Grey Lynn Tunnel

Watercare Services Limited

Notice of Requirement, Resource Consent Application and Assessment of Environmental Effects

IZ027500-709-NP-RPT-001 | Final

February 2019

Grey Lynn Tunnel

Project No:	IZ0027500.709
Document Title:	Notice of Requirement, Resource Consent Application and Assessment of Environmental Effects
Document No.:	IZ027500-709-NP-RPT-001
Revision:	Final
Date:	February 2019
Client Name:	Watercare Services Limited
Project Manager:	Nigel Kay
Authors:	Amber Tsang and Tim Hegarty

Jacobs New Zealand Limited

Carlaw Park
12-16 Nicholls Lane, Parnell
Auckland 1010
PO Box 9806, Newmarket
Auckland 1149
New Zealand
T +64 9 928 5500
F +64 9 928 5501
www.jacobs.com

Document history and status

Revision	Date	Description	By	Review	Approved
1	31/1/2019	Draft issued to Watercare	T Hegarty A Tsang	K Sinclair	N Kay
2	15/2/2019	Revised draft issued to Watercare	A Tsang	T Hegarty	N Kay
3	21/2/2019	Final for lodgement	A Tsang	T Hegarty	N Kay

Contents

Glossary of Abbreviations **1**
Executive Summary **2**
1. Introduction and Project Overview **4**
1.1 Project Overview 4
1.1.1 Project Background 4
1.1.2 Summary of Tunnelling Work 5
1.1.3 Summary of Shaft Site 7
1.2 Project Objectives 7
1.3 Report Structure and Purpose 7
2. Notice of Requirement and Resource Consent Applications **9**
2.1 Overview 9
2.2 Existing Watercare Designation and Consents 9
2.3 Notice of Requirement 10
2.3.1 Purpose of Designation 10
2.3.2 Extent of Designation 10
2.3.3 Land within Designation 10
2.4 Applications for Resource Consents 11
2.5 Permitted Activities 11
2.6 Overall Activity Status 12
2.7 Land within Consent Corridor 12
2.8 Consent Duration 12
2.9 Lapse 12
2.10 Network Discharges 13
2.11 Other Consents and Approvals 13
2.11.1 Outline Plan of Works 13
2.11.2 Requiring Authority Approvals 13
2.11.3 Other approvals 13
3. Project Description and Construction Methodology **14**
3.1 Overview 14
3.2 Tunnel Corridor 14
3.2.1 May Road and Western Springs Construction Sites 14
3.3 Tawariki Street Shaft Site 14
3.3.1 Main Shaft 15
3.3.2 Tawariki Connection Sewer Shaft – Secondary Shaft 15
3.4 Construction Timeframes 16
3.5 Construction Methodology 16
3.5.1 Shaft Construction – Main Shaft 16
3.5.2 Chamber and Grit Trap Construction 17
3.5.3 Tunnel Construction 17
3.5.4 Dewatering 20
3.5.5 Surface Features 20

3.5.6 Secondary Shaft 20
3.5.7 Hours of Operation....20
4. Assessment of Alternatives....22
4.1 Introduction....22
4.2 Consideration of Alternative Solutions....22
4.3 Consideration of Alternative Sites....22
4.4 Summary....24
5. Description of Existing Environment....25
5.1 General Site Location and Land Uses....25
5.2 Zoning and Special Features....25
5.3 Surface Hydrology....27
5.4 Geology and Groundwater....29
5.5 Infrastructure and Services....30
5.6 Flora and Fauna....30
5.7 Archaeological and Cultural Heritage....30
5.8 Soil Contamination....30
5.9 Air Quality....31
5.10 Road Network....31
6. Assessment of Effects....32
6.1 Positive Effects....32
6.2 Visual and Landscape Effects....32
6.3 Vegetation Effects....33
6.4 Ecological Effects....33
6.5 Archaeological and Historic Heritage Effects....34
6.6 Mana Whenua and Cultural Heritage Effects....34
6.7 Traffic Effects....34
6.7.1 Construction Traffic Effects....34
6.7.2 Operational Traffic Effects....36
6.7.3 Summary....36
6.8 Noise Effects....36
6.8.1 Construction Noise Effects....36
6.8.2 Operational Noise Effects....39
6.8.3 Summary....39
6.9 Vibration Effects....39
6.9.1 Vibration Effects from Tunnel Excavation....40
6.9.2 Vibration Effects from Shaft Site Works....40
6.9.3 Vibration Mitigation....40
6.10 Groundwater and Settlement Effects....41
6.10.1 Groundwater Effects from Tunnel Excavation....41
6.10.2 Groundwater Effects from Shaft Construction....41
6.10.3 Settlement Effects from Tunnel Excavation....42
6.10.4 Settlement Effects from Shaft Construction....42

6.10.5 Effects of Settlements on Buildings and Services 42
6.10.6 Groundwater and Settlement Monitoring....42
6.11 Air Quality 42
6.11.1 Construction Air Quality Effects 42
6.11.2 Operational Air Quality Effects – Tunnel Ventilation 43
6.11.3 Operational Air Quality Effects – Grit Trap Cleaning 43
6.11.4 Summary 44
6.12 Contamination....44
6.13 Earthworks Effects 44
6.14 Conclusion 45
7. Consultation 46
7.1 Introduction 46
7.2 Auckland Council 46
7.2.1 Local Board....46
7.2.2 Healthy Waters 46
7.2.3 Regulatory Services 46
7.3 Mana Whenua....46
7.3.1 Kaitiaki Managers Project List and Interested Mana Whenua Groups 46
7.3.2 Mana Whenua Engagement Summary 47
7.4 Auckland Transport 48
7.5 Network Utilities 48
7.6 Private Landowners 48
7.7 Summary 48
8. Notification 49
8.1 Resource Consents....49
8.1.1 Public Notification (Section 95A)....49
8.1.2 Limited Notification (Section 95B)....50
8.2 Notice of Requirement....51
8.2.1 Public Notification (Section 149ZCB) 51
8.2.2 Limited Notification (Section 149ZCC) 52
8.3 Summary 52
9. Statutory Context 53
9.1 Actual and Potential Effects on the Environment (s104(1)(a)) 53
9.2 National Environmental Standard (s104(1)(b)(i))....53
9.3 Other Relevant Regulations (s104(1)(b)(ii)) 53
9.4 National Policy Statements (s104(1)(b)(iii))....53
9.5 New Zealand Coastal Policy Statement (s104(1)(b)iv)) 54
9.6 Regional Policy Statement or Proposed Regional Policy Statement (s104(1)(v))....54
9.7 Plan or Proposed Plan (s104(b)(iv))....55
9.8 Other Legislative and Planning Requirements (s104(1)(c)) 56
9.8.1 Auckland Plan 2050 56
9.8.2 Auckland Council 30 Year Infrastructure Strategy....56

9.9 Section 104C Assessment 56
9.10 Recommendation by a Territorial Authority (s171) 56
9.11 Part 2 Matters – Purpose and Principles (s5, 6, 7 & 8) 57
9.11.1 Section 5 Assessment 57
9.11.2 Section 6 Assessment 58
9.11.3 Section 7 Assessment 58
9.11.4 Section 8 Assessment 58
10. Conclusion 60

Appendix A. Land Requirement Plan
Appendix B. Certificates of Title
Appendix C. Schedule of Properties on Tunnel Route
Appendix D. Tunnel Long Section
Appendix E. Tawariki Street Shaft Site Layout Plans
Appendix F. Assessment of Alternatives Report
Appendix G. Assessment of AUP Objectives and Policies
Appendix H. Proposed Conditions
Appendix I. Ecological Assessment
Appendix J. Archaeological and Historic Heritage Assessment
Appendix K. Traffic Impact Assessment
Appendix L. Noise Assessment
Appendix M. Vibration Assessment
Appendix N. Groundwater Assessment
Appendix O. Settlement Assessment
Appendix P. Air Quality Assessment
Appendix Q. Contamination Report
Appendix R. Visual Impact and Landscape Assessment
Appendix S. Arborist Report
Appendix T. Healthy Waters Letter in Support
Appendix U. Flyer to Landowners

Glossary of Abbreviations

Abbreviation	Definition
AC	Auckland Council
AEE	Assessment of Effects on the Environment
AUP	Auckland Unitary Plan: Operative in Part
BPO	Best Practicable Option
CAR	Corridor Access Request
CCO	Council Controlled Organisation
CI	Central Interceptor
CNVMP	Construction Noise and Vibration Management Plan
CSO	Combined Sewer Overflow
CTMP	Construction Traffic Management Plan
DSI	Detailed Site Investigation
ECBF	East Coast Bays Formation
EOP	Engineered Overflow Point
EPB	Earth Pressure Balance
ESCP	Erosion and Sediment Control Plan
GSMCP	Groundwater and Settlement Monitoring and Contingency Plan
MCA	Multi Criteria Analysis
NDC	Network Discharge Consent
NES	National Environmental Standard
NoR	Notice of Requirement
NPS	National Policy Statement
OLFP	Overland Flow Path
OPW	Outline Plan of Works
PSI	Preliminary Site Investigation
RMA	Resource Management Act 1991
TBM	Tunnel Boring Machine
TGA	Tauranga Group Alluvium
Watercare	Watercare Services Ltd
WWOs	Wet Weather Overflows
WWTP	Wastewater Treatment Plant

Executive Summary

Watercare Services Limited (Watercare) is the water and wastewater service provider for Auckland and is a Council Controlled Organisation (CCO) owned by Auckland Council. Watercare is proposing to construct a wastewater interceptor, known as the Grey Lynn Tunnel, from Tawariki Street, Grey Lynn, to Western Springs (the 'Project'). It will connect to the Central Interceptor (CI) at Western Springs.

The Project objectives are:

- To provide additional sewer network capacity for growth and development across the Auckland Isthmus;
- To reduce current wet weather wastewater overflow discharges, improving public health and environmental conditions; and
- To enable future works to further improve fresh water quality for the Grey Lynn catchment (a sub-catchment of the Cox's Bay catchment).

The Project will connect to the existing Tawariki Local Sewer and Orakei Main Sewer. To make these connections, a drop shaft and connection works are required at the proposed shaft site at 44-48 Tawariki Street, Grey Lynn (the 'Tawariki Street Shaft Site'). A secondary shaft at that site is also proposed to enable further collector sewer connections at a later date. Resource consents are not being sought for these future connections as part of this Project.

The Project will provide for additional wastewater network capacity and assist in reducing the volume and frequency of wet weather overflows (WWOs) in the Cox's Bay catchment. In particular, the Project will address a key overflow (engineered overflow points (EOP) 244B and D) at Tawariki Street which discharges into Cox's Creek.

The Project will also allow for added capacity across the wider wastewater network, as flows from the Orakei Main Sewer will be diverted to the CI. This will free up capacity in existing wastewater network infrastructure and directly benefits downstream areas, such as the Central Business District and Freemans Bay, allowing for urban intensification and the addition of more housing and business capacity without the need for replacement of existing infrastructure. Furthermore, The Project will perform an enabling function for future works by providing conveyance and storage capacity to collect dry and wet weather wastewater volumes, through future works, from Grey Lynn and the waterfront catchments.

This Assessment of Environmental Effects (AEE) has been prepared to support the Notice of Requirement (NoR) and resource consent applications for the Project. Watercare is lodging an NoR to designate the proposed shaft site at Tawariki Street. Several regional resource consents are also sought for the underground tunnel and construction works at the shaft site.

The Project has been developed to a concept design stage. While the layouts and dimensions provided in the AEE and drawings are approximate, the designs represent an appropriate basis for assessing the potential effects arising from construction, operation and maintenance of the Project. It is proposed to follow this NoR and resource consent application with an Outline Plan of Works once detailed design has been undertaken.

The Project is not expected to adversely affect any archaeological, heritage, landscape and ecological features. No buildings or services, groundwater users or groundwater quality, are predicted to be adversely affected, due to the tunnel and shaft excavation.

During the construction works, there will be adverse visual, traffic, noise and vibration effects within the immediate vicinity of the shaft site. These will generally be of a temporary and no more than minor nature and/or can be mitigated with appropriate construction management. Once completed, the Project and associated structures will be predominantly underground, while the shaft site will be reinstated in an appropriate manner. The adverse effects of the ongoing operation and maintenance are expected to be less than minor.

A statutory assessment forms part of this AEE and confirms that the Project is consistent with the relevant objectives and policies of the Auckland Unitary Plan: Operative in Part (AUP). The statutory assessment also

confirms that the Project is consistent with the statutory considerations contained in sections 104 (for the resource consents) and 171 (for the NoR) and the purpose of the Resource Management Act 1991 (RMA).

Overall, the Project will have positive effects by reducing the volume and frequency of WWOs, and while there will be some adverse effects (primarily during construction of the Project) these can be adequately mitigated through appropriate design and management.

1. Introduction and Project Overview

Watercare is the water and wastewater service provided for Auckland and is a CCO of Auckland Council. Watercare is proposing to construct a wastewater interceptor, known as the Grey Lynn Tunnel, from Tawariki Street, Grey Lynn to Western Springs (the 'Project'). It will connect to CI at Western Springs. The Project will provide for additional wastewater network capacity and assist in reducing the volume and frequency of WWOs in the Cox's Bay catchment.

This AEE has been prepared to support the NoR and recourse consent applications for the Project. An NoR is lodged to designate the shaft site at 44-48 Tawariki Street, Grey Lynn. A suite of regional resource consents is also sought for the underground tunnel and construction works at the shaft site.

The AEE is prepared in accordance with the requirements of the RMA, particularly the Fourth Schedule, in such detail that corresponds with the scale and significance of the effects that the project may have on the environment.

1.1 Project Overview

1.1.1 Project Background

The Project is a component of Watercare's wider regional wastewater strategy, which started development in 2004 and was published as the Three Waters Plan in 2008. The Project is located within Grey Lynn catchment which is a sub-catchment of the Cox's Bay catchment.

