Application for Resource Consent

Project title and description

Huia Replacement Water Treatment Plant (WTP) Project

Woodlands Park Road, Waima

July 2019

prepared for Watercare by:

Tonkin & Taylor Ltd

Member Leading Utilities of the World

Watercare

An Auckland Council Organisation

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Glossary of abbreviations

Term	Definition
ACM	Asbestos Containing Materials
AEE	Assessment of Effects on the Environment
AMP	Watercare Asset Management Plan 2018 to 2038
AT	Auckland Transport
AUP	Auckland Unitary Plan – Operative in part
BAC	Biologically Activated Carbon Filter
BOD	Basis of design
CCO	Council Controlled Organisation
CLG	Community Liaison Group
CNVMP	Construction Noise and Vibration Management Plan
CTMP	Construction Traffic Management Plan
CVA	Cultural Values Assessment
DAF	Dissolved Air Flotation
DWSNZ	Drinking Water Standards New Zealand 2005 (Revised 2018)
EIANZ	Environment Institute of Australia and New Zealand
ESC	Erosion and Sediment Control Report
HAIL	Hazardous Activities and Industries List
HCV	Heavy commercial vehicle
KCZ	Kauri Containment Zone
LGA 2009	Local Government (Auckland Council) Act 2009
MLD	Mega-litres per day
MoH	Ministry of Health
NES Soil	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011
NoR	Notice of Requirement
NPS-FM	National Policy Statement for Freshwater Management
NZDWS	New Zealand Drinking Water Standards
OPW	Outline plan of works
PSI	Preliminary Site Investigation
PTA	*Phytophthora* taxon Agathis infection
RMA	Resource Management Act 1991
RPS	Regional Policy Statement
SEA	Significant Ecological Area
SEV	Stream Ecological Valuation
SMP	Site Management Plan
T+T	Tonkin and Taylor Ltd
Watercare	Watercare Services Limited
WBMP	Waima Biodiversity Management Plan

Term	Definition
WRHA	Waitakere Ranges Heritage Area
WRHAA	Waitakere Ranges Heritage Area Act 2008
WTP	Water treatment plant

Executive summary

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. The company provides 'Aa'-grade safe and reliable drinking water and collects, treats and distributes around 365 million litres of water per day[1] from its water sources including rivers, dams and underground aquifers. Watercare is a Council Controlled Organisation (CCO), wholly owned by the Auckland Council.

Within the Waitakere Ranges, Watercare operates five dams 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 Water Treatment Plant (Huia WTP) before being distributed via the water transmission network, primarily to west and north Auckland. Watercare and its predecessors have made a substantial investment in the western water supply dams and these assets are critical components of Auckland's water supply system. To ensure Auckland's future growth, development and wellbeing, Watercare needs to maximise the use of these existing water sources.

The Huia WTP is the third largest water treatment plant in Auckland, treating approximately 20% of Auckland's water. The use of gravity based water sources (the upper dams) and low energy treatment facilities means the Huia WTP provides significant resilience, reliability and system efficiency benefits and is a crucial component of Auckland's water supply network. However it is now over 90 years old and is nearing the end of its operational life. Watercare therefore proposes to construct a new WTP to replace the aging Huia WTP, along with two treated water reservoirs (50ML total capacity) to provide additional treated water storage within the western supply zone.

The site for the replacement WTP 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). One 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, it will be entirely buried / below ground level. The NH2 valve chamber and tunnelling reception shaft will also be located within this site. The second 25 ML reservoir is to be constructed on the existing Huia WTP site once this plant is decommissioned. All of the structures are located on land designated for water supply purposes.

Alternative locations to construct a replacement WTP and reservoirs were extensively considered and evaluated through a comprehensive and robust site alternatives assessment. To assess onsite alternatives, detailed site investigations were undertaken to determine technical and environmental constraints and opportunities, and to determine the most appropriate footprint for the replacement WTP and reservoirs taking these constraints into account. Ecological constraints in particular have been the primary determinant, with the footprint of the replacement WTP and reservoirs progressively relocated and reduced through an iterative site layout optimisation process aimed at avoiding adverse effects on the values of the Significant Ecological Area (SEA) and permanent watercourses as far as practicable. Consistent with the mitigation hierarchy, where adverse effects cannot be avoided, then they have been remedied and mitigated. Residual effects will be addressed through a comprehensive ecological compensation package which is designed to achieve a net gain in ecological values.

This Assessment of Effects on the Environment (AEE) has been prepared to accompany the application by Watercare to Auckland Council for the regional resource consents and a land use consent under the Resource Management (National Environmental Standard for Assessing and

[1] AMP 2018 - 2038.

Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES Soil) necessary for the proposed Huia replacement WTP project.

The particular requirements for resource consent are determined by the rules in both the Auckland Unitary Plan operative in part (AUP) and the regulations in the NES Soil. The proposal involves earthworks and vegetation removal, including in an SEA overlay, and stream works including the diversion and reclamation of a small length of intermittent stream. Resource consents are also sought for the diversion and discharge of groundwater and stormwater, development of new impervious surfaces, and the disturbance of potentially contaminated land. The removal of vegetation in an SEA to enable the construction and operation of infrastructure is a restricted discretionary activity in the AUP. However the stream reclamation and diversion is a non-complying activity, and the application is likely to fall for consideration overall as a non-complying activity.

Land use activities, including the construction of the replacement WTP and reservoirs and associated traffic and noise effects do not form part of this application, and instead will be addressed through an outline plan of works (OPW) that Watercare will submit to Auckland Council as required under section 176A of the RMA in relation to its designation.

Watercare has undertaken stakeholder engagement with the local community, including through the formation of a Community Liaison Group (CLG) along with public open days, newsletter updates and media releases. Engagement with Mana Whenua and a range of stakeholder and interest groups has also been undertaken. 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 Community Liaison Group.

Watercare requests public notification of the application.

The replacement Huia WTP project will provide a number of positive effects, notably the continued provision of a reliable, long-term, and high quality water supply to service the north-west of Auckland. The purpose of the project is for the public benefit, and 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.

Construction of the project also has the potential to give rise to a range of adverse environmental effects. This includes the removal of 3.5 ha of native vegetation within an SEA, resulting in a high level of ecological effects. Watercare proposes a broad suite of measures to avoid, remedy, mitigate and compensate for these effects. This encompasses onsite mitigation that includes the retention and enhancement of 11 ha of native vegetation. Watercare also proposes to undertake a comprehensive ecological mitigation and compensation package – the Waima Biodiversity Management Plan (WBMP) - over a 990 ha area within the Little Muddy Creek catchment. This is to be administered through a charitable trust. 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. 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. The positive benefits on the environment from the proposed mitigation and compensation package are considered to appropriately compensate for the loss of forest extent.

The Project requires the reclamation and diversion of some 53 m of moderate-low value intermittent stream. The watercourse will be re-aligned as a stream diversion of at least 70 m in length, and erosion protection works will be undertaken in the upper Yorke Gully, which is assessed

as appropriate mitigation and compensation that will provide an overall freshwater ecological enhancement.

Further mitigation measures are recommended throughout the specialist reports and in the assessment of effects to ensure adverse effects are appropriately avoided, remedied, mitigated or compensated. Watercare has proposed a suite of draft consent conditions to address the key potential effects.

The Project is assessed as being broadly consistent with the relevant objectives and policies of the AUP and finds support from those enabling provisions that recognise the benefits of infrastructure, the value of investment in existing infrastructure, and the need for resilient, efficient and effective infrastructure.

The application meets the second limb of the 'gateway test' set out in section 104D of the RMA in that it is not contrary to the objectives and policies of the Regional Plan provisions of the AUP.

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*'. 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. These benefits extend to schools, hospitals, businesses, commercial and industrial facilities, as well as residential dwellings. Overall, it is considered that the proposed replacement WTP and reservoirs are in accordance with Part 2 of the RMA and promote the sustainable management of natural and physical resources.

1 Introduction

1.1 Project overview

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. The company provides 'Aa'-grade safe and reliable drinking water and collects, treats and distributes around 365 million litres of water per day[2] from its water sources including rivers, dams and underground aquifers. Watercare is a Council Controlled Organisation (CCO), wholly owned by the Auckland Council.

The sources of water for the main metropolitan area of Auckland are storage dams in the Hūnua and Waitākere Ranges, an aquifer in Onehunga and the Waikato River. Within the Waitākere Ranges, Watercare operates five dams 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 Water Treatment Plant before being distributed via the water transmission network, primarily to west and north Auckland. The smaller Waitakere Dam and associated Waitakere Water Treatment Plant are also located within the Waitakere Ranges and forms part of the western water treatment and supply network. Watercare and its predecessors have made a substantial investment in the western water supply dams and these assets are critical components of Auckland's water supply system. To ensure Auckland's future growth, development and wellbeing, Watercare needs to maximise the use of these existing water sources as well as identify and develop additional water sources as required.

The Huia Water Treatment Plant (Huia WTP) was constructed in 1929 and upgraded in the 1940s and again in the mid-2000s. It is the third largest water treatment plant in Auckland after Waikato and Ardmore, treating approximately 20% of Auckland's water. The use of gravity based water sources and low energy treatment facilities means the Huia WTP has the capability to supply water to Auckland from the upper dams with minimal power requirements, thereby providing significant resilience, reliability and system efficiency benefits. It is therefore a crucial component of Auckland's water supply network but is now nearing the end of its operational life. Watercare therefore proposes to construct a new WTP to replace the aging Huia WTP. The basis of design (BOD) developed by Watercare for the replacement WTP specifies that it shall[3]:

- Be an operationally robust, automated plant that has a treatment capacity of 140 mega-litres per day (MLD);
- Produce treated water in compliance with the Drinking Water Standards for New Zealand 2005 (revised 2008)[4];
- Provide new treatment processes that are reliably able to deal with existing contaminants and be readily upgradeable to deal with emerging contaminants;
- Meet relevant health and safety requirements;
- Address seismic design requirements; and
- Have a design life of 100 years for pipework and concrete structures.

The existing Huia WTP has an unconstrained peak production of 126 MLD. However due to the age of the WTP and the quality of the raw water received, it typically operates at a maximum production capacity of 110 MLD. This reduction in reliable plant capacity has implications for the resilience of

[2] AMP 2018 - 2038.
[3] *Huia WTP Replacement – Basis of Design Framework, Watercare (Draft 18/09/14 updated 22/05/18 (Issue 14)).* Refer Watercare website for background reports: *https://www.watercare.co.nz.*
[4] Subsequently revised in 2018.

Watercare's water supply network. The replacement WTP will allow for more efficient treatment of water from the four supply dams, enabling an increase in maximum peak production to 140 MLD.

As the sustainable volume able to be drawn from the four water supply dams is not increased, the replacement WTP does not provide for future growth. This will be met by other projects planned by Watercare. However the increase in peak production capacity will assist in meeting short-term peak demand periods and means the replacement WTP will be better able to make up a water supply shortfall in the event of a failure or the planned shutdown of another system asset (WTP or distribution network). This capability in turn increases overall system flexibility, security and resilience across the Watercare network.

Traditional treatment processes used in the existing plant will also be replaced by advanced processes now considered more appropriate for the treatment of raw water received from the dams in the Waitakere Ranges catchment. The improved treatment process will ensure ongoing compliance with the recently revised Drinking Water Standards New Zealand 2005 (revised 2018) (DWSNZ)[5].

Watercare has also identified that additional treated water storage is required within the western supply zone to provide security of supply, balance out daytime variations and ensure sufficient network capacity to service historical growth (i.e. population growth that has occurred in recent years). New treated water storage reservoirs are also required to ensure Watercare continues to meet the public health grading requirement to have 24 hours of storage as a contingency to disruption within supply zones. Watercare is therefore proposing to construct two treated water reservoirs (50ML total capacity) as part of this project. The proposed reservoirs will supply the existing network and the new North Harbour 2 Watermain (NH2) duplication which provides an additional route for conveying water from the west to the north to provide resilience and increased transmission capacity.

The site for the replacement WTP 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). One 25 ML treated water reservoir (Reservoir 1) is to be located across from the replacement WTP on the northern side of Woodlands Park Road and will be largely buried. The NH2 valve chamber and tunnelling reception shaft will also be located within the Reservoir 1 site. The second 25 ML reservoir (Reservoir 2) is to be constructed on the existing Huia WTP site once this plant is decommissioned (refer Figure 1.1 below). All of the structures are located on land designated for water supply purposes.

Alternative locations to construct a replacement WTP and reservoirs were extensively considered and evaluated through a comprehensive and robust site alternatives assessment (refer Section 5). In addition to the key design requirements specified above, in adopting the Manuka Road option as the preferred site for the development of the replacement WTP the Watercare Board stipulated that this should be subject to avoiding wherever possible significant trees and significant ecological effects, undertaking off set mitigation, and establishing a Community Liaison Group (CLG)[6]. To further give effect to this direction, and in particular on the basis of strong feedback from the CLG, Watercare recently undertook further work to identify and test alternative reservoir sites and layouts. This work built on the site alternatives assessment previously undertaken and resulted in the selection of the preferred option described above (i.e. 25 ML of storage located on the northern side of Woodlands Park Road and a further 25 ML of storage located on the existing Huia WTP site once the existing plant has been decommissioned).

[5] These came into effect on 1 March 2019.
[6] Watercare Services Board meeting minutes of public meeting held on 30 May 2017.

Figure 1.1: Construction footprints (solid black outline) and indicative layouts of the proposed replacement WTP and reservoirs (GHD, 2019)

1.2 Overview of the application

1.2.1 Regional and NES Soil consents

This Assessment of Effects on the Environment (AEE) report has been prepared to support an application 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) in fulfilment of section 88 of the Resource Management Act 1991 (RMA). The regional consent application seeks to authorise the following activities (referred to herein as 'Project works'):

- Earthworks and vegetation removal, including in a Significant Ecological Area (SEA) overlay, which are required to enable the construction of the replacement WTP and reservoirs, and to allow for the NH2 valve chamber and tunnelling reception shaft within the Reservoir 1 site;
- Discharge of contaminants associated with the disturbance of potentially contaminated land;
- Stream works including diversion and reclamation;
- Dewatering, and groundwater diversion and discharge;
- Diversion and discharge of stormwater; and
- Development of new impervious areas.

As noted above, resource consent is also required to disturb potentially contaminated land under the NES Soil.

Watercare requests that this application be publicly notified.

1.2.2 Land use activities that do not form part of this application

Land use activities under section 9(3) of the RMA are not part of this application. Watercare will submit an outline plan of works (OPW) to the Council as required under section 176A of the RMA in relation to the proposed construction of the WTP and reservoirs within designation 9324. This will address district land use matters including:

- Traffic effects and proposed management and mitigation measures associated with the construction and operation of the WTP and reservoirs (note: traffic effects related to vegetation removal and bulk earthworks are addressed in this application);
- Construction and operational noise effects and proposed measures to manage and mitigate these effects (note: noise effects related to vegetation removal and bulk earthworks are addressed in this application);
- Landscape and visual 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.

For the avoidance of doubt, the above matters will be addressed through the OPW process. Other than the exceptions noted in relation to traffic and noise, these matters are not addressed in this current application for regional resource consents and land use consent under the NES Soil.

The OPW process is separate to this application for resource consent.

Direction on the resource consent and OPW processes is set out in legal advice provided to Watercare contained in Appendix B.

1.3 Applicant and property details

Table 1.1: Applicant and property details

Applicant	Watercare Services Ltd
Owner/occupier of application site	Watercare Services Ltd
Site address / map reference	Woodlands Park Road/Manuka Road, Waima (Titirangi)
Site area	• Designated site located south of Woodlands Park Road and east of Manuka Road (where replacement WTP to be located): approximately 4.2 ha • Designated site located north of Woodlands Park Road (where Reservoir 1 is to be located): approximately 6.4 ha • Designated site located south of Woodlands Park Road and west of Manuka Road (existing Huia WTP, and where Reservoir 2 is to be located): approximately 4 ha
Legal description / Certificate of Title reference	Lot 6 DP 156565 / NA 94A/356– location of replacement WTP Lot 2 DP 484666 / 701575 – location of proposed reservoirs Lot 5 DP 156565 / NA 94A/355 – existing Huia WTP
Council / Plans	**Auckland Council** Auckland Unitary Plan – Operative in part (AUP)
Address for service during consent processing, implementation and invoicing	Watercare Services Ltd, 73 Remuera Road, Remuera, Auckland 1050 Attention: Paul Jones Phone: 021 231 2385 Email: Paul.Jones@water.co.nz

A copy of the relevant Certificates of Title is attached in Appendix A.

1.4 Designation 9324

The land subject to this application is designated by Watercare for 'Water supply purposes – water treatment plants and associated structures' (designation reference 9324 – Huia and Nihotupu Water Treatment Plants). The physical extent of the designation as it relates to the immediate locality is shown on Figure 1.2 below.

The sites on which the replacement WTP and one of the proposed reservoirs will be located were originally used for residential and farming purposes prior to being acquired by Watercare. Houses were built on the replacement WTP site and the reservoir site by Auckland City Council for staff that operated the WTP, as the site was so far away from residential areas when first built. These dwellings were subsequently removed in the 1990s and native vegetation allowed to regenerate (refer aerial photos in Section 3.7.1).

The second reservoir is proposed to be located on the existing Huia WTP site. The Huia WTP was commissioned in 1929 following the completion of the Upper Huia Dam. In 1971 the Lower Huia Dam was completed. Since it was commissioned, the Huia WTP has been expanded and upgraded a number of times with its capacity increased and new treatment processes added[7].

The Nihotupu Filter Station was commissioned in 1928 following the completion of the Upper Nihotupu Dam. The Nihotupu Filter Station was subsequently decommissioned in 1990 and water from the Upper Nihotupu Dam diverted and treated at the Huia WTP.

The first reference to the designation was in the County of Waitemata District Scheme (1973) as a notation on the planning maps. The designation was then annotated on the County of Waitemata District Scheme (1980 notified and 1984 final versions)[8]. In 1995 the Waitakere City Council (WCC) included the designation in its proposed District Plan. In 1999 Watercare lodged a Notice of Requirement (NoR) with WCC that resulted in a modification to rename the designation (to insert reference to the Huia and Nihotupu filter stations) and to clarify the extent of the activities carried out on the land. The designation purpose was amended as a result of the NoR and reflected in the Auckland Council District Plan (Waitakere Section) 2003, and subsequently rolled-over into the AUP.

In August 2017, the Environment Court declined an application for declarations in respect of Designation 9324[9]. The decision was subsequently appealed to the High Court[10] testing the scope of the designation and whether or not the purpose of the designation provides for a new WTP and reservoirs to be constructed within the designated area. Both the Environment Court and High Court decisions confirmed that Watercare's designation permits the construction of a new water treatment facility and reservoirs within the designated area.

[7] Watercare's naming convention is to name the WTP after the raw water source. Hence the location of the Huia WTP and the now decomissioned Nihotupu Filter Station in Waima.
[8] The notations were Water Supply Reserve (A.R.A) and Water Supply Purposes (A.R.A), respectively.
[9] Titirangi Protection Group Incorporated, Berman, Carter & Hutchings v Watercare Services Limited & Auckland Council 18 August 2018. Environment court reference ENV-2017-AKL-000121.
[10] Titirangi Protection Group Incorporated, Natasha Berman and David and Jolie Hutchings v Watercare Services Limited & Auckland Council, 8 May 2018. High Court reference CIV-2017-404-2762 [2018] NZHC 1026.

Figure 1.2: Map showing part of the three Watercare parcels included in Designation 9324 (GeoMaps, 2018).

1.5 Key resource consent requirements

In accordance with section 176 of the RMA works which are undertaken by a requiring authority in accordance with a designation do not require a land use consent pursuant to section 9(3) of the RMA. Instead, an outline plan of works (OPW) under section 176A of the RMA is required and will be submitted to Auckland Council.

Regional consent requirements are applicable to designated land and therefore still apply to the replacement WTP and reservoirs. In relation to the Project works provided for under this application, the following matters require resource consent under the AUP and include:

- Rule E26.5.3.2 (A106/A107) – Earthworks greater than 2,500m^2 (outside of the SEA) where the land has a slope equal to or greater than 10 degrees and/or within the Sediment Control Project Area as a restricted discretionary activity;
- Rule E26.5.3.2 (A118) – Earthworks greater than 2,500m^2 or 2,500m^3 in an SEA for the construction of infrastructure as a discretionary activity;
- Rule E26.3.3.1 (A77) – Vegetation alteration or removal in an SEA for infrastructure purposes as a restricted discretionary activity;
- Rule E3.4.1 (A19) – Diversion of a stream to a new course including any associated disturbance and sediment discharge in a Significant Ecological Area overlay (SEA) as a non-complying activity;
- Rule E3.4.1 (A49) - Reclamation of a watercourse in an SEA as a non-complying activity;
- Rule E30.4.1 (A7) – Discharges of contaminants into air, or into water, or onto or into land associated with the disturbance of potentially contaminated land as a discretionary activity;
- Rule E7.4.1 (A28) – Diversion of groundwater caused by an excavation as a restricted discretionary activity;
- Rule E7.4.1 (A20) – Dewatering associated with a groundwater diversion as a restricted discretionary activity;

- Rule E8.4.1 (A10) – Diversion and discharge of stormwater runoff from impervious areas over 5,000m² outside an urban area as a discretionary activity; and
- Rule E10.4.1 (A4) - Development of new impervious areas greater than 50 m^2 within a SMAF1 overlay that does not meet the restricted discretionary activity standards as a discretionary activity.

This list of reasons set out above is not exhaustive and the application includes all necessary consents. If further consent matters are identified post lodgement of the application, these should also be considered as forming part of the application.

An approximately 53 metre section of intermittent stream in the Yorke Gully which traverses through the middle of the replacement WTP site will need to be reclaimed to enable construction of the new plant, with flows diverted to a new stream channel to be formed outside of the project footprint. As this particular component of the project is classified as a non-complying activity under the AUP, if the application is bundled then it will fall for consideration overall as a non-complying activity.

2 Watercare and the water supply network

Secure and reliable water services are critical to the economic, social, environmental and cultural well-being of Auckland's people and communities, and are a basic human right. Auckland's population is continuing to grow. Maintenance and replacement of the existing water supply network, and the provision for future water supply security is essential to support this growth, and to continue to provide for the well-being of Aucklanders. Within this context, this section sets out an overview of Watercare and its responsibilities, and presents a summary of the water supply network along with an overview of the strategic framework that sets the context for the replacement of the existing Huia WTP.

2.1 Watercare's responsibilities and corporate objectives

2.1.1 Local Government (Auckland Council) Act 2009

Watercare'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) which states that the organisation:

a *must manage its operations efficiently with a view to keeping the overall costs of water supply and wastewater services to its customers (collectively) at the minimum levels consistent with the effective conduct of its undertakings and the maintenance of the long-term integrity of its assets;*

b *must not pay any dividend or distribute any surplus in any way, directly or indirectly, to any owner or shareholder;*

c *is not required to comply with section 68(b) of the Local Government Act 2002; and*

d *must have regard for public safety (for example, the safety of children in urban areas) in relation to its structures.*

The LGA 2009 also requires that Watercare must give effect to the relevant aspects of the Auckland Council Long-term Plan (i.e. the Auckland Plan 2050) and must act consistently with other plans and strategies of the Council[11].

2.1.2 The Auckland Plan 2050

Auckland Council's Auckland Plan 2050 is a long-term spatial plan to ensure Auckland grows in a way that will meet the opportunities and challenges of the future. The plan 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 Auckland Plan 2050 provides a pathway for Auckland's future physical development, and a framework to prioritise and coordinate the required supporting infrastructure.

One of the three key challenges that Auckland will face over the coming years is high population growth and its implications. The population of 1.6 million could grow by over 800,000 people in the next 30 years to reach 2.4 million. 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;

[11] Sections 58(1)and 58(2) of the LGA 2009, respectively.

- 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.

Direction 4 of the Environment and Cultural Heritage Outcome in the Auckland Plan is to ensure that Auckland's infrastructure is future-proofed. Much of Auckland's infrastructure is ageing and does not always meet modern requirements or expectations. As set out in Direction 4, this means that there is a need to build flexibility and adaptability into infrastructure design and reduce the impacts of inefficient infrastructure through retrofits and upgrades.

Replacement 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 (refer to Water Supply Map 22).

2.1.3 Watercare Statement of Intent 2018 - 2021

Watercare's vision and key goals are set out in its Statement of Intent (SOI) which is agreed with Auckland Council. Its vision is "*Trusted by our communities for exceptional performance every day*" and the company's mission is "*Reliable, safe and efficient water and wastewater services*."

In accordance with Schedule 8 of the Local Government Act 2002, the SOI states the activities and intentions of Watercare for the next three years, and the objectives that those activities will contribute to. The most recent SOI 2018 – 2021 identifies the following key projects with regards to the western water supply network:

i Construction of the NH2 duplication. Construction of the pipeline has commenced and is expected to be completed in sections by 2026;

ii Replacement of two critical watermains, the Nihotupu No.1 and Huia No. 1 Watermains, which are nearing the end of their design lives. Construction commenced in September 2018 and is expected to be complete by December 2021; and

iii Replacement of the Huia WTP and the provision of improved treatment processes which will maintain supply and improve levels of service.

These projects are identified as contributing to the objectives of enabling growth, improving levels of service, renewing ageing assets, and ensuring the resilience of water systems.

2.1.4 Watercare Asset Management Plan 2018 to 2038

Watercare's Asset Management Plan 2018 to 2038 (AMP) has been prepared to show how the business will operate, maintain and renew existing water and wastewater assets and provide new assets to meet demand as Auckland grows. Whilst the AMP has a 20 year horizon, it is reviewed annually and updated every three years to reflect where capital expenditure will be spent in the short and long term, and to align the planning of new or upgraded infrastructure to meet Auckland Council's spatial development priorities and to respond to growth. Watercare's asset management objectives, as identified in the AMP, are:

- To operate and maintain the water and wastewater systems in an efficient manner;
- To ensure there is sufficient infrastructural capacity to meet growth in demand;
- To meet regulatory requirements and levels of service; and
- To replace assets when they reach the end of their economic lives.

The AMP identifies key infrastructure required to meet growth while increasing resilience of supply. In terms of strategic priorities in the south of the region, the Waikato River is identified as the

preferred source to meet additional water needs during the next 30-plus years. An increase in the Waikato River take to 200 MLD is required around 2033 and an associated WTP capacity upgrade to treat 250 MLD will meet projected peak demands and provide system resilience. Related projects to realise growth include boost pumping of the Waikato Watermain and new treated water storage in Pukekohe East and additional storage at Redoubt Road.

In terms of strategic priorities in the north-west, the AMP states that[12]:

> *"The ageing Huia Water Treatment Plant will be replaced with a new 140 MLD capacity plant to help meet peak demand and improve the current system resilience. An additional reservoir (50ML) associated with the new Huia plant will be essential to increase the treated water storage for West Auckland. Extra pumping to take water from the south to the west will be required to provide redundancy against a Huia plant outage.*
>
> *The North Harbour 1 Watermain is currently our only transmission watermain conveying water from the west to the north across the Greenhithe Bridge. The North Harbour 2 Watermain will be an alternative way to service customers in the west and north, as well as provide redundancy and improved transmission capacity"*

Additional treated water storage (25 ML) is currently provided for in the AMP in the second 10 year period to assist in meeting peak demand periods and improve the system resilience in the western region. Due to the rate of growth that has occurred to date in the north-western Auckland water supply area[13], a recent assessment undertaken by Beca[14] indicates that one 25 ML reservoir is required immediately, and the second 25 ML reservoir required in a 10-year period (i.e. by 2030), to provide sufficient storage to improve the resilience to the western supply network during system outages. The reservoirs are also required to ensure Watercare continues to meet the public health grading requirement to have 24 hours of storage as a contingency to disruption within supply zones.

2.2 The water supply network

2.2.1 Overview

Auckland's four main water sources are storage dams in the Hūnua and Waitākere ranges, an aquifer in Onehunga and the Waikato River. These main sources are supplemented by local sources around the region including other dams, run of river abstraction and groundwater bores. Water is directed to fifteen water treatment plants, which supply drinking water to the Auckland region, as shown in Figure 2.1 and Figure 2.2 below. Each plant is designed to deal with the characteristics of the raw water it receives. Continuous monitoring is in place to meet the Ministry of Health's Drinking Water Standards for New Zealand and achieve an 'Aa' grade in the public health grading process.

For example, water from the Hūnua dams is treated at the Ardmore Water Treatment Plant, which uses conventional treatment processes. Water abstracted from the Waikato River travels through a number of different instream environments and therefore needs more advanced treatment, including membrane ultra-filtration and activated carbon, at the Waikato Water Treatment Plant. The Huia WTP is the third largest water treatment plant in Auckland after the Waikato and Ardmore WTPs in terms of volumes of water treated, and is a crucial component of Auckland's water supply network.

[12] Ibid., p37

[13] North-western Auckland water supply area is an integral part of the wider Auckland Metropolitan Water Supply system and is defined as: West Auckland (all of former Waitakere City boundaries), Kumeu, Huapai, the northern suburbs of North Shore (Albany, Glenfield), Orewa and Whangaparaoa.

[14] Western Water Supply - Reservoir Storage. Prepared for Watercare Services Ltd by Beca Ltd, Feb. 2019.

Once treated, water is sent around the region in an 8,900 kilometre-long network of pipes. Almost all of the water that Watercare treats feeds into the metropolitan network for Auckland and north Waikato communities. This metropolitan network extends from Pokeno in the south to Waiwera in the north. As indicted on Figure 2.1, some outlying communities such as Waiuku, Warkworth and Helensville have a local source and are not connected to the metropolitan network.

The metropolitan water supply system is an interconnected network of water sources, WTPs, large diameter transmission pipelines and treated water reservoirs. Wherever possible, the system is reliant on gravity to deliver water into discrete water supply zones.

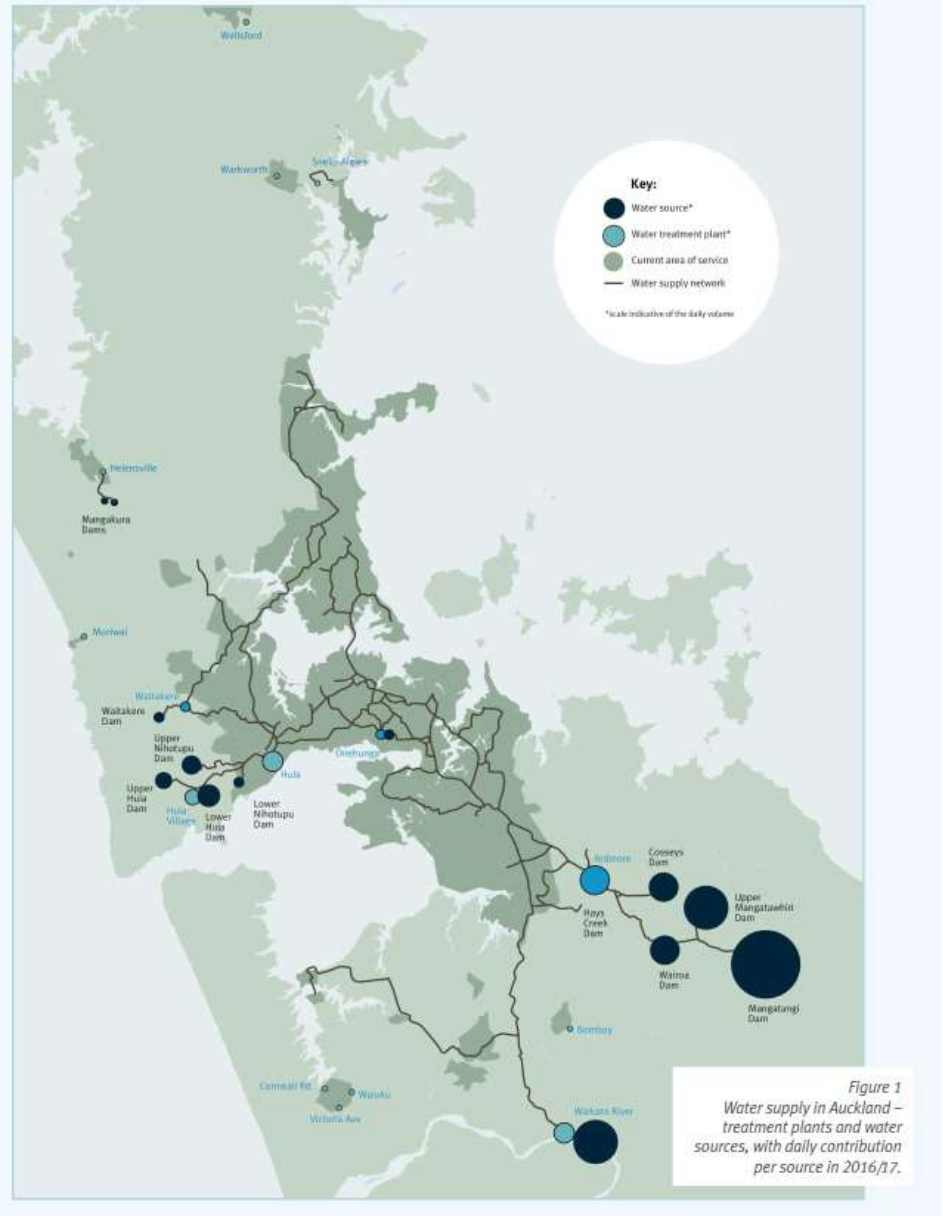

Figure 2.1: Auckland's bulk water supply system Source: p4, Water Efficiency Strategy 2017 – 2020.

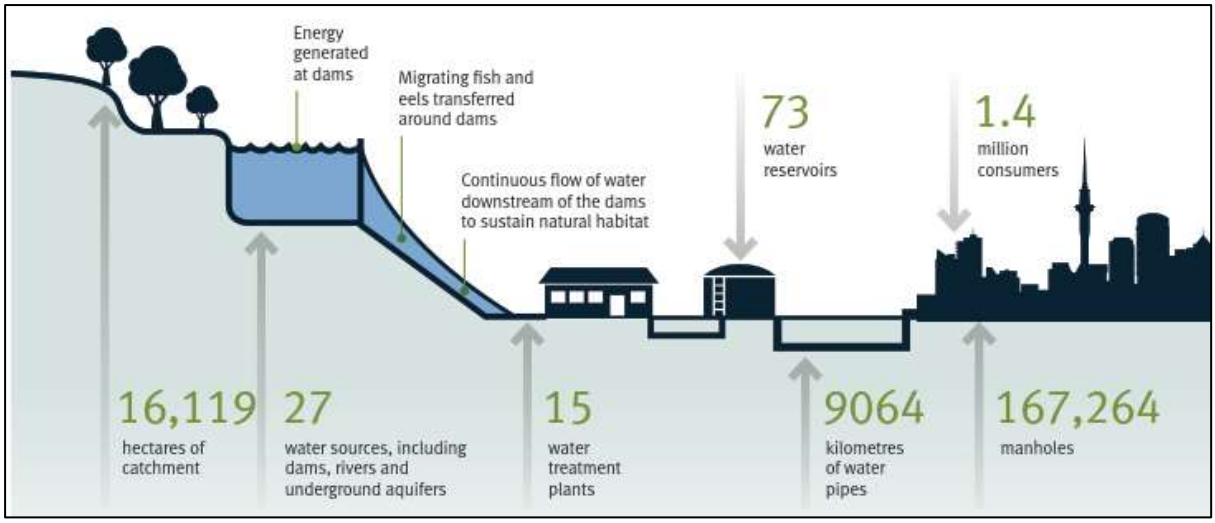

Figure 2.2: An overview of Watercare's water supply network. Source: p3, SOI 2017-2020 (Note: full figure shows continuation of wastewater network after consumption).

2.2.2 Providing for growth

Watercare services about 1.5 million people living in Auckland. Over the next 30 years the population will grow significantly. Statistics New Zealand has projected medium population growth of an additional 800,000 people and high population growth of one million people for Auckland. Watercare has adopted the medium population forecast for its planning purposes.

Watercare needs to meet the demands of that growth without compromising its mission to deliver reliable, safe and efficient water. Between 2019 and 2028 Watercare will invest $1.9 billion to build new infrastructure and renew ageing assets. This includes replacement of the Huia WTP. While the replacement WTP does not directly provide for growth, it is nonetheless critical to continue to provide a reliable long term water supply to service the north-west of Auckland. If the existing Huia WTP is not replaced, then over half of the 140 MLD of water supply which is to be provided by the replacement WTP would be required today and would not be available to support growth.

The combined capacity of the western WTPs (Huia and Waitakere) alone cannot meet the demands of the north-western water supply area. Due to historical growth within the area, the Huia WTP supply has had to be supplemented by water sourced from the south (Waikato and Ardmore) to meet daily water needs. Therefore to improve the resilience of the existing system, and to meet future growth in the north-west, additional infrastructure beyond that covered by this consent application will be progressively provided by Watercare as set out in the AMP. In particular, growth in water consumption is planned to be provided for by further expansion of the Waikato River abstraction and treatment plant as set out in section 2.1.4.

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. The provision of this infrastructure is recognised in, and needs to be developed in accordance with, the Auckland Plan 2050 and associated Development Strategy.

2.2.3 Demand management

The Auckland water efficiency strategy 2017 – 2020 outlines Watercare's approach to reduce the pressure on Auckland's water supply. The plan proposes strategies to manage demand based on the type of consumer (e.g. domestic, commercial, industrial etc.) as well as specific initiatives such as smart-metering, consumer education, reducing water-losses from the network, and water

conservation and efficiency services to reduce demand. The overall aim of the strategy is to improve water efficiency over time which will in turn help to delay investment in new water sources, treatment and network infrastructure.

Watercare operates a universal water metering system and incorporates regular conservation messages in its customer billing and on its website. Watercare has also been working with customers to reduce per-person demand through a range of initiatives including its 'Be Waterwise' programme. Aucklanders already have the lowest residential per capita water consumption in New Zealand according to the 2016 Water New Zealand performance review and as set out in the AMP, demand management initiatives are expected to further reduce the gross (residential, commercial and industrial) per capita consumption from 272 litres per person per day (L/p/d) to 253 L/p/d by 2025[15].

Watercare implements a comprehensive and well established maintenance regime to reduce leakage and maintain the effectiveness of its infrastructure, including fixing leaks and undertaking repairs in a timely and efficient manner. In terms of emergency demand management, Watercare has a comprehensive Water Conservation Plan that designates actions at various trigger levels should a major incident such as the "Tasman Tempest" (refer to Section 2.2.5) occur that requires a demand reduction.

2.2.4 Drinking water standards

Untreated or inadequately treated drinking-water contaminated with pathogens presents a significant risk to human health. Following recent outbreaks of contaminated water supply overseas, specifically in Canada, and domestically in Havelock North, there is an increased awareness of the need to ensure that New Zealanders are supplied with high quality, safe drinking water.

The Ministry of Health (MoH) DWSNZ specifies the minimum drinking water quality standards, compliance criteria (including reporting and water quality monitoring requirements), and remedial actions for drinking water suppliers in New Zealand[16]. One of Watercare's strategic priorities is to supply the highest quality 'Aa'-graded drinking water to all properties compliant with MoH DWSNZ[17].

The existing Huia WTP currently is graded 'A' and is fully compliant with the requirements of DWSNZ, however it was not designed to meet the current and short-term future source water quality challenges. Over the years the quality of the raw water feeding the Huia WTP has changed (declined). This, together with increases in Drinking Water Standards, has required process upgrades to occur. Therefore interim upgrades and process additions have been made to the existing WTP (nearly 90 years old) to ensure that it can meet its drinking water quality objectives until the replacement plant is commissioned.

To be able to continue to supply 'Aa'-graded drinking water to Aucklanders, the existing Huia WTP needs to be replaced. The replacement WTP will be designed with advanced processes appropriate for the treatment of raw water now received, and into the future. It will be capable of mitigating microbial public health risks and address current and future organic and cyanobacterial water quality influences.

