource consent required under the NES Soil as a restricted discretionary activity.
Greater than 0.01% but less than or equal to 1%.	May to lead to airborne contamination that exceeds trace level (i.e. >0.01 fibres/mL)	Class B asbestos removal works Work must be carried out by a Class A or B licenced asbestos removalist. Works are subject to an Asbestos Management Plan, asbestos controls, air monitoring, and clearance. Resource consent required under the NES Soil as a restricted discretionary activity.
Greater than 0.001% w/w but less than or equal to 0.01% w/w	May to lead to airborne contamination that exceeds trace level (i.e. >0.01 fibres/mL)	Asbestos-related works Work does not need to be carried out by a Class A or B licenced asbestos removalist. Asbestos controls, PPE, air monitoring, clearance inspections as required and basic decontamination requirements. Resource consent required under the NES Soil as a restricted discretionary activity.
Less than 0.001% w/w	Not likely to lead to airborne contamination that exceeds trace level (i.e. <0.01 fibres/mL)	Unlicensed asbestos removal work Standard earthworks controls required. No asbestos specific PPE if SQEP confirms unlikely to exceed trace levels in air monitoring (0.01 f/ml) and/or if air monitoring confirms asbestos below 0.01 f/ml. Air monitoring/clearance not required. Foot wash and used PPE collection area required. Resource consent required under the NES Soil as a controlled activity.

Table 5.3: Implications for asbestos-contaminated sites

6 Conclusions

T+T has been commissioned by Watercare to undertake a ground contamination desk study investigation for the proposed development of the replacement Huia Water Treatment Plant. We understand that Watercare proposes to construct a reservoir (Reservoir 1) on the northern section of the site and to construct a replacement water treatment plant on designated land to the east of Manuka Road. A second reservoir (Reservoir 2) will be constructed on the existing WTP site once it has been decommissioned.

T+T has undertaken this investigation to assess whether HAIL activities have occurred at the site, and the potential for these activities to have resulted in ground contamination. The investigation has identified that worker housing was constructed on the Reservoir 1 and replacement WTP sites in the 1940s and removed in the 1990s.

Buildings constructed and altered during this period may have used asbestos containing building materials and lead based paints. Ground contamination by asbestos and lead in the vicinity of the houses could have been caused by the removal/demolition of the buildings. If asbestos and/or lead are present in these areas above risk-based assessment criteria for the protection of human health, HAIL category "I' may apply. Ground contamination (if any) is likely to be limited to the near surface, dependent on how deep the filling activities have occurred.

The existing WTP (proposed Reservoir 2 site) has undergone redevelopment and expansion. There may be potential for contamination in imported fill and/or due to historic building demolition.

If HAIL category 'I' applies to the Reservoir 1, Reservoir 2 and/or replacement WTP sites, the NES Soil will apply to the proposed works in these areas because HAIL activities have/are more than likely to have occurred on the site and soil disturbance is proposed.

A maintenance workshop and chemical storeroom were located on the existing Huia WTP site. These were demolished in 2008 when the chlorine building was erected in the same location. The NES Soil applies to soil disturbance undertaken within the footprint of the former workshop as engineering workshops are a defined HAIL activity (HAIL D5).

The volume of earthworks are unlikely to meet the permitted activity threshold under the NES Soil Regulations 8(3) and therefore resource consent would be required. In the absence of a DSI being completed prior to consent application a discretionary resource consent will be required with a DSI undertaken as a condition of the consent. It may be possible to undertake this investigation concurrently with clearance works to minimise delays. If the DSI confirms that soil contaminations are below background then the NES Soil will not apply.

Resource consent may also be required under the AUP. The activities requiring resource consent depends on the concentrations of contaminants as outlined in the AUP tables. Without the completion of a DSI to characterise the contamination profile at the site, the disturbance of soil would be treated as a Discretionary Activity. Resource consent is unlikely to be required for the ongoing discharge of contaminants from the site - if contaminated material is discovered on site then we expect that it would be completely removed during excavation.

There is the potential for asbestos building materials from the buildings that have historically been on site to be present in soil. If soil is found to contain asbestos, appropriate handling and removal measures should be applied during site clearance works to avoid the release of asbestos to the ground. The H&S at Work (Asbestos) regulations will also apply to soil disturbance works.

An SMP will be needed to provide appropriate controls to minimise potential discharges of contaminants to the environment and inform health and safety measures. The SMP will be required to support resource consent applications.

7 Applicability

This report has been prepared for the exclusive use of our client Watercare Services Limited, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

.....

Keeley Clayton Environmental Consultant

Authorised for Tonkin & Taylor Ltd by:

Peter Roan Project Director

Technically reviewed by:

.....

Paul Walker

Technical Director – Contaminated Land

26-Sep-19

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Figure 1.

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B1 Site history information

Historical information relating to the site has been collected from various sources. The information presented documents on-site activities, except for the aerial photograph review where comments are also provided on readily observable surrounding land use. The information that has been reviewed is summarised in this appendix. Selected documents are provided in Appendix C-F.

B2 Certificates of title

Current and historical certificates of title (CT) were reviewed for the site. These are provided below in Appendix G. A summary of the site is presented below.

B2.1 1925

NA502/232

On 15 December 1925 Kaurilands Limited took ownership of part of the estate as fee-simple including 27 acres and three roads. This title also indicates that Thomas Augustus Bishop owned the site prior to Kaurilands.

B2.2 1966

NA9B/590

Small section of the site to the north included. Property proprietors are Watercare Services Limited. Site subject to caveat by the Auckland Regional Council.

B2.3 1967

NA10B/613

The wider property seized by The Mayor Councillors and Citizens of Auckland. Interests during issue included fencing covenants, building line restrictions and right of ways. Auckland Regional Authority vesting within the land as a bulk-water supply.

B2.4 1990

NA78D/642

NA78C/462

In 1990 Auckland Regional Authority took ownership in fee simple as a bulk water supply location.

B2.5 1993

NA66C/188 NA66C/119 NA66C/120 NA94A/354 NA94A/355 NA94A/356

Watercare's Services Limited are the proprietors on the site. The property is subject to right of ways and building line restrictions. Caveat created by Auckland Regional Council.

B2.6 2015

<u>701575</u>

Site subject to some right of ways and building lines. Caveat by the Auckland Regional Council from 1994.

B3 Historical aerial photographs

Date, run number and source	Key site features	Surrounding land features
1940 (vertical photograph) Auckland Council GeoMaps	Residential housing on Reservoir 1 site and proposed WTP site with areas of clearance along the north and to the south. Current WTP present in current location.	Predominantly surrounded by vegetation. Some areas of clearance and residential housing occurring. Filter station established to the north east.
1955 (vertical photograph) Retrolens	Residential housing on Reservoir 1/replacement WTP sites. An additional house has been included closer to Manuka Road on replacement WTP site. A small area of clearance is still noticeable to the east of the replacement WTP site and building on Scenic Drive.	Further clearing for residential properties had occurred to the west. Remainder of surrounds are some residential housing and vegetation. Filter station appears unchanged.
1959 (vertical photography) Auckland Council GeoMaps	Residential housing on Reservoir 1/replacement WTP sites. Vegetation predominantly covering the remaining parts of these site. Small area of unknown clearance to the east of proposed WTP and building in vicinity of this, used for unknown purposes.	Areas surrounding covered by vegetation. Residential housing becoming more prominent in surrounding locations. Filter station appears unchanged.
1960 (vertical photography) Retrolens	Houses remain on Reservoir 1/replacement WTP sites. Area of potential slip to the east on the ridge running up to Woodlands Park Road. Unknown building still remain. Vegetation becoming denser in other areas.	Residential lots becoming more established. Filter station appears unchanged.
1972 (vertical photography) Retrolens	Reservoir 1/ replacement WTP sites appears unchanged from 1960. Some more vegetation around site has become denser. Area of unknown clearance remains. Current WTP has expanded toward the east.	. Residential lots becoming more established. Filter station appears unchanged.
1980 (vertical photography) Retrolens	No changes noted. Development of Water Treatment Plant continuing including addition of ponds to south east.	Residential lots remain unchanged and the vegetation still present. Filter station appears unchanged.
1981 (vertical photography) Retrolens	No apparent changes.	No apparent change.
1988 (vertical photography) Retrolens	One house to the north of Woodlands Park Road (Reservoir 1) removed.	No changes to the surrounds. Vegetation appears denser

Appendix B Table 1: Summary of aerial photograph review

Date, run number and source	Key site features	Surrounding land features
		around residential properties. Filter station appears unchanged.
1996 (vertical photography) Auckland Council GeoMaps	All houses have been removed from Reservoir 1/replacement WTP sites. Areas of clearance in locations of housing previously located on site. Vegetation covers the remainder of the site.	No changes appear to have occurred.
2000 (vertical photography) Auckland Council GeoMaps	Small areas of clearance still remain in location of previous housing. Larger area to the south of Woodlands Park Road. Area of clearance to the east still appears (appeared 1959).	Residential housing and vegetation largely unchanged.
2003 (vertical photography) Retrolens	Areas of clearance where houses were located becoming vegetated. Site to the South of Woodlands Park Road appear to be becoming vegetated also. Area of clearance remains at one point in the middle of the site to the south of Woodlands Park Road.	No changes appear to have occurred.
2001 (vertical photography) Auckland Council GeoMaps	No changes appear to have occurred.	No changes appear to have occurred.
2006 (vertical photography) Auckland Council GeoMaps	Upwash tank constructed to the north with associated access way. Area of clearance to the south of Woodlands Park Road appears more prominent.	No changes appear to have occurred.
2008 (vertical photography) Auckland Council GeoMaps	Earthworks and what appears to be unknown fill on site to the south of Woodlands Park Road. Works on Water Treatment Plant water ponds.	Remainder of surrounds appears unchanged.
2010/2011 (vertical photography) Auckland Council GeoMaps	Area of earthworks/fill now appears to be unused. Remainder of site unchanged. Water Treatment Plant works have been completed.	No other significant changes.
2015/2016 (vertical photography) Auckland Council GeoMaps	Area of earthworks/fill appears to be slowly covering in vegetation. Remainder of site unchanged.	No changes appear to have occurred.
2017 (vertical photography) Auckland Council GeoMaps	Area of earthworks/fill appears more vegetated. Are around Upwash tank now has denser vegetation. Remainder of site unchanged.	No changes appear to have occurred.

B4 Council property files

A copy of the Auckland Council property files were obtained and reviewed for records of potentially contaminating uses/events. A summary of the relevant property files are below. Selected information is provided in Appendix D.

B4.1 Upwash tank

Files from December 2003 and January 2004 relate to the construction of an upwash tank on proposed Reservoir 1 site. The files that related to this included;

- Detailed plans of the upwash tank and surrounds. The detailed plans indicate the site of the upwash tank and the pipes that were to be connected from the Water Treatment Plant to the south. Access ways and notable trees were also on the plans;
- Geotechnical Assessment. This indicated that granular fill was used to level the ground at the location of the upwash tank. A bore hole that was located in the middle of the upwash tank location indicated that below this were soft and firm clays;
- Arborist report. This report indicated the notable trees in the area.

In these reports there was no mention of HAIL activities on the site.

B4.2 Historical houses

Files from 1974, 1975 and 1994 were provided that included information on the historical houses that had been on the site to the north and the south of Woodlands Park Road. The files did not indicate which house was specifically referred to but an indication of the works and the removal was provided.

Building permits and plans that were included shows the basic layout of the houses and the additions such as garages and retaining walls that were to be constructed in 1975. The plans show the houses that are to the south of Woodlands Park Road. These show the houses and the large lawn area to the front that also included a garage for each house. Some cut and fill was used in the area to create a flat platform for the works.

The files dated 1994 were for a demolition permit in relation to these houses.

B5 Archaeological information

An archaeological assessment was completed by Clough & Associates Ltd in April 2018. This report identified some surface features that had relevance to the site condition.

B5.1 Reservoir 1 Site

At the Reservoir 1 site an area of ground disturbance at the location of the historic houses that were on site included material such as building rubble, tar seal, gravel, remnants of garden landscaping (e.g. rubble garden walls) and scattered 20th century rubbish, such as broken glass and ceramic.

On the WTP site the Archaeological report noted that there was an area of disturbance where the cottages were located. There was also evidence of more recent disturbance that was carried out to clear and dump material (rocks to be used on the batters of the attenuation pond).

B6 Council contamination enquiry

A contamination enquiry was received by Auckland Council on 29 May 2018. In summary, Auckland Council reported that it holds no information regarding potentially contaminating land uses, or past pollution incidents at the site. There was one incident noted that included sediment within a pond that contained arsenic. This was 1.5 km away from the site.

B7 Council HAIL information request

Information from a site contamination information held with the Environmental Health Unit of the Licensing and Compliance Services Department (LCS) was received on 1 June 2018. There were two records that indicated that there may have been a HAIL activity on site.

The first referred to the 2009 unauthorised fill that was deposited in the Water Catchment area of the site. It appears that this report relates to the Nihotupu Reservoir site and not the project site and has been reported by AC in error.

There was also mention of historical records that indicated a maintenance workshop and chemical storeroom. This was likely for the Huia Water Treatment Plant.

B8 Google Maps street view

Google Maps street view images that were from 2008 and 2009. The 2008 image shows a digger on the southern site at the area of unknown clearance and unknown material stockpiled here. In 2009 the area appears clear with the entrance way blocked with a small stockpile of unknown material.



Photograph Appendix C.1: 1940 Aerial Photograph (Source: Auckland GeoMaps)



Photograph Appendix C.2: 1959 Aerial Photograph (Source: Auckland GeoMaps)



Photograph Appendix C.3: 1972 Aerial Photograph (Source: Retrolens)



Photograph Appendix C.4: 1980 Aerial Photograph (Source: Retrolens)



Photograph Appendix C.5: 1988 Aerial Photograph (Source: Retrolens)



Photograph Appendix C.6: 1996 Aerial Photograph (Source: Auckland GeoMaps)



Photograph Appendix C.7: 2000 Aerial Photograph (Source: Auckland GeoMaps)



Photograph Appendix C.8: Aerial Photograph (Source: Auckland GeoMaps)



Photograph Appendix C.9: 2003 Aerial Photograph (Source: Retrolens)



Photograph Appendix C.10: 2006 Aerial Photograph (Source: Auckland GeoMaps)


Photograph Appendix C.11: 2008 Aerial Photograph (Source: Auckland GeoMaps)



Photograph Appendix C.12: 2010/2011 Aerial Photograph (Source: Auckland GeoMaps)



Photograph Appendix C.13: 2015/2016 Aerial Photograph (Source: Auckland GeoMaps)



Photograph Appendix C.14: 2017 Aerial Photograph (Source: Auckland GeoMaps)

		Action required by	John McKeown MCKEOWJ
Date Received	2-April-2009 - 09:48:24	Completion due	31-August-2009 - 19:39:31
Received	00.10.21		10.00.01

Request Reference	929663	3
Request Type/Priority	N89R	Earthworks Complaint - Routine

Request from:	WAITAKERE CITY COUNCIL Private Bag 93109 Henderson WAITAKERE 0650
	Mob: Home: Bus:
Job location	Water Catchment Area, Waitakere
	Property Owner Details AUCKLAND REGIONAL COUNCIL Private Bag 92012 Victoria Street West AUCKLAND 1142

Request	02-Apr-2009 09:52:38 Significant amounts of unauthorised fill has				
Notes	been spread around native bush to create a flat extension to an				
	existing service area. Area is managed by Watercare Services and				
	is classified as Managed Natural Area. Please see Paul Tyler, EMO				
	for location and access details.				
	04-May-2009 16:25:33 Site visit 4/5/09-with Paul Tyler initially.				
	05-May-2009 08:46:46 Site visit 4/5/09. with Paul Tyler. What Paul				
	referred to as a service area has been extended to form a substantial				
	flat elliptical bench approx 30m by 18m at widest points.				
	Essentially it appears an area of bush has been cleared and earth				
	material deposited on the formerly sloping terrain to form a flat area				
	with varying steep slopes of approx 3 to 4 metres. This material is				
	deposited around the trunks of at least a dozen native trres,				
	including tea-tree, Pittosporum, Rimu. I also noted concrete blocks				
	and several painted fence posts within the lower deposits of fill.				
	Near base of fill material and embedded within it, I observed				
	broken items of thick white plastic and what appears to be the metal				
	parts of some machinery. I also noted clumps of light grey clay and				
	close by deposits of light textured brown topsoil.				
	The impression I have is that the fill material is not from a nearby				
	slip but ratherconsists of section clearouts and demolition fill.				
	18-Jun-2009 11:00:19 Have contact from Roger Bannister of ARC				
	on 8 June 09 re this matter. He prefers to leave it with us to sort out				
	but wishes to attend a meeting to discuss the issue. I have left				
	message with Watercare to come back to me re a meeting to discuss				

	issues. 14-Aug-2009 19:39:09 I intend to re-visit site next week to re- assess what needs doing to 'normalise' site, and take approp action. 20-Aug-2009 17:06:19 I have emailed Water Care Services to re- activate a new meeting to sort issue. 31-Aug-2009 10:37:40 Please note: File for this site is 'Upper Nihotupu' 31-Aug-2009 10:49:41 Email rec'd from ARC that after site visit they are happy with remedial works undertaken. NFA
Feedback Req	juired?

Action taken:

MIT thority Date 28.1.75 d. Thority Date 28.1.75 d. Thority Date 28.1.75 d. Date 28.1.75 in accordance with the plans lodged and in accordance with the plans lodged and from road boundary approved subject to petinting to be. from date of issue of permit. Spouting, dom- ed to the approval of the Inspector. Value of work, \$509 Fee \$ \$:00 : Rec. No.59450 - 22.11.74 For the Waitemata City Council	BUILDING PERI Auckland Regional Aut Private Bag, Auckland the undermentioned person au Titurangi Titurangi Titurangi Availing within 6 att irainage to be provide Ltd.,	koll No. / / 3370/Pt31 Jwner of Section Address THIS PERMIT is granted to In 23 Waima , Road on 23 Waima , Road bubject to the following condi Sufform with existing tipes and atornwater d vature of proposed work intere Bor 19078 Bor 19078	402
Duly Authorised Officer	NG EFF OVFD	OTTINO CONDITION	
For the Waitemata City Council		Bor 19078 Avordale	2
Fee \$ 5 :00 : Rec. No.59450 - 22.11.74	Ltd.,	Harman Bldg	40
Value of work, \$ 509		Arece	-
from road boundary approved subject to painting to hs. from date of issue of permit. Spouting, down- ed to the approval of the Inspector.	litions: Location 23 ft. 1 dwelling within 6 mtl irainage to be provide	ubject to the following cond onform with existing thes and atornwater d vature of proposed work	40
in accordance with the plans lodged and	Ti ti rengi	11 23 Maima , Road	-
uthorising the following building work on Lot No. Pt 2 DP (28339.	the undermentioned person au	THIS PERMIT is granted to	•
thority Date 28.1.75 d.	Auckland Regional Aut Private Bag, Auckland	Owner of Section Address	- 1
	BUILDING PERA	3370/Pt31	-
		Noil No / /	

125) 125) Inspector B Hawky Insp. Intls. Chen hard any release Ì Final Inspection Building Inspected. Date Date Régister Noted.

APPLICATION NO. $QH5/Zb$ PERMIT NO. DISTRICT OFFICE NO 29/17 DATE ISSUED C	689 28.1.75 LODGED AT DISTRICT OFFICE 3//0/24 DATE HEAD OFFICE DATE STAMP
WAITEMATA COUNTY CO 68 GREYS AVENUE (P.O. BOX 5440), AUCKLAND.	OUNCIL PHONE 33-419.
BUILDING PERMIT APPLICA	ATION
OWNER OF SECTION: NAME AUCKHAND REG (BLOCK CAP PRESENT POSTAL ADDRESS PRIVATE BAG BUILDER: NAME HARMAN BUILDIA POSTAL ADDRESS BOX 19078 AVA (Permit will be pu	PITALS) PHONE NO. 656708 PHONE NO. 8871025. VELTD PHONE NO. 887103. DALE DETER DEPUTISE OFFERING REPORTED
SIGNATURE OF APPLICANT	
NATURE OF PROPOSED BUILDING WORK	OF PROPOSED Basement:
SINGLE GARAGE	Ground Floor: $54MX3M$. First Floor: Others:
	Total: 180
FULL LEGAL DESCRIPTION OF SECTION (as appears on either rate domand or title deede) $N^{\circ} 23 WAI MA R6A$ PT 2 DP 18839	BUILDING RESEARCH ACT 1969 Levy on Buildings Valued in excess of \$3,800 Amount of Levy Receipt No.
VALUATION ROLL NO. 3370 / 5/ /	Date
NAME OF PREVIOUS OWNER OF SECTION 7 K AREA OF SECTION Acre(s) F ROAD NAME $l \lor A \land \land \land A$ IMPORTANT SEE INSTRUCT	RONTAGE OCALITY TITRANGI. CTIONS ON PAGE FOUR
FOR OFFICE L REMARKS <i>Refer to TP decision attached to</i>	JSE ONLY Retaining wall dehads to be sytmilled file BPA 245/25 To thead office
Permit Issued Subject to the Following Conditions Locator appared subject to painting to cont 6 months from donte of save of M	n 23 feel from rend boundary tern with enisting dwolling, with stormwater unainage to be a provided to the approval of the inspector
Approved by	Building Inspector 13/11/74 Date
Approved by	Plumoing/Drainage Inspector Date Date
Town Planning Zoning Ras Al, Audg nated ARA Building Permit Fee \$ 3. 8. R	ecceipt No. 59430 Date Date
Road Damage Deposit Refund \$	o Date
Cost of Vehicular Crossing \$/	
Delete not applicable.	Checked — Release/Hold

PLEASE REFER TO INSTRUCTIONS ON PAGE FOUR-

SPECIFICATION TO BE COMPLETED BELOW FOR MINOR BUILDINGS ONLY (Full specifications are required for all other work)

		•	FOUND	ATIONS			
If solid concrete	e. Size o	of footings		Walls	. v		·
If concrete blocks. Size			·····	Spacing		······	·
N.B. All blocks	must be	e at least 12" in to	ground and set	on a 12"	x 12" x 4'	' concrete pad.	
			FRAM	4ING			
		Size	Spacing		Span		Timber
Jack Studs		······ ·	•			÷	Nº1 BORIC
Bearer Plates							
Floor Joists	•		<u>مام</u>			•	
Outer Studs	••••	SX 2	$2^{\prime}q$.			. 4	
Inner Studs							
Ceiling Joists				i			24 -
Bottom Plates	Size	524				Top Plates. Size	>X 2
Noggins	Size	3X 2-		Number	of rows of	noggins UA	1 <i>E</i>
N.B. (a) Minim (b) Top w	um stud vindow ti	height for dwellin rimmers must be cl	gs is eight feet. hecked $\frac{1}{2}$ " or othe	erwise su	oported.		
			RO	 OF			,,,,,,,,,
Covering /	Rox1			Ridges.	Size	Purlins.	Size 4X2.
5				Sarking.	Size	Under P	urlins
		0' ·	Or a size	U	0	T1	1
Poston PRVT	F TR	SIZE USSES N ^{\$} H940	spacing		Span /0	. 11m // 0	I DINF
				······		······································	
			MISCELL	ANEOU	5	MILLE	
Flooring. Size				Exterior	Sheathing	(1)019	
Inside Lining		• • • •			M		
Is any second-na	and mate	erial to be used in	accompany	this form	1.	If YES, then a sepa	rate application must
			SANIT	ATION			
Privy Type			5,1111	e.g. wate	er closet. cl	hemical pan or night	t soil?
N.B. If chemica	al pan oi	night soil pan, th	e privy building	must be a	at least 15'	away from dwellin	g.

LOCALITY SKETCH TO SHOW LOCATION OF BUILDING SITE	DRAINAGE AND PLUMBING
	All drainage and plumbing must be carried out by registered tradesmen. If it is intended to install a septic tank, now or in the future, the site must be in- spected by the Health Inspector before building is commenced.
	IT IS MOST IMPORTANT that buildings should not be occupied before complete plumbing and drainage systems have been installed and officially approved.
· •	
	405



20 Novamber 1974

Auckland Regional Authority, Private Bag, AUCKLAND. 1.

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Attention Mr L. Precious

Dear Sir,

Building Permit Application 245/26 - Garage - 23 Waima Road Pt 2 DP 18839

In connection with the above building permit application, and our telephone conversation of Tuesday 19 November, I understand that Er B.J. Overington, Building Inspector for the Titirangi area, has contacted you and requested retaining wall details to be submitted.

٦.

I would also advise that the building permit fee of 33.00 is also required, and I look forward to your resittance of this amount, together with the above details, as soon as possible.

Tours faithfully,

P.J. DUCKNORTH for CIPY INSPECTOR

Copy sent to -

The Cecretary, Harman Building Ltd, P.O. Box 19078, AVCUDALE, 7.

for information

ELTY ΓΕΜΑΤΑ WA OF ۲ P.O Box 5440, Auckland This receipt is **NOT** a permit. No work is to be executed until a **PERMIT** is **OBTAINED.** 84 BUILDING PERMIT F EE Hanman **Received** from For LOT · 2 DP 15833 Warn j \$ Receipt is acknowledged of amount printed hereunder only. 3.00 5 7 1 3 Q = 12 2 74 CASH CHEQUE A. TURNER, Treasurer. 4.(.)./.....

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		And The Contract of the Contra			
		₽		÷	
	REPORT	ON COMMERCIAL OR	INDUSTRIAL BUI	LDING REPOR	₹T C.(1)
		STRUCTURAL ENGIN	EER'S REPORT		$2 = l_{2}$
		0.0	$ \sum $	APPLICATION N	10 245/26
	APPLICANT'S NAME:	1 1	$\langle H$.		· · ·
	BUILDER'S NAME:	HARMA	V AUIL	DINSS	
	PROPOSAL:	- Sr	NSLE	SARAGE	
	LEGAL DESCRIPTION:	Lo	TZ DÉ	5 18833	
	ROAD NAME & LOCALITY:	l	MIMA	Rg. TS	·/,
	<u>c.</u>	ALCULATIONS & ST	RUCTURAL CHECK		
<i>i</i>) ,			ד אותרישיניני פ		ארי אארויד:
	(OR SUPPLIED) BEFO	RE APPROVAL CAN BE	CONSIDERED: (Ple	ease list clearly,	, and
d.	date and sign requ	frements /=			
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	2				
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	RECOMMENDATION :			·	
¥	(a) The matters listed satisfaction and I	in (1) above (when recommend that the	n applicable), ha e application be	ve been settled t	o my to the
	following condition	ls:-		,,	
	х . ···	- 			• • •
*	(b) I recommend that the	a and institution had	₩⋳₽⊷⋏⋻⋻⋻⋳ਸ਼⋷⋽⋋∊€⋴∽∽	the following no	
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	Dealt with by		STRUCTURAL ENGINE	лок/_/	
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Warma Walls Rd " apr 6 mm `، ح 3405 block wall 12 bor in bond becom 12" 2 cover-4 -12 24 ers lerits 2-2 bors á 8 aleep drow to scale wide ship shetch for garage wall no facen Dengu the NZS 2'-0 of clay fell, macadano (BE MNZIE TYPICAL SECTION THROUGH BASE GARAGE WALLS NOS 23925 WAIMA RD. OF 409



SPECIFICATIONS

Foundations: Concrete blocks 18x8x6, 4' \emptyset Max. 12" in ground. On sloping ground, longer blocks may be used and base boxed in with Fibrolite sheathing.

Dampcourse: Malthoid.

Framing: $3x^2$ up to and including 200sq. ft., otherwise all $4x^2$ dressed Boric treated Pine. Frames to be made up in sections with studs at 24" & with one row of nogging and bracing and erected on extra bearer plate adequately nailed together and braced.

plate adequately nailed together and braced. *Rype Nall OLATE TRUSTER No 4947513* <u>Roofing:</u> 5x2 rafters, max./0' span, 6' C. 4x2 purlins on edge, max: 7' span, 30" C. Corrugated iron roofing, all laps primed. Fastened with springhead nails and finished with galvanised coverboards and ridging.

Sheathing: 26 gauge galvanised iron folded to resemble weatherboards. Finished with angle boxes.

410

Alternative sheathing, 3/16" flat Fibrolite.

Joinery: Standard Overhead type or similar door and rersonal door.



N Z 602 Inspector Lely. Insp. Intls. she che • Building Inspected. Date Final Inspection Date · · · · · · · Register Noted. î 412

CITY OF WAITEMATA	PERMIT Nº 705	Auchiend. 1 Date 31,1,75	person authorising the following building work on Lot No. Pt 2 DP 10635 in accordance with the plans lodged and $\frac{1}{2}$ attached.		Value of work, \$ 790 Fee \$ 4 :00 : Rec. No. 52448 - 29.10.74 For the Waitemata City Council	Duly Automical Officer
	BUILDING	Auckland Regi Private Reg.	Road Tittrangt	vork	Bldgs Ltd., 78	VIDITIONIC CEP OVED
Riding	Roll No. / / /	Owner of Section Address	THIS PERMIT is gra on Vatum	Nature of proposed v		

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ر معمد مدر د			
*	APPLICATION NO. 245,25 PERMIT NO. 705 DISTRICT OFFICE NO. 229, 19 DATE ISSUED 31.1.29	LODGED AT DISTRICT OFFICE DATE 3 1/10/14 DOS HEAD OFFICE DATE STAMP	
	WAITEMATA COUNTY COUNCIL	TIL TELLE	
	68 GREYS AVENUE (P.O. BOX 5440), AUCKLAND, PHONE 33-419.	AFRE A	
	BUILDING PERMIT APPLICATION	Chy Council 12	
	OWNER OF SECTION: NAME AUCKLAND REGIONAL AUTHO (BLOCK CAPITALS) PRESENT POSTAL ADDRESS PRIVATE BAG AUCK I	APRECIOUS.	
1	BUILDER: NAME THRITING DUG RUP NDALE	PHONE NO. 887703-	
1) 1	(Permit will be posted to builder unless of	herwiee requested)	
•	SIGNATURE OF APPLICANT 7.07 CONCAL NATURE OF PROPOSED BUILDING WORK FLOOR AF OF PROPOSED BUILDING WORK OF PROPOSED WORK DOUBLE GARAGE	REA SED Basement: Ground Floor: First Floor: Others:	a a the second
		Total:	
	FULL LEGAL DESCRIPTION OF SECTION (as appears on either rate demand or title deede) N° 25 WAI MA ROAD, P-T 2 PP 18839 VALUATION ROLL NO. 3370 / 31 // NAME OF PREVIOUS OWNER OF SECTION ARA	BUILDING RESEARCH ACT 1969 Levy on Buildings Valued in excess of \$3,800 Amount of Levy Receipt No. Date	
	AREA OF SECTION Acre(s) FRONTAGE		
	ROAD NAME WAIMA. LOCALITY IMPORTANT — SEE INSTRUCTIONS ON PAG	EFOUR	
	FOR OFFICE USE ONLY Make	ming to the office	,
He ore	Permit Issued Subject to the Following Conditions Existing garage is to of new garage 3 Garage is to be sited not les grant boundary, (not also adje of and). Stronghouse denne history of the site of site of stores and a stronghouse of stores and a store of the site of t	the time on the provide of the second of the	~
	Approved by Building	e Inspector // /// /// Date	
- 7	Approved by Health Approved by Health Town Planning Zoning ResAl, designated ARA Corown Plann a Water supply 52	h Inspector Date ning Officer 75 Date	
•	Building Permit Fee \$ Receipt No.		
	Road Damage Deposit Refund \$ To	Date	
	Cost of Vehicular Crossing	Date	
,	Electricity Transmission Lines: Present/Not Present over property* Locat	tion of ARA or NSDB Trunk Sewers Checked — Release/Hold*	
	*Delete not applicable. Initia	^{ls}	

PLEASE REFER TO INSTRUCTIONS ON PAGE FOUR '

SPECIFICATION TO BE COMPLETED BELOW FOR MINOR BUILDINGS ONLY (Full specifications are required for all other work)

	FOUND	ATIONS		
If solid concrete. Size of footings	····	Walls		· · · · · · · · · · · · · · · · · · ·
If concrete blocks. Size		Spacing		· · · · · · · · · · · · · · · · · · ·
N.B. All blocks must be at least 12" in to g	round and set o	on a 12" x 12" x 4"	concrete pad.	
	FRAM	ſING	<u> </u>	
Size	Spacing	Span	· ·	Timber
Jack Studs	· · · ·			Nº (BoRie
Bearer Plates				
Floor Joists	210,	• <u>•</u> •••••		
Outer Studs Area 2	$\sim q^{-1}$	• م		
Inner Studs				
Ceiling Joists		• ·····		44 2
Bottom Plates Size 4×7			Top Plates. Size	F
Noggins Size 4 2		Number of rows of	noggins 010	E_
N.B. (a) Minimum stud height for dwellings (b) Top window trimmers must be che	is eight feet. cked $\frac{1}{2}$ " or othe	erwise supported.		
	RO	OF	· · · · · · · · · · · · · · · · · · ·	A .
Covering		Ridges. Size	Purlins.	Size 4x2
		Sarking. Size	Under F	Purlins
Size Rafters PRYDE TRUSSES Nº H947-S 14	Spacing 6 ¢	Span 17'6 "	Tin N ^o 1	iber B6RIC
	MISCELL	ANEOUS	al la	
Flooring. Size		Exterior Sheathing	M/W/B	
Inside Lining				
Is any second-hand material to be used in th	e proposed cons accompany	struction? NO this form.	If YES, then a sepa	rate application must
· · · · · · · · · · · · · · · · · · ·	SANITA	ATION		
Privy Type		e.g. water closet, ch	emical pan or nigh	t soil?

LOCALITY SKETCH TO SHOW LOCATION OF BUILDING SITE

DRAINAGE AND PLUMBING

All drainage and plumbing must be carried out by registered tradesmen. If it is intended to install a septic tank, now or in the future, the site must be inspected by the Health Inspector before building, is commenced.

IT IS MOST IMPORTANT that buildings should not be occupied before complete plumbing and drainage systems have been installed and officially approved.

20th January 1975

Auckland Regional Authority, Private Bag, AUCKLAND, 1

Attention: Mr. L. Procious

Dear Sir,

Building Pemit Applications 245/25, 245/26 and 245/27 - Garages - 23 Waima Road, Titimand

We refer to the above mentioned applications and also to previous correspondence in this matter; and have to advise that as there appears to be further details required relating to the processing of these applications, it would be appreciated if you would contact the writer to discuss the matter further.

Yours faithfully,

F.R. SPICK for CITY INSPECTOR PRS:SCH

Dispensation. - Accessory building h frant up of B.P. Application 245/25 Double garage, 25 Warma Road, Res Al, A.R.A. designat. Water Supply This is the second application for this bot. 1) First application sited garage in same position as existing garage. Application for dispensation was declined, and A.R.A was informed that towourable consideration would be given to an amended application praicing for a front yard of 50 feet (June 1974) 2) This application shows garage 15-25 m (50 ft) from edge of road seal. This is not the fant handary, but the boundary may be difficult to determine. 3) If approved, conditions should be set for a) removal of existing garage b) painting within 6 months to confirm with dwelling dwelling, Colleen Crampton Town Planning. (mr Meciais). ARA Confirmed that a New plan will be submitted placing the gaage 19m from edge of seal. 26/11/24

PJD: DHP

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26 Hevenber 1974

Auckland Regional Authority, Private Bag, AUCULARD, 1.

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Attention Mr L. Precious

Dear Sir,

Building Permit Application 245/25 - Double Garage - No 25 Vaima Road, Pt 2 DF 18579

In connection with the above building permit application, I understand that Mr H.J. Overington, Building Inspector for the Vaimm area has advised you that retaining wall details are to be submitted to this office before consideration can be given to this application.

•

419

I look forward to receiving these details as soon as possible.

Yours faithfully,

F.J. DUCKNONTH for givy improton

Copy sent to -

The Secretary, Earman Building Ltd, .0. Box 19678, AYOHDALE. 7.

for information

11th June 1974

The Secretary, Auckland Regional Authority, Private Eag, AUCKLAND, 1

Attention: Mr. L. Precious Emintenance Superintendent



Dear Sir,

Proposed Garages - Nos 20, 23 and 25 Maima Road

With reference to your letter dated 13th May 1974, we advise that Council has made the following decisions in respect of the locations of the garages on the various sites:-

No. 23 Vaina Road

The location of the garage at 23ft from the road boundary has been approved subject to the building being painted to conform with the existing dwelling on the land, within a period of 6 months from date of jesus of the building permit.

No. 20 Waima Road

Application to erect a garage 23ft from the road boundary has been declined as there is an alternative location available approximately 55ft back from the road boundary. Council indicated that favourable consideration would be given to an amended application for the building to be erected 55ft back from the road.

No. 25 Vaima Road

Application to reconstruct the garage in close proximity to the road boundary has been declined, as there is an alternative location available approximately 50ft back from the road boundary. <u>Council</u> <u>would give favourable consideration to an amended application providing</u> for the building to be set back 50ft from the road boundary, but as the floor area of the proposed building exceeds the maximum permissible under the Economic Stabilisation (Building Registration and Construction) Regulations 1574, any formal building permit application must be accompanied by a Certificate of Registration from the Building Projects Authority.

In the case of Nos 20 and 25 Weige Food, further consideration will be given to these applications on receipt of amended plans, and of course it will be necessary to obtain a formal building penalt before proceeding with the work on No. 23 Maima Road. The relevant building penalt application forms and an edditional copy of this latter is attached so that it may be submitted when the application is lodged.

. 11

Yours faithfully,

A.B. RODERTSON COUNTY INSPECTOR

Titirangi

ABR:SCH

11th June 1974

The Secretary, Auckland Regional Authority, Private Bag, AUCKLAND. 1

Attention: Mr. L. Precious Naintenance Superintendent

Dear Sir.

Proposed Garages - Nos 20, 23 and 25 Waima Road

With reference to your letter dated 13th May 1974, we advise that Council has made the following decisions in respect of the locations of the garages on the various sites :-

No. 23 Waima Road

The location of the garage at 23ft from the road boundary has been approved subject to the building being painted to conform with the existing dwelling on the land, within a period of 6 months from date of issue of the building permit.

No. 20 Waima Road

Application to erect a garage 23ft from the road boundary has been declined as there is an alternative location available approximately 55ft back from the road boundary. Council indicated that favourable consideration would be given to an amended application for the building to be erected 55ft back from the road.

No. 25 Vaima Road

Application to reconstruct the garage on close proximity to the road boundary has been declined, as there is an alternative location available approximately 50ft back from the road boundary. Council would give favourable consideration to an amended application providing for the building to be set back 50ft from the road boundary, but as the floor area of the proposed building exceeds, the maximum permissible under the Economic Stabilisation (Building "Strictions and Construction) Regulations 1974, any formal building permit application must be accompanied by a Certificate of Registration from the Building Projects Authority.

In the case of Nos 20 and 25 Waims Road, further consideration will be given to these applications on receipt of amended plans, and of course it will be necessary to obtain a formal building permit before proceeding with the work on No. 23 Waina Road. The relevant building permit application forms and an additional copy of this letter is attached so that it may be submitted when the application is lodged.

Yours faithfully,

REFERRED TO

7 APM flean

ACTION / REPORT / INFORMATIO

A.B. ROBERTSON COUNTY INSPECTOR

List of conditions relevant to the issuance of Building Permit Ho. 705 dated 31.1.75 authorizing the erection of a garage at Value Road, Titirangi for Auchland Regional Authority.

Take note that the above building permit has been issued subject to the following conditions i-

- t. Existing garage is to be removed to coincide with the erection of new building. 2
- 2. Garage is to be sited not loss than 50 ft. from the front boundary.
- 5. Spouting, downpipes and stormwater drainage to be provided to the approval of the Inspector.
- 4. The building hereby authorized to be painted to conform with the existing dwelling on the land within a period of 6 months from date of issue of this permit.

X. Haplachlan TOVN CLERK

pers

PRSIAN

31 January, 1975

Anckland Regional Authority, Private Bag, <u>AUCRIAND</u>. 1.

Dear Sir,

REA MILLETER PER AL NO. 705 - DATED 31.1.75

The above building permit was forwarded today to your builder Barsen Building Limited.

J

Please find enclosed herewith, for your information copy of conditions.

Yours faithfully,

P.R. Spick for CITY INSPECTOR

Encla

838. AUCKLAND REGIONAL AUTHORITY

Pt Lot 2 D. P. 18839, 23 Waima Road, Waima -Garage in front of dwelling in Residential A1 zone, but 23ft from road boundary - topography. Approval to be subject to the building being painted to conform with the existing dwelling on the land within 6 months from date of issue of the building permit.

..../2

I recommend that the following applications be DECLINED for the reasons stated:-

842. AUCKLAND REGIONAL AUTHORITY

Pt Lot 2 D.P. 18839, 20 Waima Road, Waima - Garage in front of dwelling and 23ft from road boundary in Residential AI zone - alternative location available 55ft back from road boundary. Applicant to be informed that favourable consideration would be given to an amended application providing for a front yard of 55ft.

843. AUCKLAND REGIONAL AUTHORITY

PECCI NED

Pt Lot 2 D.P. 18839, 25 Waima Road, Waima -Reconstruction of garage in close proximity to road boundary in Residential A1 zone - alternative location available 50ft back from road boundary applicant to be informed that favourable consideratic would be given to an amended application providing for a front yard of 50ft, and subject to the applicant first obtaining the written consent of the Building Projects Authority, as the floor area of the proposed garage exceeds the permissible maximum of 250 square feet.

Litinongi C.J. Ros AI County Inspector Resiting dispensation for A.R.A. Waine Rd., Maima. HOUSE Nº 23 PT LOT 2 DP 18839 POSTAL ADDRESS - 121 HOBSON ST., PRIVATE BAG AUCKLAND Siting approval is nequested for a new garage to be built I'm from the front boundary of the above site in a RES A' you This site although mainly in gross, does have a steep area falling to the side shown as "Bushanca" and to construct retaining walls to form a drive way to a more conforming position would be a very costly item and because of the topography of the land forward of the develling I would necommend that approval be given for this garage to be sited 7 m from the front boundary. Alveringtin 29/5/14

(rk)

Teterangi 09 Res AI County Inspector He siting dispensation for A.R.A. & Maima Rol Maima House Nº 20 PT2 DP 18839 POSTAL ADDRESS - 121 HOBSON ST., PRIVATE BAG. AUCHLAND. Fitting approval is neguested for a new garage to be sited I'm from the front boundary of the above property in a ples # 1 your . Un an inspection of this sile it is found that there is only approximately in difference in height between the front boundary and the dwelling, but between the house and the new of the site the land river and denies access for a genage to the sear of the dwelling, also there is insufficient width of side yard for the yaraye to be between the house and the existing fence . From the front boundary to where the concrete footfath leads to the front door there is a distance of 73 ft of clear unobstructed area suitable for a garage me to be sited, this would then enable the building to be sited sign from the front boundary and the only additional cost -involved, with an increased set back (55pt), would be additional metal for a drive. as I consider this garage can be sited further back within the front yard without under hardship this afflication to site as proposed be declined but permission be granted for it to be sited within the front yourd 55 ft from the front Jacama Alberinghe Jacama 29/5/14 Jours approved at 55. -Moundary.

ference operofs

Titirangi 11 Res 41 County Inspector Re siting dispensation for A.R.A. Maima Ra Maima Aduse Nº 25 PT LOT 2 DP 18839 POSTAL ADDRESS - 121 HOBSON'ST., PRIVATE BAG AUCKLAND Siting approval is requested for the replacement of a gerage in an identical position forward of the dwelling at the aboue address in a RES AI gone. This site rises very gradually from the road to the dwelling but beyond this point it would not be possible to gain access behind the dwelling due to large mannies on one side where the land falls away, and on the other side expandions and removal of bush would be necessary but there is ample area forward of the dwelling in the area shown where the large totana tree is for a garage to be sited which would not be detrimental to this site on the locality, any additional cost to site in this area would only invalve additional metal for the extended drive way. In addition to the above it is very difficult to ascentain as to whether part of the garage extends onto the road reserve and as there does not appear to be any reason why it cannot be positioned never to the dwelling and I consider that A replecement in the identical site should be declined but would recommend, that access to the rear will be difficult and castly plus loss of buch approval be given for the genage to be sited within the grant gand 50 ft from the grout boundary. Aflaerington 30/5/14

reach nt affrace 50' (programmen)

427

INSPECTORS DEPARTME ACTION MEMO εt -----Letter From: Auckland Regional Auth. A Blobs Re: Silin Date: 16. 5 74 Referred to:R Record/Acknowledge & Notify Sopy to Mr. Original to mo/desk Further Action: Send to Mm File As Required Clerical Action Completed Date: Initials: Mr Inspector:-Report)- Informa Action-Remarks: (a) Please ensure that your report and copies of any correspondence relative to this matter are attached to this file and returned to me for information or further action. (ъ) Date:

Initials COUNTY INSPECTOR



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Please quote

your reply



AUCKLAND REGIONAL AUTHORITY

Regional House, 121 Hobson St, Auckland 1, New Zealand. Telephone: 364-420 Telegrams: Regional

All Correspondence to: The Secretary, ARA Private Bag Auckland I, N.Z.



The Building Inspector, Waitemata County Council, P.O. Box 5440, AUCKLAND, 1.



23 & 25 Renew Garages Nos 20, Waima Road, Titirangi

Please find attached one copy of your proforma for siting of buildings contrary to District Planning, two site plans, and building plans.

The existing garages are becoming uneconomical to repair and we propose renewing them with prefabricated Harman type garages, which will be painted after a due weathering period - to blend in with the surrounding bush /

To comply with the planning standards would mean destroying beautiful old trees and changing the natural surroundings by excavations and retaining walls for new access roads.

The cost of these additional works would also be prohibited in so much as we may have to delay rebuilding for a further indefinite period as the present old weatherboard and corrugated iron garages would be more economical to repair.

Yours faithfully,

J. H. COULAM Secretary

L. PRECIOUS

Maintenance Superintendent

430

Encl.

WAITEMATA COUNTY COUNCIL

The Building Inspector, Waitemata County Council, P.O. Box 5440, <u>AUCKLAND, 1</u>.

I hereby apply for permission to site a building contrary to the provisions of the District Planning Scheme. Legal Description of Property - Lot <u>2</u> D.P. <u>18839</u>. Road Name <u>Waima</u> <u>Rd.</u> <u>Riding</u> <u>TITIRANCE</u> Name of Owner <u>Auckland Regional Authority</u>.

For the reasons stated in the attached covering letter, I
consider it necessary to site the building in accordance with the
accurately scale drawn site plan, also attached. A plan of the
proposed building work a so accompanies this application
Signature of Applicant H Nur Date 13-5-74
Address: 121 Hobson Street Private Bag Auckland

FOR OFFICE USE ONLY

Application investigated by:	On
Date application considered by Council	
Decision	

AUCELAND REGIONAL AUTEORITY (245/25)

BULKINCONTION DISPENSATION

BULKILCOMMUN WAT AFPROVED

(b)

192.