A regional wastewater strategy for Auckland was developed as part of the Three Waters Plan between 2004 and 2008. The wastewater planning component of the Three Waters Plan included extensive consideration of options for addressing the region's trunk wastewater issues for the next 50 years. In summary, the Three Waters Plan confirmed the immediate need for the Auckland region was to:

- duplicate the critical section of the Western Interceptor and reduce the risk of trunk sewer failures due to ageing parts of the network;
- provide capacity for the future growth of the Auckland region; and
- mitigate combined sewer overflows and reduce untreated wastewater discharges from the wastewater network to the environment.

CI, comprising a tunnel from Western Springs to the Mangere Wastewater Treatment Plant, was identified as the preferred solution to address these needs. Watercare has obtained resource consents for CI and proposes to commence construction in 2019.

At the time CI was consented, Watercare identified that one of its benefits was that it enabled the possible future addition of a tunnel to address additional overflows in the Grey Lynn/Cox's Bay, Herne Bay, St Mary's Bay and Freeman's Bay areas.

Several studies and reports have considered network options in the Cox's Bay/Grey Lynn catchments. In summary, these are:

- *Capital Investment Plan Report – Grey Lynn*, Maunsell, 2009;
- *Options Assessment Report – Grey Lynn Wastewater Strategy*, Aurecon, 2011;
- *Waterfront Interceptor – Concept Development and Feasibility Study*, CH2M and Beca, 2014;
- *Draft Central Auckland Network Optimisation Programme, Grey Lynn Catchment Options Report*, prepared for Watercare and Auckland Council (CANOPy) by AECOM, June 2017;

- *Central Auckland Network Optimisation Programme, Central Interceptor Extension High Level Options Assessment*, prepared for Watercare and Auckland Council (CANOPy) by AECOM, Jacobs, and McMillen Jacobs Associates, June 2017.

The concept of the Waterfront Interceptor, as a 3.5 km, 3.5 m diameter tunnel from Western Springs to Pt Erin Park, was confirmed as feasible in the 2014 CH2M/Beca report. This concept was refined through Project CANOPy, a joint initiative between Auckland Council Healthy Waters and Watercare.

Project CANOPy considered a range of options for addressing wastewater overflows in ten separate wastewater catchments, including the Grey Lynn catchment. In each of the catchments, all the optimal solutions identified a tunnel between Western Springs and Grey Lynn as the best enabling works for further wider catchment solutions.

Watercare and Auckland Council reported to Auckland Council's Environment and Community Committee in October 2017. At that meeting the Committee resolved[1] to approve that Option Three, the Western Isthmus Water Quality Improvement Programme (WIWQIP), be considered part of the Long-term Plan 2018-2028, specifically recommending that the programme include the construction of a new tunnel from the termination point of the CI tunnel at Western Springs through to Grey Lynn, as well as providing investment to increase wastewater capacity for growth and to reduce WWOs, to improve stormwater management, and to separate private combined systems where appropriate.

The Project will assist in reducing the volume and frequency of WWOs in the Cox's Bay catchment and perform an enabling function for future works by providing conveyance and storage capacity to collect dry and wet weather wastewater volumes, through future works, from Grey Lynn and the waterfront catchments.

More specifically, the Project will address a key overflow (EOP 244B and D) at Tawariki Street which discharges into Cox's Creek. The drop shaft and connection works proposed at the Tawariki Street Shaft Site will enable the existing Tawariki Local Sewer and Orakei Main Sewer (including flows from the existing EOP 244B and D) connecting directly into the proposed tunnel, with flows being diverted to the CI. A secondary shaft at the shaft site will enable further collector sewer connections at a later date.

Further investigation and the development of options for further works to address water quality issues in the Auckland Isthmus is also ongoing.

1.1.2 Summary of Tunnelling Work

The Project involves construction, operation and maintenance of a 1.6km gravity tunnel between Tawariki Street, Grey Lynn and Western Springs with a 4.5m internal diameter, at an approximate depth of between 15 to 62m below ground surface, depending on local topography. The proposed alignment of the tunnel is illustrated in Figure 1.1 below. The tunnel will be constructed northwards from Western Springs using a Tunnel Boring Machine (TBM) launched at the May Road construction site.

The May Road construction site is located at 54 Roma Road, Mt Roskill and the Western Springs construction site is located within Western Springs Reserve at 731 Great North Road, Grey Lynn. Both sites are subject to Watercare's existing designation (ref: 9466) for the construction, operation and maintenance of wastewater infrastructure, with necessary regional resource consents granted for the associated construction activities.

[1] Resolution number ENV/2017/140

Figure 1.1 – Proposed Tunnel Alignment (in Green)

Until the detailed design of the Project has been completed, the final alignment for the tunnel will not be confirmed. Accordingly, resource consent is being sought for a corridor within which the tunnel will be finally located. Horizontally, the tunnel will be located within a 40m wide corridor centred on the alignment (i.e. 20 m either side of the tunnel centreline). Vertically, the tunnel will be located within a corridor of -2m/+2m based on the centreline and tunnel invert level (i.e. the bottom of the internal cross section of the tunnel). The final level of the tunnel will be determined by the geological conditions along the alignment and the selected construction method.

The Project has been developed to a concept design stage and it is likely that some design and construction details will change as the Project is optimised in the detailed design and construction stages. While the layouts and dimensions provided in the AEE and drawings are approximate, the designs represent an appropriate basis for assessing the potential effects arising from construction, operation and maintenance of the Project.

1.1.3 Summary of Shaft Site

The Project involves construction, operation and maintenance of two shafts and associated structures at Tawariki Street, Grey Lynn.

The shaft site will be located at 44-48 Tawariki Street where surface construction works will take place. Construction works will also take place within the road reserve at the eastern end of Tawariki Street and a small area of school land (St Paul's College) bordering the end of Tawariki Street (approximately 150m^2 of the school grounds).

Two shafts will be constructed at the shaft site. The main shaft will be excavated to a depth of 25m and will provide access to the TBM and for diversion works on the Tawariki Local Sewer and Orakei Main Sewer. A second 25m deep shaft will be constructed at a later date (subject to need), but within a 10-year period following construction of the main shaft and tunnel, to enable further collector sewer connections. There is sufficient land within the shaft site for the two shafts and associated structures.

Construction activities at the shaft site will include removal of existing buildings and vegetation, earthworks, relocation of services, establishment of site access, construction yards and lay down areas, traffic management, construction of the physical works, commissioning and site reinstatement.

Further detail of the project works is provided in Section 3 of this report.

1.2 Project Objectives

The project objectives are:

- To provide additional sewer network capacity for growth and development across the Auckland Isthmus;
- To reduce current wet weather wastewater overflow discharges, improving public health and environmental conditions; and
- To enable future works to further improve fresh water quality for the Grey Lynn catchment.

The proposed work and designation are reasonably necessary for achieving these objectives because:

- The proposed work is the most effective and efficient way in which to meet the objectives set out above;
- The proposed work will enable Watercare to comply with the statutory purpose of the RMA to promote the sustainable management of natural and physical resources;
- The proposed work will enable Watercare to provide wastewater services that are economically viable, environmentally sound, socially responsible and responsive to customer needs;
- The designation allows Watercare and/or its authorised agents to undertake works in accordance with the designation;
- The designation enables the proposed works to be undertaken in a comprehensive and integrated manner; and
- The designation protects the sites from future incompatible development which may preclude or put at risk the construction and/or operation of the proposed works.

1.3 Report Structure and Purpose

The purpose of this AEE report is to describe the Project, the alternatives considered, the consultation undertaken and the potential effects arising from the works. The report also assesses the Project and its potential effects against the relevant statutory documents.

The report has been prepared in accordance with the relevant provisions of the RMA and provides information in support of the NoR and resource consent applications. The scope of the NoR and resource consents sought are set out in detail in Section 2 of this report.

The AEE includes a description of the proposed works, the potential construction methods, the shaft site and related activities, an assessment of effects on the environment, and consideration of the proposed works against the relevant statutory provisions. A set of project drawings and a range of technical reports in support of the NoR and resource consent applications are also included.

2. Notice of Requirement and Resource Consent Applications

2.1 Overview

Watercare is a requiring authority pursuant to s167 of the RMA. Watercare proposes to designate land for the Project in accordance with s168 of the RMA and also requires regional resource consents for some of those works. The scope of the NoR and resource consents sought for the Project are outlined below.

2.2 Existing Watercare Designation and Consents

CI was approved in 2012, with designation (ref: 9466) established for 19 construction sites (including the May Road and Western Springs construction site) and resource consents[2] granted for the associated construction activities.

As discussed in Section 1.1.2 above, the Project will be constructed northwards from Western Springs Reserve using a TBM launched at the May Road construction site. Works at the May Road and Western Springs construction sites are authorised by Watercare's existing designation (ref: 9466) for construction, operation and maintenance of wastewater infrastructure and existing regional resource consents.

The Project requires no aboveground works at the Western Springs construction site.

For works required at the May Road construction site, the project is consistent with the designation purpose of Designation 9466 and will comply with the relevant designation and consent conditions. As such, no alteration to the existing designation conditions, nor any new resource consents, are required. The construction period at this site, though slightly longer than that envisaged at the time CI was processed and approved, will be in "general accordance" with the designation and existing consents, as the effects will not be materially different to those considered in the application material and evidence presented for the CI.

It is noted that the effects of CI were assessed with the potential for the entire CI to be driven from the May Road construction site. However, it is now confirmed that the southern leg of CI will be driven from Mangere. As such, the amount of spoil removed from the May Road construction site and associated track movements, including those required for the Project, would be less than what was originally anticipated and assessed.

The Project will increase the construction period at the May Road construction site by approximately 4 months. More specifically, the tunnelling work for the Project will increase the duration, but not intensity, of the following activities at the site:

- Spoil storage and removal – Earthworks relating to spoil storage and removal at the site will not exceed 2500m^3 and 2500m^2 at any one time and are permitted activities (E26.5.3.1 (A95-96) of the AUP);
- Truck movements for spoil removal, delivery of precast concrete tunnel segments and other materials – the designation conditions relating to truck movement hours and traffic management will be complied with; and
- Noise generation from tunnelling operation i.e. (24-hours a day 7-days a week) – tunnelling noise levels will comply with the permitted construction noise level (E25.6.27 of the AUP) and are permitted activities as assessed in the Noise Impact Assessment by Marshall Day Acoustics as part of the CI application.

As such, no further assessment of these activities is required to form part of this AEE. No alteration to the existing CI consents and designation conditions is proposed.

[2] R/LUC/2012/2846, R/LUC/2012/2846/1, PRC40962, PRC40963, 40834, 40835, 40836, 40837, 40838, 40839, 40840, 40841, 40842, 40843, 40844, 40845, 40846, 40848, 40849 and 40850

2.3 Notice of Requirement

2.3.1 Purpose of Designation

Watercare proposes to designate the shaft site at Tawariki Street, Grey Lynn. The purpose of the designation is for "the construction, operation, and maintenance of wastewater infrastructure". The activities to be authorised by the designation are described in Section 3 of this report.

2.3.2 Extent of Designation

The physical extent of the proposed designation is shown on the Land Requirement Plan included in Appendix A. The designation includes permanent works as well as temporary construction works. Vertically, the designation will extend to include works both above and below ground.

The designation area for the construction phase of the project allows for the following:

- Demolition and removal of the existing structures and utility connections;
- Earthworks and vegetation clearance;
- Refinements to the site layout, alignment and design as a result of the detailed design process;
- Changes in site layout and alignment required during construction – e.g. the discovery of otherwise unknown services or other underground features, or unexpected ground conditions;
- Accommodation of all of the permanent physical works including sewer connections, shafts, connection and control chambers etc;
- Services relocation, temporary traffic management and all associated construction activities;
- Temporary construction access; and
- Site establishment activities, including storage of plant, equipment and materials; crane set-up; site offices; erosion and sediment control; dewatering and groundwater treatment facilities; machinery working and safety areas; and temporary diversion of pedestrian and vehicular access.

On completion of construction, the extent of the designation will be reviewed. Areas of the designation not required for permanent works, inspection, or maintenance activities will be removed (i.e. the road reserve) where it is reasonable to do so under s182 of the RMA.

2.3.3 Land within Designation

In summary, the proposed designation directly affects the following land:

Address	Legal Description	Land Area
44 Tawariki Street	Lot 38 DP 38075	561m^2
46 Tawariki Street	Lot 39 DP 38075	561m^2
48 Tawariki Street	Lot 40 DP 38075	470m^2
183 Richmond Road (St Paul's College)	Lot 3 DP 17191	Approx. 150m^2 of 5.66ha
Tawariki Street	Road reserve	Approx. 250m^2

Table 2.1 – Properties within Designation

A copy of the Certificate of Title of these properties are included in Appendix B. No other properties are located within the proposed designation.

2.4 Applications for Resource Consents

Resource consents are required from Auckland Council for the construction activities required for the Project. A list of the consent triggers identified in the relevant AUP rules is included in Table 2.2 below. The following rules are not subject to any outstanding appeals and hence are operative under the AUP. These provisions supersede any relevant rules within the legacy plans (with those legacy rules being no longer operative).

For the avoidance of doubt, Watercare seeks all necessary resource consents required under the AUP.

Consent Type	Activity	RMA Ref	Rule	Activity Status	Duration	Comments
Water permit	The diversion of groundwater caused by any excavation, (including trench) or tunnel that does not meet the permitted activity standards or not otherwise listed	s14	E7.4.1 (A28)	Restricted Discretionary	Construction and operational	The diversion of groundwater caused by the tunnel and shaft excavation will not meet permitted activity standards E7.6.10 (2) and (5) as the proposed excavation will extend below natural groundwater level and will exceed 6m depth below the natural ground level. The shaft excavation (25m deep) will be within 25m to an existing building on 42 Tawariki Street.
	Dewatering or groundwater level control associated with a groundwater diversion authorised as a restricted discretionary activity under the Unitary Plan, not meeting permitted activity standards or is not otherwise listed	s14	E7.4.1 (A20)	Restricted Discretionary	Construction only	There will be dewatering associated with the diversion of groundwater caused by the tunnel and shaft excavation as stated above and during construction only.
Land use consent	Earthworks in association with a network utility from 10m^2 to 2500m^2 and from 5m^3 to 2500m^3 within a Special Character Areas overlay	s9(3)	E26.6.3.1 (A117)	Restricted Discretionary	Construction only	The tunnel excavation will involve earthworks of more than 10m^2 and 5m^3 (but less than 2500m^2 and 2500m^3) and will pass beneath the Special Character Areas – Residential Isthmus A Overlay.