2.2.5 Resilience of water supply

Currently around 75% of Auckland's water supply is provided by sources and treatment plants to the south of the main metropolitan area. Significant yield augmentation (increased Waikato River take), increased conveyance, and new treated water reservoirs in Pukekohe East and Redoubt Road, are being provided in the southern part of the region and will be conveyed north to meet growth over

[15] AMP 2018 – 2038,

[16] DWSNZ only applies to drinking water suppliers that provide drinking-water to over 500 people.

[17] The capital 'A' in the MoH grading means the quality of water leaving the treatment plants, and the quality of the source water. The lower case 'a' means the quality of water received at people's homes or businesses.

the next 35 years. However, treated water capacity across the region provides resilience to the water supply system.

The Huia WTP is of significant strategic importance due to its location on the western edge of the water supply network. Although it primarily services the western and northern suburbs of the city, water from the WTP can also be distributed to other parts of the Auckland water network as required. Because of this, the WTP is able to provide a degree of resilience in response to the reliance on the southern sources. It is dependent on different water sources (Western dams) and supply infrastructure and therefore is often able to operate independently to the outage events that occur elsewhere.

In addition, due to the use of gravity based water sources and low energy treatment facilities the Huia WTP has the capability to supply water to Auckland from the upper dams with minimal power requirements. Internationally, water suppliers proactively seek to maximise the use of gravity water sources and treatment to minimise the cost of water production by reducing associated pumping costs, increase reliability and mitigate the risks associated with power outage. This provides significant resilience and system efficiency benefits. As such, the Huia WTP plant has an important role in supplying water to the region in emergency situations and in the event of a major power supply disruption.

The current Huia WTP has a maximum short run production of 126 MLD. The replacement Huia WTP will have a maximum short run production capacity of up to 140 MLD[18]. This will assist in meeting peak demand periods and improve the current system resilience to the north-west of the Auckland region. This is part of a number of related initiatives to improve system resilience, including additional reservoir storage capacity associated with the new Huia WTP to increase the treated water storage for West Auckland and ensure that Watercare continues to meet the public health grading requirements to have 24 hours of storage as a contingency during system outages. Also the NH2 project provides an additional route for conveying water from the west to the north to provide resilience and increased transmission capacity.

Currently there is a significant reliance on the Ardmore WTP which typically treats between 60 to 70% of all of Auckland's water. The importance of the Huia WTP with respect to the resilience of Auckland's water supply was demonstrated during the "Tasman Tempest" event which brought extreme rainfall across Auckland, particularly in the south from 7-12 March 2017. Intensified rainfall in the Hunua Ranges meant that slips and sedimentation occurred in all of the supply dams. As a result of the added silt, production at the Ardmore WTP was significantly reduced. The performance of the Waikato WTP was also affected by the very high level of organics in the Waikato River from upstream activities. The reliance on the Huia WTP during this time ensured Auckland's water supply was maintained and continued to deliver 'Aa' grade water despite the effects of this extreme weather event on Auckland's largest and second largest water treatment plants. This strategic importance of the Huia WTP is only likely to increase with the projected increase in climate variability in the Auckland Region.

2.3 Huia WTP planning

Watercare has been planning to replace or significantly upgrade the Huia WTP since 2008. Key elements of the regional water supply strategic framework relevant to the development of the replacement WTP are summarised below.

[18] It should be noted that the long run processing capacity of the replacement Huia WTP will be similar to the existing plant as the sustainable draw from the four supply dams has not changed.

2.3.1 Three Waters - Final 2008 Strategic Plan

The "Three Waters - Final 2008 Strategic Plan" (Watercare, 2008) is a regional strategic plan for water supply, wastewater management and stormwater. The Three Waters - Final 2008 Strategic Plan places a strong emphasis on water demand management to delay the need to provide a new water source for up to 20 years, whilst acknowledging that population growth means treated water capacity upgrades will also be required. Furthermore, it identifies that many of the region's existing water supply assets will also need upgrading to meet more stringent New Zealand Drinking Water Standards and provide greater security of supply.

2.3.2 Water source augmentation options

In 2009 Watercare undertook an assessment of the future water supply needs of the Auckland region over a 50 to 100 year horizon[19]. The purpose of this study was "*… to identify the most appropriate mix of bulk water supply augmentation options required to meet future (50 to 100 year) demands and security of supply*".

The 2009 report identified the top eight highest risk assets in Auckland's water supply system. Huia WTP was identified as one of the highest risk assets, the failure of which could "*result in water supply failure to customers with serious financial, social and environmental impacts*".

The report considered 34 potential options for supply augmentation. The top ranking options were several demand reduction options. The top ranked infrastructure options included upgrading and expanding the existing Huia WTP to 140 MLD and expanding the Waikato scheme. Since this time the Waikato plant has been expanded from 75 MLD to 150 MLD, with expansion to 175 MLD well advanced and further staged expansion to 250 MLD planned in the future. In applying for consent for an increased take beyond 150 MLD from the Waikato River, Watercare committed to maximise the harvesting of water from the Western sources.

In regards to the existing Huia WTP, the Options Report recommended that a comprehensive master plan should be compiled for the future development of the Huia WTP. However it also recommends the structural condition and remaining life of the existing civil structures at the Huia WTP should be assessed and this option reconsidered on completion of the Huia Master Plan.

This report also considered a new 160 MLD WTP across the road from the existing Huia WTP which was identified as one of the lowest ranked options. However this was on the basis of a high level desk top assessment and prior to a detailed asset condition assessment that determined upgrading the current WTP was not feasible given its age and the need to maintain supply.

2.3.3 Huia WTP Master Plan

In 2008 Watercare commissioned Hunter Water Australia to develop a Master Plan for the Huia WTP[20]. As part of the development of the Master Plan, a high level asset review was undertaken. This identified that the Huia WTP is approaching the end of its economic life with a number of process structures due for replacement while other process units are constrained by their treatment capacity. Further to this, the plant output can be constrained by seasonal variability in the quality of the incoming raw water, which cannot always be treated by the current process.

The Master Plan assessed the current and future role of the Huia WTP and concluded, amongst other things, that:

- Watercare has a very substantial investment in infrastructure in the Western Dams;

[19] Auckland Future Water Source Augmentation Options, Watercare Services Ltd, June 2009
[20] Huia Water Treatment Plant Master Plan, Final Report, Hunter Water Australia, March 2010

- Huia WTP supplies and will continue to supply as a base load plant to West Auckland and approximately one third of the supply for North Shore, Orewa and Whangaparaoa;
- The Huia WTP has an important role in minimising the cost of water supply in the Auckland region;
- The upper sources are a gravity supply hence it is seen as a sustainable source of water which could provide short term supply mitigation during a major system power outage;
- An increase in the peak capacity of the Huia WTP increases the overall system flexibility and hence system security. This is important in reducing the risk to the southern sources;
- The plant has an important role in providing peak water needs to the Auckland region; and
- The future plant will be designed to cater for seismic events in the region. This will improve the security of supply for the overall network.

The project boundary for the Huia WTP Master Plan was confined to the boundaries of the existing Huia WTP site. The recommended configuration in the Master Plan was a new facility on the existing site. However the Master Plan also raised significant issues regarding asset condition and the viability of investing in an asset base that is nearing the end of its serviceable/economic life.

2.3.4 Consideration of alternative sites

As part of the Huia WTP project planning phase, Watercare undertook a detailed site alternatives assessment that considered and evaluated a preliminary longlist of 21 alternative locations to construct a new WTP and associated reservoirs to replace the aging Huia WTP. The initial site identification and evaluation process considered site suitability and technical feasibility to connect to the existing water supply network. For the reasons outlined in Section 2.2.5 above, a fundamental characteristic for site selection was the ability to construct a gravity fed WTP that limits pumping and provides gravity flow from the raw water source and/or to the reservoir storage and wider water supply network.

The longlist was then refined into eight WTP schemes and within each of the eight schemes a preferred site for further evaluation was identified. A Multi-Criteria Assessment (MCA) approach was adopted by Watercare as a tool for comparing and assessing the WTP schemes and site options. Section 5.4 of this report provides further details on the MCA process and the matters considered and evaluated as part of this process.

This assessment of alternative WTP sites was driven by the requirements of the RMA, but also by Watercare's desire to ensure that the proposed new plant is considered strategically in terms of selecting the best option for the operation and future development of Auckland's water treatment and drinking water supply network. As noted in Section 1.1, on June 2017 the Watercare Board accepted the recommendation of Watercare Management to select the Manuka Road option which is the subject of this application, as the preferred site for the development of the replacement WTP.

2.3.5 Consideration of alternative layouts

Following confirmation of the preferred site by the Watercare Board, an onsite alternatives assessments have been undertaken to determine the most appropriate footprint for the replacement WTP and for the reservoirs. These assessments have focused on avoiding, as far as practicable, effects on the values of the SEA and the streams and otherwise minimising and mitigating adverse effects. Section 5.5 of this report provides further details on the layout optimisation exercise which was undertaken in accordance with Schedule 4 of the RMA and also to reflect the Watercare Board's direction to avoid, as far as practicable, significant trees and significant ecological effects on the preferred site.

3 Environmental setting

3.1 Site location and description

The replacement Huia WTP site is located on land owned by Watercare which is designated for Water Supply purposes. Designation 9324 encompasses three sites and the overall WTP scheme spans each of these sites:

i The site located south of Woodlands Park Road and east of Manuka Road has a total area of approximately 4.2 ha. Within this site, the Project works associated with the replacement Huia WTP are approximately 2.7 ha in area, approximately 2.2 ha of which forms the permanent plant footprint;

ii The site located north of Woodlands Park Road has a total site area of approximately 6.4 ha. Within this site, the Project works associated with the NH2 shaft and Reservoir 1 are approximately 0.8 ha in area;

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

The Project works area is approximately 4.3 ha across the three sites within a total combined site area of 15 ha.

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. Reservoir 1 which is required immediately to enable the replacement WTP to be commissioned is to be located on the northern side of Woodlands Park Road below Exhibition Drive directly across from the existing Huia WTP. Reservoir 2 is located on the site of the existing Huia WTP, and will be constructed once the existing WTP has been decommissioned (see Figure 1.1 above).

The sites are accessed from Woodlands Park Road which is identified as a collector road. The replacement WTP site is undeveloped and development on the Reservoir 1 site is currently limited to an existing small process tank and associated pipework which will be decommissioned and removed as part of the Project works. The existing WTP site is developed with water treatment plant and associated buildings and hardstand areas as well as a discharge attenuation basin.

The site is located within the Waitakere Ranges Heritage Area. An SEA overlay in the AUP which extends throughout much of the Waitakere Ranges (SEA T 5539 – 24,000 ha) covers most of the replacement WTP site and Reservoir 1 site, and covers undeveloped parts of the existing WTP site (approximately half of the site). A scheduled kauri tree (AUP reference CHI 2175) is located in the northwest corner of the replacement WTP site and will not be impacted by the works.

The replacement WTP site is located within the Rural Urban Boundary (RUB), 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. There are 5 residential sites adjoining the proposed WTP southern boundary, 11 properties located on the ridge at an elevation well above the Reservoir 1 site, and 12 immediately neighbouring properties directly to the south of the existing WTP site.

A section of Clarks Bush track, which is currently closed by Auckland Council due to Kauri dieback, traverses through the proposed WTP site along the southern boundary. Exhibition Drive, which runs along the northern side of the proposed reservoir site, is a popular walking track providing linkages through to the wider regional parks network of tracks.

The only recorded historic heritage site in close proximity is the existing Huia Filter Station (Auckland Council GIS reference CHI 3397) located on the existing WTP site at 32 Woodlands Park Road. Also in the vicinity is the Nihotupu Filter Station (CHI 3419) which is located further to the east along Woodlands Park Road at 219 Scenic Drive near the intersection with Scenic Drive. These are cultural landscape features associated with the long-established presence of water harvesting, storage, treatment and conveyance infrastructure within the Waitakere Ranges and associated human modification to the landscape.

3.2 Waitakere Ranges water supply catchment

Raw water to the replacement WTP will be supplied from the existing Huia raw water sources; that is the four dams which 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 and identified as an SEA. The Water Supply Management Area Overlay in the AUP provides for the protection of the water catchments that supply the freshwater to Auckland municipal water supply dams. The Waitākere water supply management area 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.

3.3 Topography

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 slope up towards Scenic Drive.

The proposed Reservoir 1 site on the northern side of Woodlands Park Road is relatively hummocky with a knoll located in the southwestern corner of the site. A small gully feature (Armstrong Gully) runs north to south though the middle of the site. A short ridge leads to another knoll towards the eastern boundary of the site in the vicinity of the Woodlands Park Road/ Manuka Road intersection. Extremely steep slopes are present along the northern boundary beneath and above Exhibition Drive.

A topographic section through the Reservoir 1 and replacement WTP sites is provided in Figure 3.1 below.

The existing WTP site, on which Reservoir 2 is proposed, 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.

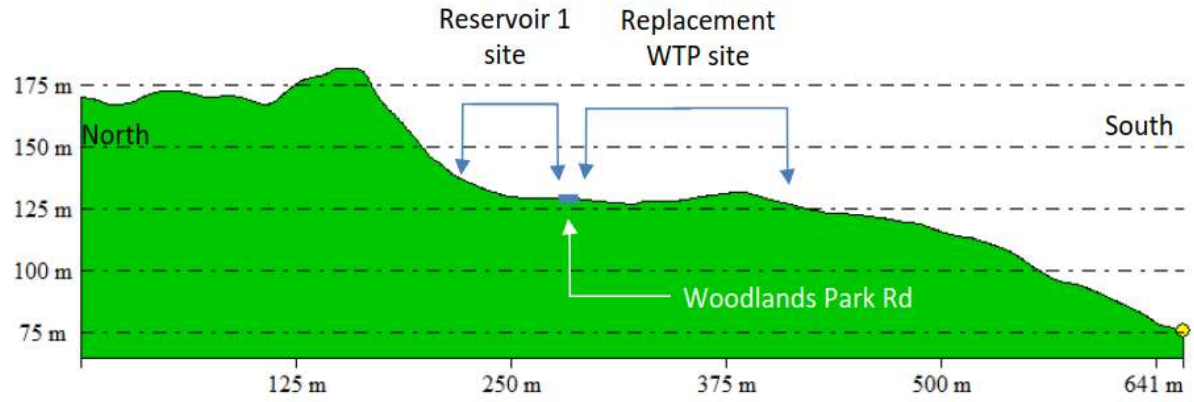

Figure 3.1: North-south topographic section through the Reservoir 1 and replacement WTP sites. (T+T (Appendix H), 2019)

3.4 Geology and groundwater

The published geological information[21,22] indicates the site is located at the junction of three major geological units: the Cornwallis Formation, the East Coast Bays Formation (ECBF), both part of the Waitemata Group and the Nihotupu Formation, which is part of the Waitakere Group. All three formations are predominantly sandstone-dominated marine sediments with a variable volcanic component.

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 site are underlain by fill material in areas of previous development, and generally underlain by colluvial landslide slope deposits, and at least in part, by the Nihotupu Formation rather than the Cornwallis Formation.

A desktop Groundwater and Settlement Report has been prepared by T+T (attached as Appendix H). Available data indicates that there are two groundwater systems present within the Project Site: one in the colluvium or residual soils at approximately 6 metres below ground level (mbgl) and a deeper groundwater system in the rock of approximately 9 mbgl.

[21] 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
[22] 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

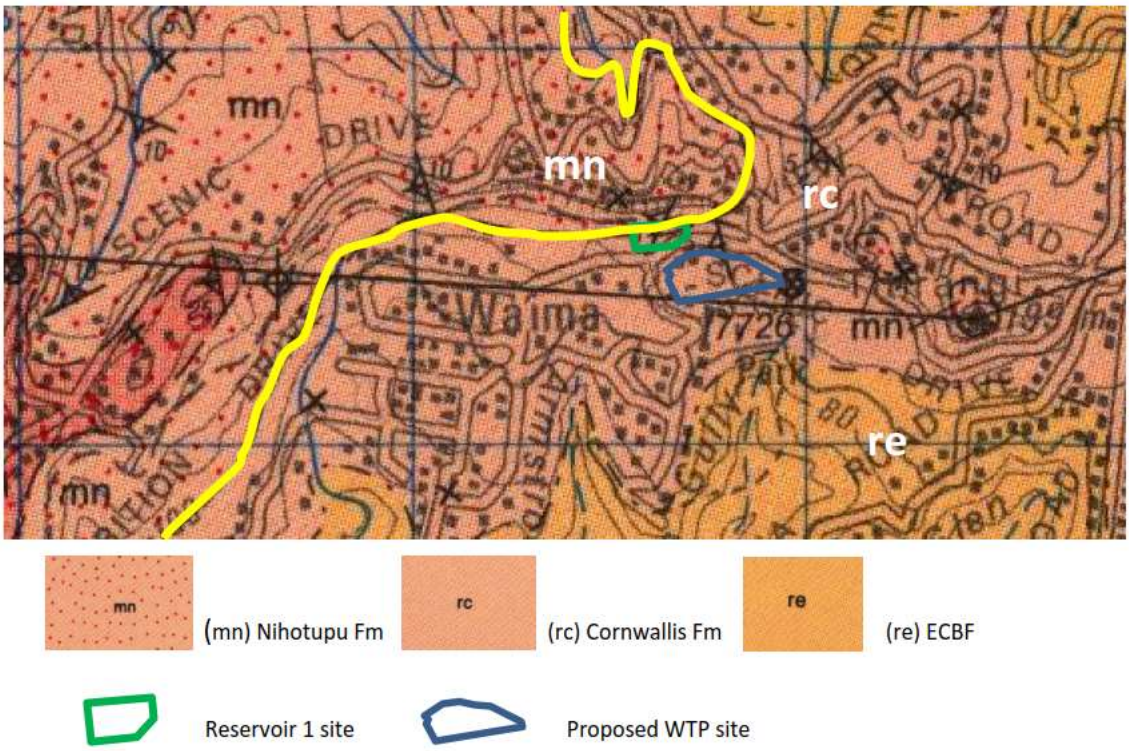

Figure 3.2: Published geology (from Kermode, 1992). The yellow line distinguishes the Nihotupu Formation from the Cornwallis Formation (T+T 2019, Appendix H)

3.5 Hydrology

The Project Site is situated at the head of the Little Muddy Creek catchment within the wider Manukau Harbour catchment. The proposed replacement WTP will primarily be located within the headwaters of the Yorke Gully. Reservoir 1 is located near the headwaters of the Armstrong Gully. Both of these streams discharge into the Waituna Stream before discharging into Little Muddy Creek. The Yorke Gully receiving environment is located within Waitakere Ranges Regional Parkland, commonly referred to as Clarks Bush.

The watercourses present on the sites have been identified based on a site-specific assessment, and taking into account the definitions of permanent, intermittent and ephemeral streams within the AUP (refer Figure 3.4 below. Note these are shown in larger A3 format in the Ecological Assessment in Appendix L).

North of Woodlands Park Road, the upper Armstrong Stream runs through the western side of the Reservoir 1 site before turning south and passing under Woodlands Park Road and the existing WTP via a culvert. The stream is largely permanent but as flows decrease up the catchment it becomes intermittent or ephemeral. A smaller ephemeral watercourse branches off to the east within the Reservoir 1 site.

The Armstrong Stream is piped beneath Woodlands Park Road and the existing WTP site to the southern boundary of the site, where controlled discharges from the existing WTP also occur. Another headwater branch originates east of Manuka Road and flows as an open channel through the eastern part of the existing WTP. The confluence of the two stream arms is at a culvert structure near the southern boundary of the existing WTP.

On the replacement WTP site, the general topography consists of shallow gullies and basins sloping from the west to the southeast, with some steeper slopes near Scenic Drive in the northeast. The streams combine and fall into a steep gully near the southern boundary. The majority of the

streams in the upper gullies and basins on the site are ephemeral only and carry surface runoff. Some intermittent sections of stream (with defined channels and occasional pools) occur near the southern boundary. The extent of permanent streams on the replacement WTP site is minimal.

Auckland Council GEOMAPS models a number of overland flow paths on the eastern side of the proposed replacement WTP site which ultimately discharge to Yorke Gully. Overland flow paths are also identified on the western side of the proposed reservoir site and along its southern boundary. Potentially flood prone areas are identified alongside the permanent stream on the proposed reservoir site.

The Project Sites are located with a Stormwater Management Flow 1 overlay (SMAF1).

Figure 3.3: Streams within the Project Site *(Boffa Miskell, 2019)*

3.6 Freshwater ecology

Boffa Miskell Ltd has undertaken an assessment of the freshwater (and terrestrial) ecological values of the Project Sites. Their report is contained in Appendix L and is summarised in the following sections.

Watercourses within proximity to the proposed footprint of works were assessed for their permanence based on the definitions within the AUP. Figure 3.3 and Figure 3.8 below identify the location and extent of freshwater habitats on the Project Site. Basic stream attributes such as channel, bank, in-stream and riparian habitat were recorded for all watercourses, with full habitat assessments undertaken at selected permanent and intermittent stream sites using the Stream Ecological Valuation (SEV) methodology. Fish and macroinvertebrate communities were assessed at three sites. The Macroinvertebrate Community Index (MCI) was also used in the ecological assessment of the site as an indicator of stream water quality.

3.6.1 Armstrong Gully

The site on which Reservoir 1 is to be located encompasses the headwaters of the Armstrong Gully. South of Woodlands Park Road, the main Armstrong Gully watercourse is piped under the existing Huia WTP (and proposed Reservoir 2 location), discharging into the open channel of the Armstrong Gully stream near the southern boundary of the existing Huia WTP. An intermittent-to-permanent tributary of the Armstrong Gully watercourse has an open channel in its upper reaches (in the north-eastern corner of the existing WTP site) before being piped.

The following sections summarise the assessed ecological value of each of the surveyed stream reaches.

Armstrong Gully stream – Reservoir 1 site

The Armstrong Gully stream to the north of Woodlands Park Road site scored an SEV value of 0.747 indicative of a good quality stream. The stream displays a natural, stable stream channel with no external modifications, inputting stormwater or preventing access to the full floodplain during storm events. Habitat provision functions scored relatively lowly which indicates poor habitat for aquatic fish and fauna. This is predominantly because of the unsuitable spawning habitat for fish due to the lack of low-growing bank-side vegetation and gravels, or instream gravels and cobbles. Biodiversity provision functions is a combined measure of the fish and macroinvertebrate communities present within the reach and the condition of the adjoining riparian vegetation. This function scored moderately low, as no fish species or high value EPT taxa were present within the community, though riparian vegetation intactness scored reasonably well.

A range of macroinvertebrates were found with the community dominated by the amphipod *Paraleptamphopus* and the chironomid midges (*Polypedilum and Tanypodinae*) accounting for 49% and 34% of individuals, respectively. The MCI-sb[23] score of 95.3 is indicative of 'Fair' water quality, with possible moderate pollution.

No fish species were caught or observed along a 50m reach of the stream.

Armstrong Gully tributary (Manuka) – replacement WTP site

The Armstrong Gully tributary near the corner of Woodlands Park Road and Manuka Road is an open channel fed by a small 200 mm diameter pipe flowing under Woodlands Park Road with a 10 m long culvert located in the middle of the reach, and a second shorter culvert. Two pools of water were observed at the time of the survey but otherwise no water flow was present. Riparian vegetation is a mix of low native and exotic scrub with heavily weed-infested groundcover.

Armstrong Gully stream – receiving environment

The Armstrong Gully receiving site located approximately 35 m downstream from the existing Huia WTP scored an SEV value of 0.770 indicative of a good quality stream. The stream is located in a steep gully and had a moderate habitat diversity with woody debris, undercut banks, cobble and the occasion overhanging vegetation present.

Macroinvertebrate taxonomic richness was high. The chironomid midge *Polypedilum* dominated the community accounting for 31 % of individuals, followed by the net-building caddis *Orthopsyche* accounting for 25 % of individuals. The presence of *Orthopsyche,* particularly when in conjunction with mayflies and stoneflies, is an indication of good water quality (Landcare Research, 2018). The MCI score was 106, which is indicative of 'Good' water quality, with possible mild pollution.

A shortfin eel was the only fish observed at this site.

[23] A variation of the MCI designed for streams with a predominantly soft substrate (soft bottom).

Hydraulic functions within the receiving Armstrong Gully site were scored moderately as the channel itself appears moderately natural but is highly incised in places with some evidence of historical erosion protection works. Biogeochemical functions showed good functionality, with very good dissolved oxygen levels and organic matter inputs. Biodiversity provisions scored moderately well as a result of a poor fish population, but a good abundance of EPT taxa and good riparian condition and connectivity.

3.6.2 Yorke Gully

The replacement WTP site is within the headwater catchment of the Yorke Gully. Watercourses running through this footprint discharge into the open channel of the Yorke Gully Stream which intersects the adjoining Clarks Bush Reserve.

The following sections summarise the assessed ecological value of each of the surveyed stream reaches.

Yorke Gully – replacement WTP site

The Yorke Gully stream within the replacement WTP has an average channel width of 0.5m with intermittently flowing water and isolated pools present. The survey site received a high score for hydraulic functions indicating a natural, stable stream channel with no external modification or inputs of stormwater and full access to the floodplain during storm events. Dissolved oxygen levels, and organic matter input both scored 1.00 showing high biogeochemical functionality. This reach scored poorly for habitat provisions functions, mainly due to the unsuitability of fish spawning habitat. Riparian condition and connectivity was good.

A short, ephemeral section of stream is located upstream of this intermittent branch of the Yorke Gully stream. It was covered in leaf litter with no discernible stream banks.

Yorke Gully – receiving environment

The Yorke Gully stream receiving environment downstream of the replacement WTP site is a substantial stream with an average channel width of 1 m, high hydrologic heterogeneity, and typically good shading present. The site scored an SEV value of 0.845 indicative of an excellent quality stream. Hydraulic functions scored highly indicating good hydraulic functionality. Biogeochemical functionality was moderate to high and habitat provisions demonstrated high functionality. Biodiversity provisions scored moderately well which was primarily driven by relatively low fish diversity. The macroinvertebrate community returned a good MCI score of 119[24] with good EPT abundance and community diversity. Riparian condition and connectivity was very good.

Along a 50 m reach ten fish were observed from three species (Koura, Longfin Eel and Inanga), the latter two of which are listed as At Risk – Declining. A fish survey was not undertaken in the Yorke Gully - replacement WTP site as there was not enough available water.

3.6.3 Summary

Overall, freshwater habitats are varied across the potential impact and receiving environments of the existing, proposed replacement Huia WTP and Reservoir 1 sites. The permanent watercourses within the downstream receiving environments of the Armstrong Gully and Yorke Gully are incised gully streams of high ecological value. Freshwater habitats within the Project Site are typically intermittent or ephemeral in nature, with the exception of the Armstrong Gully reservoir site stream which was permanent. This permanent watercourse was of moderate-high ecological value. The

[24] 'Excellent' is > 119.

smaller intermittent watercourses are typically of moderate-low ecological value, with limited surface water at the time of sampling.

3.7 Terrestrial Ecology

Boffa Miskell Ltd has undertaken an assessment of the terrestrial (and freshwater) ecological values of the proposed replacement WTP site and the reservoir site. Their report is contained in Appendix L and is summarised in the following sections.

3.7.1 Overview

The Waitakere Ranges is ecologically significant as one of the largest areas of coastal and lowland forest remaining in the Auckland Region. The Waitakere Ranges supports a wide range of habitats including forest, shrubland, freshwater and coastal/saline ecosystems. The forest types reflect the history of forest clearance and milling but include remnant kauri and podocarp broadleaf forest, coastal forest, and large areas of regenerating manuka and kanuka.

The site is also located on the fringe of the Waitakere Ecological District and within the Waitakere Ranges Heritage Area and is almost completely vegetated in native bush. It is identified as part of an extensive Significant Ecological Area (SEA_T_5539) in the AUP which essentially extends throughout the entire Waitakere Ranges area. The site features characteristic components of the Waitakere Ranges forest ecosystems, including kauri and podocarp forest remnants, regenerating secondary forest, and freshwater habitats. As with much of the surrounding landscape, historical aerial photographs illustrate the site's history of vegetation clearance and modification.

Figure 3.4: 1940 aerial photograph of the Project Site (Auckland Council Geomaps, 2019).

Figure 3.5: 1959 aerial photograph of the Project Site (Auckland Council Geomaps, 2019).

Figure 3.6: 2017 aerial photograph of the Project Site (Auckland Council Geomaps, 2019).

3.7.2 Vegetation

Vegetation types

Based on the ecology surveys undertaken by Boffa Miskell Ltd, four key groupings of vegetation have been identified: Kanuka forest, Kauri – podocarp forest, Kanuka broadleaf scrub mosaic and modified scrub (Figure 3.7 below). Large trees within the Project Site (over 20 cm diameter) are also identified in Figure 3.7 (refer Appendix L for A3-scale figures)

Kanuka is the most common and widespread canopy dominant throughout the site but is noticeably sparse in areas where kauri are abundant. Mahoe and kahikatea are also dominant with the latter surrounding the watercourse and floodplain in the north-western quarter of the site.

Vegetation types are generally consistent with characteristic forest communities of the Waitakere Ranges and no threatened or at risk plants were observed within the site, though a few threatened species were identified on the escarpment below Exhibition Drive.

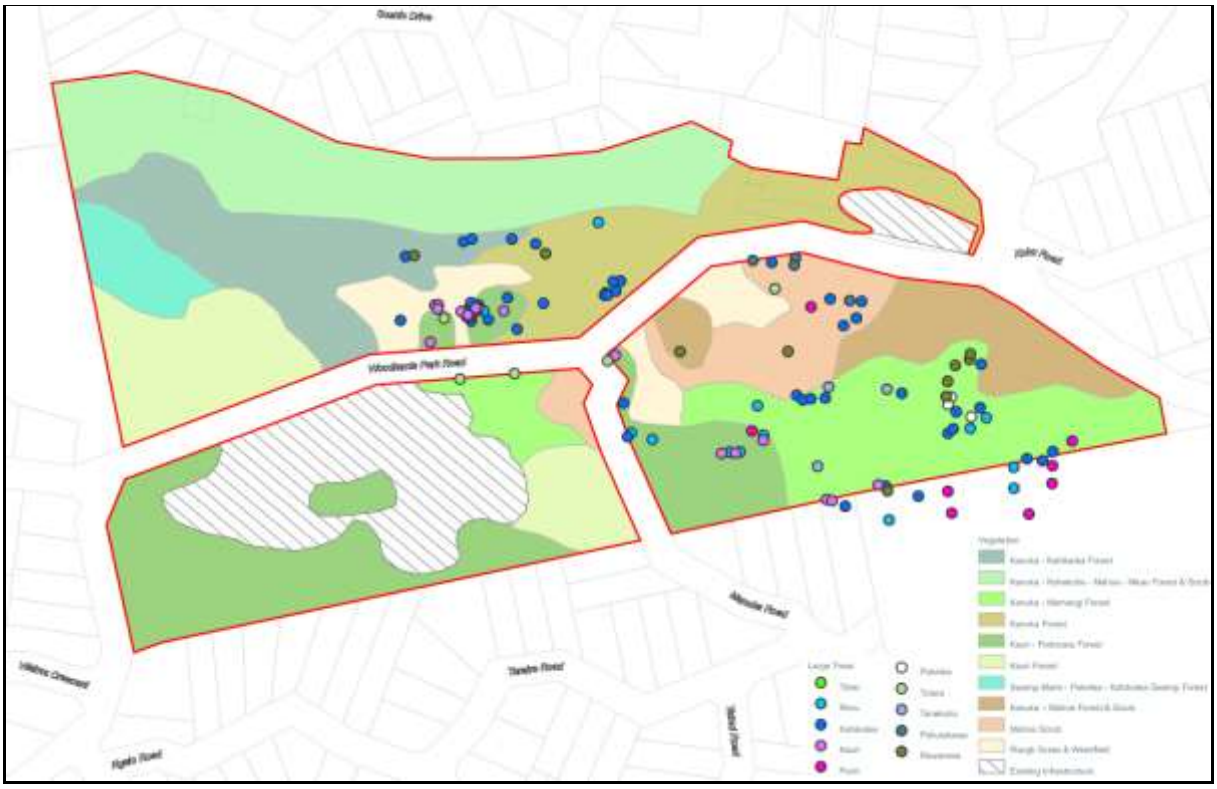

Figure 3.7: Vegetation types and large trees *(Boffa Miskell, 2019)*

Ecological integrity

The assessment of ecological integrity compares the structure, composition, and function of an ecosystem to reference ecosystems operating within natural or historical disturbance regimes. An ecosystem-specific metric was then developed to compare component vegetation communities within the site to distinguish between highly impacted, degraded or depauperate states of vegetation compared to relatively unimpaired, complete and functioning states. The ecological integrity evaluation identified a gradient in the quality and condition of the ecosystem within the Project Site. Based on this analysis, an ecological integrity map was prepared to assist decision-making around ecosystem values and priorities for the site. The results of the ecological integrity analysis are mapped on Figure 3.8

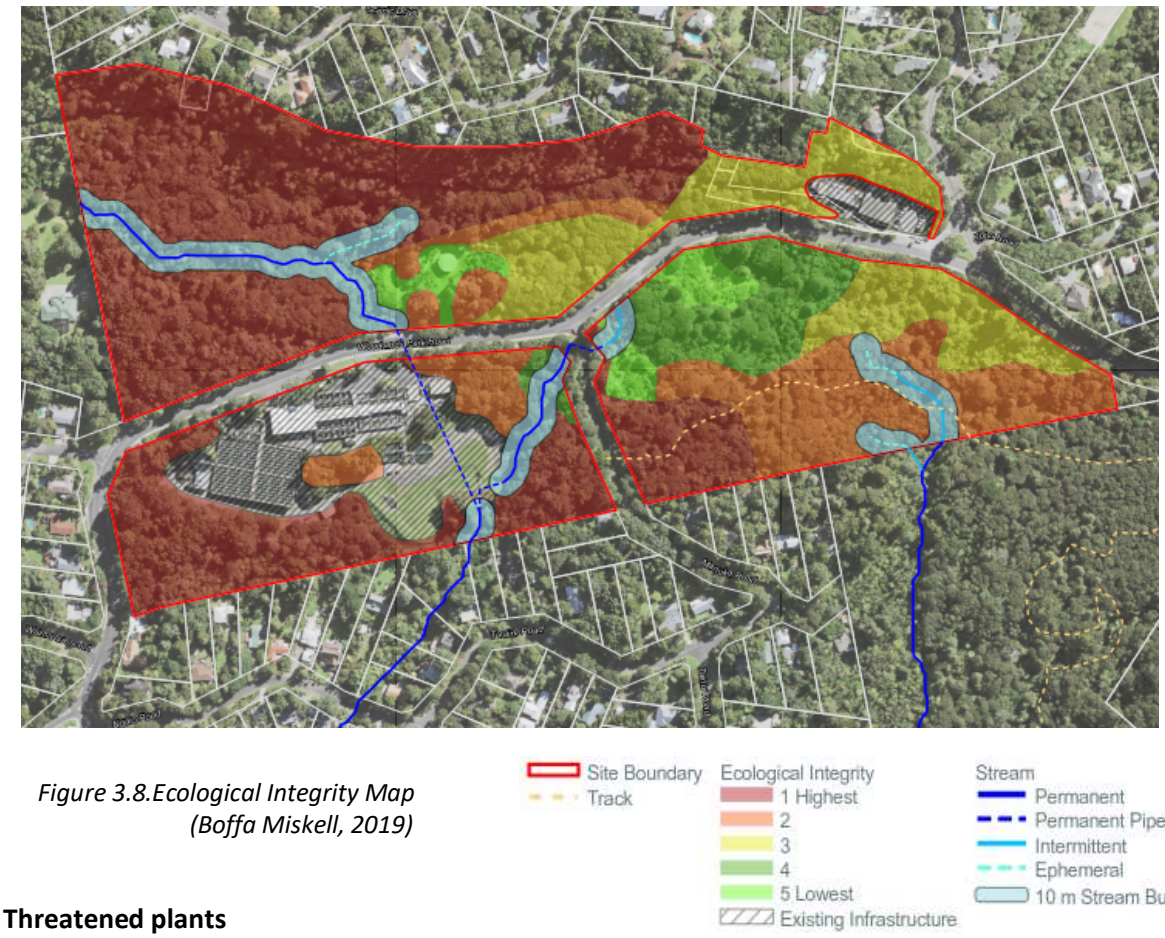

Figure 3.8.Ecological Integrity Map (Boffa Miskell, 2019)

Threatened plants

The Department of Conservation's most recent revision of the conservation status of New Zealand indigenous vascular plant taxa[25] includes kauri (due to kauri dieback disease) and all Myrtaceae (due to myrtle rust) in the nationally threatened plant list. The threatened plants identified in the site comprise: kauri, pōhutukawa, climbing ratas, maire tawake, kanuka, manuka, and *Elaeocarpus hookerianus*.

Kauri dieback

Phytophthora taxon *Agathis* (PTA) infection (Kauri dieback) has emerged as a major and significant threat to the future of the Waitakere Ranges Heritage Area's forest ecosystems. Symptoms of kauri dieback were observed on a single large kauri tree within the mature kauri forest stand in the north western quarter of the Project Site.

3.7.3 Reptiles and amphibians

Database records within 10 km of the site included five native terrestrial lizard species, with three records of forest gecko in the immediate vicinity of the Project Site. A diverse native lizard community has been detected in the surrounding area and suitable lizard habitat occurs on site.

Six copper skinks and one unidentified skink were detected during site surveys. No geckos were detected. Detection rates and diversity of native lizards within the site were both very low, however the availability of suitable habitat on the site presents a reasonable likelihood that a range of species recorded in the surrounding area are present on site.

[25] de Lange, P.J.; Rolfe, J.R.; Barkla, J.W.; Courtney, S.P.; Champion, P.D.; Perrie, L.R.; Beadel, S.M.; Ford, K.A.; Breitwieser, I.; Schonberger, I.; Hindmarsh-Walls, R.; Heenan, P.B.; Ladley, K. 2018: Conservation status of New Zealand indigenous vascular plants, 2017. New Zealand Threat Classification Series 22. Department of Conservation, Wellington. 82 p.

3.7.4 Bats

The Waitakere Ranges is key habitat for long-tailed bats in Auckland and multiple bat surveys have been undertaken in the vicinity of the site. Bat acoustic surveys were undertaken by Boffa Miskell between November 2017 and November 2018 at 22 locations across the site. During the survey period uncertain passes (bat echolocation calls) were recorded. Follow-up surveys in December 2018 and January 2019 determined that the uncertain records from previous acoustic surveys were most likely passing cars, and were not bat passes.

Surveys undertaken on behalf of Auckland Council at eight monitoring locations within 2.6 km of the site did not record bats. Given the relative proximity of known bat roosts coupled with the extensive habitat connectivity between the site and the previous records, Boffa Miskell considers that long-tailed bats may use the area occasionally but are unlikely to roost in the Project Site.

3.7.5 Birds

The birdlife assessment included a desktop review, five-minute bird counts and incidental observations, acoustic monitoring and data analysis. Fourteen bird species were detected within the Project Site during the bird counts - seven native and seven exotic bird species. Tui were the most abundant species across the Project Site and Kereru were detected at two of the monitoring sites. Given the presence of numerous emergent kauri and podocarp trees, and periodically abundant food sources (e.g., during mast kahikatea fruiting seasons), wide-ranging species such as kaka may use the area occasionally but are unlikely to reside in the Project Site. The avifauna assemblage within the Project Site is representative of Waitakere Ranges bush habitats. No threatened or uncommon birds were detected during the site surveys.