Pt Lot 2 D.P. 19339, 25 Vaima Road, Vaima -Garago in Residential At some - in front of dvelling, but 50ft from road boundary preservation of pative trees - most practicable location. Approval to be subject to the following conditions:-(a)

Eristing garage to be repoved to coincide with the crection of the now building.

The proposed garage is to be painted to conform with the existing dwelling on the land within a period of 6 nonthe from date of issue of the building permit.

REFERRED TO NTORMATION ACTION / REPOR DATE
Henderson has provided facilities used more by Waitemata City ratepayers than ratepayers of Henderson for many years, (One example - 68-pensioner flats owned by the Council are largely populated by people who have never been resident in the Borough) but I would like to make it clear that my Council welcomes the use of its facilities by Waitemata City residents and ratepayers. When our parks and playing fields are fully developed we will welcome their use by people living outside the Borough boundaries, and I presume that this is also the policy of your Council. My Council would be most concerned if the statement by your Acting Chief Planning Officer was your Council's present thinking, particularly as it is not borne out by the facts set out above.

- A17 ,- ,

The Henderson Borough Council is atways ready to meet and discuss matters of mutual interest for the benefit of all ratepayers and citizens of West Auckland in a true spirit of co-operation.

Yours sincerely,

A.K. CORBAN,

MAYOR.

-12 0000

A copy of this letter has been sent to His Worship the Mayor of Waitemata.







52 ARA. Warma Id House Nº 25 al. 245/25 The attached plan for the sting of a garage 17.5 m from road seal her Sence been clapped by er' Precious as just on 50 feet from The approximate boundary (as no one is clear on the sheet location of the boundary) -Howeve it is also suggested that the building cauld not be siled forthe back as the is an existing bland of old Kauri trees just to the read of the proposed building anluation I sugget that the the approach as the only proctuable sate remain gament fame

11th June 1974

The Secretary, Auckland Regional Authority, Private Dog, <u>AUCKLAND, 1</u>

Attention: Mr. L. Precious Emintenance Superintendent

Dear Sir,

Proposed Careens - Nos 20, 23 and 25 Vaine Road

With reference to your letter dated 13th May 1974, we advise that Council has made the following docisions in respect of the locations of the garages on the various sites:-

No. 23 Vaina Ruad

The location of the garage at 23ft from the road boundary has been approved subject to the building being painted to conform with the existing dwelling on the land, within a period of 6 months from date of issue of the building permit.

No. 20 Waima Road

Application to orect a garage 23ft from the road boundary has been declined as there is an alternative location available approximately 55ft back from the road boundary. Council indicated that favourable consideration would be given to an amended application for the building to be created 55ft back from the road.

No. 25 Vaima Poad

Application to reconstruct the garage in close proximity to the road boundary has been declined, as there is an alternative location available approximately 50ft back from the road boundary. Council would give favourable consideration to an amended application providing for the building to be set back 50ft from the road boundary, but as the floor area of the proposed building exceeds the maximum permissible under the Economic Stabilisation (Building Registration and Construction) Regulations 1974, any formal building permit application must be accompanied by a Certificate of Registration from the Building Frojects Authority.

In the case of Nos 20 and 25 Vaina Boad, further consideration will be given to these applications on receipt of anended plans, and of course it will be necessary to obtain a formal building penalt before proceeding with the work on No. 23 Vaina Road. The relevant building penalt application forms and on additional copy of this latter is attached so that it may be submitted when the application is lodged.

Yours faithfully.

A.B. ROBERTSOM



WAITEMATA CITY COUNCIL 1.75 Date. 1319 MEMORANDUM for:er' (~~6 Nº 1249 l. 245/25-26.27 Subject: ARA \mathcal{A} P_s NOTE — These memos are for staff and inter-office use only and must not be used for general correspondence. 436C&D 51654





FRONT ELEVATION

SPECIFICATIONS.

Foundations: Concrete blocks 18"x8"x6" set firmly minimum 12" in the ground. Malthold dampcourse.

Framing: $4x^2$ studs, 24", $4x^2$ nogging and bracing, frames made up in sections and all linked with lapping studs, all firmly nailed and braced.

<u>Roofing</u>: 6x2 rafters, maximum 10' span and 6'8" Z carried on specified Harman lattice truss 12" deep ex $1\frac{1}{2}x1\frac{1}{2}$ " angle steel top and bottom cords, $\frac{1}{2}$ " rod infill bracing - span full length of garage under the ridge. 4x2 purlings on edge, max. 7' span, 30" Z.

26 gauge corrugated iron roofing, all laps primed MAX 6'8' ¢. ALTERNATIVE, PRYDE NAIL PLATE TRUSSES AT MAX 6'8' ¢. Sheathing: Galvanised metal weatherboard or 3/16" flat Fibrolite sheathing.

Doors: Sliding or Overhead doors, glass and louvres to be inserted to customer's requirements.

Floor. - H" thic 2,500 psi. concrete



Foundations: Concrete blocks 18x8x6, 4' \emptyset Max. 12" in ground. O sloping ground, longer blocks may be used and base boxed in with Fibrolite sheathing.

Dampcourse: Malthoid.

<u>Roofing</u>: 5x2 rafters, max. 6' span, 8' \emptyset . 4x2 purlins on edge, max. 7' span, 30" \emptyset . Corrugated iron roofing, all laps primed. Fastened with springhead nails and finished with galvanised

coverboards and ridging. ALTER NATIVE PRYDE NAL PLATE TRUSSES AT MAX 6'8" . Sheathing: 26 gauge galvanised iron folded to resemble weatherboards Finished with angle boxes.

438

Alternative sheathing, 3/16" flat Fibrolite.

Joinery: Standard Overhead type or similar door and personal door.

Floor - H"thk 2, 500 p.s. concrete



FRONT ELEVATION

SPECIFICATIONS

<u>Foundations</u>: Concrete blocks 18x8x6, 4' \emptyset Max. 12" in ground. On sloping ground, longer blocks may be used and base boxed in with Fibrolite sheathing.

Dampcourse: Malthoid.

3x2 up to and including 200sq. ft., otherwise all 4x2 dressed Framing: Boric treated Pine. Frames to be made up in sections with studs at 24" α with one row of nogging and bracing and erected on extra bearer plate adequately nailed together and braced.

Roofing: $5x^2$ rafters, max. 6' span, 8' \emptyset . $4x^2$ purlins on edge max. 7' span, 30" \emptyset . Corrugated iron roofing, all laps primed. Fastened with springhead nails and finished with galvanised 4x2 purlins cn edge, coverboards and ridging. ALTER NATIVE PRYDE NAW PLATE TRUSSES AT MAX 6'8"F. Sheathing: 26 gauge galvanised iron folded to resemble weatherboards.

Finished with angle boxes.

439

Alternative sheathing, 3/16" flat Fibrolite.

Floor - H" thk 2,500 p.s. concrete

Standard Overhead type or similar door and personal door. Joinery:



FRONT ELEVATION

SPECIFICATIONS.

Foundations: Concrete blocks 18"x8"x6" set firmly minimum 12" in the ground. Malthoid dampcourse.

Framing: $4x^2$ studs, $24" \notin$, $4x^2$ nogging and bracing, frames made up in sections and all linked with lapping studs, all firmly nailed and braced.

Rocfing: $6x^2$ rafters, maximum 10' span and 6'8'' 2 carried on specified Harman lattice truss 12'' deep ex $1\frac{1}{2}x1\frac{1}{2}$ '' angle steel top and bottom cords, $\frac{1}{2}$ '' rod infill bracing - span full length of garage under the ridge. $4x^2$ purlings on edge, max. 7' span, 30'' \mathcal{Q} .

440

26 gauge corrugated iron roofing, all laps primed. ALTERNATIVE, PRYDE NAW PLATE TRUSSES AT MAX 6'8' \$. Sheathing: Galvanised metal weatherboard or 3/16" flat Fibrolite sheathing.

Doors: Sliding or Overhead doors, glass and louvres to be inserted to customer's requirements.

Floor - H" thk 2, 500 psi concrete



Roofing: 6x2 rafters, maximum 10' span, and 6'8", a carried on specified Harman lattice truss 12" deep ex l2x11" angle steet top and bottom cords, "rod infill bracing- span full length of Garage under the ridge. 4x2 purlings on edge, max. 7' span, 30" 2. 26 gauge corrugated iron roofing, all laps, primed SUCH

26 gauge corrugated iron roofing, all laps primes SUCH Sheathing: Galvanised metal weatherboase 38713/168 #Dafforibrolite

Sheathing. <u>Doors</u>: Sliding or Overhead doors, glass and Fouries to be inserted to customer's requirements.

SNED :-



BUILDING CONSENT NO:

83/2883 Section 35, Building Act 1891 of F

93/2883

Project Information Memorandum No:

ISSUED BY

(Insert a cross in each applicable box. Attach relevant documents).

	PROJECT
Name ATERCARE SERVICES LTD	All 10:37974
Mailing Address:	Stage No of an intended stages
ATTN:PETER SPENCER PRIVATE BAG 32521 WELLESLEY STREET	New Building
PROJECT LOCATION	Alteration
Street Address:	Intended Use(s) (in detail):
30 WOODLANDS PARK RD TITIRANGI	DEMOLITION OF HOUSE & GARAGE
	· · · ·
	Intended Life:
LEGAL DESCRIPTION	Indefinite but not less than 50 years
Property Number: 0	
Valuation Roll Number: 33220-001(=02	Specified as years
Lot: 6 DP: 156565	Demolition
Section: Block:	5,568.75
Survey District:	ESIIMAILU VAIUL. D
COUNCIL CHARGES	······································
The balance of Council's charges payable on uplifting of this building consent, in accordance with the	Signed for and on behalf of the Council:
tax invoice are:	Name:
Total: \$	
ALL FEES ARE G.S.T. INCLUSIVE Rot 216192	Date: 24. 1. 1. 94.
This building consent is a consent under the Building Act 19	391 to undertake building work in accordance

with the attached plans and specifications so as to comply with the provisions of the building code. It does not affect any duty or responsibility under any other Act nor permit any breach of any other Act.

This building consent is issued subject to the conditions specified in the attached pages, headed "Conditions of Building Consent No / "

te Inspected	REMARKS (e.g.	stage reached with work	2)	f
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	(SIGNATURE)	_	DATE//	444

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CONDITIONS OF BUILDING CONSENT 2620

The above Building Consent has been approved today subject to the following conditions:-

- 1. Take care not to damage any native vegetation when demolishing the buildings on this site.
- 2. To notations on plans.

BUILDING CONSENT NO:

93/2883

93/2883 Project Information/Memorandum No:

446

JC

ISSUED BY

Section 35, Building Act 1991 2620 MAITAKERE CITY COUNCIL ert a cross in each applicable box. Attach relevant documents)

APPLICANT	PROJECT
Name: WATERCARE SERVICES LTD Mailing Address: ATTN:PETER SPENCER PRIVATE BAG 92521 WELLESLEY STREET	All Stage No >of an intended stages of:
SIGENICIS DRIUE	Alteration
LEGAL DESCRIPTION Property Number: 0 Valuation Roll Number: 33220-001 202 Lot: 6 DP: 156565 Section: Block: Survey District: 8	Indefinite, but not less than 50 years Specified as years Demolition Estimated Value: \$ 5,568.75
COUNCIL CHARGES The balance of Council's charges payable on uplifting of this building consent, in accordance with the tax invoice are:	Signed for and on behalf of the Council:
Total: S D D D ALL FEES ARE G.S.T. INCLUSIVE QCF 216-19 This building consent is a consent under the Building Act 19 with the attached plans and specifications so as to comply	Position: Date: 24 / 1 / 94 991 to undertake building work in accordance with the provisions of the building code. It

This building consent is issued subject to the conditions specified in the attached headed "Conditions of Building Consent No $\ /\ "$, / pages,

2620 **BUILDING CONSENT APPLICATION** 510 CEIVED:21/12/93 PROGRESS SHEET **Dist**o

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APPL NO:

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	Building Surveyor				
	Plumbing & Drainage Surveyor	23/12	2 3 DEC 1993	Fc	0 /L
	Environmental Health Officer				·
	Dangerous Goods Surveyor				
1 2 2 1	Design Engineer				
	Drainage Engineer				
	Development Engineer	•			
	Parks Manager		y		
	Community Facilities Manager				
	Roading & Traffic Manager				
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÷ ā	Final Check -	23/12	23/12	Doc. Aep.	0K 117

relies Autor 155292 7630	RECEIVED FOR DUILDING CONSENT RECEIVED FOR BUILDING CONSENT RECEIVED FOR DUILDING CONSENT	21 DEC 1993 7 1 'L' PECTON APPLICATION-NUMBER 2/2883	AND 72 S221 PARTACT (If not owner) CARE I CENTRES CTD (Michaentermas) DETER SPENCUR BAGS 72 S221 Parent Address PORPERT MANAGON	1025 ACLUMA 57 ACL Phone Number: 03 ACL Fax Number:	Street: LACODLAND PALLY BOAD 3	l (Office Use Only)	DP: KSS 4S Section: Block:	Square Metres Survey District: Hectares ENDLITION OF HOUSE + CARACE	Atta 4 6 S: 7S No. of Dwelling Units: No. of Stores:	or less than 50 years or specified asyears. Alteration Demolition Z	ission lines cross the property? F Yes/No used? Yes/No OFFICE USE ONLY CATEGORY	the making of this application Plan Review Fee: INSBP	\$533 effeted being \$100 which wave book
		WAITAKERE CITY COLNEL PRIVATE BAG 93109 HISTIPERS	1. OWNER C. Name: Name: WATER (MANAGEREAL) WATER	Phone Number: 302 - 802 Fax Number: 302 - 802	3. PROJECT LOCATION Number:	4. LEGAL DESCRIPTION	33.7000 (cm loc	Site Area: 4-2027	Estimated Use(s) (In detail)	Intended Life: Indefinite but no New or relocated building Stages: All or Stage No	Do high tension electricity transm. Will any second-hand materials be 6. CHARGES	The Council's charges payable on are:	wcc202 Carpte Pr
с. 	IPLIANCE SCHEDULE DETAILS	SITATING A COMPLIANCE SCHEDULE lings and alterations, except single residential dwellings)	xx and attach proposed inspection, maintenance, and reporting procedures):	automatic fire protection. and which are designed to close of ut and retrain shut on an alarm of fire.		to a potable water supply.	cm serving all or a major part of the building. It is the serving all or a major part of the building. It is the structure of the serving system whose proper operation is necessary for compliance with $J_{\rm eff}$	s to the exterior and interior walls of buildings. Chief Executive Officer frames and Admin.	Community Services Environmental (CC) Z Sitabey & Dev.	S: TO BE INCLUDED IN THE COMPLIANCE SOMEDULE regressing & Works Free reg contains one or more of the systems listed in Part E1 ox and attach proposed inspection, maintenance, and reporting procedures):		persons with disabilities which meet the requirements of section 25 of the 1975. Building Code or Section 25 of the Disabled Persons Community Welfare	Date: 20/12/63
	PART E : CON	E1 : SYSTEMS NECES (Complete Part E1 for all new built	Il contain the following (cross each applicable	matic sprinkler systems or other systems of matic doors which form part of any fire wall gency warring systems for fire or any oth	rgency lighting systems. Pe route pressurtiation systems.	automatic back-flow preventer connected , escalators or travelators or other similar	hanical ventilation or air conditioning syst other mechanical, electrical, hydraulic or	vuilding code. ding maintenance units for providing acce. 1 sitens as are required by the building code	e of the above.	E2 : OTHER SYSTEMS AND FEATURI Complete Part E2 only if the build uil contain the following (cross each amhleable)	as of account from fire.	ty barriers. uns of access and facilities for the use by Disabled Persons Community Welfare A d-held hoses for fire fighting. h signs as are required by the New Zealand 1975.	for and on behalf of owner:

	 Producer statements References to accreditation certificates issued by the Building Industry Authority References to determinations issued by the Building Industry Authority Proposed procedures, if any, for inspection during construction. 	The drawings, specifications and other documents according to which the building is proposed to be constructed to comply with the provisions of the New Zealand Building Code, with supporting documents, if any, including: Building certificates	PART C : BUILDING DETAILS Complete Part C in all cases This application is accompanied by (cross each applicable box, attach relevant documents in duplicate).	Details of any cultural heritage significance of the building or building site, including whether it is on a marae.	 Precutions to be taken where building work is to take place over existing drains or sewers or in close proximity to wells or watermains. New connections to public utilities. Provisions to be made in any demolition work for the protection of the public, suppression of dust, disposal of debris and disconnection from public utilities, and suppression of noise. 	 Location in relation to legal boundaries, and external dimensions of new, relocated, or altered buildings. Provisions to be made for vchicular access, including parking. Provisions to be made in building over or adjacent to any road or public place. New provisions to be made for disposing of stormwater and wastewater. 	PART B : PROJECT DETAILS (Complete Part B only if you have NOT applied separately for a project information memorandum). The project involves the following matters, cross each applicable box, if any, and attach relevant information in duplicate.	Application for Building Consent only, in accordance with Project Information Memorandum No Application for Building Consent and Project Information Memorandum.
If more than number allowed for please provide details on a separate sheet.	CERTIFIER Name: NA Name: NA Address: Certifying:	ELECTRICIAN Name: N/A Address: Reg. No.	GASETTER N/A	Address Reg. No.	DRAINLAXER NAME Name Reg. No.	Address Po Cor 12.720 Pen/Antor ENGINEER N/A Name: N/A Reg. No.	Name: N/A Name: N/A Nume: N/A	PART D Complete as far as possible in all cases (Give names, addresses and relevant registration numbers if known)

- (EILIE)	ADDI ICATION FOD BUILDING CONSE
	APPLICATION FOR BOILDING CONSE (Attach all relevant documents in duplic
A RECEIL	(i that in the value documents in depice
AT ALLENED 12	
AITAKERE CITY COUNCIL C 1933	APPLICATION NUMBER
RIVATE BAG 93109 HEXTDERSON	in all cases
1. OWNER Ci	2. CONTACT (If not owner)
Name: (MrAdentale) WATERCARE SERVIETS LTI	Contact Name: PETER SPENCE
Postal Address: PETNATE BAG 92521	Postal Address: DETREPAT MANAGER
WELLEVET STREET ALCHLAND	
302-8037	
Phone Number:	- Phone Number:
Fax Number:	Fax Number:
3. PROJECT LOCATION	
Number: 30 Street: GOODLAWA	S PARK READ =
Landing TITTRANGI	· ·
4. LEGAL DESCRIPTION	
Valuation Number:	(Office Use Only)
33200 00 100 Z	Property ID:
Lot: 6 DP: 156565	Section: Block:
Site Area: Square Metres	Survey District:
4.2027 Hectares	
5. PROJECT	· · · · · · · · · · · · · · · · · · ·
Intended Use(s) (In detail)	
Betimated Value: \$	No. of Dwelling Units:
Floor area of proposed work:	No. of Storeys:
Intended Life: Indefinite but not less than 50 years	or specified as years.
New or relocated building Alteration	Demolition
Stages: All or Stage Noof an intended St	ages
Do high tension electricity transmission lines cross the property?	Yes/No
Will any second-hand materials be used? Yes/No	
6. CHARGES OFFICE USE ONLY	CATEGORY
	Harce and name.
The Council's charges payable on the making of this application	$\mathbf{P}_{\mathbf{r}} = \mathbf{P}_{\mathbf{r}} + $
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FOR OFFICE USE ONLY

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CODE	FEE DESCRIPTION	MNEMONIC	5	\$
1	Plan Review Fee	BI		
2	Building	B1	-36	00
3	Plumbing	B1		
3A	Drainage	B1		
4	Water Connection	WHSCON		
5	Planning Check Fee	PL3		
6	Bldg Research Levy	BLDGRESLY		
7	Street Damage	FTPTHDGEDP		
8	Crossing Bond	P/XSP		
9	Septic Tank Fee	B10		ļ
10	Amended Plan Fee	B1		
11	Sewer Connection	SEWREC		
12	Re-lay Sewer	SEWREC		
13	Reserve Contribution	SPRLSCONTR		
14	Engineering Fee - Subdivision	SD2		
15	Photocopying	B2		
16	Pool Inspection Fee	B7		
17	Performance Bond	SECHNDBOND	=.	
18	Stormwater Upgrading	SWCONTRIB		ļ
19	Road Construction Deposit	RDCONSTDEP		ļ
» - 20	PIM Fee	B9		
21	Code Compliance Certificate	B 8	26.	00
22	Stormwater Connection	SWCONREC	-	ļ
4A	Water Charge	WNEWCON		
5A	Resource Consent (Minor Addm)	PL2		
23	Engineering Fees - Development	SD3		
24	Building Industry Authority Levy	BIAL		
· •			•	
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	TOTAL		s 112	100

ROAD DAMAGE DEPOSIT REFUND		
Amount S	Date	
Refunded		·
To: Owner/Builder/Applicant	<u></u>	
VEHICLE CROSSING BOND REFUND		
Amount \$	Date	
Refunded		- Contraction (1997)
To: Owner/Builder/Applicant		

Prepaid?

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PROJECT INFORMATION MEMORANDUM NO:

Section 31, Building Act 1991

93/2883

SSUED BY WATTAKERE CITY	COUNCIL
(Insert a cross in each applicable	box Attach relevant documents)
APPLICANT Name:	PROJECT
Mailing Address:	New or Relocated Building
ATTN:PETER SPENCER PRIVATE BAG 92521 WELLESLEY STREET	DEMOLITION OF HOUSE & GARAGE
PROJECT LOCATION Street Address:	Indefinite, but not less than 50 years Specified as years
30 WOODLANDS PARK RD TITIRANGI	This is: Confirmation that the proposed building work may be undertaken, subject to the provisions of the Building
LEGAL DESCRIPTION	Act 1991 and any requirements of the building consent.
Property number:0 $0 > 1 - 2$ Valuation Roll Number: $33220 - 0.01$ 902 Lot: 6 DP : 156565 Section:Block:Survey District: 8	Not yet applied for
COUNCIL CHARGES The Council's total charges payable on the uplifting of this project information memorandum, in accordance with the	Notification that other authorisations must be obtained before a building consent will be issued.
tax invoice are \$ 0.00	Notification that the proposed building work may not be undertaken because a necessary authorisation has been refused.
This project information memorandum includes (cross each and copy to any relevant network utility operators and organisati	pplicable box, attach relevant documents, and send a ons having the power to classify land and buildings):
Information identifying relevant special features of the land	concerned.
Information about the land or buildings concerned notified to the power to classify land or buildings.	the Council by any statutory organisation having
Details of relevant utility systems.	
Details of authorisations which have been granted.	uilding consent will be issued
Details of authorisations which have been refused.	

Signed for and on behalf of the Council:

Name:	alto	
	e pe	;
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Position:		

Date: 05/45394

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د. للأجريب

PROJECT INFORMATION MEMORANDUM

NO: 93/2883 SITE ADDRESS: 30 WOODLANDS PARK ROAD, TITIRANGI

LEGAL DESCRIPTION: LOT 6 DP 156565

PLANNING

Zoning: Landscape Protection 2 (Waitemata Section)

Site Designated Stability Sensitive: YES

Site Designated Flood Sensitive: NO

Land Use Consent Required: NO

Land / Building classification by Statutory Organisation: Designated 'Water Supply Purposes'

Any Specific Requirements:

Care must be taken not to damage any native vegetation when demolishing the buildings on this site.

PLUMBING AND DRAINAGE:

Existing foulwater drains: YES (Photocopy of 'as built' plan attached)

Existing stormwater drains: YES

Sanitary Sewer: YES (Photocopy of sewer plan attached)

Stormwater Sewer: YES

Auckland Regional Council Sewer clearance required: NO

Auckland Regional Council Bulk Watermain clearance required: NO

ELECTRICITY/GAS SUPPLY

You are advised to contact Waitemata Electricity Ltd (837-2446) or Enerco Gas Auckland (379-4892) for any requirements that either utility may have for your intended project.

	Whe ink, ALL Owr	re di and , dra , dra	rainage plans must show d ins & inspect Name:	are no learly ion fi	street b street b street b street b	oundary	y, property	boundaries	, outlin	ne of buildin	gs as wel	las layou	it of	
	Add Lot Drai	ress S inlaye	of Property: ~0 er's Name:	<u> </u>	D.P. 3	584 Thes	9			Where poss Otherwise u Please Ir	ible use se 1/1 idicate S	$\mathbf{t}'' = 1$ 6" = 1 cale Used	foot	
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			Drainage Per Building Per	rmit l mit l	No. 51 No.//	1-		pe	7		-			



PROJECT INFORMATION MEMORANDUM

PROCESSING SHEET

PIM NO: 93/2883 SITE ADDRESS: 30 WOOD LANDS PARK RU LEGAL DESCRIPTION: LOT 6, DP 1565 Enter information in appropriate place. If none enter N/A. PLANNING zoning: Landscape Protection 2 (Waitemata Section) Site Designated Stability Sensitive: (YES)/ MO Site Designated Flood Sensitive: YES (NO Land Use Consent Required: YES NO ALBEADY GRANTED BEING-TO-BE-ASCERTAINED Supply Kurposes Land / Building classification by Statutory Organisation: Care must be taken not to damage any Any Specific Requirements: Mative vegetation when demolishing the buildings on this site BUILDING High-tension electricity transmission lines clearance required: YES / NO If yes: Waitemata Electric Power Board / Electrix Hazard Register: PLUMBING AND-DRAINAGE: Existing foulwater drains: YES / DO (if yes, attach photocopy of 'as built' plan) Existing stormwater drains: YES / XO attacher Sanitary Sewer: YES /200 (if-yes, attach photocopy of sewer plan)(if-no-state-effluentdisposal_requirements)-Stormwater Sewer: YES / YO (if no, state disposal requirements)

-2-
Auckland Regional Council Sewer clearance required: YES/NO
Auckland Regional Council Bulk Watermain clearance required: Y/S / NO
HEALTH/DANGEROUS GOODS
Hazardous contaminants present (if known) YES / NO (eg: asbestos/treatment chemicals)
If yes, state requirements:
DRAINAGE ENGINEER
Requirements for building over or adjacent to Council sewer: (state requirements)
WATER SUPPLY
Water supply available: YES / NO
Existing water connection(s): YES / NO
Fire fighting supply available: YES / NO
WATER DISTRIBUTION ENGINEER
Approximate cost of connection/metering (over 25mm): \$
Other comments:
DEVELOPMENT ENGINEER
Subdivision requirements:
Fire fighting requirements:
Roading requirements:
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ELECTRICITY/GAS SUPPLY

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You are advised to contact Waitemata Electricity Ltd (837-2446) or Enerco Gas Auckland (379-4892) for any requirements that either utility may have for your intended project. 458

Waitakere City Council-

APPLICANT

PRIVATE BAG 92521 Wellesley Street	WATERCARE SERVIO	CES LTD CER
WELLESLEY STREET	PRIVATE BAG 9253	21
	WELLESLEY STREE	r · ·

DATE: 05/01/94

THIS IS A TAX INVOICE G.S.T. No. 52-211-247

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CONSENT APPLICATION No.	93/2883		OWNER'S NAME PROJECT STREET ADDRESS	WATERCARE 30 WOODL	SERVICES LTD	
ACCOUNT NAME BUILDING CODE COMPLI	ANCE CERT	CODE B1 B8		NET 76.44 23.11	G.S.T. 9.56 2.89	GROSS 86.00 26.00
					-	
			<i>.</i> •			
216	193 -94					۰
			·	` 99.55	12.45	112.00
PLAN REVIEW FEE	ALREADY PAIL) = \$	133.00	BALANCE	TO PAY \$	112.00

The above Building Consent has been approved and is now ready for upliftment on payment of the fees shown.

. Please present this involce, together with any enclosures duly completed, to the Service Centre cashiers, between 8.30am and 4.15pm weekdays. The approved plans can then be uplifted from the Service Centre building counter on presentation of the receipted invoice. To assist Council you are requested to uplift the consent within one month of the date of this invoice otherwise the permitconsent may be concelled. Enquiries regarding this invoice should be directed to extension 8606.

Wallakere Cliy Council, Civic Centre, Walpareira Avenue, Private Bag 93109, Henderson, 8. Telephone 09 834000 09 836 8001.

\$112.00 86.00 26.00 RECEIVED AMOUNT TDTAL: \$: \$0.00 DP:05/TT:307 000372025001701111 000372025001771026 ASSESSMENT No. ACCOUNT No. CHANGE \$0.00 \$112.00 TENDERED AMOUNT Chq WATERCARE SERVICES LTD NAME AND ADDRESS DETAILS CASH CHEQUE WATERCARE SERVICES LTD 30 WOODLANDS PARK RD 216193 24-Jan-94 93/2883 RECEIPT No. DATE

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OFFICIAL RECEIPT



Waitakere City Council

CIVIC CENTRE – 6 WAIPAREIRA AVENUE, WAITAKERE CITY POSTAL ADDRESS: PRIVATE BAG 93 109 HENDERSON, WAITAKERE CITY, 1231

TELEPHONE 0-9-836 8000 OFFICE HOURS: 8.30 A.M. - 4.30 P.M.

460

CONDITIONS OF BUILDING CONSENT 2620

The above Building Consent has been approved today subject to the following conditions:-

1. Take care not to damage any native vegetation when demolishing the buildings on this site.

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2. To notations on plans.

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CHECK LIST — BUILDING CONSENT APPLICATIONS

A building consent is required for most building construction and alterations. The following is a check list of requirements to be submitted to Council to obtain a building consent.

APPLICATIONS WHICH DO NOT MEET REQUIREMENTS WILL NOT BE ACCEPTED FOR PROCESSING

APPLICATION FORMS

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1. (a) Building Consent Application:

An application form must be completed and signed by the owner. All applicable items on the application form must be completed.

(b) Street Damage Deposit:

Except where the road adjacent to the property has a metal surface, all applications where the total value of work exceeds \$15,000 a Street Damage Deposit form must be completed. Any damage to footpath, crossing or kerb must be recorded.

(c) Vehicle Crossing Details:

All properties must have a complying vehicle crossing. Vehicle crossing details must be shown on the Vehicle Crossing Details form and signed by the owner.

Application for Water Supply:

For new buildings on a reticulated water supply the Application for Water Supply form must be completed. For flats, factories and shops a separate water meter is required for each flat, factory unit or shop.

Septic Tank Application:

For buildings requiring a septic tank a registered Civil Engineer's report is to be lodged with the application and the owner is to complete and sign the septic tank application form.

Temporary Accommodation:

Where it is intended to live on the site in temporary accommodation while constructing a dwelling it will be necessary to complete a Temporary Accommodation/Building form and submit this (together with the specified fee) with your application for a building consent.

SITE AND DRAINAGE PLANS

Two copies of site plans are to be submitted with all building consent applications and shall clearly show the following (min. scale 1:100, or 1:200 for sections larger than 1500 m², drawn in ink).

- .2. (a) The position of all survey pegs relating to the lot or lots involved.
 - All legal boundaries are to be clearly shown with dimensions.
 - Any existing buildings on the site are to be clearly defined and dimensioned from boundaries.

Position of proposed building to be clearly defined and dimensioned from boundaries and any other buildings on site.

- Details of land contours required:
 - (i) A contour plan with 500mm increment lines;

(ii) Spot levels at building corners, site corners and on side boundaries opposite building corner (minimum 12 points).

The ground floor level must be defined with a R.L. or datum when using spot levels or contours.

Excavation and site development and/or retention proposals. If a building platform is required, details of benching and fill compaction will be necessary.

Position of sanitary and stormwater public sewers to be shown on site plan. Distances to boundaries to be stated when sewers are outside site.

Layout of proposed private drains to approved connections to be shown.

Layout of existing private drains to be shown.

Proposed method of collecting and disposing of ground water and seepage to be shown, e.g. behind retaining walls.

Locality sketch showing location of property in relation to nearest major road.

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VOF	KING	B DRAWINGS AND SPECIFICATIONS
		Two copies of working drawings are to be submitted with all building consent applications and shall clearly show the following (min. scales 1:100 and 1:10 drawn in ink)
(a)	Foundation plans detailing each element used, and bracing required.
(b)	Floor plan showing proposed use of all parts of the proposed building. No consent application shall be received unless the whole floor is shown with existing layout and use, proposed work and final complete floor layout and use.
(c		Roof plan showing members used and bracing required. Truss code number's to be supplied.
(d) 🖂	Elevations of ALL exterior walls showing ground levels, both existing and final development.
(e) []	Cross section of proposed building, showing existing and proposed adjacent ground levels.
(f)		Details of wall bracing to be shown and bracing calculations provided.
(g)	Details of thermal insulation to be shown. If not complying with accepted practice of B.R.A.N.Z. C.1. publication, thermal calculations will be required.
(h)	Details of terraces/steps, showing construction.
(i)		Drawings and calculations for firewalls with details of soffit blocking, etc.
(j)		Specific Engineering Design:
		All applications for building consents where elements of structure require specific design by an engineer shall be accompanied by calculations and a Producer Statement signed by a registered engineer. All items covered by the calculations shall be incorporated into the working drawings.
(k) 🖂	Stability Sensitive Sites:
		All applications for building consents on sites designated Stability Sensitive in the Town Planning District Plan shall be accompanied by a soils assessment/report prepared by an approved engineer experienced in geomechanics.
(I)		Two sets of specifications, with section headings. All irrelevant information is to be deleted.
(n	<u>ר</u> ו וי	Schematic plumbing layout to be included on working drawings for Commercial/Industrial applications.
NI		<u>G POOLS</u>
(a)	Capacity of pool to overflow level is to be stated and depth into ground indicated. Some pools, due to their siting or depth, may need additional support such as retaining walls and these shall be included in the application. Details of fencing to comply with the requirements of the Fencing of Swimming Pools Act 1987 shall be included with the working drawings.
(b)	Application form Inspection For Compliance of Pool Fencing shall be completed and signed by OWNER or OCCUPIER.
		- -
)	All th	ne necessary requirements are included in the plans submitted.
	Sign	ature: Date:
)	The f NOT	following requirements are to be incorporated before plans will be accepted for processing: E: This Check List must be returned when re-submitting application.
	Item	s Nos
	Sign	ature: Date:
		tional requirements as in (b) submitted with plans
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PLANNING CHECKLIST

ĥУ All applications for Building Consents, except heater installations, must be accompanied

A SITE PLAN	- 🗆	I
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5' A FULL SET OF ELEVATIONS

.ε A FLOOR PLAN

.equirements. The following details must be shown on <u>all</u> site plans in addition to the building

	clearance required (including species and height).
(i	Location of native trees or bush on site and details of any tree or bush
	ground level at each point on the boundary opposite the corners of the proposed building/addition). OR Contour levels across the <u>whole</u> site at 500mm increments (minimum).
(प	Spot heights (finished ground level at all building comers and existing
	be shown on the elevations.
3)	The finished floor level of all proposed buildings/additions. This must also
	. swimming pools which are over 1.0m above ground level.
(ł	The location of ALL buildings on site, including garden sheds and
(ə	If the accessway is shared, a copy of the certificate of title.
(p	The location of vehicle parking spaces, both existing and/or proposed.
()	The position of all vehicle access areas, including manoeuvring areas.
(9	The location of the street.
(B	North Point.

Any retaining walls, their position and height.

IMPERIAL MEASURED PLANS ARE NOT ACCEPTABLE. VIT LIVING WUST BE TO A RECOGNISED METRIC SCALE. COPIES OF

The site area, including the net site areas and common area if applicable.

percentage of which would be outside the eavelines of the main dwelling.

An indication of the volume of fill and/or excavation required, and the





29 May 2018

Tonkin & Taylor Limited PO Box 5271 Wellesley Street Auckland 1141 Attention: Keeley Clayton

Dear Keeley

Site Contamination Enquiry – Lot 2 DP 484666, Lot 1 DP 156565, Lot 3 DP 156565, Lot 4 DP 156565, Lot 5 DP 156565, Lot 8 DP 56335, Lot 6 DP 156565

This letter is in response to your enquiry requesting available site contamination information for the above site. The following details are based on information available from the former Auckland Regional Council records system and information currently held by the Auckland Council Natural Resources and Specialist Input Unit. The details provided below exclude any property information held by the former district/city councils.

Relevant details of the pollution incidents are appended to this letter (Attachment A). Please refer to the column labelled 'Property Address' and Incident/Consent/Bored ID (where applicable) on the attached spreadsheet to aid in identifying corresponding data on the map.

The general catchment file and site visit file for the catchment (5-21 and 7-60 -SV respectively) were not searched. These files contain pollution incidents where the source of pollution was not traced to a particular site, site visits where no follow-up correspondence was required and some information from archived files.

If the above site is coastal or beside a river, it is possible that historic, unconsented reclamation may have occurred. The Auckland Council Specialists Unit Coastal Team may be able to provide further information.

The records reviewed as part of this Site Contamination Enquiry search do not identify individual horticultural sites in the region. However, there is a possibility that horticultural activities may have occurred at the site. The local Auckland Council customer service centre, specific to the area of the site may be able to provide relevant information where former horticultural sites have been mapped.

If you are concerned that a historic land use (such as filling) may have caused the underlying soils to become contaminated, it is recommended that you obtain an independent environmental assessment of the site. Staff from the Auckland Council Earthworks and Contaminated Land Team can provide advice on the results of any evaluation in terms of site remediation and/or potential consent requirements.

The former Auckland Regional Council and current databases were searched for records of closed landfills, bores, air discharge, industrial and trade process consents, contaminated site discharge consents, and environmental assessments within approximately 200 metres of the site. No consents were identified.

The details provided are in accordance with the obligation to make information publicly available upon request. While the Auckland Council has carried out the search using its best practical endeavours, it does not warrant its completeness or accuracy and disclaims any responsibility or liability in respect of the information. If you or any other person wishes to act or to rely on this information, or make any

financial commitment based upon it, it is recommended that you seek appropriate technical and/or professional advice.

In addition, further site specific pollution incidents may be held at area office below. It is recommended that you contact the local customer service centre of the Auckland Council, specific to the site being investigated: 35 Graham Street, Auckland Central / Ground Floor, Kotuku House, 4 Osterley Way, Manukau Central as they also may hold files with further relevant information.

I trust that this answers your query. If you wish to discuss the matter further, please contact Andrew Kalbarczyk on 301 0101. Should you wish to request any of the files listed above for viewing, please contact the Auckland Council Call Centre on 301 0101 and note you are requesting former Auckland Regional Council records (the records department requires three working days' notice to ensure files will be available).

Please note: the Auckland Council cost recovers officer's time for all site enquiries. A basic enquiry takes approximately 1 - 2.5 hours to search the files and databases in which information is held. As such an invoice for the time involved in this enquiry will follow shortly.

Yours sincerely

Jared Osman Team Leader – Contaminated Air, Noise Specialist Unit | Resource Consents
Please refer to the column labelled 'Property Address' and Incident/Consent/Bored ID (where applicable) on the attached spreadsheet to aid in identifying corresponding data on the map.



From:	Claire Lacina <claire.lacina@aucklandcouncil.govt.nz> on behalf of RECContamination <reccontamination@aklc.govt.nz></reccontamination@aklc.govt.nz></claire.lacina@aucklandcouncil.govt.nz>
Sent:	Friday, June 1, 2018 4:12 PM
To:	Keeley Clayton
Cc:	RECContamination
Subject:	RE: Scenic Drive Titirangi - HAIL information
Follow Up Flag:	Follow up
Flag Status:	Flagged

Hi Keeley,

This email is in response to your recent enquiry requesting available site contamination information that was held within the Environmental Health Unit of the Licensing and Compliance Services Department (LCS).

Council's regulatory records indicate that there could be historic, and/or current, land use activities on or adjacent to this site that falls within the Hazardous Activities and Industries List (HAIL) published by the Ministry for the Environment.

- Our 2009 records indicate unauthorised fill deposited in the Water Catchment area of this site. Our records do not confirm the exact site location in relation to the overall property area of Scenic Drive Titirangi.
- Our historical records indicate a maintenance workshop and chemical storeroom likely for the Huia water treatment plant near Waima Road, Titirangi, which appears to be adjacent to the red area you have highlighted below.

Please note that only council's soil contamination records within the LCS department and GIS map have been checked. There may be other soil contamination information held within:

1. Contaminated Site Enquiry team: ContaminatedSites@aucklandcouncil.govt.nz

2. Property File for viewing reports or all relevant information relating to the property -Requested from the local service centre, by phone, 09 3010101.

Kind regards,

Claire Lacina | Technical Officer – Environmental Health Specialist Input | Resource Consents Ph 09 3522621 (Int 465621) | Mob 021 718 038 Auckland Council, Level 2, 35 Graham Street, Auckland Visit our website: www.aucklandcouncil.govt.nz

From: Keeley Clayton [<u>mailto:KClayton@tonkintaylor.co.nz</u>] Sent: Tuesday, 29 May 2018 1:27 p.m. To: RECContamination Subject: Scenic Drive Titirangi - HAIL information

Hi,

I am hoping to get any HAIL information that you have for the following site (information from Auckland Geomaps): Address: Scenic Drive Titirangi Legal Description: Lot 2 DP 484666, Lot 1 DO 156565, Lot 3 DP 156565, Lot 4 DP 156565, Lot 5 DP 156565, Lot 8 DP 56335, Lot 6 DP 156565 Council property ID:11149394

This is a rough drawing of the area that I am referring to:



The lot descriptions do carry the property further west, you can disregard this area.

Let me know if there is anything else you require.

Thanks, Keeley Tonkin + Taylor To send me large files you can use my file drop



Best Provider to Construction & Infrastructure

NOTICE: This email together with any attachments is confidential, may be subject to legal privilege and may contain proprietary information, including information protected by copyright. If you are not the intended recipient, please do not copy, use or disclose the information in it, and confidentiality and privilege are not waived. If you have received this in error, please notify us immediately by return email and delete this email.



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COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Historical Search Copy



Identifier Land Registration District North Auckland Date Issued

NA502/232 15 December 1925

Cancelled

Prior References DI 10A.329	DI 7A.98
Estate	Fee Simple
Area	11.2629 hectares more or less
Legal Description	Lot 2 Deposited Plan 18839
Original Proprieto	ors
Thomas Augustus E	Bishop

Interests

For memorials see historic paper image of title. Cancelled

8323552.1 Departmental Dealing to convert and cancel the within title into Landonline - 22.10.2009 at 1:05 pm

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			lice book, 502 , jolio 232	ER ACT.	sin DESIROYED	itnesseih that		tified by memorial under written ay Act of the General Assembly , bo the several admeasurements	ud_thirteen_perches_more d_ae_No.15839_and_teing		District Land Registrar. In the Deece Redister	the sayth in equal	1 preduced 15/26	bouncelears and
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DART. CA		EW ZEAL		TITLE UNDER	day of Deterber	rar of the Land Registration Di		rvations, restrictions, encumbran of the Crown to take and lay of the same is delitested by the pla	of laud containing Twenty-re- posited in the Land Reg rich of Waikowith		Cutitand1	<u>Fort686</u> Hiternicu Shares	Ita When	an mark
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COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Search Copy



Identifier	NA9B/590
Land Registration District	North Auckland
Date Issued	07 September 1966

Prior References		
NA624/29	NA669/42	NA672/179
NA787/180	NA787/181	
Estate	Fee Simple	
Area	3321 square metres more or le	ess
Legal Description	Lot 8 Deposited Plan 56335	
Proprietors		
Watercare Services	Limited	

Interests

C480523.2 CAVEAT BY THE AUCKLAND REGIONAL COUNCIL - 14.5.1993 AT 1.57 PM



9B/ 590 No.