Table 2.2 – Relevant AUP Rules

2.5 Permitted Activities

Table 2.3 outlines the construction and operational activities of the Project that are provided for under the AUP as permitted activities.

Activity	Rule	Provision	Activity Status/Comments
Wastewater infrastructure	E26.2.3.1 (A49)	Underground pipelines and ancillary structures for the conveyance of water, wastewater and stormwater (including above	**Permitted**

Activity	Rule	Provision	Activity Status/Comments
		ground ancillary structures associated with underground pipelines)	Construction of the tunnel and ancillary structures is provided for as a permitted activity.
	E26.2.3.1 (A57)	Ventilation facilities, drop shafts and manholes	**Permitted** Construction of the proposed shafts is provided for as a permitted activity.
Earthworks for infrastructure and network utilities	E26.5.3.2 (A95/A96)	Earthworks up to 2500m^2/2500m^3 other than for maintenance, repair, renewal, minor infrastructure upgrading in all zones complying with standards E26.5.5.2	**Permitted** The 2500m^2 and 2500m^3 thresholds apply to the area and volume of work being undertaken at any one time at a particular location. As the construction methodology enables the progressive closure and stabilisation of the tunnel and shaft excavation can meet the permitted activity threshold.
Air discharge	E14.4.1 (A166)	Wastewater facility that is for the primary purpose of pumping or transfer or storage of raw or partially treated wastewater	**Permitted** As concluded in the Air Quality Assessment (Appendix P), the air discharge associated with the Project will meet the relevant permitted activity standards in E14.6.1.1.

Table 2.3 – Permitted Activities and Relevant AUP Rules

As wastewater infrastructure (i.e. the Grey Lynn Tunnel and ancillary structures) is a permitted activity under the AUP and a designation is proposed at the Tawariki Street Shaft Site, the district plan rules of the AUP are not relevant to determining resource consent requirements. However, they are noted because the zoning and relevant provisions indicate the type of activity expected to occur at the Site. Removal or demolition of non-scheduled buildings in the Residential – Mixed Housing Urban Zone is permitted under the AUP. Removal of non-scheduled trees in the Residential – Mixed Housing Urban and Special Purpose – School Zones is also permitted. In addition, a maximum building height of 8m with a roof height up to 9m is permitted in the Residential – Mixed Housing Urban Zone.

No consent is required under Chapter E36 of the AUP (i.e. infrastructure in floodplains and overland flow paths) as the proposed tunnel will be underground and is not located within a floodplain or an overland flow path, which are surface features.

2.6 Overall Activity Status

Overall, the resource consents required for the Project fall to be assessed as a restricted discretionary activity under sections 104 and 104C of the RMA.

2.7 Land within Consent Corridor

A schedule of properties within the 40 m horizontal corridor that the Project will be passing beneath, for which resource consents are sought, is included in Appendix C.

2.8 Consent Duration

Given the operational requirements associated with groundwater diversion, Watercare requests that the maximum duration of 35 years is applied to this consent. Both the scale of effects (as discussed in Section 6 of this AEE) and the proposed conditions (Appendix H) demonstrate that a 35-year duration is appropriate.

2.9 Lapse

The following lapse dates are sought:

- Designation – 10 years from inclusion in the AUP, in accordance with section 184(1) of the RMA and
- Resource consents – 10 years from the date on which the resource consents are granted.

2.10 Network Discharges

As discussed above, the scope of the NoR and resource consents sought for the Project is for the construction, operation, and maintenance of the proposed tunnel, drop shafts and chambers. The ongoing discharges from the network are addressed separately by the Comprehensive Wastewater Network Discharge Consent (NDC) held by Watercare. No consents are being sought for network discharges as part of this Project.

2.11 Other Consents and Approvals

2.11.1 Outline Plan of Works

Section 176A of the RMA requires the submission of an Outline Plan of Work (OPW) and sets out the requirements for submission of an OPW for works to be constructed on designated land. However, an OPW is not required where a project has been otherwise approved under the RMA (i.e. permitted under the AUP or approved resource consents), the relevant designation includes detailed design, or the relevant territorial authority waives the requirement.

OPWs will be prepared for the Project as required and in accordance with s176A(3) of the RMA, prior to the commencement of construction.

2.11.2 Requiring Authority Approvals

The shaft site is not subject to any designations of other Requiring Authorities. Other designations above the tunnel alignment (over land in the 40 m horizontal corridor that the tunnel will be passing beneath) are:

AUP Reference	Description	Comment
ID3300	Broadcasting and telecommunications facility – Kordia NZ	This designation is unaffected given its height above ground level. It is a communications transmission corridor between the Sky Tower and Scenic Drive, Titirangi.
ID518	Car Park – Auckland Council	This designation is unaffected as no above ground work is proposed at this site.

Figure 2.4 – Existing Designations

These designations are not affected by the Project.

2.11.3 Other approvals

Some project works are expected to occur in the road reserve. Corridor Access Request (CAR) approvals will be required from Auckland Transport for these works.

Other approvals or agreements are, or may be, required under the Public Works Act 1981 and Building Act 2004. Any required processes under these Acts will occur in parallel with the statutory processes under the RMA or at a later date as appropriate. Watercare will follow the process under the Local Government Act 2002 for undertaking works on private land.

Given that no known archaeological sites are expected to be affected by the project works and it is unlikely that any undetected sites are present (refer to Archaeological and Historic Heritage Assessment in Appendix J), an archaeological authority is not required.

3. Project Description and Construction Methodology

3.1 Overview

The Project involves the construction, commissioning, operation and maintenance of a wastewater interceptor and associated activities. As described in Section 1 above, the Project can be broken into two distinct parts:

- The tunnel corridor; and
- The Tawariki Street Shaft Site.

These elements are described in detail below.

The Project has been developed to a concept design stage. As it moves through the detailed design process and as construction methodology is confirmed, it is likely that some details will change. All figures and dimensions provided are approximate and will be confirmed during the detailed design and processes.

3.2 Tunnel Corridor

The tunnel will run for a length of 1.6km, from Western Springs to Tawariki Street, Grey Lynn. The tunnel will be situated between 15 and 62m below ground level, depending on existing topography, gently rising to its terminus at Tawariki Street.

It will have an internal diameter of 4.5m and will be lined with concrete panels to avoid seepage of wastewater into surrounding geological strata. Given the tunnel design, it will not require any pump stations or vents between Tawariki Street and Western Springs, resulting in a structure which is entirely contained underground.

It will be constructed northwards from Western Springs using a TBM launched at the May Road construction site. The tunnel will connect to the CI at Western Springs. At the Grey Lynn end, the tunnel will connect to the existing Tawariki Local Sewer and the Orakei Main Sewer to increase the wastewater network capacity and capture WWOs.

To allow for future design optimisations and flexibility, the final location of the tunnel is to be within a 40m wide corridor, centred on the alignment shown in Figure 1-1 (i.e. within 20 m either side of the centre-line shown). Vertically, the tunnel will be located within a corridor of -2m/+2m based on the centreline and tunnel invert level (refer to the long section of the tunnel in Appendix D). The final level of the Tunnel will be determined by the geological conditions along the alignment, the selected construction method, and the required hydraulic grade.

3.2.1 May Road and Western Springs Construction Sites

Aboveground works at the May Road construction site associated with the Project will include storage and removal of spoil discharging from the TBM, and truck movements for spoil removal, delivery of precast concrete tunnel segments and other materials. Tunnel segments will be stored on site, but the manufacture and bulk storage of segments will be at a suitable off-site facility. As noted in the Section 2.2.3 above, these activities are permitted by Watercare's existing designation and resource consents.

No aboveground works associated with the Project will be required at the Western Springs construction site.

3.3 Tawariki Street Shaft Site

The Project also involves construction, operation and maintenance of two shafts and associated structures at the shaft site at Tawariki Street. The shaft site will be located at 44-48 Tawariki Street where the majority of the construction works will take place. Construction works will also take place within the road reserve at the eastern end of Tawariki Street and a small area of school land (St Paul's College) broadening the end of Tawariki Street (approximately 150m^2). The shaft site will be the most visible portion of the Project, given surface works and permanent use of the site for wastewater purposes. Plans of the site are provided in Appendix E.

Construction at the shaft site will commence with site establishment works which generally involve the following activities:

- Removal or demolition of three existing residential dwellings;
- Vegetation removal;
- Services relocations;
- Site levelling and drainage works;
- Establishment of erosion and sediment control measures;
- Formation of construction access;
- Establishment of site buildings and services; and
- Construction of site perimeter fencing and noise mitigation barriers.

Following the site establishment works, the following components will be constructed:

3.3.1 Main Shaft

- A 25m deep shaft, with an internal diameter of approximately 10.8m, to drop flow from the existing sewers into the tunnel;
- Diversion of the Tawariki Local Sewer to a chamber to the north of the shaft. This chamber will be approximately 12m long, 5m wide and 5m deep below ground, and will connect to the shaft via a trenched sewer;
- Diversion of the Orakei Main Sewer to a chamber to the south of the shaft. This chamber will be approximately 10m long, 5m wide and 11m deep below ground;
- Construction of a stub pipe on the western edge of the shaft to enable future connections (that are not part of this proposal) from the Combined Sewers Overflows (CSO) network;
- Construction of a grit trap within the property at 48 Tawariki Street to replace the existing grit trap located within the Tawariki Street road reserve. The replacement grit trap will be approximately 16m long, 5m wide and 13m deep below ground;
- Permanent retaining of the bank at the end of Tawariki Street to enable the construction of the chamber for the Orakei Main Sewer. This is required given the difference in elevation between the shaft site and the neighbouring fields at St Paul's College. The area of the bank requiring retaining will be approximately 44m long, 3m wide and 2m high; and
- An above ground plant and ventilation building that is approximately 14m long, 6m wide and 4m high. An air vent in a form of a 5m stack (total height) will be incorporated into the plant and ventilation building and discharge air vertically via a roof vent. The vent stack will be designed with a flange to allow future extension of up to 8m in total height and approximately 1m in diameter in the unexpected event of odour issues.

At the completion of works, the site will be reinstated with a mix of concrete hardstand and trafficable, grassed surface with landscape planting.

3.3.2 Tawariki Connection Sewer Shaft – Secondary Shaft

A secondary shaft will be constructed at the shaft site to enable the connection of future sewers (that are not part of this proposal) from the CSO network. This will involve the following components:

- A 25m deep drop shaft with an internal diameter of approximately 10.2m; and
- A sewer pipe constructed by pipe-jacking to connect the secondary shaft to the main shaft.

3.4 Construction Timeframes

The construction works for the main shaft, chambers and tunnel will occur at the same time as works for the CI. Construction is programmed to start in 2022 and will continue for up to 2.5 years.

The construction of the main shaft and chambers is estimated to take approximately 12 months initially, followed by a hiatus of several months due to the time taken for the TBM to arrive at the shaft site. This will be followed by approximately 9 months of activity to remove the TBM and complete the internal structure of the main shaft.

The secondary shaft will be constructed in conjunction with the future local sewers at a later date but within a 10-year period following construction of the main shaft and tunnel. The timing of the second shaft's construction will be subject to local network requirements. The construction period for the secondary shaft and future sewer connections is estimated to require a further two years.

3.5 Construction Methodology

A range of construction methods will be employed, depending on the location of works and final structures required. Each of these methods is described below.

3.5.1 Shaft Construction – Main Shaft

A shaft is required at the termination of the tunnel to retrieve the TBM. On completion of the shaft and tunnel excavations, the shaft will be fitted out to form the permanent lined shaft for a sewer drop.

The shaft will be approximately 26-27m excavated depth. The finished shaft invert will be approximately 25m deep. The shaft diameter will be approximately 12m excavated for TBM retrieval, and 10.8m finished inside diameter for the final drop structure.

Up to two cranes may be required on site at any one time. The crane for the shaft construction will be a typical crawler crane, which is a 120t crane, 7x5m footprint with extended belts. The crane for the TBM recovery will be a 450t crane, 16x9m footprint with extended outriggers.

The shaft will be excavated by conventional mechanical equipment (e.g. CAT 330 medium hydraulics excavator or similar) through overburden soils and East Coast Bay Formation ("ECBF") bedrock. The overburden soils and completely weathered ECBF are anticipated to be approximately 8m to 10m thick. These conditions will require the excavation support system to consist of either secant piles, sheet piles, ring beams with lagging, steel liner plate, precast segmental rings, caisson or similar, and will be designed to be near-watertight to limit groundwater drawdown.

An example of a secant pile and rock mesh supported shaft is shown in

Figure **3.1**.

In weathered to fresh ECBF bedrock, excavation support is anticipated to consist of a combination of rock bolts, steel mesh, and/or shotcrete, depending on ground conditions.

Figure 3.1 – Shaft Supported by Secant Piles in Soil and Mesh in ECBF Rock

Blasting will not be used for construction of either shaft.

Permanent lining and interior shaft structures are required to form the hydraulic sewer drop, provide ventilation, and facilitate future access for inspection and maintenance. The shaft lining and interior structures will be constructed of either cast-in-situ concrete, precast concrete, and potentially of other corrosion resistant materials.

3.5.2 Chamber and Grit Trap Construction

Two underground chambers and a grit trap will be accommodated at the shaft site, connecting the Tawariki Local Sewer and Orakei Main Sewer. The chambers will be fitted with penstocks to control the flow from the sewers into the tunnel while the grit trap is designed to prevent grit in the sewer from entering the tunnel.