3.7.6 Terrestrial invertebrates

Invertebrate sampling detected 732 separate taxa at the Project Site, with the fauna found generally comparable with that of similar bush-clad areas of the southern Waitakere Ranges. Some less-common invertebrate taxa were observed in their characteristic mature forest habitats, including intact kauri forest and wet kahikatea forest.

3.7.7 Summary of terrestrial ecological values

The Waitakere Ranges is ecologically significant as one of the largest areas of coastal and lowland forest remaining in the Auckland Region. The site is identified as part of an extensive SEA which essentially extends throughout the entire Waitakere Ranges area.

The Ecological Assessment uses the Environment Institute of Australia and New Zealand (EIANZ) impact assessment guidelines to assess the overall terrestrial ecological value of the Project Site. Ecological values are ranked on a scale of Negligible, Low, Moderate, High, or Very High, based on the extent to which the site exemplifies qualities of four key attributes characteristic of its ecosystem type. The assessment assigns the site a ‘Moderate’ rating for representativeness, and a ‘High’ rating for rarity/distinctiveness, diversity and pattern, and ecological context. In accordance with the EIANZ criteria, the Project Site is therefore deemed to be of ‘Very High’ value.

3.8 Ground contamination

A Preliminary Site Investigation (PSI) was undertaken by T+T and is included in Appendix J. The PSI indicates that one activity that may have resulted in contamination could have occurred on the reservoir and replacement WTP sites. Specifically, while there is very limited information regarding the use or presence of asbestos and/or lead based paints, workers’ dwellings on the sites were constructed, altered and removed from the site during the period when the use of Asbestos Containing Materials (ACM) and lead-based paint was common.

4 Description of proposed works

4.1 Introduction and overview

Watercare proposes to construct a WTP on the corner of Manuka Road and Woodlands Park Road to replace the existing Huia WTP. The replacement WTP will have a maximum production capacity of 140 MLD. 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 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 is completely buried / below ground level; Reservoir 2 will be constructed on the existing Huia WTP site once the existing plant has been decommissioned. The proposed works also includes construction of the NH2 watermain valve chamber and tunnelling reception shaft within the Reservoir 1 site.

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 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.

An overview of the Project works included as part of this application is as follows:

- 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;
    - 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;
- Creation of new impervious areas and the associated diversion and discharge of stormwater.

A construction footprint has been established as set out in Figure 4.1. This represents the minimum footprint required to construct and operate a WTP scheme developed in accordance with the BOD,

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 4.1: Construction footprints (solid black outline) and indicative layouts of the proposed replacement WTP and reservoirs. (Alta, 2019)

4.2 Vegetation removal

The replacement WTP site, Reservoir 1 site, and undeveloped parts of the existing WTP site are almost fully covered in native bush reflective of the wider Waitākere Ranges area. Vegetation removal is therefore required to enable the construction of the proposed infrastructure. The proposed WTP footprint encompasses an area of 2.7 ha which comprises 2.5 ha of ecologically significant native forest and scrub. The proposed works footprint on the Reservoir 1 site encompasses an area of 0.8 ha which comprises an area of 0.6 ha of ecologically significant native forest. The Reservoir 2 works footprint is 0.8 ha of which 0.4 ha is native vegetation.

Vegetation clearance within the construction footprint will be undertaken prior to mobilisation to site to create adequate space for the establishment of the Contractor's haul roads, site compounds, parking, laydown areas and stockpiles. Due to ecological constraints, vegetation deemed to be high quality lizard habitat will only be cleared between the months of October to April to enable lizards to be rescued. All other vegetation can be cleared both within and outside of this period. Due to the density and size of the vegetation required to be removed, mechanical plant such as 20 tonne (T) diggers and large chippers will be required on site to undertake the clearance works.

Kauri dieback disease is a significant threat to kauri forests, and it will be necessary for the contractor to comply with a strict protocol to manage the potential spread of the disease. Refer to Section 4.10.2 for further details.

Plant will mobilise on low loaders and trucks. Trees will be cleared with the footprint to establish an access track around the site. After the establishment of the access routes, chippers will process shrubs and branches on site, except in areas where chipping/ mulching is precluded by the kauri dieback protocol. Tree trunks will likely be hauled off site using logging trucks. Watercare is also investigating options with Mana Whenua for cultural use of the largest trunks. Stumps and topsoil will be excavated and disposed off-site in accordance with kauri dieback requirements.

No vegetation removal will be undertaken outside of the construction footprint. Surveys will be undertaken prior to commencement of any works on site to define the construction footprint, with the extent determined on site in conjunction with the works arborist so that wherever possible individual trees that do not conflict with construction will be retained. Trees that border the construction footprint will be assessed individually as required by the Project contractor, works arborist and ecologis t to determine appropriate tree protection measures required.

A key part of the Project works is a comprehensive mitigation and biodiversity compensation package. The biodiversity compensation package includes weed and pest management over a substantial area (990 ha) of native forest along with kauri dieback measures, including tree health assessments and site specific management including on private properties. The mitigation and biodiversity compensation package is focussed on achieving an overall net benefit in biodiversity. This is further described in Sections 4.10.9 and 7.5 below.

4.3 Replacement WTP

The construction methodology will be developed by the Contractor on the basis of detailed design. However an indicative methodology for the earthworks to enable the construction of the replacement WTP is provided in the following sections, with an indicative construction site layout shown in Figure 4.2 below.

Figure 4.2: WTP Site Layout Plan (Alta, 2019)

4.3.1 Construction laydown

An additional area to the east of the main WTP footprint is required for marshalling of materials and temporary laydown during construction. The area has moderately steep terrain and is required to be terraced to create useable flat areas. This area will be used for:

- Unloading materials away from work faces allowing trucks to get off the road and minimise traffic effects to local roads.
- Storing formwork, plant and materials (reinforcing steel, mechanical equipment, pipework and general building materials).

- Site facilities and storage for specialist subcontractors.
- Worker welfare facilities.
- Emergency equipment and activities including segregated muster area, staff safety briefing area, first aid room, storage of spill kits, firefighting equipment and man cages.

As noted in the Indicative Construction Methodology Report prepared by Alta (Appendix F), further laydown areas would normally be provided to support the level of construction activity expected on a project of this scale and complexity. However due to Watercare's intention to avoid as far as practicable vegetation clearance on the site this will not be possible.

4.3.2 WTP site earthworks

A total area of 2.7 ha will be disturbed on the WTP site, which includes earthworks for the building platform and a site laydown area to the east of the WTP. The permanent plant footprint is approximately 2.2 ha in area.

While the final surface of the proposed WTP is generally above the existing ground level, a number of the building footprints will require significant excavations. The deepest excavation is approximately 11 m below existing ground level to form the necessary building depths relating to the plant operations, however excavations are typically less than 4 m deep. Approximately half of the site will need filling in order to achieve final grade

An estimated 41,500 m^3 of topsoil and unsuitable cut material is to be disposed offsite during bulk earthworks with 30,400 m^3 of imported fill required. If the cut material is deemed suitable for reuse as engineered fill then the bulk earthworks volumes will reduce. If material is able to be reused on site then suitable excavated cut material will be either stockpiled or moved directly around the site with dump trucks or other suitable plant. This has the potential to reduce the cut material required to be disposed of offsite (i.e. from approximately 87,000 m^3 across both the WTP and reservoir sites to a net cut volume of approximately 52,000 m^3).

Earthworks are expected to be focused on levelling out the centre of the WTP footprint to enable the construction of water treatment process structures - the Biologically Activated Carbon Filter (BAC) and Dissolved Air Flotation (DAF) structures. Following bulk cut excavations within the centre of the site, excavations around the periphery of the site will follow. All earthworks at the WTP site will be undertaken at or above the groundwater table, and therefore no groundwater dewatering is anticipated to be required.

4.3.3 Site access and haul roads

Following establishment of erosion and sediment control measures and initial vegetation clearance, the Contractor will establish site accesses and haul road routes in and out of the replacement WTP and reservoir sites to allow for safe access of construction traffic.

Due to the varying contours on both sites, significant initial earthworks will be required to level the sites to enable the formation of haul roads to a suitable width and gradient for plant and equipment access. Topsoil and any other material unsuitable for reuse will be stripped and disposed of off-site.

One permanent site access will be established off Woodlands Park Road for the replacement WTP and will be used for access for the duration of construction. This allows for single direction construction traffic circulation within the site during works which would minimise the need for turning and reversing of construction traffic. Additional to the primary route, the haul road will be extended and adjusted within the WTP footprint during the works to enable staged construction.

4.3.4 Raw water tunnel

To connect the reservoirs to the replacement WTP a new raw water tunnel or similar is required from Mackies Rest to the WTP site. Construction of the tunnel is outside of the scope of this application, however construction of the shaft within the WTP site is discussed below as it interfaces with the construction of the WTP.

Construction of the tunnel shaft to launch/receive the micro-tunnelling machine required to construct the raw water tunnel is proposed within the WTP. Construction of the shaft is to occur prior to commencement of construction of the WTP. The shaft may be constructed from bored piles, sheet piles or a concrete caisson.

4.3.5 Retaining wall construction

Retaining wall construction around the perimeter of the WTP will commence after the site has been excavated to formation level. It is anticipated the retaining wall construction will be built outward from the south-eastern corner in coordination with the progressive bulk earthworks. The installation of subsoil drainage and backfilling behind retaining structures will be undertaken concurrently with overall bulk filling works.

Retaining wall structural types will vary based on whether the retaining wall is constructed in cut or fill. Fill retaining structures for the replacement WTP site will likely be formed as either mechanically stabilised earth walls (with bored piles or soil mix columns below), or bored piles with cast in situ UC's and precast panels, or similar.

The retaining walls in the north eastern corner of the WTP site will need to be constructed in a top down method. This will involve a piling rig working from a temporary access track. This is similar to the piling method described for Reservoir 1 in Section 4.4.4 below.

4.3.6 Pipework and ancillary utilities

Pipework connecting the process structures and chambers will be installed at the same time as other below ground structures including the pipeline between the replacement WTP and the new reservoirs. Due to the depth and diameter of the pipework between the sites, it is likely that micro tunnelling will be used to install these pipes.

Smaller diameter pipes, ducting and chambers for electricity, lighting, communications and stormwater around site are to be trenched and installed during construction prior to civil finishing works. This will include incoming power and water and outgoing sewer.

Construction of these utilities will require works within Woodlands Park Road. Appropriate traffic management controls will be established and the standard Corridor Access Request Process followed to authorise such works. However this will occur in the future once a Contractor has been appointed and detailed design undertaken.

4.3.7 Stream works

An approximately 53 m intermittent section of the Yorke Gully Stream will be reclaimed and diverted to allow for the construction of the replacement WTP, as indicated in Figure 4.3 below. The permanent stream diversion will be constructed late in the programme as part of the civil and finishing works.

Initially, a clean water diversion will be established using clean water bunds to divert water around the upstream slope and eastern side of the WTP and away from entering streams. The clean water diversion along the eastern side of the WTP will be in place during construction only and is likely to be staged over the construction period.

Following completion of bulk earthworks, once structures are being built, the diversion along the eastern side will be formed into a stream that will also receive collected and treated stormwater from the replacement WTP site. The delivery of this water to the diversion channel will mimic the intermittent nature of the existing Yorke Gully stream. Due to the steepness of the existing terrain, the realigned stream will be designed to minimise scour, such as by meandering the stream across the contour and/ or by including pooling areas and weirs. Some further erosion and scour protection may be required in the Yorke Gully Stream.

This work is likely to be staged over several sections of the new stream alignment. The stream will be formed using an excavator and geotextile, riprap and soil will be placed followed by planting of riparian margins and final reinstatement.

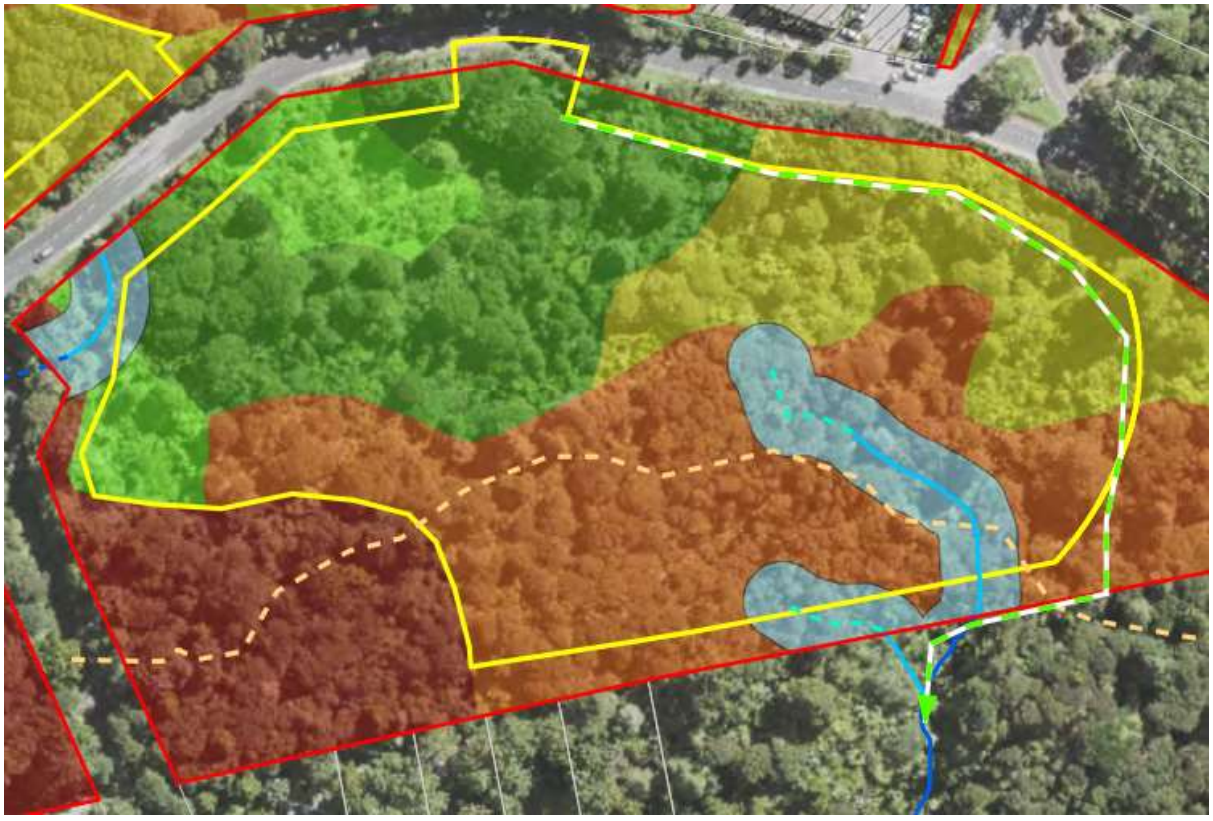

Figure 4.3: Proposed reclamation and diversion of Yorke Gully stream. The ephemeral (blue dashed) and intermittent (blue solid) sections of the stream within the construction footprint (yellow outline) are proposed to be reclaimed. The indicative stream diversion is shown by the dashed green line (Boffa Miskell, 2019).

4.4 Reservoir 1 and NH2 shaft

The construction methodology will be developed by the Contractor on the basis of detailed design. However, an indicative methodology for the earthworks to enable the construction of Reservoir 1 and the NH2 shaft is provided in the following sections, the layout of reservoir 1 and NH2 shaft is shown in Figure 4.4.

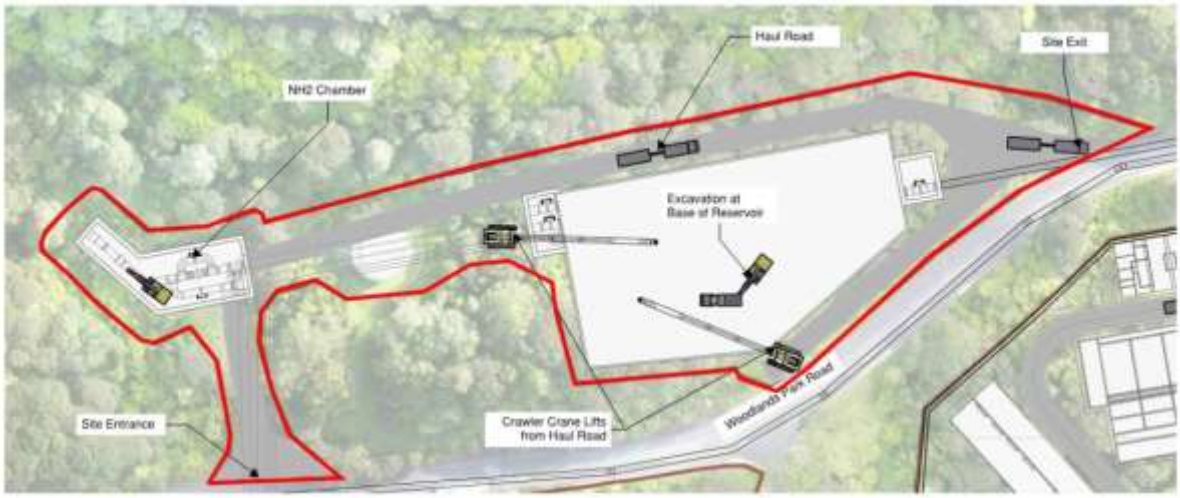

Figure 4.4: Reservoir 1 Site Layout Plan (Alta, 2019).

4.4.1 Reservoir 1 site earthworks

A total area of 0.8 ha will be disturbed on the Reservoir 1 site. This includes earthworks for the building platform, NH2 shaft, and access/ haul roads.

Reservoir 1 will require excavations up to a maximum depth of 15 m below existing ground level. This depth varies due to the presence of a hummock over part of the site. The Reservoir 1 structure will be buried / below ground level other than at its eastern end where it is approximately 1 m above existing ground level. Watercare proposes to establish a living roof (green roof) on Reservoir 1.

It is currently proposed that the NH2 shaft will be located approximately 85 m to the west of Reservoir 1. The shaft is estimated to be 16 m in diameter and founded approximately 13 m below existing ground level. After completion of tunnel construction the shaft shall become a permanent valve chamber.

It is estimated that 41,400 m^3 of cut material will be excavated and disposed of offsite as a result of bulk earthworks on the Reservoir 1 site, with 2,000 m^3 of imported fill required. Material may be stockpiled for a short term away from the works face and prior to loading into trucks. If the excavated material is found to be suitable for reuse, a portion may be used for fill on the WTP site. As noted above in relation to the WTP site, this has the potential to reduce the cut material required to be disposed of offsite.

Excavation will be undertaken using 20-40T excavators loading directly onto trucks or truck and trailers ready for disposal offsite. Excavation will likely be staged to maintain one-way access across the site (i.e. entry at the eastern access point and exit from the western access) for as much of the excavation duration as possible. Ramps would be progressively constructed to reach the base of the excavation as the excavation progresses downwards. Long reach excavators or telescopic grabs could also be utilised to complete the excavation when greater depth is achieved, which would remove the requirement for temporary ramps to the base of the excavation. Under-slab pipework and drainage will be installed once the excavation for the reservoir is sufficiently progressed prior to construction of the slab.

4.4.2 Site access and haul roads

Two site accesses off Woodlands Park Road will be used on the Reservoir 1 site to enable through movements for construction machinery.

Site access tracks/ haul roads will likely follow the perimeter of the proposed reservoir. The formation of the tracks will provide access for plant to construct the ground retaining structures prior to commencement of bulk excavation.

Piling plant will be required to construct the ground retaining structures outside of the reservoir's footprint. This plant will need level platforms to work from. Due to the existing steep topography on the reservoir site, access tracks and working platforms will likely need to be formed with steep cuts and batters. There is a possibility that part of the site will require installation of temporary retaining works (sheet piling or similar) to form the access tracks. It will also be necessary to modify the access tracks and work platforms as the works progress to create level working areas.

The objective will be to minimise vegetation clearance around the perimeter of the site. Due to the topography in some locations, a working zone will need to be cleared past the line of the retaining walls so that the plant has space required to perform the work. Where possible, this clearance will be limited to 3m or less from the retaining wall leading edge, as per the GHD site footprint drawing. In the event that a large tree's drip line or root system cross into the retaining structure, the tree clearance boundary may need to extend locally to ensure the retaining structure can be constructed safely. In this instance, the tree removal would be agreed on site and supervised by the site arborist and ecologists.

When developing clearance plans, the group of trees located to the south west of the reservoir were identified as being particularly valuable. In order to reduce the proximity of construction activities to this group of trees, initial construction plans have been prepared without a haul road in this area. Because of this, the south-western corner will likely be the most difficult for crane access. The crane option selected by the contractor will need to consider access to this point and may need to make allowance for short term use of high capacity mobile cranes reaching from either the eastern or western crane pad.

4.4.3 Connection to NH2

The NH2 will convey potable water from the storage reservoirs to customers within north-west Auckland and terminate at storage reservoirs in Albany. This will increase the capacity and resilience of Watercare's water supply network. Construction of the NH2 is planned to start before the replacement Huia WTP construction and will continue until after the new WTP is in operation.

The NH2 is authorised under a suite of existing consents and designation. However this current application provides for the construction of the reception shaft and valve chamber for the NH2 in an area of approximately 700 m^2 to the west of proposed Reservoir 1.

It is anticipated that the NH2 shaft will be constructed prior to Reservoir 1. Once the site is cleared, access tracks and a stabilised area will be established. Clearance and earthworks for the shaft is likely to encroach into the Armstrong Gully stream buffer to the west and north of the shaft. The stream section to the north is ephemeral, while the stream to the west is permanent and the channel is well defined. It is likely that works will need to encroach into the 10m buffer but are not expected to affect the channel. The shaft may be constructed from bored piles, sheet piles or possibly a concrete caisson.

Supporting facilities will need to be established near to the shaft. This will include tunnel jacking pipe storage, and handling plant and tunnel spoil handling facilities. Depending on the tunnelling method selected, a separation plant may be located on the site, within the hardstand area. As the tunnel is expected to be constructed before Reservoir 1, the footprint for the future reservoir could be

cleared and used for laydown of the pipes and separation plant during NH2 Pipeline installation works.

Cranage to service the site will be difficult given the grades of the site and the proximity of trees to be retained. Some additional tree clearance/pruning and levelling of crane sites may be required. However, should the need arise for any additional site clearance and tree clearance/pruning, these works will be coordinated with the works arborist prior to commencement.

4.4.4 Retaining wall construction

The Reservoir 1 structure is buried and will require extensive excavation within the reservoir footprint. The site clearance, ground retention structures and excavation will need to be completed before any part of the permanent structure can commence.

To create the level working pad for the site, it will be necessary to make a cut into the escarpment on the site. The largest cut will be along the northern edge of the reservoir. To retain the slope, it will be necessary to install an engineered retaining structure. This will likely consist of a soil-anchor, mesh and shotcrete construction, but could be a piled retaining structure. Selection of the retention structure would be confirmed during design development following geotechnical investigations and assessments. The ground anchors will need to extend outside of the reservoir perimeter but will be below ground level and will not require any additional vegetation clearance.

Retaining walls for supporting the excavation of the reservoir tanks will be required around the perimeter of the permanent structure. The retaining walls would likely be used as the rear form to pour the reservoir internal walls against.

The retaining walls could utilise a range of solutions, including spaced contiguous piles with shotcrete infills, interlocked secant piles or diaphragm panels. Other solutions might include sheet piles or soldier piles with timber or precast infill panels, or some other system. The final methodology for retaining wall structures will largely be determined by the contractor at the detailed design stage based on detailed geotechnical investigations, assessments and recommendations.

Once the retaining structure walls are installed, excavation for the reservoir structures will be carried out in stages. If required, ground anchors and shotcrete, or internal whalers and struts, can be installed as the excavation progresses.

4.4.5 Dewatering

There are two groundwater systems present within the reservoir site: a shallow groundwater level of approximately 6m below ground and a deeper groundwater system of approximately 9 m below ground level.

During the excavation works stormwater and groundwater entering the excavation will drain to temporary low point sumps formed in the excavation base. Dewatering pumps connected to float switches will be placed in the sumps to provide continuous pumping out of water as required. Water will be pumped out to a sediment retention pond or ‘silt buster’ type self-contained treatment plant (or similar) to remove the silt before discharging directly to the Armstrong Gully catchment. Water coming off fresh concrete will be kept separate and alkalinity treated before discharge.

Prior to the commencement of excavation, the procedures for settlement, retaining wall movement and groundwater monitoring will be established and contingency measures will be put in place including alert and alarm trigger levels.

4.5 Reservoir 2

The construction methodology will be developed by the Contractor on the basis of detailed design. However an indicative methodology for the earthworks to enable the construction of Reservoir 2 is provided in the following sections. In terms of timing, Reservoir 2 can only be constructed after the replacement WTP is fully operational and the existing WTP is decommissioned. The indication layout of reservoir 2 is shown below in Figure 4.5.

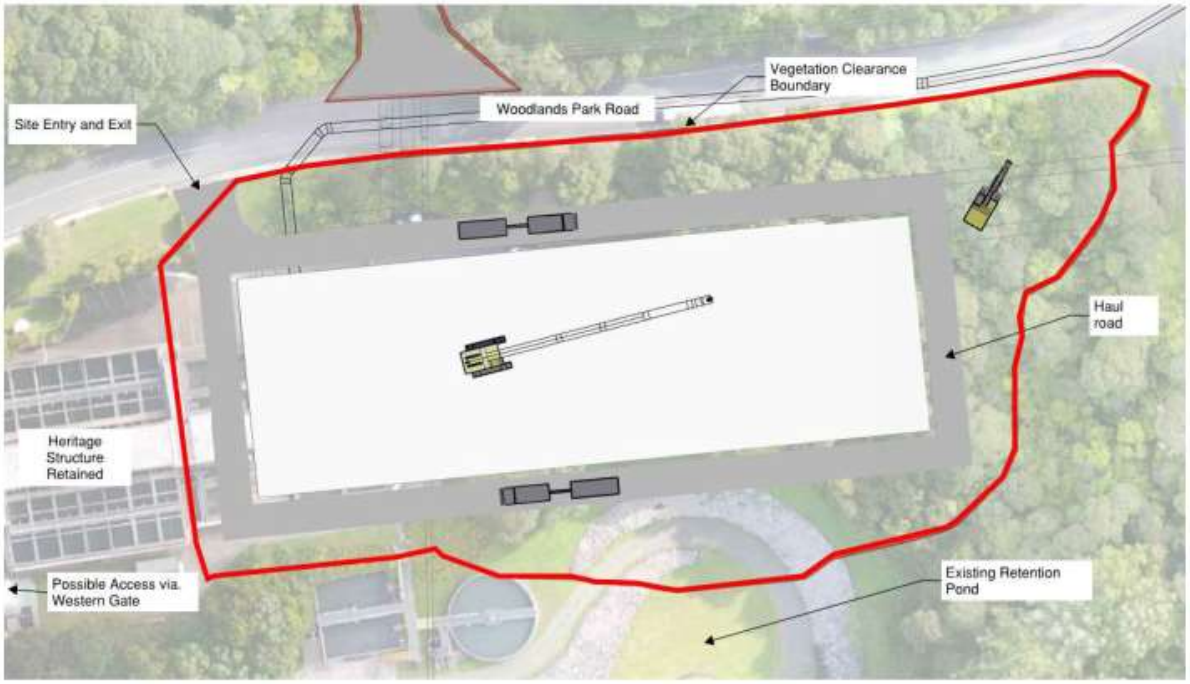

Figure 4.5: Reservoir 2 site layout (Alta, 2019).

4.5.1 Reservoir 2 site earthworks and retaining

A level construction area is required to build the reservoir. The existing site slopes from north to south and will require the northern side of the pad to be excavated and fill placed to the southern side.

A total area 0.8 ha will be disturbed on the Reservoir 2 site. It is estimated that 4,000 m^3 of cut material will be excavated and disposed of offsite as a result of bulk earthworks on the Reservoir 2 site, with 2,500 m^3 of imported fill required. If the site-won material is suitable for fill, the cut material can be placed into the fill side. Otherwise, excavated material will need to be transported off site for disposal and engineered fill imported.

Some form of retaining structure will be required to support the cut side of the excavation. This will likely be similar to the system employed on the Reservoir 1 site. It is likely that ground anchors with mesh and shotcrete would be used to retain the cut face, progressively installed as the excavation progressed downwards.

On the fill side, a Mechanically Stabilised Earth (MSE) system could be used to retain the slope. An MSE wall is a system of earth retention where tensile members such as geotextile or galvanised steel are placed into layers of the fill to enable fill to distribute loads more effectively. This would allow the fill side to have a steeper batter face, reducing the amount of fill required for the pad.

4.5.2 Site access and haul roads

Access to the site will be via the current gates of the Huia WTP. A one-way circuit would potentially be created between the western and eastern gates. A 7 m wide haul road around the reservoir has been allowed for, with a retained slope and a cut-off drain at the top of the bank. On this basis, clearance for Reservoir 2 comes up to the northern cadastral boundary of the existing WTP site.

4.6 Construction duration and sequence

The indicative construction sequence for the proposed works is set out below based on the concept design drawings completed by GHD and Beca (Appendix E) and the Indicative Construction Methodology Report prepared by Alta (Appendix F). The final construction methodology and sequence will be determined by the Contractor once detailed design has been completed.

4.6.1 Initial works

The initial construction works on the replacement WTP and Reservoir 1 sites generally comprise:

- Establishment of the construction footprint (including tree survey and fencing off working area);
- Vegetation clearance within the agreed construction footprint, and site establishment of both the WTP and Reservoir 1 sites;
- Establishment of erosion and sediment controls, including clean water diversions;
- Removal of the existing backwash tank from the Reservoir 1 site; and
- Construction of the NH2 shaft on the Reservoir 1 site.

Following these initial works and prior to construction of the WTP and reservoirs, Watercare intends to construct the NH2 pipeline tunnel (via a shaft within the Reservoir 1 site) and new raw water intake tunnel to Mackie's Rest (via a shaft within the new WTP site) as separate projects.

4.6.2 Site establishment

The following site establishment activities will be undertaken following vegetation removal prior to the commencement of any bulk earthworks or construction of any retaining structures on site:

- Reinstatement (if required) of fencing around all vegetation to be retained around the construction footprints for the duration of the works;
- Identification of existing buried services via pot holing using a small excavator, hand digging and/or hydro excavation. The Contractor will be required to protect or relocate/divert such services;
- Formation of suitable stabilised construction access at each site;
- Installation of perimeter sediment and erosion control measures (as per the Stormwater and Erosion and Sediment Control Report (Stormwater and ESC Report) attached as Appendix G);
- Construction of temporary site compounds and storage or laydown areas at both the replacement WTP site and the Reservoir 1 site (and later, within the existing WTP site) within the construction footprints;
- Establishment of temporary power and water connections to the site facilities;
- Establishment of haul roads within the construction footprints for access and movement of construction traffic and plants;
- Implementation of traffic management and controls for the duration of the works; and

- Storage of emergency spill kits on site in the event of any oils, greases or chemicals being spilt on site.

4.6.3 Replacement WTP works sequence

Following initial works, enabling and bulk earthworks on the replacement WTP site will generally be undertaken in the following sequence:

- Bulk excavation and construction of any temporary retaining structures required in the centre of the site to enable commencement of construction of the Biologically Activated Carbon Filter (BAC) and Dissolved Air Flotation (DAF) structures;
- Construction of the BAC and DAF structures while the remainder of the bulk excavation is completed for other structures;
- Construction of perimeter retaining walls and bulk filling works to occur simultaneously following the completion of the initial site strip and cut;
- Following completion of the WTP, the clean water diversion channel will be formed into a permanent stream diversion; and
- Site reinstatement, including planting and landscaping.

4.6.4 Reservoir 1 works sequence

Following initial works, construction works on the Reservoir 1 site will generally be undertaken in the following sequence:

- Commencement of bulk excavation to create a level construction site, with soil retaining structure will be constructed as required;
- Installation of perimeter retaining structures (likely bored piles);
- Continued bulk excavation, staged to allow for installation of anchors/shotcrete if required;
- Construction of Reservoir 1; and
- Finishing works such as fencing, landscaping and construction of access tracks will be undertaken simultaneously with tank commissioning.

4.6.5 Reservoir 2 works sequence

Reservoir 2 is to be constructed on the existing WTP site after the replacement WTP has been commissioned. Construction of Reservoir 2 site will generally be undertaken in the following sequence:

- Decommissioning of the existing WTP;
- Establishment of the construction footprint (including tree survey and fencing off working area);
- Vegetation clearance within the agreed construction footprint and site establishment;
- Establishment of erosion and sediment controls, including clean water diversions;
- Demolition of structures required to make space for the new reservoir construction;
- Bulk excavation and filling of the site to make a level pad for the reservoir, with installation of retention structures to support the excavation;
- Ground improvement works to support the reservoir foundation if required; this may include piled foundations;
- Installation of buried pipework;
- Construction of Reservoir 2; and

- Finishing works such as fencing, landscaping and construction of access tracks will be undertaken simultaneously with tank commissioning.

4.6.6 Indicative programme

Construction of the project is expected to commence within 18 months of the necessary consents being approved. The construction programme has been based on achieving a balance between reducing daily vehicle movements and the overall programme period. Under the proposed programme, construction is expected to take between 7 and 8 years in total, although works associated with this project will not be continuous during that period.

A conceptual programme timeline is set out in Figure 4.6 below. At this conceptual level, the works programme comprises 6 months of early works on the Reservoir 1 site (site clearance and construction of the NH2 shaft), followed by a year's pause in the project works while the NH2 tunnelling is underway. Enabling works and earthworks would then be undertaken on the WTP site (approximately 1 year), followed by construction works on the WTP and Reservoir 1 sites (approximately 2 years). Reservoir 2 is expected to be constructed a few years later, once the existing plant has been decommissioned.

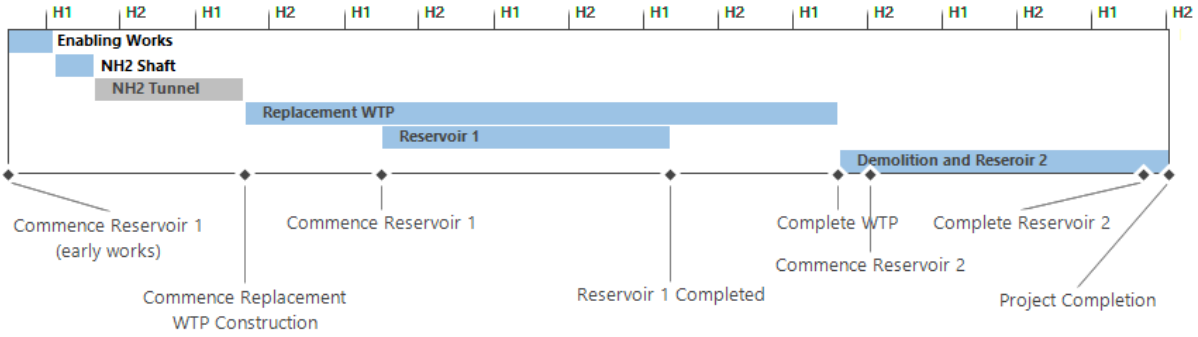

Figure 4.6: Conceptual programme timeline. H1/ H2 denotes half years. *(Alta, 2019)*

Further details on the indicative construction programme are included in the Indicative Construction Methodology Report prepared by Alta (Appendix F).

4.7 Traffic

4.7.1 Traffic movements

The Traffic and Transport Assessment in Appendix M provides an estimate of anticipated heavy construction vehicle movements. It is important to note that this is throughout the construction period, including for 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 OPW. The assessment is also based on the 'worst-case' scenario to ensure a conservative approach. Should the cut material from the reservoir site be suitable for us as fill on the replacement WTP site, the total number of overall truck movements would be less. Also if longer hours or additional working days than currently assessed are possible, this would spread out the predicted traffic demand and reduce the potential daily and hourly traffic demands. The appropriate working days and hours will ultimately be managed through a detailed Construction Traffic Management Plan (CTMP) to be certified by Council.

It is anticipated that several activities would be undertaken concurrently (e.g. construction of the replacement WTP and Reservoir 1), and it is expected that heavy vehicle movements would peak during this period. During this busiest period, 88 to 118 heavy vehicle movements are anticipated

each day, which equates to up to around 13 to 17 per hour. There are also several extended periods with no anticipated heavy vehicle movements (26 months) and less than 42 heavy vehicle movements per day (49 months) that represent approximately 75 months (76%) of the overall programme. For the avoidance of doubt, the traffic movements associated with the construction and operation of the replacement WTP and reservoirs will be addressed in the OPW.

In terms of heavy vehicle movements associated with this application for enabling earthworks, approximately 13 to 36 heavy vehicle movements are anticipated each day, with a peak of around 70 heavy vehicles per day for a 7 month period which equates to around 2 to 5 per hour, and up to 10 per hour over the peak period. This represents the traffic movements associated with vegetation removal and enabling earthworks, however the Transport Assessment has been undertaken to assess the cumulative effects of the enabling activities provided for under this current application, as well as construction and operational effects.

4.7.2 Route options

The following options have been identified as potentially appropriate routes for heavy vehicles, subject to appropriate mitigation and management through the implementation of the CTMP:

- Option 1: Inbound and outbound movements along Titirangi Road only to and from Great North Road. An alternative for some of the inbound and/or outbound movements to use Golf Road or possibly Godley Road instead of Titirangi Road.
- Option 2: One-way loop consisting of inbound from West Coast Road via Glendale Road, Kaurilands Road and Atkinson Road, then outbound via Titirangi Road (or Golf/ Godley Roads) to Great North Road.

A possible alternative landfill site for partial disposal of the cut material has been identified as the existing Parau Landfill located approximately 3 km by road to the southwest of the proposed WTP. The route towards the landfill is mainly along Woodlands Park Road with a short section along Huia Road. The landfill site could potentially accommodate 66,000 to 100,000m^3 of material. This means there is potential for some of the cut material to be transferred via heavy vehicles to this site, rather than along the two routes outlined above.

The routing will be further confirmed through the development of the CTMP, which will identify the appropriate controls around the use of these routes and taking into account the specific construction methodology the appointed Contractor develops.

4.7.3 Light Vehicles and On-site Parking Demands

Due to the adjacent road environment on Woodlands Park Road, on-street parking would not be safe for construction vehicles and general traffic. Due to this, the on-site parking has been assessed and rationalised to provide all construction parking on the site, with the exception of a shuttle bus that would transport the remainder of workers to the reservoir and WTP sites. The location of the shuttle bus interchange will form part of the CTMP.

4.8 Operational stormwater management

An assessment of the stormwater management requirements associated with the proposed works has been undertaken by Cook Costello (attached as Appendix G). As part of the WTP development a pipe reticulation network is proposed throughout the site to collect the primary stormwater flows (1 in 10 year storm). Where possible, surface water runoff from roof areas is to be conveyed into the water treatment system.

In total there are four independent networks proposed:

- Network 1 will collect roof flows from the DAF, BAC and administration buildings, and discharge to the DAF building and the WTP for reuse in the water treatment process;
- Network 2 will collect the remaining surface and roof water from the eastern portion of the WTP site, and discharge to Yorke Gully via a proposed dry pond immediately on the eastern side of the replacement WTP. The pond will have an emergency spillway designed to convey the 1 in 100 year storm event;
- Network 3 will collect surface water from the western portion of the WTP, and discharge to Armstrong Gully via a pipe connection to the existing attenuation basin in the existing WTP site; and
- Network 4 will collect surface water from the Reservoir 1 site and discharge to the existing pipe network north of Woodlands Park Road, which ultimately discharges to Armstrong Gully via the existing attenuation basin.

The piped network will discharge to one of two discharge points. The majority of the WTP area will discharge to Yorke Gully via a dry pond with earth embankment which will control flows to predevelopment flows in events up to a 1 in 100 year storm. A secondary pipe network will discharge to Armstrong Gully via the existing attenuation lagoon within the Huia WTP. As discussed in Section 6.5, existing stormwater discharges to Armstrong Gully are authorised by Permit No. 26979. Although Watercare is seeking to replace that permit as part of this application, it is noted that the proposed stormwater management measures have been designed to comply with the limits specified in the existing consent.