30,000/8/65-90

- Sec No. 10B/ 613 contained in A336991 Lease of Lo The Chairman Counor Inhabitatns of the Waitemata Ferm 21 produced P2 1,969 Fencing covenants affecting the part allotments 26.27, here subject as to parts Allotment 27 to right of way created by Deeds No.217344 (R200/332) and 203814 (R172/557). be the several admeasurements a little more or less, that is to say: All that parcel of land containing 397 acres 2 roods 12.5 perches more or less being parts allotments 17,26,27,30,31,33,34,56,57,58, 58A,59, and 60 Parish of Waikomiti parts more particularly shown as part lot 2 on Deposited Plan 18839, part lot 3 on Deposited Plan 18839, part lot Deposited Plan 19259 and lot 2 Deposited Plan 30536. memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, Allotment 57 and part 17,26,27,30,31,33,34,56,58,59, and 60 Parish of Waikomiti are imited as to parcels. 17 by Subject as Interests seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by PSZ Deed to crossing Deed 159452 Ð at date ő 207 part Allotment ng rights granted 2 (R83/233). 2 5 fillors Ŗ 2 County years L.R. 6 Issue: 1 Plan DEPOSITED 19.10 Jen S Allotments 600 and from 0f ß and herein. 557 and 59307 0 4.1967 3 6 đ 267392 within land as a bulk-undertaking pursuant t Auckland Regional Auth Entered 24.10.1968 at . A.320676 the Auckl A 506 Howselve laward by Alfan Gaeffrand Domines aste part and month 26 (30. 10. 12.47.): -H. M. 1971 at 9.40 cc. الفالم المعادية Power 44820 Hula Pod ىلا . inches from A450306 R296/60 Assistant 037 40% 20676 Evidence Auckland Regio Û Road. Entered Q 150 44 Land ĝ 2 V Re tolution Regional Authority the middle СЛ alcu-0 61/ Registrar 5 - 1970 at 1 middle bulk-water ant to Sect Authority Act о Ļ の戸 թ t \vec{O} DEPOSITED kal 1, the 9.0 919 30 Ŧ Ī -9 feat six ٥ vesting 970,a 2,000/8/61-42628 W 10.35 Depoid Plan Electric 0 J 1970, 0 D.L.R. rity of supply tion 42 ちたろ **H9654** 20 years Q ۵ 12511 1963 Ro A D ц,

WITNESSETH that THE MAYOR COUNCILLORS AND CITIZENS OF AUCKLAND	Utilis Certificate dated the 17th day of JANUARY one thousand nine hundred and SIXTY under the seal of the District Land Registrar of the Land Registration District of NORTH AUCKLAND	CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT	Transfer No. 47,945/276,970/262.	Reference: Prior C/T. 136/167,455/232,502/232, 766/253,286,769/23,778/16.	
	Id SIXTY-SEVEN			TE DESTROY	





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2 C.145843.1 O.N.C.T 30.5.1990 1. 1971) Cancelled as to the residue) and a new CT issued:) <u>78D/462</u> 20C 22 CANCELLED 212 ۰. with . New ci A Oul 21500. かく Ŗ **R** ued ġ v 65245 ک 108/613 482

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:	No.	REGISTED	780	ER LAND TRANSFER ACT	one thousand nine hundred and ninety ration District of NORTH AUCKLAND	is seised of an estate in fee simple as tion 42 Auckland Regional Authority Act	trictions, encumbrances, liens, and interests as are notified by escribed, delineated with bold black lines on the plan hereon, y: All that parcel of land containing 159.5493 $\sqrt{26}(27)(30, 31)$ 33, 34, 56, 57, 58, 58A, ularly shown as part Lot 2 on Deposited Lot 2 Deposited Plan 30536	Bisant Lind Registrat	C.522353.1) Cancelled as to Lot 1 Plan ONCT 7 156565 and new CT 66C/118 1.10.1993) issued	C.522353.2) Cancelled as to Lot 2 Plan ONCT) 156565 and new CT 66C/119 1.10.1993) issued	A.L.R. C.522353.3) Cancelled as to Lot 3 Flan ONCT) 156565 and new CT 66C/120 1.10.1993) issued	A.L.R. C.522353.4) Cancelled as to Lot 4 Plan
	f	References Prior C/T 10B/613	Transfer No. N/C. Order No. C.145843.1	CERTIFICATE OF TITLE UNDE	This Certificate dated the 30th day of May under the seal of the District Land Registrar of the Land Registrar	WITNESSETH that THE AUCKLAND REGIONAL AUTHORITY a bulk water supply undertaking pursuant to Sect 1963	is series of the servation of the servations, rest memorial underwritten or endorsed hereon) in the land hereinafter de memorial underwritten or endorsed hereon) in the land hereinafter de be the several admeasurements a little more or less, that is to say here the several admeasurements a little more or less, that is to say here the several admeasurements a little more or less, that is to say here the several admeasurements a little more or less, that is to say here the several admeasurements a little more or less, that is to say here the several admeasurements a little more or less that is to say here the several admeasurements a little more or less that is to say the the several admeasurements a little more or less that is to say here the several admeasurements a little more or less that is to say the the several several admeasurements and the several se	Ass Interests at Date of Issue:	Fencing covenants in deeds 203814, R172/557, 267392 and R296/60 (affects part Allotments 26 and 27 only)	A450306 Resolution imposing a buidling line restriction 49 feet six inches from the middle line of Huia Road - 2.4.1970 at 2.40 o'c	Subject as to parts Allotment 27 a right of way created by Deeds 217344 (R200/332) and 203814 (R172/557) Subject as to part Allotment 17 to crossing	rights granted by Deed 139432 (K03/232)

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) 156565 and new CT 94A/354)3) issued CMULL	 3.5) Cancelled as to Lot 5 Plan 3) 156565 and new CT 94A/355 3) issued & Mulu A.L.R. A.L.R. A.L.R. 3) issued beyon of Plan 3) issued & CT 94A/356 3) issued & A.L.R. A.L.R. PART CANCELLED 	
ONCT 1.10.199	C.522353 ONCT L.10.199 C.522353 ONCT L.10.199	
of Maikoniti are limited as to parcellar	C.480521.1 Certificate under Section 37 of the Building Act 1991 - 14.5.1993 at 1.57 o'c (also affects CT 19A/248) Plan (STSS Logged 9-6-73 Plan (STSS Logged 9-6-73 Plan (STSV Lodged Measurements are Metric	
e e	294/ VOL 0	11
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78D/462

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D570789.1 CT 133C/953 issued – (for the Residue) - 8.1.2001 at 9.00

- For RGL - t amar Ø

CANCELLED DUPLICATE DESTROYED

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La 462 1963 50, No. hectares more or Subject as to parts Allotment 27 a right of way created by Deeds 217344 (R200/332) Plan 18839 part Lot 3 Deposited Plan 19259 and Lot 2 Deposited Plan 30536 be the several admeasurements a little more or less, that is to say: All that parcel of land containing 159.5493 is separated and a set of the second secon and 0 0 A450306 Resolution imposing a buidling line restriction 49 feet six inches from the middle line of Huia Road - 2.4.1970 at 2.40 Fencing covenants in deeds 203844 267392 and R296/60 (affects part 26 and 27 only) Subject as Allotment 57 and part Allotments 17, 26, 27, 30, 31, 33, 34, 56, 58, 59 and 60/Parish of Waikoniti are limited as to parcely (rights Interests C.480521.1 Certificate under Section the Building Act 1991 - 14.5.1993 o'c (also affects CT 19A/248)) and 60 Parish of Waikomiti parts more particularly shown as part 203814 (R172/557) : as to part Allotment 17 to crossing granted by Deed 159452 (R83/233) at Measurements are Metric Plan 1576505 Lodged 9-6-Date Plan ST 334 Lodged less being parts allotments Рff in deeds 203814, Issue: Section Allotments R172/557, ы С 26, A.L.R A.L.R 37 of 1.57 SB (17)(26)(27)(30)Assis /1.10.1993 ONCT ONCT ONCT ONCT ONCT ONCT C.522353.6 1.10.1993 C.522353.5 C.522353.4 1.10.1993 C.522353.3 1.10.1993 C.522353.1 1.10.1993 1.10.1993 C.522353.2 The second second States and a Reg (31, 33, 33, 33)- \sim 156565 issued issued 156565 Cancelled as Cancelled Cancelled as 156565 and new CT 94A/355 issued Cancelled issued Cancelled as issued issued 156565 and new 156565 156565 and new CT 66C/118 Cancelled as PART CANCELLED Har Lot 2 ω 4 and and new CT 94A/354 and new as as 56 , new on Deposited g ő ő g ő S G ໄ ຊີ CT 66C/120 6 Shullin CT 66C/119 63MUL Lot 1 Plan Lot 3 Plan Lot 6 Plan Lot 5 Plan Lot 4 Plan Lot 2 Plan 4Smu 6Smu 63 Mill CSNUL 94A/356 ភ្ល ភូខ A.L.R. A.L.R A.L.R. A.L.R A.L.R A.L.R. 58A,

Reference Prior C/7 Transfer N/C. Orc	ss f 10B/613 No. ler No. C.145843.1		Land and Deeds 69	b/ V8 L .or	486
	CERTIFICA	TE OF TITLE UNDER L	AND TRANSFER ACT	29 <i>†</i> /	
This Co under th	rtificate dated the 30th e seal of the District Land	day of May Registrar of the Land Registration	one thousand nine hundred and ninety District of NORTH AUCKLAND	_	I
WITNES	SETH that THE AUCKLAN	ND REGIONAL AUTHORITY is s	eised of an estate in fee simple as		
a bulk	water supply underta	aking pursuant to Section	42 Auckland Regional Authority Act		

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D570789.1 CT 133C/953 issued – (for the Residue) - 8.1.2001 at 9.00 CANCELLED DUPLICATE DESTROYED Aamare P — For RGL

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COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Historical Search Copy



Identifier Land Registration District North Auckland Date Issued

NA66C/120 01 October 1993

Prior References NA78D/462

Fee Simple
58 square metres more or less
Lot 3 Deposited Plan 156565

Original Proprietors

Watercare Services Limited

Interests

A450306 Resolution imposing Building Line Restriction - 2.4.1970 at 2.40 pm (affects Huia Road) C582941.4 CAVEAT BY THE AUCKLAND REGIONAL COUNCIL - 28.3.1994 AT 2.32 PM

١. 36 ag 6 6 2 0 N/C. Order No. Transfer No. Prior C/T under the seal of the District Land Registrar of the Land Registration District of North Auckland. References WITNESSETH that THE AUCKLAND REGIONAL AUTHORITY is be the several admeasurements a little more or less, that is to say: All that parcel of land containing 58 square bulk water supply undertaking pursuant to Section 42 Auckland Regional Authority Act 1963 A450306 Resolution imposing a restriction forty-nine feet s: the middle line of Huia Road -2.40 o'c metres more or of Waikomiti C.582941.1 Transmission Regional Council - 28.3. Limited at C.582941.2 Transfer C.582941.4 COUNCIL - 2 Measurements are Metric Auckland 28.3. CAVEAT C.522353.3 less being Lot CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT 78D/462 1994 ВΥ 28.3.1994 to Watercare Services T a t 28 3.1994 THE to The Auckland N AUCKLAND REGIONAL SIX ω ф ф building ы • Deposited inches 2.32 ĥ 63 Mulie 4.1970 at 2.32 0'0 A.L.R. A.L.R. 0**°**0 A.L.R. A.L.R. from line Plan 156565 seised of an estate and being part Allotment REGISTER Assi • ۳۰٬, AND REGISTRY "H AUCKLAND NEY in fee simplé as Land and Deeds 69 nd Reg 59 Parish Q . e 2 g 0 9 491

No.









COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Search Copy



Identifier Land Registration District North Auckland Date Issued

NA94A/354 01 October 1993

Prior References NA78D/462

Estate	Fee Simple
Area	1287 square metres more or less
Legal Description	Lot 4 Deposited Plan 156565
Proprietors	

Watercare Services Limited

Interests

A450306 Resolution imposing Building Line Restriction - 2.4.1970 at 2.40 pm C582941.4 CAVEAT BY THE AUCKLAND REGIONAL COUNCIL - 28.3.1994 AT 2.32 PM







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COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

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Identifier Land Registration District North Auckland Date Issued

NA94A/355 01 October 1993

Prior References NA78D/462

Estate	Fee Simple
Area	4.0105 hectares more or less
Legal Description	Lot 5 Deposited Plan 156565
D	

Proprietors Watercare Services Limited

Interests

A450306 Resolution imposing Building Line Restriction - 2.4.1970 at 2.40 pm C582941.4 CAVEAT BY THE AUCKLAND REGIONAL COUNCIL - 28.3.1994 AT 2.32 PM







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Identifier Land Registration District North Auckland Date Issued

NA94A/356 01 October 1993

Prior References NA78D/462

Estate	Fee Simple
Area	4.2027 hectares more or less
Legal Description	Lot 6 Deposited Plan 156565

Proprietors Watercare Services Limited

Interests

Subject to a right of way over parts marked A and C on DP 156565 created by Deed 217344 (R200.322)

Subject to a right of way over part marked B on DP 156565 created by Deed 203814 (R172.557)

Subject to crossing rights created by Deed 159452 (R83.233)

A450306 Resolution imposing Building Line Restriction - 2.4.1970 at 2.40 pm

C582941.4 CAVEAT BY THE AUCKLAND REGIONAL COUNCIL - 28.3.1994 AT 2.32 PM



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REGISTERED OWNER untri CHAIRMAN TING SECRETARY BEARING DATUM GEODETIC 1949 COORDINATE DATUM GEODETIC 1949 MT EDEN CIRCUIT COORDINATES. ORIGIN: MT EDEN: 700000N \frown 300000F Existing Easement Purpose Shown Created by $\triangle \bigcirc$ Deeds 217344 Right (R200/332)of Way Deeds 203812 (R172/557) B EXEMPT FROM/ PART X OF THE RESOURCE MANAGEMENT ACT 1991 PURSUANT TO SECTION 11 (1) b OF THE SAID ACT : LAND TRANSFERRED UNDER THE PUBLIC WORKS ACT 1981 July, ACTING GENERAL SECRETARY AUCKLAND REGIONAL COUNCIL New CT Allocoted 166C/118 LOIA 94 A/354 5 94 A/355 6 94 A/356 2660/119 3660/120 Total Area 57 3635 hd Comprised in CT. 78 P/462 (pt). I. MULTEROY. JOHN. TOWNSEND. Registered Surveyor and holder of an annual practising certificate (or who may act as a registered surveyor pursuant to section 25 of the Survey Act 1986), hereby certify that this plan has been made the Survey Act 1980), hereby ceruly that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof, / aveldand this 27 1993 Signature 🦾 May Traverse Book 1387p 54 - 63 Field Book Reference Plans W. Gibbs. Examined Rallow Correct Approved as to Survey KIIM Chief Surveyor 9,7,93 day of Oct 1993 Deposited this 63 Million **District Land Registrar** File 78 DP 156565 Received Instructions 0 9 JUN 1993 LAS FORM N93 \$2 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 003



Approvals BOUNDARIES ADOPTED FROM SO 11895 UNLESS OTHERWISE SHOWN REGISTERED OWNER CHAIRMAN ACTING SECRETARY Sheel \bigcap^{\dagger} \square 2 Total Area 57:3635.hd I. MULTICLY. JOH THE TOWING CONTRACT Registered Surveyor and holder of an annual practising certificate (or who may act as a registered surveyor pursuant to section 25 of the Survey Act 1986), hereby certify that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof. 19 93 Signature Field Book Reference Plans Correct W. Gildes Examined Rustlaw Approved as to Survey Mhl Chief Surveyor 193 911 day of Oct 1993 Deposited this 63 Million District Land Registrar Assist File 77825/00 Received Instructions 10 9 JUN 1993 DP 156565 510



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Approvais REGISTERED OWNER M CHAIRMAN 82 ACTING SECRETARY >T83∕ see <u>diag</u>G B 6 4·2027 ha 76°34 28°39 adpl n IO NaNN D.P.44159 З З Sheel BOUNDARIES ADOPTED FROM SO 23931 UNLESS OTHERWISE SHOWN Total Area 57.3635 hd Comprised in CT 78 P/462 (pt) I. M. U. C. G. Y. JOHN. JOWNSE. nd. Registered Surveyor and holder of an annual practising certificate (or who may act as a registered surveyor pursuant to section 25 of the Survey Act 1986), hereby certify that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof aucklas this 27 1993 Sionature Field Boo Reference Plans Correct W. Gildes Containi Examined Approved as to Survey Mal **Chief Surveyor** 9 17 193 lit day of Oct 1993 Deposited this 63 William District Land Registrar Asses File 1/782.5/W **DP 156565** nstructions LASFORM N93



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Identifier Land Registration District North Auckland Date Issued

NA66C/118 01 October 1993

Prior References NA78D/462

Estate	Fee Simple
Area	18.3873 hectares more or less
Legal Description	Lot 1 Deposited Plan 156565
Area Legal Description	18.3873 hectares more or less Lot 1 Deposited Plan 156565

Proprietors

Watercare Services Limited

Interests

A450306 Resolution imposing Building Line Restriction - 2.4.1970 at 2.40 pm (affects Huia Road frontage)

Subject to a right of way (in gross) over part marked A on Plan 157334 in favour of the Auckland Regional Council created by Transfer C582941.3 - 28.3.1994 at 2.32 pm C582941.4 CAVEAT BY THE AUCKLAND REGIONAL COUNCIL - 28.3.1994 AT 2.32 PM

53991881 Transaction Id Client Reference kclayton001





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REGISTERED OWNER untri CHAIRMAN TING SECRETARY BEARING DATUM GEODETIC 1949 COORDINATE DATUM GEODETIC 1949 MT EDEN CIRCUIT COORDINATES. ORIGIN: MT EDEN: 700000N \frown 300000F Existing Easement Purpose Shown Created by $\triangle \bigcirc$ Deeds 217344 Right (R200/332)of Way Deeds 203812 (R172/557) B EXEMPT FROM/ PART X OF THE RESOURCE MANAGEMENT ACT 1991 PURSUANT TO SECTION 11 (1) b OF THE SAID ACT : LAND TRANSFERRED UNDER THE PUBLIC WORKS ACT 1981 July, ACTING GENERAL SECRETARY AUCKLAND REGIONAL COUNCIL New CT Allocoted 166C/118 LOIA 94 A/354 5 94 A/355 6 94 A/356 2660/119 3660/120 Total Area 57 3635 hd Comprised in CT. 78 P/462 (pt). I. MULTEROY. JOHN. TOWNSEND. Registered Surveyor and holder of an annual practising certificate (or who may act as a registered surveyor pursuant to section 25 of the Survey Act 1986), hereby certify that this plan has been made the Survey Act 1980), hereby ceruly that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof, / auchaland this 27 1993 Signature 🦾 May Traverse Book 1387p 54 - 63 Field Book Reference Plans W. Gibbs. Examined Rallow Correct Approved as to Survey KIIM Chief Surveyor 9,7,93 day of Oct 1993 Deposited this 63 Million **District Land Registrar** File 78 DP 156565 Received Instructions 0 9 JUN 1993 LAS FORM N93 3. 82 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 \mathbf{U}



Approvals BOUNDARIES ADOPTED FROM SO 11895 UNLESS OTHERWISE SHOWN REGISTERED OWNER CHAIRMAN ACTING SECRETARY Sheel $\bigcap f$ \square 2 Total Area 57:3635.hd I. MULTICLY. JOH THE TOWING CONTRACT Registered Surveyor and holder of an annual practising certificate (or who may act as a registered surveyor pursuant to section 25 of the Survey Act 1986), hereby certify that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof. 19 /3 Signature Field Book Reference Plans Correct W. Gildes Examined Rustlaw Approved as to Survey Mhl Chief Surveyor 193 911 day of Oct 1993 Deposited this 63 Million District Land Registrar Assist File 77825/00 Received Instructions 10 9 JUN 1993 DP 156565 516



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Approvais REGISTERED OWNER M CHAIRMAN 82 ACTING SECRETARY [>]783∕ see <u>diag</u>G B 6 4·2027 ha 76°34 28°39 adpl n IO NaNN D.P.44159 З З Sheel BOUNDARIES ADOPTED FROM SO 23931 UNLESS OTHERWISE SHOWN Total Area 57.3635 hd Comprised in CT 78 P/462 (pt) I. M. U. C. G. Y. JOHN. JOWNSE. nd. Registered Surveyor and holder of an annual practising certificate (or who may act as a registered surveyor pursuant to section 25 of the Survey Act 1986), hereby certify that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof aucklas this 27 1993 Sionature Field Boo Reference Plans Correct W. Gildes Containi Examined Approved as to Survey Mal **Chief Surveyor** 9 17 193 lit day of Oct 1993 Deposited this 63 William District Land Registrar Asses File 1/782.5/W **DP 156565** nstructions LASFORM N93



Historical Search Copy



Cancelled

Identifier Land Registration District North Auckland Date Issued

NA66C/119 01 October 1993

Prior References NA78D/462

Estate	Fee Simple
Area	30.6285 hectares more or less
Legal Description	Lot 2 Deposited Plan 156565

Original Proprietors

Watercare Services Limited

Interests

Subject to crossing rights created by Deed 159452 (R83.233)

Subject to rights of way over parts marked A and C on DP 156565 created by Deed 217344 (R200.322)

Subject to a right of way over part marked B on DP 156565 created by Deed 203814 (R172.557)

A450306 Resolution imposing Building Line Restriction - 2.4.1970 at 2.40 pm (affects Huia Road)

Subject to a right of way (in gross) over part marked B on Plan 157334 in favour of Auckland Regional Council created by Transfer C582941.3 - 28.3.1994 at 2.32 pm

C582941.4 CAVEAT BY THE AUCKLAND REGIONAL COUNCIL - 28.3.1994 AT 2.32 PM

10254529.2 Withdrawal of Caveat C582941.4 as to part Lot 1 DP 701574 - 17.11.2015 at 7:00 am

10254529.3 Court Order vesting part Lot 1 DP 484666 to Fernandez Family Company Limited - 17.11.2015 at 7:00 am

10254529.4 CTs issued - 17.11.2015 at 7:00 am

Legal Description	Title
Part Lot 1 Deposited Plan 484666	701574
Lot 2 Deposited Plan 484666	701575

CANCELLED

bulk water supply undertaking pursuant to Section 42 Auckland Regional Authority Act 1963

be the several admeasurements a little more or less, that is to say: All that parcel of land containing 30.6285 in second advances in the several admession and interests as are notified by the several admession and interests as are notified by the several admession and interests as are notified by

27 and 30 Parish of Waikomiti hectares more or less being Lot 2 Deposited Plan 156565 and being part Allotments 17, 26, • •

Fencing covenants in Deeds 203814, R172.557, 267392 and R296.60 (affects part Allotments 26 and 27 only)

A450306 Resolution imposing a building line restriction forty-nine feet six inches from the middle line of Huia Road - 2.4.1970 at 2.40 o'c

Council

28 3 1994 at 2, 32 0'c

157334 in

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in gross over the

part marked

B on Plan

easement

C.582941.3 Transfer granting a ROW

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HEG(5)

Subject to rights of way over the parts marked 'A' and 'C' on Plan 156565 created by Deed 217344 (R200.332)

Subject to a right of way over the part marked 'B' on Plan 156565 created by Deed 203814 (R172.557)

Subject to crossing rights granted by Deed

CSMUlian A.L.R.

A.L.R. C.582941.1 Transmission to The Auckland

Measurements are Metric

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C.582941.4 CAVEAT BY THE AUCKLAND, REGIONAL COUNCIL - 28 1994 at 2.32 o'c A.L.R.

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C.582941.2 Transfer Limited at Auckland

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Watercare Services

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Regional Council -

28.3.1994

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76, N/C. Order No. WITNESSETH that THE AUCKLAND REGIONAL AUTHORITY is seised of an estate in fee simple as under the seal of the District Land Registrar of the Land Registration District of Transfer No. Prior C/T References Chis Certificate dated the 1st C.522353.2 CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT 78D/462 day of October one thousand nine hundred and ninety-three REGISTER North Auckland. Land and Deeds 69 5- - t р 6 .oN **9 9** 521

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Search Copy



Identifier Land Registration District North Auckland Date Issued

701575 17 November 2015

Prior	References
NA66	C/119

Estate	Fee Simple
Area	30.6060 hectares more or less
Legal Description	Lot 2 Deposited Plan 484666
D	

Proprietors Watercare Services Limited

Interests

Subject to rights of way over parts marked A and C on DP 484666 created by Deed 217344 (R200.322)

Subject to crossing rights created by Deed 159452 (R83.233)

Subject to a right of way over part marked B on DP 484666 created by Deed 203814 (R172.557)

A450306 Resolution imposing Building Line Restriction - 2.4.1970 at 2.40 pm (affects Huia Road)

Subject to a right of way (in gross) over part marked B on Plan 484666 in favour of Auckland Regional Council created by Transfer C582941.3 - 28.3.1994 at 2.32 pm

C582941.4 CAVEAT BY THE AUCKLAND REGIONAL COUNCIL - 28.3.1994 AT 2.32 PM













	T 5/6
Title Plan DP 484666	

Deposited on: 17/11/2015





Historical Search Copy



Identifier Land Registration District North Auckland Date Issued

701575 17 November 2015

Prior References NA66C/119

Estate	Fee Simple
Area	30.6060 hectares more or less
Legal Description	Lot 2 Deposited Plan 484666

Original Proprietors

Watercare Services Limited

Interests

Subject to rights of way over parts marked A and C on DP 484666 created by Deed 217344 (R200.322)

Subject to crossing rights created by Deed 159452 (R83.233)

Subject to a right of way over part marked B on DP 484666 created by Deed 203814 (R172.557)

A450306 Resolution imposing Building Line Restriction - 2.4.1970 at 2.40 pm (affects Huia Road)

Subject to a right of way (in gross) over part marked B on Plan 484666 in favour of Auckland Regional Council created by Transfer C582941.3 - 28.3.1994 at 2.32 pm

C582941.4 CAVEAT BY THE AUCKLAND REGIONAL COUNCIL - 28.3.1994 AT 2.32 PM



Photograph Appendix H.1: Google Street View of cleared section on Woodpark Road March 2008 (Source: Google Maps)



Photograph Appendix H.2: Google Street View of cleared section on Woodpark Road November 2009

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ATTACHMENT THREE

FURTHER INFORMATION – NOVEMBER 2019


Job No: 30848.2000 8 November 2019

Auckland Council Private Bag 92300 Auckland 1142

Attention: Tracey Grant

Dear Tracey

Huia Replacement WTP - BUN60339273, Response to second Section 92 Request for Further Information

Further to your letter dated 2 October 2019 requesting further information pursuant to section 92 of the Resource Management Act 1991 (RMA), we write to provide a response to the matters outlined therein. For ease of reference our numbering corresponds to the numbering set out in your letter.

Question 1: Regional Stormwater and Question 2.2: Earthworks

A comprehensive response to the regional stormwater and earthworks-related matters in contained in the attached letter from Cook Costello, dated 7 November 2019 (Attachment A).

In response to the request set out at 2.2(d)(i) and (ii), please find in the table below approximate earthworks volumes including topsoil and additional cut material, and fill requirements. To ensure a conservative approach, all technical assessments have been completed on the basis that all cut material will be removed from site. However it is expected that at least some of the cut material will be able to be reused onsite as fill.

	WTP Site	Reservoir 1	Reservoir 2
Area	2.7 ha	0.88 ha	0.9 ha
SEA Area	2.5 ha	0.6 ha	0.4 ha
Cut	41,460m ³	44,000m ³	6,000m ³
Fill	30,400m ³	500m ³	11,000m ³
Total volume	71,860m ³	44,500m ³	17,000m ³
Approx. volume within SEA*	68,000m³	43,000m ³	Up to 7,000m ³
Max cut depth	13m	16m	4m
Max fill depth	10m	3m	10m

* This is based on the area contained within the SEA and takes into account earthworks cut/fill depth within those areas.

Question 2.1: Streamworks, Question 3: Terrestrial Ecology and Question 4: Kauri Dieback

A comprehensive response to the streamworks, terrestrial ecology and Kauri dieback-related matters is contained in the attached letter from Boffa Miskell Ltd, dated 20 October 2019 (Attachment B). The specific information requested is shown in italics in that letter, followed by the response. As Boffa Miskell has noted, some of the response will be provided once additional survey information has been gathered. This work is currently underway.

Exceptional	thinking	together
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www.tonkintaylor.co.nz

Question 5: Transportation

A comprehensive response to the transportation-related matters set out in questions 5.1 to 5.4 and 5.6 is contained in the attached letter from Beca, dated 4 November 2019 (Attachment C). The specific information requested is shown in italics in that letter, followed by the response.

A response to question 5.5 regarding road stability is set out in the attached letter from Tonkin & Taylor Ltd, dated 7 November 2019 (Attachment D).

Question 6: Noise and Vibration

"Please provide comments on potential vibration nuisance created by passing trucks driven on the road network during the construction phase, and include indicative vibration levels for a dwelling setback an arbitrary distance of 10m from a well maintained road with guideline limits in ISO 2631-2:1989 or other suitable standards/guidelines."

Marshall Day Acoustics (MDA) has provided the response set out as follows:

"ISO 2631-2:1989 has been superceded by ISO 2631-2:2003, however we note that the 2003 version of this standard does not contain vibration criteria and therefore is of little use. The vibration standard contained in the Auckland Unitary Plan (AUP), namely E25.6.30, relates to construction vibration and vibration from stationary machinery. The daytime limit for an "occupied activity sensitive to noise" is 2mm/s and during the night-time it is 0.3mm/s. We have also referred to British Standard BS 5228-2:2009 "Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration" for guidance on vibration perceptibility and at what levels adverse effects can arise. The following is noted:

0.14mm/s PPV	Just perceptible in particularly sensitive environments
0.3 mm/s PPV	Just perceptible in normal residential environments
1 mm/s PPV	Typically acceptable with prior notification
10 mm/s PPV	Likely to be intolerable for any more than a very brief period

Reviewing guidance from BS5228, we note that the 0.3mm/s threshold of perceptibility in normal residential environments is the same as the night-time (10pm to 7am) limit from Table E25.6.30.1 of the AUP.

We have limited measurement data available for heavy vehicle movements on roads. The data we do have has been plotted in the following figure, together with the fitted regression curve. The figure below indicates that for a distance of 10m from the road, a level of 1mm/s could be expected. While this would be perceptible (e.g. crockery or glassware could rattle), with prior notification of the activity the resulting effects are considered acceptable on the basis that the activity would occur during daytime hours. It should also be noted that dwellings located 10m from a road would also experience similar levels of vibration from other non-project related heavy vehicles."



Figure.1: Potential vibration from HCV

In addition to the response provided by MDA above, we note that the minimum yard depth in the Large Lot Residential Zone is 10m (AUP Standard H1.6.5). This is the permitted activity standard and is measured from the property boundary. Aerial photography indicates that houses along the main transportation routes in proximity to the Replacement WTP are typically set back in the order of 15 to 20m or more from the edge of the carriageway. Using a setback distance of 10m therefore represents a conservative assessment.

Question 7: Planning

7.1 Following a review of submissions, a query arises in respect of the summary of alternatives as presented in the AEE, given variations in relevant considerations for each of the sites listed (section 5.4.3). The assessment of alternatives for the development as a whole includes social impact assessment for some sites, and a social impact assessment for the subject site would seem to be a relevant matter for consideration, and separate from the technical assessments around traffic or noise effects etc. Please advise whether a social impact assessment has been prepared for the subject site.

A social impact assessment (SIA) was undertaken at the shortlist stage for the four shortlisted sites which included the current site (termed the Manuka Road Option in the SIA). An SIA therefore has been prepared for the subject site, however it is not limited to this site and includes the other three sites that were shortlisted. However on the basis of your query Watercare has engaged Beca to prepare an update 'addendum' to the original SIA which is contained in Attachment E. This summarises the potential impacts and mitigation measures proposed in the original SIA, and

3

considers the implications of the design refinements and proposed mitigation developed since the original SIA was undertaken and that form part of this current resource consent application.

7.2 A number of submitters have made comments with respect to conditions of consent (e.g. Forest & Bird, 5032, Department of Conservation, 5287). Please advise if any amendments to the draft conditions attached to the application are proposed as a result of those submissions.

We are compiling an amended and updated list of conditions to respond to some of the points raised in submissions, and also to reflect updates following matters raised in the most recent Section 92 further information request. We will provided an updated consolidated set of conditions shortly.

7.3 Further to the above, it is noted that the application includes various draft management plans (e.g. the Erosion and Sediment Control Plan, the Stream Ecological Valuation Plan, Construction Traffic Management Plan). However, no Ecological Management Plan has been provided, nor a Groundwater and Settlement Monitoring and Contingency Plan or Construction Noise and Vibration Management Plan. Please advise of the reasons for this, and/or whether drafts of such plans will be prepared for the hearing.

A draft CNVMP will be prepared for the hearing however it will be based on a number of assumptions. MDA has indicated that the most appropriate time to develop the CNVMP and provide it to Council for review would be once the main Contractor has been engaged and the construction methodology has been confirmed. The draft CNVMP would therefore need to be updated and finalised at this time.

Similarly a draft GWMCP and Ecological Management Plan will be prepared for the hearing. These plans would need to be updated and finalised once the main Contractor has been engaged and the construction methodology has been confirmed.

7.4 Some submitters have referred to the consent for works to be undertaken in Shetland Road (see 4827, 5213 and 5236). Please provided details of this consent(s).

Works in Shetland Road required for the NH2 tunnel are provided for under designation 9376 and do not form part of this current application. Relevant information can be found on Watercare's website at: <u>https://www.watercare.co.nz/About-us/Projects-around-Auckland/North-Harbour-2-watermain</u>

This resource consent application does not provide for, or include, any works in Shetland Road.

7.5 A submission in opposition to the proposal has been received from the Te Kawerau Iwi Tribal Authority and Settlement Trust (#5025). Please advise of any changes to the assessment and conclusions with respect to cultural effects set out in section 8.8.5 of the AEE, as well as the assessment against s8 at section 8.2.2 and relevant objectives and policies. It is understood that a Cultural Values (or Impact) Assessment may be being prepared by Te Kawerau ā Maki, which may further address these matters, and it would be appreciated if an indication of timing in that regard can be provided.

The AEE acknowledges the importance of the Waitakere Ranges to Te Kawerau a Maki and identifies the environmental management and mitigation measures proposed that may be of relevance to cultural effects. This includes refining the size/footprint of the proposed WTP and reservoirs and locating the footprint, wherever possible, away from permanent and intermittent streams and areas identified as having particularly high values, protecting water quality through best practise stormwater treatment and erosion and sediment control, and containing and minimising the harm from Kauri dieback along with the broader suite of ecological mitigation and compensation measures proposed. The opportunity for mana whenua to exercise their kaitiakitanga in assisting in the proposed ecological mitigation and compensation works and ensuring the knowledge, expertise



and practices held by mana whenua is utilised in the final design of these measures is also recognised.

In light of the most recent Court of Appeal 'Davidson decision', a brief assessment against Part 2 of the RMA is set out in Section 8.2.2 of the AEE which takes into account the above. A comprehensive assessment against the AUP provisions is set out in Section 8.6 and Appendix P. It is acknowledged in a number of places in the AEE that Te Kawerau is currently preparing a Cultural Values Assessment to assess the cultural implications of the proposal and identify opportunities for kaitiakitanga and that this will further inform the assessment of effects on cultural values.

We understand that Te Kawerau has indicated to Watercare that the CVA will be available shortly, however we are unable to provide a definite indication of timing. We expect that where there any updates to the cultural effects assessment and policy assessment required as a result of the CVA then this will be able to be reflected in evidence.

7.5 Please advise if any change to the default consent lapse period is sought (per s125 of the RMA).

Considering the nature and scale of the works, the applicant has sought extended lapse dates of 10 years. This approach is not unusual for large-scale infrastructure works such as these and reflect the significant cost and complexities of undertaking such a project whilst allowing for unforeseen delays.

The exception to this is the land use consents for land disturbance activities including earthworks, NES consent for disturbance of contaminated soils, and vegetation removal associated with Reservoir 2 where a lapse period of 15 years is sought. This simply reflects the construction programme, whereby work on the second reservoir located on the existing WTP site can only commence once the replacement WTP is commissioned and the existing WTP is decommissioned. This work is therefore currently programmed to commence from around March 2026.

We note in the current draft proposed set of conditions contained in Appendix Q we have indicated a lapse date of 20 years for the contaminated land discharge consent. On review we do not consider this is necessary and instead consider this should be revised back to 10 years. The updated suite of draft conditions will reflect this change.

Conclusion

We trust that the above satisfactorily addresses the matters raised and there is now sufficient information available for you to continue processing the application. Please do not hesitate to contact Karen Baverstock on 09 3592735 or <u>KBaverstock@tonkintaylor.co.nz</u> if you require further clarification on any aspects of this letter.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Prepared by:

Authorised for Tonkin & Taylor Ltd by:

Karen Baverstock Technical Director

Peter Roan Project Director

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Attachment A: Regional stormwater and earthworks response

1 November 2019 Job No: 30848.2000 5447 Our Ref: 14191

8/11/2019

Watercare Services Limited

Private Bag 92521 Wellesley Street Auckland 1141 New Zealand

Attention: Mr Paul Jones

Dear Paul,

Huia WTP - Stormwater Queries from Council S92

Cook Costello are pleased to see such detailed consideration from Council and consider this will assist with the robustness of the application.

We provide snippets of each query in regard to stormwater and earthworks with corresponding responses as below.

Item No.	Query / Response
1	The response to the first section 92 response did not address item 1.1 (water quality treatment):
	The options analysis for water quality treatment requires more detail, particularly in terms of rejecting biofiltration or permeable paving as options for stormwater quality management vs. proprietary filtration. Please provide a more detailed analysis of alternative options particularly with reference to the Best Practicable Option criteria outlined within the RMA and referenced through relevant AUP objectives and policies.
	Please provide a response to this matter.
	Water quality treatment options are assessed as detailed in the attached memorandum 14191-MEM-CIV-001.
	Please refer to the memo in Appendix A.
2.2 (a)	While SRP1 has an odd shape Mr Tutt is confident that it could operate efficiently provided the baffles are
	installed correctly to increase the retention time. One single baffle will not work. Two baffles, offset from
	each other would be required, stretching approximately two-thirds across the pond width. These baffles
	would need to be the full height of the pond (up to the primary spillway level). This could be done with
	specially made wide silt fence material. Given the design of this pond is not within GD05 standards, please
	provide an enlarged plan view of SRP1 showing the baffle positioned appropriately to increase the retention
	time. For some guidance, an as built of a similar shaped (but shallower) pond has been attached as an example
	showing the location of the baffles (Attachment 1). The yellow line shows the anticipated flow of water
	through the pond from the level spreader towards the decants.
	An additional baffle is added to SRP1. Please refer to Drawing C102 Rev. E and Drawing C102A Rev. A in Appendix
	B for the enlarged view of pond.

Whangarei 09 438 9529

Auckland 09 373 5357

Wellington 04 472 7282 **Christchurch** 03 365 5960









2.2 (b)	Erosion and sediment controls are designed for rainfall events up to the 20-year event. Please advise what contingencies or management protocols are going to be in place when events larger than the 20-year event are forecast?						
	Regular monitoring of w ARI/5% AEP or prolon earthwork disturbed are will function as intende	Regular monitoring of weather forecast will be necessary. When extreme weather (rainfall greater than 20-year ARI/5% AEP or prolonged rainfall/wet season) is forecasted, the contractor shall limit, cease and stabilise earthwork disturbed areas. Visual inspection of all E&S control devices is needed to ensure all mitigation devices will function as intended.					
2.2 (c)	An adaptive environme and set out a monitorir outflows from the se understanding any e implementation of an A Watercare will consider	ental monitoring ng programme ind diment treatmen ffects that may AEMMRP.	and managen cluding downs nt devices w y result fron cion of AEMMI	nent response p stream receiving ill be monitore n the earthwo RP in detailed de	lan (AEMMRP) o environment in d for water qu orks operation. sign stage.	can be an effective tool spections, and how the uality and to assist in Please consider the	
2.2 (d) (i)	In terms of the area an	d volume of earth	works:				
(a) (i)	The earthwork volume table clarify the poter imported fill.	s in the erosion a itial volumes of	and sediment earth to be r	control report a noved, including	and AEE don't n g topsoil, cut to	natch. Please provide a o waste, cut to fill and	
	All volume estimates ar that all cut materials wi table.	e presented with Il be removed and	in 3.2.1, 3.2.2 I all fill materia	and 3.2.3 in the als imported. We	main report boo summarise the	dy, with the assumption estimates into following	
			HRWTP [#]	Reservoir 1 [^]	Reservoir 2 [^]]	
		Strip Topsoil	13,600m ³	4,400m ³	4,500m ³		
		*Total Cut	41,460m ³	44,000m ³	6,000m ³		
		Fill	30,400m ³	400m ³	11,000m ³		
	*We assume the total c	ut volumes includ	le 0.5m thick t	opsoil to be rem	oved.	1	
	[#] See GHD Drawing 51-3	357505-C006 Rev	. 1.				
	[^] See Beca Drawing 3525	55336.K116 Issue	0B in Appendi	ix C.			
2.2 (d) (ii)	Please confirm the tota (per E26.5.3.2 (A118)).	l area and volume	e of earthwork	ks within the SEA	overlay to confi	rm a reason for consent	
	Refer T&T letter.						
2.2 (j) (i)	There are some errors	in the USLE calcul	ation highligh	ited below – plea	ase revise the U	SLE:	
	First, the area for S1 is	different to the a	rea proposed	to be earthwork	ced (2.21ha vs 1.	.98ha).	
	We note that 1.98ha is	obtained by initial	l estimation of	f catchment size	as noted in Drav	ving C102 Rev. A. Due to	
	1.964ha. Please refer to	the latest drawi	ng sheet C102	Rev. E. Catchme	ent 2A, estimate	d to be 4,150m2 in area	
	will contribute to S2.						
2.2 (j) (ii)	Secondly, the R value, model (83.6 as opposed	HIRDS calculates to the 81.4).	the 2yr 24hr	rainfall depth s	lightly higher th	nan what is used in the	



	HIRDSv3 shown b	data is a elow. W	dopted in /e are aw	our design and are that a new	d we note a w release	81.4mm is th has been m	he 2-yr Iade in	r 24-hr rainfal n HIRDS v4.	l depth sr This will	pecific to the site as slightly change the
	sedimen	t yield by	4% and r	nay be used in	final desig	n.				
	High Inte Results for Depth-Durat Sitename: H Coordinate s Easting: 265 Northing: 64	ensity Rain r Hula Treatm ion-Frequency ula Treatment Pl system: NZMG 6680 72490	nfall System ent Plant results (produce ant	m V3 Id on Monday 10th of Sep	tember 2018)					
	Rainfall	depths (m	nm)							
	ARI (v)	aep	Duration 10m	20m 30m	60m	26	6h	12h	4h 4	8h 72h
	1.58	0,633	10,0	14.0 17.1	23.9	30.7	45,6	58.5	75,1	85,8 92.7
	2,00	0,500	10,7	15,0 18,3	25,7	33,0	49,2	63,3	81,4	93,0 100,6
	5.00	0,200	13,3	18,6 22,7	31.9	41,3	62.2	80,6	104.5	119.4 129,1
	10,00	0,100	15.3	21.5 26.2	36,8	47.9	72.7	94.7	123.2	140.8 152.3
	20.00	0.000	17.6	24.7 30.1	42.2	50.0	04.4	110.4	144.4	105.0 176.5
	30,00	0.035	20.4	20.7 32.5	40.7	59.9	92.0	120.0	150.2	195,5
	50.00	0.025	2021	20.2 34.4	40.3	03.4	3/./	120/*	100.7	0.002
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	80.00	0.017	23.0	32.2 30.3	55.2	72.5	113.0	t ebt	195.8	234.B 345.7
	100.00	0.010	24.0	33.6 410	57.6	76.1	119.4	156.5	206.8	216.3 255.6
	100.00	0.010	1 2410	41.9	or a	74.1	1.138.4	100.0	x00.0	entria
2.2 (j) (iii)	The P va We have	lue shoul	d be 1.32 our calcul	e, assuming contracts and work	mpacted a	nd smooth l	bare s	oil.		
2 2 (i) (iv)	The sedi	ment cor		iency (SCE) of	silt fonces	/sunor silt f	foncos	is too high i	t is more	likely 50-60% SCF
2.2 (j) (iv)	The seul	ment coi	itioi enit	lency (SCE) Of	sint rences	/super sit i	ences	is too mgn, i	t is more	IRELY 50-00% SCE
	Best nra	ctico "noi	foctly" d	osignod SRDs v	with rainfal	ll activated	chami	cal treatment	t can achi	eve SCE of 90-95%
	Deschia	cuce per	lectly u	esigned Sites v	vitii aiiia	activateu	chenne			
	Given th	e odd de	sign of S	1. Mr Tutt esti	mates that	t it would li	kelv a	chieve a SCE	of appro	ximately 85% (also
				_,						
	noting t	hat pond	s general	ly decrease in	efficiency	over time a	as the	y fill with se	diment, e	ven after mucking
		• · - • - • -		, •						-
	them ou	t as not a	ill the sec	liment is remo	ivea).					
	85% SCE	is the val	ue being	used in our ca	lculations.					
2.2 (j) (v)	This resu	ults in a n	et yield o	fapproximate	ely 114 ton	nes of soil lo	ost du	ring the two	years of b	oulk earthworks.
	We have	e recalcul	ated the	net sediment	t loss 1, C	atchment 2	B and	Catchment 2	2C. As ar	example, the net
	seaimen	t yield for	r pond SI	is calculated a	is detailed	below.	. D	A		
				$= R \times K \times LS$	Net Sea S × C × P >	lment Los: < vears × ^c	s Per %SDR	Area 2 × (100% –	% SCE)	
		=	81 × 0.6	$55 \times 2.85 \times$	1 × 1.32	$\times 2 \times 50\%$	× (10	(100 - 15)% =	29.87 <i>t</i>	onnes/ha
					Net	Sediment	t Yield	d		
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		= 29.87tonnes/ha × Area								
				= 29.8	7tonnes/	'ha × 1.96	ha =	58.54tonn	es	
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	I ne estir	mates are	e summai	rised in the ta	bie below.	ine total s	eaime	ent yield antio	cipated fr	om the three sites
	during	onstructi	on stano	is annrovimat	ted to be	165 topper	The	calculation	Norkchan	ts are provided in
		Unstruction	on stage			TOP LOUNES	. me	calculation	NOI KSIIEE	
	Appendi	x D.								
							Duri	ng Constructi	on	
		Site	Co	ontributing	Net Sed	iment Loss I	Per		Net S	ediment Yield
			Sul	ocatchment	Area	(tonnes/ha))	Area (ha)		(tonnes)
				S1		29.87		1.96		58.54
		HWRTP		S2		66.46		0.42		27.92
				Catch 2B		8.42		0.07		0.59
	1 1			catch 2C	1	39.08		0.03		1.1/

36.38

Reservoir 1

S3



32.38

0.89



	www.coco.co.nz				
Reservoir 2	S4	51.09	0.88	44.96	
Total Sediment Yield:			165.55		

If you have any further queries, please do not hesitate to call.

Yours sincerely,

PJ Cook Chartered Professional Engineer MACENZ, CMEngNZ, MInstD, CPEng, IntPE (NZ) BE (Hons), Dip Ag.



Appendix A 14191-MEM-CIV-001



TECHNICAL MEMORANDUM

PROJECT	Huia Replacement WTP	PROJECT REFERENCE	14191		
CLIENT	Watercare Services Limited				
DATE	27/09/2019				
PREPARED BY	Yu Heng Chong	REVIEWED BY	Adrian Tonks Philip Cook		
TITLE	Stormwater Quality Treatment				

Subsequent to meeting on 3/09/2019 with Watercare we hereby provide further information in supplement to our response to S92 RFI regarding stormwater quality treatment. The discussions are in section 5.8 of the Stormwater and Erosion & Sediment Control report.

1.1 Water quality treatment

The options analysis for water quality treatment requires more detail, particularly in terms of rejecting biofiltration or permeable paving as options for stormwater quality management vs. proprietary filtration. Please provide a more detailed analysis of alternative options particularly with reference to the Best Practicable Option criteria outlined within the RMA and referenced through relevant AUP objectives and policies.

Figure 1. Extract from Auckland Council S92 RFI regarding water quality treatment.

With reference to the council GD01 publication, we note that water quality treatment is sensibly targeted at "high contaminant generating car parks and roads". Auckland Council TR2013/035 has provided the following definition for High Contaminant Generating Areas (HCGAs).

2.4.2 Land use rules: Stormwater quality

The land use rules for stormwater quality apply to activities that are identified as being HCGAs as follows:

parking areas, and associated accessways that are exposed to rainfall and carry more than 50 vehicles per day;

Figure 2. Extract from Auckland Council TR2013/035 regarding stormwater quality.

Within Auckland Unitary Plan (AUP) E9 it is specified that stormwater runoff from "any high contaminant generating car park or high use road" shall be directed to "authorised stormwater management device or system" and as such the practice is classified as a permitted activity.

The following traffic assessment report extract has identifies that the new development once completed will not cause a traffic impact. It confirms that the vehicle movements will mainly consist of trips made by authorised site operators undertaking daily WTP operations. In view of the low traffic volume (less than 50 vehicles per day), we consider the provision of stormwater quality treatment to be optional under the AUP provisions. Please refer to 5.8.1 in our main report for further justifications.



Once the replacement WTP and reservoirs are operational the current WTP plant will scale down and ultimately stop operations on switch over. The replacement WTP site, once operational, would generally only generate low volumes of traffic similar to those currently generated by the existing WTP and also have similar timings of vehicle movements discussed in Section 2.4.3. It is anticipated that the replacement WTP would generate a maximum of 10 staff (light vehicle) movements in the AM and PM peaks respectively. Heavy vehicle movements would include up to 1 to 2 heavy vehicle movements per day, which include activities such as sludge removal and chemical deliveries. Reservoirs 1, 2 and 3 would generate negligible traffic once operational and would also require minimal maintenance and heavy vehicle movements. As such, these trips would have negligible effects on the transport network.