The shallow chamber (i.e. the chamber for the Tawariki Local Sewer at 4m deep underground) will be constructed using typical earthwork equipment and temporary retaining. The construction of the deep chamber (i.e. the chamber for the Orakei Main Sewer at 12m deep underground) and the grit trap will employ similar construction methods as the shaft. The chambers and grit trap will be constructed from either pre-cast or cast-in-situ concrete.

3.5.3 Tunnel Construction

A TBM similar to what will be used to excavate and line the CI is shown in Figure 3.2 below. As the TBM specified for the CI will be used to construct the Project, the tunnel drive direction will be from the Western Springs site and will terminate at the Tawariki shaft.

Figure 3.2 – Example of a TBM

Excavation of the tunnel will be undertaken using a pressurised face TBM, specifically an Earth Pressure Balance ("EPB") TBM, to manage risks associated with ground conditions and to limit impacts on groundwater. This type of machine has been successfully used in Auckland in similar ground conditions on Project Hobson, the replacement of the Rosedale Wastewater Treatment Plant Outfall and the Waterview Connection.

Pressurised face TBMs are used where control of the face is desirable because of face instabilities and high groundwater pressures. Pressurized face techniques are preferred as they address worker safety, minimise groundwater inflow/drawdown, and mitigate settlement.

Spoil is discharged from the screw through a closable guillotine door into spoil cars or onto conveyors, to be removed to an off-site location. A schematic diagram of an EPB TBM is shown in

Figure .3 below.

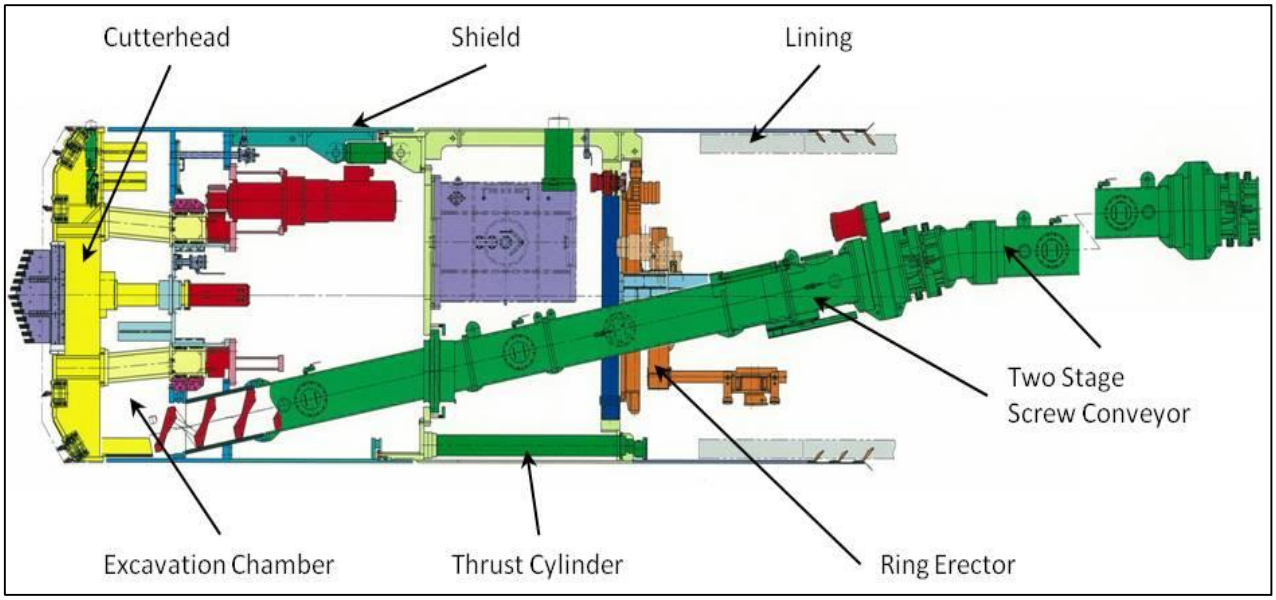

Figure 3.3 – EPB TBM Schematic Showing Basic Elements

Spoil will be removed from a construction shaft (previously consented May Road shaft) via a hoisting system which lifts spoil skips with a crawler or gantry type crane.

The tunnel liner segments are brought into the tunnel via the May Road shaft and transported to the TBM. The segmental precast concrete tunnel liner is progressively placed behind the machine as the TBM moves forward. Figure 3.4 shows an example of an installed segmental lining. Tunnel segments will be stored at the May Road construction site, but the manufacture and bulk storage of segments will be at a suitable off-site facility.

Figure 3.4 – Precast Concrete Segmentally Lined Tunnel

Tunnelling operations will occur 24 hours a day, 7 days a week. The TBM is expected to advance in the order of 10m to 20m per day. Actual tunnelling progress will vary from day to day and week to week. At the end of the tunnel drive the TBM will be retrieved from the Tawariki Street Shaft Site.

3.5.4 Dewatering

Infiltration of groundwater into the shafts and tunnel will be primarily controlled through the design and specification of near-watertight excavation support systems, which reduce water inflows that would otherwise have to be pumped out of the shafts, treated, and disposed of. Some groundwater will need to be removed from the proposed shafts at Tawariki Street, treated and disposed.

The ECBF materials at the shaft site are not expected to require special groundwater controls (such as grouting). Groundwater control methods, if used, will likely be supplemented with other measures such as a sump system to remove groundwater inflows from the excavations and concrete collars to control seepage along the soil/rock contact.

Groundwater inflow into the chamber excavations will be controlled using similar methods as the shaft excavations.

Groundwater inflows through the tunnel lining during construction are expected to be limited to less than 0.5 litre per square metre of tunnel lining per day, which is 13m^3 per day for the 1.6km length of the tunnel. Groundwater inflows during construction for the shafts is expected to range between 6 to 32m^3 per day.

Groundwater will be pumped out of the excavations at Tawariki Street and treated to Auckland Council requirements prior to discharge to the stormwater drain.

On completion of construction there will be no discharge of groundwater.

3.5.5 Surface Features

The site will be reinstated on completion of construction. A mix of concrete hardstanding and permeable paving will be used near the shafts, chambers and vehicle accessway. The remainder of the site will be grassed and landscaped, with detail to be confirmed in due course. Manholes and hatches will be at ground surface. These will be secured from public entry. An above ground plant room will house the power supply and controls for the penstocks. It will be approximately 90m^2 in area and 4m in height.

An air vent will be required for continuous air entry into the tunnel for ventilation purposes and very infrequent air exhaust when the tunnel is nearly full during severe wet weather events. The air vent stack in a form of a 5m stack (total height) will be incorporated into the plant and ventilation building and discharge air vertically via a roof vent. The vent stack will be designed with a flange to allow for a structure to up to 8m in total height and approximately 1m in diameter.

3.5.6 Secondary Shaft

The construction of the secondary shaft will be of similar depth and follow the same construction methods as described in Section 3.5.1 above for the main shaft.

3.5.7 Hours of Operation

Construction hours will likely occur on the following general basis:

- Tunnelling activities – 24 hours a day, 7 days a week for all tunnelling activities;
- Shaft site construction activities – 7 am to 6 pm Monday to Friday, 8 am to 6 pm Saturday; and
- Truck movements – 7 am to 6 pm Monday to Friday, 8 am to 6 pm Saturday.

There may be occasions where it is necessary to undertake construction activities outside of usual hours, for example, where it is necessary to complete an activity that has commenced, to tie into the existing network,

delivery of large plant or machinery, or emergency works. For works outside of normal hours, appropriate measures will be implemented to ensure that appropriate construction traffic, noise and vibration measures are employed.

4. Assessment of Alternatives

4.1 Introduction

When considering an NoR by a Requiring Authority, the Council is required under section 171(1)(b) of the RMA to have particular regard to whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if either:

i. The Requiring Authority does not have an interest in the land sufficient for undertaking the work; or

ii. It is likely the work will have a significant adverse effect on the environment.

In this instance, it is considered that the works will not have any significant adverse effects. However, Watercare does not currently have an interest in the land at 44 – 48 Tawariki Street. As such, a comprehensive assessment of alternative locations was undertaken (Appendix F). The following sections summarise that assessment.

4.2 Consideration of Alternative Solutions

As discussed in Section 1.1.1, the Project was originated from Project CANOPy which looked at options for addressing wastewater overflows in the Grey Lynn catchment. Project CANOPy recommended that the best overall option was a collector sewer (conveyance) option with an overflow frequency of six monthly for EOPs and once every two years for uncontrolled overflows. This option relied on the CI and some form of storage tunnel through the catchment terminating at least at Tawariki Street (or vicinity).

A tunnel between Western Springs and Grey Lynn could address two of the area's biggest overflow locations by volume and enable further work in the Westmere, Herne Bay/St Marys Bay, Freemans Bay and Grey Lynn wastewater catchments. This option provided the least cost estimate over other servicing options for the same level of overflow frequency reduction, assuming that the Grey Lynn tunnel was procured and constructed as part of the CI construction contract. It was identified that significant cost penalties, in the order of $50 million, would be incurred if a separate construction contract was let for the Grey Lynn Tunnel.

The programme to construct of a new tunnel from the termination point of the CI tunnel at Western Springs through to Grey Lynn (Option Three of the WIWQIP) was approved by the Auckland Council's Environment and Community Committee in October 2017.

4.3 Consideration of Alternative Sites

Given that the Project will involve the boring of a tunnel from the Western Springs construction site through to an intercept with both the Tawariki Local Sewer and Orakei Main Sewer, the options used for the assessment of alternatives were restricted to locations within proximity to these existing sewers.

The identification of the possible locations for the shaft site included the following criteria:

- The need for space for all required equipment and construction activities;
- The need to access the construction site, during construction and in the long term;
- The need to connect into the Orakei Main Sewer and Tawariki combined sewer;
- The need for permanent assets (shaft, plant room, control chambers, possible air treatment facility, grit chamber); and
- The need to undertake a second stage of works to construct future connections.

As a result of these criteria, five site options were identified and selected for consideration through a multi-criteria assessment (MCA) process. These sites were:

Site Option	Site location/description	Key features
Option 1 – St Paul's College	Construction site on the schoolgrounds, adjacent to the playing fields. Access through schoolgrounds from Moira Street.	· Connections to existing sewers (trenchless) · Underground control chamber on Tawariki combined sewer · Underground control chamber on Orakei Main Sewer
Option 2 – Moira Reserve	Construction site on Moira Reserve, with connection to Tawariki local sewer in St Paul's College grounds. Access to Moira Street, partly through school grounds.	· Connections to existing sewers (trenchless) · Underground control chamber on Tawariki combined sewer · Underground control chamber on Orakei Main Sewer · Underground grit trap
Option 3 – John Street	Construction site on currently vacant residential zoned site, with a small area extending into the St Paul's grounds. Access via John Street.	· Underground control chamber on Tawariki combined sewer and Orakei Main Sewer (combined) · Temporary diversion of Tawariki combined sewer (trenched)
Option 4 – Hukanui Reserve	Main construction site on Hukanui Reserve, with connections on Parawai Crescent (1 residential property and road reserve) and Tawariki Street (1 residential property and road reserve).	· Connections to existing sewers (trenchless and trenched) · Underground control chamber on Tawariki combined sewer · Underground control chamber on Orakei Main Sewer · Underground grit trap
Option 5 – Tawariki Street	Main construction site occupying three residential properties on Tawariki Street, with a small area of works extending into the road reserve and St Paul's College grounds.	· Connections to existing sewers (trenchless) · Underground control chamber on Tawariki combined sewer · Underground control chamber on Orakei Main Sewer
All sites		· Construction shafts (1 for Stage 1 and 1 for Stage 2 future connections) · Above ground plant and ventilation building

Table 4.1 – Shaft Site Options

Following the identification of the five options, the following MCA criteria considered both the construction and operation of the site:

- Engineering constructability;
- Network improvement opportunities;
- Operations;
- Ecology;
- Arboriculture;
- Air Quality;
- Construction traffic;

- Social impacts; and
- Property considerations.

It is noted that a mana whenua criterion was not included as engagement with mana whenua was undertaken separately. The mana whenua engagement process of the Project is detailed in Section 7.3 of the report.

The pros and cons of each option based on the above MCA criteria have been considered and are summarised as follows:

- Option 1 – St Paul's College: While the works site was located on the school's playing fields away from residential properties, it would have involved disruptions to the school's activities and required construction access through Moira Road and the school grounds;
- Option 2 – Moira Reserve: The proximity of this site to several dwellings would likely result in significant noise, vibration and air quality effects. Furthermore, it would have social and recreation effects given the loss of public open space;
- Option 3 – John Street: The on-site space available meant that this option scored well for enabling network improvements, operations and engineering constructability, but scored negatively for noise, traffic and property given its proximity to residential dwellings;
- Option 4 – Hukanui Reserve: This option was considered most negative given its impacts on vegetation, the loss of public open space, occupancy of the road reserve and its proximity to residential dwellings; and
- Option 5 – Tawariki Street: This option was considered most positive due to its central location to existing infrastructure, which was considered beneficial to controlling the site and delivering and efficient construction programme.

Based on the above, the Tawariki Street option was selected as the preferred shaft site.

4.4 Summary

Watercare has undertaken an assessment of alternatives for the Project. The chosen shaft site provides for the construction and operation of the Project, while also providing flexibility for future water infrastructure connections. It will not require the permanent loss of any public open space or removal of significant volumes of vegetation, while its effects can be suitably managed.

Based on the attention given to the consideration of alternatives as summarised above and detailed in Appendix F, the Project satisfies the requirements of section 171(1)(b) of the RMA.