Overland flow paths will be diverted around the development where required to convey flows that exceed the 1 in 100 year storm event. Proposed flow paths generally following internal access tracks.

Stormwater runoff from pavement areas within the WTP site will pass through proprietary devices (e.g. storm filters or similar) for treatment prior to discharge. Roofs are likely to be constructed of non-zinc materials, and it is therefore expected that roof runoff will not require treatment.

4.9 Existing Huia WTP works

The lagoon on the existing WTP site will be used to capture and treat a portion of the stormwater from the replacement WTP, as well as continuing to capture off-specification discharges. To facilitate this, a pipeline connecting the replacement WTP to the lagoon is required. The pipeline will run below Manuka Road and a wing wall and outlet will be built in the side wall of the existing Huia WTP lagoon. The pipeline is likely to be installed via trenchless construction methodologies.

4.10 Environmental management and mitigation measures

4.10.1 Tree protection controls

Vegetation removal is required to enable the construction of the replacement WTP and new reservoirs. However to ensure no vegetation removal occurs outside of the construction footprint, and to protect trees outside of the footprint, particularly those trees which are outside of but in close proximity to the footprint, a range of measures is proposed. These will include the following:

- Undertaking surveys prior to commencement of any works on site to define the construction footprint.
- Mesh fencing or similar physical demarcation established around the construction footprint to clearly define the construction footprint.
- Trees that border the construction footprint will be assessed individually as required by the Project contractor, works arborist and ecologist to determine appropriate assessment and tree protection measures required.

- Supervision of works within the vicinity of trees by a suitably qualified and experienced arborist.
- Any excavation work required in or around the root zone or drip line of trees to be retained is to be undertaken under the guidance and supervision of the works arborist.
- Any exposed roots of retained trees will be covered with a suitable medium to protect from damage until the area surrounding the root can be back filled with soil.
- No material will be stored in or around the root zone of any retained trees without prior approval from the works arborist. Any material requiring storage in or around the root zone of any trees will be stored on temporary hard surfaces such as plywood.
- Adverse effects on any retained trees through compaction, physical damage, spillage of lubricants and fuels or discharge of waste emissions as a result of vehicle movement on site is to be avoided. If necessary, the root zone of any trees to be retained will be covered with suitable protective overlays.

In addition to the above applied measures, all site personnel will be educated with regards to tree protection protocols and the importance of adhering to such protocols.

4.10.2 Kauri dieback hygiene protocols

Kauri dieback has emerged as a significant threat to the future of the Waitakere Ranges Heritage Area's forest ecosystems. As is standard practice when working in areas where symptoms of kauri dieback have been observed, Kauri Containment Zones (KCZs) will be established as a means to help prevent the spread of kauri dieback disease.

Likely symptoms of kauri dieback were observed on a single large kauri tree within the mature kauri forest stand in the north western quarter of the replacement WTP site, but outside of the construction footprint. There are no kauri trees (trunks greater than 20 cm diameter) within the construction clearance footprints on any of the three sites. Mature kauri are present nearby.

The Ecological Assessment in Appendix L sets out a protocol for kauri dieback hygiene, based on current knowledge of the disease. "Kauri containment zones" (KCZ), that comprise areas within three times the radius of the canopy dripline of any kauri tree with a trunk greater than 20 cm diameter, will be established. Works within these zones, removal of soil and organic matter, and movement of personnel, equipment and machinery will adhere to the following protocols:

- KCZ will be clearly marked out on site (e.g. by fencing) and indicated with appropriate signage;
- Any clearance of soil and organic material from within a KCZ will be undertaken in stages, under the supervision of the Project Ecologist;
- Trees and dense vegetation will be felled and disposed of at a landfill approved to receive kauri dieback infected material, or as otherwise approved by Council. Logs may be cut into sections, but no plant material may be chipped or mulched;
- Remaining vegetation, organic material and soil to a depth of 1 m will be stripped and disposed of as above;
- Machinery will be cleaned and sterilised with an approved disinfectant and used to strip a further 1 m layer of soil within the KCZ. Soil material removed from this layer will be disposed of at an approved facility as above. Machinery used for excavation will be cleaned and sterilised before further use;
- Remaining soil excavated from the KCZ may be reused on-site or removed to an approved cleanfill facility;
- Once all vegetation has been cleared and earthworks are completed within a KCZ, the Project Ecologist will inspect the area. The KCZ for the area can be removed once the Project Ecologist

is satisfied the contamination risk has been appropriately managed. Fencing and signage will be amended as appropriate.

Elsewhere within the works footprint, the following standard kauri dieback protocols will be adhered to:

- All plant operators and site staff will be briefed on managing kauri dieback.
- Prior to vegetation clearance work commencing, a suitable wash station will be established on each site and shall remain in place for the duration of works. The wash station shall contain suitable quantities of Trigene. The station will also make available any cleaning equipment which may be required to ensure that suitable cleaning of footwear, tools, clothing and equipment can be carried out.
- Gravelled hard-stand areas (maintained to a depth of 500 mm) will be formed within the sites to ensure haulage trucks and large plant are not operating on bare soil.
- Footwear, tools, clothing and equipment are to be cleaned so as to be totally free of soil prior to:
  a Entering or exiting a site; or
  b Moving from one site to another; or
  c Entering a stream system in a site.
- Where possible, plant, vehicles or materials shall remain on site for the duration of works for which the plant, vehicles or materials are required.
- Drainage and storm water run-off from the site are to be diverted away from kauri trees.

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. The above therefore represents a broad general approach. However it is expected that this will be amended and updated in consultation with Council biosecurity specialists to ensure that when works commence, the most appropriate controls are in place to manage the spread of kauri dieback disease.

4.10.3 Security

A secure fence will be erected along the road frontage of the sites at the commencement of the works. To minimise the impact on existing vegetation, the construction fence surrounding the replacement WTP site will be erected prior to vegetation removal on the edge of the footpath along Manuka Road, Woodlands Park Road and Scenic Drive, as well as along the boundary to the south of the site. Alternatively, the security fence will be erected around the edge of the construction footprint following vegetation clearance.

4.10.4 Erosion and sediment control

An Stormwater and ESC Report has been prepared which provides details and proposed mitigation measures to help minimise erosion and prevent discharge of sediment laden water during and immediately following earthworks (Appendix G). The Stormwater and ESC Report will be updated and finalised once a Contractor has been appointed and a detailed construction methodology confirmed. However all erosion and sediment control practices will be constructed and maintained in accordance with best practise as set out in Auckland Council's guidance document '*Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region*', June 2016 (GD05)

The measures to be implemented to protect against the adverse effects from earthworks include:

- Stabilised entry/ exit points and wash down facilities;

- Construction laydown areas with stabilised surfaces;
- Catch-pit inlet protection;
- Dust control such as by dampening down / use of water carts;
- Clean water diversion channels and bunds to minimise the volume of runoff from earthworks areas;
- Contour/ cut off drains across the contours of a sloping earthworks areas to reduce the velocity and therefore erosion potential of the runoff;
- Sediment retention ponds as the primary treatment of sediment laden water, including forebays and flocculation sheds, the south eastern corner of the replacement WTP site is the natural low point of the existing topography. The indicative Erosion and Sediment Control Plan (ESCP) in the ESC Report proposes a sediment treatment pond located at this point;
- Silt fences and super silt fences;
- Dirty water conveyance channels; and
- Dewatering of excavations, with collected water discharged to a sediment retention pond for treatment prior to discharge.

The Stormwater and ESC Report sets out the inspection and maintenance procedures to ensure the erosion and sediment control measures are maintained in good working order. This includes regular inspection of control measures at the end of each day, with particularly thorough inspections prior to forecasted rain events, following rain, and during severe rain events.

4.10.5 Dust control measures

In dry conditions earthworks activities have the potential to produce dust which could migrate from the site. Appropriate dust control measures will therefore be implemented in order to minimise potential effects on adjacent properties. Dust mitigation measures are likely to include the following:

- Water carts on site during dry and windy conditions to spray exposed areas;
- Maintain site accesses and haul roads in good condition, including placing coarse aggregate on haul roads;
- Minimise extent of exposed areas at any given time where possible;
- Wet down of areas in advance of cut and fill activities;
- Excavated areas to be surfaced immediately where possible;
- Effective management of stockpile areas;
- Sweeper trucks to remove material deposited on public roads as soon as possible;
- Any vehicle loads moving fine material to be covered appropriately; and
- Enforcement of maximum speed limits on site to prevent dust generation.

4.10.6 Contaminated land management

A PSI included in Appendix J indicates that the following HAIL[26] activity may have been undertaken:

- Housing that may have used asbestos containing materials (ACM) (HAIL activity E1). This relates to the reservoir site and the WTP site.

A Site Management Plan (SMP) has been prepared to provide appropriate controls to minimise potential discharges of contaminants to the environment and inform health and safety measures. It

[26] HAIL – Hazardous Activities and Industries List

also sets out pre-works sampling, testing and reporting requirements, contingency measures, health and safety requirements, and site validation and reporting.

The management rationale contained in the SMP and the associated site management procedures are based on low levels of asbestos and other contaminants being present. The SMP provides an outline for contamination investigations which will occur prior to earthworks commencing. The management procedures in the SMP will be confirmed on completion of pre-works testing.

4.10.7 Construction noise management

Marshall Day Acoustics has prepared a Construction Noise and Vibration Assessment based on the indicative construction methodology prepared by Alta (included as Appendix N).

Noise from enabling and bulk earthworks carried at the replacement WTP site is predicted to comply with the relevant noise limits apart from when vegetation removal (chainsaw/chipper) occurs at 55 m from Manuka Road receivers, and at 65m from Scenic Drive receivers (in this latter case the exceedances are minor (3dB)). While it not uncommon for large infrastructure projects to be undertaken in proximity to sensitive receivers, the predicted exceedances trigger the requirement for noise mitigation and effects management via a Construction Noise and Vibration Management Plan (CNVMP).

Through the development of a CNVMP, the following mitigation measures are likely to be put in place to manage the impacts of construction noise and vibration:

- Communication and consultation with stakeholders;
- Limiting the timing of noisy construction works to between 0730 and 1800 hrs;
- Establishment of noise barriers where possible and adoption of alternative construction methods; and
- Avoidance of unnecessary noise such as horns, reversing alarms, people noise and music.

General acoustic management and mitigation measures are also recommended to be implemented throughout the course of the Project as a best practice provision e.g. maintenance of equipment to a high level and the avoidance of unnecessary noise and vibration such as the use of horns, tonal reverse alarms or clearing excavator buckets by hitting the ground.

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.

The Noise and Vibration Assessment has been undertaken to assess the cumulative effects of the enabling activities provided for under this current application, as well as construction and operational effects. However for the avoidance of doubt, noise and vibration associated with the construction and operation of the replacement WTP and reservoirs will be addressed in the OPW.

4.10.8 Construction traffic management

A detailed Construction Traffic Management Plan will be prepared by the appointed Contractor to minimise the impact of construction traffic movements. The CTMP will reflect the proposed work sequencing and programme with control and mitigation measures to include the following:

- Vehicle movements are to take place during the work hours set out in the CTMP. This shall include limiting heavy vehicle movements on adjacent roads during the weekday morning and afternoon peak periods around school pick-up/drop-off times and general commuter peak periods. Note: the CTMP will need to provide for some flexibility or exceptions to this

including for concrete pours which require continuous supply of concrete trucks typically early in the morning with placement of concrete concluding late in the morning;

- Reductions in heavy vehicle movements through the development of the construction methodology;
- Heavy truck routing via a combination of Scenic Drive and either Titirangi Road or Atkinson Road, Kaurilands Road and Glendale Road in order to manage the hourly heavy truck movements on the identified truck routes at certain times of day or days of the week;
- Heavy truck routing to Parau Landfill via Woodlands Park Road and Huia Road for disposal of cut material;
- Measures such as temporary speed limit reductions, heavy vehicle crossing signage, temporary bus stop relocations, no on-street staff parking and on-site parking/loading;
- Development of a travel management plan within the CTMP to manage staff travel via shuttle bus;
- Localised road widening along the northern side of Woodlands Park Road to provide new kerb and channel between Scenic Drive and the sites;
- Works areas to be securely isolated from pedestrian and vehicle access using fencing and approved barrier systems;
- A temporary speed limit will be put in place where a lane closure is required and when construction activities are occur on the carriageway; and
- Should the existing footpath on the southern side of Woodlands Park Road need to be closed during the works, a suitable alternative access is required to be established on an adjacent route or on the opposite side of the road in accordance with the Auckland Council's Code of Practice for Working in the Road.

A draft CTMP is attached to the Traffic and Transport Assessment in Appendix M to this report, with the final CTMP to be prepared by the Contractor based on detailed design and the confirmed construction methodology.

Traffic management operations will be required to be planned and carried out in accordance with the Code of Practice for Temporary Traffic Management as well as the Auckland Council and NZTA's Manual of Temporary Traffic Management and the Code of Practice for Working in the Road. A copy of the CTMP will be provided to Council for certification prior to works commencing.

4.10.9 Ecological mitigation and compensation

A mitigation hierarchy based on NZ good practice has been followed in the design of the project, where effects are firstly avoided, then remedied, then mitigated, and finally, any residual adverse effects are offset or compensated for through protection, restoration and enhancement measures.

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. The proposed mitigation and compensation package comprises:

- Protection and enhancement of the remaining 11 ha of vegetation within the Project Site that is outside the development area, including through protection from accidental encroachment and damage during construction, revegetating bush edges and open areas, riparian planting, and weed and animal pest control;

- Construction protocols for bats, birds and lizards, including pre-works survey and salvage (refer Section 7.5);
- Creation of a stream diversion to replace the intermittent reach to be diverted and reclaimed, ensuring hydraulic neutrality/ mimicking the pre-existing stream channel hydraulic characteristics in the design of the stream diversion; and
- Management of stormwater quantity and quality discharging to the stream.

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.

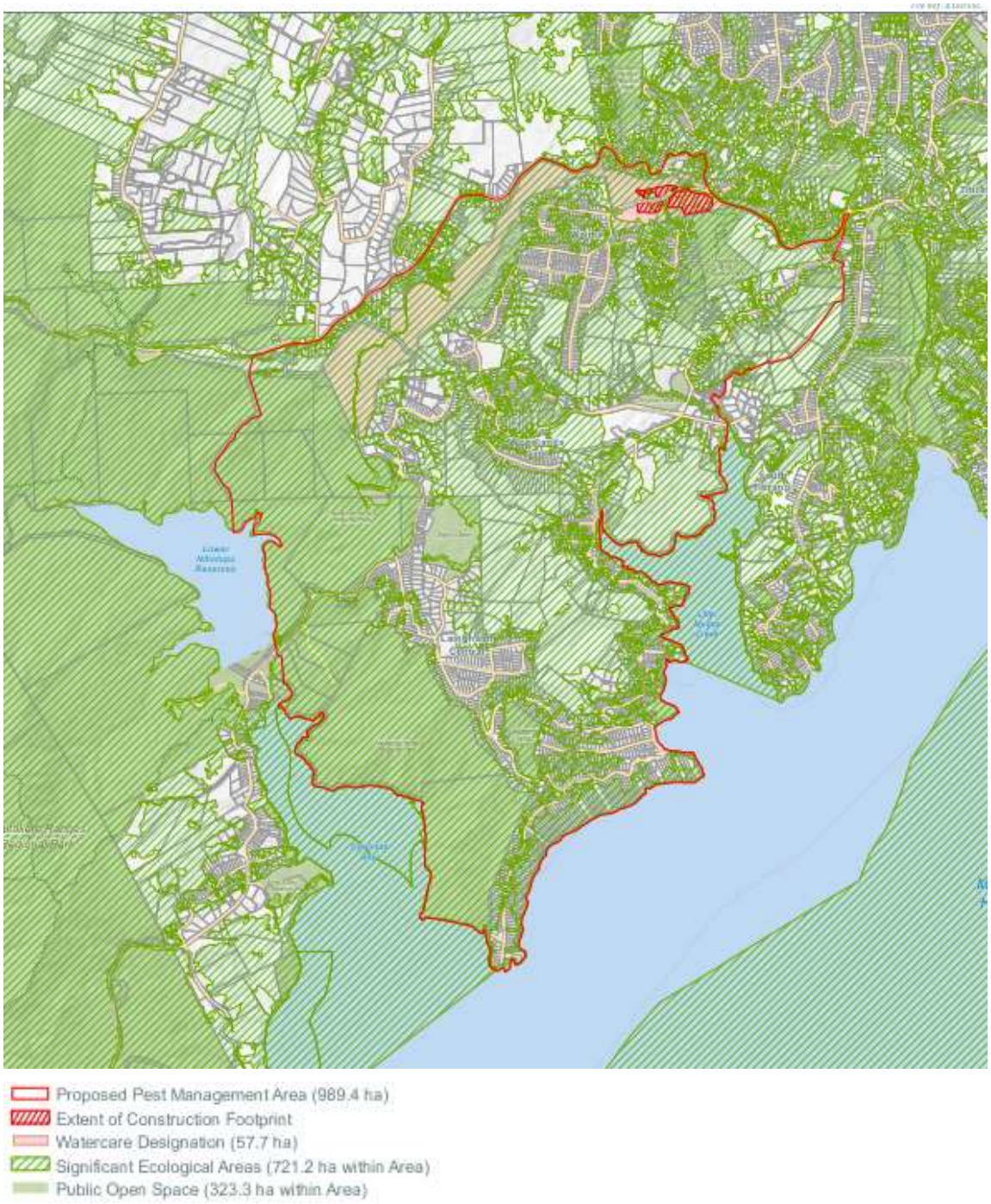

Figure 4.7: Proposed WBMP area *(Boffa Miskell, May 2019)*

4.10.10 Broader mitigation initiatives

The approach outlined above is considered to appropriately manage, mitigate and compensate for the environmental effects associated with vegetation removal and enabling earthworks required to construct the replacement WTP and reservoirs.

Ensuring a quality potable water supply and resilient water supply infrastructure is fundamental to achieving the purpose of the RMA and in particular to enabling '*people and communities to provide for their social, economic and cultural well-being and for their health and safety*'. 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. This includes an increase in capacity which will assist in meeting peak demand periods and improve the current system resilience to the north-west of Auckland, and ultimately increase overall system flexibility, security and resilience across the water supply network. Improved treatment processes will also ensure ongoing compliance with the DWSNZ. The additional treated water reservoirs will ensure the public health grading requirement to have 24 hours of storage as a contingency to disruption on the supply zones is met

Notwithstanding these two factors, Watercare is proposing to implement significant broader community mitigation initiatives which have either been identified through the CLG or on the basis of other community feedback, or which consultation to date indicates are supported by the community. These 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. These initiatives are outlined below and will be more fully described in the OPW required for the actual construction of the infrastructure.

Repurposing of the Nihotupu Filter Station

The Nihotupu Filter station was closed in 1990 and the building has subsequently been subject to vandalism and gradual decay. The community has expressed considerable displeasure regarding this situation, including at the open days that Watercare held to discuss the proposed new WTP.

Watercare has subsequently undertaken further heritage and asset condition investigations. These have confirmed that undertaking the required remediation work and repurposing the structure is the most preferred option from a heritage perspective. From a building integrity perspective with appropriate remediation measures this is also a feasible option. It is understood this option is supported by the Community Liaison Group and Engineering Heritage NZ, as well as West Auckland heritage groups.

Watercare is therefore committed to undertaking the required remedial and strengthening work to enable the building to be repurposed, potentially as office space (including a potential site office during the construction period) or as a water supply heritage facility as advocated by members of the Engineering Heritage New Zealand and local heritage groups. The cost of carrying out the required remedial and strengthening work and potentially repurposing for office space has been estimated to be $3.8 million.

Woodlands Park Road/ Scenic Drive intersection upgrade

The intersection of Woodlands Park Road and Scenic Drive is currently unsafe due to its layout. Heavy truck movements through this intersection will compound this situation. There is also a need to slow vehicles down as they pass the entrance to the new site due to the limited sight lines. In response to the need to modify the intersection's layout, traffic engineers working on the project have designed an alternative layout. The new design has the initial support of Auckland Transport (AT), the Local Board, CLG and members of the community.

The realignment provides an opportunity to also relocate the carpark that services Exhibition Drive (one of the most popular walks in the Waitakere), thereby freeing up the area that has been identified as required for a second Nihotupu Reservoir.

The realignment of the intersection and carpark has been estimated to cost approximately $1 million. In addition to these enhancements, members of the CLG and the Local Board have suggested that the intersection become the gateway to the Waitakere Ranges. Watercare proposes to investigate this option further in consultation with these and other interested parties.

5 Consideration of alternatives

5.1 Statutory Context

Under Schedule 4 of the RMA, if it is likely that an activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity is required (Clause 6(1)(a)). 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.

5.2 Water supply network alternatives

In 2009 Watercare undertook an assessment of the future water supply needs of the Auckland region in order to identify the most appropriate mix of bulk water supply augmentation options required to meet future demands, over a 50 to 100 year horizon, and security of supply [27]. As set out in Section 2.3.2, the report considered 34 potential options for supply augmentation with the top ranked infrastructure options being expanding Huia WTP to 140 MLD and expanding the Waikato scheme from 150 MLD to 175 MLD with further staged expansion to 250 MLD in the future[28].

The existing Huia WTP was commissioned in 1929 and is now nearing the end of its operational life. Watercare has been planning to replace or significantly upgrade the Huia WTP since 2008. The option of upgrading the facility was canvassed in the High Court decision as follows (at paragraphs 10 – 11)[29]:

> *"A recent independent high-level asset review has identified that it is not viable for Watercare to invest significant capital into the Huia Plant because it is nearing the end of its economic life. Even with careful ongoing maintenance it is unlikely that the Huia Plant will be able to perform its current role for more than five to ten years. Watercare has therefore concluded that traditional treatment processes used in the existing plant should be replaced by advanced processes now considered more appropriate for the treatment of water received from the dams that supply it.*
>
> *Watercare has also concluded that any new capital investment in this area should focus on the development of a modern water treatment plant rather than upgrading of the Huia Plant. Any new plant will not only incorporate more advanced processing systems but will also address seismic design requirements and other limitations faced by the existing facility."*

In terms of network alternatives, as noted previously Watercare and its predecessors have made a substantial investment in the western water supply dams which are critical components of Auckland's water supply system. Watercare needs to maximise the use of these existing water sources both to ensure Auckland's future growth, development and wellbeing, and also to operate in accordance with its legal obligation to manage its operations efficiently and keep the overall cost of water supply to a minimum.

[27] Auckland Future Water Source Augmentation Options, Watercare Services Ltd, June 2009

[28] In applying for consent for an increased take beyond 150 MLD from the Waikato River, Watercare committed to maximise the harvesting of water from the Western sources.

[29] Titirangi Protection Society Inc v Watercare Services Ltd, CIV-2017-404-2762, [2018] NZHC 1026.

5.3 Earlier work on alternatives

In 2013 MWH was engaged to develop an implementation strategy and overall concept layout plan for the Huia WTP[30]. Through the Huia WTP Upgrade Implementation Strategy, alternative layouts for the Huia WTP were prepared based on key design criteria developed as the basis for the future upgrade of the WTP to an expanded capacity of 140 MLD[31]. A set of 15 preliminary site layout options were developed based on 5 main configurations:

1 A new WTP located within the general constraints of the existing Huia WTP site with the new reservoir(s) located on the Manuka Road site;

2 A new WTP located on the north side of Woodlands Park Road with the new reservoir(s) located on the Manuka Road site;

3 A new WTP located on both sides of Woodlands Park Road with the new reservoir(s) located on the Manuka Road site;

4 Relocation of Woodlands Park Road with the new WTP located to the north of the existing plant with the new reservoir(s) located on the Manuka Road site; and

5 A new WTP constructed on the Manuka Road site with the new reservoir(s) located on the north side of Woodland Park Road.

A two-stage optioneering and MCA process was undertaken to identify layout options and assess them against agreed criteria. This process resulted in the selection of Option 5B as the preferred layout (refer Figure 5.1 below).

During 2013 – 2015 an extended pilot plant investigation was undertaken by Watercare and Hunter H2O. This pilot work tested the process sequence adopted in the MWH report and confirmed that the core processes could achieve the desired treated water objectives, including under various raw water quality scenarios including poorest water quality.

[30] Huia Water Treatment Plant Upgrade Implementation Strategy. MWH, November 2013.
[31] The Huia WTP Facility Plan Design Criteria and Huia WTP Facility Plan Unit Process Datasheets report (CH2M Beca, June 2010).

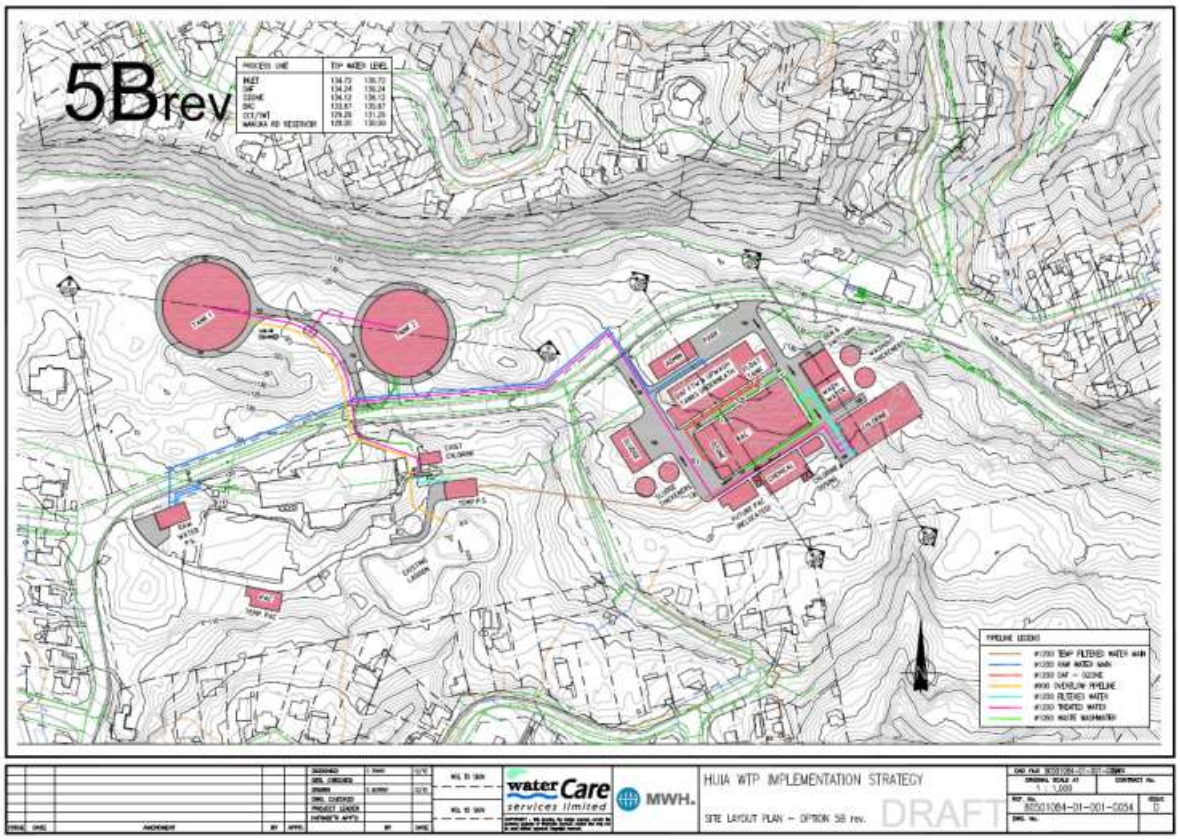

Figure 5.1: Huia WTP Implementation Strategy Option 5B, MWH.

5.4 Description of alternative locations

As outlined above, previous work on the siting of a new WTP has focused on the Manuka Road site immediately adjacent to the existing site. However Watercare subsequently decided to adopt a 'first principles' approach to investigate alternative sites. This was driven by the requirements of the RMA, particularly section 171(1)(b) and also Clause 6 of Schedule 4 which both indicate a robust assessment of alternative options is required in relation to the siting of a new WTP. However this broader assessment of alternatives was also supported by Watercare's desire to ensure that the proposed upgrade was considered strategically in terms of the operation and future development of the overall water treatment and drinking water supply network.

A Multi-Criteria Assessment (MCA) approach was adopted by Watercare as a tool for comparing and assessing the site options. The MCA took into account a variety of technical and environmental matters. On the basis of the MCA results and taking into account broader considerations, the Watercare Board selected the Manuka Road option as the preferred site for the development of a replacement WTP.

A high-level summary of the various stages of the assessment of alternative options for the replacement WTP project is set out in the following sections. Refer to the Longlist and Shortlist Reports and associated project reports for a full description and analysis.[3233]

[32] *Huia WTP Replacement: Report on Longlist Options, prepared by Tonkin + Taylor Ltd, June 2016;* and *Huia WTP Replacement: Report on Shortlist Options, prepared by Tonkin + Taylor Ltd, June 2017.*

[33] Note all reports referred to in Section 5.4 are available on Watercare's website: https://www.watercare.co.nz/About-us/Projects-around-Auckland/Huia-water-treatment-plant-replacement-Manuka-Ro

5.4.1 Initial site identification and evaluation

A series of site principles was developed to inform the initial site identification and overall evaluation of sites, particularly in terms of their technical feasibility (i.e. elevation, particularly in terms of minimising pumping / ensuring only raw water or treated water pumping (not both), size, and location, including connection to the existing water supply network[34]. These principles were developed taking into account the BOD and based on the following objectives:

- Maximise the utilisation of the existing water resources in the Waitakere Ranges;
- Maintain or improve the existing raw water transmission system operation;
- Maintain or improve the existing treated water transmission system operation;
- Provide an integrated maximum treated water flow of 140 ML over a 24 hour period; and
- Provide an integrated minimum treated water flow of 30 ML over a 24 hour period.

As noted in Section 2.2.5, water suppliers proactively seek to maximise the use of gravity water sources and treatment due to significant resilience, reliability and system efficiency benefits. The existing Huia WTP has the capability to supply water to Auckland from the upper dams with minimal power requirements and therefore has an important role in supplying water to the region in emergency situations and in the event of a major power supply disruption. This capability in turn increases overall system flexibility, security and resilience across the Watercare network. A fundamental characteristic for site selection was therefore the ability to construct a WTP that is reliant on gravity wherever possible.

The initial identification of potential sites involved using GIS tools to identify potentially suitable locations that aligned with the principles. The principles applied in this initial GIS screening approach focused on 'technical feasibility' e.g. locations outside of the Watercare dam catchments, elevation, proximity (distance of each parcel from the existing WTP and to the North Harbour 2 Watermain) and slope, to ensure a broad approach to the initial identification of sites. These key technical requirements were then overlaid to identify "more suitable" and "less suitable" sites on the basis of how well each site aligned with each of these principles.

Through the process set out above, a preliminary longlist of 21 sites was identified for further consideration and evaluation in the MCA process. This list was then further refined into eight schemes based on similar geographical locations, hydraulic characteristics, and pipeline routes and network connections. Scheme development focused on the ancillary structures required to service the new WTP and reservoirs (e.g. pipelines, tunnels, pumping stations).

5.4.2 Description of alternative schemes

The eight schemes and the corresponding sites are shown in and described in Table 5.1 below[35]. These are described in more detail in the Scheme Option Development Report[36] and the Longlist Report.

[34] *Huia WTP Site Selection Site Principles report prepared by CH2M Beca Ltd, Dec. 2015.*
[35] Clause 6(1)(a) of Schedule 4 requires a description of alternatives.
[36] *Huia Water Treatment Plant Site Selection: Long-list Option Development report prepared by CH2M Beca Limited (25 May 2016).*

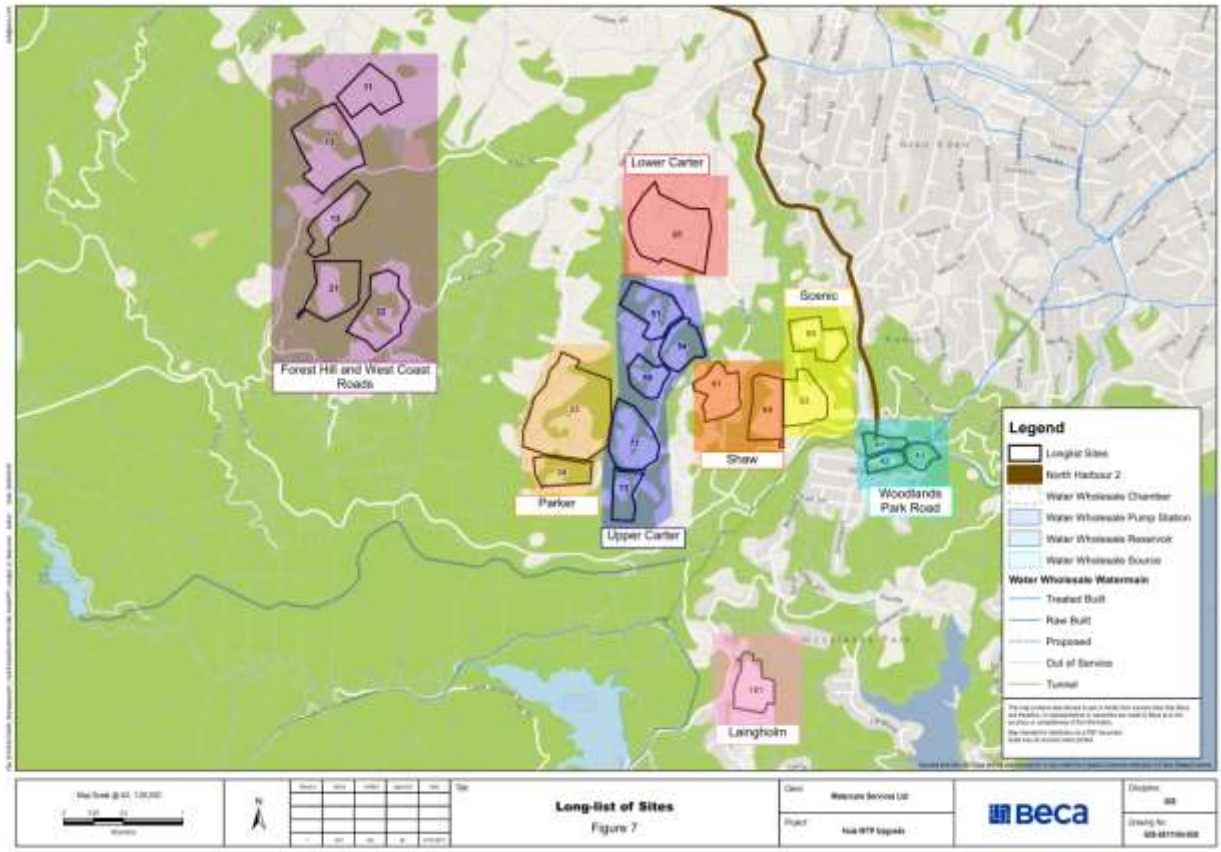

Figure 5.2: Map showing long listed schemes and corresponding sites Beca Limited, drawing no. GIS-6511164-038)

Table 5.1: Description of alternative schemes (sites and ancillary infrastructure)

Scheme name	Key scheme and engineering characteristics	Site description
Woodlands Park Road	- Connection to the end of the raw water aqueduct. - Close to existing raw water, treated water and overflow infrastructure. - Good elevation. - Direct supply to Titirangi Reservoirs, and to North Harbour No. 2 Watermain (NH2) route via treated water tunnel.	<u>Manuka Road site option</u> - Utilises two existing parcels of land which adjoin the existing Huia WTP: WTP located on the Manuka Road site and the reservoir site located on the northern side of Woodlands Park Road. - Existing Huia WTP and Nihotupu Filter Station are listed heritage features. - Site is c. 95% Significant Ecological Area (SEA) under the AUP including mature/high value vegetation. - Warituna Stream headwaters – challenging site for freshwater ecology. - No landscape overlays. Site is visually well buffered. - Low property risk as sites are already owned by Watercare / both sites are designated for Water Supply purposes. - Existing WTP provides a baseline / existing environment for establishment and operation of a new WTP.

Scheme name	Key scheme and engineering characteristics	Site description
Laingholm	- Low elevation. - Separate reservoir site / long way from treatment plant (long treated water pipeline along Huia and Woodlands Park Roads). - Treated water pumping required / significant lift. - Short raw water connection to Mackies Rest but otherwise generally poor linkage to existing water supply infrastructure. - Close to Coastal Marine Area (CMA) for overflow and attenuation pipeline.	- Located on the pony club area and below the sports fields at 436B Huia Road. Reservoirs in the same location as the Woodlands Park Road scheme - Large flat site includes buffer area with relatively limited earthworks required. - Site likely to contain some fill (though not a closed landfill site registered on Auckland Council's database). - Access along very windy roads and long distance. Traffic considerations/constraints. - One recorded site R11/1993. - Development footprint shown partly over an SEA and partly over wetland vegetation in tributary of Woodlands Stream but site large enough that this can likely be avoided. - Worst site from a landscape perspective. Entirely open, with high viewing audiences and high amenity values due to public reserve. - Auckland Council owned site. Zoned and used for public open space/ recreational purposes. Important community facility and the location of a WTP here would likely have a high social impact. - Potentially high construction impacts (noise, traffic, visual effects).
Scenic Drive	- Below ideal elevation band, with reservoirs located separately - Treated water pumping required. - Poor linkages to existing infrastructure. - Connection to the end of the raw water aqueduct. Raw water tunnel from Woodlands Park Road - Minor diversion to WMNH2 route	- Located off Scenic Drive with the main access of Shetland Street, Glen Eden. Reservoirs located at the Shaw Road site - Adequate area includes buffer. However topography is challenging, including for ancillary structures. Site topography and associated earthworks and geotechnical uncertainties increases the risk associated with this site. - Very challenging site access. - No recorded archaeological/heritage sites. - Footprint encroaches into SEA but may be able to largely avoid through careful design. But development would result in the loss of several individual indigenous trees/ stands of trees within grassland area. - Pipeline route intersects regenerating kauri - podocarp forest, and route crosses Kaurimu Stream tributary. Numerous flow paths/ minor tributaries. - Catchment for new WTP extends to north toward urban area, location in valley. Potential visibility from surrounding residential areas. - Social and community impacts around traffic, particularly construction traffic which would pass through built up residential area. - Alignment and geotechnical risks associated with the raw water tunnel.
Shaw Road	- Good site elevation, slope and proximity to existing water	- Located off Scenic Drive near Shaw Road. Large enough and high enough to accommodate the WTP and reservoirs on the same site.