Figure 3. Extract from traffic assessment.

The discharge of stormwater runoff from pavement (trafficable) surface will be fed into the existing and proposed dry ponds for detention purpose prior to draining into downstream Armstrong Gully and Yorke Gully. To mitigate any potential detrimental impacts, it is proposed to provide treatment for the runoff collected from trafficked areas prior to directing it into the detention ponds (see drawing C455 for paved catchment area considered for water quality treatment). This treated water quality runoff will then be discharged into Manukau Harbour via Little Muddy Creek.

While the dry ponds will provide quantity controls through regulating flow via detention through attenuation mechanism, they will also provide temporary storage and sedimentation capacity for contaminants. While we consider this to be sufficient in the long term additional precautionary measures have been added to ensure that the potential adverse impacts on natural environment resulting from the development are minimised. Our client Watercare has engaged us to technically confirm this is the best practice solution to mitigate the risk of effecting the living ecosystem at downstream.

A number of water quality treatment options were considered and we have adopted the Best Practicable Option (BPO) approach in determining the preferred option to align with the Resource Managmenet Act (RMA 1991) requirements. Each BPO criterion is addressed in assessing the potential alternatives. The implications of each option are compared in the table below. Please also refer to 5.8.2 and 5.8.3 in the main report for further details.

Option 1	Option 2	Option 3
Bioretention – Pervious	Bioretention – Swales /	Proprietary Device –
Pavement	Rain Garden	Stormfilter

(a) The nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects

In this context the discharge refers to the degraded surface runoff which may be polluted by contaminants from vehicles. The nature and quality of discharge will not be significantly altered as compared to the existing, given the traffic volume is similar to the existing as detailed in the traffic assessment.

Considering the sensitivity of receiving environment and to mitigate any potential adverse effects any potential increase in contaminants as a result of the development, it was recommended to add stormwater quality treatment. This will protect the downstream receiving environment and the overall ecology through ensuring contaminated runoff is trapped and stored within a treatment device.



Option 1	Option 2	Option 3
Bioretention – Pervious Pavement	Bioretention – Swales / Rain Garden	Proprietary Device – Stormfilter
(b) The financial implication compared with other op	ns, and the effects on the env tions	ironment, of that option when
Low operational maintenance but long-term inspection of pavement conditions is required to prevent clogging. Periodic cleaning is necessary to restore permeability and maintain functionality. In addition, this type of pavement will reduce the total site impervious area and thus the peak discharge rate through attenuating runoff feeding into downstream water bodies. Permeable pavement is capable to trap fine sediments, but it is not an effective mean of removing pollutants and contaminants.	Long-term monitoring and maintenance required for replanting and removal of trapped litters and sediments. Swales and rain garden are capable to hold gross pollutants, sediments and retain hydrocarbons including oils and grease. They also provide flow retention and detention functions. The size of swales and rain garden needs to be specifically designed based on the post development impermeable cover. The device generally requires large open space. Rain garden replicates the natural stormwater infiltration system and provides additional cultural values with planting of native trees. It creates green open space, thus providing additional aesthetic values to the local landscape.	Scheduled maintenance and replace of cartridge filters as per recommendations by the manufacturer. This will ensure that the system is operating correctly to achieve desired and optimal water quality treatment. Stormfilter is specifically sized based on the overall paved catchment area. It is designed to improve runoff quality via removal of solid sediments, metals, contaminants including oils and grease. This alternative will provide near-source treatment and the outcome aligns with the Water Sensitive Design (WSD) approach for stormwater as promoted by the council.



Option 1 Bioretention – Pervious Pavement	Option 2 Bioretention – Swales / Rain Garden	Option 3 Proprietary Device – Stormfilter	
(c) The current state of tec successfully applied	hnical knowledge and the like	lihood that the option can be	
Very limited water quality treatment achievable through infiltration.	Sustainable and effective treatment device as described in GD01.	ARC TP10 approved treatment device for highly trafficked roads. Proven performance and >75% TSS removal	
This option is not to be considered as the benefits are limited to stormwater quantity control (detention and retention) instead of water quality treatment.	This option is unlikely to be selected due to limited space available on site. Steep site gradients as further constraint that has to be considered.	according to manufacturer. This option is more likely to be selected as its compact, underground configuration does not require large space.	

Table 1. Selection of water quality treatment device in accordance with BPO approach.

From the assessment of the BPO we consider Stormfilter to be the preferred option that best protects the environment. It is noted that Option 2 will provide minor additional benefits to the local environment, however this alternative is not considered at this stage due to site constraints as determined by the preliminary design. It may be further considered once detailed design confirms that additional space is available after reassessment in detailed design.

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Appendix B Drawing C102 Rev. E Drawing C102A Rev. A





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Appendix C Watercare Reservoir Concept – Earthworks Plan (Drawing No. 3255336-K116 Issue 0B)



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EARTH WORKS CUT / FILL DEPTHCUT / FILL DEPTHDEPTH COLOUR



Appendix D USLE Calculation 81.4mm Rainfall Depth USLE Calculation 83.6mm Rainfall Depth



			LS Para	ameters	USLE Parameters					Time	Gross Sediment	Sediment Delivery	Sediment Control	Net Sediment Loss (per ha)			Difference (Prior and Post)
Section	Period	Area	Slope	Length	R	к	Ls	С	Р	(years)	Yield	Ratio	Efficiency	Prior	During	Restoration	(tonnes)
		(hectares)	(s) %	(m)							(tonnes)	(%)	(%)	(tonnes)	(tonnes)	(tonnes)	
	Prior	1.96				0.391		0.01	1.00	1.00	0.90	50.0	-	1.76			
S1	During	1.96	9	180	81	0.655	2.85	1.00	1.32	2.00	398.26	50.0	85.0		58.54		59.21
	Restoration	1.08				0.391		0.10	1.00	1.00	9.00	50.0	50.0			2.43	
	Prior	0.42				0.391		0.01	1.00	1.00	1.43	70.0	-	0.60			
S2	During	0.42	13	150	81	0.655	4.53	1.00	1.32	2.00	632.99	70.0	85.0		27.92		28.47
	Restoration	0.23				0.391		0.10	1.00	1.00	14.31	70.0	50.0			1.16	
	Prior	0.89				0.391		0.01	1.00	1.00	0.78	70.0	-	0.70			
S3	During	0.89	10	100	81	0.655	2.48	1.00	1.32	2.00	346.47	70.0	85.0		32.38		33.02
	Restoration	0.49				0.391		0.10	1.00	1.00	7.83	70.0	50.0			1.34	
	Prior	0.88				0.391		0.01	1.00	1.00	1.10	70.0	-	0.97			
S4	During	0.88	20	40	81	0.655	3.48	1.00	1.32	2.00	486.53	70.0	85.0		44.96		45.85
	Restoration	0.48				0.391		0.10	1.00	1.00	11.00	70.0	50.0			1.86	
	Prior	0.07				0.391		0.01	1.00	1.00	0.25	50.0	-	0.02			
Catch 2B	During	0.07	8	20	81	0.655	0.80	1.00	1.32	2.00	112.20	50.0	85.0		0.59		0.60
	Restoration	0.04				0.391		0.10	1.00	1.00	2.54	50.0	50.0			0.02	
	Prior	0.03				0.391		0.01	1.00	1.00	0.84	70.0	-	0.02			
Catch 2C	During	0.03	20	13	81	0.655	2.67	1.00	1.32	2.00	372.19	70.0	85.0		1.17		1.20
	Restoration	0.02				0.391		0.10	1.00	1.00	8.41	70.0	50.0			0.05	



168.34 tonnes\ha

Notes:- (i). The catchment area for the restoration period based on 55 % of the total catchment area to be reinstated. (ii) Assume Sediment delivery ratio is 0.5 for slopes less than 10% and 0.7 for slopes greater than 10%.

		Area (ha)	Prior	During	Restoration	
HWRTP Site	•	2.48	2.41	88.22	3.66	tonnes
Reservoir 1 \$	Site	0.89	0.70	32.38	1.34	tonnes
Reservoir 2 S	Site	0.88	0.97	44.96	1.86	tonnes
Total		4.25	4.07	165.55	6.86	tonnes



			LS Para	ameters	USLE Parameters					Time	Gross Sediment	Gross Sediment Sedime Sediment Delivery Control		Net Se	diment Los	Difference (Prior and Post)	
Section	Period	Area	Slope	Length	R	к	Ls	С	Р	(years)	Yield	Ratio	Efficiency	Prior	During	Restoration	(tonnes)
		(hectares)	(s) %	(m)							(tonnes)	(%)	(%)	(tonnes)	(tonnes)	(tonnes)	
	Prior	1.96				0.391		0.01	1.00	1.00	0.95	50.0	-	1.87			
S1	During	1.96	9	180	86	0.655	2.85	1.00	1.32	2.00	422.32	50.0	85.0		62.08		62.78
	Restoration	1.08				0.391		0.10	1.00	1.00	9.55	50.0	50.0			2.57	
	Prior	0.42				0.391		0.01	1.00	1.00	1.52	70.0	-	0.64			
S2	During	0.42	13	150	86	0.655	4.53	1.00	1.32	2.00	671.24	70.0	85.0		29.60		30.19
	Restoration	0.23				0.391		0.10	1.00	1.00	15.17	70.0	50.0			1.23	
	Prior	0.89				0.391		0.01	1.00	1.00	0.83	70.0	-	0.74			
S3	During	0.89	10	100	86	0.655	2.48	1.00	1.32	2.00	367.40	70.0	85.0		34.33		35.02
	Restoration	0.49				0.391		0.10	1.00	1.00	8.31	70.0	50.0			1.42	
	Prior	0.88				0.391		0.01	1.00	1.00	1.10	70.0	-	0.97			
S4	During	0.88	20	40	81	0.655	3.48	1.00	1.32	2.00	486.53	70.0	85.0		44.96		45.85
	Restoration	0.48				0.391		0.10	1.00	1.00	11.00	70.0	50.0			1.86	
	Prior	0.07				0.391		0.01	1.00	1.00	0.27	50.0	-	0.02			
Catch 2B	During	0.07	8	20	86	0.655	0.80	1.00	1.32	2.00	118.98	50.0	85.0		0.62		0.63
	Restoration	0.04				0.391		0.10	1.00	1.00	2.69	50.0	50.0			0.03	
	Prior	0.03				0.391		0.01	1.00	1.00	0.89	70.0	-	0.02			
Catch 2C	During	0.03	20	13	86	0.655	2.67	1.00	1.32	2.00	394.68	70.0	85.0		1.24		1.27
	Restoration	0.02				0.391		0.10	1.00	1.00	8.92	70.0	50.0			0.05	



175.74 tonnes\ha

 Notes: (i). The catchment area for the restoration period based on 55 % of the total catchment area to be reinstated.
 (ii) Assume Sediment delivery ratio is 0.5 for slopes less than 10% and 0.7 for slopes greater than 10%.

		Area (ha)	Prior	During	Restoration	
HWRTP Site	9	2.48	2.55	93.55	3.88	tonnes
Reservoir 1	Site	0.89	0.74	34.33	1.42	tonnes
Reservoir 2	Site	0.88	0.97	44.96	1.86	tonnes
Total		4.25	4.26	172.84	7.16	tonnes

Attachment B: Streamworks, terrestrial ecology and kauri dieback response

1 November 2019 Job No: 30848.2000

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> PO Box 91250 Auckland 1142 New Zealand

Tel: 64 9 358 2526

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20 October 2019

Paul Jones Watercare Services Ltd.

Our Reference: A16055F



Dear Paul,

HUIA WATER TREATMENT PLANT: S92 Response

Please find below our response to the request from Auckland Council for further information issued under section 92 of the Resource Management Act, and detailed in letter dated 2 October 2019. Here we respond to the matters raised under Streamworks, Terrestrial Ecology, and Kauri Dieback. We note here, and throughout our text, that some of the response will be provided once additional survey information has been gathered.

We note that these matters have been raised by Council in response to submissions on the project following notification of the application for resource consents. We also observe that some of the queries are less about further information and more a question of the findings of the application.

1. Streamworks and Earthworks

- 2.1 Streamworks
- (a) The SEV is a tool for quantifying the values of streams based on the performance of their key ecological functions. Based on these key ecological functions the draft Stream Ecological Value Plan (SEVP) concludes a predicted current ecological value score of 0.81 for the Yorke_Project_intermittent, indicating high ecological value. Aquatic biota were absent due to downstream barriers and MCI was not sampled due limited surface water presence. Yet the Assessment of Ecological Effects concludes a moderate-low ecological value based on the EIANZ guidelines, Table 24 of the Ecological Effects Assessment. This is then used to infer that the magnitude of effects on these ecological values is moderate-low. The stream section being reclaimed and diverted is a largely untouched natural headwater stream in native bush. The ecological context has been removed from this assessment. Please review and provide an assessment on the ecological value and magnitude of effects assessment taking into account the ecological context (which includes hydrological and biogeochemical aspects etc) of this headwater stream section.

The SEV assesses the ecological function of the stream and is a tool for helping inform ecological values (and is not a measure of ecological values in themselves, a common error that excludes other elements of ecological values). The EIANZ is an assessment that is based upon ecological values. While we did take into account the streams



ecological function, using the SEV score as part of our assessment, our assessment of ecological values takes into account a range of other matters (such as the catchment context, downstream receiving environment, presence of threatened species). We are comfortable with our assessment of moderate-low ecological value and moderate-low magnitude of effects.

The *Ecological Context* assessment was undertaken, and the notes constitute the last row of Table 24 Within the AEE. We do note that there is a formatting error that has resulted in the heading of ecological context not being present.

We question the assertion that the intermittent stream is a largely 'untouched natural headwater stream'. In fact, the stream section to be reclaimed and diverted has a long history of modification. The watercourse has been truncated by Woodlands Park Road and although it receives some stormwater from this road, for the most part the upper part of the catchment is diverted to Armstrong Stream catchment. Further, a water retention dam was constructed across the site (still intact and visible), former house platforms exist in the catchment, and the area has been subject to public access with the formation of a track running through the catchment, and a poorly formed understorey throughout much of the area.

We advise that a full SEV assessment is to be undertaken on Yorke_Project_Intermittent during Oct/Nov 2019; within the recommended sampling season as defined by Neale et al. (2016). We accept that the uncertainty around the assessed SEV has proved troublesome for Council; the fresh assessment will aid Council by removing any uncertainty with the current SEV score.

(b) The current SEV calculations indicate that 71% of the stream loss will be addressed via the diversion channel. The Armstrong_Manuka stream contains a piped section. It is understood that a feasibility study of daylighting this section of stream is being undertaken. An estimated ECR calculation has been provided for daylighting a section of the Armstrong_Manuka stream which shows that this could potentially address the remaining 29% of the stream impacts. If daylighting is to be pursued, please include this in the ecological report along with accompanying SEV data. While it is pragmatic to use attributes from the Armstrong_Impact SEV as the streams are similar, updated SEV data is still required for this section due to the changes in the surrounding riparian environment post construction of the treatment plant reservoir next to the stream.

An SEV is to be undertaken on Armstrong_Manuka Stream during Oct/Nov 2019. The results for this will be used in an updated ECR calculation. This will be outlined in an Addendum to our Stream Ecological Valuation Plan.

(c) The SEVP mentions 80 m of piped stream, but it is unclear what length of stream can practically be daylighted. Please confirm the length of piped sections present within the Armstrong_Manuka stream that is readily available for daylighting (and comment on any landowner approvals that would be required).

The proposed daylighting sections are predominantly located adjacent to the existing water treatment plant. There is a confirmed 30 m of piped watercourse located to the



south-east of the existing flood bowl (lower *Armstrong_Manuka stream*). The remainder is estimated from additional culverts and pipes upstream of this section.

We intend to confirm the locations and lengths of the available watercourse for daylighting the during our site visit in the next week. This will be outlined in an Addendum to our Stream Ecological Valuation Plan.

All streams proposed for daylighting are located within Watercare owned land.

(d) Please provide details of the daylighting activity of piped sections Armstrong_Manuka stream - would this be removing the pipe in situ and recreating the stream channel, or would it be creating a new stream channel offline which flows will be diverted into?

At this stage we anticipate that the daylighting of the lower section of *Armstrong_Manuka stream* will involve creating a surface channel (continuing the exiting stream channel), and allowing the channel to fall naturally via a moderate gradient into the Armstrong Gully. Thus the channel will not be offline and will follow a similar trajectory to what we anticipate as the original watercourse, and it will continue to discharge into its original downstream catchment. Passage for climbing fish will be provided for.

Concept plans for the daylighting will be provided.

(e) It is noted that a time lag is likely to occur in relation to stream impacts occurring and stream offsets taking place. Please provide an estimate as to how long this time lag could be and any associated effects, and the compensatory measures in place to account for the time lag.

We acknowledge that there is likely to be a time lag estimated to be as much as three years between the reclamation of the Yorke_Project_intermittent and the creation of the final diversion channel. Nevertheless, we have used the standard ECR and multiplier to estimate the mitigation required.

An SEV will be undertaken on Yorke_Project_Intermittent in the coming week and will result in a revision of the ECR. We will revise the ECR in light of the SEV result, our assessment of ecological values, the proposed lag time and the proposals for the diversion channel. The outcome will be outlined in an Addendum to our Stream Ecological Valuation Plan.

(f) It is also mentioned that 'if required' compensatory erosion protection works will be undertaken downstream in the Armstrong and /or Yorke Stream to address this. Please confirm if this will be required. If it is required, then please detail the locations that this will occur in and the type and extent of erosion protection measures to be implemented (and any additional consent requirements). Also, note that landowner approval will likely be required to undertake any erosion protection work on these streams as the streams flow through both private and public land.

The requirement for these works will be confirmed following the site visit in the coming week. This will be outlined in an Addendum to our Stream Ecological Valuation Plan.



We are well aware that the stream flow through both private and public land, but we also note that some ad hoc erosion measures have been implemented by landowners. A cohesive erosion prevention plan will be beneficial for all concerned. However, we anticipate that such erosion prevention works, if required, will be detailed as part of a plan that would be required as a resource consent condition.

(g) Draft streamworks monitoring conditions are noted. The final draft conditions states that daylighted Armstrong_Manuka stream sections and Yorke diversion channel will meet the estimated SEV values within two years. Please describe how the replanted riparian margin will achieve "[r]egenerating indigenous vegetation in a late stage of succession". Alternatively revise the time frame to something more suitable that reflects the SEV assumptions, i.e. 15+ years.

The predicted SEV scores for riparian vegetation of the daylighted and diversion channels will be revised following the SEV surveys in the coming week. This will be outlined in an Addendum to our Stream Ecological Valuation Plan.

We should emphasise here that the SEV tool does not require that a "regenerating indigenous vegetation in a late stage of succession" has to be achieved, nor that it should take 15+ years to achieve an SEV; this misrepresents the purpose and intended outcome of an SEV assessment. We have stated that we intend to achieve an SEV score (as indeed the SEV tool requires), and although riparian vegetation forms an important component of that score, it's purpose is to provide for ecological function.

(h) Please detail what contingency measures will be put in place to address residual freshwater ecological effects if the stream diversion does not achieve the assumed ecological values.

We expect the stream diversion to meet the assumed ecological values, and along with the other proposed stream enhancement measures will provide the mitigation required. We question the requirement for contingency measures as we have not seen this requirement emerge in resource consent applications.

(i) The assumptions in the SEV assumptions table do not line up with the corresponding attributes (e.g., From the current table "Vrough - Have assumed a single piped discharging"). Please correct the SEV assumptions table.

The attributes assumption table will be revised following the SEV surveys in the coming week. This will be outlined in an Addendum to our Stream Ecological Valuation Plan.

(j) If SEV spreadsheets have been updated, please provide these along with a description of any changes, and the reasoning behind the changes.

We have provided the SEV spreadsheets with our previous S92 response. The SEV spreadsheets will be revised following the SEV surveys in the coming week. If attributes have changed then the spreadsheets will be updated and the corresponding assumption table also updated. This will be outlined in an Addendum to our Stream Ecological Valuation Plan.



(k) Please provide details on how the stream diversion channel and all other stream enhancement measures undertaken to address effects of stream reclamation will be protected and maintained in perpetuity. This can be in the form of a consent notice, covenant or other similar protection mechanism.

We anticipate that the stream diversion channel and all other stream enhancement measures will be protected through permanent protection such as a QEII covenant.

3. Terrestrial Ecology – Dr Carol Berquist, Senior Ecologist NW

Many submitters consider that there has been an inadequate assessment of the range of fauna that inhabit or use the Watercare site, and consequently, an under-assessment of the potential adverse effects of the proposal on native fauna. Further matters arising as a result of reviewing the submissions are as follows:

- 3.1 The applicant's long-tailed bat survey and assessment is considered inadequate as it lacks key information on the potential adverse effects on long-tailed bats as a result of the proposed activity. The (35) recorded bat passes were summarily dismissed and the conclusion was reached that there is a "very small risk of direct mortality via removal of occupied solitary day roosts during vegetation clearance". However, an assessment of the number of potential bat roost trees within the construction footprint has not been provided to allow a full assessment of the potential adverse effects of potential roost tree removal, and potentially underestimates the presence of maternity roosts for bats. In particular, further information is required as follows:
 - (a) An assessment of the number of <u>potential</u> bat roost trees within the construction footprint is required to allow a full assessment of roost tree removal on long-tailed bats.
 - (b) In addition, an assessment of loss of foraging areas and commuting routes is required.
 - (c) Potential effects of noise, artificial light, and the creation of new habitat edges is required to determine potential changes in behaviour.

We did not "summarily dismiss" recorded bat passes. As explained in the Ecological Assessment (page 37), field surveys using acoustic bat monitors recorded a series of uncertain spectrogram signatures that resembled but were not typical of a bat echolocation call, due to the time of day recorded (more than an hour before official sunset, well before the normal emergence time of long-tailed bats) and unusual characteristics of the spectrograph pattern.

For this reason, a further survey was undertaken using both acoustic recorders and hand-held detectors to validate the uncertain readings. Ambient anthropogenic noises (cars, bikes, and pedestrians) were observed to have variable acoustic signatures at 40 kHz that appeared bat-like on a spectrogram. Sounds produced by some passing cars produced spectrograms consistent with 'uncertain' recordings.

The absence of bat activity from the site during breeding season is a robust indication that the site does not contain favoured maternity roost trees, therefore no detailed inspections of trees were undertaken to locate maternity roosts.

Long-tailed bats use a wide variety of small and large-stature trees and treeferns for solitary roosting and are not necessarily faithful to particular trees or sites within seasons or from year to year. Therefore, any tree within the site or surrounding area could conceivably be used as a bat roost at some time in the future, and this possibility cannot be confirmed or excluded through field surveys. Surveys immediately prior to site clearance will detect whether any bats are using the site at the time, in which case clearance will be postponed until they relocate off-site.

Our surveys found no indication that bats use the site as a commuting route, and the site's habitat characteristics have habitat potential but do not distinguish it as of particular value for foraging. Long tailed bats are 'edge specialists', i.e., they use linear features such as forest edges to navigate and forage, and they range widely throughout the landscape on a nightly basis to feed. Preferred habitats include forested riparian corridors, forest roads and tracks, forest gaps and edges, and areas of open water. The forest clearance associated with construction of the WTP will create approximately 800 m of additional forest edge (though revegetation within the site will infill existing tracks and reduce some edges), however we do not anticipate that additional edge habitat will adversely affect long-tailed bats as this species does not rely on intact forest interior environments to move through the landscape; nor is there evidence that bats regularly frequent the site.

The proposed WTP will not generate significant noise as water flows are to be gravityfed, and the plant will not be manned at night so will not require lighting. This is consistent with the operation of the current Huia WTP.

Further bat surveys within the site and surrounding areas will be undertaken in the 2019/ 2020 field season to increase our understanding of long-tailed bat activity in the landscape, in order to provide further context for our observations to date.

- 3.2 The Ecological Assessment by Boffa Miskell acknowledges that the proposed works will result in localised fragmentation of a relatively intact vegetated corridor in the upper Little Muddy Creek catchment which will reduce connectivity across the landscape.
 - An assessment of the ecological effects of reduced connectivity across the landscape on long-tailed bats and other long-range foraging species is required.

See comments above with respect to bats.

Birds are the other wide-ranging native fauna of interest, and the development of the proposed WTP will not constrain the movements of any species recorded at the site (all species observed are present in urban landscapes). The loss of connectivity is more likely to adversely affect dispersal and gene flow between populations that do not range widely (i.e., lizards, flightless invertebrates, some flora) at a local-scale. We note that intersecting roads and residential development surrounding the project site already pose physical barriers to movement of these taxa.

- 3.3 The assessment of herpetofauna habitat values undertaken by the applicant also contains an inadequate level of information and is considered insufficient to quantify potential adverse effects on lizard and frog species. The Ecological Assessment focuses on lizards and omits to note the presence of a population of the indigenous Hochstetter's frog (At Risk-Declining) within 5 km of the site.
 - More detail is requested regarding how habitats were assessed and deemed unsuitable for this species. If they are present, any potential adverse effects on frogs will need to be appropriately managed.

Hochstetter's frogs occupy stream and riparian habitats, and require cover objects (stones, woody debris) to shelter beneath during the day. Figure 1 shows the past 20 years of DoC Bioweb database Hochstetter's frog records from within a 10 km radius of the site (a total of 232 frogs observed in total; refer Table 1 below). Frogs have been detected at a single location in the Nihotupu catchment within 5 km of the site, and at numerous locations in the forested Waitakere Ranges to the west and northwest.

Prospective Hochstetter's frog habitat within the project footprint is a scoured intermittent stream channel with little overhanging vegetation or debris that would offer suitable cover. We acknowledge that habitats both upstream and downstream of the project footprint contain habitat that is potentially suitable for Hochstetter's frogs, and further fieldwork is scheduled to ascertain whether frogs are present in these areas to inform preparation of the ecological management plan for the wider site.

- 3.4 Table 9 of the Ecological Assessment lists lizard records for five species "within a 10 km radius of the proposed Huia WTP site". An independent review of DoC's Bioweb Database and Auckland Council's lizard record database revealed that 45 records of six species (including Pacific gecko) are present within a 5 km radius of the project site, and at least 160 records of six species are present within 10 km. The lizard survey undertaken does not provide adequate certainty of actual species diversity and abundance within the project area and adverse effects on lizard species appears to be underestimated.
 - A re-assessment of potential species diversity and abundance of herpetofauna is required in order to be able to determine whether the measures proposed by the applicant adequately or appropriately address effects on herpetofauna.

We have corrected and updated our review of the DoC Bioweb Database. Table 1 below includes records of all herpetofauna recorded within 10 km of the project site within the past 20 years. The database contains numerous duplicate records which are not counted in the summary.

Records include a total of 142 native lizards comprising six species, five of which are classified as "At Risk". Copper skinks from three locations account for a large number of the individuals recorded, nevertheless the distribution and species richness of the lizard population in peri-urban and urban bush areas in the vicinity of the Project Site (Figure 1) demonstrates that the quality of this habitat for lizards is high, and the presence of forest gecko and elegant gecko in particular within the site itself is likely.


Herpetofauna surveys will be recommenced within the 2019/2020 field season as soon as conditions are favourable, and will include the use of tree wraps in addition to nocturnal surveys in an effort to increase the likelihood of detecting forest geckos.

Species	No. of records	Threat Classification
Elegant gecko	13	At Risk – Declining
Forest gecko	36	At Risk – Declining
Pacific gecko	2	At Risk - Relict
Copper skink	89	Not Threatened
Striped skink	1	At Risk – Declining
Ornate skink	1	At Risk – Declining
Hochstetter's frog	232	At Risk – Declining

Table 1: Herpetofauna recorded within a 10 km radius of the proposed replacement WTP site since 1999.

- 3.5 The Appendix 1: Waima Invertebrate Fauna Report by Peter Maddison did not list the new species of flightless parasitic wasp (Pseudoceraphron n.sp.) currently being described by the Curator of Entomology at the Auckland War Memorial Museum; nor the rare slave ant (Strimigenys xenos) both found in Clark's Bush. Another species of thread bug (Empicornis serous Bergroth has been noted at the Kahikatea wetland, the fourth record in NZ.
 - The locations of these and possibly other invertebrates, such as the species of peripatus (Peripatoides) noted in Appendix 1 as being found in Clark's Bush and along the Huia Aqueduct Track, should be identified and measures proposed to avoid their disturbance.

Dr Maddison, who undertook the invertebrate survey, provided notes on the above observations after lodgement of the resource consent application. We understand that observations of all the above mentioned species within the project site were made outside of the proposed footprint, and that the habitats where they were found also do not occur within the proposed footprint. Further confirmation of the site locations will be provided.

3.6 In assessing the magnitude of ecological effects the Ecological Assessment has used the three assessment matters (rarity, diversity and ecological context) in assigning value and has determined the overall magnitude of effects as Moderate (AEE, Table 26), and so the level of effect as High (AEE, Table 27). However, the magnitude of ecological effects has been assessed by Ms Berquist as High by using Table 25 (consistent with EIANZ Guidelines), which would result in the level of effect as Very High (AEE, Table 27). Please confirm that Table 26 has been used correctly in the AEE.

We confirm that the EIANZ assessment of effects has been applied correctly in the AEE. What we see in the S92 request is a difference of viewpoint on the assessment of overall magnitude of effects rather than a request for further information. We would welcome the opportunity to discuss our assessment with Council staff and explain our findings.

- 3.7 Submitters also raised the matter of the lack of information regarding proposed clearance of vegetation and construction works within the riparian margins of watercourses and consider the applicant's s92 response needs further clarification.
 - As it is not possible to quantify potential effects on freshwater habitat values for native freshwater fish, and it is not appropriate to leave this issue to management plans that are prepared by the applicant following the grant of resource consents, it is requested that riparian restoration plans are provided that include bank profiles, weed removal, revegetation plans, planting schedules and a 5-year maintenance period for riparian margins of streams that are affected by the proposed works.

A full Ecological Management Plan and a Stream Valuation Plan (including riparian management plan) will be submitted to Council prior to the hearing.

3.8 The risk of spreading kauri dieback disease (PA) is a significant issue and is being addressed by the Biosecurity team. However, with the Waitakere Ranges containing the largest and most intact Kauri forest in the region and the rapid increase to 18.95% of Kauri trees in the Waitakere Ranges infected with PA, the effects of removing 3.5ha of forest on the survival of the kauri population has not been assessed. Survival of Kauri forest is dependent on natural immunity of individual trees and cohorts, and the ability of the forest to regenerate. Kauri is a key species in its ecosystem on which many other animal and plant species rely. In addition to the assessment of risk of spreading PA through earthworks and stream diversion:

An assessment of the impact of removing 3.5 ha of this forested area on the survivability of Kauri forest in the Waitakere Ranges is required.

No kauri trees are to be removed. The secondary kanuka forest to be cleared is a "precursor" forest type to kauri and kauri-podocarp forest, but we note that no regenerating kauri were observed within the proposed WTP or reservoir footprints (occasional small seedlings may be present but not observed). Hence, we do not expect that kauri forest is the future successional trajectory of these stands in the absence of fire or some other significant relatively large-scale forest disturbance. Kahikatea and other podocarps are present, along with secondary broadleaved species, hence mixed podocarp-broadleaved forest is the likely future forest type if the existing vegetation cover was retained.

Given the extent of pressures on Kauri Forest in the Waitakere Ranges, we do not consider that an assessment of the impact of removing 3.5 ha of this forested area on the survivability of Kauri forest in the Waitakere Ranges is warranted as a result of the proposed project. We do consider that a multi-agency study on the survivability of Kauri Forest in the Waitakere Forest (and beyond) would be highly worthwhile, as there are many factors that will influence the outcome for Kauri.



4. Kauri Dieback – Jeanie Allport, Senior Adviser, Kauri Dieback

4.1 Hygiene Procedures

Information previously supplied, does not provide sufficient detail in relation to hygiene measures related to all personnel, equipment and machinery working on site. This was also highlighted in public submissions with concerns that the Council's Kauri Dieback SOP was not 'fit for purpose' for such a large project, concerns over heavy machinery spreading the disease and the disposal of sediment/slurry from cleaning (this will be discussed further under Sediment Control).

It is requested that Watercare provide a comprehensive draft hygiene management plan (management plan) for all activities to be carried out on site related to both works within three times the dripline of a kauri and outside of this zone. This will need to identify all potential vectors, the risks they pose, and how the risks will be mitigated.

A draft Kauri Dieback Management Plan will be prepared and submitted to Council for review prior to the hearing.

4.2 Sediment Control

The 'Erosion and Sediment Control' section is silent in relation to the potential for Phytophthora Agathidicida to be transported via sediment entering streams/water courses. I would like to see this point acknowledged and how they propose to mitigate against this potentially occurring. This was also picked up in the public submissions with concerns in relation to inability to control sediment and thus the potential for spread of kauri dieback. Given the causal agent of kauri dieback, Phytophthora Agathadicida, is minute coupled with the fact it can remain viable in soil for over ten years, it is extremely important that Watercare's management of sediment is considered very seriously. Toward the rear of the water treatment works site there are significant numbers of kauri whose health could be adversely impacted by poor sediment management.

Please advise of any changes to the erosion and sediment control measures to address this matter.

As noted in our previous Section 92 response, appropriate controls to prevent discharges of sediment to waterways is a requirement of construction. Prevention of sediment discharges to watercourses would also prevent movement of *P. agathadicida*. Requirements for specific stormwater management measures over and above best practice will be detailed in the Kauri Dieback Management Plan (see above).

Concluding comments

We trust our explanations included in this letter provide the additional information for the further assessment of the assessment of effects of the proposed Huia Water Treatment Replacement. Any further queries can be addressed to Ian Boothroyd or Sarah Flynn (contact details below).



Yours sincerely BOFFA MISKELL LTD

Sarah Flynn <u>Principal Ecologist</u> Telephone: 021 591320 or email sarah.flynn@boffamiskell.co.nz

C.K. Boothoyd

Ian Boothroyd Senior Principal

Telephone: 027 8364290 or email ian.boothroyd@boffamiskell.co.nz



Figure 1. Review of Herpetofauna Database Records 2019



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Attachment C: Transportation response



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Watercare Services Limited 73 Remuera Road Remuera Auckland 1050 4 November 2019

Attention: Mr. Paul Jones

Dear Paul

Huia Replacement Water Treatment Plant – Section 92 Request for Further Information Response to Transport Assessment Report

CH2M Beca Ltd (Beca) was commissioned by the Watercare Services Ltd (Watercare) to consider the potential transport effects arising from the enabling works, construction and operation for the replacement Huia Water Treatment Plant (WTP) and the associated proposed reservoirs (the Project).

A Transport Assessment report (TAR) has been prepared by Beca, dated 10 July 2019, which was submitted with the regional consent application. Beca has previously responded to a request for further information under section 92 of the Resource Management Act 1991, which was received from Auckland Council (dated 25 July 2019) following its review of the TAR.

After the Beca response letter, the application was publicly notified, and the submissions period has now closed. Following on from Council's review of the submissions received, Council has provided an additional section 92 request letter dated 2 October 2019. Section 5 of the Council's letter relates to Transportation matters, covering the following topics:

- Impact at Schools and childcare centres etc
- Pedestrian safety, truck congestion and Huia Road
- Existing Heavy Vehicle Volumes
- Construction Truck Volumes
- Road Stability
- Titirangi Village Parking.

The following sections provide responses to the Council's additional s92 request under these topics with the Council's request provided *'in Blue'* text and then the Beca response (text in black). It is noted that this does not address the 'Road Stability' topic which we understand will be addressed by Tonkin & Taylor Ltd (T&T).

We have provided an updated set of conditions, as **Attachment A**, which respond to transportation matters only. We understand an updated consolidated set of conditions incorporating these changes will be provided by T&T.

1 Impact at Schools and childcare centres

The applicant is requested to consider recommended measures that may form the basis of conditions in respect of the following:

(a) Include Titirangi Primary School, Kaurilands School, Woodlands Park School, as stakeholders to have involvement in the preparation of the CTMP;¹

We understand that Watercare intends to include the Titirangi Primary School, Kaurilands School, Woodlands Park School and Glen Eden Intermediate School as part of the consultation parties for the CTMP in proposed Conditions 44 and 46, in addition to the CLG and where public access is affected by construction. This is reflected in the attached updated conditions.

(b) Recommend that Woodlands Park Road and Atkinson Road routes are "prohibited" during school pick up / drop off periods, unless otherwise agreed via the CTMP with Auckland Transport and named stakeholders (e.g. schools boards);

The TAR and Draft Construction Traffic Management Plan (CTMP) identify that the Titirangi Road route is the primary and preferred route for heavy trucks, rather than the Atkinson Road route. This also reflected in the attached updated conditions (Condition 45). The TAR and Draft CTMP also identify that heavy trucks would only operate one-way on the Atkinson Road route and neither the Woodlands Park Road and Atkinson Road routes are to be used by heavy trucks during the school pick up / drop off periods. Those documents currently state that this is "where practicable".

This is on the basis that due to the longer journeys involved in travelling on the wider road network to the Project sites or unexpected circumstances on the Project sites, a heavy truck may occasionally travel on these routes in these periods. It may also be that exceptions are required during concrete pours, as previously identified in the consent documents and recognised by the Council. Albeit, as discussed in the TAR, it is recognised that the Atkinson Road route is physically constrained for heavy trucks in the school pick up / drop off periods, due to the amount of on-street parking occurring.

It is also important to note that the volume of heavy trucks movements fluctuates significantly over the course of the site enabling works. The highest level of heavy truck movements occurs within a window of seven months. Outside of this time heavy vehicle movements are typically much more limited, in 77 of the 99 months of the site enabling works, heavy truck movements are less than 20 movements per day (or three movements per hour across the day).

A blanket prohibition would apply across the full duration of the works, including when heavy truck movements are very low. Within the context of existing traffic volumes, including heavy vehicle movements, a complete prohibition on this level of activity is potentially very restrictive. As such, it is considered that whilst heavy trucks should be planned to be avoided at these times, a full prohibition, or one that is subject to approval from third parties, is not supported nor is it practical. Notwithstanding this, if a prohibition on heavy truck movements related to this project was still considered necessary at the time, then the current approach (outlined in the attached updated conditions) enables this to be reflected in the CTMP.



¹ This could include Glen Eden Intermediate School -while they did not lodge a submission they are near Kaurilands Primary and would be affected by the Atkinson Road route.

The intent of using "where practicable" was to recognise the above factors, rather than to enable less restricted use of these routes by heavy trucks, particularly during the school pick up / drop off periods. It is considered that the attached updated conditions provide more certainty regarding the proposed restrictions and greater confidence to submitters on the likely operations and associated transport effects.

(c) Recommend that Titirangi Road route has a cap on heavy vehicle movements during school pick up / drop off periods, suggest that this be 10 movements per hour (both directions);

The TAR and the Draft CTMP recognise the need to limit the number of heavy trucks operating on Titirangi Road through Titirangi Village during the school pick up / drop off periods. It is only expected to be during the busiest periods of all activities on the Project sites, around 11 or 12 months, that the Council's suggested 'cap' on hourly heavy truck movements may be exceeded. During this period, it is predicted there could be up to approximately 13 to 17 heavy truck movements per hour, if only the Titirangi Road route is used by heavy trucks. However, this is a conservative (high) assessment for a number of reasons. If some of the excavated material can be re-used on site as fill, or if the Parau landfill site is utilised for some or all of the spoil from the Project sites, or if the Atkinson Road route is used, then in all instances the number of truck movements along Titirangi Road will be reduced.

If the heavy truck movements associated with the site enabling works consent only (refer to **Section 4** of this letter) are considered, then the hourly heavy trucks movements are not predicted to exceed the Council's suggested 'cap' for the school pick up / drop off periods. It may therefore be preferable for any 'cap', if identified, to be included within the CTMP, which will address the overall Project activities, rather than conditions relating to this consent.

The proposed consent conditions relating to the CTMP require the CTMP for each stage of the Project to be submitted to Council (and Auckland Transport) for certification and approval. It is considered that the CTMP provides the opportunity, with input from the CLG, the schools and stakeholders, for any 'cap' to be provided and for that to then be reviewed and adjusted, if necessary.

(d) Suggest that school peak times are 0800 – 0900 and 1430 – 1530;

These time periods are consistent with those stated in Section 4.2 of the Draft CTMP and, as discussed above, would be subject to monitoring and consultation with schools.

(e) Suggest that consent conditions are specific about time restrictions on each haulage route; and

The time restrictions for the heavy truck routes are identified in Section 4.2 of the Draft CTMP. For the same reasons discussed above, it is considered more appropriate for time restrictions to be included in the CTMP.

(f) Suggest that peak commuter hours do not need to be restricted for HCV unless these overlap with the school peak.

Generally accepted, although this will again be subject to monitoring and consultation as part of the CTMP, taking into consideration the overall construction activities.



2 Pedestrian safety, truck congestion and Huia Road

It is requested that an updated tracking assessment diagram is provided, to depict the following:

- (a) Identify key pinch points on each route and provide a brief description of why these points are "worst case scenario" locations; and
- (b) Provide image of truck tracking in each direction at the identified pinch points to confirm two trucks can pass each other (or not).

In order to confirm the adequacy of the identified heavy truck routes to accommodate these vehicles and to review interaction between construction vehicles and other vehicles, Beca has coordinated vehicle demonstrations along the proposed routes.

The demonstrations used the appropriate design vehicle (either rigid truck or truck and trailer) similar to the vehicles anticipated for cut/fill (earthworks) transport to and from the Project sites. The demonstrations were recorded by taking video from vehicles in front and behind the heavy vehicles. The truck and trailer vehicle demonstration occurred in both directions along Woodlands Park Road, Scenic Drive, Titirangi Road, Atkinson Road, Woodlands Park Road and Glendale Road. The rigid truck demonstration occurred along the route via Woodlands Park road and Huia Road to the Parau landfill site, given the previous TAR recommendations that truck and trailer vehicles were not used on this route.

Letters describing the vehicle demonstrations and the outcomes have previously been provided to the Council in Beca letters dated 9 August and 23 September 2019. For ease of reference, both letters are included in **Attachment B** of this letter.

All routes were driven in both directions and the images along the route are attached to both letters in Appendix A of those letters. Each appendix includes two separate sheets illustrating the northbound and southbound journeys respectively with images of the front and rear of the rigid heavy vehicle at each location. Whilst the demonstrations considered the whole route, in both directions, the images shown in appendices represent the key locations that have been identified to be potential constraints, for example, at intersections, on bends in the road or narrower sections of the routes.

In summary, the vehicle demonstration has confirmed that the majority of the routes are adequate to accommodate the predicted increase in heavy vehicle movements associated with the Project. However, it has been identified that the predicted heavy vehicles associated with the Project, would potentially have adverse effects, due the current situation for existing buses and heavy trucks travelling northbound on Titirangi Road passing on-street parking, between Titirangi Village and Park Road.

As such, it is considered that this section of Titirangi Road would benefit from the potential mitigation options (or a combination of these options) identified in the letter dated 9 August 2019 (and discussed further in **Section 5** of this letter) to manage the safety risks for existing road users and Project staff vehicles in the identified area. It is considered that the proposed package of measures would improve the current situation on this section of Titirangi Road and can be implemented with no more than minor adverse effects on the use and supply of the on-street parking in the identified area.

This package of measures is recognised in the measures identified in Proposed Condition 45 and the draft CTMP through the review and monitoring processes. The conditions also include having no heavy trucks or limiting heavy trucks operating past the schools during the weekday school pick up / drop off periods (as discussed above), as well as the Site-Specific Traffic Management Plans (SSTMP). The overall package of measures and their implementation during the Project works can be developed and amended through further discussion between the contractor (once appointed) and Auckland Transport, as well as stakeholder input, as required through the proposed conditions.



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(c) Please also clarify whether Huia Road is going to be used or not, as the Parau Landfill disposal site suggests use of Huia Road, at least in part.

As stated in the TAR and Draft CTMP, it is intended that the section of Huia Road between Woodlands Park Road and the Parau landfill site will be used for some or possibly all the spoil removal from the Project sites. As discussed above, the Beca letter of 23 September 2019 describes the vehicle demonstration that has been undertaken on this route.

3 Existing Heavy Vehicle Volumes

Submitters have questioned Beca traffic counts and believe that utes and campervans have been included as "HCV".

Auckland Transport data indicates the following:

- In 2017 Woodland Park Rd had 95% car, 1% LCV, 3% MCV, and 1% HCV, while the Beca report said 3% HCV;
- In 2017 Atkinson Rd had 97% car, 2% MCV and 1% HCV, while the Beca report said 5% HCV; and
- In 2016 Scenic Drive had 96% car, 1% LCV, and 3% MCV, while the Beca report said 4% HCV.

The NZTA definitions of commercial vehicles are as follows:

- LCV are utes and vans less than 3.5 tonne;
- MCV are trucks 3.5 12 tonne most people would think of these as "trucks";
- HCV are trucks over 12 tonne.

While the AT and applicant data are similar, with a degree of variation expected between surveys, the applicant is requested to specify light (e.g. utes and vans), medium (3.5 to 12 tonne), and heavy commercial vehicle percentages for clarity.

Beca has used the standard transport assessment approach, based on the NZTA's Vehicle Classification Scheme (attached to **Attachment C**), which includes 14 different vehicle classifications. This approach is also used in reporting of traffic counts by Auckland Transport.

As per the standard approach, the TAR classified all vehicles in Classes 4 to 13² as a heavy vehicle. This includes commercial vehicles, which are not considered to be light vehicles, but are medium vehicles (MCVs, i.e. vehicles 3.5 to 12 tonnes). As such, the HCV % in the TAR includes vehicles of 3.5 tonnes or more; such as MCVs, rigid trucks, buses, articulated trucks, semi articulated trucks, truck and trailers, and B-trains, which would generally be thought of as heavy vehicles (or HCVs) by the general public.

The table below shows the vehicle numbers and associated percentage (%) of vehicles in the LCV, MCV and HCV groups, as requested the Council. The percentages presented below are consistent with the percentages identified in the TAR (Table 2-3), with the total heavy vehicles (including MCVs and HCVs, as per the standard approach) comprising around 4 to 5% of ADT volumes on the surrounding road network.



² Class 14 is 'Unclassified' vehicles

Road	2018 Average Daily Traffic (derived from 5 day totals)					
	Light Vehicle	MCV / Buses	нсу	Unclassified	ADT	
	17,195	626	310	59	18 131	
Titirangi Road	95%	4%	1%	<1%	,	
	7,443	227	167	117	7 954	
Atkinson Road	94%	3%	2%	1%	1,001	
Scenic Drive	7,014	270	42	3	7 3 25	
(South of Titirangi Rbt)	96%	3%	<1%	<1%	7,525	
	4,972	140	23	1	5 135	
Woodlands Park Road	97%	3%	<1%	<1%	0,.00	

4 Construction Truck Volumes

In terms of the frequency of truck movements, it is understood that 118 truck movements/day includes earthworks and construction activity and occurs during one month (refer Beca Transport Assessment Fig 4-6). It is recommended that the applicant consider presenting earthworks/vegetation material and construction movements as separate activities, as well as keeping the assessment of the combined effects.