5. Description of Existing Environment

5.1 General Site Location and Land Uses

The Project alignment passes through the urban environment of the Auckland Isthmus, beneath a range of urban land uses in Western Springs and Grey Lynn. Land uses along the alignment are predominantly suburban residential, with some higher density residential, community facilities and urban parks present.

The Western Springs end of the tunnel is located within the Western Springs construction site (existing Watercare Designation ref: 9466) at the Western Springs Reserve. The Grey Lynn end of the tunnel is located at 44-48 Tawariki Street. Construction activities will take place within the road reserve at the eastern end of Tawariki Street and a small area of school land (St Paul's College) which borders the terminus of Tawariki Street (approximately 150m^2).

Tawariki Street is a cul-de-sac defined by single-lot residential development. The majority of the sites on this street contain mid-20th century state homes. The properties at 44, 46 and 48 Tawariki Street each contains a single storey house and are bounded by Marist School to the north and St Paul's College to the east. Similar residential development is located along the surrounding roads.

Moira Reserve is located near the shaft site. Access to the reserve is via a footpath located to the eastern end of Tawariki Street and Moira Street. The reserve can also be accessed via another footpath along the properties at 29 and 33 Tawariki Street, and 12 and 16 Moira Street.

5.2 Zoning and Special Features

Figure 5.1 below shows the AUP zoning of land around the Project. The zoning of land above the tunnel (within the 40 m horizontal corridor) includes sites zoned:

- Residential – Mixed Housing Urban;
- Residential – Mixed Housing Suburban;
- Residential – Single House;
- Residential – Terrace Housing and Apartment Buildings;
- Open Space – Informal Recreation;
- Business – Local Centre; and
- Business – Mixed Use.

All the residential properties on Tawariki Street, Moira Street and Mokau Street, including the properties at 44-48 Tawariki Street (the shaft site), are zoned Residential – Mixed Housing Urban under the AUP. Marist School and St Paul's College are zoned Special Purpose – School and Moira Reserve is zoned Open Space – Informal Recreation.

Figure 5.2 below shows the relevant AUP overlays and controls near the Project. The overlays and controls indicate the presence of features and existing designations. The shaft site, nearby residential properties and schools are not subject to any AUP overlays and controls. The tunnel alignment passes beneath several properties within the Special Character Areas Overlay – Residential Isthmus A. Designations above the tunnel alignment are outlined in Section 2.5.2 above. There are no other relevant AUP overlays and controls.

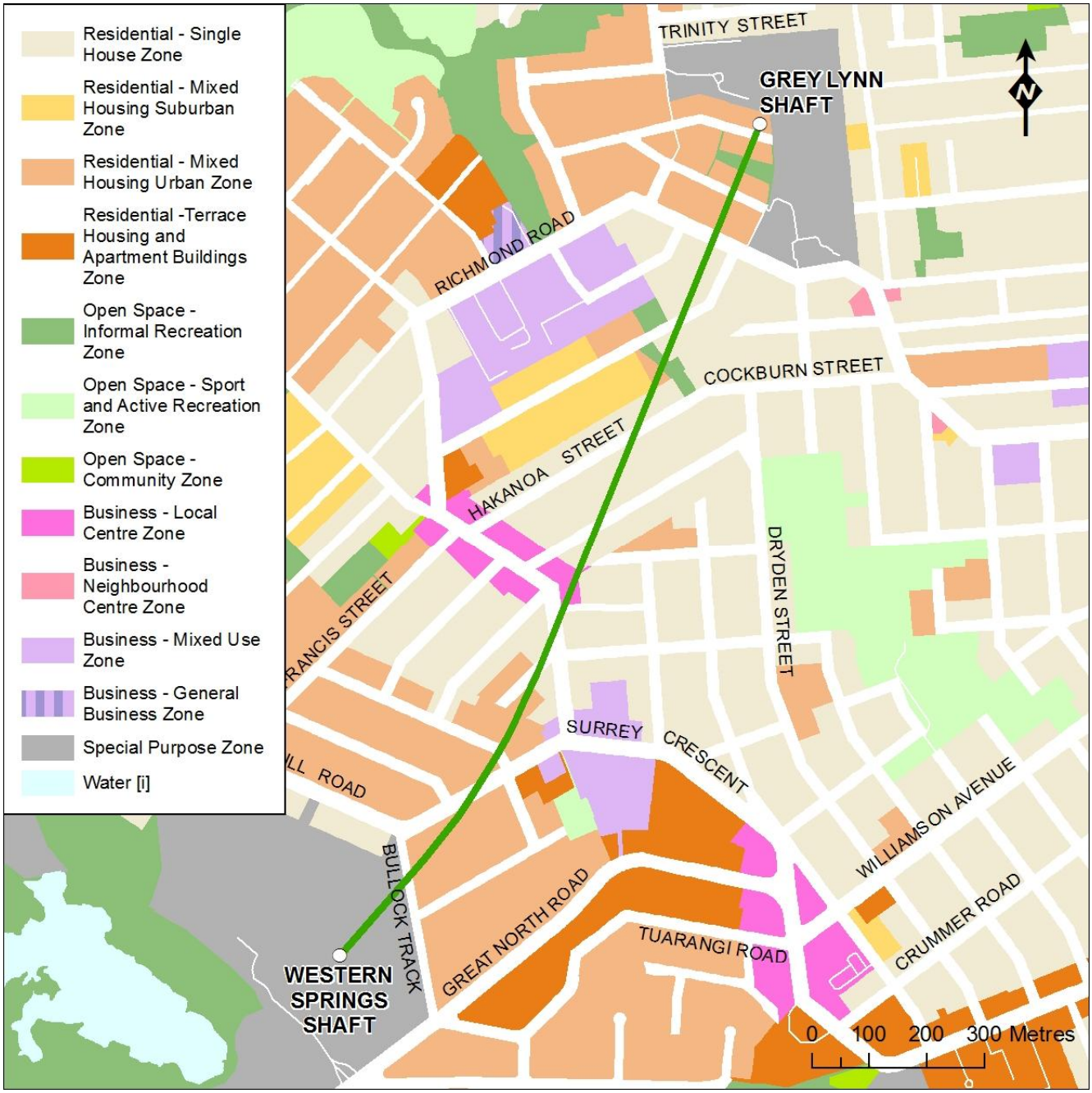

Figure 5.1 – AUP Zoning (from Auckland Council GEOMaps)

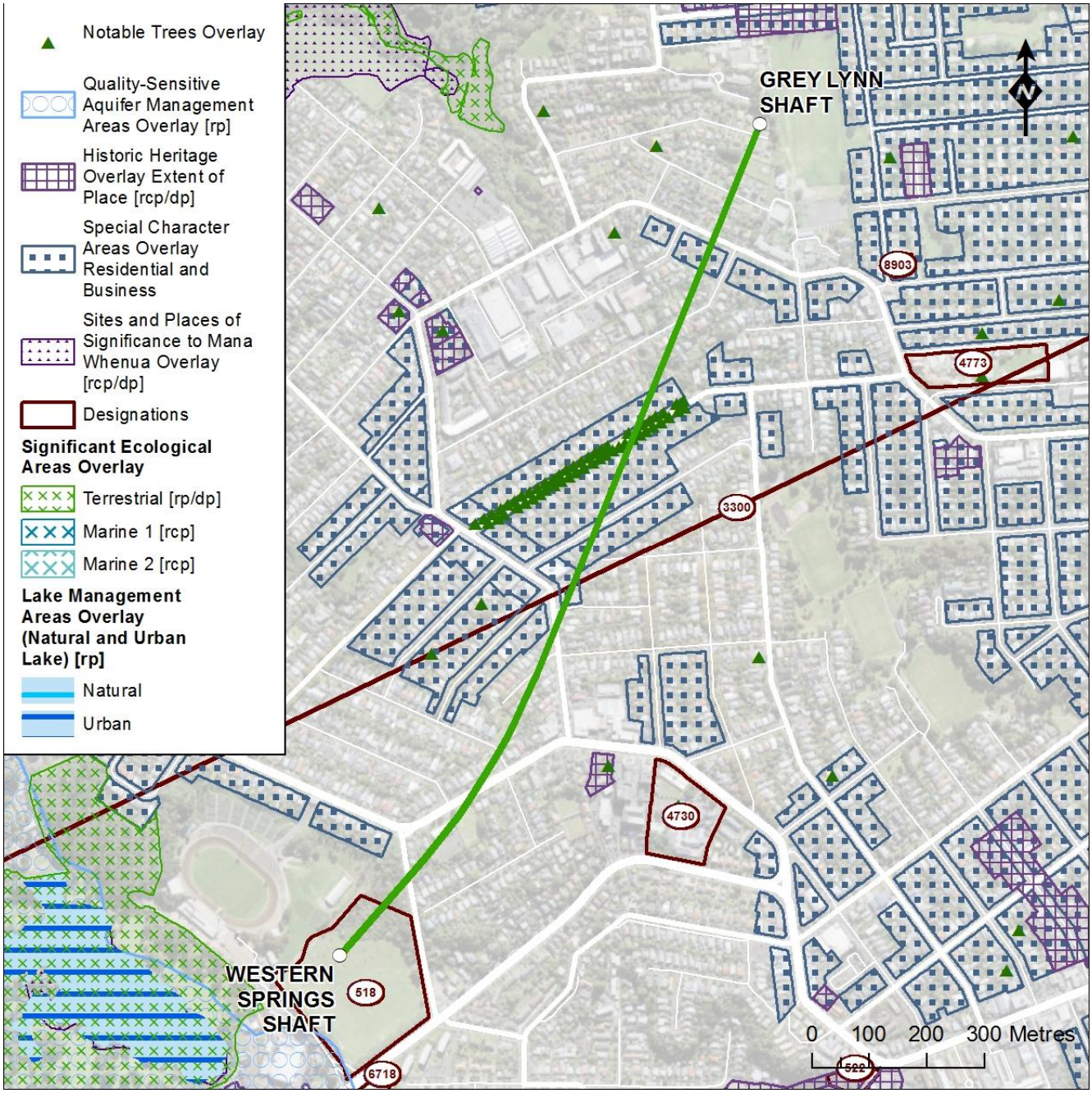

Figure 5.2 – Relevant AUP Overlays and Controls (from Auckland Council GEOMaps)

5.3 Surface Hydrology

The wider project area is bisected by a number of watercourses and associated stormwater catchments. As shown in Figure 5.3, these are Motions Creek and Cox's Creek. These watercourses are affected by pollution sources from their urban catchments, including combined sewer overflows, stormwater runoff, illegal discharges and leachate from historic landfills. As a consequence of this pollution, neither of these watercourses is suitable for contact recreation or shellfish collection. It is noted that some of blue lines shown in Figure 5.3 are piped stormwater network, including that to the north of Tawariki Street and across Grey Lynn Park.

The tunnel alignment passes beneath a number of overland flow paths (OLFP) and areas of the 1 in 100 Annual Recurrence Interval (ARI) flood plain, as shown in Figure 5.4. The Tawariki Street Shaft Site is located outside of a flood plain. There is an OLFP which flows from the site, in an east to west direction, towards Cox's Creek.

Figure 5.3 – Watercourses (from Auckland Council GEOMaps)

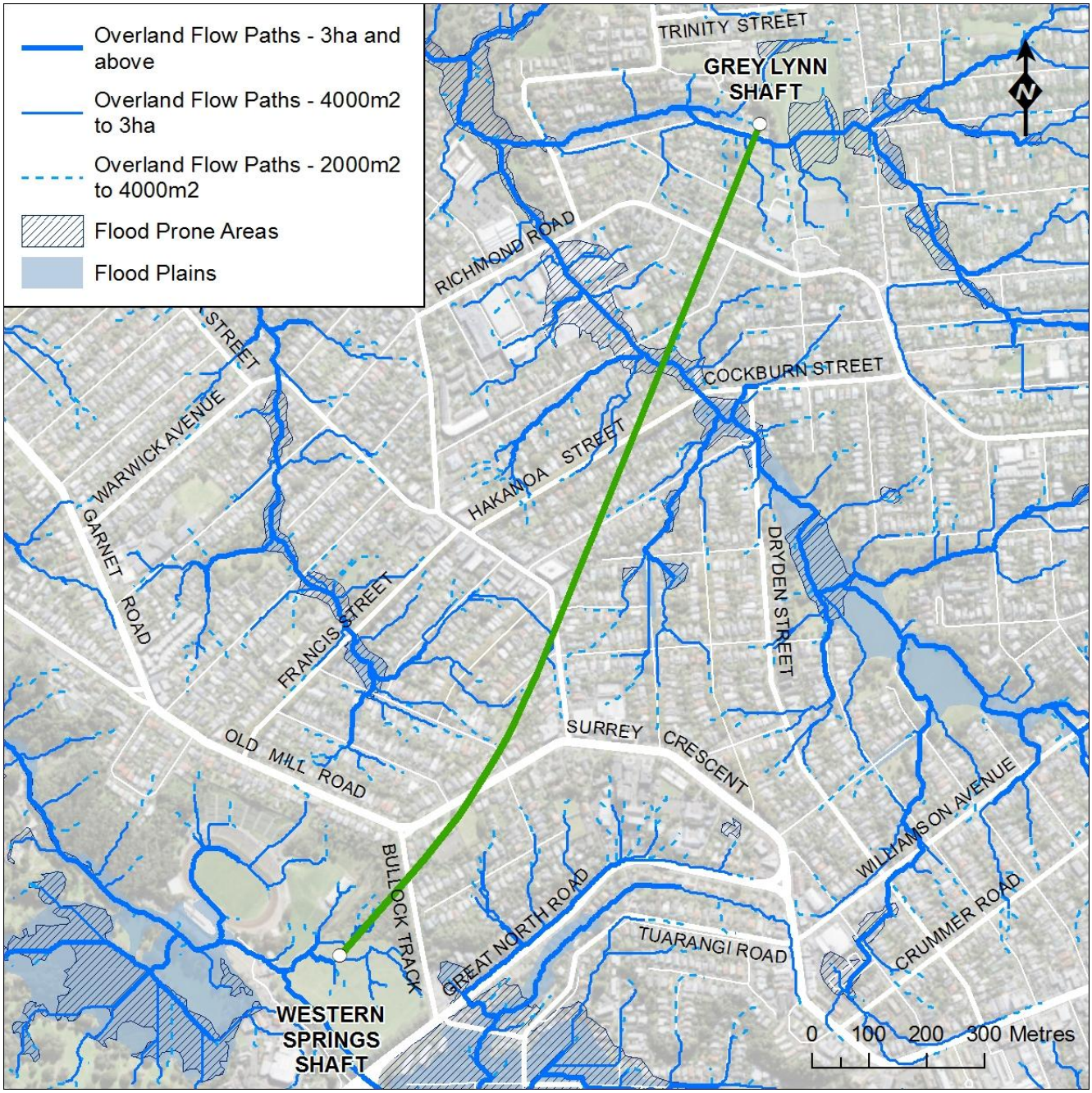

Figure 5.4 – OLFPs and Flood Plains (from Auckland Council GEOMaps)

5.4 Geology and Groundwater

The geology and groundwater regime within the project area is described in the Groundwater and Settlement Assessments (Appendix N and O) and is summarised below.