Scheme name	Key scheme and engineering characteristics	Site description
	supply infrastructure. - Raw water pumped. Pump station at existing plant or Exhibition Drive/Shaw Road. - Treated water gravity fed to reservoirs. Treated watermain in Shaw Road - Complex arrangement for ancillary structures, with no connection to Titirangi Reservoirs or supply to the city. - Tunnel length is reasonably short.	- Very poor/challenging site access. Bylaw prevents heavy traffic along section of Scenic Drive so access would be via a bridge to Shaw Road. Shaw Road will need to be upgraded/widened and a bridge constructed to cross a gully into the site. - A pumped raw watermain presents challenges around maintaining a gravity supply from the Upper Nihotupu Dam. Alignment and geotechnical risks associated with the raw water tunnel. - Relatively tight site with some steep grades and significant earthworks required. Site contours would make site set out complex. Trenched pipeline leaving site is challenging due to gully. - No recorded sites. - Indicative footprint encroaches into SEA which comprises c. 65 year old kanuka forest, but largely avoidable with some opportunity for on-site mitigation. - Site encompasses main stem and tributaries of Kaurimu Stream, and numerous flow paths/ minor tributaries, along with two ponds. - Relatively good from a landscape perspective as plant can likely be contained within the site (although access may impact further). - Social and community impacts around traffic, particularly construction traffic. - Site is made up of six parcels on predominantly large rural blocks.
Upper Carter	- Good proximity to existing water supply infrastructure. - Raw water tunnel to Carter Road from Mackie's Rest - Raw and treated watermains in Carter Road - Connection to treated water network on West Coast Road - Loss of system hydraulic efficiency due to need to gravitate to below hydraulic grade line and then pump.	- The majority of the site is below the ideal elevation range– treated water pumping to reservoirs. The area at a suitable elevation for reservoirs is limited and the land between the WTP and the reservoirs is steep. - Site can be approached from two directions. - No recorded sites. - Footprint as shown encroaches into SEA margins - limited opportunity to wholly avoid bush due to site constraints; some opportunities for protecting/ revegetating surrounds. - Pipeline route intersects stand of regenerating kauri - podocarp - kanuka forest (SEA) within the site envelope - The site encompasses flowpaths/ minor tributaries of Cochrane Stream, some of which are likely to be affected; fairly limited opportunities for onsite mitigation. - Reservoirs very prominent / would have a significant visual impact. - Ability to manage noise and vibration is good, however impacts on nearby school will need to be managed (particularly traffic). - 10 land owners - predominantly lifestyle / developed properties. - Limited space on site for overflow attenuation if needed.

Scheme name	Key scheme and engineering characteristics	Site description
		- Site topography increases earthworks requirements.
Lower Carter	- Entirely below the ideal elevation band - Loss of system efficiency due to need to gravitate to below hydraulic grade line and then pump. Requires large pumping station (60m lift). - Treated water reservoir at an elevated site on Carter Road - Raw water tunnel and connection (shaft) at Shaw-Exhibition intersection. Alignment and geotechnical risks - Raw watermain in Shaw Road	- Located on a large site which stretches between the northern end of Carter Road and Shaw Road. WTP located in the south-eastern corner of the site with access off Shaw Road. - Reservoirs located at an alternative site which is limited in size and only just at a high enough elevation (at Upper Carter). Reservoir construction challenging due to limited site footprint and dual pipelines in Carter Road. - Likely to be contaminated from previous horticultural use. - Adequate access. Site can be approached from two directions. - No recorded sites - No SEA overlay on the WTP site. - No landscape overlays on the WTP site however, reservoirs are in the same location as Upper Carter and would have the same visual impacts. - School located in reasonably close proximity (corner West Coast Road and Shaw Road). - Reservoirs likely to be associated with additional social and visual impacts. - 3 land owners of mainly large rural land holdings.
Parker Road	- Very good elevation. - Integrates logically into hydraulic grade line and maximises use of gravity. - Raw water tunnel from Mackie's Rest. - Site located some distance from existing infrastructure, especially raw water. 2.5km of curved tunnelled section, approximately 7.5km in total pipeline length. - Treated watermain down Parker Road - Connection to treated water network on West Coast Road	<u>Parker Road North site option</u> - Located along and accessed from Parker Road. Site is high enough and large enough to accommodate the WTP and the reservoirs on the same site, with two potential layouts. Flexibility for WTP configuration and buffer area. - Flat site so little earthworks required. - Adequate for traffic/access. - One scheduled heritage site but potentially will be able to avoid. - Site encompasses SEA comprising mature kanuka - broadleaved forest with scattered kauri and podocarps, however this can likely be avoided. Potential lizard habitat outside of SEA. - Pipeline route intersects area of low kanuka scrub surrounding a stream tributary (not SEA). Scope for on-site mitigation. - Can avoid nearest Outstanding Natural Landscape (ONL). Rural residential and horticulture, houses generally orientated out from ridge so screening potential. - This site is best from a noise perspective. Low visual amenity impacts if site can be screened. - Approximately 12 land owners for each of the Parker site locations. - Alignment and geotechnical risks associated with long raw water tunnel.

Scheme name	Key scheme and engineering characteristics	Site description
Forest Hill	- Site below ideal elevation range. Separate site needed for reservoirs. - Remote from existing infrastructure. - Long raw water tunnel and treated water pipelines - Raw watermain to the end of Shaw Road and then back uphill to Forrest Hill Road or along West Coast Road - Sites fall away from the road and require a second tunnelled section under high points close to the site or a pipeline route across private property	- Located some distance north of the existing plant off Forest Hill Road. Accessed over private property from Forest Hill Road. - Not high enough to accommodate the reservoirs on the same site. Instead these would be located further west at or about 259 Forest Hill Road - Complex raw and treated water setup. Raw water connection to aqueduct at Mackie's Rest. Raw water connection to Upper Nihotupu would be a pipeline route via bush. - Long length of tunnel. Trenched pipeline would be through narrow windy roads with geotechnical concerns, long distance. - No recorded sites. - No SEA overlay. No significant woody vegetation cover. - Route intersects sections of riparian mixed podocarp-broadleaved forest surrounding Anamata Stream, Norman Glen and McLeod Stream tributary. - Site just clips ONL in west corner can be avoided. Entirely open rural - low intactness. Visual catchment for WTP limited to local area, low level residential in surrounds. Valley with potential ability to screen viewing audiences. Low context/quality. - 5 land owners, predominantly lifestyle / developed properties - Risks include route of raw water and treated water pipelines which pass over high point on Forest Hill. Raw water pipeline would either require additional land purchase or tunnelling. - Ground conditions across the site are known to be poor.

5.4.3 Longlist Assessment Overview

To ensure that a range of options across a range of locations was considered, all eight schemes proceeded to the longlist MCA. Within each of the eight schemes a preferred site for further evaluation was identified based on a high level MCA, meaning the “best” option for each scheme was subject to further assessment. The eight longlisted schemes and the corresponding preferred site were then subject to evaluation through the MCA longlist assessment. Scoring was undertaken on the basis of engineering, cultural, environmental, social and consenting risk criteria. Costing was also undertaken for each of the schemes.

The Parker Road scheme consistently ranked as the highest scoring scheme based on the non-weighted scores as well as when weightings were applied. The site is large, with two alternative WTP locations within the site, and located at a very good elevation. The scheme scored well across all engineering-related criteria as well as non-engineering/environmental related criteria. At the long list stage social effects were considered in terms of noise and amenity effects associated with construction and operation of the plant, and property impacts. Overall Parker Road scored relatively well for social and community impacts at this stage of the MCA due to the large site area and the ability this allowed to manage noise and amenity effects. However the potential for a new WTP at this location to cause disruption to the local community was noted but not evaluated at this point. The site also scored poorly from a property perspective due to a number of properties likely to be directed impacted by the siting of a new WTP at this location.

The Woodlands Park Road scheme was generally the second ranked scheme. The site is owned by Watercare and designated for water supply purposes and is located immediately adjacent to the existing Huia WTP which forms part of the existing environment in terms of effects on the surrounding community. Woodlands Park Road scored poorly in terms of environmental considerations, in particular the presence of the SEA across most of the site, but generally well on engineering-related matters in that it is at a good elevation and is well connected to the existing water supply network.

The Laingholm and Shaw Road schemes consistently ranked in the top half of the table. Laingholm ranked well from an operational perspective as it is a large site with good access. It also offers a short raw water connection to the existing network at Mackies Rest. However the low elevation of the site means the reservoirs need to be located remotely and a significant treated water lift (pumping) is required. It is also the worst ranking site from a landscape perspective and is likely to have relatively high social impacts and high consenting risk being located on or near community facilities (sportsgrounds and pony club) and within a residential area. Shaw Road by comparison scores better from an environmental and social perspective but carries significant constraints from an engineering perspective. This is particularly due to access which would require widening of Shaw Road and a bridge from Shaw Road to the site through an established area of vegetation. Topography also has the potential to pose a significant challenge at the Shaw Road site.

The Scenic Drive, Upper Carter and Forest Hill schemes did not rank in the top half of the sites even with multiple different weightings applied. The Lower Carter scheme generally ranked in the middle relative to other schemes, but has significant operational issues due to being located at a low elevation, with treated water needing to be pumped to a higher elevation. This means the reservoirs need to be located off-site in the same location as the visually prominent Upper Carter scheme reservoirs. Therefore, these four schemes were not recommended to proceed to the shortlisting evaluation process.

5.4.4 Shortlist Assessment Overview

Shortlisted options

Watercare determined that it would take the top two schemes from the longlist assessment through into the detailed shortlist stage, being Parker Road and Woodlands Park Road. The wider site options for these schemes were then revisited to determine whether other sites within the preferred schemes should be subject to further evaluation through the shortlisting stage. This resulted in four sites in total proceeding through into the shortlist assessment process, two for each of the shortlisted schemes: the Parker Road scheme could be divided into Parker North and Parker South given the site size; and two sites were assessed for the Woodland Park Road scheme being the Manuka Road (proposed) site and the existing Huia WTP site. This is discussed in detail below.

Previous work on the siting of a new WTP had focused on the Manuka Road site which is owned by Watercare and designated for 'water supply purposes – water treatment plants and associated structures'. This longstanding designation signals to the community the future use of the site for a public work. While Watercare undertook a 'first principles' approach to investigating and assessing alternatives sites, the Woodlands Park Road scheme/Manuka Road site was considered to be the yardstick against which other sites are assessed. Watercare therefore determined that it would only take forward a scheme and associated site option(s) which were at least as good as the Woodlands Park Road scheme. The only scheme option which fitted this direction was the Parker Road scheme.

The Manuka Road site was identified as the preferred site for the Woodlands Park Road scheme. However, at the conclusion of the longlisting stage Watercare resolved to further investigate the option of rebuilding on the existing Huia WTP site and in particular, to determine whether or not this option was feasible from a water supply and network operations and resilience perspective.

Therefore the existing Huia WTP site was also considered in the shortlist options assessment process.

Through the long list stage, a large parcel of potentially suitable land was identified on Parker Road (Parker 3) that aligned well with the site principle requirements. The Parker 3 site had extensive areas with suitable ground levels to accommodate a treatment plant without the need for raw water pumping. On further inspection two distinct areas were identified within the larger parcel of land, both of which would be able to accommodate the development of a WTP. As a result, two options for the Parker Road scheme - labelled Parker North and Parker South - were developed and assessed through the shortlist stage.

Site evaluation methodology

The process for evaluating and ranking the four sites on the short list to assist with determining the preferred site is summarised as follows:

1 Development of further site-specific information. This included more detailed information relating to each site including indicative site layouts and consideration of pipeline routes and connections;

2 Engagement of additional subject matter experts (SME) to address the social impacts, traffic effects and the heritage and archaeological effects associated with a new WTP at the four shortlisted sites, and to provide expert scoring of the relevant criteria for the short listed options;

3 Site visits. A series of site visits was undertaken by the subject matter experts to the short-listed sites as well as to Mackies Rest;

4 Challenge workshops. Subject matter experts undertook an assessment of the four sites and presented their scores for the relevant criteria (i.e. within their field of expertise only) and a rationale for this based on their assessments. Scoring was then debated and confirmed through a series of workshops; and

5 MCA analysis. Final scores were then entered into the MCA spreadsheet and an overall score was generated for each site to enable a ranking and comparison of sites. Weighting and sensitivity analysis was undertaken to further analyse and test the sensitivity of the process and inform the overall decision making.

MCA results

Through the shortlist MCA process, the **Parker South** site scored well in terms of constructability and moderately well for key site characteristics and operability. However compared to the other three sites under consideration it consistently ranked poorly overall both with and without weightings applied. While it is a relatively large site which provides some flexibility in terms of site layout (although less than the Parker North site), the elevation of the site potentially presents challenges in terms of locating the reservoirs at an acceptable level. In terms of ancillary infrastructure, the distance from the Titirangi Reservoirs means there is reduced connectivity to the wider network, and the connection to the raw water network at Mackie's Rest is challenging. In terms of the environmental criteria, the ecological assessment identified the potential for significant adverse effects on ecological values at this site. The Social Impact Assessment (SIA) has also identified the potential for significant social impacts. There are also significant constraints associated with site access and traffic effects.

The **Parker North** site performed well on the basis of technical/engineering criteria, particularly in terms of constructability, and also in terms of key site characteristics and operability. The site is large and therefore has a high level of layout flexibility and all the benefits that entails. It is also located at a good elevation. However similar to the Parker South site, the key constraint identified at the Parker North site was the social impacts of establishing a new WTP in a locality where there is no

expectation of a facility of this nature and scale, and where the policy direction at a local level is focused on retaining and enhancing rural character and amenity values and ensuring the subservience of the built environment. The property impact at Parker North is also significant relative to Manuka Road and the existing WTP site. Additional constraints at the Parker North site include the potential for high traffic effects and moderate landscape and visual effects, and some challenges associated with the provision of ancillary infrastructure to service the site.

Through the MCA process the **Manuka Road** site was typically ranked either first or second on its weighted and unweighted scores. The properties on which the new WTP would be sited are owned by Watercare and designated for water treatment purposes. The Manuka Road 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.

The Manuka Road site is located at a good elevation with minimal pumping requirements and in close proximity to the existing raw and treated water network. However it does not perform as well as either of the Parker Road sites in terms of the engineering criteria, mainly due to it being a smaller and more constrained site. These features make constructability and operability more challenging. It also scored poorly in terms of ecological effects due to the impact of vegetation removal in an SEA.

The **existing Huia WTP** site scored moderately to poorly across most criteria with some exceptions, being social effects, property and traffic effects where it scores well relative to the Parker Road sites. There are a number of significant challenges associated with redevelopment of the existing site, in particular:

- It is a constrained site which has a number of drawbacks including reduced site flexibility, a restricted working area, the inability to accommodate a new WTP and storage lagoon for off-spec discharges on the site, and limitations on site manoeuvrability and internal circulation. These matters are reflected in the low scores attributed to the existing Huia WTP for key site characteristics, constructability and operability;
- The demolition of the existing Huia WTP would remove the upper and lower Huia and upper and lower Nihotupu raw water supply sources from Auckland's water supply network for around three years. Construction at this site therefore compromises the security of the supply system for the duration of the construction period and has broader network implications in terms of reduced resilience during this period; and
- Expansion of the existing WTP footprint including the reservoir site would impact identified SEA and result in the generation of high adverse effects on terrestrial ecology. These have been assessed as higher than at the adjacent Manuka Road site (refer Figure 5.5).

Overall, the shortlist MCA process indicated that both the Manuka Road and Parker Road North sites had features and attributes that made them suitable for the location of a new WTP site. These factors counter balance each other to the extent that the two sites were more-or-less equal in terms of the weighting and sensitivity analysis results. However overall, taking into account all of the technical/engineering, property and environmental matters assessed, the Manuka Road site emerged from the MCA process marginally better.

In June 2017 the Watercare Board accepted the recommendation of Watercare Management to select the Manuka Road option as the preferred site for the development of the replacement WTP. In making its decision, amongst other things the Board resolved that this should be subject to avoiding wherever possible significant trees and significant ecological effects. Every effort has been made through the assessment of alternative site layouts, described in Section 5.5 below to determine a layout and footprint which gives effect to this requirement. It has also directly informed the further consideration of reservoir options described in Section 5.5.4 below.

5.5 Description of alternative layouts

Following selection of the preferred site, an onsite alternatives assessment has been undertaken to determine the most appropriate footprint for the replacement WTP and reservoirs. This has focused on layout optimisation taking into account technical, operational and construction requirements and balancing these against environmental constraints to identify a suitable footprint. This description of onsite alternatives is potentially required by Schedule 4 of the RMA and also reflects the Watercare Board's direction discussed above.[37]

5.5.1 Background and Basis of Design

Watercare has been planning to replace or significantly upgrade the Huia WTP since 2008 and has put considerable effort into defining what is required in terms of the layout and scale of a new WTP, and treatment processes to ensure the water supplied from a new WTP is suitable into the future.

The BOD was developed by Watercare to clearly document its requirements of the new infrastructure[38] (refer Section 1.1). Amongst other things, it sets out the required treatment processes and key requirements regarding redundancy, design criteria and design consideration for each of these processes. It also sets out the sizing of key process units to be used to develop design concepts. This has subsequently informed the site layout optimisation work described in Section 5.5 below.

The starting point for the site layout optimisation is therefore the BOD that stipulates Watercare's requirements of the new infrastructure. This is represented by the pre-concept site layout developed by MWH (refer Figure 5.3 below), as updated by the pilot plant trial results which have been reflected in updated versions of the BOD. This has been subsequently updated by the shortlist conceptual site layout plan (refer Figure 5.4 below).

[37] Note all reports referred to in Section 5.5 are available on Watercare's website: https://www.watercare.co.nz/About-us/Projects-around-Auckland/Huia-water-treatment-plant-replacement-Manuka-Ro

[38] *Huia WTP Replacement – Basis of Design Framework, Watercare (Draft 18/09/14 updated 22/05/18 (Issue 14)).*

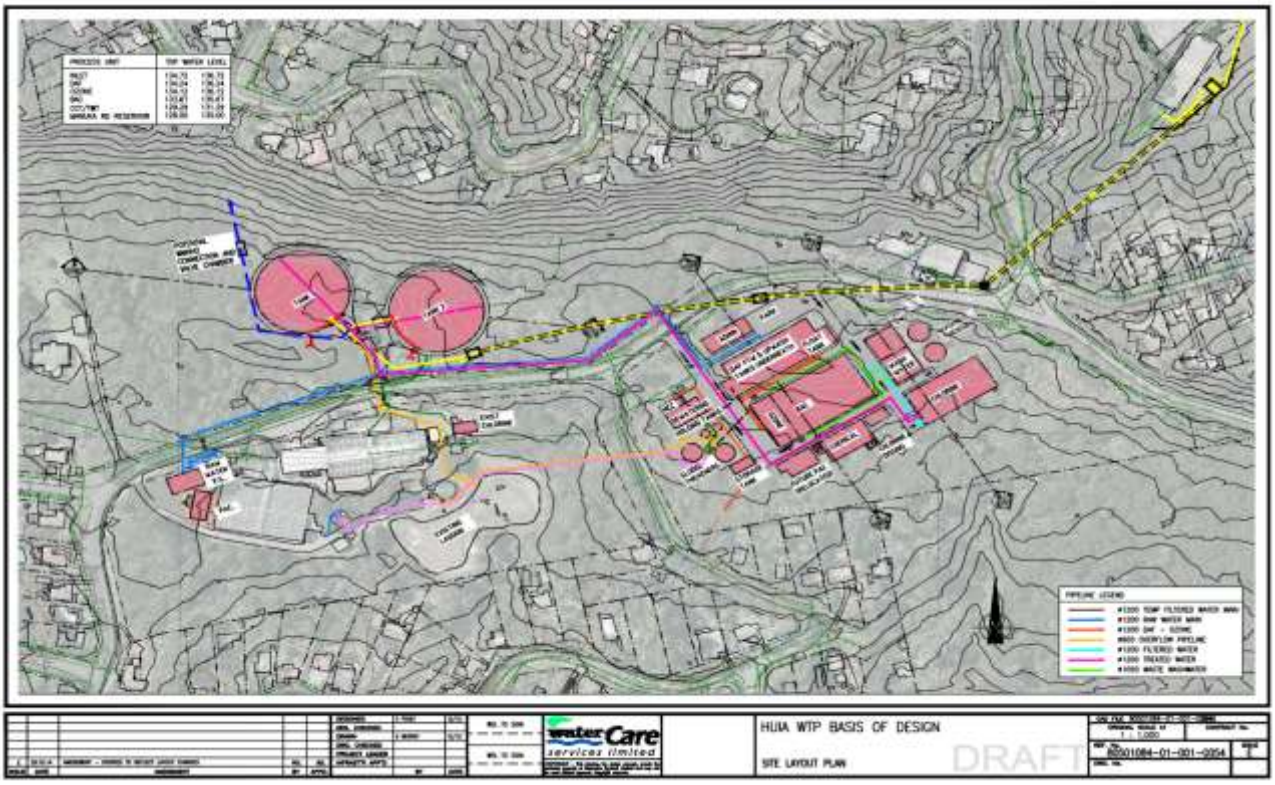

Figure 5.3: BOD Site Layout Plan (MWH)

Figure 5.4: Manuka Road shortlist site layout. Source: Shortlist Site Development Report (GHD, March 2017).

5.5.2 Methodology

To assess onsite alternatives, detailed site investigations were undertaken to determine technical and environmental constraints and opportunities, and to determine the most appropriate footprint for the replacement WTP and reservoirs taking these constraints into account. Using the BOD as the starting point, the on-site alternatives assessment also needed to factor in the requirements of a water treatment plant, both in terms of the necessary components, their sizing and layout on site, as well as broader operational and health and safety requirements, and construction-related requirements.

Once the constraints and opportunities had been identified and mapped (where relevant), a series of workshops was then held to discuss, debate and refine the proposed WTP and reservoirs location, size, and footprint. Specifically, this included input from:

- Planners;
- Terrestrial and freshwater ecologists;
- Landscape architects;
- Civil engineers and water treatment plant process engineers (including Watercare's Operations team);
- Construction contractors; and
- Traffic engineers.

The overall objective of these workshops was 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. This assessment therefore focused on avoiding as far as practicable (i.e. within the constraints required by locating a scheme reliant on gravity as far as possible on this site), effects on the values of the SEA and the streams and otherwise minimising and mitigating adverse effects.

5.5.3 Key opportunities and constraints

5.5.3.1 Ecological integrity mapping

As set out earlier in Section 3.6 and 3.6, in order to identify areas with particularly high values within the overall SEA, extensive terrestrial and freshwater ecological surveys were undertaken to provide a detailed assessment and mapping of ecological values and ecological integrity across the site. This was undertaken on the basis that it is not possible to avoid vegetation clearance altogether in order to accommodate the replacement WTP and reservoirs. Therefore a more granular assessment would allow for areas of particularly high value to be identified along with lower value areas so that development could, as far as practicable, be directed away from the higher value areas and centred on the lower value areas within the site.

The ecological integrity map formed the basis for the onsite alternatives assessment, guiding the project team's discussions and decisions on preferred development locations within the sites. Priority was given to avoiding, as far as practicable, development within the areas mapped as having the highest ecological values (i.e. 'red' and 'orange' areas) and focused development of the sites within the areas identified as having the lower ecological value ('green' areas). Priority was also given to avoiding, as far as practicable, works within intermittent and permanent sections of Armstrong Gully and Yorke Gully streams.

The evolution of the WTP and reservoir site layouts from the original BOD layout is set out in the GHD report.

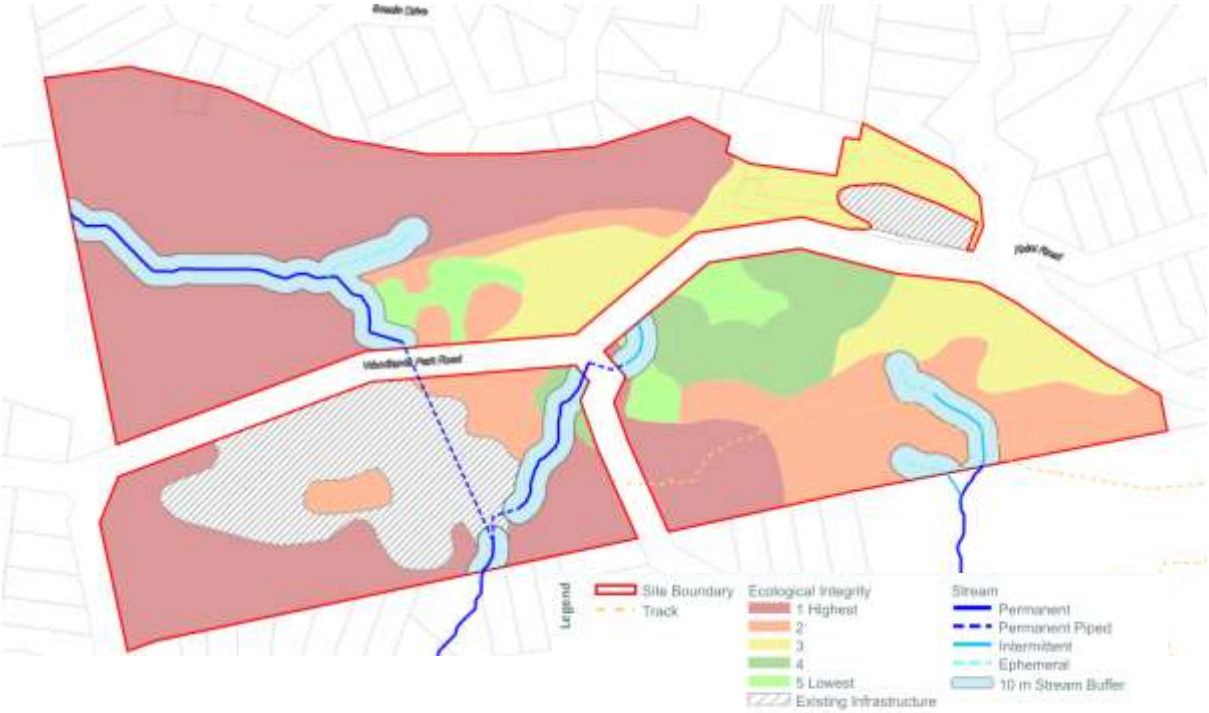

Figure 5.5: Ecological Integrity Map *(Boffa Miskell, 2019)*

5.5.3.2 Technical requirements

The BOD sets out fundamental water process design principles that were not able to be changed as part of the onsite alternatives assessment. The BOD also specifies an indicative gravity water treatment process and associated WTP layout that is considered appropriate for the treatment of water received from the western dams. As noted in Section 2.2.5, water suppliers proactively seek to maximise the use of gravity water sources and treatment due to significant resilience and system efficiency benefits.

Key water treatment process units required as part of the gravity system treatment process and relative spatial layout considerations are canvassed in the Site Layout Development Report (GHD, 2018) (attached as Appendix C)[39]. Due to the proposed replacement plant being a gravity system, certain process units are required to be located adjacent to and down slope of one another to enable gravity supply. The main process units, in descending order (highest to lowest elevation) are the DAF units, BAC filter units, ozone plant and chlorine contact tanks. The location of these process units is more-or-less fixed. However through the onsite alternatives / layout optimisation process, distances between the main process units were minimised, as far as practicable, to reduce the overall WTP footprint and pipeline lengths between the units.

The supplementary process units, wherever possible, have also been arranged to provide gravity flow from the main process units. Supplementary process units include the washout balance tank, washwater thickeners, sludge thickeners, sludge balance tank, filter press and supernatant tank. The size of each of the supplementary process units has also been reviewed to identify opportunities to minimise the WTP footprint as far as practicable.

Other additional site layout limitations that are driven by health and safety and/or accessibility constraints include the location of the administration building, and chemical and chlorine facilities. There is a strong preference to locate the administration building at the entry of the site for health

[39] Huia Replacement Water Treatment Plant: Consenting Phase Site Layout Development Report. GHD, October 2018.

and safety reasons, including ensuring it is easily accessible for visitors to sign in prior to entering the facility. Stacking of the administration building has been incorporated into the indicative design to reduce the overall footprint. Stacking of the various WTP components is limited due to health and safety, and operability constraints.

The chemical facility requires sufficient area for tanker deliveries and a dedicated spill area large enough to provide containment in case of any minor or major spills. Due to the nature of both the chlorine and chemical facility there was also a preference to locate these facilities away from site boundaries and/or residential properties. The chlorine contact tanks were reduced in size by one third following Watercare obtaining special authorisation from the Auckland Regional Health Drinking Water Assessment Unit to reduce chlorine contact time from 30 minutes to 20 minutes.

The onsite alternative assessment focused on relocating the supplementary process units and other WTP components around the Project Site to avoid the higher ecological areas wherever practicable. As explained above and in more detail in the Site Layout Development Report, these units were able to be moved around the site without jeopardizing the gravity system and operability of the plant. Figures showing the changes made to the WTP layout and construction footprint are provided in the Site Layout Development Report.

5.5.3.3 Constructability

Constructability constraints and opportunities were identified across the Project Site and were taken into consideration as part of the on-site alternatives assessment.

The primary constructability constraints identified related to site topography. In particular the need to maintain sufficient setback distances from the steep slopes along the northern boundary of the reservoir site and the eastern extent of the replacement WTP site to maintain slope stability and reduce earthwork volumes.

Constructability opportunities were also identified in order to reduce the construction footprint and reduce vegetation removal within the Project Site. One opportunity identified and adopted was to primarily use retaining walls rather than batter slopes to retain the proposed excavations. An earlier site layout proposed battered slopes, however by retaining the excavations ('cut') necessary to establish the building platform the construction footprint was notably reduced. This further serves to reduce the extent of vegetation removal proposed across the Project Site.

As noted in the Alta Construction Methodology Report, further laydown areas would normally be provided to support the level of construction activity expected on a project of this scale and complexity. However due to Watercare's intention to avoid as far as practicable vegetation clearance on the site this will not be possible. The limitations on laydown areas will limit storage and preparation areas on the site requiring careful staging of works, logistics planning including just-in-time deliveries, and increasing the need for more offsite assemble of certain elements. Opportunities for staging of the enabling works is discussed in the Indicative Construction Methodology Report attached as Appendix F.

5.5.3.4 Landscape and visual principles

The following sections set out the landscape and visual principles developed by the project team that were prioritised during consideration of alternative layouts and subsequent construction footprints. These principles were developed with the primary objective to minimise, as far as practicable, potential adverse landscape and visual effects.

Landscape buffer

In order to retain the surrounding natural landscape and minimise the visual dominance of the replacement WTP, a minimum 10 m wide landscape buffer around the perimeter of the Project Sites

was determined to be a key design principle required to avoid, and otherwise remedy or mitigate, adverse landscape and visual effects.

The 10 m wide landscape buffer is proposed to substantially screen the replacement WTP and reservoirs[40]. A 2 m working zone is proposed within the landscape buffer where isolated vegetation removal may occur during construction, subject to agreement and under the supervision of ecology and landscape specialists. This seeks to provide a balance between maintaining a substantial landscape buffer while recognising that this has the potential to pose a constraint to construction activities. However the expectation is that the landscape buffer will largely be retained, and there is only limited opportunity to reduce this to 8m in particular isolated circumstances.

Retention of notable kauri tree

There is an existing large Kauri tree located on the north-western corner of the WTP site, specifically on the corner of the intersection of Woodlands Park Road and Manuka Road. This tree was identified as a significant individual feature due to its highly visible location, size and age. It is also identified in the AUP as a Notable Tree (AUP reference 1836, Kauri). Consequently, this tree was prioritised as being retained during the onsite alternatives process and it will continue to form part of the landscape buffer in the north-western corner of the replacement WTP site.

5.5.3.5 Site and internal access

Site access

Alternative site access designs were considered as part of the layout optimisation exercise. Two key design principles were developed and agreed relating to the location of site access:

i. The first design principle was positioning the site access where safe sight lines along Woodlands Park Road could be achieved without significantly upgrading or realigning Woodlands Park Road. This consequently avoided the need to remove a large amount of trees along Woodlands Park Road; and

ii. The second design principle was minimising, as far as practicable, the size (width) and extent of site accesses. Limiting the number of temporary construction accesses and proposed future accesses to one access for the WTP and two (one permanent and one temporary) for the reservoirs site also reduced the extent of vegetation clearance required.

Ensuring the site access on the WTP is suitable to provide for construction traffic, as well as permanent site access once the WTP is operational also reduces the requirement to clear vegetation within the 10m wide landscape buffer.

The temporary construction access proposed to the east of the reservoir site is required due to the limited working space for large vehicle manoeuvring within the site. Upon completion of works, this access will be entirely replanted.

The permanent vehicle access located to the south west on the reservoir site is required to be wide enough to allow for large vehicles during the construction period. However following completion of the construction works, this permanent vehicle access will be reduced in width and replanted.

Internal access roads

A further design consideration was vehicle tracking internally within the WTP and reservoir sites. The widths of the internal access roads around the WTP need to be appropriately sized to accommodate vehicles accessing the site but also not unnecessarily oversized resulting in a larger footprint. The largest vehicle typically visiting the WTP site is a two trailer truck (known as a B-Train). Generally, B-

[40] Note: this was subsequently revised to 3m specifically in relation to the reservoir located on the northern side of Woodlands Park Road. See below for rationale.

Trains are used for chemical deliveries and therefore only require access to certain process units located around the perimeter of the site. Beca undertook a B-Train vehicle tracking analysis through the WTP site to ensure the internal access roads around the perimeter of the WTP site are appropriately sized to accommodate these trucks. However other internal roads within the WTP site (not required for B-Train trucks) have been reduced in size, only providing one way access for smaller vehicles and space for pedestrian movement.

In terms of the reservoir site, through the layout optimisation workshops vehicle access around the reservoirs was amended from a full access road around the perimeter of the reservoirs to a one way vehicle access, and only along the western and northern boundaries and in between the two reservoirs. No vehicle access is provided internally along the southern side (adjoining Woodlands Park Road) minimising the extent of vegetation clearance and allowing the 10 m landscape buffer to be retained along Woodlands Park Road[41].

5.5.4 Reservoir alternatives assessment

Following the site-optimisation process described above, Watercare was at a point where it was close to finalising and lodging the relevant resource consent applications. However rather than proceed with lodgement, it determined to re-evaluate the reservoirs to further identify and test alternative sites and layout. This further work was primarily driven by the CLG, but also reflected the Watercare Board's resolution to avoid wherever possible significant trees and significant ecological effects as well as the strong policy direction regarding protection of Significant Ecological Areas. While the CLG has expressed concern generally about the effects of the replacement WTP and reservoirs, through the course of consultation with the CLG it became apparent that this group had particular concerns about the reservoir site and the ecological and landscape effects of the proposed new reservoirs. As a result of this, Watercare engaged Beca to undertake further evaluation of the storage requirements within the western water supply area and alternative sites on which to locate the required storage (refer to the Storage Requirements Report and the Reservoir Site Layout Development Report included as Appendix D). This work built on the work previously undertaken through both the site alternatives and alternative layout assessments described above.

At a high level, the steps undertaken by Beca in their assessment comprised:

1 A review of national and international practice in relation to reservoir storage requirements;

2 An assessment of the total storage required, based on Watercare's current and future needs;

3 Development of a suite of Watercare's principles and operational requirements to guide the location of storage in the north-western supply area;

4 A desk top study to identify potential locations where this reservoir storage could be located; and

5 Screening and more in-depth analysis to identify the preferred location for strategic storage.

Storage requirements

The analysis undertaken by Beca demonstrated that for the North Western Water Supply area:

- There is currently enough storage across the supply area as a whole, but it is not provided in the required location;
- The future total deficit in storage for the North Western Water Supply area, accounting for planned changes in the reservoir storage, is approximately 60,000 m^3;
- The current storage deficit in Area 1 (near the Huia WTP) is approximately 25,000 m^3; and
- The future storage deficit in Area 1 totals approximately 50,000 m^3;

[41] Note: This has subsequently been amended through the additional reservoir work undertaken. Refer section 5.5.4.

- In summary, 25,000 m^3 of additional storage is required now in Area 1 and a further 25,000 m^3 within a ten year period i.e. by 2030.

Location of storage

Similar to the approach taken to identify potential WTP sites, a desk-top based GIS mapping exercise was undertaken to identify potential reservoir sites located in Area 1 within the correct elevation band, and within 2km of the proposed NH2 pipeline route. Through this process, a preliminary list of 11 sites was identified.

As the assessment of storage requirements above demonstrated, 25,000m^3 is required now to commission and operate the replacement Huia WTP, with a further 25,000m^3 required by 2030. This provides the opportunity to provide the required storage using a combination of two reservoirs potentially at two different sites. From the preliminary list of 11 sites, 5 combinations of sites were subsequently identified to provide the storage volume required. These options were then subject to a high-level assessment which determined that the two preferred options which more closely aligned with Watercare's principles were:

- Option 1 i.e. the 'status quo' comprising 50ML of reservoir storage located on the northern side of Woodlands Park Road; or
- Option 2 comprising 25ML of storage located on the northern side of Woodlands Park Road and a further 25ML of storage located on the existing Huia WTP site once the existing plant has been decommissioned.

From an operational viewpoint Option 1 is preferred. However from a sustainability viewpoint Option 2 is preferred in that it would avoid the removal of the knoll and a number of significant native trees located along the northern side of Woodlands Park Road. While Option 2 is a more complex option and will still entail some vegetation removal, constructing one of the reservoirs on the northern side of Woodlands Park Road and the other reservoir on the existing Huia WTP site has less environmental effects overall than Option 1. Option 2 was therefore confirmed as the preferred option to move forward to consenting.

Reservoir layout optimisation

The Reservoir Site Layout Development Report prepared by Beca (included in Appendix D) describes the further work undertaken in relation to Option 2 to further reduce environmental effects as far as practicable, whilst still ensuring technical and operational requirements were met. This focused on identifying key site constraints, including those related to ecological and landscape effects, topography and access, along with operational requirements. The proposed reservoir layouts were then developed in conjunction with SME's including the project landscape architect, terrestrial and freshwater ecologists, and constructability experts. An arborist was also engaged at this stage to provide input into effects on specific trees and appropriate measures to avoid or mitigate effects. This was a detailed assessment which included a survey of individual trees within the vicinity of the potential works footprints on each of the three sites.

On the basis of the optimisation process undertaken by Watercare and the relevant experts, Reservoir 1 on the northern side of Woodlands Park Road has been located towards the eastern part of the site. Key considerations in determining the footprint of Reservoir 1 included the following:

- Minimising construction effects and required clearance of the Exhibition Drive escarpment;
- Directing the footprint towards previously disturbed/modified area wherever possible;
- Reducing visual and landscape effects including by seeking to retain the landscape feature (knoll and large trees) adjacent to Woodlands Park Road and to bury the reservoir wherever possible;
- Protection of surveyed Kauri on the site; and

- Reducing effects on the Armstrong Gully Stream.

A reduction of the landscape buffer from 10 m to 3 m from the road boundary has been agreed with the Landscape Architect on the basis this further reduces construction effects on the above considerations (and noting the reservoir is almost entirely buried / below ground level which negates the requirement for a large landscape buffer). The shape of the reservoir has also been adapted to fit within the above constraints, rather than a more traditional circular or rectangular shape.

Reservoir 2 is located towards the north-eastern part of the existing Huia WTP site. Key considerations in determining the footprint of Reservoir 2 included the following:

- Retaining the volume of the existing attenuation pond as an operational requirement / ensuring the footprint does not impinge on this;
- Protecting the existing heritage buildings and structures. While pipework and an overland flow path is provided in the corridor between the reservoir and heritage buildings, the reservoir footprint itself is located further to the east of heritage features;
- Providing a 10m setback from the reservoir to the site boundary. Pipework is allowed for in this corridor;
- Reducing effects on vegetation and works around the stream in the north-eastern corner of the site; and
- Retaining site access through the existing site access / not providing for a new site access.

A rectangular reservoir is proposed in this area, with chambers integrated in the overall structure. Pipework corridors have been considered to reduce the ecological effects wherever possible.

To maintain a continued supply from the Huia WTP sources, the Huia Replacement WTP and Reservoir 1 are required to be commissioned and operational prior to the decommissioning of the existing Huia WTP and construction of Reservoir 2.

5.5.5 Summary

As illustrated in the Site Layout Development Report prepared by GHD, considerable work has gone into optimising the layout and reducing and minimising environmental effects, with over seven WTP layouts and five reservoir layouts developed as part of the onsite alternative assessments.