It is confirmed that daily heavy truck movements presented and assessed in the TAR, including 118 daily heavy truck movements in the TAR relates to the combined site enabling works activities (part of this consent) and the other construction activities across the replacement WTP, Reservoir 1 and Reservoir 2.

The figure in **Attachment D** of this letter shows the heavy truck movements associated with only the site enabling works consent for the earthworks/vegetation removal. For a robust assessment, we have taken a broad approach in determining what activities are considered part of the regional resource consent application (i.e. versus construction of the plant which is provided for through an Outline Plan of Works). The numbers below therefore represent a conservative approach ('worst case' scenario).

The breakdown of heavy truck movements for the site enabling works consent is summarised below:

- In the seven busiest months associated with the site enabling works consent activities, there would be around 66 to 71 daily heavy truck movements, equating to around nine to ten heavy truck movements per hour (both directions) across the day
- The further breakdown of the predicted range of daily heavy trucks movements across the 99 month programme for the site enabling works activities is as follows:
 - 56 months of no site enabling works activities
 - 21 months of 1 to 20 movements per day up to three movements per hour across the day
 - 14 months of 21 to 45 movements per day up to seven movements per hour across the day
 - 1 month of 46 to 60 movements per day up to nine movements per hour across the day
 - 7 months of 61 to 71 movements per day up to ten movements per hour across the day
- 77 of the 99 months therefore result in 20 or less heavy truck movements per day, equating to three or less heavy truck movements per hour (both directions) across the day.



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5 Titirangi Village Parking

Please provide further detail on the location and number of on-street car parking spaces that would need to be temporarily removed, as suggested in the mitigation options included in Beca's haulage route assessment letter dated 9 August 2019 (reference 6513515/s92/BUN60339273 NZ1-16354770-3).

The specific section of the 9 August 2019 letter referring to the temporary carparking restrictions, on page 8 of that letter, is provided below for ease of reference:

"2. Restrict parking on those sections that are most affected by the northbound heavy vehicle or bus movements (mainly where the road is not straight) or where there is lower parking demand to reduce the potential and extent of the potential areas of conflict. Noting that:

- a. The zonal occupancy shows not all the zones are well-used, so by restricting some parking potentially in Zones A, B and C, vehicles can make use of the under-utilised parking in Zone D (which is generally on a straighter section).
- b. Removing under-utilised parking in Zone D, reducing the overall length of parking that could occur at any time, so reducing the extent or length of the potential conflict area."

If parking was restricted in Zones A, B and C, as suggested in 2.a., this could prevent the use of up to 17 car parking spaces. Albeit, it is not anticipated that all this parking would need to be restricted, particularly in Zone A (nine spaces), which includes five indented carparking spaces closer to the Village. The spaces in Zone A, together with the nine spaces in Zone D, would therefore continue to provide around 14 to 18 spaces.

If parking was restricted in Zone D, as suggested in 2.b. above, this would leave up to 17 car parking spaces remaining in then Zones A, B and C.

These remaining car parking spaces compare to the surveyed peak demands for carparking in this area of 14 and five carparking spaces in the weekday and weekend surveys respectively.

We trust the above is in order, should you have any queries please do not hesitate to contact us.

Yours sincerely

Scheepers Fourie

Senior Transportation Planner on behalf of

Beca Limited Direct Dial: +64 9 308 4573 Email: Scheepers.Fourie@beca.com

Enc. Attachments A to D





Attachment A – Updated Transport Conditions





Construction traffic

- <u>42</u> The Consent Holder shall prepare a Construction Traffic Management Plan (CTMP) in accordance with the Council's requirements for CTMP and the New Zealand Transport Authority's Code of Practice for Temporary Traffic Management for each stage of the Project. The CTMP shall be in general accordance with the Draft CTMP provided as part of the application documents and shall address the management of construction traffic from the site enabling works.
- <u>43</u> The Consent holder shall submit the CTMP for each stage of construction to the Team Leader Compliance and Monitoring – West at least twenty (20) working days prior to the Commencement of Construction for each stage for certification that the CTMP gives effect to the objectives in Condition 44 and complies with the requirements in Conditions 45 and 46, as applicable to the particular stage of construction.
- 4244 The objectives of the CTMP are to:
 - Limit and manage the number of construction traffic movements on the transport network;
 - Provide for the safety of everyone at all times;
 - Ensure maintenance of access at all times to / from properties;
 - Minimise disruption from construction traffic on the travelling public and road users along the identified sections of the construction routes;
 - Seek to avoid full road closures and minimise any partial or managed closures;
 - Manage integration with other construction projects and Auckland Transport projects;
 - Provide for prior engagement with relevant stakeholders, including:
 - when public access, particularly to properties, will be affected by construction traffic; and
 - with schools located along identified heavy vehicle routes (Titirangi Primary School, Kaurilands School, Woodlands Park School and Glen Eden Intermediate School).
 - Provide a mechanism for addressing queries and responding to complaints (including through <u>thea</u> Community Liaison Group (CLG) or similar).

4345 The CTMP shall include:

- The traffic management measures that will be required to be implemented, including in the vicinity of the site access points and at the Woodlands Park Road / Scenic Drive intersection;
- A mechanism and nominated stakeholder manager responsible for receiving, addressing and monitoring queries and responding to complaints in relation to the construction works;
- Provision of appropriate ingress and egress routes to/from the sites for the construction vehicles, including confirmation of appropriate heavy vehicles layover areas and overdimensional vehicle routes;
- For each Project stage, confirmation of typical numbers of heavy vehicle movements throughout the day for heavy vehicle access routes;
- Coordination with Auckland Transport regarding other construction sites and streetworks;

- Restricted parking for workers on construction sites, with parking prioritised for minor trades (i.e. those needing to bring tools for specialist activities), car / van pooling, staff working outside standard hours and mobility impaired staff / visitors;
- A site parking plan, including measures to restrict construction vehicles associated with this consent from parking on Woodlands Park Road, Manuka Road and Scenic Drive;
- Location of any shuttle bus interchange and operation of this (or similar) service to transport workers to and from the site;
- _____Location and operation of any works staging site;
- The Titirangi Road route as the preferred ingress and egress route to/from the sites for the construction vehicles, instead of the Atkinson Road (South), Kaurilands Road and Glendale Road route, whenever possible;
- Limitations on heavy vehicle movements/ deliveries to and from the construction sites on the Titirangi Road route during the following periods,s on weekdays (excluding public holidays) during the weekday peak hours and from around midday on Saturdays, school holidays and vehicle movements associated with concrete pours;
 - o Weekday morning and afternoon pick-up / drop-off periods for schools
 - o Weekday commuter peak periods
 - o <u>Around midday on Saturdays</u>
- <u>Limitations onNo</u> heavy vehicle movements <u>/ deliveries</u> to and from construction sites on the Atkinson Road (South), Kaurilands Road and Glendale Road route <u>shall occur</u> during the weekday morning and <u>afternoon</u>-pick-up / drop-off periods for <u>kindergartens</u> and schools, <u>excluding public holidays</u>, <u>school holidays and vehicle movements</u> associated with concrete pours, unless approved as part of a CTMP;
- No heavy vehicle movements / deliveries to and from construction sites on the Woodlands Park Road / Huia Road route (associated with any use of the Parau landfill site) during the weekday morning and afternoon pick-up / drop-off periods for schools, excluding public holidays and school holidays, unless approved as part of a CTMP;
- Monitoring of pavements located on construction routes (the scope and extent of which is to be agreed with Auckland Transport) and remediation of any damage resulting from Project construction traffic;
- Specific measures to provide for the safe movement of pedestrians, including access to bus stops, and cyclists in the vicinity of the site access points;
- The provision of construction traffic management staff to assist any construction trucks reversing into or out of the construction site;
- Monitoring of and cleaning of spillage from construction trucks onto roads;
- Vegetation trimming or removal within the site to achieve sufficient sight lines from site accesses;
- Educating construction staff of the safety needs of pedestrians and people cycling; and
- Processes for monitoring, review and amendments to the CTMP.
- 44<u>46</u> The CTMP shall be prepared in consultation with the CLG in accordance with Condition 7<u>, and</u> in consultation with schools located along identified heavy vehicle routes (Titirangi Primary School, Kaurilands School, Woodlands Park School and Glen Eden Intermediate School.
- 45 The Consent Holder shall submit the CTMP for each stage of the Project to Council at least twenty (20) working days prior to the commencement of construction for certification that the CTMP gives effect to the objectives in Condition 42 and complies with the requirements in Conditions 43 and 44, as applicable to the particular construction stage.

46<u>47</u> There shall be no damage to public roads, footpaths, berms, kerbs, drains as a result of the earthworks and construction activities. In the event that such damage does occur, Auckland Council will be notified within 24 hours of its discovery. The costs of rectifying such damage and restoring the asset to its original condition will be met by the Consent Holder.

Advice notes:

The CTMP required by Conditions 42 to 47 is required to address the management of construction traffic from the site enabling works (including earthworks and vegetation clearance). Overall traffic management, including for enabling works and construction of the WTP and reservoirs, will be addressed by the separate Outline Plan process and does not form part of this consent.

It is the responsibility of the consent holder to seek approval for the TMP from Auckland Transport. Contact Auckland Transport on (09) 355 3553.

All applications for temporary use of the road reserve during construction must be submitted to Auckland Transport as a Corridor Access Request (CAR). The CAR application should be submitted to Auckland Transport at least 12 weeks prior to the scheduled commencement of works.

Works within the Auckland Transport road reserve will require a Works Access Permit and Engineering Plan Approval from Auckland Transport.



Attachment B – Vehicle Demonstrations







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Watercare Services Limited 73 Remuera Road Remuera Auckland 1050

9 August 2019

Attention: Mr. Paul Jones

Dear Paul

Huia Replacement Water Treatment Plant – Section 92 Response – Transportation Matters

CH2M Beca Ltd (Beca) was commissioned by the Watercare Services Ltd (Watercare) to consider the potential transport effects arising from the enabling works, construction and operation for the replacement Huia Water Treatment Plant (WTP) and the associated proposed reservoirs (the Project). A Transport Assessment report (TAR) has been prepared by Beca, dated 10 July 2019, which was submitted with the regional consents application. A request for further information under Section 92 of the Resource Management Act 1991 has been received from Auckland Council, dated 25 July 2019, following its review of the TAR. In relation to 'Transportation' matters, this stated:

"The adequacy of route widths to carry significantly increased volumes of heavy vehicles does not appear to be adequately addressed in Section 4.1.1. For example, page 36 notes that on both Titirangi Road and Atkinson Road South "interaction of construction vehicles with adjacent land use activities will need to be managed", but no detail is given of the type of management required or its local impacts. Page 12 of the CTMP suggests that some temporary prohibition of on-street parking may be necessary. This would potentially have a significant impact on parking supply for adjacent land uses, e.g. Titirangi village. The necessary traffic management measures at pinch points on construction truck routes should be identified so that they can be assessed and mitigated if necessary."

This letter provides the Beca response to the Section 92 request including identifying any mitigation measures necessary to address the transport-related effects of the Project. As part of this response, it also addresses the 'placeholder' provided on Page 41 of the TAR relating to the heavy vehicle demonstration.

Heavy Truck Access Routes

As discussed in Section 4 of the TAR, it is identified that the primary route for heavy vehicles accessing the Project sites will be along Woodlands Park Road, Scenic Drive and Titirangi Road. However, to assist in managing the predicted adverse effects of heavy vehicles, the following routes have also been identified to distribute the predicted heavy vehicle demands across the transport network. This also provides flexibility in heavy vehicle routing, particularly during the busier periods of the construction programme.

- Atkinson Road (South), Kaurilands Road and Glendale Road
- Titirangi Road, Golf Road and Portage Road.

The route along Woodlands Park Road and Scenic Drive is common to all routing options.

As set out in Sections 4 and 6 of the TAR, it is recognised that to address the predicted adverse effects of the Project, it will be necessary to implement mitigation measures. These measures include operating articulated and oversize trucks under a one-way arrangement on the Atkinson Road (South) / Kaurilands Road / Glendale Road route and preventing or limiting heavy vehicle movements on this and the other routes at certain times of days and days of the week.

This is discussed further in the draft Construction Traffic Management Plan (CTMP) in Appendix E of the TAR. For example, Section 4.2 of the draft CTMP, identifies:

- For the Titirangi Road routes, this includes limiting heavy trucks in the following periods, where practicable, to address the potential adverse effects in Titirangi Village:
 - During the weekday peak hours (07:30 to 08:30 and 17:00 to 18:00), excluding public holidays
 - Around midday on Saturdays (12:00 to 14:00).
- For the Atkinson Road (South), Kaurilands Road and Glendale Road route, as well as the Parau Landfill site route, this includes no heavy trucks, where practicable, in the following periods to address the potential adverse effects on kindergartens and schools on these routes:
 - During the weekday morning and evening pick-up / drop-off periods in school term times (08:00 to 09:00 and 14:30 to 15:30), excluding public holidays.

Heavy Vehicle Demonstration Summary

In order to confirm the adequacy of the routes to accommodate the increase in heavy vehicles, particularly articulated / truck and trailer vehicles, and to review interaction between construction vehicles, Beca has coordinated a vehicle demonstration. The demonstration used a truck and trailer vehicle (see **Figure 1**) similar to the vehicles anticipated for cut/fill (earthworks) transport to and from the Project sites. The demonstration was undertaken on the morning of Wednesday 17 July 2019. The demonstration was recorded by taking video from vehicles in front and behind the truck and trailer vehicle.



Figure 1: Typical Truck and Trailer Vehicle



Figure 2 illustrates the routes that were driven (in both directions) by the truck and trailer vehicle on the day of the demonstration, which included:

- Route 1 Woodlands Park Road, Scenic Drive, Titirangi Road
- Route 2 Woodlands Park Road, Scenic Drive, Atkinson Road (South), Kaurilands Road, Glendale Road.



Figure 2: Vehicle Demonstration Routes

The heavy vehicle demonstration summary and associated images along the route are attached to this letter in **Appendix A**. In summary, the vehicle demonstration has indicated that the majority of the proposed routes, including the intersections, are adequate for use by heavy vehicles (including articulated trucks / truck and trailers). As noted in the TAR, it is only recommended to operate articulated / truck and trailer vehicles under a one-way arrangement on the Atkinson Road (South) / Kaurilands Road / Glendale Road route. The sections below provide further information on sections of the routes that are considered to require further discussion.

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Route 1: Titirangi Road

The vehicle demonstration has identified that the section of Titirangi Road, immediately to the north of the Titirangi Village would benefit from some mitigation, as a result of the proposed heavy vehicles interacting with other vehicles and the on-street parking on the western side of the road.

On this section of Titirangi Road, the existing on-street parking results in a reduced width for the existing two traffic lanes. The vehicle demonstration has indicated that heavy vehicles travelling north would run along the centre line markings in some sections, when providing clearance to the adjacent on-street car parking, as shown in **Figure 3**.



Figure 3: Heavy Vehicle Demonstration (Titirangi Road – North of Village)

The width constraint not only affects the truck and trailer vehicle used in the heavy vehicle demonstration, but also affects existing heavy vehicles and buses using Titirangi Road northbound. As shown in **Figure 4**, buses are also observed to run along the centre line markings in order to provide clearance to the adjacent parked cars. However, as shown in **Appendix A**, the southbound demonstration vehicle travelling toward the Village along this section Titirangi Road had sufficient width, therefore allowing two heavy vehicles to pass each other.



Figure 4: Northbound Bus (Titirangi Road – North of Village)



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As discussed in Section 2.8 of the TAR, six bus services currently operate along this section of Titirangi Road, in addition to school bus services, which means this section of Titirangi Road is already a regular pinch point for bus services and heavy trucks. The traffic surveys undertaken indicate that around 350 heavy vehicles (including buses) currently operate northbound on Titirangi Road on weekdays.¹

Notwithstanding this existing situation, the use of Titirangi Road as the primary heavy vehicle route for the Project will mean an increase in two-way heavy vehicle movements on this section of Titirangi Road, potentially up to an additional 118 daily two-way vehicles per day in the busiest 11 months. As such, the probability that heavy vehicles and buses will need to pass one another is increased. Albeit during these months, it is expected that Titirangi Road would only be used one-way, in combination with the Atkinson Road (South), Kaurilands Road and Glendale Road route. Hence, at the busiest times of the construction, heavy vehicles operating on either route would generally only be passing existing traffic, not each other.

Route 2: Atkinson Road (South) / Glendale Road / Kaurilands Road

The vehicle demonstration has identified that there are sections along Atkinson Road and Kaurilands Road, where there is existing on-street parking, where it was necessary for the demonstration vehicle to cross the centre line markings (see **Appendix A**) to avoid parked cars. However, similarly to the section of Titirangi Road discussed above, this has also been observed to be necessary for existing buses and other heavy trucks already using these roads.

As shown in **Figure 5**, on Glendale Road, the demonstration identified the truck and trailer vehicle passing a bus (driving in the opposite direction) with on-street parked cars on both sides of the road (near the Levy Road intersection). This demonstrates that, although there are some narrower sections along this route, for the most part heavy vehicles and buses are able to pass each other adequately.



Figure 5: Heavy Truck and Bus Passing (Glendale Road)

Moreover, as recommended in the TAR, this route would be used as part of a one-way circulation to/from the Project sites (in combination with the Titirangi Road route). Therefore, the proposed heavy truck movements will generally only be passing existing traffic (including buses), not each other. Section 2.8 of the TAR identified that only one bus service operates along either Atkinson Road (South) (172/172X) or Kaurilands Road (151X), with both these services being at a frequency of no more than every 30 to 60 minutes throughout the day. As such, any potential conflicts are not be predicted to occur frequently, particularly as outside school drop-off / pick-up periods on weekdays, on-street parking on these roads is more intermittent providing opportunities for vehicles to wait and pass other vehicles.

¹ Average daily heavy vehicles from 5 day weekday count, northbound only

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As discussed in the TAR, it is recognised that during school drop-off / pick-up periods, there is significantly increased demand for on-street parking along Atkinson Road (South) and Kaurilands Road in the vicinity of the schools and kindergartens. As such, as discussed earlier, the TAR and the draft CTMP have identified that no heavy trucks use the Atkinson Road (South), Kaurilands Road and Glendale Road route during these periods in school term times, where practicable. In combination with the one-way operation, it is considered that this would sufficiently address the identified adverse effects of heavy vehicles using this route.

Parking Survey

To further inform the understanding of the potential effects of heavy trucks using the section of Titirangi Road to the north of the Village, Beca commissioned a parking occupancy survey, illustrated in **Figure 6**. There is currently space for unrestricted parking of approximately 26 cars along the western side of Titirangi Road in this section. There is no parking allowed on the eastern side. The parking is broken up by existing property driveways. The parking occupancy surveys was undertaken for 24 hours during the following periods:

- Weekdays (Average of Tuesday 21 and Thursday 23 May 2019)
- Weekend (Saturday 25 May 2019).



Figure 6: Parking Survey Areas – Titirangi Road

The observed occupancy for all parking spaces on the weekday and weekend (Saturday) is as follows:

- The weekday survey indicates a higher occupancy than over the weekend period (shown in Figure 7)
- However, the weekday occupancy is still observed to peak at around 14 spaces only, just slightly more than 50% of the total spaces
- From around 9am to 5pm on weekdays the parking demands exceeded 10 vehicles
- On the Saturday, there is an even spread of parking demand over the day, with a maximum demand of five vehicles observed.



Figure 7: Parking Survey Occupancy

The parking occupancy per zone is shown on the graphs in **Appendix B**. This has focussed on the weekdays, given these periods were observed to have the higher parking demand. It is noted that Zone A includes five indented parking spaces, closest to the Titirangi Village, where the vehicle demonstration has shown there is more than sufficient width for heavy vehicles.

The zonal occupancy survey indicates that Zones A, B and C have the highest occupancy levels, with there being little demand for the nine spaces in Zone D. It is considered that as Zones A to C are in closer proximity to Titirangi Village, this is the most likely reason for the higher demand in these zones.

Our Ref: 6513515/s92/BUN60339273 NT 166527703 1.0

Potential Mitigation Options

It has been identified that the predicted heavy vehicles associated with the Project, would potentially have adverse effects, due the current situation for existing buses and heavy trucks travelling northbound on Titirangi Road passing on-street parking. As such, it is considered that this section of Titirangi Road would benefit from the following potential mitigation options (or a combination of these options).

The mitigation options identified at this stage include:

- An adjustment to the current centre line marking (adjacent to the on-street parking) to visually indicate a lane that better accommodates heavy vehicles and buses travelling northbound on Titirangi Road. This would more clearly provide the necessary width for northbound heavy vehicles, while still providing sufficient width for heavy vehicles and buses travelling southbound.
- 2. Restrict parking on those sections that are most affected by the northbound heavy vehicle or bus movements (mainly where the road is not straight) or where there is lower parking demand to reduce the potential and extent of the potential areas of conflict. Noting that:
 - a. The zonal occupancy shows not all the zones are well-used, so by restricting some parking potentially in Zones A, B and C, vehicles can make use of the under-utilised parking in Zone D (which is generally on a straighter section).
 - b. Removing under-utilised parking in Zone D, reducing the overall length of parking that could occur at any time, so reducing the extent or length of the potential conflict area.
- 3. Reduce the footpath width (where practicable) to create more separation of parked cars to heavy vehicles and buses travelling northbound. This would need to be limited to the southern section, where there is currently a wider footpath.
- 4. Use the identified one-way routing for the Project heavy vehicles over a longer period to reduce twoway heavy vehicles in this section. This still needs to consider limiting the duration of the programme that heavy vehicles will operate along the Atkinson/ Kaurilands/ Glendale Roads route during the Project works, so is less preferable.
- 5. The option of taking excess spoil the Parau landfill site will reduce heavy vehicle movements using both the Titirangi Road and the Atkinson/ Kaurilands/ Glendale Roads routes during the Project works. The reduction would relate to truck and trailer vehicles associated with the removal of spoil from the Project sites to the Parau landfill. The potential reduction in heavy vehicles on Titirangi Road would be around 24 to 36 heavy vehicle movements per day associated with those activities.

It is considered that any of the potential mitigation options (or a combination of these options) would reduce the risk to existing road users and Project staff vehicles in this area to an acceptable level. It is considered this package of measures should be recognised in the measures identified in Proposed Condition 43 and the draft CTMP. The package of measures and their implementation during the Project works can be developed through further discussion between contractor (once appointed) and Auckland Transport, as required through the proposed conditions.

Our Ref: 6513515/s92/BUN60339273 N 16653710 1.0

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Summary

In summary, the vehicle demonstration has confirmed that the majority of the routes are adequate to accommodate the predicted increase in heavy vehicle movements associated with the Project.

However, it has been identified that the predicted heavy vehicles associated with the Project, would potentially have adverse effects, due the current situation for existing buses and heavy trucks travelling northbound on Titirangi Road passing on-street parking, between Titirangi Village and Park Road. As such, it is considered that this section of Titirangi Road would benefit from the potential mitigation options (or a combination of these options) identified in this letter to reduce the safety risks for to existing road users and Project staff vehicles in the identified area.

It is considered that the proposed package of measures would improve the current situation on this section of Titirangi Road and can be implemented with no more than minor adverse effects on the use and supply of the on-street parking in the identified area.

It is considered this package of measures should be recognised in the measures identified in Proposed Condition 43 and the draft CTMP. The package of measures and their implementation during the Project works can be developed through further discussion between contractor (once appointed) and Auckland Transport, as required through the proposed conditions.

We trust the above is in order, should you have any queries please do not hesitate to contact us.

Yours sincerely

Scheepers Fourie

Senior Transportation Planner on behalf of

Beca Limited Direct Dial: +64 9 300 9000 Email: Scheepers.Fourie@beca.com



Appendix A – Vehicle Demonstration





Design Vehicle:



Gleeson Cox Truck And Trailer – Bulk Haulage

- Date of Survey
 - 17/07/2019
- Time of Survey
 - 10:30 11:30 Am
- Route 1
 - Scenic / Woodlands and Titirangi Road
- Route 2
 - Scenic / Woodlands and Atkinson / Kaurilands / Glendale Road





Route 1 Assessment Southbound / Westbound





















Appendix B – Parking Occupancy Tables




TITRANGI ROAD PARKING OCCUPANCY - ZONES



613





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Watercare Services Limited 73 Remuera Road Remuera Auckland 1050

26 September 2019

Attention: Mr. Paul Jones

Dear Paul

Huia Replacement WTP: Rigid Heavy Vehicle Demonstration

CH2M Beca Ltd (Beca) was commissioned by the Watercare Services Ltd (Watercare) to consider the potential transport effects arising from the enabling works, construction and operation for the replacement Huia Water Treatment Plant (WTP) and the associated proposed reservoirs (the Project). A Transport Assessment report (TAR) has been prepared by Beca, dated 10 July 2019, which was submitted with the regional consents application.

A request for further information under section 92 of the Resource Management Act 1991 was received from Auckland Council, dated 25 July 2019, following its review of the TAR. A response was provided to the Section 92 request in the Beca letter dated 9 August 2019, describing the findings of a truck and trailer vehicle demonstration along the identified heavy truck routes via Titirangi Road and Atkinson Road. That letter suggested mitigation measures necessary to address the transport-related effects of the along Titirangi Road and Kaurilands Road routes.

Following that Beca letter, Council requested that a similar vehicle demonstration be undertaken in order to understand the adequacy of the Parau landfill site route to accommodate the anticipated heavy truck movements and identify any additional mitigation needed along this route.

Heavy Truck Access Routes

As discussed in Section 4 of the TAR, it is identified that the primary route for heavy vehicles accessing the Project sites will be along Woodlands Park Road, Scenic Drive and Titirangi Road. However, a possible alternative landfill site for the disposal cut material has been identified as the Parau Landfill site to the south west of the proposed WTP.¹ The route to and from the Parau landfill is identified along Woodlands Park Road through the Woodlands Park village and then along Huia Road.

The TAR identified that, given the route and transport environment, there would be limitations on the heavy truck types that could operate along this route to dispose of the cut material. As such, the TAR already recommended that the heavy vehicle type for the transport of cut material be restricted to a rigid truck only, rather than a truck and trailer combination vehicle. The TAR identified that there would be around 61 to 90 daily heavy rigid vehicle movements during the anticipated intensive earthworks periods on this route. This is based on the maximum scenario of all cut material having to be disposed of off-site and not being suitable for re-use on the site).

¹ Section 4.1.6 of the TAR

The TAR identified the Parau site as a potentially feasible option for the disposal of cut material during the earthworks, subject to implementation of the recommended measures through the Construction Traffic Management Plan (CTMP) to manage the predicted effects.

The TAR also noted that the benefits of using the Parau site for disposal of a large proportion, if not all, of the cut material, from a transport perspective are:

- Movements to the Parau site would mean that these movements did not need to occur along the Titirangi Road or Atkinson/ Kaurilands Roads routes, reducing the adverse traffic effects on those corridors, and distributing adverse effects over a wider network area
- Overall shorter trip distance (3.6km), less distance travelled by heavy vehicles on the public road network, when compared to the longer route via Titirangi Road to Great North Road or Atkinson/ Kaurilands Roads to West Coast Road. The latter routes would also result in further travel distance to and from disposal sites, beyond the point of reaching Great North Road or West Coast Road
- Shorter trip durations, less time for heavy vehicles on roads, improving the turnaround for material disposal, and reliability of arrivals and departures from the site.

The use of Parau landfill would ultimately mean that there is a reduced duration of activities for heavy vehicle movements due to the shorter travel distance and quicker turnaround time.

Heavy Vehicle Demonstration Summary

In order to confirm the adequacy of the Parau site route to accommodate heavy vehicles and to review interaction between construction vehicles, Beca has coordinated a vehicle demonstration. The demonstration used a rigid truck (Six Wheeler, see **Figure 1**) similar to the vehicles recommended in the TAR for cut/fill (earthworks) transport to and from the Parau site. The demonstration was undertaken on the morning of Tuesday 10 September 2019 and was recorded by taking video from vehicles in front and behind the rigid heavy vehicle.



Figure 1: Rigid Heavy Vehicle – Six Wheeler

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Figure 2: Vehicle Demonstration Route - Parau Landfill Site

Figure 2 illustrates the route that was driven (in both directions) by the rigid heavy vehicle, which included Woodlands Park Road and Huia Road. The demonstration assessment summary with associated images along the route are attached to this letter in **Appendix A**, with two separate sheets illustrating the northbound and southbound journeys respectively with images of the front and rear of the rigid heavy vehicle at each location. Whilst the demonstration considered the whole route, in both directions, the images shown in **Appendix A** represent the key locations that were identified to be potential constraints, for example, at intersections or on bends in the road.

In summary, the vehicle demonstration indicates that the proposed route is geometrically adequate for the safe use by rigid heavy vehicles in a two-way arrangement on both Woodlands Park Road and Huia Road.

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Figure 3: Heavy Vehicle Demonstration (Woodlands Park Road)

The demonstration shows (**Figure 3** and **Appendix A**) that the rigid vehicle is able to stay within the traffic lanes, where parked vehicles did not obstruct movements. In locations where parked vehicles were occasionally encountered (**Figure 4**), the rigid heavy vehicle needed to cross the centreline in order to avoid the parked vehicles. However, this would have also been the case for any car, bus or other heavy vehicle travelling along this route, passing the parked vehicles. As such, as for any other vehicle, it would be necessary for rigid heavy vehicles transporting cut material pass a parked vehicle in a safe manner.



Figure 4: Woodlands Park Road (Parked Vehicle)

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The route passes Woodlands Park Primary School. As with the schools along Atkinson Road and Kaurilands Road, the TAR and the Draft CTMP have identified that there shall be no trucks operating past the School during the busy weekday school pick-up and drop-off periods, where practicable. It is considered that this will address the potential adverse effects of the Project on the safety of children and parents travelling to and from the school.

On the day of the vehicle demonstration, it was identified that there was a high parking demand on the route near the school, within defined parking areas. The demonstration did not identify major conflicts along this section. The rigid heavy vehicle could safely travel within the lane widths and did not cross the centreline or edge lines at any point as shown in **Figure 5** (also refer to **Appendix A**). An existing zebra crossing, which is raised, provides a safe crossing point for people, near the school pedestrian access.







Figure 5: Woodlands Park Road Bus (Woodlands Park School)

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Summary

In summary, the vehicle demonstration has confirmed that the Parau site route is adequate to accommodate the predicted increase in rigid heavy vehicle movements associated with the Project. The heavy rigid vehicles would mainly be operating in non-peak hour periods, where there would generally be less parked cars and other vehicles using these roads.

As such, as already identified in the TAR and Draft CTMP, it is considered that by having no heavy trucks operating past the school during the busy weekday school pick-up and drop-off periods, where practicable, the potential operational and safety effects can be satisfactorily addressed. The TAR and Draft CTMP also identified the need for a Site-Specific Traffic Management Plan (SSTMP) to be implemented at the Parau Landfill site access off Huia Road to manage the effects of heavy vehicles entering and exiting the site, which may include some localised widening of this access off Huia Road.

The package of measures outlined in the Draft CTMP and their implementation during the Project works will be refined through further discussion between contractor (once appointed) and Auckland Transport.

We trust the above is in order, should you have any queries please do not hesitate to contact us.

Yours sincerely

Scheepers Fourie Senior Transportation Engineer

on behalf of **CH2M Beca Ltd** Direct Dial: +64 7 577 7979 Email: scheepers.fourie@beca.com

Copy Karen Baverstock, Tonkin and Taylor



Appendix A: Rigid Heavy Vehicle Demonstration



Design Vehicle:



Gleeson Cox 6 Wheeler – Bulk Haulage

- Date of Survey
 - 10/09/2019
- Time of Survey
 - 10:30 11:30 Am
- Route
 - Woodlands Park Rd / Huia Rd









Attachment C – NZTA Vehicle Classification Scheme





Vehicle Classification Scheme (NZTA 2011)

NZTA	Vehicle Types in Class AxI			ıps Criteria ·	Maximum a	de spacin	g < 10m Length		NZTA FEM LIÇ	Light	t NZTA	Austroads
Axel Class		Axles	Groups		AS1-2	AS2-3	AS3-4	Range (WIM data)	Class	or Heavy	Length Class	1994 Class
1	oo (verv short 2 ax veh = motorbike)	2	1	2 ax. AS 1 criterion	>=0.5. <1.75		-	>1.5 - 2.5	(PC)	Light	VS	1
2	o-o (short 2 axle vehicle = car)	2	2	2 ax AS 1 criterion	>=1.75 < 3.2			2.5-5.5		Light	s	1
2		2	2		>=1.75, < 3.2			(4-6)	FCQLCV	Light	у М	1
2	0-00 (car towing 1 axie trailer)	3	3	3 ax, AS 1,2 criteria	>2.1, < 3.2	>2.1	-1.0	7 -11 9 12		Light	M	2
3	o-ooo (car towing cardem trailer)	4	3	4 ax, AS 1,3 criteria	>2.1, < 3.2	>2.1	<=1.0	10.15	FCQLCV	Light	M	2
	oo (truck or bus)	7	7	2ax AS lcriterion	> =3.2m	72.1	72.1	5 - 12			M	3
4	ooo (truck towing light trailer)	3	3	3 ax, AS 1,2 criteria	>=3.2m	>2.1, <=6.8	-	8 - 16	Bus & MCV		L	6
	oooo (truck tow light 2 ax trailer)	4	3	4 ax, AS 1,3 criteria	>=3.2m	>2.1	<=1.0	9 -17	•		L	7
	ooo (truck or bus/coach)	3	2	3 axles, 2 groups	>=3.2m	<=2.1	-	7 -12			М	4
	ooo (tractor without semi-trailer)	3	2	3 axles, 2 groups	>2.1, < 3.2	<=2.1	-	6 -8			М	4
5	ooo (twin steer truck)	3	2	3 axles, 2 groups	<=2.1	-	-	7 -12		Henry	М	4
J	ooo (artic e.g. bread truck)	3	3	3 ax, AS 1,2 criteria	>=3.2m	>6.8	-	11 -17	bus de nevi	Heavy	L	6
	oooo (truck tow light 1 ax trailer)	4	3	4 ax, AS 1,2,3 criteria	>=3.2m	<=2.1	>2.1	10 -17			L	7
	oooo (twin steer tow 1 ax trailer)	4	3	4 ax, AS 1,3 criteria	<=2.1	-	>2.1	10 - 17			L	7
	oooo (heavy truck)	4	2		<=2.1	-	>1.0, <=2.1	7 - 13			М	5
6	oooo (heavy truck)	4	2	4,5 axles, 2 groups	>2.1	<=2.1	>1.0, <=2.1	7 -11	HCV1	Heavy	М	5
	ooooo (heavy truck)	5	2			-	-	8 -13			М	5
_	oooo (artic A112)	4	3	4 ax, AS 1,2,3 criteria	>2.1	>2.1	>1.0, <=2.1	12 -18	1101/1		L	7
	oooo (artic A121)	4	3	4 ax, AS 1,2,3 criteria	>2.1,<3.2	<=2.1	>2.1	12-18	HCVI	неаvy	L	7
	ooo (truck tow heavy trailer)	4	4	4 axies, 4 groups	>=3.2	>2.1	> 2.1	13-17			VL VI	/ °
	o-oo-oo (artic)	5	3	5 avles		-	-	12-17			VL	8
8	0000 (artic)	5	3	Junes				12-17	HCV2	Heavy	-	8
-	00000 (T+T)	5	4	3.4.5 groups		-	-	13 -18	nerz	incut,	VL	8
	o-o-o-o (mobile crane)	5	5	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-	-	-	10-13			L	8
	oooooo (artic)	6	3			-	>2.2,<12.0	13 -18			L	9
	000000 (artic)	6	3		-	-	-	13 -18			L	9
	ooooooo (artic)	7	3	6-8 axles	-	-	-	> 16			L	9
9	ooooooo (artic)	7	3	3 groups	-	-	-	> 17	HCV2	Heavy	L	9
	ooooooo (artic)	7	3		-	-	-				L	9
	oooooooo (artic)	8	3		-	-	-				L	9
	oooooooo (artic)	8	3		-	-	-				L	9
	0000-00 (T+T)	6	4		-	-	-				VL	10
	00000 (T+T)	6	4		-	-	-				VL	10
10	00000 (T+T)	6	4	6 axles	-	-	-		HCV2	Heavy	VL	10
	0000-0 (1+1)	6	5	4,5 groups	-	-	-				VL	11
	00000-0 (A train)	6	5		-	-	-				VL	11
	000000 (X train)	7	3		>2.2m		-				VL	10
11	00000 (B train)	7	4	7 axles, not twin steer	>2.2m		-		HCV2	Heavy	VL	10
	ooooo (A train)	7	5	(AS 1 criterion)	>2.2m	-	-			,	VL	11
	00000-00 (T+T)	7	4		<=2.2m	-	-				VL	10
	00000 (T+T)	7	4		<=2.2m						VL	10
	0000-00 (T+T)	8	4		<=2.2m	-	-				VL	10
	0000-000 (T+T)	9	4	7-11 axles	<=2.2m	-	-				VL	10
12	000000 (T+T)	9	4	twin steer	<=2.2m	-	-		HCV2	Heavy	VL	10
	0000-000 (T+T)	10	4	(AS 1 criterion)	<=2.2m		-				VL	10
	00000000 (T+T)	10	4		<=2.2m						VL	10
	0000000 (T+T)	11	4		<=2.2m	-	-				VL	10
	various (twin steer A train)	7-11	5		<=2.2m	-	-				VL	11
	oooooo (B train)	8	4		>2.2m	-	-				VL	10
	000000 (B train)	8	4		>2.2m	-	-				VL	10
12	000-000-000 (B train)	9 10	4	0 11 autor	>2.2m	-	-		HCV2	Heaver	VL VI	10
13	000000-00 (A train)	ιU Ω	4	o-11 axies	>2.2m		-		110.42	neavy	VL \/I	10
	000000 (A train)	8	5	(AS 1 criterion)	>2.2111		-				VI	11
	oooooo (A train)	8	5	, or a renteriony	>2.2m	-	-				VL	11
14	- (any		Everything else		-	-					
NZT	A Length Class: VS= 0.5-2.0)m S	=2.0-5.5	5m M=5.5-11m	L=11-17m	VL>17n	า					
Axle Gro AS1	es: Number of axles ups: Number of axle groups (a -2: Distance between first and 2: Distance between first and	in axle secon	group is d axle	where axles are lo	ess then 2.1r	n apart.						
AS2 AS3	AS3-4: Distance between third and fourth axle											



Attachment D – Heavy Truck Movements Summary









6	87	88	89	90	91	92	93	94	95	96	97	98	99



Attachment D: Road stability response



Job No: 30848.2000 8 November 2019

Watercare Services Limited 73 Remuera Road Remuera Auckland 1050

Attention: Paul Jones

Dear Paul

Huia WTP Replacement Project - Response to Section 92 request for further information: Road Stability

Auckland Council issued a Request for Further Information (s92) for the Replacement Huia Water Treatment Plant Project on 2 October 2019. Item 5.5 of the request dealt specifically with the issue of traffic-induced instability of Scenic Drive. This letter provides the required response.

1.0 Information Request

The request received from Auckland Council is reproduced below in full. Our response is provided in Sections 2 through 6 below.

5.5 Road Stability

Submitters have raised concerns that heavy vehicle traffic may cause slips and road closures, such as on Exhibition Drive.

Auckland Transport advise, based on RAMM records, that in early January 2018, approximately the first kilometre of the Scenic Drive pavement (i.e. approximately from Titirangi roundabout to Woodlands Park Rd) was rehabilitated by AT. The project included a timber retaining wall to support an unstable section of footpath approximately 450m from beginning of the road.

It should be noted that if slips occur which restrict Scenic Drive during the earthworks stage, AT would likely revoke/revise the CTMP.

Without a doing a full investigation and a slope stability analysis, AT are unable to confirm whether slope stability would be affected due to the future number of HCV movements. AT's Asset Team request that the applicant provides comment from a geotechnical engineer regarding the effect to slope stability due to high HCV movements including monitoring scheme during the truck movement period plus another period of time as advised by the consultant.

Please provide an assessment of the potential land instability effects along Scenic Drive, which may result from the additional HCV movements generated by the proposed activity. This assessment should consider the cumulative effect of construction activity, which will be concurrent but is not part of this consent.

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2.0 Background Information

2.1 Location

That part of Scenic Drive relevant to this request is the approximately 1080 m section located between Titirangi and the Nihotupu Filter Station located on the corner of Scenic Drive and Woodlands Park Road.

2.2 Geology

Scenic Drive has been excavated to a depth of several metres within the sandstones of the Nihotupu Formation (Photo 1).

Scenic Drive is understood to have been built in the 1930's. Although construction details are not known to be available, the height of the road cuttings would indicate that that the entirety of the inside lane (Woodlands Park Road to Titirangi) is located in a rock cutting. The outside lane (Titirangi to Woodlands Park Road) is expected to be underlain by a mixture of intact rock, in-situ soil and sidecast fill, the proportion of each varying significantly along the road as a function of the original topography.

Figure 1 presents a schematic cross-section through Scenic Drive showing the inferred geology relative to the traffic lanes.



Photograph.1: Nihotupu Formation sandstones exposed within the side of Scenic Drive



Figure.1: Schematic section showing the inferred geology of Scenic Drive between Titirangi and Woodlands Park Road

2.3 Current Vehicle Traffic

Traffic data presented in the AEE (Appendix H – Transport) provided the following estimated traffic volumes for this section of road:

- The road currently carries an average of 7,325 vehicles per weekday; and
- On average, 293 heavy vehicles (HCV) use the road each weekday. This equates to approximately 75,000 HCV per year, excluding weekend traffic.

Beca has provided further details on their derivation of vehicle numbers in their response to the Section 92 request dated 2 October 2019.

3.0 The Nature of Slope Instability

The slopes that support the outside of roads in hilly or mountainous terrain may be subject to instability (under-slips) depending on a number of factors, although the material from which they are formed (soil versus rock), steepness of the terrain and local drainage/groundwater conditions are the most important.

Although the presence of a soil (fill or in-situ) dipping parallel to the slope is the most likely cause for an under-slip to occur, the <u>trigger</u> for failure is usually an increase in pore water pressure, either due to a large rainfall event or problems with surface/subsurface drainage systems. Traffic movement does not contribute to these effects. Slips of this type may also result from sustained seismic shaking, however the forces required to initiate slips of this type are such that they are typically only observed as a result of large magnitude earthquakes.

Figure 2 presents a schematic of the typical under-slips that can occur on roads such as Scenic Drive.

These failures typically occur within the sidecast fill, at the contact between the sidecast fill and the underlying natural materials (either in-situ soils or rock) or between the in-situ soils and the underlying rock. The likely presence of both sidecast fill and natural soils within the slopes below



Scenic Drive means that both modes of instability are considered possible. It should therefore be expected that that some form of instability, either in the form of surface creep or shallow slips, should be expected on these slopes and that these will be triggered by groundwater and surface water conditions. The presence of shallow soil movement is not by itself any indicator that traffic is having an effect on the slopes.

Two examples of such under-slips occurred on nearby Exhibition Drive following heavy rain in July 2017 (Photos 2 and 3). These under-slips occurred within the sidecast fill that forms the outside of the road. They show the geometric features that are characteristic of under-slips, in that they are laterally extensive both down slope and parallel to the road but very limited in terms of how deep the slip extends into the road.

Even if outright failure does not occur, the surface soils of such slopes are often subject to ongoing creep and downwards movement. This process is thought to have been the cause of deformation of the footpath that extends out from the Scenic Drive cutting (Photo 4).



Figure.2: Common mechanisms for under-slips



Photograph 2: Under-slip #1 on Exhibition Drive, July 2017



Photograph.3: Under-slip #2 on Exhibition Drive, July 2017

5



Photograph.4: Evidence of shallow soil movement on the outside of Scenic Drive in the form of a tension crack in the footpath and an out-of-alignment fence. This indicates movement on the outside half of the footpath

Failures within the underlying rock may occur if adversely oriented structures such are joints or bedding are present and dipping out of the slope at an angle generally greater than 30 degrees. These structurally controlled landslips are much rarer than the under-slips indicated on Figure 2 and observed on Exhibition Drive. Examination of the sandstones exposed within the Scenic Drive cutting has shown that the required dipping structures are absent. On this basis it is considered that potential slope instability is limited to the very outside of the Titirangi to Huia WTP lane.

4.0 Effect of Traffic on Roads

The impact of vehicle loading on a road is typically limited to the degradation of the pavement layers directly beneath the tyres as a result of both static loading (from the weight of the vehicle) and dynamic loading (from the vehicle moving on its suspension).

A road that is properly design with respect to the strength of the natural soils beneath the pavement (subgrade) and the expected traffic volume and axle weights will be able to resist this degradation for an extended period of time. Nevertheless, the effect of vehicle passage in the pavement layers directly beneath the tyres is cumulative. As such the road pavement has a certain life span, after which it needs to be repaired or replaced.

Dynamic vehicle loading is known to attenuate rapidly with depth, such that it reduces to zero at a depth of approximately 1 m or less below the road surface (NZTA Bridge Manual). Whilst dynamic loading may be important in determining the life span of pavements, it is the self-weight of the vehicles that have the potential to induce instability within the underlying slopes.

Geotechnical design requires slopes to achieve a minimum factor of safety against failure. Part of the process of road design is to include a vehicle weight in the slope model to ensure that the required factor of safety (typically 1.5) is achieved. As this loading is applied on a 2D section, this is equivalent to the assumption that the vehicle loading is continuous along the road, not just limited to a single passing vehicle. This loading is temporary and small enough relative to the permanent forces acting on the slope that any effect of vehicle loading is non-cumulative (non-plastic deformation).

6

8 November 2019

5.0 The effect of Construction Traffic on Scenic Drive

Appendix H (Traffic) of the AEE indicates that construction will result in an average of 37 trucks per day with a peak of 88 to 118 heavy vehicle movements per day during the most intensive construction period (11 months in total), and an average of around 84 per weekday during the main two-year construction period. There are also extended periods where little or no heavy vehicle movements are anticipated. The total number of HCV movements during the two-year main construction period is broadly estimated to be approximately 44,000 in total. If during the two-year duration main construction period the existing HCV traffic stays the same (i.e. non-construction HCV do not avoid Scenic Drive) there will be 150,000 weekday regular HCV movements (average of 293 per weekday over a two-year period) plus an additional 44,000 construction-related HCV movements in total (average increase of 84 per weekday), an increase of 27%.