The Project is located within the Waitemata Basin, in which the subsurface geology is dominated by the weak sandstones and mudstones/siltstones of the Waitemata Group rocks, including both East Coast Bays Formation (ECBF) and Tauranga Group Alluvium (TGA) deposits. Puketoka Formation sediments are also present, as well as undifferentiated alluvium. Closer to the surface at the shaft site is weathered rock material, undifferentiated fill and residual ECBF soils.

The primary geologic units in the area are described in summary below:

- **ECBF** – it is the primary geologic unit around the shaft site and tunnel alignment. ECBF is characterised by alternating, graded sandstones, and siltstones with facies of volcanic-rich and volcanic-poor material. ECBF typically has low permeability.

- **TGA** – collectively the Puketoka Formation and recent alluvium and colluvium make-up the TGA. The recent TGA deposits are late Pleistocene to Holocene in age, having been deposited within low lying drainage channels and topography. On the Auckland Isthmus the alluvium is typically derived directly from the weathering and erosion of ECBF. TGA has Low to moderate hydraulic conductivity.

The aquifer system in the area is recharged by rainfall. Borehole testing along the tunnel alignment shows that local groundwater flows in a southeast to northwest direction at an average gradient of 1.5%. As the groundwater flows reach closer to sea level they discharge at the ground surface, feeding local watercourses. The groundwater table (shallow aquifer) geometry generally mimics regional topography, with areas of localised perching likely along ridge lines.

There are no consented groundwater takes near the shaft site. The closest consented groundwater take is 2.5km south of the shaft site, which is a 150mm bore used for irrigating the fields at Eden Park.

5.5 Infrastructure and Services

Given its urban location, the tunnel alignment passes beneath local infrastructure assets. These include water, wastewater, stormwater, energy and telecommunication infrastructure. Near the shaft site there are underground water and stormwater pipes, stormwater manholes and catchpits, and overhead electricity lines.

No major assets will be affected by the Project other than those owned and operated by Watercare. The Tawariki Local Sewer is situated to the north of the shaft site and the Orakei Main Sewer is situated to the south, though these sewers will connect to the Project. The existing grit trap located within the Tawariki Street road reserve will be replaced by a new grit trap within the shaft site.

5.6 Flora and Fauna

The flora composition at the shaft site and within the immediate road reserve is predominantly exotic, with only four silver ferns, a few karamu seedlings and a small multi-stemmed pohutukawa being the native species recorded. A detail list of floral species and condition in the vicinity of the shaft site is provided in the Arboricultural and Ecology Assessments (Appendix S and L).

No native fauna was found near the shaft site (refer to Ecology Assessment in Appendix L). While potential lizard habitat is present in areas of dense ground cover within St Paul's College, no native lizards were observed. No native birds were observed, although those with small home ranges may visit the area intermittently.

5.7 Archaeological and Cultural Heritage

As discussed in the Archaeological and Historic Heritage Assessment (Appendix J), no known archaeological or other historic heritage sites are located near the proposed works on Tawariki Street. Similarly, no archaeological or other historic heritage sites have been identified within the Western Springs Reserve during the archaeological assessment for the CI or during the field survey for the Project.

The shaft site and the surrounding properties are not subject to the Historic Heritage overlay or the Sites and Places of Significance to Mana Whenua overlay under the AUP.

5.8 Soil Contamination

A limited Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) have been undertaken for the Project (Appendix Q). Historical aerial photographs indicate that the shaft site has been largely residential since 1940, along with the length of the Project.

The PSI concludes that an activity or industry described in the MfE Hazardous Activities and Industries List (HAIL) is unlikely to have been undertaken (both historical and current) within the vicinity of the shaft site. Any potential HAIL activities (current or historical) on the surface of land above the tunnel alignment will be vertically remote from the underground tunnel.

The DSI did not find any evidence of asbestos contamination at the shaft site, while laboratory testing did not find any contaminants in excess of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES Soil) or AUP Permitted Activity Criteria.

5.9 Air Quality

Tawariki Street and its surrounds feature typical suburban activities, such as residential dwellings, local reserves and schools. As such, the shaft site is surrounded by a number of sensitive receptors as identified in the Air Quality Assessment (Appendix P).

The Residential – Mixed Housing Urban, Special Purpose – School and Open Space – Informal Recreation Zones are classified in the AUP as High Air Quality – Dust and Odour Areas.

5.10 Road Network

The road network in the vicinity of the shaft site is described in the Traffic Impact Assessments (Appendix K) and is summarised below.

Tawariki Street runs in a general east-west direction and connects to Parawai Crescent at its western end and terminates in a cul-de-sac to the east. Tawariki Street provides for a single traffic lane in either direction with on-street parking provided on both sides of the road. Pedestrian footpaths are also provided along the street. Similar to Tawariki Street, the nearby streets are residential in nature. The posted speed limit in the area is 50km/h.

Parawai Crescent runs in a general north-south direction and connects to Hukanui Crescent at its northern end and Richmond Road to the south. Parawai Crescent provides for a single traffic lane in either direction with on-street parking and pedestrian footpaths provided on both sides of the road. Traffic islands are located within the carriageway that only allow one-way movement for vehicles to encourage a low-speed environment.

Moira Street runs in a general east-west direction and connects to Tawariki Street at its western end and to an accessway into St Paul's College to the east. Moira Street provides for a single traffic lane in either direction with on-street parking and pedestrian footpaths provided on both sides of the road.

Mokau Street runs in a general north-south direction and connects to Moira Street at its northern end and Richmond Road to the south. Mokau Street provides for a single traffic lane in either direction with on-street parking and pedestrian footpaths provided on both sides of the road.

Richmond Road runs in a general east-west direction and connects to Warnock Street at its western end and Ponsonby Road at its eastern end. Richmond Road provides for a single traffic lane in each direction and is separated by a flush median. Pedestrian footpaths and kerbside parking are also provided along both sides of the road.

6. Assessment of Effects

The following assessment is provided on the actual and potential effects that can be reasonably expected from the Project. This assessment has been undertaken in regard to the effects of the Project on the existing environment[3] as discussed in Section 6 above.

Overall, the Project is in a highly modified urban environment with limited natural or historic heritage features.

6.1 Positive Effects

The Project will deliver significant positive effects for the community. As previously noted in Section 1 of the report, the Project will deliver two key benefits:

- Increased wastewater network capacity; and
- A decrease in the volume and frequency of WWOs.

The provision of additional wastewater network capacity is an important step towards realising the projected growth of the Auckland Plan, the AUP and other strategic planning documents. The Grey Lynn/Cox's Bay and Ponsonby areas all have the potential for additional residential growth, through infill housing and the construction of multi-unit developments (i.e. apartment buildings). This growth requires the establishment of additional wastewater infrastructure. The existing network is unable to accommodate this growth without service disruptions and the higher risk of WWOs. The Project alleviates some of these capacity issues, ensuring that growth occurs in a sustainable manner.

Furthermore, the Project represents part of the wider reorganisation of the metropolitan wastewater network, as flows from Orakei Main Sewer are diverted to the CI. This will allow for added capacity across the wider wastewater network, by freeing up capacity in existing wastewater network infrastructure. This directly benefits downstream areas, such as the Central Business District and Freemans Bay, allowing for urban intensification and the addition of more housing and business capacity without the need for replacement of existing infrastructure. This thereby avoids the need for costly or disruptive projects across the urban area.

6.2 Visual and Landscape Effects

As identified by the Landscape and Visual Effects Assessment by Boffa Miskell (Appendix R), the Tawariki Street Shaft Site is located at the end of a residential cul-de-sac within Grey Lynn. The local streetscape is comprised of mid-twentieth century homes, each of which are setback from the road boundaries. When combined with the mature vegetation present in both the road reserve and private sites, Tawariki Street presents a pleasant residential character. The eastern terminus of the street is framed by a large vegetated bank, which acts as a visual barrier between the street and the adjoining school grounds. It is noted that Tawariki Street is not subject to any character or landscape overlays in the AUP.

The site is in a gully floor and while some views are afforded by the higher surrounding sites, these views are obscured in part from both buildings and vegetation. To the north, a large belt of trees blocks views, while to the east, the lower elevation of the site (in comparison to the St Paul's schoolgrounds) obstructs views from further afield. Given these factors, the only dominant viewpoints are from Tawariki Street itself (including the adjoining properties) and Moira Reserve.

During construction, some disruption to local character and visual amenity will occur, given the presence of the shaft site's crane (typical construction crane with a footprint of 7x5m and maximum lift height of 30m) and the 2.5-year duration of works. While the site will be partially obscured by construction hoardings, the cranes will still be visible and have the potential to be visually dominant for the adjoining sites. Given this, the Project's construction phase will have more than minor visual and landscape effects for the occupiers at 37 – 41 and 42

[3] The assessment of a proposal's adverse effects against the existing environment is an established principle in law (Hawthorn Estate Limited NZRMA 424). Under this case, the existing environment may include unimplemented resource consents and utilisation of rights to carry out permitted activities under a district or regional plan. It does not include future possible resource consents or the ecological potential of watercourses.

Tawariki Street, while less than minor effects will be generated beyond these sites. However, these effects are temporary and will cease upon the completion of the construction phase.

The long-term visual effects have been addressed by limiting the size and height of above-ground structures at the shaft site. The plant room will be approximately 4m high and have the bulk and appearance of a small house or garage, while the tallest structure will be an air vent stack at the roof of the plant room (5m above ground and can be extended up to 8m in total height) and feature a slimline design (approximately 1m in diameter). These structures will constitute a minor element of the view from the adjacent properties and will not be prominent. As such, the operational (permanent) visual and landscape effects of the Project will be less than minor.

6.3 Vegetation Effects

As noted in the Arborist Report by Greenscene (Appendix S), the Project will not affect any protected or arboriculturally significant vegetation. A tree survey by Greenscene has identified that a number of unprotected trees will be removed due to their proximity to the proposed works and subsurface excavations. These trees are largely exotics and in poor to fair health. The affected trees include acmena, lemon trees, ponga, wattles and poplars.

While some vegetation clearance will take place, no significant specimens or large natives will be affected. Watercare will employ a tree protection methodology (as detailed in Appendix S) to protect vegetation nearby the shaft site (for visual amenity purposes). Specific tree protection measures will include:

- Supervision of root zone work by an experienced arborist;
- Protection screening/fencing for any trees which are to be retained;
- Avoiding the storage of construction equipment or materials within the root zone of any retained trees; and
- The use of plastic root barriers for retained trees near concrete pouring.

Further to these site-specific works, minor pruning will be required of street trees on Moira Avenue to enable the safe movement of construction vehicles. Specifically, this pruning will affect three Pohutukawa, with these works undertaken in accordance with arboriculture best practice to ensure the trees' wellbeing.

Given the unprotected status of the removed vegetation and the tree protection methodology proposed by Watercare, the Project will have less than minor adverse effects on vegetation.

6.4 Ecological Effects

As stated in the Ecological Assessment by Bioresearches (Appendix I), the shaft site at Tawariki Street has limited existing ecological values. The site does not feature any watercourses or wetlands. The botanical values are also low given the limited number of native flora present. As such, no native birds were observed roosting at the site, although some lizard species may be present given the presence of low-level vegetation at St Paul's College.

Given these low values, it is anticipated that the Project will have minimal ecological effects on area surrounding Tawariki Street. The vegetation present is of low biodiversity value and the removal of pest plants (e.g. bamboo and agapanthus) will be beneficial.

The greatest potential ecological effects will be the loss of possible lizard habitat at St Paul's College (given the removal of vegetation along the school boundary). However, this loss of potential habitat can be mitigated by lizard capture and relocation, which is a standard ecological mitigate measure employed during infrastructure projects, including those undertaken by Watercare.

Given the limited existing ecological values of the site and the use of lizard capture and relocation, the Project will have less than minor ecological effects.

6.5 Archaeological and Historic Heritage Effects

As identified in the Archaeological and Historic Heritage Assessment by Clough and Associates (Appendix J), no known archaeological or other historic heritage sites are located near the Tawariki Street Shaft site and within the Western Springs construction site. There is little potential for discovery of unrecorded archaeological remains due to the early 20th century modification to the area. Similarly, it was determined that no known archaeological or other historic heritage sites will be affected by the proposed tunnel construction.

To address the possibility of uncovering remains, accidental discovery protocols will be developed (in accordance with the AUP) to set out procedures if archaeological remains, taonga or koiwi tangata (human remains) are exposed during the works. If modification of an archaeological site does become necessary (although, this is unlikely, as assessed by Clough and Associates), an authority will be applied for under section 44(a) of the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA).

Overall, the Project will have less than minor archaeological and historic heritage effects.