A further detailed assessment of the reservoir location and layout was then undertaken as a subsequent piece of work as described in the Reservoir Storage Alternatives Report and Reservoir Site Layout Development Report prepared by Beca. While this re-evaluation exercise meant that lodgement of the resource consents was deferred for some time until this exercise was completed, Watercare undertook this further assessment in response to feedback from the CLG and considers that while it represents a more complex arrangement, it also results in a better environmental outcome particularly from an ecological and landscape perspective. As described above, the reservoir layout optimisation process was a detailed and iterative process that involved numerous design team and site meetings with SME's along with constructability and operational experts to determine the preferred footprint for the two reservoirs

Using the BOD as the starting point, the initial WTP footprint occupied approximately 2.3 ha of highly valued ecological area and the reservoirs footprint over 3 ha of highly valued ecological area, this latter footprint 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 above, 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 proposed as part of this resource consent application have been optimised to avoid areas of vegetation which has been identified as the highest value through the ecological integrity mapping exercise.

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.

6 Resource consent requirements

6.1 Introduction

This section sets out the resource consent requirements pursuant to the AUP and the NES Soil, as well as identifying the relevant permitted activity rules that apply to the proposed works. An assessment of the applicable permitted activity standards in the AUP is provided in Appendix O**.**

The AUP overlays and planning limitations which apply to the sites are presented in Table 6.1 below.

Table 6.1: Huia Replacement WTP planning notations

Planning notation	Comment
Regional Plan provisions	
Significant Ecological Area Overlay – Terrestrial (SEA_T_5539)	Significant Ecological Areas – Terrestrial. These are identified areas of significant indigenous vegetation or significant habitats of indigenous fauna. The SEA Overlay covers almost all of the Project Site other than the developed part of the existing WTP site, a small area in the vicinity of the reservoir location immediately to the north of Woodlands Park Road, and a small area adjacent to Woodlands Park Road in the centre of the Manuka Road replacement WTP site. Schedule 3 of the AUP identifies this SEA as meeting all five of the significance factors.
Stormwater Management Area Control – Titirangi / Laingholm Flow 1	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. This control applies to the entire Project Site, as well as most of Titirangi, Woodlands Park and Laingholm.
District Plan provisions	
Designation 9324 – Huia and Nihotupu Water Treatment Plants	This designation applies across the entire Project Site. The land is owned by Watercare and is designated for 'water supply purposes - water treatment plants and associated structures'. The designation includes three conditions relating to: 1. The requirement to provide an outline plan of works which includes an AEE and policy assessment. 2. Erosion and sediment control measures. 3. Not adversely affecting the identified heritage values of the Huia Filter Station (otherwise requires an alteration to the designation). Watercare will submit an OPW to Auckland Council for the proposed works.
Waitākere Ranges Heritage Area Overlay - WRHA_06 Subdivision Schedule (subject to appeal)	The Waitākere Ranges Heritage Area Overlay covers most of the Waitākere Ranges including the entire Project Site.
Historic Heritage extent of place overlay – ID 77	ID 77: the existing Huia Filter Station was built in 1928 and is a scheduled historic heritage building under the AUP. This will be retained in the proposed scheme layout.

Planning notation	Comment
	ID 86: the Nihotupu Filter Station which is located back along Woodlands Park Road and outside of the Manuka Road site footprint is also identified as a heritage building.
Notable tree – Kauri (1836)	This tree is located on the replacement WTP site on the corner of Woodlands Park and Manuka Roads. As illustrated on indicative design drawings attached as Appendix E, this tree will be retained.
Ridgeline Protection Overlay	The Ridgeline Protection Overlay applies to the part of the reservoir location (northern boundary of the designated area). All works are contained outside of this overlay.
Outstanding Natural Landscapes Overlay – Area 72; South Titirangi,	The Outstanding Natural Landscapes Overlay applies to the very south-eastern corner of the Manuka Road replacement WTP site. All works are contained outside of this overlay.
Open Space Conservation Zone	The underlying zoning of the Project Site is Open Space Conservation. However as the Project Site is designated then this underlying zoning is not relevant.

6.2 AUP regional resource consent requirements

Regional resource consents required for the works under the AUP are outlined in Table 6.2 below.

Resource consents are being sought to enable the Project works as described in this report and the application intends to include all necessary consents for those activities to occur, even if not specifically notified or identified in Table 6.2. Therefore the consent requirements set out below may not be an exhaustive list and if further consent matters are identified, including post lodgement of the application, these should also be considered as forming part of the application.

Table 6.2: Resource consents required

Proposed activity	Description of works	Applicable rule and activity status
Earthworks in a SEA Overlay for infrastructure	Earthworks within the SEA Overlay will exceed 2500 m^2 and 2500 m^3.	**E26.6.3.1 -** Earthworks in overlay areas except Outstanding Natural Features Overlay. **(A118) -** Earthworks greater than 2500 m^2 or 2500 m^3 is a **discretionary activity**.
Earthworks for construction of infrastructure (outside of the SEA)	Earthworks on site will exceed 2500 m^2 and the slope is equal to or greater than 10 degrees. Earthworks are also proposed within 50 m of a watercourse.	**E26.5.3.2** – Earthworks greater than 2,500 m^2 other than for maintenance, repair, renewal or minor infrastructure upgrading. **(A106)** – Earthworks where the land has a slope equal to or greater than 10 degrees is a **restricted discretionary activity** in an SEA. **(A107)** - Earthworks within the Sediment Control Protection Area[42] is a **restricted discretionary activity** in an SEA.

[42] The AUP defines the Sediment Control Protection Area as 50 m landward of the edge of a watercourse, or wetland of 1000 m^2 or more.

Proposed activity	Description of works	Applicable rule and activity status
Vegetation removal in a SEA Overlay for infrastructure	Vegetation removal on both the reservoir site and the replacement WTP site will include trees over 6 m in height and 600 mm in girth. Vegetation removal will also result in the removal of more than 20 m^2 of vegetation within an SEA. Therefore, the proposed works cannot comply with conditions (1) and (2) of the permitted activity standard E26.3.5.2.	**E26.3.3.1**– Vegetation alteration or removal that does not comply with standards E26.3.5.1 to E26.3.5.4 within an SEA. **(A77)** - The removal of vegetation within an SEA for infrastructure purposes that cannot meet permitted activity standards is a **restricted discretionary activity**.
Reclamation and drainage and associated structures, diversion and discharges.	The location of the replacement WTP site encompasses a small reach of the Yorke Stream classified as an intermittent stream. This section of stream is located towards the centre of the site and therefore these works cannot be avoided.	**E3.4.1**– Reclamation and drainage and associated structures, bed disturbance or depositing any substance, diversion of water, incidental temporary damming of water, and discharges arising from the piping of a reclaimed waterbody associated with the following: **(A49)** - New reclamation or drainage, including filling over a piped stream, is a **non-complying activity** in an SEA.
Diversion of a river or stream to a new course and associated disturbance.	Diversion of an intermittent section of the Yorke Stream is required to enable construction of the WTP.	**E3.4.1 -** Activities involving the diversion of a river or stream to a new course including any associated disturbance and sediment discharge **(A19)** – Diversion of a river or stream to a new course and associated disturbance and sediment discharge is a **non-complying activity** in an SEA.
Instream erosion protection	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 SEVP to address existing erosion issues.	**E3.4.1 -** New structures and the associated bed disturbance or depositing any substance, reclamation, diversion of water and incidental temporary damming of water **(A34)** - Erosion control structure less than 30m in length when measured parallel to the direction of water flow complying with the standards in E3.6.1.14, is a **discretionary activity** in an SEA.
Dewatering and groundwater level control	There are two groundwater systems present within the Project Site, one shallower groundwater table at approximately 6 mbgl and a deeper groundwater system at 9 mbgl. Groundwater will therefore need to be managed during excavation works on the reservoir site. Groundwater is not expected to be encountered on the replacement WTP site. The proposed works cannot meet permitted activity standard E7.6.1.6 (3)	**E7.4.1–** Dewatering or groundwater level control associated with a groundwater diversion authorised as a restricted discretionary activity under the AUP. **(A20)** - Dewatering or groundwater level control not meeting permitted activity standards or otherwise listed is a **restricted discretionary activity**.

Proposed activity	Description of works	Applicable rule and activity status
	as the water take will occur for a period of more than 30 days.	
Diversion of groundwater caused by any excavation or tunnel	The proposed excavation as part of the construction works on the reservoir site will result in the permanent diversion of groundwater. The proposed diversion cannot meet permitted activity standard E7.6.1.10 (2) as the excavations will extend more than 6m below ground level in some places over an area of greater than 1 ha.	**E7.4.1–** The diversion of groundwater caused by any excavation (including trench) or tunnel that does not meet the permitted activity standards or not otherwise listed. **(A28)** – Diversion of groundwater cause by any excavation or tunnel that cannot meet permitted activity standards is a **restricted discretionary activity**.
Diversion and discharge of stormwater runoff from impervious areas	The total impervious area after works have been completed is approximately 28,430 m^2 (2.84 ha), and stormwater 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).	**Rule E8.4.1**- Diversion and discharge of stormwater runoff from impervious areas onto or into land or into water or to the coastal marine area pursuant to sections 14 and 15 of the RMA. **(A10)** – Diversion and discharge of stormwater runoff from impervious areas over 5,000 m^2 outside an urban area is a **discretionary activity.**
Development of new impervious areas within a SMAF1 overlay	The development of approximately 28,430 m^2 (2.84 ha) of impervious area that does not comply with the standards in E10.6.1 or E10.6.4.1.	**Rule E10.4.1** – Development of new impervious areas pursuant to section 9(2) of the RMA. **(A4)** – Development of new impervious areas greater than 50 m^2 within a SMAF1 overlay that does not meet the restricted discretionary activity standards is a **discretionary activity**.
Contaminated land – disturbing soil on land containing elevated levels of contaminants	The volume of soil disturbed on the site will exceed 200 m^3 and therefore the proposed disturbance exceeds permitted activity standard E30.6.1.2. Note: In the absence of a DSI this is a very conservative approach which assumes environmental contaminants may be present.	**E30.4.1** – Discharges of contaminants into air, or into water, or onto or into land. **(A7) –** The discharge of contaminants not meeting controlled activity standard E30.6.2.1 is a **discretionary activity.**

For the avoidance of doubt, Watercare is seeking resource consents under the rules above and any other rules which may apply to the activity, even if not specifically noted.

The reclamation and diversion of a small section of the Yorke Gully Stream to a new course is a non-complying activity in an SEA. Therefore if the application is bundled, it would fall for consideration overall as a **non-complying activity** under the AUP.

6.3 Assessment criteria – restricted discretionary activities

Under Rules E26.5.3.2 (A106) and (A107) in relation to earthworks; E26.3.3.1 (A77) in relation to vegetation removal; E7.4.1 (A20) and (A28) in relation to dewatering and groundwater diversion, the Council has restricted its discretion. These matters are identified in Table 6.3 below. The assessment in Section 7 of this AEE incorporates these matters.

Table 6.3: RDA matters of discretion

Rule reference	Matters of discretion
E26.5.3.2 (A106 and A107) - Earthworks for construction of infrastructure (where slope of land >10° and within a Sediment Control Protection Area)	1) All regional restricted discretionary activities: a) Compliance with the standards; b) The design and suitability of sediment and control measures to be implemented; c) Adverse effects of land disturbance and sediment discharge on water bodies, particularly sensitive receiving environments; d) Effects on cultural and spiritual values of Mana Whenua including water quality, preservation of wāhi tapu, and kaimoana gathering; e) The proportion of the catchment which is exposed; f) Staging of works and progressive stabilisation; g) Timing and duration of works; h) Term of consent; i) Potential effects on significant ecological and indigenous biodiversity values; j) The treatment of stockpiled materials on the site including requirements to remove material if it is not to be reused on the site; and k) Information and monitoring requirements.
E26.3.3.1 (A77) – Vegetation removal in a SEA Overlay for infrastructure purposes	a) Ecological values: i. The effects that the vegetation alteration or removal will have on ecological values, including on threatened species and ecosystems. aa) hazard mitigation: (i) the role of the vegetation in avoiding or mitigating natural hazards and the extent to which the vegetation alteration or removal will increase any hazard risk. b) Sediment, water quality and hydrology: i. The effects the vegetation alteration or removal will have on soil conservation, water quality and the hydrological function of the catchment. c) Use: i. The extent to which the vegetation alteration or removal is necessary to provide for the functional and operational needs of infrastructure. d) Methods and location: i. The minimisation of effects from alteration or removal of vegetation and land disturbance through alternative locations on the site and/or methods of undertaking the works. e) Mitigation measures: i. The remedy or mitigation of adverse effects, including through revegetation, restoration of other areas of vegetation and ongoing maintenance. f) Bonds and covenants: i. The benefit of imposing bonds, covenants or similar instruments as conditions of consent in implementing any of the matters of discretion g) Mana Whenua values: i. The effects on Mana Whenua values associated with a Significant Ecological Area Overlay.
E7.4.1 (A20) – Dewatering or groundwater level control associated with a groundwater diversion.	1) General a) The effects on Mana Whenua values 6) Dewatering and diversion of groundwater a) How the proposal will avoid, remedy or mitigate adverse effects: i. On the base flow of rivers and springs;

Rule reference	Matters of discretion
E7.4.1 (A28) – The diversion of groundwater caused by any excavation, (including trench) or tunnel that does not meet the permitted activity standards.	ii. On levels and flows in wetlands; iii. On lake levels; iv. On existing lawful groundwater takes and diversions; v. On groundwater pressures, levels or flow paths and saline intrusion; vi. From ground settlement on existing buildings, structures and services including roads, pavements, power, gas, electricity, water mains, sewers and fibre optic cables; vii. arising from surface flooding including any increase in frequency or magnitude of flood events; viii. from cumulative effects that may arise from the scale, location and/or number of groundwater diversions in the same general area; ix. from the discharge of groundwater containing sediment or other contaminants; x. on any scheduled historic heritage place; and xi. on terrestrial and freshwater ecosystems and habitats. b) NA c) Monitoring and reporting requirements incorporating, but not limited to: i. the measurement and recording of water levels and pressures; ii. the measurement and recording of the settlement of the ground, buildings, structures and services; iii. the measurement and recording of the movement of any retaining walls constructed as part of the excavation or trench; and iv. requiring the repair, as soon as practicable and at the cost of the consent holder, of any distress to buildings, structures or services caused by the groundwater diversion. d) The duration of the consent and the timing and nature of reviews of consent conditions; e) The requirement for and conditions of a financial contribution and/or bond; and f) The requirement for a monitoring and contingency plan or contingency and remedial action plan.

6.4 NES 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, a HAIL site (as recorded on the Hazardous Activities and Industries List – Ministry for the Environment).

As outlined in Section 3.8 above, one activity potentially on the HAIL may have previously occurred on the site: the removal of buildings (dwellings) potentially containing Asbestos Containing Materials (ACM) and/or lead based paints. Table 6.4 outlines the provisions of the NES Soil that applies to these works.

Table 6.4: NES Soil provisions

Proposed activity	Description	Rule reference / activity status
Soil disturbance on land where activities on the HAIL have occurred	Soil disturbance volumes on site exceed the permitted activity standards under the NES Soil of no more than 25 m^3 per 500 m^2 of disturbance and no more than 5 m^3 per 500 m^2 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 DSI must be exist for the site. A DSI has not yet been prepared for the site.	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. The activity is a **discretionary activity.**

Resource consent is required as a discretionary activity under the NES Soil.

6.5 Existing resource consents

Permit No. 35534 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. The permit provides for a maximum discharge rate of 730 L/s and up to 1620 L/s under emergency situations (involving spill discharge from the lagoon). This consent expires on 31st December 2030. 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.

Watercare also holds Permit No. 26979 that authorises an allowable stormwater discharge of 0.25 m^3/s to an unnamed tributary of the Warituna Stream (via Armstrong Gully) in the 1 in 20 year event. Watercare 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. It is noted that the proposed stormwater management measures have been designed to comply with the limits specified in the existing consent.

6.6 Permitted activities

The activities in Table 6-5 have been identified as permitted activities under the AUP. An assessment against the relevant standards is provided in Appendix O.

Table 6-5: Permitted activities

Proposed activity	Rule	Comment on compliance
Any activity that is undertaken in, on, under, over or within the bed of an ephemeral stream.	E3.4.1(A53)	Sections of the watercourse traversing through the Project site are classified as ephemeral. Specific mitigation for the loss of these watercourse would not be required under AUP.
Diversion and discharge into an artificial watercourse	E7.4.1(A11)	The diversion and discharge will be designed to meet all permitted activity standards, including not increasing flooding, scouring, erosion, instability or sediment discharge.

Proposed activity	Rule	Comment on compliance
Off-stream dam (earth embankment on the dry pond on the replacement WTP site)	E7.4.1(A29)	The bund will be designed to meet all permitted activity standards, including having a bund height not exceeding 4 m, surface area of the impounded water not exceeding 5,000 m^2, storage volume of the impounded water not exceeding 20,000 m^3, and an emergency spillway and outlet to convey the 100 year flow.
The temporary diversion and damming of surface water and the discharge of treated sediment laden water from land disturbance	E11.4.2(A13)	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 Auckland Council Technical Publication GD05 and in line with best practices.

In addition to the above, a new stormwater outlet is proposed on the replacement WTP site. However 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 consent has not specifically been sought for this structure under the AUP rules set out in Chapter E3.

6.7 Other requirements

6.7.1 General archaeological authority

The Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA) provides overarching protection for archaeological sites, and in particular, 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. An archaeological assessment has been undertaken for the project, which found that no archaeological sites are known to be present on the sites and it is considered unlikely that any will be exposed during development. Accidental Discovery Protocols will be followed should an archaeological site be discovered through the course of the works.

6.7.2 Building consent

Upon completion of detailed design, Watercare will obtain the necessary building consents for the proposed buildings and structures in accordance with the Building Act 1991.

6.7.3 Outline plan of works

In accordance with Section 176 of the RMA, works which are undertaken by a requiring authority in accordance with a designation do not require a land use consent pursuant to Section 9(3) of the RMA. Instead, an OPW under Section 176A of the RMA is required. Watercare will submit an OPW to Auckland Council in due course.

6.7.4 Corridor Access Request

The project involves work that will affect the normal operation of the road. A Corridor Access Request (CAR) is therefore required to be submitted to AT prior to work commencing.

6.7.5 Signage Bylaw 2015

Signs proposed for the project will comply with the Signage Bylaw 2015, and no dispensation is required.

6.7.6 Wildlife Act Authority

A Wildlife Act Authority will be required from DoC prior to the salvage and translocation of lizards (proposed as ecological mitigation in Section 7), in accordance with the Wildlife Act 1953.

7 Assessment of effects on the environment

7.1 Introduction

7.1.1 Scope of assessment

In accordance with Section 104(1)(a) of the RMA, the assessment set out in the following sections identifies and assesses the types of effects that may arise from the proposed works provided for under this application. This assessment also outlines the measures that Watercare proposes to avoid, remedy or mitigate any potential adverse effects on the environment.

While the activity falls for consideration overall as a non-complying activity, vegetation removal in an SEA overlay associated with infrastructure is a restricted discretionary activity pursuant to Rule E26.3.3.1 (A77). Similarly dewatering and the diversion of groundwater are restricted discretionary activities pursuant to Rules E7.4.1 (A20) and (A28) respectively. The relevant matters of discretion and assessment criteria are therefore considered below along with a broader assessment of effects.

This assessment draws on information provided in the technical reports contained within Appendices E to N and addresses the following effects:

- Positive effects;
- Effects of stream diversion and reclamation;
- Effects of earthworks and sediment generation on water quality;
- Terrestrial ecological effects;
- Land stability effects;
- Contaminated soil disturbance effects;
- Groundwater and settlement effects;
- Stormwater diversion and discharge effects;
- Cultural effects;
- Transport effects; and
- Noise and vibration effects.

7.1.2 Existing environment

In accordance with sections 104(2) of the RMA, when forming an opinion for the purposes of subsection (1)(a), a consent authority may disregard an adverse effect of the activity on the environment if a national environmental standard or the plan permits an activity with that effect. As well as comprising what is permitted as of right under the relevant plan, the permitted baseline as defined through case law also incorporates the existing environment and, where appropriate, activities which are authorised under a current but yet to be implemented resource consent.

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, 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[43]. Both the High Court and the Environment Court recently confirmed that the designations provide for a new water treatment plant within the designated area[44]. 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.

7.2 Positive effects

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. Statistics New Zealand has projected medium population growth of an additional 800,000 people and high population growth of one million people for Auckland. Growth that is occurring to the north-west of Auckland will primarily be serviced by the replacement WTP and reservoirs. Replacement of the Huia WTP is therefore vital to continue to provide a reliable long term water supply to service the north-west of Auckland.

The primary objective of the replacement Huia WTP project is to replace an aging asset that is a crucial component of Auckland's water supply network. The Huia WTP is the third most significant WTP in Auckland and treats approximately 20% of the region's water. The replacement of the ageing WTP with a new WTP of increased peak production capacity will assist in meeting peak demand periods and improve the current system resilience and security across the water supply network.

The existing Huia WTP was not designed to meet the current and short-term future source water quality challenges. The replacement WTP will be designed to meet current engineering standards and with improved treatment processes appropriate for the treatment of water now received from the Western dams. This will ensure ongoing compliance with the DWSNZ which reflects one of Watercare's strategic priorities to supply the highest quality 'Aa'-graded drinking water to all properties. The additional treated water reservoirs will ensure the public health grading requirement to have 24 hours of storage as a contingency to disruption on the supply zones is met.

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. Following recent outbreaks of contaminated water supply overseas, specifically in Canada, and domestically in Havelock North, there is an increased awareness of the need to ensure that New Zealanders are supplied with high quality, safe drinking water.

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*'. 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. These benefits extend to schools, hospitals, businesses, commercial and industrial facilities, as well as residential dwellings. Overall the Huia Replacement WTP and reservoirs will deliver positive effects both on the immediate community and the region as a whole.

[43] Waimairi County Council v Hogan [1978] 2 NZLR 587 (CA) at 590.
[44] Titirangi Protection Society Inc v Watercare Services Ltd, CIV-2017-404-2762, [2018] NZHC 1026.

7.3 Effects of stream diversion and reclamation

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.

Cook Costello has provided an assessment of the erosion and sediment control and stormwater components of the project. Boffa Miskell Ltd has 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. Their reports are contained in Appendix G and Appendix L respectively, and are summarised in the following sections.

7.3.1 Armstrong Gully

The broader sites on which the proposed reservoirs are located encompass the headwaters of the Armstrong Gully. A small section of intermittent watercourse which also forms a tributary of the Armstrong Gully headwaters is located on the corner of the replacement WTP site, near the intersection of Manuka Road and Woodlands Park Road, which flows in an open channel with two piped sections through the existing WTP site (immediately east of proposed Reservoir 2). The main stem of the Armstrong Gully stream is piped under the existing Huia WTP and discharges into the open channel of the Armstrong Gully stream near the southern boundary of the existing Huia WTP.

The project footprint has been amended through the layout optimisation process to avoid the permanent and intermittent Armstrong Gully stream channels on the Reservoir 1 and existing WTP sites. With some minor exceptions, permanent structures have been located outside of a 10 m riparian zone noting that temporary construction works on both sites are required within this zone. The affected riparian buffer zones will be restored with early successional wet forest/ stream margin species to buffer and enhance the watercourse and adjacent forest area.

In summary, all permanent and intermittent stream reaches within the Armstrong Gully catchment will be avoided and there is no loss or diversion of any watercourse within this catchment.

7.3.2 Yorke Gully

The replacement WTP site is within the headwaters catchment of the Yorke Gully. Watercourses running through this footprint discharge into the open channel of the Yorke Gully Stream which intersects the adjoining Clarks Bush Reserve.

The layout optimisation process has sought to avoid effects on permanent watercourses. However a short section of the Yorke Gully stream which is ephemeral and then intermittent in nature is located towards the centre of the replacement WTP site and it is not practicable to avoid this stream entirely. It is therefore proposed to reclaim approximately 53 m of intermittent stream habitat in the Yorke Gully Stream and divert stream flows around the project footprint via a new 70 m length of stream channel.

The ecological assessment indicates 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 Stream Ecological Valuation (SEV) attributes). No fish habitat is present up-stream so disruption to fish passage is not a consideration for upstream migration. The ecological values of the intermittent stream were ranked as moderate-low. An SEV Plan is attached to the Ecological Assessment in Appendix L, which sets out the calculation of the mitigation/ compensation requirement.

The loss of stream reach will be mitigated by way of an on-site stream diversion at least 70 m in length, with additional off-site compensation provided through erosion protection works in the upper Yorke Gully (downstream of the Project Site).

The construction of the stream diversion on the replacement WTP site will occur during a period of low or negligible flows. The new alignment will be constructed in sections away from the existing flow path. In order to protect the existing flow path from sediment-laden runoff, the work areas for the new alignment will be separated by bunds and/or silt fences.

The stream diversion will be an intermittent watercourse that collects clean water from the upper catchment, bypassing the earthworks and the final developed site, and will collect treated stormwater from the site to support flows so that the new stream mimics the pre-existing stream flows. The diversion and meanders will result in a slightly shallower gradient allowing a greater diversity and abundance of habitat features to be included (e.g., pools and cascades). In reflecting the existing stream and the steepness of the site, consideration will be given to energy dissipation to avoid scour within the realigned stream. Some rock-lined reaches and weirs are likely to be included for stability, which will also provide enduring habitats. The ecological function of the riparian zone will be enhanced by implementing a Riparian Planting Plan which will include infill planting of lower stature vegetation to improve instream habitat.

A finalised stream diversion design will be provided to Council prior to the works commencing. This will require:

- Detailed design of the stream diversion channel, incorporating features that enhance instream ecology values;
- A Riparian Planting Plan that aims to enhance the ecological function of the riparian zone adjacent to the diversion channel;
- Ecological monitoring programme of the diversion channel to demonstrate it provides ecological benefit; and
- A programme to monitor scour and erosion at the downstream extent of the diversion channel.

The final diversion will be designed to maintain and improve the existing SEV attributes to provide an improved overall aquatic ecological benefit.

As set out in the SEV Plan (attached to the Ecological Assessment in Appendix L), the proposed diversion channel does not account for all the stream loss when using the conventional calculation. Therefore, a mitigation/ compensation package is proposed that 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 (within an Auckland Council reserve). The upper, intermittent, reaches of the York Gully Stream have some significant erosion issues, with recent bank erosion and slumping that is releasing large volumes of fine sediment into the stream. Watercare proposes to address this erosion through stream bank stabilisation works and some minor channel clearance, using soft-engineering techniques. Addressing this localised erosion within the upper Yorke Gully will reduce the fine sediment entering the stream and will reinstate some intermittent habitat.

The proposed stream mitigation and compensation works are reflected in the proposed draft consent conditions contained in Appendix Q.

Stream hydrology

The contributing catchment area to the Yorke Gully stream will be reduced once the construction of the WTP has been completed due to the diversion of roof runoff to the WTP process. To mitigate this, in addition to catchment inputs the replacement stream channel 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 this treated stormwater to the replacement channel will mimic the intermittent nature of the existing stream, and continue to support flows in the downstream sections.

The realigned stream will be designed to dissipate the energy and reduce scour, such as by meandering the stream across the contour and/ or by including pooling areas and weirs. On site stormwater retention will also reduce peak flood flows, which will address the potential for downstream flooding and erosion. Where necessary, energy-reducing engineered structures will be located at the boundary to minimise scour and erosion at this point and further downstream. This is reflected in the proposed draft consent conditions contained in Appendix Q.

7.3.3 Summary

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.

7.4 Effects of earthworks and sediment generation on water quality and soil conservation

Vegetation clearance and bulk earthworks activities have the potential to cause adverse erosion and sedimentation effects. 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 if not managed appropriately.

As set out in Section 4.10.4, to address these effects Cook Costello has prepared an indicative Stormwater and ESC Report (Appendix G) that outlines potential erosion and sediment control measures to be implemented during the works in order to minimise the effects of erosion and discharge of sediment laden runoff generated by the works. This includes the following key measures:

- 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.

Any 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.[45]

7.5 Terrestrial ecological effects

7.5.1 Introduction

An Ecological Assessment is included in Appendix L. Based on the EIANZ matrix, the Ecological Assessment finds that the level of ecological effect arising from the proposed development is high.

The following sections summarise the terrestrial ecological effects of the project, and the measures proposed to avoid, remedy and mitigate those effects. Residual adverse effects will be compensated through the implementation of the WBMP, which is described in Section 7.5.9 below.

7.5.2 Forest clearance

Removal of intact native forest and scrub is the primary ecological impact arising from the proposed development.

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, kauri-podocarp forest and swamp forest ecosystem units[46]. 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).

Within the replacement WTP site, approximately 34 mature canopy or emergent native trees require removal, including 16 kahikatea between 44 and 90 cm in diameter, along with other podocarp and broadleaved species.

Within the Reservoir 1 site, the affected vegetation mainly comprises kanuka forest (moderate integrity) and patches of kahikatea-kanuka forest (moderate to high integrity). An estimated 9 canopy or emergent, mid-late successional indigenous trees require removal, comprising 8 kahikatea and a rewarewa. The kahikatea trees appear to be of a similar age to the kanuka population cohort, as no large trees are present in old aerial photographs (refer Section 3.7).

Vegetation clearance in the existing WTP site for Reservoir 2 comprises mostly kanuka-mamangi forest. Two large totara trees adjacent to the road will be removed, along with three rewarewa trees adjacent to the road and one pohutukawa on the southern side of the reservoir footprint.

The avoidance of large kauri trees has been a key consideration in the project design, and it is not anticipated that any kauri trees with a diameter over 20 cm will require removal for the works.

[45] Addresses matter of discretion E26.3.7.1 (1)(b)
[46] Addresses matter of discretion E26.3.7.1 (1)(d)

In addition to the loss of forest extent, the proposed clearance and development introduces localised fragmentation into the vegetated corridor across the top of the Little Muddy Creek catchment that is, at present, relatively intact (relative to other parts of the catchment where there is more residential development and associated roading infrastructure). Hence, while the proposed forest clearance amounts to a small proportion of the indigenous forest present in the Little Muddy Creek catchment and wider SEA, the gap created will further reduce connectivity across the already somewhat fragmented local landscape, and between mature and regenerating forest patches in the immediate environs of the Project Site.

The unmitigated adverse effect of forest clearance is assessed as being high. Weed and animal pest management is proposed 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 wider WBMP. Native planting will be undertaken within open areas throughout the remaining 11 ha Project Site area, to buffer the forest interior, inhibit weed encroachment and accelerate regeneration.

While these measures within the Project Site will improve the ecological value of this 11 ha area, the measures will only partly mitigate the adverse effects of the project. The comprehensive WBMP described in Section 7.5.9 has been designed to fully compensate the residual adverse ecological effects of the project that cannot practicably be avoided, remedied or mitigated. Overall, the positive benefits on the environment from the proposed mitigation and compensation package are considered to appropriately compensate for the loss of forest extent.[47].

Effects on retained vegetation

Due to the highly constrained construction area, there will need to be considerable emphasis placed on protecting retained vegetation from accidental encroachment and damage. Such effects will be avoided, mitigated or remedied through clear site protocols and careful demarcation of the work site and associated laydown areas. The input of an arborist has already been sought in relation to the Project footprint and managing effects on adjacent trees. Their input will be ongoing throughout construction activities.

Clearance of vegetation within the works footprint has the potential to result in poor health or failure of adjacent trees that are retained, known as edge effects. The creation of new forest edge environments can result in a progressive change in vegetation communities, such as the expansion of disturbance-tolerant species and communities, and increased weed incursions. Forest clearance that exposes mature forest trees to an edge environment can also undermine their health and stability, which is particularly relevant to a group of large, old-growth podocarps adjacent to the south-western corner of the WTP footprint.

Recommendations to address these potential effects are set out in the Ecological Assessment and include a requirement for an arborist to advise during detailed design and onsite as the clearance area is demarcated on site to ensure large trees close to the development footprint are appropriately protected, including specifying earthworks setbacks if necessary. Exposed bush edges, old tracks and open areas within forest remnants in the Project Site will be revegetated with fast-growing forest edge species to buffer the forest interior, inhibit weed encroachment, and accelerate regeneration[48].

7.5.3 Loss of threatened or at risk flora

The proposed forest clearance will result in the removal of vegetation species that are identified as being threatened or at risk, although it is noted that the threat classification is due to disease risk

[47] Addresses matter of discretion E26.3.7.1 (1)(a) and (e)
[48] Addresses matter of discretion E26.3.7.1 (1)(d)

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[49].

Other threatened plant species were recorded within the wider Project Site but are outside the project footprint and will not be affected.

7.5.4 Spread of kauri dieback disease

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.

7.5.5 Reptiles and amphibians

While only copper skinks (not threatened) are known to inhabit the Project Sites, there is a reasonable likelihood that other lizard species would also be present, particularly arboreal geckos. Vegetation clearance is likely to impact lizard populations primarily by way of direct mortality, along with habitat loss and intensification of competition as resident lizards are displaced to adjacent territories. Mortality of lizards is more likely if vegetation clearance is undertaken during cooler months when lizards are relatively inactive, or if trees are felled without an opportunity to salvage lizards.

As described in the Ecological Assessment, lizard surveys and salvaging will be undertaken within the delineated works footprint immediately prior to and during vegetation clearance. Boffa Miskell recommends 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, 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.

Translocation sites will be identified within the Project Site, and if required, habitat enhancement measures will be undertaken prior to lizard release such as specific planting and formation of habitat log stacks. Intensive pest control will also be undertaken in and around the release sites.

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.

[49] Addresses matter of discretion E26.3.7.1 (1)(a)

7.5.6 Bats

The ecological assessment found that the Project Site is unlikely to be important habitat for long-tailed bats. However, as long-tailed bats have large home ranges, individual bats may occasionally utilise the Project Site for foraging and/ or solitary roosts.

The risk of direct bat mortality from the removal of occupied solitary day roosts during vegetation clearance is assessed as being small. Vegetation clearance during cooler months of the year increases the risk of mortality to roosting bats as they spend longer in torpor and are less likely to be roused.

As described in the Ecological Assessment, 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.

7.5.7 Birds

A variety of native and exotic bush birds inhabit the Project Site and surrounds, comprising species that commonly inhabit fragmented landscapes. 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. 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 produces periodically abundant food sources (e.g., during mast kahikatea fruiting seasons).

As described in the Ecological Assessment, 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), which will improve the viability of bird populations.

7.5.8 Terrestrial invertebrates

Field surveys 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.

7.5.9 Ecological compensation – WBMP

As introduced in Section 4.10.9, a key part of the project design is a comprehensive ecological mitigation and compensation package, which is focussed on 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.

7.5.9.1 WBMP Management Area

The 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. Refer to Figure 7.1 below. Biodiversity values within the Management Area are considered comparable to that present within the Project Site. The choice of the Little Muddy Creek catchment as the focus of proposed biodiversity management meets the AUP 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 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.

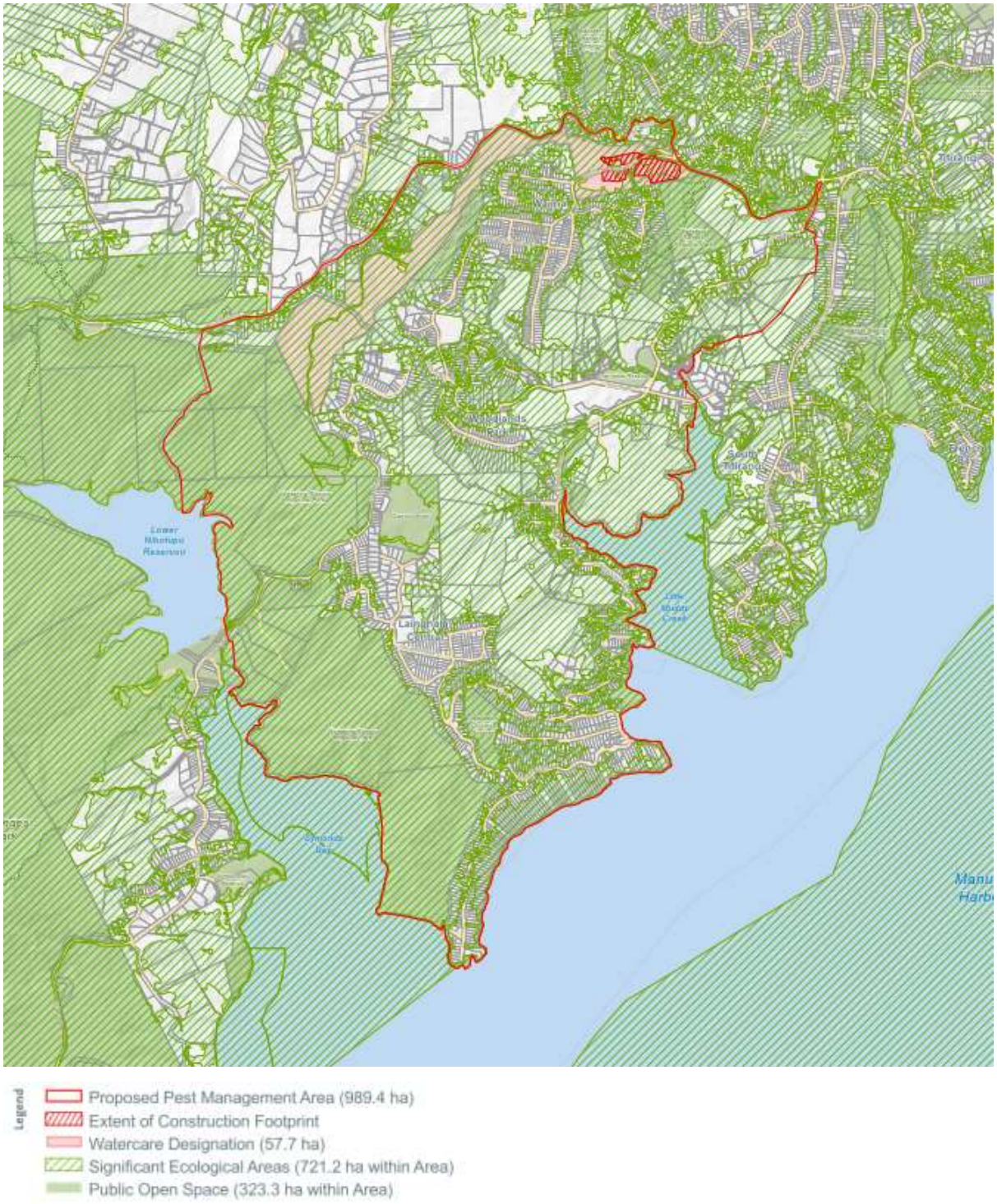

Figure 7.1: Proposed WBI Management Area (red outline). *(Boffa Miskell, 2019)*

Existing biodiversity funds and initiatives exist within the Little Muddy Creek catchment. These include:

- Auckland Council's pest management programme, which to date has been intermittent and mainly focussed on possum control. 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 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; and
- Community-led pest management activity through the Waima-Laingholm Pest Free Zone and by individual landowners, focussed mostly on possums with limited rat control. 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 also includes ideas and visions for the future to provide a long-term direction for Council, iwi and community action in the area (refer to Section 8.8.3 for further discussion).

For the compensation to be real, it must be additional and deliver conservation gains beyond those that would be achieved by other ongoing or planned activities. Council's 10-year budget provides funds for a substantial expansion in biosecurity management in parkland across the region, however Council's allocated budget will not be sufficient to undertake comprehensive pest control over all its parks and reserves. Based on discussions with Council, Boffa Miskell considers that funding of weed control work through the WBMP will provide a means for 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.

7.5.9.2 Waima Biodiversity Trust

The proposed WBMP will be funded and coordinated through a charitable trust that will be established to hold and administer the project (the Waima Biodiversity Trust, referred to hereafter as the Trust). It is envisaged that the Trust Board will comprise representatives from local community-led conservation project leaders, mana whenua, residents, Watercare and Auckland Council. The Trust is intended to provide an administrative structure that coordinates and implements conservation work on both public and private land throughout the Management Area to maximise ecological benefits.