It is noted that these are the anticipated traffic volumes associated with both the enabling earthworks and associated activities provided for under this application as well as for construction of the replacement WTP and structures which are not part of this application/will be addressed through the OPW¹. Furthermore there is potential for cut material from the reservoir site to be used within the immediate vicinity of the WTP and therefore those vehicle movements would avoid Scenic Drive altogether. The assessed vehicle volumes presented here are therefore conservative.

If the effect of vehicle weight on the slopes beneath Scenic Drive are, as is considered above, noncumulative, then the additional construction traffic will not have a detrimental effect on the slopes.

If however, it is assumed that the effects of HCV traffic on the Scenic Drive slopes is indeed cumulative, then the slopes will at some stage reach a point of instability having been subject to a certain critical number of vehicle passages simply as a result of the existing traffic loads. After all, the road will have been subjected to some 750,000 weekday HCV movements in total over the past 10 years, if current traffic volumes are typical.

In this scenario, the presence of additional construction traffic has the potential to, at worst, very marginally bring forward the occurrence of instability that was inevitable anyway. We consider, however, that the HCV traffic will not induce such instability, be it under current or temporarily greater traffic volumes.

In our opinion there is no basis in which it can be argued that the current HCV movements do not have a detrimental effect on slope stability but the temporary additional 27% increase in HCV movements, <u>and only these vehicles</u>, induce such instability. Whether the presence of these additional vehicles have a cumulative impact or not, they will not change the eventual outcome.

We also know from decades of experience in quarries and open-pit mines that narrow haul roads cut into the steep sides of these excavations do not suffer under-slip instability despite the sustained passage of many thousands of very heavily loaded trucks over periods of many years. The engineering literature is also essentially silent on traffic-induced slope instability being an issue indicating that this is not an issue.

6.0 Monitoring

The simplest method to demonstrate and ensure the ongoing stability of Scenic Drive is to undertake a pre-construction condition survey of the route and to undertake regular inspections to identify potential changes. We understand that this is already addressed through the requirement for a Pavement Impact Assessment (PIA) along with the requirement that any damage to roads be rectified. However pre-construction monitoring would consist of:

¹ In the seven busiest months associated with the site enabling works consent activities, there would be around 66 to 71 daily heavy truck movements, equating to around nine to ten heavy truck movements per hour (both directions) across the day (Beca, 4/11/2019).

- Logging of existing road and footpath deformation (on drawings and/or photographic records);
- Recording of the condition of retaining walls and other structures supporting the footpath; and
- Engineering geological mapping of the slopes beneath Scenic Drive to identify existing areas of slope instability or areas where instability may potentially occur based on topography, drainage etc.

An inspection of the footpath and outside lane should be undertaken on a regular basis to identify any degradation or evidence of the on-set of instability. The frequency of this inspection would be dependent on the level of heavy vehicle movements, however a frequency of once per 2 weeks for a 3 month period in the most intensive period of enabling works / heavy vehicle movements would be appropriate. If no change in condition is evident then the inspection could be undertaken monthly (or less where construction activities / the number of heavy vehicle movements is low).

Re-inspection of the slopes and retaining walls should be undertaken periodically (e.g. every 3 months during the more intensive construction period) unless evidence of instability is present within the road/footpath. If this is the case then these inspections should be undertaken immediately.

Tonkin & Taylor Ltd Environmental and Engineering Consultants Prepared by:

Krll of

Kevin J. Hind Technical Director, CMEngNZ (PEngGeol)

Authorised for Tonkin & Taylor Ltd by:

Peter Roan Project Director

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Update Assessment Paper

То:	Paul Jones – Watercare	Date:	8 November 2019
Prepared by:	Charlotte Clouston and Amelia Linzey	Our Ref:	6513515
Subject:	Huia Replacement Water Treatment Plant Assessment (Options Evaluation) in light of	- Review and u f Project Propo	pdate of Social Impact sal (with conditions)

1 Background

Watercare has applied for resource consents for a new Water Treatment Plant (WTP) to replace the existing WTP at Huia, Titirangi, Auckland. The application was lodged with Auckland Council in July 2019. It is noted that this proposal relates to an existing designated site. In that regard, it has been acknowledged in the assessment that the potential social impacts of the overall activity are already anticipated and provided for in the Unitary Plan (e.g. through that designation) and that the designation is a part of that existing social environment.

As part of the preliminary works to decide on a preferred site for the new WTP, Beca Ltd was engaged to prepare a Social Impact Assessment (SIA) to assess four short-listed options that were being considered at that time for a new Water Treatment facility in Huia.

An outcome of the overall option assessment was identification of a preferred option, which was the development of a new WTP on Watercare land adjacent to the existing Huia WTP (referred to as the Manuka Road Option). The site for the replacement WTP (as applied for) is located in close proximity to the existing Huia WTP, on the corner of Manuka Road and Woodlands Park Road on land owned by Watercare and designated for Water Supply Purposes (designation 9324). As set out above, the option assessment recognised that the existence of the designation creates a social expectation that a water treatment plant (water supply) could be established on this site (as it has been explicitly provided for in the Auckland Unitary Plan: Operative in Part).

In addition to the replacement WTP, one 25 ML reservoir is to be constructed on the existing Huia WTP site once the existing plant is decommissioned. Another 25 ML treated water reservoir is to be located across from the replacement WTP on the northern side of Woodlands Park Road. Other than the most eastern extent of this reservoir, this reservoir will be entirely buried/below ground level. The NH2 valve chamber and tunnelling reception shaft will also be located within this site. All of these additional structures associated with the WTP are also located on land designated for water supply purposes.

2 Recommended Approach in Baseline SIA

The SIA (Beca Ltd, August 2017) ("the Options SIA") assessed potential social impacts of the proposed planning, construction and operation phases of a new WTP with a four short-listed options being evaluated (based on high level plans provided at the short-list phase). That SIA was undertaken at the shortlist stage of the optioneering (as discussed in section 5.4.4 of the Assessment of Effects on the Environment (AEE), July 2019, lodged for the resource consent application). The options SIA concluded that, for the Manuka Road option, the potential social impacts during construction are likely to be moderate due to impacts on people's way of life and quality of the environment. Some negative impacts were identified during operation, particularly for



people's way of life¹. However, these potential impacts were generally considered to be at a lower scale of impact than other short-list options (in particular the Parker Road options) based on the following reasons:

- the smaller number of people potentially impacted;
- the nature of the community;
- accessibility for that community
- existence of a WTP in a similar location; and
- residential properties are not directly affected by the site options.

Potential negative impacts identified at that assessment were associated with the potential loss of Clarks Bush, which some in the community identified as a reserve (in this instance, the issue of the difference between community values and expectations and the designated purpose of the site are acknowledged).

While mitigation measures were proposed or identified in the assessment report, the assessment itself had not concluded residual impacts with mitigation in place, as it was uncertain which measures may be adopted by Watercare (and / or the viability of these measures given design development to be undertaken in subsequent stages of the project). Furthermore, at that time there were some 'potential' issues identified as there remained some uncertainty on the detail of design and footprint for the options (e.g. the extent of works within and potentially beyond designated areas). The site level assessment was based on a high level design, shown in Figure 1.

The footprint of the replacement WTP and reservoirs, as they form the current proposal being considered for resource consents, was undertaken following selection of the preferred site, and after the options SIA was undertaken. It is understood that a process of assessing onsite alternatives was undertaken, looking at constraints and opportunities and resulting in design changes.

The options SIA indicated that following identification of a preferred site and development of the design and specific management options for that site, it would be appropriate to review the potential social impacts of the Project with the management options and mitigation in place. On that basis, this Paper reviews the social impacts considered in the options SIA and the mitigation proposed in the resource consent application.

¹ This assessment was included in the SIA, acknowledging the existing designation and that the land had been 'set aside' for water supply purposes.



Figure 1: Manuka Road shortlist site layout (Source: AEE, Figure 5.4).

3 Review of updated design and mitigation of social impacts in consent application

The following sections summarise the potential impacts and mitigation measures proposed in the options SIA. The design of the new WTP has been developed since the options SIA was undertaken, with seven WTP layouts and five reservoir layouts being developed and evaluated in the alternatives assessment once the Manuka Road short listed option was selected.

The following sections summarise the potential impacts identified in the options SIA and the potential mitigation options that were recommended. The table then considers the implications of the design refinements undertaken since the options SIA was completed (including through site optimisation workshops held once the preferred site was selected, as detailed in the Alternatives Assessment section of the AEE – section 5.5.2) and the mitigation proposed in the resource consent application. This memorandum is a review of the options SIA in light of the proposal now being proposed, rather than a new social impact assessment.



3.1 Potential impacts on way of life

The options SIA indicated potential moderate negative impacts on way of life during construction at the community scale, which may be high for some individual residents. The effects were considered moderate where residents have alternative road access. The impacts included disruption to access for schools and properties, including for daily commutes to work. These disruptions were anticipated as a result of construction traffic and trenching of Woodlands Park Road, which may impact on people's ability to pop to shops and services in Titirangi village centre. The SIA identified potential disruption to people's leisure activities, particularly for walkers and runners using the road for leisure or accessing recreation tracks. Concerns for safety for pedestrians, particularly children popping to their neighbours place, may result in disruptions to social activities.

Proposed mitigation in the Options SIA	Design refinements	Proposed mitigation in resource consent application	Comment
Provide mechanisms for the community to have input into construction management planning and ability to liaise with construction teams for managing disruption impacts.	A Community Liaison Group (CLG) was established during project design to provide a forum for community updates and feedback on the proposal.	Proposed conditions 7 – 9 provide for the establishment, administrative support of and consultation with a CLG comprised of representatives of the local community. This condition in effect continues the operation of the existing CLG.	The ongoir appropriate concerns a activities.
Avoid road disruptions in 'peak' periods, such as avoiding construction traffic during school bus and pick up/drop off times. (Noting that this raises related potential impact of extending construction programme).	The traffic assessment indicated that peak school traffic would interact with heavy vehicle traffic associated with the project on Atkinson Road, Kaurilands Road and Godley Road. Traffic would also impact recreational users who use Woodlands Park Road to access the Exhibition Drive track located at the corner of Scenic Drive and Woodlands Park Road. A principle of the design was to minimise the number of vehicles accesses onto the site. The design indicates haul routes options using a combination of roads to address operational and safety effects of heavy truck movements.	Proposed condition 43 provides for development of a Construction Traffic Management Plan (CTMP), to include limits on heavy vehicle movements during weekday peak hours (i.e. weekday morning and evening pick-up/drop-off periods for kindergartens and schools), and from midday on Saturdays. The AEE also indicates limits around commuter peak periods. The AEE also indicates that in developing the construction methodology, there is a need for balance of the daily number of heavy truck movements and the implications on the extension of the programme.	The develo work and c appropriate periods wh It is recom provide fo disruption does not a
Manage impacts of construction works with measures such as installation of screening, and control noise and construction timeframes. Provide buffering for residential properties (to be integrated with landscape and ecological management for the project).	The AEE indicates that ecological and landscape, construction activities and potential traffic impacts and routes were key concerns raised during CLG meetings. Watercare revised the design of the proposal, including separating one 50 ML reservoir into two 25 ML reservoirs, to mitigate this. A 10m wide landscape buffer around the perimeter of the project sites was determined to be a key design principle for avoiding and mitigating landscape and visual effects. The 10m wide landscape buffer is proposed to substantially screen the replacement WTP and reservoirs. The buffer is limited to 3m in relation to the reservoir located to the northern side of Woodlands Park Road. During design, Watercare have opted to retain access to the existing walking tracks through Clarks Bush and Exhibition Drive.	 Proposed conditions 47 – 54 provide for a Construction Noise and Vibration Management Plan (CNVMP), to include mitigation measures such as noise barriers. The AEE references limiting hours of noisy construction activities to between 0730 and 1800 hrs, which would be included in the CNVMP. Condition 43 specifically provides for limits on heavy vehicle movements to reduce disruption caused by construction traffic. 	The AEE h buffering fo The ongoir appropriate concerns a activities. Retaining a mitigation f The AEE in to date, wh apart from meeting c impacts a discussed

With the mitigation proposed in the resource consent application, it is considered that the potential adverse social impacts on way of life are assessed to remain as low. The disruptions to access and social activities that could result from the construction activities are considered to be appropriately managed by the conditions proposed as part of the proposal.

3.2 Potential impacts on community cohesion

The options SIA indicated potential low positive and low negative impacts during the planning phase, and very low / negligible impact during operation on community cohesion. No mitigation was proposed in the SIA. Potential impacts identified during planning are low positive, as there is potential to galvanise some in the existing community and strengthen awareness and connections between community in Titirangi (particularly Waima). A potential low negative social impact during planning is polarisation of Oratia and Titirangi communities.

ng operation of the CLG provides an e forum for community members to raise and provide feedback on construction

opment of a CTMP that restricts hours of construction traffic accessing the site is e for minimising road disruptions in peak nich was a key concern.

nmended that the CTMP should also or pedestrian access to minimise ns to leisure and social activities as this appear to be provided for.

nas proposed screening through vegetation or neighbouring residences.

ng operation of the CLG provides an e forum for community members to raise and provide feedback on construction

access to walking tracks is appropriate for potential impacts on leisure activities. ndicates that the CLG has had 13 meetings here Watercare has presented on all issues social impact. It is suggested that a closing out the response from the social nd mitigation/management review be d at future CLG.



During operation, potential social impacts on community cohesion were considered in the options SIA to be very low / negligible. With no loss of housing, the options SIA assumed that the community would be unlikely to see more than 'normal change' (e.g. people will not leave the area as a result of WTP option being at that site). This assessment acknowledges the existing environment on the site.

The proposed conditions in the resource consent application include establishment of the Waima Biodiversity Trust to achieve the objectives of the Waima Biodiversity Management Plan. One of the objectives is to increase community-wide engagement in stewardship and sustainable environmental management of the catchment by seeking acceptance of landowners and residents within the area for the Trust's activities on their properties. The Biodiversity Management Plan, along with the CLG, provide for a sense of community in the catchment.

3.3 Potential impacts on sustaining one's self

During Construction, the SIA indicated there are likely to be low to very low adverse effects on sustaining one's self. These are related to disruption to access for businesses using Woodlands Park Road and other roads, where there are some or limited detours available. During operation there is likely to be a negligible impact.

Proposed mitigation in SIA	Design refinements	Proposed mitigation in resource consent application	Comment
Provide for ongoing liaison with local businesses throughout construction period and maintain reasonable service to these businesses.	-	-	There is no application local busin the Comm conditions

The potential adverse impacts on sustaining one's self it is considered that the potential adverse social impacts remain low to very low, as there is potential disruption to access for local businesses and no mitigation is proposed. There is an opportunity to include reference to local businesses in the CLG or CTMP to address this potential impact.

3.4 Potential impacts on guality of the environment

During Construction, the SIA indicated that there is likely to be low negative social impacts on quality of the environment. These relate to concerns about construction emission pollution (noise, light and receiving environments, and the safety for people and environment from these emissions) and safety for traffic on Woodlands Park Road during construction. The impacts on residents in the neighbourhood would be to varying degrees, but greatest for those immediately neighbouring or surrounding the proposed WTP site.

During operation, the SIA indicated that there is likely to be a low negative social impact, resulting from loss of tranquillity, valued vegetation and ecological areas. The assessment acknowledged concerns about emission pollution, as identified in the impacts during construction, but concluded that in operation these are likely to be diminish as concerns for change are often greater than the actual experienced effects. Furthermore, given there is an existing noise environment and operation of existing WTP in the vicinity of the site and the designated purpose of the site it is acknowledged that this change was one anticipated or provided for (e.g. in the Unitary Plan). Some impacts on quality of the environment were also acknowledged fears and perceptions of change to the environment from the community; and that these were not necessarily the physical changes to the environment (e.g. as design certainty on the project progressed, some of the concerns for specific changes may be addressed).

Proposed mitigation in the Options SIA	Design refinements	Proposed mitigation in resource consent application	Comment
Establish mechanisms for the community to actively provide input into construction management planning and the ability to liaise with construction teams for managing disruption impacts. Watercare to actively communicate with community about planning and construction activities, and to engage on community issues and concerns.	A Community Liaison Group was set up during project design to provide a forum for community updates and feedback on the proposal.	Proposed conditions 7 – 9 provide for a Community Liaison Group (already set up and has met 13 times to date). The AEE indicates mitigation of effects is set out in the terms of reference for the CLG. The discussions to date have included plant and landscape design, construction activities, noise effects, potential traffic impacts and routes. The proposed CTMP (conditions 42-46) and CNVMP (conditions 47-54) are to be prepared in consultation with the CLG.	The ongoir mitigating of AEE states to date, Wa all issues a determined actual exter See earlier outcomes CLG. It is recom meet annu CLG wish any issues operation
Manage impacts of construction works with measures such as installation of screening, and control noise and construction timeframes.	A minimum 10m wide landscape buffer around the perimeter of the project sites was determined to be a key design principle required to avoid, and otherwise	The CNVMP proposed (conditions 47 – 54) includes provision of mitigation measures such as noise barriers and acoustic screening. The AEE references limiting	Vegetation neighbouri valued asp



o reference in the resource consent materials to local businesses. Inclusion of less representation could be provided for in unity Liaison Group (as proposed in 7-9) and also in the CTMP.

ng operation of the CLG is appropriate for community concerns.

s that in the course of the 13 CLG meetings atercare and its experts have presented on apart from social impact (as it was d that until the final design was known, the ent of the impact could not be determined). commentary on update to the CLG on of the SIA review being discussed at a future

nmended that a mechanism for the CLG to ually during operation (at least until the to cease meeting), is provided so that s arising in operation or changes in to be discussed with the community.

barriers are appropriate for buffering ng properties and retaining nature that is a pect of the environment.

Proposed mitigation in the Options SIA	Design refinements	Proposed mitigation in resource consent application	Comment
	remedy or mitigate, adverse landscape and visual effects. The 10m wide landscape buffer is proposed to substantially screen the replacement WTP and reservoirs. This was subsequently revised to 3m in relation to the reservoir located to the northern side of Woodlands Park Road.	hours of noisy construction activities to between 0730 and 1800 hrs, which is daylight hours. The AEE indicates that ecological and landscape, construction activities and potential traffic impacts and routes were key concerns raised during CLG meetings. Watercare revised design to mitigate this.	Limiting col potential lig
Provide for community led design in landscaping and other mitigation work to avoid impacts on loss of tranquillity and vegetation values. The options SIA at the time identified a potential permanent loss of features on the site, but indicated there is some opportunity to mitigate this by retaining valued vegetation on the site if feasible.	Engagement with the community through the CLG resulted in a design change in 2018 as a result of particular concerns around ecological and landscape effects of the 50 ML reservoir on the northern side of Woodlands Park Road (outlined in AEE, section 9.5). The re-evaluation led to a design change that avoided the removal of a knoll and a number of significant native trees, as well as the almost full burial of Reservoir 1. This design was largely based on community concerns. The 10m vegetation buffer on the perimeter of the site also seeks to retain areas of vegetation and value to the community.	Ecological compensation is proposed through an Ecological Management Plan / Waima Biodiversity Management Plan (WBMP). Proposed condition 24 – 28 provide for preparation of an Ecological Management Plan, in consultation with the CLG. The Waima Biodiversity Trust is proposed for establishment to hold and administer the project to fund and coordinate the WBMP. The Trust Board will include community-led conservation project leaders, with a focus on community leadership and advocacy. An objective of the proposed WBMP includes increasing community-wide engagement in stewardship and sustainable environmental management of the Waima catchment by seeking acceptance of landowners and residents within the area for the Trust's activities on private properties.	The ongoin constructio operational active invol Biodiversity concerns a values.

With the above, the potential adverse impacts on quality of the environment, from the initial SIA, are assessed to remain low with the mitigation proposed. The ongoing operation of the CLG and the WBMP will provide mechanisms to discuss and address concerns around environmental effects during construction, and any impacts on amenity values during operation.

Potential impacts on political structures and democratic processes 3.5

Mitigation proposed is ongoing open communication and active engagement with the community (noting that some of the impacts already occurred in the planning stage so are unable to be retrospectively mitigated). As summarised in the sections above, the proposed conditions require the continued operation of the CLG throughout design, consenting and construction phases of the project. This provides an ongoing mechanism for Watercare (and contractors) to engage with the community.

nstruction hours to daylight hours will reduce ght pollution impacts.

ng engagement with the CLG during on, and the Waima Biodiversity Trust once I, will provide for community feedback and lvement in activities on the site. The Waima y Trust and WBMP particularly provide for around loss of tranquillity and vegetation

#
4 Conclusion

On the basis of the above review, it is considered that the potential social impacts of the proposed WTP (as identified in the Options SIA) have been considered in the design refinement of the proposal, the AEE and the development of measures to manage and mitigate these effects (the conditions, particularly relating to management of construction effects). In particular, the proposed conditions for the management of the effects provide for ongoing community consultation during construction through the Community Liaison Group. Active community engagement was a key mitigation measure proposed in the options SIA. During design, community concerns raised through the CLG resulted in design changes to the proposal. The conditions provide for this forum to discuss management of effects going forward.

The proposed conditions have responded appropriately to most of the potential social impacts identified. Preparation of a CTMP and CNVMP will provide for management of construction effects, which is appropriate for impacts of way on life caused by heavy vehicle traffic as an example.

There is room for the CLG to include representation of local businesses as the potential impacts on sustaining one's self are not addressed in the AEE. There is also potential for the CTMP to include provision for pedestrian access along footpaths and roads, as impacts on way of life identified in the SIA included recreational users walking and cycling in the area.

Overall, it is considered that the potential adverse social impacts identified in the Options SIA can be appropriately managed through the mitigation measures proposed in the AEE if these form conditions of that consent. On this basis, the level of assessed impact from the Options SIA are considered to either remain the same, or be less than in the earlier assessment.

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Huia Water Treatment Replacement Plant

Addendum to Stream Ecological Value Plan Prepared for Watercare Services Limited

26 November 2019

Boffa Miskell 🥒



Document Quality Assurance

Bibliographic reference for citation:

Boffa Miskell Limited 2019. *Huia Water Treatment Replacement Plant: Addendum to Stream Ecological Value Plan.* Report prepared by Boffa Miskell Limited for Watercare Services Limited.

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Status: Final	Revision / version: 0	Issue date: 26 November 2019

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Template revision: 20180621 0000

File ref:

U:2016\A16055F_IBo_Huia_Additional_Ecology_Surveys\Documents\Freshwater Assessment\A16055F_ADDENDUM_Stream_Eco_Value_Plan_20191126_FINAL.docx

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1.0 Introduction

1.1 Background

The Huia water treatment plant (WTP), located at the corner of Woodlands Park Road and Manuka Road, is Auckland's third-largest water treatment plant. It treats water from the Upper and Lower Huia Dams and Upper and Lower Nihotupu Dams, comprising almost 20 percent of Auckland's water supply. The plant is nearing the end of its operational life and needs to be replaced.

The replacement water treatment plant is located along Woodlands Park Road in Waima. The proposed replacement of the water treatment plant requires the loss of approximately 53 m of intermittent stream channel within the headwaters of the Yorke Gully Catchment. This stream is referred to as Stream 'Yorke_Project_Intermittent', or the 'Impact' Site (Boffa Miskell 2019).

An Assessment of Ecological Effects for the whole site was prepared by Boffa Miskell in July 2019. A Stream Ecological Valuation Plan was also prepared by Boffa Miskell in July 2019, specifically to address mitigation for the loss of the intermittent stream. Field surveys for the Stream Ecological Valuation Plan were undertaken on 19 October 2017. Subsequent to that document additional field surveys have been undertaken and as a result the Plan needs to be updated. This report herein constitutes an Addendum to the Stream Ecological Valuation Plan.

2.0 Additional Survey Methods

2.1 Stream Ecologival Valuation

Additional ecological assessments, in the form of Stream Ecological Valuation (SEV) surveys, were undertaken at two locations on 22 October 2019. Survey methods utilised are the same as those outlined within Section 2.0 of the Stream Ecological Valuation Plan.

Two additional SEV surveys were undertaken within the Watercare owned site. A repeat SEV survey was undertaken at 'Yorke_Project_Intermittent', or the 'Impact' site. A SEV survey was also undertaken at a new location, 'Armstrong_Daylight' (Figure 1). Both streams are classified as intermittent using the Auckland Unitary Plan Permanence Classifications (AUP; Chapter J). Surveys were undertaken within the recommended season for SEV assessments on intermittent streams of July – October and following two months of winter flows (Auckland Council 2016).





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50 m

Projection: NZGD 2000 New Zealand Transverse Mercator

Site Boundary Extent of Construction Footprint - Permanent Swamp Area

Stream

-- Permanent Piped H Visual Assessment Intermittent

- Ephemeral

ARC Habitat Assessment A16055F HUIA ADDITIONAL ECOLOGY SURVEYS Freshwater: SEV Site Addendum to Stream Ecological Value Plan Date: 26 November 2019 | Revision: 0 Potential Daylighting g Plan prepared by Boffer Miskell Limited Project Manager: lan.Boothroyd@boffamiskell.co.nz | Dan Ay Checked: KMc



3.0 Site History

The Watercare site has a long history of modification. Aerial imagery from the 1940s (Auckland Council Geomaps) show parts of the site cleared for pasture and residential housing across the site. By 1959 the majority of the grassed areas had regenerated to native forest and by 1996 the residential houses had been removed.

The watercourse Yorke_Project_Intermittent and particularly its headwaters, have undergone widespread modifications. A topographic map drawn in 1936 shows the upper reach of the watercourse has been bunded off and is being used as a depository for washwater before a 'Washwater Tank' was constructed. The dam bund and the washwater tank are still present today.

The alignment of the watercourse is also shown (Appendix 1). A washwater outlet and pipe drain (that drains down to Muddy Creek) are shown. During the survey in 2019 the dam bund, washwater tank and associated features were investigated. At some point water within the dam site has breached through the dam wall and down into the intermittent channel, carving out a channel in the dam wall. Above the dam wall the sludge site is flat and is dominated by invasive plant species. The dam site is visible in aerial imagery with the bund clearly visible in 1940, and an infestation of weeds species visible in 2008 (Auckland Council Geomaps; Figure 2).



Aerial imagery of the site is shown in Figure 2 below.

Figure 2: Aerial images of the Watercare site showing land use change and modification from 1940 to the present day. The road visible in the bottom left corner of all images is Manuka Road. The top row is years 1940 and 1959, left to right, respectively. The bottom row is years 1996 and 2000, left to right, respectively (Auckland Council Geomaps).



We understand that a pipe was laid at the time of the bund construction, taking washwater from the site all the way to Muddy Creek.

In addition, we note that the upper reaches of the intermittent stream have been truncated by the construction of Woodland Road. A portion of road stormwater is discharged to Yorke_Project_Intermittent, with the remainder discharged to Armstrong_Manuka_Project stream.

The site history and current configuration of the intermittent stream channel suggests that it is in a highly modified state.

4.0 Impact Site Existing Ecology

4.1 Freshwater Habitat

The freshwater habitat observed at Yorke_Project_Intermittent during the repeat SEV survey was virtually unchanged from the initial SEV survey (Figure 3). Flowing water was present in the lower reaches of the channel and there was more surface water present within the channel.

The average wetted width of the channel was 0.45 m.



Figure 3: Images of Yorke_Project_Intermittent taken during SEV survey undertake on 22 October 2019.

4.2 Stream Ecological Valuation

A full SEV was undertaken during the repeat survey at Yorke_Project_Intermittent, with flowing water at the time allowing all stream attributes to be measured. Some of the SEV function scores recorded in 2019, vary from those recorded during the 2017 survey. Differences in these scores are explained below.

Hydraulic function mean score remained unchanged, with a score of 1.00, the highest possible score.

Biogeochemical function mean score increased from 0.82 (2017) to 0.89 (2019). This small change is a product of an increase in woody debris, leaf litter and roots recorded within the stream channel.

Habitat provision function mean score increased from 0.31 (2017) to 0.43 (2019). This change is a result of the increase in Gobiidae spawning variable as a result of the increase in hard surfaces. The variable phsyhab had a large increase in score as in 2017 only two of the five habitat parameters were able to be completed. A decrease in the length of Galaxiidae spawning habitat present was recorded in 2019, owing to an increased knowledge of the hydrology of the stream and an overestimation in 2017.

Biodiversity function mean score was unable to be calculated for the 2017 survey as there was not sufficient water to undertaken macroinvertebrate sampling or fish surveys.

A full SEV score of 0.76 was calculated and the SEVi-C score (No FFI or IFI) was 0.84 for our 2019 survey. This is higher than the SEVi-C of 0.81 estimated from the 2017 survey.

5.0 Daylighting Channel Existing Ecology

5.1 Freshwater Habitat

The proposed daylighting channel, 'Armstrong_Daylight', is located to the south of Woodlands Park Road and west of Manuka Road, on the upper reaches of the Armstrong Gully and within the existing Watercare site (Figure 1). The headwater of Armstrong_Daylight is referred to as 'Armstrong_Manuka_Project' and is a small intermittent stream channel to the east of Manuka Road (Figure 1).

The stream Armstrong_Daylight' is an intermittent stream that had very low flow at the time of the survey (Figure 4). The upper extent of the reach is an outlet that comes under Manuka Road, and the lower extent is a scruffy dome inlet which contains a large vertical drop. The stream reach contains two piped sections (estimated to be 15 m in length), both of which are perched at their respective downstream outlets. Areas of active erosion were observed and the reach is highly modified in the lower reaches.

The average wetted with of the channel was 0.62 m. The stream bed was predominantly silt/sand with small gravels, small woody debris and an area of exposed bedrock recorded. Leaf litter, roots and undercut banks were also recorded within the channel.

Riparian vegetation was predominantly regenerating native bush with weed species. In the lower reaches of the channel, riparian vegetation is limited to mown grass on the TRB. Shading

was low in the lower reaches of the reach, where riparian vegetation is limited on the TRB, and was moderate – high in the upper reaches. The reach contained large amounts of litter.

Stream banks were typically higher in the upper reaches, up to 1.0 m at culvert outlets, than the lower reaches.



Figure 4: Images of 'Armstrong_Daylight'. Top Row is images from the upper reaches, with regenerating native riparian margins on both TLB and TRB. Bottom Row is the lower reaches, with mown grasses riparian margin on the TRB. 22 October 2019.

5.2 Stream Ecological Valuation

Site 'Armstrong_daylight' was classified as intermittent and at the time of the survey water within the reach was slowly flowing along most of the reach. A full SEV was undertaken including macroinvertebrate community samples and electric fishing. No fish were observed. SEV function mean scores are discussed below.

Hydraulic function mean score scored poorly (0.51) indicating reduced hydraulic functionality. This was largely owing to multiple total fish barriers, areas of channel incision and the straightening of the lower reach.

Biogeochemical function mean scored moderately (0.71). The score was influenced by low shading and reduced riparian margin in the lower reach.

Habitat provision function scored poorly (0.44), largely due to the unsuitability of fish spawning habitat, bot for Galaxiidae and Gobiidae species.

Biodiversity function also scored poorly (0.49), largely driven by the presence of no native fish species. Six EPT taxa were recorded within the reach, including taxa from Ephemeroptera, Plecoptera and Trichoptera.

A full SEV score of 0.57 was calculated and the SEVi-C score (No FFI or IFI) was 0.59.

6.0 Updates to Effects Management

6.1 Introduction

The effects management analysis undertaken within this Addendum follows the same methods as those outlined within Section 5.0 of the Stream Ecological Valuation Plan. There have been updates to the SEVi and SEVm scores following the additional surveys. In particular, the following supersedes Table 4, Table 5 and Table 6 of the Ecological Valuation Plan.

6.2 Stream Diversion

The stream diversion design is as outlined within Section 4.0 of the Stream Ecological Valuation Plan. This includes the creation of an intermittent stream channel with a minimum length of 70 m. The diversion channel will mimic, where practical, the existing stream morphology and will replicate the natural steepness of the site.

At the time of completing this report, further detail of the design of the diversion and the daylighting section of watercourse is in preparation.

6.3 Ecological Compensation and Mitigation

Additional surveys were undertaken on 22 October 2019 and as a result the SEV scores and the ECR calculations have been updated (Table 1; Table 2).

The loss of the intermittent stream is proposed to be compensated for both through the creation of a diversion channel and the daylighting of some currently piped sections of stream.

6.3.1 Diversion Channel

The diversion channel is proposed to account for 76% of the loss of the intermittent stream.

The SEVm-P for the proposed diversion channel returned a score of 0.65. The predicted SEV score for the diversion channel is lower than that of the current channel being lost. The stream diversion design has yet to be finalised and the predicted attribute scores were conservatively estimated. The design of the diversion channel is to mimic the current channel to be lost and this is reflected in the predicted scores. However, the lower SEVm-P is attributable to the prediction of an inflow from the stormwater device, the possibly of a weir-like device within the diversion to maintain water levels, a possible lack of connection between the channel and riparian zone in some sections and the increase in impervious surface within the catchment.

While these factors result in a lower SEV score, it is not predicted that this will result in an actual reduction in ecological functionality.

Assumptions for the predicted scores are provided in Appendix 2.

6.3.2 Daylighting

The option of daylighting channels within the Armstrong_Manuka watercourse has further been investigated and we consider this to be a feasible and important component of the mitigation package. An SEV was undertaken within the Armstrong_Manuka channel, at site Armstrong_daylight. Three sections of the channel are currently piped and are proposed to be daylighted.

The daylighting sections are proposed to account for 31.5% of the loss of the intermittent stream, bringing the outcome to 107%.

The three daylighting sections are located in the headwater of the Armstrong Gully, within the current Watercare site. There are two piped sections, totalling 15 m in length, that are referred to as 'Upper'. A longer 30 m piped section, that is located under the bund of the existing flood bowl wall, is referred to as 'Lower'. The potential scores for these two daylighting sections has been calculated separately, as they are predicted to have some notable differences.

Detailed design of either daylighted channel has not yet been undertaken. When detailed design is undertaken it will seek to replicate the predicted functions herein. Daylighting of the 'Upper' piped sections is expected to be undertaken by removing the in-situ pipe and recreating the channel to connect to the upstream and downstream reaches. The daylighting of the 'Lower' piped section is expected to be undertaken in a similar manner, recreating a channel that will fall naturally into the existing Armstrong gully. Passage for climbing fish species will be provided for.

Assumptions for the predicted scores are in Appendix 2.



Table 1: Current and predicted SEV scores for use in ECR	calculations from surveys
undertaken on 22 October 2019.	

Function	Yorke_Project Intermittent			tion Yorke_Project Proposed Intermittent Diversion			osed rsion	Proposed Daylighting			Proposed Daylighting			
						Up	per	Lov	wer					
	SEVi-C	SEVi-P	SEVi-I	SEVm-C	SEVm-P	SEVm-C	SEVm-P	SEVm-C	SEVm-P					
Natural Flow Regime	1.00	1.00			0.37		1.00		0.71					
Floodplain Effectiveness	1.00	1.00			0.38		0.65		0.47					
Connectivity for natural species migrations	1.00	1.00			1.00	•	1.00		0.30					
Natural connectivity to groundwater	1.00	1.00			0.99		1.00		0.78					
Hydraulic Functions	1.00	1.00			0.76		0.91		0.56					
Water temperature control	0.68	0.68			0.70		0.70		0.50					
Dissolved oxygen levels	1.00	1.00			1.00		1.00		1.00					
Organic matter	1.00	1.00			0.75		0.65		0.50					
Instream particle retention	1.00	1.00			0.96		1.00		0.68					
Decontamination of pollutants	0.79	0.75			0.47		0.63		0.59					
Biogeochemical Functions	0.89	0.89			0.78		0.80		0.65					
Fish Spawning Habitat	0.1	0.05			0.10		0.05		0.50					
Habitat for aquatic fauna	0.75	0.75			0.63		0.71		0.45					
Habitat Provisions Functions	0.43	0.40			0.37		0.38		0.48					
Fish Fauna Intact	-*	-*			-*		-*		-*					
Invertebrate Fauna Intact	-*	-*			-*		-*		-*					
Riparian Vegetation Intact	0.80	0.80			0.13		0.52		0.47					
Biodiversity Provision Functions	0.80	0.80			0.13		0.52		0.47					
SEV Score (No FFI or IFI)	0.84	0.84	0.00	0.00	0.65	0.20	0.74	0.20	0.58					

* - not included in ECR SEV score.

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sງແອເມແດວ	The creation of the diversion channel will mitigate for 75.7% of the loss of the intermittent stream. 76% of impact accounted for.	Daylighting of 15 m of channel will compensate for 13% of the loss of the intermittent stream. 89% of impact accounted for.	Daylighting 30 m of channel will compensate for 13% of the loss of the intermittent stream. 107% of impact accounted for.	
Proportion of impact reach compensated	75.7%	12.6%	18.9%	
Average width of msərte notisenəqmoo	0.5 m	0.47 m	0.5 m	
Length of compensation stream available	70 m 15 m		30 m	
Average width impacted stream		0.45		
Length impact	53 m			
SEVm-P Score	0.65			
ECR	1.93		3.32	
əfi2 noifsgifiM	Diversion Channel	iversion Channel rmstrong_Daylight_Upper		
Impact Site	tnəttim	roject_Intern	Yorke_P	

6.3.3 Time Lag

There is an expected time lag between the loss of the intermittent channel and the creation of the final diversion channel. In the interim a clean water diversion channel will be in place, which will provide some functionality. Where possible, ecological features will be incorporated to provide for some ecological function, but will still feed the downstream catchment during times of intermittent flow.

6.3.4 Summary

The updated SEV scores for Yorke_Project_Intermittent and the confirmation and surveying of the daylighting channels has confirmed that the loss of the intermittent channel can be appropriately mitigated. The creation of the diversion channel and the daylighting of the Armstrong_Daylight_Upper and Armstrong_Daylight_Lower will mitigated and compensate for 107% of the impact of the loss of the intermittent channel.

Further erosion protection measures were proposed within the Stream Ecological Valuation Plan. This is no longer considered necessary following the confirmation of the SEV and ECR scores.

6.4 Summary

The proposed upgrade of the Huia WTP will result in the loss and diversion of approximately 53 m of intermittent stream channel. The diversion of this stream channel will result in the creation of an intermittent stream channel at least 70 m in length and the daylighting of 45 m of piped channel within the upper reaches of the Armstrong gully.

Thus, the overall package encompasses both the creation of the diversion channel to mitigate on-site effects, and the daylighting of a currently piped channel section to provided additional benefit as a compensatory measure.



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Auckland Council (2016). Stream Ecological Valuation: application to intermittent streams. Prepared by Golder Associates (NZ) Limited for Auckland Council. Auckland Council technical report, TR2016/023.



Appendix 1: 1934 Topographic Map





Appendix 2: SEV Assumptions Table



	Yorke_Project	_Intermittent	Pr	oposed Diversion	Proposed Daylighting		
		_			Upper & Lower	Upper	Lower
	SEVi-P	SEVi-I	SEVm-C	SEVm-P	SEVm-C	SEVm-P	SEVm-P
Attribute	Predicted	Predicted	Current value	Predicted value of mitigation	Current value	Predicted value of	Predicted value of
	potential from Restoration	after impact	of mitigation site	site	of mitigation site	mitigation site	mitigation site
Vchann	No change	Stream will be entirely reclaimed.	Currently no stream, so value of 0 applied.	Assume 5% of flow patterns impacted by instream structure	Accepted SEV score of 0.2 applied as it is currently culverted.	Assume natural.	Assume some parts of reach affected by instream structures, some reduction in roughness elements and some natural.
Vlining	No change			Assume 5% of channel lined with permeable lining.		Assume natural.	Assume some impermeable lining, some permeable lining and some natural.
Vpipe	No change			Assume one small pipe <20 cm.		Assume no piped inflows.	Assume no piped inflows.
Vbank	No change			Assume 50 % of flood flows won't reach floodplain.		Assume no restriction.	Assume 50 % of flood flows won't reach floodplain.
Vrough	No change	_		Assume 25% of riparian margin is disturbed or impervious, remainder is regenerating indigenous vegetation in a late stage of succession.		Assume 35% of riparian margin is disturbed or impervious, remainder is regenerating indigenous vegetation in a late stage of succession.	Assume 50% of riparian margin is a mix of short grasses, long grass and mature flax. Remainder is regenerating indigenous vegetation in a late stage of succession.
Vbarr	No change			Assume no barriers.		Assume no barriers.	Assume barrier to swimming species (partial).
Vchanshape	Autopopulated	_		Autopopulated	1	Autopopulated	Autopopulated
Vshade	No change	_		Assume 50% high and 50% moderate shading from riparian planting.		Assume a mix of moderate to high shading	Assume a mix of moderate and low shading
Vdod	No change			Assume optimal.		Assume optimal.	Assume optimal.
Vveloc	No change			Assume the same as those measured at Yorke_Project_intermittent in 2019.		Assume the same as those measured at Armstrong_Daylight in 2019.	Assume the same as those measured at Armstrong_Daylight in 2019.
Vdepth	No change			Assume the same as those measured at Yorke_Project_intermittent in 2019.		Assume the same as those measured at Armstorng_Daylight in 2019.	Assume the same as those measured at Armstrong_Daylight in 2019.
Vripar	No change			Assume 75% of riparian covered in bush.		Assume 65% of riparian covered in trees or bush.	Assume 50% of riparian covered in trees or bush.
Vdecid	No change			Assume deciduous.		Assume deciduous.	Assume deciduous.
Vmacro	No change			Assume no macrophytes.]	Assume no macrophytes.	Assume no macrophytes.
Vretain	Autopopulated	7		Autopopulated]	Autopopulated	Autopopulated
Vsurf	No change			Assume similar to those measured Yorke_Project_intermittent in 2019		Assume similar to those measured at	Assume increase in gravels/s cobbles and



			with less roots, more gravels and cobbles and less wood.	Armstrong_daylight in 2019, with a reduction in roots present	some areas of concrete (bedrock).
Vripfilt	No change		Assume vegetated areas high, unvegetated areas bare or impermeable.	Assume vegetated areas very high, unvegetated areas bare or impermeable.	Assume existing vegetated areas very high, grassed areas very low, low-stature planting low.
Vgalspwn	No change		Assume same low habitat as those measured at Yorke Project intermittent in 2019.	Assume same to those measured at Armstrong daylight in 2019.	Assume no suitable spawning area.
Vgalqual	No change		Assume unsuitable.	Assume unsuitable.	Assume unsuitable.
Vgobspawn	Autopopulated		Autopopulated	Autopopulated	Autopopulated
Vphyshab	No change		Assume a reduction in riparian vegetation integrity.	Assume reduction in riparian vegetation integrity.	Assume reduction in all scores.
Vwaterqual	No change		Assume upper stream shading remains the same.	Assume upper stream shading remains the same.	Assume upper stream shading remains the same.
Vimperv	No change		Assume increase in impervious surface of catchment.	Assume increase in impervious surface of catchment.	Assume increase in impervious surface of catchment.
Vfish	Excluded from model	1	Excluded from model	Excluded from model	Excluded from model
Vmci	Excluded from model	1	Excluded from model	Excluded from model	Excluded from model
Vept	Excluded from model	1	Excluded from model	Excluded from model	Excluded from model
Vinvert	Excluded from model	1	Excluded from model	Excluded from model	Excluded from model
Vripcond	Autopopulated	1	Autopopulated	Autopopulated	Autopopulated
Vripconn	No change		Assume 50% of stream channel not connected.	Assume no impediment.	Assume some impediment.

From:	Carl Tutt
То:	Tracey Grant; Richard Blakey
Subject:	FW: Huia WTP SEV
Date:	Wednesday, 27 November 2019 9:45:09 AM
Attachments:	A16055F SEV intermittent predicted.xls
	A16055F SEV-calculator-intermittent.xls

FYI - Stream SEV spreadsheets attached

From: Katrina McDermott <Katrina.McDermott@boffamiskell.co.nz>
Sent: Wednesday, 27 November 2019 9:44 AM
To: Carl Tutt <carl.tutt@aucklandcouncil.govt.nz>
Subject: RE: Huia WTP SEV

Hi Carl,

Please find attached.

Cheers, Katrina.

From: Carl Tutt <<u>carl.tutt@aucklandcouncil.govt.nz</u>>
Sent: Wednesday, 27 November 2019 9:39 AM
To: Katrina McDermott <<u>Katrina.McDermott@boffamiskell.co.nz</u>>
Subject: Huia WTP SEV
Importance: High

Good Morning Katrina,

Could you please send through any updated/new SEV spreadsheets associated with the latest stream report.

Kind Regards,

Carl Tutt | Ecologist Biodiversity (Central/South) | Infrastructure and Environmental Services

Ph 021 530 472 Auckland Council, Level 2, Bledisloe House, 24 Wellesley Street, Auckland



Visit our website: www.aucklandcouncil.govt.nz

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Stream Ecological Valuation (SEV) Data Analysis spreadsheet V2.2 (July 2012)

Introduction - Read me

The Stream Ecological Valuation (SEV) method (Storey et al, 2011) assesses how well the main ecological functions of a stream reach are being performed. The ecological functions assessed are:

• hydraulic function - processes associated with water storage, movement and transport;

• biogeochemical function - those related to the processing of minerals, particulates and water chemistry;

habitat provision functions – the types, amount and quality of habitats that the stream reach provides for flora and fauna; and
 native biodiversity function – the occurrence of diverse populations of indigenous native plants and animals that would normally be associated with the stream reach.

It incorporates a broad range of physical and biological measures derived from field and desk-top assessment.

This spreadsheet uses an largely automated process for calculating variables used to derive Stream Ecological Values (SEV) for stream reaches. Data is entered from field or labratory sheets. In addition to this spreadsheet, the spreadsheet "Auckland Fish IBI. xls" is used to calculated V_{fish} . The resulting data needs to be entered into the V_{fish} worksheet.

Data for upto 10 test sites and 3 reference sites can be analysed without modification to the spreadsheet.

* Worksheet 2 (Function Scoring) contains the variable scores and final SEV scores for each site.

* Worksheets 3 - 31 contain the calculations for individual variables. Data are entered into these worksheets as instructed, with the blue cells indicating data entry for reference sites and the tan cells indicating data entry for test sites.

By following the instructions in each worksheet, variable scores are automatically calculated and transferred to the appropriate cell in the Function Scoring worksheet. Each worksheet is set up with reference sites first, followed by test sites. It is important that data are entered into the appropriate cell for a designated site. Site names/numbers are automatically transferred to all worksheets following initial entry into the Function Scoring sheet.

The user is referred to Storey et al (2011) for background information as to how the method was derived and the basis for the algorithms used.

As a first step, it's probably a good idea to make a copy of this database.

For comments and guidance on this spreadsheet please contact Dr Richard Storey at r.storey@niwa.co.nz

SEV scores for stream reaches

This worksheet calculates the final scores for each function, the sum of all scores (ranging between 0 and 14), and the overall mean SEV score (ranging between 0 and 1), for each site. The final scores are located at the bottom of the table. Reference site values derived from other studies are also presented.