6.6 Mana Whenua and Cultural Heritage Effects

As noted above, the Project is in a highly modified urban environment which is dominated by suburban residential developments. The Tawariki Street Shaft Site is currently occupied by residential dwellings. There are no scheduled trees, heritage features or archaeological sites located within the site. In addition, the site is not subject to the Sites and Places of Significance to Mana Whenua Overlay under the AUP. The tunnel alignment does not pass beneath an area that is subject to the Sites and Places of Significance to Mana Whenua Overlay.

Engagement with the relevant iwi and interested mana whenua groups has been undertaken and is detailed in Section 7.3 below. No concerns have been raised by the mana whenua groups.

Given the existing environment and feedback received form the relevant and interested mana whenua groups, the Project will have less than minor mana whenua and cultural heritage effects. Watercare will continue to engage with mana whenua that have indicated an interest in the Project.

6.7 Traffic Effects

A detailed Traffic Impact Assessment has been undertaken by Commute (Appendix K). The assessment identifies the traffic effects of the Project and the measures which will be employed to address construction traffic effects. The traffic effects of the Project are summarised as discussed below.

6.7.1 Construction Traffic Effects

The construction phase of the Project involves four distinct work phases, each of which have their own traffic characteristics, with these being:

- Stage 1 – shaft excavation (main shaft and chambers). This will occur over a period of 12 months.
- Stage 2 – preparation for TBM arrival at Tawariki Street Shaft Site. This will occur over several months. Truck volumes will be significantly lower than those generated in Stage 1. All truck movements associated with spoil removal and material delivery associated with the tunnel construction will occur at the May Road construction site, and therefore are not relevant to this assessment.
- Stage 3 – TBM removal and final construction. This will occur over a period of 9 months. Truck volumes are expected to be of a similar or lower level to those generated in Stage 1. The TBM removal will be a one-off event.
- Secondary shaft – This will occur over a period of 12 months. Truck volumes are expected to be of a similar level to those generated in Stage 1.

Stage 1 will feature the greatest number of truck and vehicle movements, given that it will involve the excavation of the main shaft, site clearance and the establishment of the construction area (including the closure of a portion of Tawariki Street for the duration of construction). It is anticipated that these works will require approximately 82 vehicle movements a day, 64 of which will be heavy vehicles (i.e. spoil removal and building material deliveries). Stages 2 and 3 are expected to generate less traffic, while the construction of the secondary shaft is expected to have similar traffic volumes as Stage 1.

Figure 6.1 identifies the two proposed routes for heavy construction vehicles associated with the shaft site. Traffic arriving at the site will come via the St Lukes' Interchange and then proceed to the site via Meola Road, Old Mill Road and Surrey Crescent. They will then proceed northwards along Richmond Road before making a left-hand turn into Mokau Road. Departing traffic will exit onto Richmond Road via a left-hand turn and proceed towards the Hobson Street onramps. Both routes avoid right-hand turns into Mokau Street and maximise the use of arterial roads, thereby reducing the effects of construction traffic on road safety and congestion.

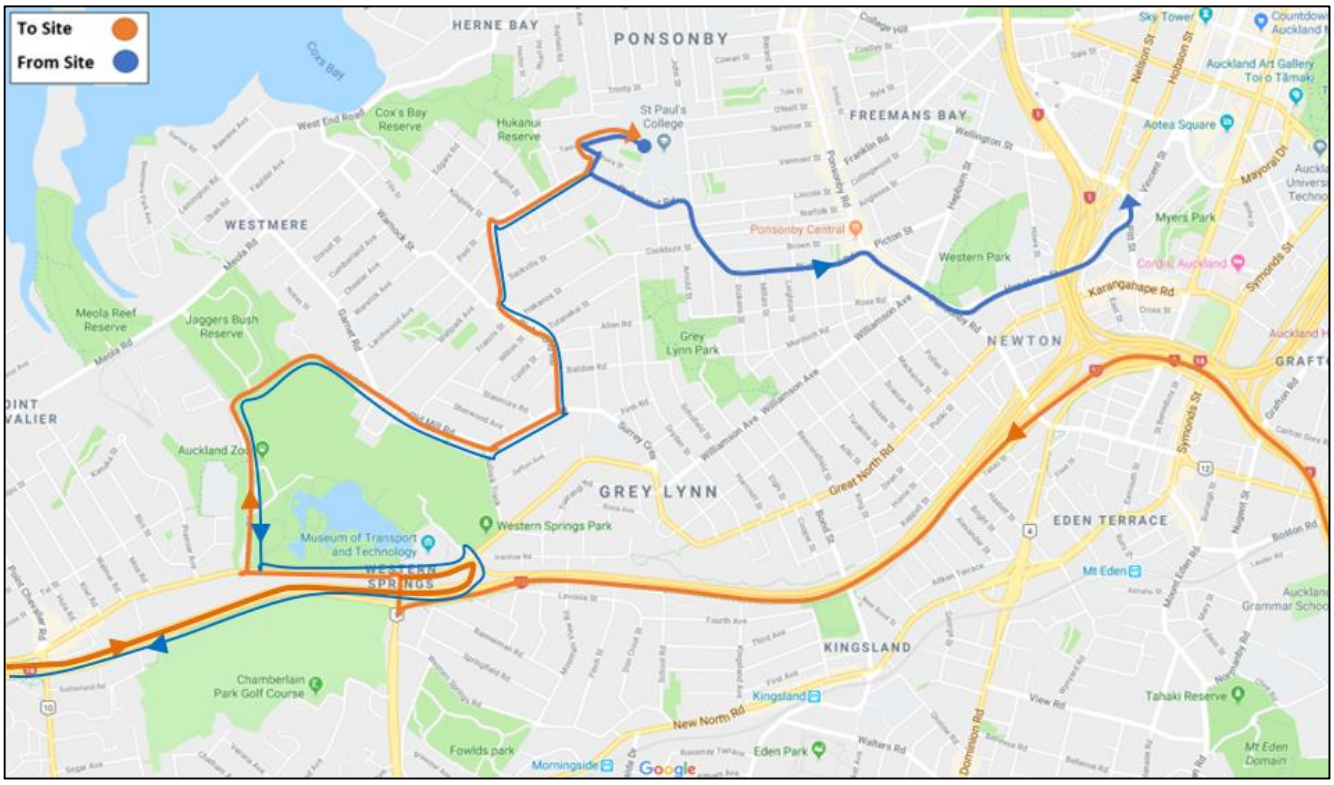

Figure 6.1 – Proposed Construction Traffic Routes

It is also noted that adequate manoeuvring space is available within the Tawariki Street road reserve for vehicles up to 8m in length. Larger vehicles, such as portable cranes or plant deliveries, will require temporary traffic management measures to ensure safety for road users.

Approximately 14 on-street parking spaces in the immediately vicinity of the shaft site (i.e. outside 42-48 and 33-41 Tawariki Street) are required to be removed during the construction phase on the Project. On-street parking along Tawariki Street, Mokau Street and Moira Street will be maintained, except when large vehicles are accessing the shaft site on-street parking along one side of these streets will need to be removed temporarily. Large vehicles access will occur infrequently, for only a few hours at a time, and can be scheduled for off-peak times.

Overall, the construction traffic associated with the Project will be temporary and can be addressed by a Construction Traffic Management Plan (CTMP), which will include:

- The measures employed to communicate to residents any road closures, on-street parking and other roading disruptions;
- The measures employed to maintain access to private properties;

- The measures employed to protect pedestrian and cyclist safety; and
- Any other measures employed to control construction traffic.

The CTMP will be employed for the duration of construction and will be submitted to Auckland Transport with the Project's Corridor Access Request. A copy will also be provided to Council for information purposes.

It was concluded by Commute that the Project will have minimal traffic effects to the function, capacity and safety of the surrounding transport network. During the construction phase, there will be temporary disruption to on-street parking, pedestrian movements, and site access in the immediately vicinity of the shaft site and temporary disruption to traffic flows along Tawariki Street, Mokau Street and Moira Street. As such, the Project is considered to have no more than minor adverse effects on the occupants of Tawariki Street, Moira Street and Mokau Street during the construction phase, while less than minor effects will be generated beyond these sites.

6.7.2 Operational Traffic Effects

Given the lack of permanent on-site staff at the site, the operational traffic effects of the Project will be limited to regularly monthly maintenance visits. Maintenance vehicles will enter the site via a controlled entry, while on-site parking will also be provided for visiting Watercare staff. Any operational traffic effects will be minimal.

6.7.3 Summary

In summary, the Project will have no more than minor adverse traffic effects. These effects are largely restricted to the construction phase of the Project and largely relate to the road closures and on-street parking removal required to ensure the safe movement of heavy vehicles. In addition, Watercare proposes to employ a CTMP to manage these effects and will undertake regular communication with residents to minimise traffic and disruptions.

6.8 Noise Effects

The potential noise effects of the Project have been assessed by Marshall Day Acoustics (Appendix L). This technical assessment employed an on-site noise survey to provide a baseline for the Project's noise assessment. The results of the survey were:

Measurement Position	Measurement		Measured Level (dB)				Noise Source
	Start/ Finish Times	Duration min:sec	L_{Amax}	L_{A10}	L_{Aeq}	L_{A90}	
MP1 (eastern end of Tawariki Street)	22:12 pm/ 22:27pm	15:22	50	41	38	35	Wind in trees, crickets, distant aircraft, distant traffic, household noise, dog barking

Table 7.1 – Existing Noise Levels

This result highlights the quiet suburban nature of the shaft site and the sensitivity that existing residents may have to the noise associated with the Project. While these noise effects are fully assessed in the attached noise report, the following summarises both the construction and operational noise effects of the Project.

6.8.1 Construction Noise Effects

As a major infrastructure project, a range of heavy vehicles and construction equipment will be required at the shaft site for the duration of works. Marshall Day have assessed the possible noise levels (with and without mitigation) generated from construction activities, additional road traffic and night-time tunnelling.

Activity	Equipment	Sound Power	Mitigation	Façade Noise Level (dB L_{Aeq})			Limit Setback (m)
		(dB L_{WA})	(dB)	10	20	40	70dB L_{Aeq}
Tawariki Street Shaft and Chamber							
Excavation and Support	30T excavator (sheet piling)	116	0	***91***	***85***	***78***	83
	30T excavator (digging)	103	-10	68	62	55	8
	3-axle truck	105	-10	70	64	57	10
	Hydraulic power pack	102	-10	67	61	54	7
	Generator	103	-10	68	62	55	8
	Shaft ventilation	102	-10	67	61	54	7
	Grout pump	107	-10	***72***	66	59	13
	Dewatering pump	97	-10	62	56	49	4
	Water treatment	95	-10	60	54	47	3
	Concrete truck + pump	107	-10	***72***	66	59	13
	Plate compactor	106	-10	***71***	65	58	11
Construction	30T excavator	103	-10	68	62	55	8
	20T mobile crane	99	-10	64	58	51	5
	50T crane	98	-10	63	57	50	4
	3-axle truck	105	-10	70	64	57	10
	Hiab truck	97	-10	62	56	49	4
	Dewatering pump	97	-10	62	56	49	4

Table 7.2 – Predicated Noise Levels from Construction Activities and Equipment

As shown in Table 7.2 above, the highest noise levels will be associated with sheet piling (during shaft excavation), which is not unusual on a project of this type and will only occur on an intermittent basis. The construction noise limits relevant to the Project as set out in the AUP is 70dB L_{Aeq} / 85dB L_{Amax} between 7.30am and 6.00pm, Monday to Saturday. It is noted by Marshall Day that while a 3m high site hoarding would attenuate much of the construction noise, it would not satisfactorily address the noise levels generated during sheet piling (i.e. these noise levels would still be greater than 70dB L_{Aeq} for the properties identified in Table 7.3). However, the use of a Construction Noise and Vibration Management Plan (CVNMP) will be employed to manage and minimise noise effects on these residents.

Receiver	Predicted Noise Level (70dB L_{Aeq} Noise Limit)
Marist Catholic School	72
29 Tawariki Street	72
33 Tawariki Street	73
35 Tawariki Street	76
36 Tawariki Street	73
37 Tawariki Street	79

Receiver	Predicted Noise Level (70dB L_{Aeq} Noise Limit)
38 Tawariki Street	76
39 Tawariki Street	82
40 Tawariki Street	77
41 Tawariki Street	84
42 Tawariki Street	83

Table 7.3 – Properties Affected by Sheet Pilling Noise

Vehicle noise from the Project is not anticipated to generate significant effects. Even during the excavations of shafts and the frequent movement of spoil carrying trucks, the only noise increase will be limited to 5dB on Tawariki Street, from 50 to 55dB. This increase will not be perceivable and will not require specific mitigation.

In terms of night-time tunnelling noise, Marshall Day has assessed that a minimum vibration slant distance of approximately 18m would allow compliance with a regenerated noise criterion of 35 dB LAeq (15-min), which is considered a satisfactory noise level that will not cause sleep disturbance for residents. Table 7.4 identifies the properties which will have the shallowest depth to pipe crown (slant distance) based on the worst case vertical tunnel alignment. Only two residential properties (32-34 Sackville Street) have a calculated worst-case slant distance of less than the 18m threshold and may therefore potentially experience regenerated noise above 35dB LAeq. Although there may be instances where tunnelling noise is audible, it will not result in any appreciable sleep disturbance effects. Any noise effects from night-time tunneling on these properties will be limited to a few nights only as the TBM will progress at approximately 15m per day. Watercare proposes to undertake advance communication with the identified residents to address any concerns.

Receiver Address	Use	Min Depth to Pipe Crown (m)	Comment
38 Sackville Street	Day care	15.9	No dwellings
36 Sackville Street	Open space	15.3	No dwellings
34 Sackville Street	Residence	15.5	
32 Sackville Street	Residence	16.9	
2/30 Sackville Street	Residence	18.0	
30 Sackville Street	Residence	18.0	
39 Tawariki Street	Residence	18.0	
37 Tawariki Street	Residence	18.4	

Table 7.4 – Slant Distance Summary

Given the above assessment, Watercare proposes to develop a CNVMP for the Project and will ensure that it is prepared in accordance with the minimum requirements of NZS6803:1999 Section 8 and Annex E. The CNVMP will include:

- A summary of the project noise criteria;
- A summary of construction noise assessments/predictions;
- General construction practices, management and mitigation;
- Noise management and mitigation measures specific to activities and/or receiving environments;
- The requirement for pre and post-construction building condition surveys;
- Monitoring and reporting requirements;

- Procedures for handling complaints; and
- Procedures for review of the CNVMP throughout the Project.