The proposed initiative will involve a strong component of community leadership and advocacy and encompasses conservation management of private land. However, implementation work will not rely on volunteers. Funding will be provided by Watercare in the form of a $5,000,000 lump sum payment at the inception of the Trust, which will secure long-term resourcing for the project. In this way, a portion of the work can be funded from dividend payments, as roll-out of project initiatives throughout the catchment will be progressive, and a set amount can be built into the funding contribution to allow ongoing dividend returns.

While the outcome of the proposed strategy relies on a proportion of private landowners accepting weed and pest management on their properties, non-participant sites benefit from a 'halo' effect of management on surrounding properties. Furthermore, studies indicate a target for effective participation of just one in five properties. A high level of community engagement is anticipated with this project. Watercare has had a survey undertaken in the area which indicates that acceptance rates for allowing a dedicated organisation onto private property to manage environmental and

ecological challenges in the area would be over 70%. This provides some confidence that the target levels will be met and the benefits realised.

A draft Trust Deed is included as Appendix R.

7.5.9.3 Biodiversity benefits of the WBMP

The objectives of the proposed WBMP are 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.

Key actions to achieve these objectives, and the associated measurable targets, are set out in the Ecological Assessment Report.

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.

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.

7.6 Land stability effects

A Preliminary Land Stability Assessment is included in Appendix I. The assessment finds 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)[50].

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.

7.7 Contaminated soil disturbance effects

The PSI indicates that the following HAIL[51] activity may have been undertaken on the site:

- 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). This relates to the Reservoir 1 site and the replacement WTP site.

As set out in the PSI, this is a conservative approach 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.

As set out Section 4.10.6, a Site Management Plan (SMP) (Appendix K) has been prepared to provide appropriate controls to minimise potential discharges of contaminants to the environment and inform health and safety measures. 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.

7.8 Groundwater and settlement effects

T+T has undertaken 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. It is based on the existing borehole data located within and adjacent to the proposed WTP and reservoir sites. The Groundwater and Settlement Report is included in Appendix H and is summarised below.

[50] Addresses matter of discretion E26.3.7.1 (1)(aa) (Proposed PC14)
[51] HAIL – Hazardous Activities and Industries List

7.8.1 Groundwater drawdown effects

At the Reservoir 1 site, the pre-excavation groundwater level is conservatively inferred to be located approximately parallel to the ground surface at a depth of 5 m below ground level (bgl). Due to the depth of excavation (up to 15 m for Reservoir 1 and 10 m for the NH2 shaft), dewatering will be required which will result in groundwater drawdown.

The estimated depth and lateral extent of groundwater drawdown at each of the walls of Reservoir 1 excavation and at the NH2 shaft is presented in Table 7.1. Given that the expected construction method will greatly reduce the inflows of groundwater to well below those assumed in the assessment, the estimated drawdown is considered conservative, if not worst case.

Table 7.1: Estimated groundwater drawdown for Reservoir 1 and NH2 shaft excavations

	Reservoir 1 – excavation face				**NH2 shaft**
	North	**South**	**West**	**East**	
Depth of drawdown	10 m	8 m	7m	10 m	8 m
Lateral extent of drawdown	Maximum 67 m but 13 m expected	Maximum 54 m	Maximum 47 m	Maximum 67 m	Maximum 54 m

All potential groundwater drawdown effects will be contained within Watercare property and Woodlands Park Road, with up to 300 m of Woodlands Park Road located within the potential drawdown zone.

The close proximity of the Armstrong Gully Stream to the NH2 shaft excavation means there is some potential for groundwater drawdown associated with the shaft construction to affect stream flows. The stream sits at an elevation above that of the groundwater table and is independent of it, and the stream will potentially provide water to the underlying groundwater system but not the reverse. As such, drawdown of the static groundwater table is not expected to negatively affect the flows with the stream. .

No groundwater drawdown will occur as a consequence of construction of the replacement WTP or Reservoir 2.

7.8.2 Drawdown-induced settlement effects

Settlement effects from the dewatering have been estimated based on the extent of groundwater drawdown at the edge of the excavations and the nature (elastic stiffness) of the affected materials.

Groundwater-induced settlement varies significantly around the edge of Reservoir 1 in response to differences in initial groundwater level and stratigraphy. The maximum settlement of 83 mm is estimated for the south wall (i.e. facing Woodlands Park Road) primarily because of the very thick colluvium in this area. The minimum estimated settlement is 44 mm at the west wall, due to the thinner colluvium and smaller groundwater drawdown. Settlement will decrease with distance from the excavation.

For the NH2 shaft, the groundwater drawdown is estimated to result in settlement immediately adjacent to the excavation of 91 mm. However, as the shaft is likely to be constructed using secant pile walls (or similar) that extend into the underlying rock, actual drawdown and settlement is expected to be a fraction of that estimate.

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.

7.8.3 Potential effects on Armstrong Gully Stream

The Reservoir 1 site encompasses the headwaters of the Armstrong Gully. Geotechnical investigations undertaken in this area have shown the upper-most groundwater table is located some 6 m bgl. It is apparent that the Armstrong Gully Stream is fed directly from overland flows as well as water entering the channel via the soils that form its banks. The stream sits at an elevation above that of the groundwater table and is independent of it, and the stream will potentially provide water to the underlying groundwater system but not the reverse. As such, drawdown of the static groundwater table will not affect the flows within the stream.

In terms of the matters for discretion which apply to rules E7.4.1 (A20) and (A28), the groundwater assessment demonstrates that the proposed works avoid effects on surface water.

7.8.4 Monitoring requirements

The Groundwater and Settlement Report notes that additional geotechnical investigations will be required prior to the undertaking of detailed design and recommends that additional piezometers be installed at that time to be used for groundwater monitoring during construction. Consistent with the matters for discretion identified for rules E7.4.1 (A20) and (28), Watercare proposes a condition of consent which requires a programme of groundwater and ground surface monitoring be undertaken during construction in order to ensure that the effects are within the predicted range, with contingency and remedial measures identified. 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.

7.9 Stormwater diversion and discharge effects

Cook Costello has undertaken an assessment of the stormwater management requirements associated with the proposed works. The Stormwater and ESC Report is contained in Appendix G and summarised below.

7.9.1 Assessment

The Project Site is within a SMAF1 overlay within the AUP and therefore subject to a number of hydrology mitigation requirements including for retention and detention. Key design principles are to replicate as much as possible the pre-development scenario in terms of catchment areas and points of discharge, and manage 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 enter either the Armstrong Gully catchment or the Yorke Gully catchment. To manage the increase in flow from the proposed development, stormwater runoff volumes will be managed and maintained at predevelopment levels in all assessed storm

events up to a 1 in 100 year event. The attenuation of flows shall be achieved by controlling the discharge from two online stormwater management structures; one within each catchment. For flows that discharge to the Armstrong Gully (Reservoir 1 site, existing WTP site, and a portion of the replacement WTP site) it is proposed to utilise the existing lagoon on the existing Huia WTP site. If detailed design indicates a further flow reduction is required, the outfall structure of the pond would be modified to reduce the current flow rate in smaller more regular storm events. Flows that discharge to Yorke Gully (the remainder of the replacement WTP site) shall 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 and Auckland Council's Guidance Document GD01[52]. Further retention volume will be provided by the proposed living (green) roof on Reservoir 1.

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. 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.

Stormwater treatment by proprietary devices is considered to be the best practicable option for the replacement WTP site. Alternative methods such as a wetland, biofiltration and swales were considered, but these were not considered suitable for the proposal (refer to the Stormwater and ESC Report in Appendix G). The Ecological Assessment (Appendix L) finds that the ecological function of the receiving streams will not be affected by the proposal.

The stormwater management system has been designed to meet the detention requirements of the AUP and GD01 by limiting flows to those under predevelopment conditions in events up to a 1 in 100 year storm. Overland flow paths will be constructed to accommodate rain events that exceed this. These measures will ensure that the risk of increased flooding of downstream environments is adequately managed. The retention of stormwater on site in events up to a 1 in 100-year storm will reduce the risk of erosion downstream.

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.

7.10 Cultural effects

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 has decided to place a rāhui (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 in this application to ensure that the adverse effects of the proposed works are appropriately avoided, remedied and mitigated. This includes stringent protocols and a best practice approach to managing and minimising the risk of kauri dieback. The proposed mitigation and compensation package also

[52] Guideline Document 2017/001 Version 1: Stormwater Management Devices in the Auckland Region

incorporates tree assessments and treatment, including on private property, to contain and minimise harm from kauri dieback.

The best practice approach to earthworks and sediment and erosion control, which is designed to minimise the generation of sediment and prevent the discharge of sediment laden water, will protect water quality. Similarly the approach to stormwater detention, retention and treatment is consistent with best practise and will appropriately protect water quality and flows in receiving streams.

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 will also be opportunities 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.[53]

At a broad level, ensuring a quality potable water supply and resilient water supply infrastructure supports cultural well-being and health and safety. Watercare has discussed the project with mana whenua through its Mana Whenua Kaitiaki Forum, which includes representation from 19 iwi authorities in Tāmaki Makaurau. Three mana whenua groups indicated they have an interest in the project and engagement with them is ongoing. In particular, Te Kawerau indicated the desire to prepare a Cultural Values Assessment (CVA) which is currently underway. It is expected that this will further inform the assessment of effects on cultural values. The other two mana whenua, Ngāti Whātua o Ōrākei and Te Akitai, have requested that they be kept informed of the progress of the project.

7.11 Transport effects

CH2M Beca has undertaken an assessment of the transport effects of the bulk earthworks and construction activities through to commissioning of the new WTP and reservoirs. This assessment is contained in Appendix M and is summarised below, insofar as it relates to the vegetation removal and earthworks provided for under this application.

7.11.1 Assessment

The traffic assessment identifies 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. In particular:

- For the combined busiest period, where the enabling and construction works for the replacement WTP and proposed Reservoir 1 occurs concurrently, all roads on the identified routes are expected to experience an increase of between 1 to 2% in average daily traffic volumes due to HCV traffic. In some cases this results in a notable increase in the number of HCV using these roads across the day, when compared to current traffic demands; and
- The total residual lane capacity including all traffic generated as a result of the enabling and construction works conservatively ranges from 7% to 63%. This demonstrates that the existing lane capacity for the roads recommended for heavy vehicle traffic is sufficient to cater

[53] Addresses matter of discretion E26.3.7.1 (1)(g)

for the additional heavy vehicle and staff traffic during the proposed combined enabling and construction works.

It is noted that this is based on the 'worst case' scenario, with the proposed combined enabling and construction works for the replacement WTP and proposed reservoirs, and all traffic routed in the one direction rather than using alternate construction routes, as well as the peak period of the construction programme. By comparison, the traffic demands of the enabling works only on a daily and hourly basis will be lower than the traffic demands assessed here and have less effects on the transport network. As noted earlier, the construction works are outside the scope of these consents and will be addressed through the OPW process.

7.11.2 Management and mitigation approach

The traffic assessment identifies that while there is sufficient capacity, even in the worst case scenario, there is the potential for adverse safety and efficiency impacts on the road network due to the increase in heavy trucks at certain times requiring mitigating measures in order to reduce these adverse effects. The assessment has therefore identified the following mitigation to minimise the adverse impacts on nearby schools, local and town centres, public transport services, and recreational users that will be implemented through the provision of a Construction Traffic Management Plan (CTMP), which will be a condition of the consent:

- In developing the construction methodology, balance the daily number of heavy truck movements and the implications on the extension of the programme, that will prolong the duration of the potential and actual adverse effects;
- Limiting and managing, where practicable, heavy truck movements on the adjacent road network during the weekday morning and afternoon peak periods around school pick-up/drop-off time and general commuter peak periods, as well as during the Saturday mid-day peak period;
- Heavy truck routing via the identified haul route options using a combination of Woodlands Park Road and Scenic Drive, together with; Titirangi Road, Golf Road, Atkinson Road, Kaurilands Road and Glendale Road, which will address the operational and safety effects of the predicted hourly heavy truck movements on the identified truck routes at certain times of day or days of the week;
- Heavy truck routing to Parau Landfill via Woodlands Park Road and Huia Road should this prove viable as a disposal site for cut material;
- Localised road widening along the northern side of Woodlands Park Road to provide new kerb and channel between Scenic Drive and the Project Sites;
- Site-specific traffic management, temporary speed limit reductions, temporary bus stop relocations and pedestrian management measures along Woodlands Park Road near the Project Sites, up to and including the Scenic Drive intersection;
- On-street staff parking restrictions, on-site parking / loading management, together with a staff travel management plan, including details of staff shuttle bus scheduling and identification of a suitable pickup/drop-off location at the 'staging' site;
- Provision of a 'staging' site (location to be confirmed, likely in New Lynn area) to store materials, provide parking, bus/shuttle pickup and act as a partial assembly location to have greater flexibility and reliability of site truck and light vehicle movements; and
- For over-dimensional plant/equipment movements and 'Wide Loads' identification of appropriate scheduling of these movements, such as overnight or on weekends.

7.11.3 Conclusion

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

7.12 Noise and vibration effects

Marshall Day Acoustics (MDA) has conducted an assessment of construction noise and vibration based on the Indicative Construction Methodology Report prepared by Alta. This report is attached in Appendix N and summarised below.

7.12.1 Assessment

Noise from any construction work activity must be measured and assessed in accordance with the requirements of NZS 6803: 1999 "Acoustics - Construction Noise". As the anticipated length of the construction period exceeds 20 weeks, the construction noise limits would be decreased by 5 decibels. In summary, the noise limits applying to typical construction hours (7:30am to 6:00pm) would be 70 dB LA_{eq} and 85 dB LA_{max} assessed at 1 m from the façade of occupied buildings.

Noise from enabling and bulk earthworks carried at the replacement WTP site is predicted to comply with the relevant noise limits apart from when vegetation removal (chainsaw/chipper) occurs at 55 m from Manuka Road receivers, and at 65 m from Scenic Drive receivers. In terms of Scenic Drive receivers, it is noted that the exceedances are minor (3dB) and intermittent, and given that the work would be carried out during normal construction hours, no adverse effects are anticipated.

MDA has also considered the potential noise impact of increased truck movements on the road network resulting from construction activities. The results indicate that the increased truck movements and ratio of heavy vehicles on the identified roads would result in less than 1 decibel increase in noise when assessed over a daytime hour.

In terms of vibration effects, given the location of works MDA considers there to be negligible potential for adverse vibration effects from construction activities at the Reservoir 1 and existing Huia WTP site/Reservoir 2 location. At the replacement WTP site, all activities are predicted to readily comply with the vibration limits in DIN4150-3 and any potential risks of cosmetic damage to these buildings would therefore be low. There would also be a low risk of cosmetic damage to the Nihotupu and Huia Filter Stations.

The AUP amenity limits would be complied with at 43 metres distance or greater. Notwithstanding this, there will be instances where vibration may be felt by some receivers therefore advance communication with some stakeholders located on Manuka Road is recommended to address any concerns about potential building damage. While vibration limits are comfortably met, pre and post-construction building condition surveys could also be undertaken at the nearest sensitive receptors to alleviate concerns.

7.12.2 Management and mitigation

While it not uncommon for large infrastructure projects to be undertaken in proximity to sensitive receivers, the predicted exceedances of the construction noise limit trigger the requirement for noise mitigation and effects management via a Construction Noise and Vibration Management Plan (CNVMP).

Through the development of a CNVMP, the following mitigation measures are likely to be put in place to manage the impacts of construction noise and vibration:

- Communication and consultation with stakeholders;
- Generally limiting the timing of noisy construction works to between 0730 and 1800 hrs;
- Pre- and post-construction building condition surveys at the nearest sensitive receptors where the relevant vibration limits will be exceeded and where agreed to with the owners;
- Establishment of noise barriers where possible and adoption of alternative construction methods; and
- Avoidance of unnecessary noise such as horns, reversing alarms, people noise and music.

General acoustic management and mitigation measures are also recommended to be implemented throughout the course of the Project as a best practice provision e.g. maintenance of equipment to a high level and the avoidance of unnecessary noise and vibration such as the use of horns, tonal reverse alarms or clearing excavator buckets by hitting the ground.

7.12.3 Conclusion

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 non-project 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.

7.13 Summary of effects and conclusion

The replacement Huia WTP project will provide a number of positive effects (as discussed in Section 7.2), notably the provision of a reliable, long-term, and high quality water supply to service the north-west 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.

Construction of the project has the potential to give rise to a range of adverse environmental effects and these have been covered in the preceding assessment. Watercare proposes conditions as part of this resource consent application in order to avoid, remedy, mitigate or compensate the adverse effects of the construction activities as appropriate (Appendix Q).

It is considered that the proposed reclamation and diversion of a short section of intermittent stream will have minor short term effects, but these effects will be appropriately mitigated and compensated such that the project will provide an overall enhancement of freshwater ecological values.

Vegetation clearance and bulk earthworks activities have the potential to cause adverse erosion and sedimentation effects, however these activities will be appropriately managed by the proposed erosion and sediment control measures.

Removal of intact native forest and scrub is the primary ecological impact arising from the proposed development. While ecological constraints have been the key determinant of the project design, with the footprint reduced or moved away from more sensitive areas and the area of vegetation clearance minimised as much as practicable, 3.5 ha of ecologically significant vegetation is proposed

for removal, and the level of ecological effect arising from the proposed development is assessed as being high. To address this, Watercare proposes a comprehensive ecological mitigation and compensation package (the WBMP), which is focussed on achieving an overall net benefit in biodiversity. The WBMP comprises ecological management over a 990 ha area, of which approximately 720 ha is classified as SEA, and will be funded and coordinated through a charitable trust. The positive benefits on the environment from the proposed mitigation and compensation package are considered to appropriately compensate for the loss of forest extent

A conservative approach to the potential presence of contaminated soils has been taken, and a Site Management Plan will be followed to ensure appropriate controls are in place to minimise potential discharges of contaminants to the environment and inform health and safety measures.

A preliminary land stability assessment finds 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.

Groundwater drawdown will occur as a result of excavation to construct the NH2 shaft and Reservoir 1. All potential groundwater drawdown effects will be contained within Watercare property and Woodlands Park Road, and minor ground settlement of the road is estimated. Monitoring is proposed to address the potential effects. Groundwater drawdown is not expected to affect stream flows.

In regard to stormwater diversion and discharge from the development, 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.

A broad range of environmental management and mitigation measures are proposed in this application that will address potential effects on cultural values, including stringent protocols for managing kauri dieback disease, a comprehensive ecological mitigation and compensation package, and erosion and sediment control measures.

Te Kawerau ā Maki is currently preparing a Cultural Values Assessment (CVA) that will further inform the assessment of effects on cultural values.

The transport effects of the enabling works (vegetation clearance and bulk earthworks) will be managed through the implementation of a CTMP, which will ensure the safe and efficient operation of the local transport network.

It is considered that the noise and vibration effects of the enabling works will be adequately controlled through the implementation of a CNVMP.

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 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.

8 Statutory Assessment

8.1 RMA requirements

8.1.1 Consideration of applications – Section 104

Section 104(1) of the RMA sets out the following matters which, subject to Part 2 of the RMA, a consent authority must have regard to when considering an application for resource consent:

> d *(a) Any actual and potential effects on the environment of allowing the activity;*
>
> *(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;*
>
> *(b) 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*
>
> *(c) Any other matter the consent authority considers relevant and reasonably necessary to determine the application.*

As required by section 104(1)(a), an assessment of any actual or potential effects is included in Section 7 of this report.

As required by section 104(1)(ab), measures proposed by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment are included in Sections 4.10 and 7 of this report and identified in Section 8.1.2 below. This recent amendment to the RMA provides for both offsets and compensation which recognises a distinction between them. It is relevant to note that this section of the RMA came into force after the AUP had been made operative in part, and is therefore not fully reflected in the AUP provisions including those which are directly relevant to this application. This matter is addressed further in Section 8.6 below.

In accordance with section 104(1)(b), this section of the report contains an assessment of the application against the relevant provisions of the following statutory documents:

- National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health (NES Soil);
- National Policy Statement for Freshwater Management (NPS-FM);
- Regional Policy Statement provisions of the AUP; and
- Regional Plan provisions of the AUP.

In accordance with the requirements of section 104(1)(c), the consent authority must also have regard to any other matter it considers relevant and reasonably necessary to determine the application.

Other matters which are considered relevant include the following:

- Waitakere Ranges Heritage Area Act 2008 (WRHAA);

- Biodiversity Collaborative Group (BCG) Recommended Draft National Policy Statement on Indigenous Biodiversity (BCG Draft NPS-IB);
- Local Government (Auckland Council) Act 2009;
- Drinking Water Standards New Zealand 2005 (revised 2018);
- The Auckland Plan 2050;
- Muddy Creeks Local Area Plan (2014);
- Te Kawerau ā Maki rāhui;

8.1.2 Positive effects to offset or compensate adverse effects – Section 104(1)(ab)

As required by section 104(1)(ab), any measures proposed by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment are included in this report. In summary, these are:

Yorke Gully Stream mitigation and compensation package

A mitigation and compensation package is proposed to address the reclamation of approximately 53 m 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 will address localised erosion in this area, reduce the fine sediment entering the stream and will reinstate some intermittent habitat. The Ecological Assessment considers that these works will provide an overall ecological enhancement.

Waima Biodiversity Management Plan

A key part of the project design is a comprehensive ecological mitigation and compensation package, which is focussed on 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 initiative referred to as the WBMP.

The 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. Biodiversity values within the Management Area are considered comparable to that present within the Project Site. Benefits 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 species (kokako, robin, whitehead, kakariki) reach carrying capacity and disperse from intensively managed habitats.

Other off-site 'mitigation' initiatives

Section 4.10.10 of this AEE report identifies broader mitigation initiatives. These are 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. These have been identified on the basis of community feedback, or which consultation to date indicates are supported by the community. These 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. These initiatives will be more fully described in the OPW required for the actual construction of the infrastructure.

8.1.3 Proposed conditions of consent

Section 108AA sets out the requirements for conditions of resource consents as follows:

> e *(1) 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.*

Mitigation measures are recommended throughout the specialist reports and in the assessment of effects in Section 7 to ensure adverse effects are appropriately avoided, remedied, mitigated or otherwise compensated for. Draft conditions proposed by the applicant are set out in Appendix Q. These represent key conditions which capture all of the mitigation measures and management plans identified in the specialist reports and assessment of effects which are considered necessary to address the potential adverse effects of the proposed activity on the environment. In particular, the proposed conditions require:

- The establishment, administrative support of and consultation with a **CLG** comprised of representatives of the local community;
- The preparation and implementation of an **Ecological Management Plan**, 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;
- 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 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;
- The preparation and implementation of a **Waima Biodiversity Management Plan**, 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.
- The establishment of a charitable trust (**Waima Biodiversity 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 Waima Biodiversity Management Plan, provide a mechanism for achieving the objectives of the Waima Biodiversity Management Plan, 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 $5,000,000 to the Trust.

- The preparation and implementation of an **Erosion and Sediment Control Plan**, that is generally in accordance with the draft Stormwater and ESC Report included as Appendix G to this application;
- The works to be undertaken in accordance with the **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;
- 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;
- 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.
- The preparation and implementation of a **Construction Traffic Management Plan** that is generally in accordance with the draft CTMP included as Appendix M to this 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;
- Preparation of a **Pavement Impact Assessment**, with the scope and extent of the assessment agreed with AT.
- The preparation and implementation of a **Construction Noise Management Plan** that includes management and mitigation options, methods and frequency of monitoring and reporting, and a protocol for communication, consultation and complaints response.

8.1.4 Discharge permit requirements - Sections 105 and 107

Section 105(1) requires the consent authority to have regard to the nature of the discharge and the sensitivity of the receiving environment, the applicant's reasons for the proposed choice and possible alternative methods of discharge.

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 matters identified in Sections 105(1) and 107(1) have been addressed throughout this report. In particular, Section 3.6which describes the receiving environments (Armstrong and Yorke Gully Streams) and Section 7 which assesses the effects on the environment.

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 practise, as reflected in Council technical publications GD01 and GD05, and will not give rise to any of the effects identified above.

8.2 Part 2 – Purpose and principles (sections 5 to 8)

8.2.1 Approach in light of Davidson decision

Traditionally an analysis of the consistency of an application with Part 2 of the RMA has been fundamental to the overall assessment of applications for resource consent. Section 104(1) of the RMA requires that consideration of applications for resource consent be 'subject to Part 2'. Until recently this has been considered to require an 'overall broad judgement' approach in the form of a fulsome Part 2 analysis.

However that traditional approach has been called into question through decisions on *R J Davidson Family Trust v Marlborough District Council* (Davidson). The most recent Court of Appeal's decision clarifies the application of this as follows[54]:

> [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 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…

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.

However taking a conservative approach, and to ensure a comprehensive assessment, a brief assessment against Part 2 is set out below.

[54] R J Davidson Family Trust v Marlborough District Council [2018] NZCA 316, particularly at [74] and [75].

8.2.2 Part 2 assessment

Part 2 of the RMA sets out the purpose and principles of the Act. The purpose of the RMA is to promote the sustainable management of natural and physical resources.

Section 6 (Part 2) of the RMA sets out the matters of national importance. The following clauses are of particular relevance:

(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;

(e) the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taonga;

Section 7 (Part 2) of the RMA sets out other matters to be considered. This includes:

(a) kaitiakitanga;

(aa) the ethic of stewardship;

(b) the efficient use and development of natural and physical resources;

(d) intrinsic values of ecosystems;

(f) maintenance and enhancement of the quality of the environment.

Section 8 (Part 2) requires persons exercising functions and powers under the RMA to take into account the principles of the Treaty of Waitangi.

The proposal is considered to be consistent with the relevant matters of national importance set out in section 6 of the RMA. Of particular relevance to this proposal is section 6(c), the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna, as well as the matters in section 7(d), intrinsic values of ecosystems, and section 7(f), maintenance and enhancement of the quality of the environment. 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.

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 990 ha area, including approximately 720 ha of forested SEA, which is assessed to appropriately compensate for the loss of forest extent. 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.

Watercare and its predecessors have made a substantial investment in the western water supply dams and these assets are critical components of Auckland's water supply system. To ensure Auckland's future growth, development and wellbeing, Watercare must ensure that it maximises the use of these existing water sources.

The proposal is located in close proximity to, and relies on a raw water supply from the existing western water supply dams. It is also located in close proximity to the existing WTP and associated raw water and treated water network. Reservoir 2 is to be located on the existing WTP site, and the

project makes use of the existing attenuation lagoon on this site. The proposal is therefore considered to be an efficient use and development of existing natural and physical resources.

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. As a critical part of the region's water supply that provides drinking water to a third of the country's population, the replacement WTP is considered both regionally and nationally significant infrastructure.

Secure and reliable water services are critical to the economic, social, environmental and cultural well-being of Auckland's people and communities, and are a basic human right. Auckland's population is continuing to grow. Maintenance and replacement of the existing water supply network, and the provision for future water supply security is essential to support this growth, and to continue to provide for the well-being of Aucklanders.

The construction of the project will have some adverse effects, while the operation of the replacement WTP and reservoirs will have overwhelmingly positive effects. Overall, it is considered that the proposed replacement WTP and reservoirs are in accordance with Part 2 of the RMA and promote the sustainable management of natural and physical resources.

8.3 Waitākere Ranges Heritage Area Act 2008

The Project site is located within the Waitakere Ranges Heritage Area (WRHA) which was created under the Waitakere Ranges Heritage Area Act 2008 (WRHAA). The purpose of the WRHAA as set out in section 3 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:

- terrestrial and aquatic ecosystems of prominent indigenous vegetation;
- natural landforms and landscapes which give the area its distinctive character;
- streams that rise in the eastern foothills and contribute positively to downstream urban character, stormwater management, and flood protection;
- the quiet and darkness of the Waitakere Ranges;
- the buffer provided by the eastern foothills;
- the subservience of the built environment;
- the identity and character of settlements;
- 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.

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 section 8 of the WHRAA. These include the following provisions as particularly relevant to this application for regional consent for vegetation removal and enabling earthworks:

- to protect, restore, and enhance the area and its heritage features

- to ensure that impacts on the area as a whole are considered when decisions are made affecting any part of it:
- to adopt the following approach when considering decisions that threaten serious or irreversible damage to a heritage feature: carefully consider the risks and uncertainties associated with any particular course of action; and take into account the best information available; and endeavour to protect the heritage feature:
- to recognise and avoid adverse potential, or adverse cumulative, effects of activities on the area's environment (including its amenity) or its heritage features:
- to manage aquatic and terrestrial ecosystems in the area to protect and enhance indigenous habitat values, landscape values, and amenity values:
- to protect those features of the area that relate to its water catchment and supply functions:
- 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 WRHHA provides high level direction to guide the Auckland Council in its policy, planning and decision-making roles regarding the Heritage Area. Through the RMA it introduces extra considerations that are locally focused to produce planning documents that better reflect the purpose of the WRHAA. Section 25 of the WHRAA provides for Auckland Council to prepare Local Area Plans (LAP) 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 Plan, which is addressed in 8.8.3 of this report.

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).

The purpose and objectives of the WRHAA is given effect to by the AUP through the Waitakere Ranges Heritage Area Overlay and Section B4.4 of the Regional Policy Statement (RPS). It is noted that the overlay is a district plan provision, and is therefore not considered in this application but will be addressed in the subsequent OPW. The relevant RPS provisions are addressed in Section 8.6 below.

8.4 NES Soil

The NES Soil is the only National Environmental Standard relevant to this application. One of its key features is to provide national planning controls that direct the requirement for consent or otherwise for activities on contaminated or potentially contaminated land. All territorial authorities are required to give effect to and enforce the requirements of the NES Soil in accordance with their functions under the RMA relating to contaminated land. The resource consent requirements under the provisions of the NES Soil are set out in Section 6 and the adverse effects of disturbing potentially contaminated soil are assessed as being no more than minor in Section 7 of this report.

8.5 National Policy Statements – Freshwater Management

The NPS-FM is the only National Policy Statement relevant to this application. 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.

The following NPS objectives are considered 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 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 moderate-high 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. The project is assessed as being consistent with the NPS-FM.

8.6 Auckland Unitary Plan

8.6.1 Introduction

The AUP became operative in part on 15 November 2016 and provisions with no outstanding appeals are now operative. In addition, some of the AUP provisions relevant to this application are affected by Plan Change 14. This has been taken into account in this report and assessment set out below.

RPS and Regional Plan objectives and policies that are considered particularly relevant to this project are identified and summarised in the tables below. An assessment in relation to these provisions, and to the broad overall direction set by the RPS and Regional Plan, is set out below each table. A complete assessment of relevant objectives and policies is provided in Appendix P.

8.6.2 Enabling provisions that recognise the benefits of infrastructure

RPS	Regional Plan
Obj. B2.2.1 (1) Quality compact urban form that enables better use of existing infrastructure and efficient provision of new infrastructure **Obj. B3.2.1 (1)** Resilient, efficient and effective infrastructure **Obj. B3.2.1 (2)** Benefits of infrastructure are recognised **Pol. B3.2.2 (1)** Enable efficient development, operation,	**Obj. E26.2.1 (1)** Benefits of infrastructure are recognised **Obj. E26.2.1 (2)** Value of investment in infrastructure is recognised **Obj. E26.2.1 (3)** Safe, efficient and secure infrastructure is enabled. **Obj. E26.2.1 (4)** Development, operation, maintenance, repair, replacement, renewal, upgrading and removal of infrastructure is enabled. **Obj. E26.2.1 (5)** Resilience of infrastructure is improved and continuity of service is enabled. **Pol. E26.2.2 (1)** Recognise the social, economic, cultural and environmental benefits that infrastructure provides, including…

RPS	Regional Plan
maintenance and upgrading of infrastructure. **Pol. B3.2.2 (2)** Recognise the value of investment in existing infrastructure.	**Pol. E26.2.2 (2)** Provide for the development, operation, maintenance, repair, upgrade and removal of infrastructure by recognising: (a) functional and operational needs; (b) location, route and design needs and constraints; (d) benefits of infrastructure to communities with in Auckland and beyond;

Discussion

The provisions identified above in B3.2.1 and B3.2.2 of the RPS and the Regional Plan provisions which give effect to the RPS direction are enabling provisions that recognise the benefits of infrastructure, the value of investment in existing infrastructure, and the need for resilient, efficient and effective infrastructure.

These matters are addressed in Section 2 of this AEE report and each of these objectives and policies specifically responded to in Appendix P. In summary, the existing Huia WTP is a crucial component of Auckland's water supply network. Replacement of this ageing infrastructure 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 replacement WTP will allow for more efficient treatment of water from the four water supply dams, enabling an increase in maximum capacity to 140 MLD. This will assist in meeting peak demand periods and improve current system resilience to the north-west of the Auckland region. Resilience and efficiency within the WTP itself is provided through the use of gravity based systems, and ensuring a design which meets modern seismic design requirements and a 100-year design life. The reservoirs also increase overall system resilience and security of supply, ensuring that Watercare continues to meet the public health grading contingency storage requirements.

The replacement WTP and reservoirs are consistent with these RPS and Regional Plan provisions and are in fact supported and enabled by these provisions.

8.6.3 Function or operational requirements of infrastructure

RPS	Regional Plan
Obj. B3.2.1 (4) Functional and operational needs of infrastructure are recognised. **Pol. B3.2.2 (3)** Provide for the locational requirements of infrastructure by recognising that it can have a functional or operational need to be located in SEA.	**Pol. E26.2.2 (2)** Provide for the development of infrastructure by recognising (a) functional and operational needs; (b) location, route and design needs and constraints. **Pol. E26.2.2 (6)** Consider the following matters where new infrastructure is proposed within a SEA: (b) whether the infrastructure has a functional or operational need to be located in or traverse the proposed location.

Discussion

As part of providing for and enabling infrastructure, the provisions outlined above specifically recognise that there may be a functional or operational need for infrastructure to locate in an SEA.

The replacement WTP and reservoirs are to be located on owned by Watercare and designated for water treatment purposes. 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 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.

The proposed works are considered to be consistent with the policy direction summarised above.

8.6.4 Development of infrastructure in an SEA

RPS	Regional Plan
Obj. B3.2.1 (3) Development of infrastructure is enabled, while managing adverse effects on SEA **Obj. B3.2.1 (8)** The adverse effects of infrastructure are avoided, remedied or mitigated. **Pol. B3.2.2 (6)** Enable infrastructure in SEA while ensuring adverse effects on values of such areas are avoided where practicable or otherwise remedied or mitigated. **Pol. B3.2.2 (8)** Avoid, remedy or mitigate the adverse effects from the construction etc. of infrastructure.	**Obj. E26.2.1 (9)** The adverse effects of infrastructure are avoided, remedied or mitigated. **Pol. E26.2.2 (4)** Require the development and operation of infrastructure to avoid, remedy or mitigate adverse effects, including, on (e) Values for which a site has been scheduled or incorporated in an overlay. **Pol. E26.2.2 (5)** When assessing the effects of infrastructure consider: (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. **Pol. E26.2.2 (6)** Consider the following matters where new infrastructure or major upgrades to infrastructure are proposed within an SEA: (a) the economic, cultural and social benefits and the adverse effects of not providing the infrastructure; (b) functional or operational need (see table and discussion above); (d) whether there are any practicable alternative locations, routes or designs, which would avoid, or reduce adverse effects on the values of the SEA, 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: (v) natural ecosystems and habitats; (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 NPS, NES or RPS.

Discussion

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. In relation to this application, along with the requirement to enable infrastructure this is considered to be the key direction established by the AUP policies and objectives at both an RPS and Regional Plan level.

The Regional Plan policies and objectives that give effect to the RPS policy direction similarly require that adverse effects are avoided, remedied or mitigated (Obj. E26.2.1 (9), Pol. E26.2.2 (4)). Policies E26.2.2 (5) and (6) in particular provide strong guidance on how the overall Regional Plan objectives

will be implemented, and in turn give effect to the RPS direction to enable the development of infrastructure while managing adverse effects[55].

In terms of Policy E26.2.2 (5):

- The site is identified as part of an extensive SEA in the AUP which essentially extends throughout the entire Waitakere Ranges area. However as with much of the surrounding landscape, vegetation on the site has been modified by historical development and there is a gradient in the quality and condition of the ecosystem within the Project Site.
- The existing Huia WTP is a crucial component of Auckland's water supply network. Replacement of this ageing infrastructure along with additional treated water storage capacity 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. There would be significant impacts on the Auckland region's water supply network and levels of service if the proposed work is not undertaken.
- In terms of subsections (d) and (e), as set out in Section 2 of this AEE report and summarised below:
  - Currently around 75% of Auckland's water supply is provided by sources and treatment plants to the south of the main metropolitan area. However treated water capacity across the region including in the north-west provides resilience to the overall water supply system. The replacement Huia WTP is therefore of significant strategic importance due to its location on the western edge of the water supply network.
  - Due to the use of gravity based water sources and treatment facilities, similar to the existing Huia WTP the replacement WTP will have the capability to supply water to Auckland from the upper dams with minimal power requirements. This provides significant resilience and system efficiency benefits. As such, it has an important role in supplying water to the region in emergency situations and in the event of a major power supply disruption.
  - The replacement WTP will have a maximum short run production capacity of up to 140 MLD which will assist in meeting peak demand periods and improve the current system resilience to the north-west of the Auckland region.
  - Additional reservoir storage capacity in the north-west will ensure that Watercare continues to meet the public health grading requirements to have 24 hours of storage as a contingency during system outages.
  - Secure and reliable water services are critical to the economic, social, environmental and cultural well-being of Auckland's people and communities, and are a basic human right. Auckland's population is continuing to grow. Maintenance and replacement of the existing water supply network, and the provision for future water supply security is essential to support this growth, and to continue to provide for the well-being of Aucklanders and beyond.

In terms of Policy E26.2.2 (6), the functional or operational need and the benefits of the infrastructure and the adverse effects of not providing it have been canvassed above. Watercare has assessed alternative locations and designs and found the proposal is the best practicable option having regard to a broad range of matters including those identified in E26.2.2 (6)(a) – (c). On-site alternatives including the iterative layout optimisation process for both the replacement WTP and reservoirs has ensured that adverse effects on the values of the SEA have been avoided as far as

[55] This is also reflected in the Regional Plan rules to achieve these objectives and policies. The removal of vegetation within an SEA for infrastructure purposes that cannot meet permitted activity standards is a restricted discretionary activity pursuant to E26.3.3.1 Rule (A77).

practicable, and otherwise minimised. This has focused in particular 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 extent practicable. On site mitigation will include retention and enhancement of the remaining 9.3 ha of native vegetation within the Project Site that is outside of the developed area. Residual effects on the SEA are proposed to be addressed through a comprehensive ecological compensation package which is designed to appropriately compensate for the loss of forest and achieve an overall net benefit in terms of biodiversity.

The RPS provisions broadly seek to enable infrastructure, with the Regional Plan provisions recognising this and seeking to provide particular guidance on the matters to be considered where infrastructure needs to be located within an SEA. Taking the above into account, this application for the replacement Huia WTP and reservoirs is considered to be enabled by the RPS provisions identified above, and is consistent with the Regional Plan objectives and policies that give effect to the RPS policy direction.

8.6.5 Natural heritage

RPS	Regional Plan
Obj. 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.	(No regional plan provisions)

The purpose and objectives of the Waitakere Ranges Heritage Area Act 2008 (WRHAA) is given effect to in the AUP through the Waitakere Ranges Heritage Area Overlay and Section B4.4 of the RPS. It is noted that the WRHA overlay is a district plan provision, and is therefore not considered in this application but will be addressed in the subsequent OPW.

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 particular 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.