Instructions: Enter the site number or name into the tan cells. No other data entry is required on this worksheet.

Date			Test sites										Reference sites			Mean values for	Mear	
Function category	Report Function Worksheet # Vari	iable (code)	SEVi-C S	EV day S	iEVi-P S	EVmday	SEVmdiv- S	EVmday[OOWN-P				Site	name/num	iber	e sites	values for reference sites	values for referenc
	Vcha Vlinir Vpip	ann ng ie	1.00 1.00 1.00	0.46 0.90 1.00	1.00 1.00 1.00	1.00 1.00 1.00	0.96 0.98 0.70	0.69 0.74 1.00	0.69 0.00 enter data	0.00 0.00 enter data		#DIV/0	e sites #DIV/0!					
Hydraulic	4.1 NFR	=	1.00	0.61	1.00	1.00	0.67	0.71	#VALUE!		#DIV/0	#DIV/01						
	Vrou	ıgh	1.00	0.88	1.00	0.65	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0: #DIV/0!
Hydraulic	4.2 FLE	=	1.00	0.65	1.00	0.65	0.38	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Hydraulic	4.3 CSM	=	1.00	0.00	1.00	1.00	1.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
	Vcha	anshape	1.00	0.59	1.00	1.00	1.00	0.85	0.85	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Hydraulic	4.4 CGW	=	1.00	0.80	1.00	1.00	0.99	0.74	0.28	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
	Hydraulic fund	ction mean score	1.00	0.51	1.00	0.91	0.76	0.56	#VALUE!		#DIV/0	#DIV/0!						
	Vsha	ade	0.68	0.40	0.68	0.70	0.70	0.50	#DIV/0!		#DIV/0	#DIV/0!						
biogeochemical	4.5 WIC	= d	1.00	1.00	1.00	1.00	1.00	1.00	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/01 #DIV/01	#DIV/01 #DIV/01	#DIV/01 #DIV/01	#DIV/01 #DIV/01	#DIV/01 #DIV/01		#DIV/0 #DIV/0	#DIV/0! #DIV/0!
biogeochemical	4.6 DOM	=	1.00	1.00	1.00	1.00	1.00	1.00	#DIV/0!		#DIV/0	#DIV/0!						
	Vripa	ar cid	1.00	0.85	1.00	0.65	0.75	0.50	0.00 #DIV/01		#DIV/0 #DIV/0	#DIV/0! #DIV/01						
biogeochemical	4.7 OMI	=	1.00	0.85	1.00	0.65	0.75	0.50	#DIV/0!		#DIV/0	#DIV/0!						
	Vma	acro	1.00	0.99	1.00	1.00	1.00	1.00	#DIV/0!		#DIV/0	#DIV/0!						
biogeochemical	4.8 IPR	=	1.00	0.52	1.00	1.00	0.90	0.08	#DIV/0!		#DIV/0	#DIV/0!						
	Vsur	rf ev	0.78	0.69	0.69	0.62	0.35	0.52	#DIV/0!		#DIV/0	#DIV/0!						
biogeochemical	4.9 DOP	nit =	0.80	0.88	0.80	0.65	0.60	0.66	#DIV/0!		#DIV/0	#DIV/0!						
_	Biogeochemical fund	ction mean score	0.89	0.71	0.89	0.80	0.78	0.65	#DIV/0!		#DIV/0	#REF!						
	Vgal	spwn	0.40	0.44	0.40	0.44	0.40	0.00	#DIV/0!		#DIV/0	#DIV/0!						
	Vgot	lqual bspwn	0.00	0.25	0.00	0.00	0.00	1.00	#DIV/0!		#DIV/0	#DIV/0! #DIV/0!						
habitat provision	4.10 FSH	=	0.10	0.10	0.05	0.05	0.10	0.50	#DIV/0!		#DIV/0	#DIV/0!						
	Vphy Vwat	yshab Itgual	0.74	0.86 0.70	0.74	0.84 0.85	0.69	0.63	0.00 #DIV/0!		#DIV/0 #DIV/0	#DIV/0! #DIV/0!						
	Vimp	perv	0.70	0.70	0.70	0.30	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
habitat provision	4.11 HAF	=	0.75	0.78	0.75	0.71	0.63	0.45	#DIV/0!		#DIV/0.	#DIV/0!						
	Habitat provision fund	ction mean score	0.43	0.44	0.40	0.38	0.37	0.48	#DIV/0!		#DIV/0	#DIV/0!						
Biodiversity	4 12 FEI	י =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Diodiversity	Vmc	si	0.63	0.74	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
	Vept	t	0.23	1.00 #	#VALUE! ;	#VALUE!	#VALUE! :	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#DIV/0	#DIV/0!
Biodiversity	4.13 IFI	=	0.71	0.82	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0 #DIV/0	#DIV/0!
	Vripo	cond	0.80	0.70	0.80	0.52	0.60	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Biodiversity	4.14 RVI	conn =	1.00 0.80	0.90	1.00 0.80	1.00 0.52	0.21 0.13	0.90	#VALUE!	#VALUE!	#VALUE!	#VALUE! #VALUE!	#VALUE!	#VALUE!	#VALUE! #VALUE!		#DIV/0	#DIV/0! #DIV/0!
	Biodiversity fund	ction mean score	0.44	0.49	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#REF!
Overall mean SEV score (maximum value 1)			0.760	0.570	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!		#DIV/0	#DIV/01						

HAVE YOU ENTERED DATA IN ALL WORKSHEETS?

HAVE YOU ENTERED DATA IN ALL WORKSHEETS?

* see Storey et al (2011) for further details

Date				Test sites Site name/number										Reference sites			Mean values for	Mean	value
Function category	Report	Function	Worksheet # Variable (code)	SEVI-C SI	EV day	SEVi-P	SEVmday	SEVmdiv-	SEVmday	DOWN-P							e sites	values for reference	for referenc
	section*		Vchann Vlining	1.00 1.00	0.46 0.90	1.00 1.00	1.00 1.00	0.96 0.98	0.69 0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	e sites #DIV/01
the description		NED.	Vpipe	1.00	1.00	1.00	1.00	0.70	1.00	enter data	enter data	enter data	enter data	enter data	enter data	enter data		4011 (A)	400/AL
Hydraulic	4.1	NPK	Vbank	1.00	0.61	1.00	1.00	0.67	0.60	D 00	0.00	D 00	D 00	BVALUE:	0.00	#VALUE		#DIV/0	#DIV/0
			Vrough	1.00	0.88	1.00	0.65	0.75	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Hydraulic	4.2	FLE		1.00	0.65	1.00	0.65	0.38	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Undersolie	4.2	0.014	Vbarr	1.00	0.00	1.00	1.00	1.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/01	#DIV/0!
Hydradiic	4.3	Com	Vchanshape	1.00	0.59	1.00	1.00	1.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/01
			Vlining	1.00	0.90	1.00	1.00	0.98	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Hydraulic	4.4	CGW	-	1.00	0.80	1.00	1.00	0.99	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
			Hydraulic function mean score	1.00	0.51	1.00	0.91	0.76	0.56	#DIV/01	#DIV/01	#DM/01	#DIV/01	#DM/01	#DM/01	#DIV/01		#DIV/0	#DIV/0!
biogeochemical	4.5	WTC	=	0.68	0.40	0.68	0.70	0.70	0.50	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
			Vdod	1.00	1.00	1.00	1.00	1.00	1.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!
biogeochemical	4.6	DOM	-	1.00	1.00	1.00	1.00	1.00	1.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01		WDIV/0	#DIV/0!
			Vripar	1.00	0.85	1.00	0.65	0.75	0.50	0.00 #DIV/01	0.00 #DIV/01	0.00 #DM/01	0.00 #DIV/01	0.00 #DM/01	0.00 #DM/01	0.00 #DIV/01		#DIV/0	#DIV/0!
biogeochemical	4.7	OMI	=	1.00	0.85	1.00	0.65	0.75	0.50	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
			Vmacro	1.00	0.99	1.00	1.00	1.00	1.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
			Vretain	1.00	0.52	1.00	1.00	0.96	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
biogeochemical	4.8	IPR	= Mauf	1.00	0.52	1.00	1.00	0.96	0.68	#DIV/0!	#DIV/0!	#DIV/01	#DIV/01	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
			Vripfilt	0.80	0.88	0.80	0.65	0.60	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#010/01	#DIV/0:
biogeochemical	4.9	DOP		0.79	0.79	0.75	0.63	0.47	0.59	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/03		WDIV/0	WDIV/0!
			Biogeochemical function mean score	0.89	0.71	0.89	0.80	0.78	0.65	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/01	#REF!
			Vgalspwn	0.40	0.44	0.40	0.44	0.40	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01		#DIV/0	#DIV/0
			Vgobspwn	0.00	0.10	0.00	0.00	0.00	1.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0
habitat provision	4.10	FSH		0.10	0.10	0.05	0.05	0.10	0.50	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01		WDIV/0	#DIV/0!
			Vphyshab	0.74	0.86	0.74	0.84	0.69	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
			Viennerv	0.84	0.70	0.84	0.85	0.85	0.25	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0	#DIV/0!	#UIV/U		#DIV/0	#DIV/0
habitat provision	4.11	HAF	-	0.75	0.78	0.75	0.71	0.63	0.45	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01		WDIV/0	WDIV/0!
		1	Habitat provision function mean score	0.43	0.44	0.40	0.38	0.37	0.48	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	WDIV/0		WDIV/01	NDIV/0!
		_	Vfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
Biodiversity	4.12	FFI	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		WDIV/0	WDIV/0!
			Vmci	0.63	0.74	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01		#DIV/0	#DIV/0
			Vinvert	0.23	0.82	#VALUE:	#VALUE:	1.00	1.00	#VALUE:	1.00	1.00	#VALUE:	#VALUE:	#VALUE:	#VALUE:		#DIV/0	#DIV/0
Biodiversity	4.13	IFI	100 C	0.52	0.85	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	WDIV/0!
			Vripcond	0.80	0.70	0.80	0.52	0.60	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
Biodiversity	4.14	DVI.	Vripconn	1.00	0.90	1.00	1.00	0.21	0.90	#VALUE!	#VALUÉ!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#DIV/0	#DIV/0
ciouverany'	4,14	NU	Biodiversity function mean score	0.44	0.49	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0		#DIV/0	#BIVIO
Overall mean SEV score (maximum value 1)				0.760	0.570	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		WDIV/0	#DIV/0!

SEV (Minus FFI, IFI)

 0.84
 0.59
 0.84
 0.74
 0.85
 0.58

 SEV.C
 SEV.Hot
 <td

For each site enter the data for the relevant variable from the field blue (reference site) or tan (test site) cells. Site is will be automatically transferred from the Function Scoring ores will be automatically calculated and transferred to the ng worksheet.


Viinin

Instructions: For each site enter the data for the relevant variable from the field sheet into the blue (reference site) or ta (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be



<u>├</u>───└───

\mathbf{V}_{pipe}

Instructions: For each site enter data for the relevant variable from field sheet in the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be

Site	Size and number of stormwater pipes or mole/tile drains (1=none; 2=one <20cm diam; 3=several or >20cm diam)	V_{pipe}
Reference Sites		
Site name/Number (upto 3)		
0		enter data
0		enter data
0		enter data
Test Sites		
Site name/Number (upto 10)		
SEVi-C	1.00	1
SEV day	1.00	1
SEVi-P	1.00	1
SEVmdayUP-P	1.00	1
SEVmdiv-P	2.00	0.7
SEVmdayDOWN-P	1.00	1
0		enter data

V_{bani}

• saw Instructions: For each sile enter the data for the relevant variable from the field sheet into the blue (reference site) or tan (rest site) cells. Site nameshumbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheat



Vmosh between the standard standard did for the velocity version from the field sheet into the balance (instruments didle) are then standard standards with the automatically transformed from the Function Storing worksheet. Concern will be automatically calculated and standards to the the function Storing worksheet.

		1 m m						1																			
		Reference	a Sites					Test Shi	85																		
Ets name/Kumber				•				anv c		BBV day		1007		HVeday/P-P		100mde P		11Veday00W						•		•	
Description	Weighting (W)	Proportion (P) of barries covered (D-1)	Baars (WuP)	Proportion (P) of banks covered (2-1)	Bases (Wal ^p)	Proportion (P) of banks covered (D-1)	Bases (Walf)	Proportion (P of barries covered (2-1)	Bases (Well)	Proportion (P) of banks covered (2-1)	Baars (WuP)	Proportion (P) of banks covered (0-1)	Baars (Wal ^p)	Proportion (P) of banks covered (0-1)	Bases (Wal ^p)	Proportion (P) of banks covered (2-1)	Baars (WaP)	Proportion (P) of banks covered (2-1)	Bases (Walf)	Proportion (P) of barries covered (D-1)	Bases (Wal ^p)	Proportion (P) of banks covered (2-1)	Bases (Wal ^p)	Proportion (P) of banks covered (2-1)	Basers (Wal ^a)	Proportion (P) of banks covered (2-1)	Bases (WuP)
Rature independence regelation with diverse canoor and under divery			•								•																
Representing indipension separation in late slape of excorectors.			•		•		•		1	0.85	0.85		1	0.60	0.45	0.75	0.79	0.0	0.8		•		•		•		
Natural, diverse welland vegetation on banks			•		•		•		•				•		•		•						•		•		
Mature native trees but damaged under storey	6.6						0																				
Mature exalts trees (e.g. willows or plantation feasit	6.7				•																						
Low diversity regenerating both with dock excluded OK for each charter in Text			•		•		•		•		•						•		•						•		
Mature Sax, tono oranges and orders Low severely representating some with			•		•		•				•		•		•		0	0.2	0.3		•		•		•		
Early dage reducation planting CR Short-earlie struke (< 2m) CR			•		•		•				•		•				0								•		
Materia long organized ergand or mowell	6.6																	0.1	0.05								
Gazed wellands	6.2						0																				
Mainly shart grasses	6.2		•				•		•	0.15	0.03		•		•			0.2	0.04		•		•		•		
Disturbed have soll or artificial surfaces.			•				•		•		•		•	0.35	•	0.28					•		•		•		
Vnumh		0		0		0			1 1	1	6.88	1	1	1	6.65	1	6.78		6.79	0		0		0		0	
		Red call + sum	greater than maximum	· Fail call + aut	creater than maximu	m Red cell + sum o	creater that maximum	n Red cell + se	in creater than maximum	Fiel cell + sum		n Red call + sum		n Red call + sum		Field Call - Barry P		Find only - name		to Red call + sum		Red cell + sum		n Red call + sum		n Red call + sum	

V_{barr}

Instructions: For each site enter data for the relevant variable from the field sheet into the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.

Site	Barriers (No=1, Partial=2, Total=3)	V _{barr}
Reference Sites		
Site name/Number (upto 3)		
0		0
0		0
0		0
Test Sites		
Site name/Number (upto 10)		
SEVi-C	1	1
SEV day	3	0
SEVi-P	1	1
SEVmdayUP-P	1	1
SEVmdiv-P	1	1
SEVmdayDOWN-P	2	0.3
0		0
0		0
0		0
0		0

V_{chanshape}

Instructions: For each site onter data for the relevant variable from field sheet into the blue (reference all(s) or in the statistic data fasts names.burthers will be automatically namefree from the Frection Society weakheed. Society the automatically variable and transferred to the Frection Society weakheet. Taly Vahade categories from the fieldsheet and enter under appropriate category below.

site) or Lan (test site) cel worksheet. Scores will be auto Vshade categories from the fi	lls. Site names/num lomatically calculate fieldsheet and enter	bers will be d and tran under app	sferred b ropriate o	ically tr o the Fi ategor	ansferred fro unction Scori y below.	m the Fu ng worksi	nction Sco neet. Tally	ing																					
		Reference	e Sites (up	nto 3)						Test Sites (up	o to 10)																		
Shading description	Weighting (W)	0 Frequenc "total" ro	(F: yon Wx	,	0 Frequency (F; "total" row on	WxF	0 Freque "total"	cy(F; ow on WxF		SEVI-C Frequency (F; "total" row on	WxF	SEV day Frequency (F; "total" row on V	x.F	SEVI-P Frequency (F; "total"	W x F	SEVindayUP-P Frequency (F; "total" row on	WxF	SEVindy-P Frequency (F; "total" row on	WxF	SEVindayDOV Frequency (F; "total" row	W x F	0 Frequency (F; "total" row on	W x F	0 Frequency (F; "total" row on	W x F	0 Frequency (F Total' row or	WxF	0 Frequency (F; "total" row on	W x F
Very high shading, shading from wegetation and topographical features > 90%		1		٥		0			0		0		٥		٥		٥		٥		0		٥		0		•		•
High shading: shading from vegetation and lopographical features 71 - 90%	0.			٥		۰			0		3.2	2	1.6		3.2	•	4	5	4		٥		٥		•		•		۰
Moderate shading: shading from wgetstion and lopographical features 51 - 20%	0.	6		0		0			0	6	3.6	1	0.6		3.6	5	3	5	3	5	3		٥		0		٥		•
Low shading shading from vegetation and lopographical features 31 - 50%	0.	4		٥		•			•		0	2	0.8		٥		0		٥	5	2		۰		•		•		•
Very low shading: shading from vegetation and topographical features 11, 30%	0.	2		٥		0			0		0	5	1		٥		٥		٥		0		٥		٥		٥		•
No effective shading: shading from vegetation and topographical features = 10%		•		٥		•			•		٥		۰		۰		0		۰		•		۰		•		•		•
aum of	f F (+number of transects V _{shade} = sum(W x F) / 1	0	0 #0	N/01		#DIV/01		0 FDM/	-	10	0.65	10	0.4	10	0.65	10	6.7	10	0.7	10	0.5		#DN/D		#DN/D		NDM DI		econo:
		Row 15 ci	ds stay red	unless 1	0 transects enter	ed																							

\mathbf{V}_{dod}

Instructions: For each site enter data for the relevant variable from the field sheet into the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.

Site	Status (optimal=1, sub- optimal=2, marginal=3, poor=4)	V _{dod (initial)}	S/Z	C (correction factor)	V _{dod} (corrected)	Vdod (final)
Reference Sites						
Site name/Number (upto 3)						
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Test Sites						
Site name/Number (upto 10)					-	
SEVi-C	1.00	1	#NUM!	#NUM!	#NUM!	1.00
SEV day	1.00	1	#NUM!	#NUM!	#NUM!	1.00
SEVi-P	1.00	1	#NUM!	#NUM!	#NUM!	1.00
SEVmdayUP-P	1.00	1	#NUM!	#NUM!	#NUM!	1.00
SEVmdiv-P	1.00	1	#NUM!	#NUM!	#NUM!	1.00
SEVmdayDOWN-P	1.00	1	#NUM!	#NUM!	#NUM!	1.00
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

V Datastas Pere Data (Mancas Isan Januar Ina Is Isan Januar Ina Isa	nde vile seder 7 121 jar 100 jar Paradam Baaring Louisen Baaring	e dala he he straat () wik Diesa ig antahesi Door antahesi	untakin bun Be merchanskens all will be automatio	latii shawi isin la Lier askee alicelly ally salusialed as																																							
Management	Reterence	Titles for to 21	1		T T		_	T T	_	test 2	perior in 12			100.00				w			-			Million of			-	-															
Terrari Latitar	-	:	-	Į	:	-	Į			2	::	·*****	-	ţ			1	1	-	<u>×.</u>	1	:	ii iir	1	1		11	: ::::	2	5	3		1	ţ		-	35	. : :::::	17. mayor		~ • m		-
	and an even of the local	and states of a	v	ene m.e	distants also	~	eter dist	Anna 1873	CH .	aller that	dinis.	ava.		and and past	and streams of	**			Arres 1	**		ana a	ane v	400 m	Acres 1			-	ana 14				Ý	diam'r	-	**	-	- ann	and the				
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		-	86.0			80.0			80.8										1				1		•			1	-	1			80.0			80.0			80.0	-			2002
	-	-			-	-		-								_						-			_	_		_				_			_				_	_	_	_	-
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T DESCRIPTION OF			2010			200			202				A.4							2.0			2010		_	201				2010			810			2010		-			_	_	-
																																											_

V_{depth}

Instructions: For each site enter the depth (in metres) from the field sheet into the bit (inferences site) or tim (inst site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Vaew scores will be automatically calculated and transferred to the Function Scoring worksheet.

Reference Sites (upto	3)				
	True left				True right
County With					
Cross section#% of channel width	10	10	50	70	90
cross sections is or channel whith	14		3	10	~
1					
10					10110
sean at each point	PC/CPU1	POWO	RCKWGI	PLIVICE	#UNIO
Mean across all points (Z_)	#UKV/01				
Vinit	#01/101				
	True left				True right
Denthilite					
Cross section#% of channel width	10	10	50	70	90
1					-
2					
ŝ					
Manager at a state statist	100.00	403/07	100.00	400.000	ADA.ON
Reall at each point	PLANNA -	Pointo	PLANNA -	Parrie	There are a second seco
Nean across all points (Z_)	ADIA.01				
Vent	#D0//01				
	True left				True right
Depth/Site					
Cross section#% of channel width	10	30	50	70	90
1					
2					
3					
4					
5					
6					
7					
10					
Mean at each point	#D0/01	#DM/07	#D0/01	#DM/Df	405/07
	400000				
Mean across all points (Z_)	activity:				





Instructions: For each site enter data for the relevant variable from the field sheet into the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.

Site	Proportion of riparian zone covered in trees or bushes (20m either side of stream) (0 - 1)	
Reference Sites		
Site name/Number (upto 3)		
0		
0		
0		
Test Sites		-
Site name/Number (upto 10)		
SEVi-C	1	
SEV day	0.85	
SEVi-P	1	
SEVmdayUP-P	0.65	
SEVmdiv-P	0.75	
SEVmdayDOWN-P	0.5	
0		
0		
0		
0		

$\mathbf{V}_{\text{decid}}$

Instructions: For each site enter data for the relevant variable from field sheet into the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.

	R	eferenc	e Sites (u	pto 3)	Test Site	es (upto 10	D)							
Cross section#/site		0	0	0	SEVi-C	SEV day	SEVi-P	SEVmday	SEVmdiv-	SEVmdayl	0	0	0	0
	1				1	1	1	1	1	1				
	2				1	1	1	1	1	1				
	3				1	1	1	1	1	1				
	4				1	1	1	1	1	1				
	5				1	1	1	1	1	1				
	6				1	1	1	1	1	1				
	7				1	1	1	1	1	1				
	8				1	1	1	1	1	1				
	9				1	1	1	1	1	1				
1	0				1	1	1	1	1	1				
V _{decid} = Mean	#	#DIV/0!	#DIV/0!	#DIV/0!	1	1	1	1	1	1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Proportion of canopy cover that is NOT deciduous

Red cell: value greater than maximum allowed. Must enter values between 0 and 1.

V_{macro}

Instructions: For each site enter data for the relevant variable from field sheet into the blue (reference site) or tan (test site) cells.

	Referenc	e Sites (upto	3)				1	Test Site	es (upto 1	10)																					
Cross section#/site	0		0			0		SEVI-C			SEV day		SEV	VI-P		SEVmday	P-P		SEVmdiv-P		SEVmday	DOWN-P)		0		0			0
	surface-		surface-		surfac	e-		surface-			surface-		surf	face-		surface-			surface-		surface-		surface-		surfa	e-		surface-		surface-	
	reachingle	below-	reaching/e	below-	reach	ng/e below-		reaching/	e below-		reaching/e	below-	rear	ching/e I	below -	reaching/e	below -		reaching/e bel	- WC	reaching/	e below-	reaching/e	below-	reach	ng/e below-		reaching/e	below-	reachingi	e below-
	mergent/b	surface	mergent/b	surface	merge	nt/b surface		mergent/l	b surface		mergent/b	surface	mer	rgent/b :	surface	mergent/b	surface		mergent/b sur	face	mergentil	o surface	mergent/b	surface	merg	nt/b surfac	8	mergent/b	surface	mergentil	b surface
	anksirio		anksiria	1 1	anksi	lo .		ankcirla		0	anksido		ank	osido	0	anksida		_	anksido		ankskla		ankskie		anksi	6	_	ankside		anksida	
		_			_				0	0	0.15	0		0	0	0	0	-	0	0		0 0			_	_	_	-	++	_	_
							-		0	0	0	0		0	0	0	0		0	0		0 0						-		-	
									0	0	0	0		0	0	0	0		0	0		0 0								-	
									0	0	0	0		0	0	0	0		0	0		0 0								-	
									0	0	0	ō		0	0	Ö	ō		ō	0		0 0								-	
	7								0	0	0	0		0	0	0	0		0	0		0 0								-	
	3								0	0	0	0		0	0	0	0		0	0		0 0									
	9								0	0	0			0	0	0	0		0	0		0 0									
1									0	0	0	0		0	0	0	0		0	0		0 0									
number of transects surveyed								1	0 1	0	10	10		10	10	10	10		10	10	1	0 10									
mea	#DIV/01	#DIV/0!	#D(V/0!	#D(V/0!	#DI	//01 #DIV/01			0	0	0.015	0		0	0	0	0		0	0		0 0	#DIV/01	#DIV/08	#DI	//0! #DIV	101	#DIV/0!	#DIV/01	#DIV/0!	#D(V/0!
weightin	1	0.5	1	0.5		1 0.5	i l		1 0.	5	1	0.5		1	0.5	1	0.5		1	0.5		1 0.5		0.5		1 0	0.5	1	0.5		1 0.5
v	1	#DIV/0!	1	#DIV/01	1	#DIV/01	1			1		0.985			1		1			1		1		#DIV/01		#D(V	101		#DIV/01		#D(V/0!

Blue or tan cell turns red: value greater than maximum allowed. Must enter values between 0 and 1. Vinacro cell turns red: surface-reaching + below-surface macrophyte cover must not be >1 on any transect

V_{retain}



Vriofilt Instructions: For each sile enter data for the relevant variable from field sheet into the blue (reference sile) or tan (lest sile) cells. Sile namesinumbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the function. Scoring worksheet.

		0	ies (apio 3)	0		0		SEVI-C		SEV DBY		SEV-P	-	SEVITORY UP-P	-	SEVINOV-P	-	SEVINGIOUN	PP	U U			_			0	
Description	Weighting (W)	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	W x P	Proportion of channel (P)	WxP	Proportion of channel (P)	W x P	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	W x P	Proportion of channel (P)	NxP
Any high filtering activity. Dense ground cover egelation or thick organic litter layer under canopy; ND run-off into stream diffuse, with no defined trainage channels; AND width of buffer greater than for channel with			٥		0		٥		٥	0.0	5 0.85		۰	0.65	0.65		0	0.5	0.5		٥		٥		٥		٥
Sigh filtering activity. Dense ground cowr wegetation or thick organic litter layer under canopy; AND run- off into stream diffuse, with only minor defined trainage channels, AND/CR width of buffer +5x hawnal unith.	0.0		٥		0		٥	1	0.8		۰	,	0.8		0	0.75	0.5		٥		٥		٥		0		0
Ibdensis filtering activity. Uniform-ground cover sepatistion or abundant organic litter under canopy; ND run-off into stream mostly diffuse, with few stifned drainage channels.	0.6		0		0		٥		•		۰		٥		٥		۰		٥		۰		۰		۰		٥
Low filtering activity. Patchy ground cower wegetation or title organic titler layer under canopy, AND/OR some run-off into stream in amail defined drainage chamela.	0.4		0		0		٥		0		•		٥		0		٥	0.3	0.12		٥		٥		•		0
Very low filtering activity. Short (mown or grazed) sepatistics, with high soil compaction; AND/CR run- of into stream mostly contained in small defined foringe channels.	0.2		0		0		0		0	0.1	5 0.03		٥		0		0	0.2	0.04		٥		0		•		0
to filtering activity; banks bare or impermeable.	٠		0		٥		0		٥		0		0	0.35	٥	0.25	٥		٥		٥		٥		0		0
	sum of P V _{rists} = sum(W x P)				0		0	1	0.0		1 0.00	1	0.0	1	0.65	1	0.6	1	0.65	0	٠	0	۰	0	۰	0	۰

$\mathbf{V}_{\text{galspwn}}$

Instructions: For each site enter data for the relevant variable from the field sheet into the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.

Reference Sit	tes	
Site name/Number	0	Length of spawning habitat (m
	Length of near-flat (slope<10°) (m) (Lb)	
	Length of reach (m) (Ls)	
	R	#DIV/0
	V galspwn	#DIV/0
Site name/Number	0	Length of spawning habitat (m
	Length of near-flat (slope<10°)	
	(m) (Lb) Length of reach (m) (Ls)	
	R	#DIV/0
	V _{galspwn}	#DIV/0
Site name/Number	0	Length of spawning habitat (m
	Length of near-flat (slope<10°)	
	(m) (Lb) Length of reach (m) (Ls)	
	R	#DIV/0!
	V _{galspwn}	#DIV/0
Inc. a	Test Sites	
Site name/Number	SEVI-C	Length of spawning habitat (m)
	(m) (Lb)	5
	Length of reach (m) (Ls)	50.00
	Vasionum	0.4
	- gaispwii	
Site name/Number	SEV day	Length of spawning habitat (m
	Length of near-flat (slope<10°) (m) (Lb)	10
	Length of reach (m) (Ls)	80.00
	R	0.06
	Vgalspwn	0.4375
Site name/Number	SEVi-P	Length of spawning habitat (m)
	Length of near-flat (slope<10°)	5
	Length of reach (m) (Ls)	50.00
	R	0.05
	V _{galspwn}	0.4
Site name/Number	SEVmdayUP-P	Length of spawning habitat (m)
•	Length of near-flat (slope<10°)	10
	(m) (Lb) Length of reach (m) (Ls)	80.00
	R	0.06
	V _{galspwn}	0.4375
Site name/Number	SEVmdiv-P	I enoth of snawning habitat (m
one numeritamber	Length of near-flat (slope<10°)	Length of spawning habitat (in
	(m) (Lb)	50.00
	R	0.05
	V _{galspwn}	0.4
Cite name/Normhan		l
Site name/Number	Length of near-flat (slope<10°)	Length of spawning habitat (m
	(m) (Lb)	50.00
	R	0.00
	Vgalspwn	0
I		
Site name/Number	0	Length of spawning habitat (m)
	(m) (Lb)	
	Length of reach (m) (Ls) R	#DIV/0
	V _{galsown}	#DIV/0
	gaopini	
Site name/Number	0	Length of spawning habitat (m)
	(m) (Lb)	
	Length of reach (m) (Ls)	#DIV/0
	Vasionum	#DIV/0
	- gaispwii	
Site name/Number	0	Length of spawning habitat (m)
	Length of near-flat (slope<10 [°]) (m) (Lb)	
	Length of reach (m) (Ls)	
	к V	#DIV/0
	♥ galspwn	#DIV/0
Site name/Number	0	Length of spawning habitat (m)
	Length of near-flat (slope<10°)	
	Length of reach (m) (Ls)	
	R	#DIV/0
	Vgalspwn	#DIV/0



Instructions: For each site enter data for the relevant variable from the field sheet into the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.

Site	Quality of fish spawning habitat (High=1, medium=2, low=3, unsuitable=4)	$V_{galqual}$
Reference Sites		
Site name/Number (upto 3)		
0		0
0		0
0		0
Test Sites		
Site name/Number (upto 10)		
SEVi-C	4.00	0
SEV day	3.00	0.25
SEVi-P	4.00	0
SEVmdayUP-P	4.00	0
SEVmdiv-P	4.00	0
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$\mathbf{V}_{\mathsf{physhab}}$

Instructions: This measure requires comparison with the mean value for Auckland State of Environment reference sites. If using in a place where Auckland SoE sites are not relevant, copy the mean of your reference sites (cell B14) to B15. Site names/numbers will be automatically transferred from the Function Scoring worksheet. $V_{physhab}$ scores will be automatically calculated and transferred to the Function Scoring worksheet.

	Referenc	e Sites (u	oto 3)	Test Site	s (upto 10)							
Habitat Parameter/Site name or number	0	0	0	SEVi-C	SEV day	SEVi-P	SEVmday	SEVmdiv-	SEVmday	0	0	0	0
Aquatic Habitat Diversity				11	17	11	17	11	9				
Aquatic Habitat Abundance				11	15	11	15	11	11				
Hydrologic Heterogeneity				10	16	10	16	10	11				
Channel Shade				15	14	15	14	15	12				
Riparian Vegetation Integrity (sum of both banks)				16	12	16	10	12	11				
H (sum/100)	0	0	0	0.63	0.74	0.63	0.72	0.59	0.54	0	0	0	0
Mean of reference sites	0			_									
Mean of Auckland SoE reference sites	0.86												
V _{physhab}	0.00	0.00	0.00	0.74	0.86	0.74	0.84	0.69	0.63	0.00	0.00	0.00	0.00

If using this spreadsheet outside of Auckland you will need to insert the average of the reference sites (found in cell B14) into cell B15.

V_{watqual}

Instructions: For each site enter data for the relevant variable from field sheet in the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.

Site	Reference S	ites (upto	3)	Test Sites (upto 10)								
	0	0	0	SEVi-C	SEV day	SEVi-P	SEVmdayL	SEVmdiv-	SEVmdayl	0	0	0	0
V_{dod} (DOM) (transferred directly from V_{dod} worksheet)	#DIV/0!	#DIV/0!	#DIV/0!	1.00	1.00	1.00	1.00	1.00	1.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
V _{shade} (transferred directly from V _{shade} worksheet)	#DIV/0!	#DIV/0!	#DIV/0!	0.68	0.4	0.68	0.7	0.7	0.5	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
S (Well = 1, Partial = 2, Minimal =3, No = 4)				1	1	1	1	1					
S	0	0	0	1	1	1	1	1	0	0	0	0	0
V _{watqual}	#DIV/0!	#DIV/0!	#DIV/0!	0.84	0.70	0.84	0.85	0.85	0.25	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

$\mathbf{V}_{\text{imperv}}$

Instructions: For each site follow steps 1, 2 and 3 below and enter final V_{imperv} value into the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.

Steps to follow

1	Determine % imperviousness for site	Calculate using GIS or similar for % of catchment area upstream of survey site that has impervious surfaces
2	Determine level of upstream flood control	Use table below to define level of control (high, medium or low). High control includes flow attenuation devices, such as grass swales and stormwater management structures
3	Determine V _{imperv} from Vimperv values table below	Determine from table below as the combination of % imperviousness and extent of flood flow controls. Enter this value into the the data table (V _{imperv})

% of catchment above site	V _{impe}	_{rv} values	i
that is impervious	Flood flow and fir	st flush run	off controls
	High (much control)	Medium	Low (no control)
0%	1.0	1.0	1.0
<10%	0.9	0.8	0.7
10-25%	0.5	0.4	0.3
>25%	0.3	0.2	0.1

Site	V _{imperv}
Reference Sites	
Site name/Number (upto 3)	
0	
0	
0	
Test Sites	
Site name/Number (upto 10)	
SEVi-C	0.7
SEV day	0.7
SEVi-P	0.7
SEVmdayUP-P	0.3
SEVmdiv-P	0.3
SEVmdayDOWN-P	0.3
0	
0	
0	

Red cell = value greater than maximum allowed (which is 1.0)

\mathbf{V}_{fish}

Instructions: Enter fish presence data into the Excel spreadsheet "Auckland Fish IBI.xls" (Joy and Henderson, 2004) and calculate IBI score. Copy IBI scores into the blue (reference site) or tan (test site) cells in this worksheet. Site names/numbers will be automatically transferred from the Function Scoring worksheet. V_{fish} scores will be calculated automatically and transferred into the Function Scoring worksheet.

	Fish IBI scores (from Auckland Fish IBI.xls)													
	Reference	e Sites (upto	3)	Test Site	s (upto 10)								
Site	0	0	0	SEVi-C	EVi-C SEV day SEVi-P SEVmday SEVmdiv- SEVmday 0 0									
IBI score				0	0	0								
V _{fish}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	



Nativelasis. For each all enter presence laborance addit (order "1⁴ for presence) from the maximum that all back table to the holes (order manual of the order of the order

708

V_{ept}

Instructions: No data entry is required. The number of EPT taxa will be automatically calculated from the data entered into V_{mci} . Scores are adjusted relative to mean reference EPT numbers from Auckland State of Environment reference sites. V_{ept} scores are automatically transferred to the Function Scoring worksheet. Site names/numbers will be automatically transferred from the Function Scoring worksheet.

	Reference	e Sites (up	to 3)	Test Sites	s (upto 10)									
Site name or number	0	0	0	SEVi-C	SEV day	SEVi-P	EVmdayUP	SEVmdiv-P	/mdayDOW	0	0	0	0	
Ephemeroptera	0	0	0	0	2	0	0	0	0	0	0	0	0	1
Plecoptera	0	0	0	0	1	0	0	0	0	0	0	0	0	
Trichoptera	0	0	0	1	3	0	0	0	0	0	0	0	0	
EPT richness	0	0	0	1	6	0	0	0	0	0	0	0	0	
Mean reference # EPT	or soft-botto	hard or soft	hard or soft	4.4	4.4	hard or sof	t hard or soft	hard or soft	hard or soft	hard or sof	t hard or soft	hard or soft	hard or soft	-bottomed?
V _{ept}	#VALUE!	#VALUE!	#VALUE!	0.227273	1	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	

Number of EPT taxa

Vripcond

Instructions: No data entry required (data are automatically transferred from the corresponding cells in Vchann)

		Reference 5	iites (up	to 3)					Test Sites (u	pto 10)																							
		0		0			0		SEVI-C		SEV day		SEVI-			SEVmdayl	IP-P	527	Vmdiv-P		SEVmdayD	WN-P	0			0			0		0		
Description	Weighting (W)	Proportion W	I x P	Propo	etic W x P		Proportic W x P		Propertien c	WxP	Proportion	WxP	Propo	tion (W x F	۰ e	Proportion	c W x P	Pro	oportion (W	V x P	Proportion	WxP	Proporti	on (WxP		Proportion	c W x P		Proportion (V	I x P	Pro	partien c W	хP
Mature indigenous vegetation with diverse canopy and under above:	1	0	0		0	0	0 0	0	0	0	0	0		٥	0		0		٥	0	0	0		0	0			D	0	0		٥	0
Regenerating indigenous vegetation in late stage of surressaires	0.5	0	0		0	0	0 0	0	1	0.8	0.85	0.68		1	0.8	0.62	0.52		0.75	0.6	0.5	0.4		0	0			0	0	0		0	0
Natural disease wellend constalion on hanks	0.5	0	0		0	0	0 0	0	0	0	0	0		0	0		0		0	0	0	0		0	0	0	E 4		0	0		0	
Mature native trees had classes of content of the	0.7	0	0		0	0	0 0	0	0	0	0	0		0	0		0			0	0	0		0	0		U		0			0	
Mature exotic trees (e.g. willows or plantation freest)	0.7	0	0		0	0	0 0	0	0	0	0	0		0	0		0		•	0	0	0		0	0			D	0	0		٥	0
Regenerating bush, low diversity. (e.g., manuka acrub) or high exotic shrubs. Stock excluded	0.6	0	0		0	0	0 0	•	0	0	0	0		•	0				0	0	0	0		0	۰			o	0	0		0	0
Mature fax long grasses and sectors	0.4	0	0		0	0	0 0	0	0	0	0	0		0	0		0		0	0	0.2	0.08		0	0	0		0	0			0	
Regenerating bush (e.g., manuka scrub) with stock access, or early stage restoration planting, or low exotic strubs (+2 m high) or immature plantation forest	0.3	0	0		0	٥	0 0	0	0	0	0	0		0	0	0			٥	٥	0	0		0	٥	c		•	0	0		0	
Mainly long grass (not graited or group)	0.2	0	0		0	0	0 0	0	0	0	0	0		0	0		0		0	0	0.1	0.02		0	0	0		D	0	0		0	
Graned welland venetation on hanks	0.2	0	0		0	0	0 0	0	0	0	0	0		0	0		0		0	0	0	0		0	0	0	-	0	0	0		0	-
Mainly short crass (craited or most)	0.1	0	0		0	0	0 0	0	0	0	0.15	0.015		0	0		0		0	0	0.2	0.02		0	0	0	-	0	0	0		0	-
Disturbed bare soils or artificial surfaces	0	0	0		0	0	0 0	0	0	0	0	0		0	0	0.35	0		0.25	0	0	0		0	0	0		D	0	0		0	
	sum of P	۰_		_	0		0		1		1			1					1		1			0		6			0			0	_
	V _{riscand} = sum(W x P)		0			0		•	L	0.8		0.695			0.8		0.52			0.6		0.52			٥			0		0			

$\mathbf{V}_{\text{invert}}$

Instructions: For each site, enter presence/absence of high conservation-value species (koura and kakahi) - enter "1" for presence. For other invertebrate species, presence/absence data will be automattically transferred from the Vmci worksheet.

What sampl bottomed =	ing method wa SB, hard-botto	Table 1 is used? Soft- imed = HB	Referenc 0 0	e Sites (u 0 0	pto 3) 0	Test Sites SEVI-C SB	SEV day	SEVi-P	SEVmday	SEVmdiv	SEVmday	0	0	0	0	% occurrence in Auckland INTERMITTEN reference sites
Koura (freshwate Kakahi (freshwate	er crayfish) present? er mussels) present?					N N	N N									
														_		
Ephemeroptera	Leptophlebiidae	Arachnocolus	0	0	0	0	0		0	0	0	0	0	0	0	90
Ephemeroptera	Leptophiebiidae	Геракіа	0	0	0	0	0		0	0	0	0	0	0	0	90
Trichoptera	Leptoceridae	I riplectides	0	0	0	0	0		0	0	0	0	0	0	0	70
Dintora	Chironomidae	Tanunodinae	0	0	0	1	1			0	0	0	0	0	0	70
Diptera	Dividae	Paradiya + Divid pupae	0	0	0		1			0	0	0	0	0	0	50
Crustacea	Amphipoda	Paralentamphonus	0	0	0	1	1			0	0	0	0	0	0	60
Crustacea	Amphipoda	Talitridae	Ő	Ő	Ő	1	0		o o	0	0	0	ő	0	ő	
Crustacea	Decapoda	Paranephrops	0	0	0	Ó	0		0 0	0	0	0	0	0	0	
Crustacea	Decapoda	Paratva	0	0	0	0	0) (0 0	0	0	0	0	0	0	
Ephemeroptera	Leptophlebiidae	Zephlebia	0	0	0	0	1		0 0	0	0	0	0	0	0	100
Diptera	Chironomidae	Polypedilum	0	0	0	0	0) (0 0	0	0	0	0	0	0	50
Mollusca	Gastropoda	Potamopyrgus	0	0	0	1	1		0 0	0	0	0	0	0	0	80
										-						100
Oligochaeta			0	0	0	1	1		0 0	0	0	0	0	0	0	100
Acarina			0	0	0	1	0		0	0	0	0	0	0	0	70
Collembola	Landardalah Balan	A south as blable	0	0	0	1	1		0	0	0	0	0	0	0	50
Ephemeroptera	Leptophiebiidae	Acanthophiebia	0	0	0	0	0			0		0	0	0	U	
Trichontera	Concesucidae	Olinga	0	0	0	0	0			0	0	0	0	0	0	
Trichoptera	Heliconsychidae	Helicopsyche	0	0	0	0	0			0	0	0	0	0	ů 0	
Trichoptera	Hvdrobiosidae	Costachorema	Ő	0	0	0	0		0 0	0	0	0	0	0	0	
Trichoptera	Hydrobiosidae	Hydrobiosis	0	0	0	0	1		0 0	0	0	0	0	0	0	
Trichoptera	Hydrobiosidae	Psilochorema	0	0	0	0	0) (0 0	0	0	0	0	0	0	
Trichoptera	Hydropsychidae	Orthopsyche	0	0	0	0	0) (0 0	0	0	0	0	0	0	
Trichoptera	Philopotamidae	Hydrobiosella	0	0	0	0	0) (0 0	0	0	0	0	0	0	
Plecoptera	Austroperlidae	Austroperla	0	0	0	0	0) (0 0	0	0	0	0	0	0	
Plecoptera	Eustheniidae	Stenoperla	0	0	0	0	0) (0 0	0	0	0	0	0	0	
Plecoptera	Gripopterygidae	Megaleptoperia	0	0	0	0	0		0	0	0	0	0	0	0	
Piecoptera	Gripopterygidae	Zelandopena	0	0	0	0	0			0		0	0	0	U	
Coleoptera	Hydraenidae		0	0	0	0	0			0	0	0	0	0	0	
Coleoptera	Ptilodactylidae		0	0	0	0	0			0	0	0	0	0	0	
Dintera	Chironomidae	Orthocladiinae (incl. Corvnone	0	0	0	0	0		0	0	0	0	0	0	0	50
Diptera	Chironomidae	Tanvtarsini	ů ů	0	0	0	0		0 0	i õ	0	0	0	0	0	60
Diptera	Simuliidae	Austrosimulium	Ő	0	0	0	0		0 0	0	0	0	0	0	0	
Diptera	Tipulidae	Aphrophila	0	0	0	1	0) (0 0	0	0	0	0	0	0	
Megaloptera		Archichauliodes	0	0	0	0	0) (0 0	0	0	0	0	0	0	
Mollusca	Gastropoda	Latia	0	0	0	0	0) (0 0	0	0	0	0	0	0	
	Intermittent	# of taxa	0	0	0	7	8	3 (0 0	0	0	0	0	0	0	9.8
		# of taxa	0	0	0	7	8	3 (0 0	0	0	0	0	0	0	
		Vinvert (raw) Vinvert (final)	FALSE 1	FALSE 1	FALSE	0.71428571 0.71428571	0.816327 0.816327	FALSE	FALSE	FALSE 1	FALSE 1	FALSE 1	FALSE	FALSE 1	FALSE	

Presence/absence macroinvertebrate data (from Vmci)

0

$V_{ripconn}$

Instructions: For each site enter data for the relevant variable from the field sheet into the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.

Site	Proportion of stream channel where stream channel NOT impeded (0 - 1)	Effects of stormwater pipes or drains bypassing riparian zone	Vripconn	
Reference Sites				
Site name/Number (upto 3)				
0		enter data	#VALUE!	
0		enter data	#VALUE!	
0		enter data	#VALUE!	
Test Sites				
Site name/Number (upto 10)				
SEVi-C	1.00	1	1.00	
SEV day	0.90	1	0.90	
SEVi-P	1.00	1	1.00	
SEVmdayUP-P	1.00	1	1.00	
SEVmdiv-P	0.25	0.7	0.21	
SEVmdayDOWN-P	0.90	1	0.90	
0		enter data	#VALUE!	
0		enter data	#VALUE!	
0		enter data	#VALUE!	
0		enter data	#VALUE!	