8.6.6 Significant indigenous biodiversity

RPS	Regional Plan
Obj. B7.2.1 (1) Protect areas of significant indigenous biodiversity value from adverse effects of development. **Obj. B7.2.1 (2)** Indigenous biodiversity is maintained through protection, restoration and enhancement in areas where ecological values are degraded, or where development is occurring. **Pol. B7.2.2 (1)** Identify and evaluate areas of indigenous vegetation and habitats considering the factors in Schedule 3 of SEA – Terrestrial Schedule **Pol. B7.2.2 (5)** Avoid adverse effects on areas listed in Schedule 3 of SEA – Terrestrial Schedule	**Obj. D9.2 (1)** Areas of significant indigenous biodiversity value in terrestrial (and freshwater) areas are protected from the adverse effects of development. **Obj. D9.2 (2)** Indigenous biodiversity values of SEA are enhanced. **Pol. D9.3 (1)** Manage the effects of activities on the indigenous biodiversity values of SEA by: (b) avoiding adverse effects as far as practicable, and where avoidance is not practicable, minimising adverse effects on the identified values; (c) remedying adverse effects where they cannot be avoided; (d) mitigating adverse effects 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[56]. **Pol. D9.3 (2)** Adverse effects on indigenous biodiversity values in SEA that are required to be avoided, remedied, mitigated or offset includes [refer Appendix P]. **Pol. D9.3 (3)** Enhance indigenous biodiversity values in SEA through [refer Appendix P]. Includes (b) control, and where possible, eradication of plant and animal pests; (e) development and implementation of management plans to address adverse effects; (f) re-vegetating areas; (g) providing for the role of Mana Whenua as kaitiaki. **Pol. D9.3 (5)** Enable identified vegetation management activities in SEA to provide for the reasonable use and management of land. Includes vegetation removal to (c) establish a reasonable cleared area around a building; (d) maintain lawfully established activities, structures and buildings; (e) to provide for a dwelling on a site; **Pol. D9.3 (6)** Avoid as far as practicable the removal of vegetation and loss of biodiversity in SEA from the construction of building platforms, access ways or infrastructure, through: (a) using any existing cleared areas 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; (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. **Pol. D9.3 (8)** Manage the adverse effects from the development of infrastructure in accordance with the policies above, recognising that it is not always practicable to locate and design infrastructure to avoid SEA. **Pol. E11.3 (1)** Avoid where practicable, and otherwise mitigate, or where appropriate, remedy adverse effects on SEA.

Discussion regarding offsetting versus compensation

In terms of Policies D9.3 (1) and (2), recent guidance states that environmental compensation is not biodiversity offsetting. However this strict interpretation is not reflected in the RMA or the AUP. As noted in Section 8.1.2 above, Section 104(1)(ab) of the RMA was amended recently to include explicit reference to compensation to reflect the distinction that is now being drawn and to ensure

"offset" was not read down in a way that would exclude compensation when the intent was offset would encompass both.

The Independent Hearings Panel (IHP) specifically considered whether the AUP should be amended to specify that in offsetting there should be "no net loss". It noted that[57]:

> *A goal of offsetting can be to achieve no net loss, and while this outcome may be expected on most occasions, the achievement of no net loss should not be a strict requirement. This provides some flexibility so that an offset, which achieves a high level offsetting but not no net loss, is still recognised in the polices (and would not be considered to be contrary to those policies in terms of any non-complying gateway tests).*

The reference to offsetting in Policies 9.3(1) and (2) therefore incorporates the compensation package even though the measures it includes are not "biodiversity offsets" as more recently defined in the various guidance documents.

Discussion

The overall objective established by the RPS provisions in relation to significant indigenous biodiversity values is to protect these from the adverse effects of development, and to maintain, restore and enhance indigenous biodiversity in areas where development is occurring (Obj. B7.2.1 (1) and (2)). RPS policies require the identification of SEA and avoidance of adverse effects on these areas (Pol. B7.2.2 (1) and (7)). The Regional Plan objectives that give effect to the RPS policy direction require that values of an SEA are protected and enhanced (Obj. D9.2 (1) and (2)).

The RPS includes a policy requiring adverse effects are avoided (B7.2.2 (5)). This policy should not be interpreted as an absolute prohibition because the wider context of the AUP indicates that Auckland Council has determined that infrastructure can have a functional or operational need to be located in areas with natural and physical resources that have been scheduled in the AUP and that it is not always practicable to locate and design infrastructure to avoid SEA. Instead, this policy is to achieve the overall objectives of protecting and enhancing significant indigenous biodiversity, and importantly is given effect to at a Regional Plan level through policy provisions which specifically recognise that it is not always practicable to avoid adverse effects on an SEA, and in fact provide for vegetation removal in particular circumstances.

The Regional Plan policies establish a mitigation hierarchy around managing effects of activities on indigenous biodiversity values in an SEA (Policies D9.3 (1) and (6), E11.3 (1)). This direction is consistent with the policy direction for the development of infrastructure in an SEA (refer Section 8.6.4 above). The fundamental principle of the mitigation hierarchy is that avoidance of adverse effects is prioritised, with remediation then mitigation, before finally considering the appropriateness of offsetting or compensating any residual adverse effects that are significant and where they have not been able to be mitigated, through protection, restoration and enhancement measures. This approach has been fundamental to the Ecological Assessment contained in Appendix L and to the comprehensive site layout optimisation process described in Section 5 and supporting technical reports.

In order to identify areas with particularly high values within the overall SEA, extensive terrestrial and freshwater ecological surveys were undertaken to provide a detailed assessment and mapping of ecological values and ecological integrity across the site. This was undertaken on the basis that it is not possible to avoid vegetation clearance altogether in order to accommodate the replacement WTP and reservoirs. Therefore a more granular assessment allowed for areas of particularly high value to be identified and protected, along with lower value areas so that development could, as far

[57] IHP, Report to Auckland Council Hearing topics 006 Natural resources and 010 Biodiversity, July 2016 at 8.2.3.

as practicable, be directed away from the higher value areas and centred on the lower value areas within the site.

The detailed ecological values assessments, ecosystem classification and integrity evaluation enabled the project design team to give priority to avoiding areas of highest value, including permanent watercourses, threatened ecosystem types and areas of mature forest. Particular emphasis has been placed on avoidance of kauri forest, including old-growth kauri and individual trees which have provenance value.

The focus has then been on minimising the extent of the works footprint and configuring the plant and laydown areas to utilise lower-value parts of the site to the greatest extent possible within the constraints of the design brief. Detailed design also focused on limiting losses of intermittent watercourses and individual mature trees (refer Section 5).

This focus on avoiding the disturbance of areas with the highest ecological integrity, together with on-site mitigation of the remaining 9.3 ha of native vegetation within the Project Site and the comprehensive ecological compensation package which is proposed, which includes extensive weed and pest control, ensures that existing significant indigenous vegetation is protected to the greatest extent practicable. The ecological compensation package is designed to appropriately compensate for the loss of forest extent and achieve an overall net benefit, thereby ensuring biodiversity values are restored and enhanced.

Policies D9.3 (3) and (6) provide guidance on how the overall Regional Plan objectives of protecting and enhancing the values of an SEA will be implemented. These are in addition to the infrastructure-specific ones contained in E26.2.2 and are more focused on day-to-day residential type development. Importantly however these policies anticipate and respond to the type of development anticipated in the surrounding Large Lot Residential Zone, and provide for vegetation clearance associated with establishing a reasonable cleared area around a building, maintaining lawfully established activities, and providing for a dwelling on site and associated services, access and car parking[58]. While the replacement WTP and reservoirs are of a notably larger scale then a dwelling, it is nonetheless development that is anticipated by the designation. In this respect the replacement WTP and reservoirs is a reasonable use and management of land consistent with Policy 9.3(5). Consistent with Policy D9.3(8) which recognises that it is not always practicable to locate and design infrastructure to avoid SEA, adverse effects have been managed in accordance with the policy direction established through the Regional Plan provisions.

In summary, the application has avoided adverse effects on the SEA where practicable, and otherwise remedied or mitigated adverse effects to the greatest extent practicable. Residual adverse effects will be compensated for through a comprehensive suite of measures within the surrounding catchment[59]. The application is considered to be broadly consistent with the direction established by both the RPS and Regional Plan in relation to significant indigenous biodiversity, and is not contrary to the Regional Plan policies and objectives identified above and further assessed in Appendix P.

[58] The Large Lot Residential Zone has a minimum net site area of 4,000 m^2. Within this zone, vegetation alteration or removal of up to 300 m^2 within the SEA is a controlled activity (E15.4.2 (A29)). If the Project Site area of 106,100 m^2 was zoned Large Lot Residential consistent with surrounding zones, then approximately 8,000 m^2 of vegetation removal across all of the residential lots could be undertaken as a controlled activity.

[59] While Policy 9.3(1) refers to offsetting, we note this was prepared prior to recent amendments to the RMA which now specifically recognise and provide for both offsetting and compensation (Section 104(1)(ab)). A review of relevant AUP supporting documents at the time of drafting indicate that the term 'offset' was used in a broad sense and would include compensation.

8.6.7 Works in a watercourse

RPS	Regional Plan
Obj. 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 **Pol. 7.3.2 (4)** Avoid the permanent loss and significant modification or diversion of streams (excluding ephemeral streams) unless (a) it is necessary to provide for: (iv) infrastructure; (b) no practicable alternative exists; (c) mitigation measures are implemented to address the adverse effects; and (d) where adverse effects cannot be adequately mitigated, environmental benefits including on-site or off-site works are provided. **Pol. 7.3.2 (5)** Manage development, including discharges and activities in stream beds to (b) minimise erosion and modification of beds and banks streams; (c) limit structures to those that have a functional need or operational requirement; and (d) maintain or where appropriate enhance riparian vegetation and areas of significant indigenous biodiversity.	**Obj. D9.2 (1)** Areas of significant indigenous biodiversity value in freshwater (and terrestrial) areas are protected from the adverse effects of development. **Obj. E3.2 (2)** Auckland's lakes, rivers, streams and wetlands are restored, maintained or enhanced. **Obj. E3.2 (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. **Obj. E3.2 (4)** Structures in the bed of a stream are provided for where there is a functional or operational need. **Obj. E3.2 (6)** Reclamation and drainage of the bed of a lake, river, stream and wetland is avoided, unless there is no practicable alternative. **Pol. 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) Significant Ecological Areas Overlay. **Pol. E3.3 (7)** Provide for structures and any associated diversion of water where: (d) the structure is for (iv) infrastructure; (a) there is no practicable alternative method or location; and the structure is designed to (b) be the minimum size necessary; (c) avoid creating or increasing a hazard; (e) avoid significant adverse effects and avoid, remedies or mitigates other adverse effects on Mana Whenua values associated with freshwater resources. **Pol. E3.3 (13)** Avoid the reclamation and drainage of the bed of lakes, rivers, streams and wetlands unless all of the following apply: (a) there is no practicable alternative method for undertaking the activity; (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. **Pol. E1.3 (2)** Manage discharges and development that affect freshwater systems to: (a) maintain or enhance water quality, flows, stream channels etc where the current condition is above the NPS bottom lines; or (b) enhance where the current condition is below national bottom lines. **Pol. E1.3 (3)** Require freshwater systems to be enhanced.

The RPS focuses on maintaining and enhancing freshwater systems including minimising modification to stream beds, limiting structures and enhancing riparian vegetation.

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 site and existing WTP site. 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 tawake-pukatea-kahikatea wetland forest present on the reservoir site.

RPS Policy 7.3.2(4) establishes a specific direction in relation to reclamation that it should be avoided other than in specified circumstances. As described above, the project results in the reclamation and

diversion of an approximately 53 m intermittent reach of the Yorke Gully Stream which is located towards the centre of the replacement WTP site. 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 ecological assessment indicates that due to the intermittent nature of the stream and its moderate to low ecological value, significant adverse effects will be avoided. The reclaimed stream will be replaced with at least 70 m 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 in combination with proposed downstream enhancement. The proposal is assessed as being consistent with RPS Policy B7.3.2 (4). For the same reasons it is also considered to be consistent with Regional Plan Policy E3.3 (13).

Structures are limited to those that have a functional and operational need to be located in a stream bed, being a stormwater outfall structure and erosion protection structures where required. 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. Overall, the proposal is assessed as meeting RPS Objectives B7.3.1 (1) and (2) and Policy B7.3.2 (5). Similarly it is considered to be consistent with the direction established through the relevant Regional Plan provisions, in particular Objectives D9.2(1) and E3.2(4) and policies E3.3 (1) and (7), and E1.3 (2) and (3).

Amongst other things, objectives in the Regional Plan broadly seek to protect and enhance freshwater systems and to avoid reclamation and drainage unless there is no practicable alternative. Objective E3.2(4) requires that significant residual adverse effects that cannot be avoided, remedied or mitigated are offset where this will promote the purpose of the RMA. To achieve these objectives, the Regional Plan policies effectively establish a mitigation hierarchy around managing effects of activities on freshwater systems. This requires that significant adverse effects are avoided, and other adverse effects are avoided where practicable or otherwise remedied or mitigated (Pol. E3.3(1) and (13)). This is similar to, albeit stricter than the mitigation hierarchy established in relation to infrastructure in an SEA and effects on significant indigenous vegetation in that it imposes an additional requirement, or first step in the hierarchy that significant adverse effects are to be avoided.

At the outset of the site layout optimisation process, a series of site constraints were developed. This included the requirement to protect permanent watercourses and maintain a 10 m buffer around these watercourses wherever practicable, and to otherwise minimise effects on other watercourses (refer Section 5). The project footprint has been specifically designed to avoid effects on permanent streams and wetlands and otherwise minimise impacts on other watercourses. The ecological assessment demonstrates that significant adverse effects on freshwater systems have been avoided. 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.

Along with the creation of the stream diversion channel, the mitigation/ compensation package also encompasses erosion protection works within an off-site section of the Yorke Gully (within an Auckland Council reserve). The upper, intermittent reaches of the York Gully Stream have some significant erosion issues that are releasing large volumes of fine sediment into the stream. Watercare proposes to address this erosion through stream bank stabilisation works and some minor channel clearance, using soft-engineering techniques. Addressing this localised erosion within the upper Yorke Gully will reduce the fine sediment entering the stream and will reinstate some intermittent habitat. Overall, 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 resulting from the replacement WTP project, and will provide an overall ecological enhancement.

On this basis, the proposal is considered to be consistent with the RPS and Regional Plan provisions relating to freshwater systems and works in a watercourse.

8.6.8 Summary of objectives and policies assessment

Both the RPS and Regional Plan components of the AUP include 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 Court[60], 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 as SEAs, and it is a natural consequence of such development that adverse effects may occur.

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.

Overall, 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.

8.7 Non-complying activities - Section 104D

The reclamation and diversion of a small-section of intermittent stream in the Yorke Gully is a non-complying activity. Therefore the application falls for consideration overall as a non-complying activity.

Section 104D sets out particular restrictions for non-complying activities and effectively establishes what is known as a 'gateway test' for non-complying activities. In order to proceed to consideration under Section 104(1) the proposal must meet at least one of the following gateway tests:

a. The adverse effects of the activity on the environment will be minor; or
b. The application is for an activity that will not be contrary to the objectives and policies of the relevant plan.

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

[60] Royal Forest and Bird Protection Society of NZ Inc v Bay of Plenty Regional Council [2017] NZEnvC 045

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 terms of the second gateway test, i.e. the application is for an activity that will not be contrary to the objectives and policies of the relevant plan, for the purpose of these regional resource consent applications legal advice has confirmed that the relevant regional plan in this instance is the Regional Plan section of the AUP.

A discussion in relation to the second gateway test i.e. an assessment against the relevant objectives and policies of the Regional Plan section of the AUP, is set out in above and in Appendix P. It is relevant to note that the gateway test of Section 104D 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 the basis of the assessment set out in the sections above, the application is considered to be not contrary to the objectives and policies of the Regional Plan provisions of the AUP. The application therefore passes the second gateway test of Section 104D and can proceed for consideration under Section 104(1).

8.8 Other matters

8.8.1 Watercare's responsibilities and obligations

Watercare's responsibilities and obligations are canvassed in Section 2 of this report. In summary:

- Watercare'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).
- Amongst other things, the LGA 2009 requires that Watercare must manage its operations efficiently with a view to keeping the overall costs of water supply and wastewater services to a minimum.
- The LGA 2009 also requires that Watercare 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.
- Replacement of the Huia WTP, construction of western reservoirs storage, and the NH 2 watermain duplication are identified in the Auckland Plan 2050 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.

8.8.2 The Auckland Plan 2050

The Auckland Plan 2050 is addressed in Section 2 of this AEE report. As set out there, Direction 4 of the Environment and Cultural Heritage Outcome is to ensure that Auckland's infrastructure is future-proofed. Much of Auckland's infrastructure is ageing and does not always meet modern requirements or expectations. This means that there is a need to build flexibility and adaptability into infrastructure design and reduce the impacts of inefficient infrastructure through retrofits and upgrades. Replacement of the Huia WTP, construction of additional treated water storage reservoirs, and the 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.

8.8.3 Muddy Creeks Local Area Plan

The Muddy Creeks Local Area Plan (2014) was prepared in accordance with the WRHAA through a public participation process. It includes ideas and visions for the future to provide a long-term direction for Council, iwi and community action in the area. It identifies features important to the community and proposes objectives and actions to achieve desired outcomes.

Key ecology-related themes include recognition of the heritage value of the kauri forest that the community inhabits, and the kaitiakitanga shown through local initiatives (e.g., the Sustainable Neighbourhood groups or Waituna Action Group). The Muddy Creeks Plan includes an ecological objective of fostering healthy, safe and connected ecosystems through managing kauri dieback, restoration of ecological corridors and advocacy for pest management. The project includes robust kauri dieback protocols and the WMBI has a significant focus on pest management.

8.8.4 Te Kawerau ā Maki rāhui

Te Kawerau ā Maki has placed a rāhui (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. The Waitākere Ranges Heritage Area is the approximate boundary of the rāhui which covers both public and private property. The purpose of the rāhui is to enable the environment to recuperate and regenerate without the presence and impacts of humans.

The rāhui cover areas of private property but will not impact upon any private property rights or uses. Te Kawerau ā Maki has indicated they want to work in partnership and collaboration with property owners to ensure that the threat of kauri dieback is contained and managed within their individual properties to help safeguard the whole.

It also establishes a warrant system to allow for pest and weed management to continue within the rāhui area. Although the rāhui is a prohibition on human presence and activity, 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.

As set out in Sections 4.9 and 7.5 of this report, 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.

8.8.5 Iwi Management Plan for Ngāti Whātua Ōrākei

The site is located within the wider Rohe of Ngāti Whātua o Ōrākei. Within their wider Rohe, The Iwi Management Plan (IMP) states that Ngāti Whātua Ōrākei wishes to be engaged in development proposals that are publicly notified under the AUP and any development proposals that are within 50 m of a known Ngāti Whātua o Ōrākei site of cultural significance. The main goal for Ngāti Whātua Ōrākei is to ensure all activities are environmentally restorative and reflects their kaitiakitanga and guardianship roles in Tāmaki Makaurau. Priorities from the IMP that are relevant for this project include water quality, stormwater and biodiversity. These are addressed in Section 7 of this report. In addition, engagement with Mana Whenua including Ngāti Whātua o Ōrākei through the Kaitiaki Forum is outlined in Section 9.6 of this report.

8.8.6 BCG Recommended Draft National Policy Statement on Indigenous Biodiversity

The Biodiversity Collaborative Group (BCG) is a stakeholder-led group that was established by the Minister for the Environment. The BCG has developed a draft National Policy Statement on Indigenous Biodiversity (BCG Draft NPS-IB) and recommendations to the Government on complementary and supporting measures to maintain indigenous biodiversity. T

The BCG Draft NPS-IB sets out objectives and policies to manage natural and physical resources so as to maintain indigenous biological diversity ('biodiversity') under the RMA. Policy 4 sets out requirements in relation to the identification of significant natural areas, with the criteria contained in Appendix 1 to be applied to determine ecological significance. Policy 6 sets out the direction for managing effects within a significant natural area, and Policy 7 recognises the need to provide for social, cultural and economic wellbeing in the management of significant natural areas.

The BCG Draft NPS-IB sets out the direction in relation to biodiversity offsetting and compensation that a future NPS may take. However there has been no public consultation to date and there are a number of provisions where agreement has not been reached by the BCG. Furthermore it is currently in a recommended draft form and has no statutory weight.

9 Consultation

9.1 Introduction

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.

9.2 Consultation objectives

Watercare's broad objectives for stakeholder engagement and consultation on the project have included:

- Working with stakeholders throughout the project to gain information and feedback;
- Bringing transparency to the ecological surveys and effects assessments;
- Developing mitigation measures in collaboration with the local community that best serves both Watercare and the community's interest; and
- Providing opportunity for community input and comment through the resource consent process.

9.3 Consultation methods

The consultation methods used for the project to date are summarised in Table 9.1.

Table 9.1: Consultation methods

Consultation method	Detail
Community Liaison Group (CLG)	The CLG meets regularly to discuss the project, its effects, and the approach to minimising and mitigating the environmental effects. The CLG actively promotes and provides project information to interested parties. Meeting minutes have also been placed on the project web page. Refer below for further detail.
Public open days and information evenings	Public open days and open sessions have been held. Refer below for further detail.
One-on-one meetings	One-on-one meetings were held as requested or required by stakeholders and interested parties.
Telephone and email	Contact with stakeholders and interested parties has been undertaken via email and telephone, to answer queries as they arise.
Newsletters	Flyers have been distributed to the wider community providing information about the project and inviting people to the public open days.
Media releases	Local media have attended all public events. Watercare has issued media releases as required.

Consultation method	Detail
Watercare project website	Key technical reports and contact details are available on the project website: https://www.watercare.co.nz/About-us/Projects-around-Auckland/Huia-water-treatment-plant-replacement-Manuka-Road.

9.4 Initial design work

The design of the Huia WTP replacement commenced in 2008. At this stage concept design work was prepared for feasibility purposes. As the subject sites were designated for water treatment purposes public input was not sought during these early design stages.

In 2015 Watercare formed a focus group to assist in considering the various opportunities identified over the intervening years and developing a preferred solution. The focus group consisted of five members, including the Waitakere Ranges Protection Society, Titirangi Ratepayers and Residents Association and Waitākere Community Liaison Group. The focus group met on two occasions.

During this period, Watercare identified eight potential areas (schemes) that appeared to meet the site selection principles and be suitable to accommodate the replacement plant. Each of these schemes contained multiple potential sites (21 sites in total). Watercare did not engage with stakeholders at this stage as it was early in the process and there was a large number of sites across a wide area throughout west Auckland, and therefore a high level of uncertainty as to which was the most appropriate site. There was also a desire to narrow down the site selection to a few potential options before engaging with the public.

9.5 Community Liaison Group

In May 2017 Watercare's Board adopted the preferred site for the replacement WTP on Manuka Road subject to several conditions. One of these was that a Community Liaison Group (CLG) be established to participate in discussions on the development of the project.

A terms of reference was prepared and the CLG was formed in July 2017 and meets regularly with Watercare. The group is chaired by Paul Walbran and includes invited representatives from the community. The CLG represents key groups with a particular interest in the area including:

- West Auckland Historical Society
- Titirangi Protection Group
- Waitakere Ranges Protection Society
- Titirangi Residents and Ratepayers Association
- Auckland Botanical Society
- Waima Restoration Protection Society
- Tree Council
- Forest and Bird Waitakere branch
- Friends of Arataki
- Auckland Botanical Society
- Waima and Woodlands Park Residents and Ratepayers

In addition to the above, members of the Waitakere Ranges Local Board regularly attend the meetings as well as individuals from the community. The CLG has been open to additional groups/individuals joining and consequently the number of members has increased since the first meeting.

The scope of the CLG as set out in its terms of reference includes discussions on the replacement of the Huia WTP, the new treated water reservoirs on Woodlands Park Road and adjacent to the Nihotupu Filter Station, mitigation of effects, and the future use of the heritage sites and Exhibition Drive.

The intention of the CLG is to encourage constructive community dialogue with a view to optimising design, minimising adverse effects, developing appropriate mitigation measures and delivering good community outcomes. The CLG has met 13 times, when a Watercare representative has been present, to discuss the design and development of the plant. In the course of these meetings, Watercare and its experts have presented on all issues apart from social impact (as it was determined that until the final design was known, the actual extent of the impact could not be determined).

The discussions have included plant and landscape design, construction activities, future use of historical buildings, noise effects, how Watercare's network operates, ecological surveys, and potential traffic impacts and routes. The majority of the group's meeting minutes are available on Watercare's website. These outline the matters canvassed at the CLG and any subsequent actions.

The CLG requested the appointment of an independent ecologist to assist them in reviewing the ecological surveys and interpretation of the findings by Boffa Miskell. Watercare agreed to this request and to fund the position. Shona Myers, who is an experienced ecologist, was endorsed by the CLG and has since reviewed and advised on the work undertaken by Watercare's experts and provided the CLG with ecological advice. Watercare also agreed to the appointment and funding of an independent resource management planner, Marlene Oliver, to advise the group on planning matters. In addition to attending three CLG meetings (also attended by Watercare representatives), the group has meet with Marlene on two separate occasions. Marlene has also provided individual members with advice on the matter. Marlene is an experienced planner and is a qualified planning commissioner and has been an Environment Court Commissioner.

As a result of discussions and feedback from the CLG, amongst other things Watercare has assessed the potential to deposit excavated material at the existing Parau Landfill sludge site, reviewed the need for the two reservoirs, relocated the second reservoir to the existing WTP site, and further investigated and developed mitigation and compensation measures and amended aspects of the proposed WBMP and charitable trust tasked with implementing the comprehensive compensation package.

As set out in Section 5.5.4, towards the end of 2018 Watercare was at a point where it was close to finalising and lodging the relevant resource consent applications. However rather than proceed with lodgement, on the basis of feedback from the CLG Watercare determined to re-evaluate the reservoirs to further identify and test alternative sites and layout. While the CLG had expressed concern generally about the effects of the replacement WTP and reservoirs, through the course of consultation with the CLG it became apparent that this group had particular concerns about the 50 ML reservoir proposed on the northern side of Woodlands Park Road, and in particular the ecological and landscape effects of this. As a result, Watercare delayed lodgement and engaged Beca to undertake further evaluation of the storage requirements within the western water supply area and alternative sites on which to locate the required storage[61]. The outcome of this further reservoir optimisation work is the alternative reservoir layout now proposed in this application, being 25ML of storage located on the northern side of Woodlands Park Road and a further 25ML of storage located on the existing Huia WTP site once the existing plant has been decommissioned. While this option was less preferred from an operational perspective, it was ultimately selected as it was preferred from a sustainability viewpoint in that it would avoid the removal of the knoll and a number of

[61] Western Water Supply - Reservoir Storage. Prepared for Watercare Services Ltd by Beca Ltd, Feb. 2019.

significant native trees located along the northern side of Woodlands Park Road. The reservoir optimisation work also provided for Reservoir 1 to be almost fully buried resulting in significant landscape benefits.

9.6 Mana Whenua

Engagement with Māori is an important element of all of Watercare's work and their ties with local iwi form a valued partnership. Watercare recognises the importance of the values held by kaitiaki (guardians or protectors). These include their environmental and spiritual ties to ancestral lands, water, sites, waahi tapu (sacred areas) and other taonga (treasures), and the wellbeing of the entire iwi.

Watercare and Mana Whenua groups with interests in the Auckland region have established a Mana Whenua Kaitiaki Forum to enhance and develop the relationships between the parties. The Forum has agreed a process for engagement in projects initiated by Watercare. This process includes early notice of works to be undertaken by Watercare that may require a resource consent. A list of Watercare's projects is presented to each iwi to register their interest in particular projects within their rohe.

The Kaitiaki Schedule is regularly sent to the 19 tribal authorities in Tāmaki Makaurau. Representatives are invited to express interest in projects. Whether they choose to join the project team or just make comments, there is an opportunity for iwi input throughout the process of developing infrastructure.

Watercare has discussed the Huia replacement WTP project with Mana Whenua through its ana Whenua Kaitiaki Forum. Of the 19 Mana Whenua groups in the Forum, the following groups indicated that they had an interest in the Project:

- Te Kawerau a Maki
- Te Akitai
- Ngāti Whātua o Ōrākei

Of the mana whenua that expressed an interest in the Project, Te Kawerau a Maki is the only mana whenua who have indicated that they would prepare a MVA/CVA for the project. Te Kawerau a Maki has also undertaken a site visit. Te Akitai and Ngāi Whātua o Ōrāki have both requested that they continue to be informed as to the progress of the project.

Engagement with Mana Whenua will continue throughout the project lifecycle through the Mana Whenua Kaitiaki Forum, and particularly with Te Kawerau following completion of the CVA. Through this ongoing engagement and participation, Mana Whenua can determine their involvement in the project, and identify any opportunities and potential adverse cultural effects and measures to address these. Initial examples that have been discussed include the opportunity for cultural harvest of trees (provided this complies with the required kauri dieback hygiene protocols). There will also be opportunities 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.

9.7 Immediate neighbours

Watercare has met with the immediate neighbours (12 – 20 and 13 Manuka Road) on four occasions. At each of these, experts from the project have spoken to the neighbours and have answered questions. Shona Myers and Marlene Oliver, the independent consultants have also attended several of the meetings. It is understood that Marlene has provided the neighbours with independent planning advice.

In response to the concerns of neighbour, Watercare has agreed to erect retaining walls along the southern edge of the building platform rather than constructing earth batters. Watercare intends to continue to work with these neighbours to minimise the effects of construction and operation of the plant.

9.8 Auckland Council elected officials

Watercare has engaged directly with the Waitākere Ranges Local Board since the project's early conception. In addition to providing regular project updates, Watercare has given numerous presentations to the Local Board with the first update in October 2015 providing a general project overview.

Since the preferred site was selected in May 2017 there have been eight workshop presentations to the Local Board. On each occasion Watercare has provided an update on the project. In addition to the updates, the majority of presentations have included members of the project team, outlining the various technical investigations and responding to questions.

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.

Members of the Board regularly attend the CLG meetings.

The Mayor and Waitakere Ward Councillors Penny Hulse and Linda Cooper have also received regular updates on the project.

9.9 Auckland Council

9.9.1 Regulatory Services

Watercare has had ongoing pre-lodgement communications with the Auckland Council resource consent processing staff. Following early engagement with the then Major Infrastructure Team Planning Manager in 2015, a pre-application meeting was held on 24 July 2018 followed by site visits on 14 September 2018 and 30 January 2019.

In addition to these meetings, correspondence has been ongoing with Auckland Council resource consent processing staff. There has also been pre-lodgement discussions between the specialists engaged by Watercare for the project and their nominated counterparts at Council.

9.9.2 Other departments

Watercare has been in contact with and held regular meetings with the Auckland Council Parks department with a particular focus on discussing options and opportunities for appropriate mitigation measures within the Waitakere Ranges Regional Parkland that Auckland Council Parks administer. Several options were discussed, including planting out closed tracks and installing fish passages.

Meetings and other communication have also taken place with Auckland Council's Biosecurity department in regard to an appropriate kauri protocol for the site and potential mitigation methods, in particular compensation measures through the formation and operation of the proposed Trust. The last meeting included a Ministry of Primary Industries expert in this field. The input from this

team and Parks staff has helped develop both the Kauri dieback protocols proposed as well as the Trust documents.

Consultation with Auckland Council Healthy Waters has also been undertaken with a focus on confirming the approach and assumptions made in the stormwater design.

Watercare has also meet with the Council to discuss the possibility of incorporating the upgrade of the Woodlands Park Road and Scenic Drive intersection with the Council's intention of constructing a heritage gateway feature in this location to mark the entrance to the Waitakere Ranges.

9.10 Auckland Transport (AT)

Watercare has had numerous pre-lodgement discussions with AT to discuss the project. Pavement damage caused by HCVs was raised as a concern for AT, and AT requested a Pavement Impact Assessment (PIA) be undertaken. Watercare intends to include the requirement for a PIA through the OPW process, with the scope and extent to be agreed with AT.

Watercare has also met with AT to discuss the potential minor settlement of Woodlands Park Road due to groundwater drawdown. AT requested that the condition of the road be monitored during the works and remediated if required, and conditions of consent are proposed to ensure this is undertaken.

AT has had input into the development of the proposed haulage route for construction vehicles.

Watercare has also met with AT representatives to discuss upgrading the intersection of Scenic Drive and Woodlands Park Road. They indicated general support for the proposal, recognising the safety benefits the realignment would bring to the network, but would need more specific design information on the proposed layout.

9.11 Department of Conservation

A meeting with the Department of Conservation (DoC) and Watercare was held on 24 September 2018 at Watercare's Waikato Water Treatment Plant. The purpose of the meeting was to update DoC on the need for the project, summarise the site alternatives assessment that Watercare has undertaken, and present the key findings of the draft ecological assessment and compensation package that was in the process of being prepared.

In regard to Watercare's proposal to establish a trust to implement the ecological compensation package, DoC made the following comments:

- Professional input and guidance on pest management and coordination of work would be required to ensure biodiversity benefits are achieved.
- Needs to be a clear audit process (or some mechanism) to ensure biodiversity gains were being achieved.
- Watercare as consent holder would remain responsible for achieving the required biodiversity objectives and if they are not met would be accountable for non-compliance of consent conditions.
- DoC's key interest would be the performance measures/ targets stipulated in the consent conditions and certainty that the outcomes would be achieved.

DoC also provided further comments on a draft copy of the Ecological Assessment.

Watercare subsequently met DoC at the Project Site on 2 April 2019 for a site walkover, and provided further detail on the proposed compensation and design developments. A copy of the final Ecological Assessment will be provided to DoC and further engagement undertaken.

9.12 Public open days

Two open days have been held at the Huia WTP, with over 200 people attending (8 April and 9 April 2017). These were held during the MCA process to determine the preferred option. The purpose was to show the public a working water treatment plant and to allow the public to ask questions of the experts involved in the selection process. Feedback forms were provided and responses recorded.

Two drop-in sessions were also held at Lopdell House (a community building in Titirangi) to discuss the replacement WTP at the Manuka Road site and associated reservoirs to the north of Woodlands Park Road (1 March and 5 March 2018). Over 135 people attended these two sessions, the purpose of which was to inform the community about the project and to seek people's feedback on both the proposed Plant and potential mitigation measures, in particular those that were community orientated. Feedback forms were provided and responses recorded.

9.13 Watercare project website

Watercare has developed a stand-alone web page for the project[62]. The web page has received over 10,500 views. The page includes:

- The most relevant documents that detail the process from the initial determination that the existing Huia WTP needed replacing, through the long list and short list site alternatives process, to the project as currently proposed.
- An extensive collection of reports and videos of the site and the treatment plant with site information updated as it becomes available. One of the videos interviews members of the CLG in which they discuss their views of the process. The reports include the following:
    - Assessment of Ecological Values - Boffa Miskell (5 July 2018)
    - S. Myers Review of Huia Site Ecology Study (July 2018)
    - Geotechnical reports (1 – 10)
    - Next steps (February 2017)
    - Traffic technical note (May 2017)
- An extensive question and answer collection that is constantly updated as additional questions are asked and the process moves into another phase.
- 'How to guide' with regards to the regional consent and OPW processes.

The web page contains the most relevant documents that detail the process as the project develops, from the initial determination that the existing Huia WTP needed replacing, through the long list and short list site alternatives process, to the project as currently proposed.

The web page will be updated to include all of the technical reports and the Assessment of Environmental Effects allowing easy public access to information on the project and consent application.

9.14 Other consultation

Other consultation undertaken by Watercare includes:

[62] https://www.watercare.co.nz/About-us/Projects-around-Auckland/Huia-water-treatment-plant-replacement-Manuka-Road

- Direct Correspondence: Watercare has received over 1,600 emails to date regarding the project. All emails are replied to and where appropriate the answers have been added to the question and answer page on the website.
- Newsletters: Watercare has distributed four newsletters to Titirangi residents and the wider communities. These newsletters set out the project background and provide updates, along with details on how people can find out more and have their say. A fifth newsletter has been prepared covering the consent application and public notification process. A sixth newsletter is also been prepared which will cover the OPW process. These will be distributed to the local community immediately following consent lodgement.

9.15 Media

Regular press releases have been forwarded to the local newspapers, including the Western Leader and the Fringe.

10 Conclusion

The Huia WTP is the third largest water treatment plant in Auckland, treating approximately 20% of Auckland's water. It is a crucial component of Auckland's water supply network but is over 90 years old and is now nearing the end of its operational life. Watercare proposes to construct a new WTP to replace the aging Huia WTP, and two treated water reservoirs (50ML total capacity) to provide additional treated water storage within the western supply zone.

The proposal involves earthworks and vegetation removal, including in an SEA overlay, and stream works including the diversion and reclamation of a small length of intermittent stream. Resource consents are also sought for the diversion and discharge of groundwater and stormwater, development of new impervious areas, and the disturbance of potentially contaminated land. The removal of vegetation in an SEA to enable the construction and operation of infrastructure is a restricted discretionary activity in the AUP. However the stream reclamation and diversion is a non-complying activity, and the application is likely to fall for consideration overall as a non-complying activity.

Alternative locations to construct a replacement WTP and reservoirs were extensively considered and evaluated through a comprehensive and robust site alternatives assessment. To assess onsite alternatives, detailed site investigations were undertaken to determine technical and environmental constraints and opportunities, and to determine the most appropriate footprint for the replacement WTP and reservoirs taking these constraints into account. Ecological constraints in particular have been the primary determinant, with the footprint of the replacement WTP and reservoirs progressively relocated and reduced through an iterative site layout optimisation process aimed at avoiding adverse effects on the values of the SEA and permanent watercourses as far as practicable.

This AEE report draws the following conclusions:

- Construction of the project has the potential to give rise to a range of adverse environmental effects. This includes the removal of 3.5 ha of native vegetation within an SEA, resulting in a high level of ecological effects. Consistent with the mitigation hierarchy, where adverse effects cannot be avoided, then they have been remedied and mitigated. Residual effects will be addressed through a comprehensive ecological compensation package which is designed to achieve a net gain in ecological values.
- The actual and potential effects of the proposed works include significant positive effects, as the Project will ensure a quality potable water supply and resilient water supply infrastructure that will support the existing and future well-being of Auckland.
- The Project is assessed as being broadly consistent with the relevant objectives and policies of the AUP and finds support from the suite of RPS and Regional Plan objectives and policies that recognise the benefits of infrastructure; the value of investment in existing infrastructure; the need for resilient, efficient and effective infrastructure; and the functional and operational needs of infrastructure to locate in scheduled areas such as an SEA;
- The application meets the second limb of the 'gateway test' set out in section 104D of the RMA in that it is not contrary to the objectives and policies of the Regional Plan provisions of the AUP;
- Overall, it is considered that the proposed replacement WTP and reservoirs are in accordance with Part 2 of the RMA and promote the sustainable management of natural and physical resources;

Watercare requests that the resource consent applications be publicly notified. In accordance with section 95A(2)(a) and 95A(3)(a), public notification is therefore mandatory.

The key draft resource consent conditions proposed by Watercare are included in Appendix Q.

Appendix A: Certificates of Title (CTs)

Appendix B: Legal advice regarding resource consent and OPW process

Appendix C: WTP and Reservoirs Site Layout Development Report

Appendix D: Reservoirs storage, location and layout assessment

Appendix E: Indicative design drawings

Appendix F: Indicative Construction Methodology Report

Appendix G: Stormwater and Erosion and Sediment Control Report (Stormwater and ESC Report)

Appendix H: Groundwater and Settlement Report

Appendix I: Preliminary Land Stability Assessment

Appendix J: Preliminary Site Investigation (PSI)

Appendix K: Site Management Plan (SMP)

Appendix L: Ecological Assessment

Appendix M: Traffic and Transport Assessment

Appendix N: Construction Noise and Vibration Assessment

Appendix O: Permitted activity standards assessment

Appendix P: Objectives and policies assessment

Appendix Q: Proposed draft consent conditions

Appendix R: Draft Trust Deed

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