Stream Ecological Valuation (SEV) Data Analysis spreadsheet V2.2 (July 2012)

Introduction - Read me

The Stream Ecological Valuation (SEV) method (Storey et al, 2011) assesses how well the main ecological functions of a stream reach are being performed. The ecological functions assessed are:

• hydraulic function - processes associated with water storage, movement and transport;

• biogeochemical function - those related to the processing of minerals, particulates and water chemistry;

habitat provision functions – the types, amount and quality of habitats that the stream reach provides for flora and fauna; and
native biodiversity function – the occurrence of diverse populations of indigenous native plants and animals that would normally be associated with the stream reach.

It incorporates a broad range of physical and biological measures derived from field and desk-top assessment.

This spreadsheet uses an largely automated process for calculating variables used to derive Stream Ecological Values (SEV) for stream reaches. Data is entered from field or labratory sheets. In addition to this spreadsheet, the spreadsheet "Auckland Fish IBI. xls" is used to calculated V_{fish} . The resulting data needs to be entered into the V_{fish} worksheet.

Data for upto 10 test sites and 3 reference sites can be analysed without modification to the spreadsheet.

* Worksheet 2 (Function Scoring) contains the variable scores and final SEV scores for each site.

* Worksheets 3 - 31 contain the calculations for individual variables. Data are entered into these worksheets as instructed, with the blue cells indicating data entry for reference sites and the tan cells indicating data entry for test sites.

By following the instructions in each worksheet, variable scores are automatically calculated and transferred to the appropriate cell in the Function Scoring worksheet. Each worksheet is set up with reference sites first, followed by test sites. It is important that data are entered into the appropriate cell for a designated site. Site names/numbers are automatically transferred to all worksheets following initial entry into the Function Scoring sheet.

The user is referred to Storey et al (2011) for background information as to how the method was derived and the basis for the algorithms used.

As a first step, it's probably a good idea to make a copy of this database.

For comments and guidance on this spreadsheet please contact Dr Richard Storey at r.storey@niwa.co.nz

SEV scores for stream reaches

This worksheet calculates the final scores for each function, the sum of all scores (ranging between 0 and 14), and the overall mean SEV score (ranging between 0 and 1), for each site. The final scores are located at the bottom of the table. Reference site values derived from other studies are also presented.

Instructions: Enter the site number or name into the tan cells. No other data entry is required on this worksheet.

Date						Test	sites					Ref	erence si	ites	Mean values for	Моа	mean
						Site name	/number					Site	name/num	nber	referenc e sites	values fo	, values
Function category	Report Function Worksheet # \ section*	Variable (code)	York_imp A	rmstrong_Daylight												reference sites	referenc
		Vchann	1.00	0.46 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	# sites #DIV/0!
		Viining Vpipe	1.00	1.00 enter data	enter data	enter data	enter data	enter data	0.00 enter data ei	nter data	0.00 enter data	enter data	enter data	enter data			
Hydraulic	4.1 NFR	=	1.00	0.61 #VALUE	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE! #	VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#DIV/0	#DIV/01
		Vrough	1.00	0.88 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0 #DIV/0	#DIV/0!
Hydraulic	4.2 FLE	=	1.00	0.65 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Hydraulic	4.3 CSM	=	1.00	0.00 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/01
		Vchanshape Vlining	1.00	0.59 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Hydraulic	4.4 CGW	=	1.00	0.80 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/01
	Hydraulic	function mean score	1.00	0.51 #VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE! #	VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#DIV/0	#DIV/0!
hissoshamiaal		Vshade	0.68	0.40 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
biogeochemical	4.5 WIC	- Vdod	1.00	1.00 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01		#DIV/0 #DIV/0	#DIV/01 #DIV/01
biogeochemical	4.6 DOM	=	1.00	1.00 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0 #DIV/0	#DIV/0!
	X	Vdecid	1.00	1.00 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0 #DIV/0	#DIV/0!
biogeochemical	4.7 OMI	=	1.00	0.85 #DIV/0	#DIV/01	#DIV/01	#DIV/01	#DIV/01	#DIV/0!	#DIV/01	#DIV/01	#DIV/0!	#DIV/0!	#DIV/01		#DIV/0 #DIV/0	#DIV/0!
	X	Vretain	1.00	0.52 0.00	#D10/0! 0.00	0.00	0.00	0.00	0.00	#D10/0!	0.00	0.00	0.00	#DIV/0		#DIV/0 #DIV/0	#DIV/0!
biogeochemical	4.8 IPR	=	1.00	0.52 #DIV/0	#DIV/01	#DIV/01	#DIV/01	#DIV/01	#DIV/0!	#DIV/01	#DIV/01	#DIV/0!	#DIV/0!	#DIV/01		#DIV/0 #DIV/0	#DIV/0!
		Vripfilt	0.80	0.88 0.00	#DIV/0!	0.00	0.00	0.00	0.00	#D10/0!	0.00	0.00	0.00	#DIV/0		#51010	#010/0
biogeochemical	4.9 DOP	=	0.79	0.79 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
	Biogeochemical	function mean score	0.89	0.71 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#REF!
		Vgalspwn Vgalgual	0.40	0.44 #DIV/0! 0.25 0.00	#DIV/0! 0.00	#DIV/0! 0.00	#DIV/0! 0.00	#DIV/0! 0.00	#DIV/0! 0.00	#DIV/0! 0.00	#DIV/0! 0.00	#DIV/0! 0.00	#DIV/0! 0.00	#DIV/0! 0.00		#DIV/0 #DIV/0	#DIV/0! #DIV/0!
	V	Vgobspwn	0.20	0.10 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
habitat provision	4.10 FSH	= Vphyshab	0.10	0.10 #DIV/0! 0.86 0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0! 0.00		#DIV/0 #DIV/0	#DIV/0! #DIV/0!
	No.	Vwatqual	0.84	0.70 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
habitat provision	4.11 HAF	Vimperv =	0.70	0.70 0.00 0.78 #DIV/0!	#DIV/0!	0.00 #DIV/0!	#DIV/0!	#DIV/0!	0.00 #DIV/0!	#DIV/0!	0.00 #DIV/0!	#DIV/0!	#DIV/0!	0.00 #DIV/0!		#DIV/0 #DIV/0	#DIV/0!
	Habitat provision	function mean score	0.43	0.44 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
Diadiueraitu	4.43	Vfish	0.00	0.00 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Biodiversity	4:12 FFI	= Vmci	0.63	0.74 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0 #DIV/0	#DIV/0! #DIV/0!
	, in the second s	Vept	0.23	1.00 #VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE! #	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#DIV/0	#DIV/0!
Biodiversity	4.13 IFI	=	0.71	0.82 1.00 0.85 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0 #DIV/0	#DIV/0!
Biodiversity	4.14 RVi	Vripcond Vripconn =	0.80 1.00 0.80	0.70 0.00 0.90 #VALUE! 0.63 #VALUE!	0.00 #VALUE! #VALUE!	0.00 #VALUE! #VALUE!	0.00 #VALUE! #VALUE!	0.00 #VALUE! #VALUE!	0.00 #VALUE! # #VALUE! #	0.00 #VALUE! #VALUE!	0.00 #VALUE! #VALUE!	0.00 #VALUE! #VALUE!	0.00 #VALUE! #VALUE!	0.00 #VALUE! #VALUE!		#DIV/0 #DIV/0 #DIV/0	#DIV/0! #DIV/0! #DIV/0!
	Biodiversity	function mean score	0.44	0.49 #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#REF!
Overall mean SEV score (maximum value 1)			0.760	0.570 #VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE! #	VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#DIV/0	#DIV/0!

HAVE YOU ENTERED DATA IN ALL WORKSHEETS?

HAVE YOU ENTERED DATA IN ALL WORKSHEETS?

* see Storey et al (2011) for further details

Date									Test Site name	sites 2/number					Ref	erence s	sites mber	Mean values for referenc	Mean	values
Function category	Report	Function	Worksheet # Variable	e (code)	York_imp A	rmstrong	_Daylight											e sites	values for reference sites	for referenc
	section		Vchann		1.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	e sites #DIV/0!
			Vlining		1.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Undersulie		NED	Vpipe		1.00	1.00	enter data	enter data	enter data	enter data	enter data	enter data	enter data	enter data	enter data	enter data	enter data		#DI3/(8)	#DI)//01
Hydraulic	4.1	NEK	Vbank	<u> </u>	1.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0
			Vrough		1.00	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Hydraulic	4.2	FLE		10 C	1.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
Undersulie	4.2	0.014	Vbarr		1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/01	#DIV/0!
Hydraulic	4.3	CSM	Vchansh	ape	1.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0:
			Vlining		1.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Hydraulic	4.4	CGW			1.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
			Hydraulic function	n mean score	1.00	0.51	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		WDIV/0	#DIV/0!
hisasshamiaal		WITC	vsnade	_	0.68	0.40	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0
biogeocrienical	4.0	WIC	Vdod		1.00	1.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01	#DIV/0!	#DIV/01	#DIV/0!	#DIV/01		#DIV/0	#DIV/0!
biogeochemical	4.6	DOM		- C.	1.00	1.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		WDIV/0	#DIV/0!
			Vripar		1.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
hisasshamiaal	47	011	Vdecid	_	1.00	1.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
biogeochemical	4.1	UMI	Vmacro		1.00	0.99	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01	#DIV/01	#DIV/01	#DIV/01	#DIV/01		#DIV/0	#DIV/0
			Vretain		1.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
biogeochemical	4.8	IPR		10 C	1.00	0.52	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
			Vsurf		0.78	0.69	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!
biogeochemical	4.9	DOP	wriping		0.80	0.88	#DIV/01		#DIV/01	#DIV/01	#DIV/01	#DIV/01	#DIV/01	#DIV/01	#DIV/01	#DIV/01	#DIV/01		#DIV/01	#DIV/01
			Biogeochemical function	n mean score	0.89	0.71	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#REF!
			Vgalspwr	1	0.40	0.44	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!
			Vgalqual		0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
habitat provision	4 10	ESH	Vgobspw	n	0.20	0.10	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/01	#DIV/01	#DIV/01	#DIV/0!	#DIV/01		#DIV/0	#DIV/0
habitat provision	4.10	1011	Vohvshal	-	0.74	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0	#DIV/0!
			Vwatqual	1	0.84	0.70	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
			Vimperv		0.70	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
habitat provision	4.11	HAF			0.75	0.78	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	WDIV/0!	#DIV/0!	WDIV/0!	#DIV/0!	#DIV/0!		WDIV/0	#DIV/0!
		,	labitat provision function	mean score	0.43	0.44	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		WDIV/0	WDIV/0!
			Vfish		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
Biodiversity	4.12	FFL		1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		WDIV/0	WDIV/0!
			Vmci		0.63	0.74	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0	#DIV/0!
			Virwert		0.23	0.82	#VALUE:	1 00	1 00	1 00	1 00	1 00	1 00	#VALUE:	#VALUE:	1 00	#VALUE:		#DIV/0	#DIV/0
Biodiversity	4.13	IFI		10 C	0.52	0.85	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	NDIV/01	#DIV/01	#DIV/0!	#DIV/0!	NDIV/0!		WDIV/0	NDIV/01
			Vripcond		0.80	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		#DIV/0!	#DIV/0!
Biodiversity	4.44	D14	Vripconn		1.00	0.90	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#DIV/0	#DIV/0!
biouiversity	4.14	RVI	Biodiversity function	mean score	0.44	0.49	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/01	#DIV/0!	#DIV/01	#DIV/01	#DIV/01		#DIV/0	#DIV/0:
Overall mean SEV score (maximum value 1)			0.760	0.570	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		wDIV/0	#DIV/0!		

SEV (Minus FFI, IFI) 0.84 0.59

V_{char}

metruellone: For each site enter the data for the relevant variable from the field wheel into the blue (reference site) or law (test site) eetas. Site ameshimmbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the "unicidin Scoring worksheet."



Viinin

Instructions: For each site enter the data for the relevant variable from the field sheet into the blue (reference site) or ta (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be



|----I

\mathbf{V}_{pipe}

Instructions: For each site enter data for the relevant variable from field sheet in the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be

Site	Size and number of stormwater pipes or mole/tile drains (1=none; 2=one <20cm diam; 3=several or >20cm diam)	V_{pipe}
Reference Sites		
Site name/Number (upto 3)		
0		enter data
0		enter data
0		enter data
Test Sites		
Site name/Number (upto 10)		
York_impact	1.00	1
Armstrong_Daylight	1.00	1
0		enter data
V_{bani}

• saw Instructions: For each sile enter the data for the relevant variable from the field sheet into the blue (reference site) or tan (rest site) cells. Site nameshumbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheat



Refer State Tet State	4 Proposition (P) of latenta convent (01)
Answer Answer <th>e Proposition (P) of lateria commit (01)</th>	e Proposition (P) of lateria commit (01)
And And <th>Proportion (P) of banks Boore (WuP) covered (9.1)</th>	Proportion (P) of banks Boore (WuP) covered (9.1)
Maximum 1 Image: State of the state o	
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Heid i an entir ha nation Heid i an entir ha	

V_{barr}

Site	Barriers (No=1, Partial=2, Total=3)	V _{barr}
Reference Sites		
Site name/Number (upto 3)		
0		0
0		0
0		0
Test Sites		
Site name/Number (upto 10)		
York_impact	1	1
Armstrong_Daylight	3	0
0		0
0		0
0		0
0		0
0		0
0		0
0		0
0		0

V_{chanshape} Instructions: No data entry re

cubic Reference Single Reference Single Image: Single Sing

V_{shade}

The **Bortuctions:** For each site enter data for the relevant variable from field when two the **Dist (reference** giftig) of the **Time (reference)**. Site names humbers will be automatically transformed from the Function Scoreg worksheet. Scoreg worksheet. Taly Valued categories from the feisbheet and enter under appropriate category below.

	Reference	Sites (upto 3)					7	Test Sites (up	to 10)																		
Shading description Weighting (W)	0 Frequency () "Sotal" row o	w xF	0 Frequency "total" rov	(F: on WxF	0 Frequency Total Tree	(F) on WxF		York_impact Frequency (F; "total" row on	WxF	Armstrong_Day Frequency (F; "total" row on	/6ght W x F	0 Frequency (F; "total"	W x F	0 Frequency (F; "total" row on	WxF	0 Frequency (F; "total" row on	WxF	0 Frequency (F; "total" row	WxF	0 Frequency (F; "total" row or	WxF	0 Frequency (F; "total" row on	W x F	0 Frequency (F; "total" row on	W x F	0 Frequency (F; "total" row on	W x F
Very high shading; shading from wegebtion and topographical features > 90%	1	0		ÿ		0			٥		٥		٥		٥		٥		0		٥		٥		0		•
High shading: shading from vegetation and topographical features 71 - 90%	0.8	٥		4				4	3.2	2	1.6		۰		•		۰		٥		٥		٥		٥		۰
Moderate shading: shading from wegebilion and topographical features 51 - 20%	0.6	0		ŝ		0		6	3.6	4	0.6		٥		٥		٥		0		٥		٥		0		•
Low shading shading from vegetation and topographical features 31 - 50%	0.4	0		4		0			0	2	0.8		•		•		•		۰		•		۰		•		•
Very low shading; shading from wegetation and topographical features (1, 10%)	0.2	0		4		4			٥	5	1		٥		٥		٥		0		٥		٥		0		•
No effective shading: shading from vegetation and lopographical features = 10%	•	۰		4		0			0		۰		•		٥		•		٥		•		٥		٥		•
sum of F (+number of transe V _{shelle} = sum(W x F)	cts) / 10	ectivitit		#DIV/SI		6 #D1//01	1	10	0.65	10	0.4		#DIVID:		#DM/0		#Dividi		#DIVID		401/12		101/10		(DMD)	0	(COVID)

\mathbf{V}_{dod}

Site	Status (optimal=1, sub- optimal=2, marginal=3, poor=4)	V _{dod (initial)}	S/Z	C (correction factor)	V _{dod} (corrected)	Vdod (final)
Reference Sites						
Site name/Number (upto 3)						
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Test Sites						
Site name/Number (upto 10)					-	
York_impact	1.00	1	#NUM!	#NUM!	#NUM!	1.00
Armstrong_Daylight	1.00	1	#NUM!	#NUM!	#NUM!	1.00
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0		0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

V Instructions for biographics in the basedword from its basedword in the	and a list sole (124) at 125 • Fundion Ecol	The data to the set of the setter is ring unstatured is representations.	rani antalis hun h in saras huniars t mes all in adena	e bii sheei i ii ke askeral indy shalab	tin Ber Boally Manual																																											
Management of	Rataran						-	a al					10 12) 					<u>-</u>	-	22.0	- ===	<u>•~</u> ••			= <u>-</u>	Ĩ	17.1	: ===	: <u>~</u>		<u>.</u>	222	in mary	1		12. T	~	::	100 L		1	; =		-	22	==	a 127.	
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		15	100		15		100		-	-	-			-		-	-	-			-											_	-		1					-				-		_	_	-

V_{depth}

Reference Sites (upto	3)				
	Your laft				Texas similar
Consulta Miles	-				noe nga
Course constituently of observed width		10		70	
cross sections of or channel would	14	30	30	10	~
(
;					
10 Manager at a stable station	400.00	403.005	400.00	404/04	404.00
weather watch public		U	PL-190		#6400
Mean across all points (Z_)	#CIV.0:				
V	#U///01				
	True left				True right
Depth/Site	0				
Cross section#7% of channel width	10	30	50	70	90
1					
2					
3					
4					
5					
6					
7					
9					
10					
Mean at each point	#D0//01	#DN/01	#D0//01	#DM/01	#DM/01
Mean arrows all points (Z.)	#D(V/0)				
v	#00/0/				
1 deals					
	I FUE HERT				irue right
ue parvone					
uross sections/>, of channel width	10	30	50	70	90
-					
2					
3					
4					
6					
1					
10					10110
wean at each point	#U/M01	PU/VOI	#U/M01	PUNO!	#U///01
Mean across all points (Z_)	#DIV/01				





Site	Proportion of riparian zone covered in trees or bushes (20m either side of stream) (0 - 1)	
Reference Sites		
Site name/Number (upto 3)		
0		
0		
0		
Test Sites		
Site name/Number (upto 10)		_
York_impact	1	
Armstrong_Daylight	0.85	
0		
0		
0		
0		
0		
0		
0		
0		

$\mathbf{V}_{\text{decid}}$

Instructions: For each site enter data for the relevant variable from field sheet into the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.



Proportion of canopy cover that is NOT deciduous

Red cell: value greater than maximum allowed. Must enter values between 0 and 1.

V_{macro}

Instructions: For each site enter data for the relevant variable from field sheet into the blue (reference site) or lan (test site) cells.

	Referen	ce Sites (upto 3						Test Site	es (upto	10)																							
Cross section#/site		0		0)	York imp	act		Armstron	g Dayli	ght	1			0			0			0		0			0		0		0	J
	surface-			surface-			surface-		surface-			surface-			surface-		s	urface-		surf	ice-		surface-		surface			surface-		surfa	ace-		surface-	
	reaching	le below-		reaching/e	below-		reaching/e	below-	reachingi	e below-		reaching	e belov	V-	reaching/e	below-	re	eaching/e	below -	read	hing/e belo	W-	reaching	e below-	reachin	g/e below		reaching/	below-	reac	hingle be	low-	reaching/e	below -
	mergent	b surface		mergent/b	surface		mergent/b	surface	mergenti	b surface	8	mergent/	b surfa	00	mergent/b	surface	п	nergent/b	surface	mer	ent/b surfa	909	mergent	b surface	merger	t/b surfac	•	mergentit	surface	merg	,ent/b su	irface	mergent/b	surface
	anksirio			anksiria		-	anksido		ankcirla	-1	-	anksido	-	-	anksirio		а	nksirla		ank	kie	_	ankskla		anksiri	_	_	ankside		anks	.ide		anksiria	
		_								0	0	0.1	5	0										_		_								
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	-	-	-			-		-	 	0	0		0	0		-						_		-		_	_		-					-
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1	0									0	0		0	0																				-
number of transects surveyed									1	o ·	10	1	0	10																				
mea	#DIV/0	1 #DW/I	M	#D(V/0!	#D(V/0!		#DIV/01	#DIV/01		0	0	0.01	5	0	#DIV/0!	#D(V/0!		#DIV/0!	#D(V/0!	#1	IV/01 #D	10/VI	#DIV/0	#D(V/0!	#DIV	DI #DIV	101	#DIV/0!	#D(V/0!	#D	(V/0! #	#DIV/01	#DIV/0!	#D(V/0!
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Varan		#DIV/I	н		#DIV/01			#DIV/01			1		0	.985		#D(V/0!			#D(V/0!		#D	10/VI		#D(V/0!		#DIV	101		#D(V/01		1	#DIV/01		#D(V/0!

V_{retain}



Vriofilt

		Reference Si	tes (upto 3						Test Sites (up	to 10)																		
		•		•			•		Tork_impact		Armatrong_u	Yoğra																
Description	Weighting (W)	Proportion of channel (P)	WxP	Proport channel	ion of v (P) v	V x P	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP	Proportion of channel (P)	WxP
Very high filtering activity. Dense ground cover wegetation or thick organic litter layer under canopy; AND nun-off into stream diffuse, with no defined draimage channels; AND width of buffer greater than for channel with.	,		٥			٥		0		٥	0.8	0.05		٥		0		0		0		٥		٥		٥		۰
High filtering activity. Dense ground cowr wegetation or thick organic litter layer under canopy; AND nav- off into atream diffuee, with only minor defined drainage channels, AND/CR width of buffer <5x rhannel actiffs.	0.1		٥			٥		٥	1	0.8		۰		٥		0		٥		٥		٥		٥		٥		0
Moderate filtering activity. Uniform ground cover wgeblion or abundant organic litter under canopy; AND run-off into stream mobil, diffused with few defined drainage chamela.	0.0		•			٥		٥		٥		•		۰		٥		•		۰		۰		۰		۰		۰
Low filtering activity. Patchy ground cover vegetation or title organic littler layer under canopy; AAD/OR some run-off into stream in small defined drainage channels.	8.4		٥			٥		0		0		٥		٥		۰		•		٥		٥		٥		٥		0
Very low filtering activity. Short (moven or grazed) wegetation, with high soil compaction; ANDICR nun- of into stream mostly contained in amail defined distings channels.	0.3		٥			٥		0		0	0.11	0.03		0		0		0		0		٥		٥		٥		٥
No fillering activity; banks bare or impermeable.			0			٥		0		٥		0		0		٥		0		0		٥		٥		٥		٥
	sum of P V _{rists} = sum(W x P)				٥	٥		0	· ·	0.0		0.00	0	۰	0	•	0	۰	0	٥	0	۰	0	۰	0	۰		, s

$\mathbf{V}_{\text{galspwn}}$

Reference Si	tes	
Site name/Number	0	Length of spawning habitat (m)
	Length of near-flat (slope<10°) (m) (Lb)	
	Length of reach (m) (Ls)	
	R	#DIV/0
	V galspwn	#DIV/0
Site name/Number	0	Length of spawning habitat (m)
	Length of near-flat (slope<10°)	
	(m) (Lb) Length of reach (m) (Ls)	
	R	#DIV/0!
	Vgalspwn	#DIV/0!
Site name/Number	0	Length of snawning habitat (m)
one numeritumber	Length of near-flat (slope<10°)	Length of Spawning habitat (iii)
	(m) (Lb)	
	Length of reach (m) (Ls) R	#DIV/0
	V _{galsown}	#DIV/0!
	3	
	Test Sites	
Site name/Number	York_impact	Length of spawning habitat (m)
	Length of near-flat (slope<10°)	5
	Length of reach (m) (Ls)	50.00
	R	0.05
	V _{galspwn}	0.4
Site name/Number	Armstrong Davlight	Length of snawning habitat (m)
	Length of near-flat (slope<10°)	Longer of operating neutral (in)
	(m) (Lb)	80.00
	R	0.06
	Vgalspwn	0.4375
Site name/Number	0	Length of spawning habitat (m)
	(m) (Lb)	
	Length of reach (m) (Ls)	#DIV/0
	N .	#DIV/0
	• galspwn	*51110
Site name/Number	0	Length of spawning habitat (m)
	Length of near-flat (slope<10°)	
	Length of reach (m) (Ls)	
	R	#DIV/0!
	V _{galspwn}	#DIV/0!
Site name/Number	0	Length of spawning habitat (m)
•	Length of near-flat (slope<10°)	· · · · · · · · · · · · · · · · · · ·
	(m) (Lb) Length of reach (m) (Ls)	
	R	#DIV/0!
	V _{galspwn}	#DIV/0!
lon		
Site name/Number	Length of near-flat (slope<10°)	Length of spawning habitat (m)
	(m) (Lb)	
	Length of reach (m) (Ls) R	#DIV/0
	V _{galsown}	#DIV/0
_	gaopini	
Site name/Number	0	Length of spawning habitat (m)
	Length of near-flat (slope<10 ⁻) (m) (Lb)	
	Length of reach (m) (Ls)	
	R	#DIV/0
	[♥] galspwn	#51470
Site name/Number	0	Length of spawning habitat (m)
	Length of near-flat (slope<10°)	
	Length of reach (m) (Ls)	
	R	#DIV/0!
	V _{galspwn}	#DIV/0!
Site name/Number	0	I enoth of snawning habitat (m)
	Length of near-flat (slope<10°)	
	(m) (Lb)	
	Length of reach (m) (Ls) R	#DIV/0
	V _{galspwn}	#DIV/0
lau		
Site name/Number	l ength of pear-flat (cloner10°)	Length of spawning habitat (m)
	(m) (Lb)	
	Length of reach (m) (Ls)	#DIV/0
	Vaslanum	#DIV/0
	yaispwii	



Site	Quality of fish spawning habitat (High=1, medium=2, low=3, unsuitable=4)	V galqual
Reference Sites		
Site name/Number (upto 3)		
0		0
0		0
0		0
Test Sites		
Site name/Number (upto 10)		
York_impact	4.00	0
Armstrong_Daylight	3.00	0.25
0		0
0		0
0		0
0		0
0		0
0		0
0		0
0		0

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Vanimum

$\mathbf{V}_{\mathsf{physhab}}$

Instructions: This measure requires comparison with the mean value for Auckland State of Environment reference sites. If using in a place where Auckland SoE sites are not relevant, copy the mean of your reference sites (cell B14) to B15. Site names/numbers will be automatically transferred from the Function Scoring worksheet. $V_{physhab}$ scores will be automatically calculated and transferred to the Function Scoring worksheet.

	Referenc	e Sites (u	pto 3)	Test Site	s (upto 10)							
Habitat Parameter/Site name or number	0	0	0	York_imp	Armstrong	0	0	0	0	0	0	0	0
Aquatic Habitat Diversity				11	17								
Aquatic Habitat Abundance				11	15								
Hydrologic Heterogeneity				10	16								
Channel Shade				15	14								
Riparian Vegetation Integrity (sum of both banks)				16	12								
H (sum/100)	0	0	0	0.63	0.74	0	0	0	0	0	0	0	0
Mean of reference sites	0			_									
Mean of Auckland SoE reference sites	0.86												
V _{physhab}	0.00	0.00	0.00	0.74	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

If using this spreadsheet outside of Auckland you will need to insert the average of the reference sites (found in cell B14) into cell B15.

$\mathbf{V}_{watqual}$

Site	Reference S	ites (upto	3)	Test Sites (upto 10)								
	0	0	0	York_impact	Armstrong	0	0	0	0	0	0	0	0
V _{dod} (DOM) (transferred directly from V _{dod} worksheet)	#DIV/0!	#DIV/0!	#DIV/0!	1.00	1.00	#DIV/0!							
V _{shade} (transferred directly from V _{shade} worksheet)	#DIV/0!	#DIV/0!	#DIV/0!	0.68	0.4	#DIV/0!							
S (Well = 1, Partial = 2, Minimal =3, No = 4)				1	1								
S	0	0	0	1	1	0	0	0	0	0	0	0	0
V _{watqual}	#DIV/0!	#DIV/0!	#DIV/0!	0.84	0.70	#DIV/0!							

$\mathbf{V}_{\text{imperv}}$

Instructions: For each site follow steps 1, 2 and 3 below and enter final V_{imperv} value into the blue (reference site) or tan (test site) cells. Site names/numbers will be automatically transferred from the Function Scoring worksheet. Scores will be automatically calculated and transferred to the Function Scoring worksheet.

Steps to follow

1	Determine % imperviousness for site	Calculate using GIS or similar for % of catchment area upstream of survey site that has impervious surfaces
2	Determine level of upstream flood control	Use table below to define level of control (high, medium or low). High control includes flow attenuation devices, such as grass swales and stormwater management structures
3	Determine V _{imperv} from Vimperv values table below	Determine from table below as the combination of % imperviousness and extent of flood flow controls. Enter this value into the the data table (V _{imperv})

% of catchment above site	V _{impe}	_{erv} values	i
that is impervious	Flood flow and fir	st flush run	off controls
	High (much control)	Medium	Low (no control)
0%	1.0	1.0	1.0
<10%	0.9	0.8	0.7
10-25%	0.5	0.4	0.3
>25%	0.3	0.2	0.1

Site	V _{imperv}
Reference Sites	
Site name/Number (upto 3)	
0	
0	
0	
Test Sites	
Site name/Number (upto 10)	
York_impact	0.7
Armstrong_Daylight	0.7
0	
0	
0	
0	
0	
0	
0	
0	

Red cell = value greater than maximum allowed (which is 1.0)

\mathbf{V}_{fish}

Instructions: Enter fish presence data into the Excel spreadsheet "Auckland Fish IBI.xls" (Joy and Henderson, 2004) and calculate IBI score. Copy IBI scores into the blue (reference site) or tan (test site) cells in this worksheet. Site names/numbers will be automatically transferred from the Function Scoring worksheet. V_{fish} scores will be calculated automatically and transferred into the Function Scoring worksheet.

Fish IBI scores (from Auckland Fish IBI.xls)

	3)	Test Site	s (upto 10))									
Site	0	0	0	York_impa	Armstron	0	0	0	0	0	0	0	0
IBI score				0	0								
V _{fish}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



V_{ept}

Instructions: No data entry is required. The number of EPT taxa will be automatically calculated from the data entered into V_{mci} . Scores are adjusted relative to mean reference EPT numbers from Auckland State of Environment reference sites. V_{ept} scores are automatically transferred to the Function Scoring worksheet. Site names/numbers will be automatically transferred from the Function Scoring worksheet.

	Reference	e Sites (upt	to 3)	Test Sites	s (upto 10)									
Site name or number	0	0	0	/ork_impac	strong_Day	0	0	0	0	0	0	0	0	
Ephemeroptera	0	0	0	0	2	0	0	0	0	0	0	0	0	1
Plecoptera	0	0	0	0	1	0	0	0	0	0	0	0	0	
Trichoptera	0	0	0	1	3	0	0	0	0	0	0	0	0	
EPT richness	0	0	0	1	6	0	0	0	0	0	0	0	0	
Mean reference # EPT	pr soft-botto #VALUE!	hard or soft #VALUE!	hard or sof	4.4	4.4	hard or soft #VALUE!	hard or soft	hard or soft	hard or soft	hard or soft	t hard or soft #\/ALLIF!	hard or soft	hard or soft	-bottomed?
Mean reference # EPT V _{ept}	or soft-botto #VALUE!	hard or soft #VALUE!	hard or soft #VALUE!	4.4 0.227273	4.4 1	hard or soft #VALUE!	t hard or soft #VALUE!	hard or soft #VALUE!	hard or so #VALUE	oft. !				

Number of EPT taxa

Vripcond

Instructions: No data entry required (data are automatically transferred from the corresponding cells in Vchann)

		Reference 5	Sibes (upl	03)				Test Sites (apto 10)																							_
		0		0		0		York_impac	<u> </u>	Armstrong	Daylight	0			0		0			0		0			0		0			0		
Description	Weighting (W)	Proportion W	f x P	Propor	tic W x P	Proportic W x P		Propertion c	WxP	Proportion of	WxP	Propert	ion (W x P		Proportion (WxP	Pr	reportion (W x P		Proportion c W	xP	Proportion	I W X P		Proportion c	WxP	1.19	Proportion (V	N x P	Prop	partion c W	хP
Mature indigenous vegetation with diverse canopy and undervalower	1	0	0		0 0	0	0	0	0	0	0		0	0	0	0		0	0	0	0		•	0	0	0		0	0		0	0
Regenerating indigenous vegetation in late stage of surrowairon	0.8	0	0		0 0	0	0	1	0.8	0.85	0.68		0	0	0	0		0	0	0	0		0	0	0	0		0	0		0	0
Natural vicense wellend centralism on hanks	0.8	0	0		0 0	0	0	0	0	0	0		0	0	0	0		0	•	0	0		0	•	0	0		0	0		0	0
Mature matter trees but classical under alreasy	0.7	0	0		0 0	0	0	0	0	0	0		0	0	0	0		0	<u> </u>	0	0		2	ō	0	0					0	
Mature exotic trees (e.g. willows or plantation freesit)	0.7	0	0		0 0	0	0	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		٥	0		0	0
Regenerating bush, low diversity. (e.g., manuka scrub) or high exotic shrubs. Stock excluded	0.6	٥	0		0 0	0	0	0	0	0	0		0	0	0	0		0	0	0	0		•	0	0	0		0	0		0	c
Mature flax long grasses and sectors	0.4	0	0		0 0	0	0	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		0	0		0	
Regenerating bush (e.g., manuka scrub) with slock access, or early stage restoration planting, or low exotic shrubs (+2 m high) or immature plantation forest	0.3	0	٥		0 0	0	۰	•	0	0	0		0	0	0	0		0	0	0	0		•	•	0	0		0	0		0	c
Mainly long grass (not graded or mown)	0.2	0	0		0 0	0	0	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		0	0		0	
Grazed wetland vegetation on banks	0.2	0	0		0 0	0	0	0	0	0	0		0	0	0			0	0	0	0		0	0	0	0		0	0		0	0
Mainly short grass (grazed or mown)	0.1	0	0		0 0	0	0	0	0	0.15	0.015		0	0	0			0	0	0	0		0	0	0	0		0	0		0	0
Disturbed bare soils or artificial surfaces	0	0	0		0 0	0	0	0	0		0		0	0	0	0		0	0	0	0		•	0	0	0		•	0		0	
	sum of P	•			0	0		1		1			0					0		0			0		0			0			0	
	Vracend = sum(W x P)		0		0		0		0.8		0.695			0		0			0		0			•		0			0			

$\mathbf{V}_{\text{invert}}$

Instructions: For each site, enter presence/absence of high conservation-value species (koura and kakahi) - enter "1" for presence. For other invertebrate species, presence/absence data will be automattically transferred from the Vmci worksheet.

		Table 1	Referend	ce Sites (u 0	pto 3) 0	Test Sites	(upto 10) Armstrons	0	0	(0 0) 0) () 0	0	% occurrence in Auckland INTERMITTENT reference sites
What samp	ling method wa	as used? Soft-	0	0	0	SB	SB	0	0	c c	D () o		0	0	
bottomed =	SB, hard-botto	omed = HB				-										
Koura (freshwate Kakahi (freshwat	er crayfish) present? ter mussels) present?			1		N N	N N			1			1			
Enhemerontera	Lentonhlehiidae	Arachnocolus	0	0	0	0	0	0	0					0	0	90
Ephomoroptora	Lentophlebiidae	Tenskis	0	0	0	° 0	0	0	0					ů ů	0	90
Trichontera	Leptopriebildae	Triplectides	0	0	0	0	0	ů	0					0	ů	30
Trichontera	Polycentropodidae	Polyplectropus	0	ő	ő	1	1	ő	0					0	ő	70
Diptera	Chironomidae	Tanypodinae	ů ů	Ő	Ő	1	1	0	Ő					o o	Ő	60
Diptera	Dixidae	Paradixa + Dixid pupae	0	0	0	0	1	0	0	(0 0) 0		0	0	50
Crustacea	Amphipoda	Paraleptamphopus	0	0	0	1	1	0	0		0 0) 0		0 0	0	60
Crustacea	Amphipoda	Talitridae	0	0	0	1	0	0	0	(0 0	0 0		0 (0	
Crustacea	Decapoda	Paranephrops	0	0	0	0	0	0	0	(0 0	0 0		0 0	0	
Crustacea	Decapoda	Paratya	0	0	0	0	0	0	0	(0 0	0 0) (0 0	0	
Ephemeroptera	Leptophlebiidae	Zephlebia	0	0	0	0	1	0	0	(0 0	0 0		0 (0	100
Diptera	Chironomidae	Polypedilum	0	0	0	0	0	0	0	(0 0	0 0		0 (0	50
Mollusca	Gastropoda	Potamopyrgus	0	0	0	1	1	0	0		0 0	0 0) (0 0	0	80
Oligochaeta			0	0	0	1	1	0	0	(0 0	0 0) (0 0	0	100
Acarina			0	0	0	1	0	0	0	(0 0	0 0) (0 0	0	70
Collembola			0	0	0	1	1	0	0	(0 0	0 0		0 (0	50
Ephemeroptera	Leptophlebiidae	Acanthophlebia	0	0	0	0	0	0	0	(0 0	0 0) (0 0	0	
Ephemeroptera	Leptophlebiidae	Austroclima	0	0	0	0	1	0	0	(0 0	0 0) (0 0	0	
Trichoptera	Conoesucidae	Olinga	0	0	0	0	0	0	0	(0 0	0 0) (0 0	0	
Trichoptera	Helicopsychidae	Helicopsyche	0	0	0	0	0	0	0		0 0	0 0		0 0	0	
Trichoptera	Hydrobiosidae	Costachorema	0	0	0	0	0	0	0		0 0	0 0		0 0	0	
Trichoptera	Hydrobiosidae	Hydrobiosis	0	0	0	0	1	0	0			0		0	0	
Trichoptera	Hydrobiosidae	Psilochorema	0	0	0	0	0	0	0		0 (0		0	0	
Trichoptera	Hydropsychidae	Orthopsyche	0	0	0	0	0	0	0					0	0	
I richoptera Discontera	Austroporamidae	Hydrobiosella Austroporto		0	0	0	0	0	0				4 9		0	
Piecoptera	Austroperiidae	Ausuoperia			0	0	0	0	0				4 2		U	
Piecoptera	Gripopterugidas	Mensientoneria		0	0	0	0	0	0						0	
Plecontera	Gripopterygidae	Zelandoneria	0	0	0	0	0	0	0						0	
Coleontera	Elmidae	Loos of the loop of the	1 0	0	0	0	0	0	0						0	
Coleoptera	Hydraenidae		0	0	0	0	0	ů	0					0	ů	
Coleoptera	Ptilodactylidae		Ő	ő	0	ů	ő	ő	0		ů c			o o	0	
Diptera	Chironomidae	Orthocladiinae (incl. Corvnone		0	n	ň	0	n	n) ()		0 0	0	50
Diptera	Chironomidae	Tanytarsini	Ő	ő	ő	ő	ő	ő	0			0		0	ő	60
Diptera	Simuliidae	Austrosimulium	0	0	0	ő	0	Ő	Ő		0 0) 0		0 0	0	
Diptera	Tipulidae	Aphrophila	Ö	Ŏ	Ő	1	Ő	Ő	Ő					o o	0	
Megaloptera		Archichauliodes	0	0	0	0	0	0	0		0 0) 0		0 0	0	
Mollusca	Gastropoda	Latia	0	0	0	0	0	0	0		0 0) 0		0 0	0	
	Intermittent	# of taxa	0	0	0	7	8	0	0		0 0) () (0 0	0	9.8
		# of taxa	0	0	0	7	8	0	0	Ċ	0 0	0 0) () 0	0	
					-	•										
		Vinvert (raw)	FALSE	FALSE	FALSE	0.71428571	0.816327	FALSE								
		Vinvert (final)	1	1	1	0.71428571	0.816327	1	1	1	1 1	1 1	1 1	1 1	1	

Presence/absence macroinvertebrate data (from Vmci)

0

$\mathbf{V}_{\mathsf{ripconn}}$

Site	Proportion of stream channel where stream channel NOT impeded (0 - 1)	Effects of stormwater pipes or drains bypassing riparian zone	Vripconn	
Reference Sites				
Site name/Number (upto 3)				
0		enter data	#VALUE!	
0		enter data	#VALUE!	
0		enter data	#VALUE!	
Test Sites				
Site name/Number (upto 10)	l			
York_impact	1.00	1	1.00	
Armstrong_Daylight	0.90	1	0.90	
0		enter data	#VALUE!	
0		enter data	#VALUE!	
0		enter data	#VALUE!	
0		enter data	#VALUE!	
0		enter data	#VALUE!	
0		enter data	#VALUE!	
0		enter data	#VALUE!	
0		enter data	#VALUE!	

	Huia Replace Estimation of Sediment Yield by	ement Treatment Plant F the Universal Soil Loss	Project Equation	Project No Date:). 14191 Nov-19			
Soil Loss: A = R K LS C P	Required Inputs							
	Inputs from Nomograph		K Factor Parameters					
A = soil loss (tonnes/hectare/year)	Correction based on organic c	ontent	Desc	iption: Soil %				
R = Rainfall Factor			East S	LT 4	0			
K = Soil erodibility Index			CI	AY <mark>4</mark>	<mark>0</mark>			
LS = slope length and steepness factor	2yr 24hr rainfall depth P ₂₄	83.6 mm	SA	ND 2	<mark>0</mark>			
C = vegetative cover factor	2yr 6hr rainfall depth P ₆	52.5008 mm	0	RG 🛛	<mark>0</mark>			
P = erosion control practice factor				= 0.3	(from nomos	graph)		
			Corr	ection 0.1	K(CORR)	0.4	K(metric)	0.528
Construction Time 24 months			Correction existing (4% org	anics) -0.1	K(CORR)	0.2	K(metric)	0.264

			LS Para	ameters			USLE Param	neters		Time	Gross Sediment	Sediment Delivery	Sediment Control	rol Net Sediment Loss (per h			Difference (Prior and Post)
Section	Period	Area	Slope	Length	R	ĸ	Ls	С	Р	(years)	Yield	Ratio	Efficiency	Prior	During	Restoration	(tonnes)
		(hectares)	(s) %	(m)							(tonnes)	(%)	(%)	(tonnes)	(tonnes)	(tonnes)	
	Prior	1.96				0.264		0.01	1.00	1.00	0.65	50.0	-	1.26			
S1	During	1.96	9	180	86	0.528	2.85	1.00	1.32	2.00	340.58	50.0	85.0		50.07		50.54
	Restoration	1.08				0.264		0.10	1.00	1.00	6.45	50.0	50.0			1.74	
	Prior	0.42				0.264		0.01	1.00	1.00	1.03	70.0	-	0.43			
S2	During	0.42	13	150	86	0.528	4.53	1.00	1.32	2.00	541.33	70.0	90.0		15.91		16.31
	Restoration	0.23				0.264		0.10	1.00	1.00	10.25	70.0	50.0			0.83	
	Prior	0.89				0.264		0.01	1.00	1.00	0.56	70.0	-	0.50			
S3	During	0.89	10	100	86	0.528	2.48	1.00	1.32	2.00	296.29	70.0	90.0		18.46		18.92
	Restoration	0.49				0.264		0.10	1.00	1.00	5.61	70.0	50.0			0.96	
	Prior	0.88				0.264		0.01	1.00	1.00	1.06	70.0	-	0.93			
S4	During	0.88	20	40	86	0.528	4.68	1.00	1.32	2.00	558.31	70.0	90.0		34.39		35.25
	Restoration	0.48				0.264		0.10	1.00	1.00	10.57	70.0	50.0			1.79	
	Prior	0.07				0.264		0.01	1.00	1.00	0.18	50.0	-	0.01			
Catch 2B	During	0.07	8	20	86	0.528	0.80	1.00	1.32	2.00	95.95	50.0	50.0		1.68		1.68
	Restoration	0.04				0.264		0.10	1.00	1.00	1.82	50.0	50.0			0.02	
	Prior	0.03				0.264		0.01	1.00	1.00	0.60	70.0	-	0.02			
Catch 2C	During	0.03	20	13	86	0.528	2.67	1.00	1.32	2.00	318.29	70.0	50.0		3.34		3.36
	Restoration	0.02				0.264		0.10	1.00	1.00	6.03	70.0	50.0			0.03	
	Prior	0.23				0.264		0.01	1.00	1.00	1.02	70.0	-	0.23			
Catch 2H	During	0.23	25	18	86	0.528	4.53	1.00	1.32	2.00	540.89	70.0	50.0		43.35		43.57
	Restoration	0.13				0.264		0.10	1.00	1.00	10.24	70.0	50.0			0.45	

4.48

169.64 tonnes\ha

 Notes: (i). The catchment area for the restoration period based on 55 % of the total catchment area to be reinstated.
 (ii) Assume Sediment delivery ratio is 0.5 for slopes less than 10% and 0.7 for slopes greater than 10%.

		Area (ha)	Prior	During	Restoration	
HWRTP Site		2.70	1.96	114.35	3.07	tonnes
Reservoir 1	Site	0.89	0.50	18.46	0.96	tonnes
Reservoir 2 Site		0.88	0.93	34.39	1.79	tonnes
Total		4.47	3.39	167.20	5.82	tonnes

HIRDS V4 Depth-Duration-Frequency Results									
Sitename: Huia Water Treatment Plant									
Coordinate system: WGS84									
Longitude: 174.6406									
Latitude: -36.9383									
DDF Model Paramete	r: c	d	e	f	g	h	i		
Values:	0.002724	0.444053	-0.02394		0 0.235367	-0.01013	3.168367		
Example:	Duration (h	ARI (yrs)	х	у	Rainfall De	epth (mm)			
24 100 3.178054 4.600149 189.7997									

Rainfall depths (mm) :: Historical Data

ARI	AEP	10	m 2	20m	30m	1h	2h	6h	12h	24h	48h	72h 9	96h	120h
	1.58	0.633	9.93	14.2	17.3	23.8	31.9	48.7	61.8	76.5	92.6	102	109	115
	2	0.5	10.8	15.4	18.8	25.9	34.8	53.2	67.4	83.6	101	112	120	126
	5	0.2	13.7	19.6	24	33.1	44.6	68.4	86.9	108	131	145	155	163
	10	0.1	15.9	22.7	27.7	38.3	51.8	79.6	101	126	153	170	182	191
	20	0.05	18	25.9	31.6	43.7	59.1	91	116	144	176	195	209	220
	30	0.033	19.3	27.7	33.9	46.9	63.5	97.9	125	156	190	210	226	237
	40	0.025	20.2	29	35.5	49.2	66.7	103	131	164	199	222	238	250
	50	0.02	20.9	30.1	36.8	51	69.1	107	136	170	207	230	247	260
	60	0.017	21.5	30.9	37.9	52.5	71.2	110	140	175	214	237	255	268
	80	0.012	22.4	32.3	39.5	54.8	74.4	115	147	183	224	249	267	281
	100	0.01	23.1	33.3	40.8	56.6	76.8	119	152	190	232	258	276	291
	250	0.004	26	37.5	46	64	87	135	173	216	264	294	316	333