The CNVMP will be submitted to Council for certification prior to the commencement of works and will be augmented by regular communication with the residents and St Paul's College, ensuring works are limited to standard construction hours (unless an Activity Specific Noise and Vibration Management Plan (ASCNVMP) has been prepared), avoiding the generation of unnecessary noise and the installation of noise barriers around the site. These measures have been included in the proposed conditions (Appendix H).

6.8.2 Operational Noise Effects

Marshall Day have identified the greatest source of operational noise as the above-ground plant room, given the presence of the air vent and electrical equipment. However, the plant room will be constructed to reduce noise generation, including the use of pre-cast concrete and sound absorbing roofing materials. These measures will ensure that the plant room will meet the AUP night time noise limits.

The other possible source of operational noise are activities associated with the cleaning of the grit trap. However, the grit trap will replace an existing structure in the road reserve, and cleaning will only occur on a periodic basis (approximately 3 to 6-month intervals) during normal business hours.

6.8.3 Summary

Given the assessment above, the Project will have no more than minor adverse noise effects. While high noise levels can be expected during construction, these can be managed by the CNVMP and any ASCNVMP (as required). Regular communication with residents will occur to ensure that all parties are aware of upcoming construction activities and the measures employed to mitigate and manage noise effects. Furthermore, the highest noise levels are associated with sheet piling, which will only occur on an intermittent basis and for up to one week at a time.

Operational noise effects will be less than minor, with the design of the plant room to incorporate noise attenuation, while the grit trap cleaning is a continuation of an existing (and intermittent) activity.

6.9 Vibration Effects

A detailed assessment regarding vibration effects has been prepared by McMillen Jacobs Associates (Appendix M), which addressed both the excavation of the shafts and the tunnel. The vibration assessment is based on widely accepted industry standards, including DIN 4150-3 (German Industrial Standard: Vibrations in Buildings – Effects on Buildings), British Standard 5228-2:2009 (Criterion for human response to construction vibration) and the vibration standards of the AUP (E25.6.30) as detailed in Tables 7.5 – 7.7.

Receiver	Period	Peak Particle Velocity (PPV) Limit (mm/sec)
Occupied activity sensitive to noise or vibration	Night-time 10 pm to 7 am	0.3
	Daytime 7 am to 10 pm	2.0
Other occupied buildings	At all times	2.0

Table 7.5 – Vibration Limits in Buildings (AUP Table E25.6.30.1)

Category of Structure	Short-Term Vibration				Long-Term Vibration[b]
	PPV (mm/sec) at Foundation Frequency of:			PPV at Horizontal Plane of Highest Floor at All Frequencies (mm/sec)	PPV at Horizontal Plane of Highest Floor (mm/sec)
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[a]		
Commercial/Industrial	20	20 to 40	40 to 50	40	10
Residential/School	5	5 to 15	15 to 20	15	5

Historic or sensitive structures	3	3 to 8	8 to 10	8	2.5

a) At frequencies above 100 Hz, the values in this column may be used as minimum values.
b) Standard defines short-term vibration as "vibration which does not occur often enough to cause structural fatigue, and which does not produce resonance in the structure being evaluated". Long-term is defined as all other vibration types not covered by the short-term definition.

Table 7.6 – Vibration Velocity Guideline Values for Peak Particle Velocity (PPV) for Structures (DIN 4150-3)

Peak Particle Vibration level (mm/sec)	Effect
0.14	Vibration might be just perceptible in most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that the vibration at this level in residential environments will cause complaint but can be tolerated if prior warning and explanation have been provided to the residents.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Table 7.7 – Criteria for Human Response to Construction Vibration (BS 5228-2:2009, Annex B)

The results of the vibration assessment are summarised below.

6.9.1 Vibration Effects from Tunnel Excavation

As stated in Section 3 above, the excavation of the tunnel will involve an EPB TBM. This mechanical process will be the primary source of vibration during tunnel excavation. The vibration assessment found that the use of the TBM and rolling stock/conveyors would meet the vibration standards of the AUP and DIN 4150-3 for a range of structures including residential, commercial and historic/sensitive structures, with a maximum ground vibration of 1.25mm/sec anticipated (at the Sackville Reserve at 36 Sackville Street). It was also noted that where the tunnel excavation reaches above20m below ground level (at 30, 2/30, 34, 36, 38, 37 and 39 Sackville Street), it may be possible for residents to sense low level vibrations, while the tunnel vibrations will also be above the AUP standards for night-time works. However, the assessment advised that the use of a CNVMP and communication with susceptible properties can address any concerns that residents may have.

6.9.2 Vibration Effects from Shaft Site Works

The shaft site works will involve a range of potential vibration sources including pile driving, crane operation and installation, and the excavation of shaft spoil, all within proximity to existing residential properties. The vibration assessment found that the operation of cranes, secant pile drill rigs and excavators would be compliant with DIN 4150-3 but would generate minor infringements of the AUP's night-time vibration standards and those of BS 5228-2:2009, with maximum ground vibrations of up to 0.82mm/sec possible. No excavation or crane use is proposed between 6pm and 7am and a CNVMP will be developed and used to address residents' concerns regarding daytime works.

The greatest potential for vibration effects is from the use of the sheet pile vibratory hammer, which will only occur on an intermittent basis and for up to one week at a time. The assessment found that while this activity will comply with the short-term standards of DIN 4150-3 with vibrations of 5.95mm/sec and frequency spectra of 20 to 50 Hz (at 42 Tawariki Street), it would not comply with the long-term standards of DIN 4150-3 by up to 0.95mm/sec. Furthermore, these vibrations would not comply with the AUP standards by up to 5.65mm/sec near 42 Tawariki Street and by 3.6mm/sec near residences at 35, 37, 39 and 46 Tawariki Street, while they would also be perceivable to the residents. The assessment suggested that these vibration effects could be addressed through communication with affected residents, the use of a CNVMP and avoiding night-time works between 6pm and 7am.

6.9.3 Vibration Mitigation

While some construction aspects of the Project will not comply with the relevant vibration standards, the Project's vibration effects can be mitigated through the following mitigation measures:

- Avoiding night-time surface works (i.e. crane operation, piling and excavations) at the shaft site;

- Undertaking regular communication with residents to advise them of vibration generating activities (e.g. piling);
- Installing seismograph stations along the tunnel route to monitoring vibration levels;
- Retaining an earthen bund at Tawariki Street to minimise vibration of neighbouring utilities; and
- Prepare and implement a CNVMP for the duration of works.

The CNVMP will be submitted to Council for certification prior to the commencement of works and will include the following vibration related measures (in addition to those matters outlined in Section 6.8.1 above):

- Notification requirements for residents and other parties;
- Guidance levels, including safety triggers;
- Hours of operation;
- Monitoring requirements, including the location and type of monitoring equipment;
- Details of inspection processes for potentially affected structures;
- Training procedures; and
- A complaint recording system.

Watercare have included these mitigation measures within the proposed conditions (Appendix S) and subject to the use of those measures, the Project will have no more than minor vibration effects.

6.10 Groundwater and Settlement Effects

The potential groundwater effects of the Project have been assessed by Williamson Water & Land Advisory (Appendix N) and the potential settlement effects have been assessed by McMillen Jacobs Associates (Appendix O). These assessments are summarised below.

6.10.1 Groundwater Effects from Tunnel Excavation

The groundwater effects of the tunnel excavation will be minimal as it will involve an EPB TBM, which limits groundwater ingress to the tunnel and prevents any groundwater related impacts from occurring.

6.10.2 Groundwater Effects from Shaft Construction

A numerical model was developed to determine the potential impact of shaft construction on regional groundwater and to estimate the rate of groundwater drainage into the shaft during and following construction for a range of shaft lining permeabilities. Maximum construction groundwater inflow is expected to peak at $32m^3$ per day if the shaft is unlined during excavation. If lining is installed during shaft construction, flows would reduce to 23 to $30m^3$ per day depending on lining permeability. Groundwater drainage into the shaft after construction is $5.6m^3$ per day for an unlined shaft, with drainage reducing to $4m^3$ per day with moderate lining permeability (10^{-8} m/s) and $2m^3$ per day with low lining permeability (10^{-9} m/s or less).

Groundwater drawdown with no shaft lining was predicted to be 5.5m at a distance of 10m from the shaft and reduced to 0.6m at 100m from the shaft. Any measurable drawdown (>0.05m) would be within 420m of an unlined shaft or 350m of a lined shaft.

Based on the modelling results, no existing groundwater users will be affected as the closest consented groundwater take is 2.5km south of the shaft site (a 150mm bore used for irrigating the fields at Eden Park). In addition, drawdown was not predicted to extend to the coast, avoiding any adverse effects relating to saline intrusion of the aquifer.

6.10.3 Settlement Effects from Tunnel Excavation

Given the favourable geological conditions along with the tunnel length (i.e. outside of alluvium or residual soil where there is no basalt or thin basalt cap and not within 3m of the top of the ECBF rock), there will be negligible settlement from the tunnel excavation.

6.10.4 Settlement Effects from Shaft Construction

As identified in the Settlement Assessment, the construction of the shafts may produce both mechanical settlement (due to soil excavation) and consolidation settlement (due to groundwater drawdown) around the shafts. These have been combined and modelled to produce a combined settlement contour plot. The assessment found that the maximum combined settlement is 14mm occurring over the playing fields within St Paul's College, to the east of the shaft site. As noted by McMillen Jacobs Associates, settlement of this magnitude is insignificant and the potential settlement effects of shaft construction will be less than minor.

6.10.5 Effects of Settlements on Buildings and Services

The 50mm total settlement and 1:1000 differential settlement limits have been adopted to assess settlement effects on building and services. No building or services (other than those located within the shaft site) are within a settlement zone exceeding 1:1000 differential or 50mm total settlement.

The existing buildings within the shaft site (i.e. dwellings on 44-48 Tawariki Street) will be demolished or removed. The only services that will be affected form part of the Project. As such, no buildings or services are predicted to be adversely impacted by the tunnel and shaft construction.

6.10.6 Groundwater and Settlement Monitoring

Watercare proposes to develop a Groundwater and Settlement Monitoring and Contingency Plan (GSMCP) for the Project. The GSMCP will include:

- Groundwater monitoring protocol prior to, during and after construction;
- Location plan of settlement and building (if required);
- Shaft wall monitoring protocol;
- Deformation and settlement alert and alarm levels (trigger levels) to be utilised for early warning of settlement with the potential to cause damage to buildings and services and details of the processes used to establish and, if necessary, review these triggers; and
- Procedures should deformation and settlement trigger levels be exceeded.

The GSMCP will be submitted to Council for certification prior to the commencement of works and will provide information to confirm that the magnitude of impact, if any, is no greater than predicted in this AEE. This has been included within the proposed conditions (Appendix H).

Overall, the Project will have less than minor groundwater and settlement effects.

6.11 Air Quality

As identified in Section 2, the Project meets the permitted air discharge standards of the AUP. Regardless, an Air Quality Assessment has been prepared by AECOM (Appendix P) which addressed both the construction and operation related air discharges of the Project.

6.11.1 Construction Air Quality Effects

The Air Quality Assessment has identified that the primary source of air quality effects during construction will be the works to connect the Orakei Main Sewer to the tunnel. However, the offensive odours caused by these

works can be managed using a suppression chemical spray and discharge via a temporary vent. Alternatively, a small portable carbon filter or similar could be employed. Watercare will also undertake regular monitoring to ensure that no objectionable odours are generated during works on the Orakei Main Sewer.

In addition to odours from sewer connections, the only other source of potential construction air quality effects will be from dust during earthworks. The use of standard erosion and sediment controls, including water suppression and stockpiling covering, will be employed to prevent the generation of dust.

6.11.2 Operational Air Quality Effects – Tunnel Ventilation

As described in Section 3, the finished shaft site will feature an air vent to allow the discharge of air from the tunnel. During dry weather conditions, this vent will be inoperative, with air from the tunnel ventilated downstream and not at the site. However, during wet weather conditions, the vent will allow for the discharge of air from the tunnel. This is required due to the pressure that the downstream vent sites will be under from increased system flows, resulting in air flows of up to 8.8m^3/sec during 10-year storm events.

Given these possible air flows, modelling of possible odour conditions based on discharges at ground level, 5m and 8m high was undertaken as shown in Table 7.8 below.

Parameter	Scenario 1	Scenario 2	Scenario 3
Odour Concentration (OU/m^3)	350	350	350
Air Flow Rate (m^3/s)	8.8	8.8	8.8
Odour Emission Rate (OU/s)	3,080	3,080	3,080
Stack Height (m)	0.1	5	8
Stack Diameter (m)	1.74	1.06	1.06
Stack Exit Velocity (m/s)	5	10	10
Assumed Stack Exit Temperature °C (K)	15 (288)	15 (288)	15 (288)

Table 7.8 – Odour Emission Parameters

These parameters were then modelled against existing land uses, including sensitive receivers (such as schools and dwellings). This modelling found that adequate dispersal of odour would occur under Scenarios 2 and 3 (i.e. 5m high and 8m high dispersal). As such, it is recommended that any discharge is via a 5 m stack incorporated into the plant and ventilation building. The flange around the top of the vent should be designed so that the short extension vent of 1 m external diameter could be easily retrofitted (to extend the height of the stack to 8 m above ground level) in the very unlikely event that odour nuisance occurs (less than a 1 in 10-year event). It is also noted that that the air vent will only operate during storm events, during which sensitive receivers are unlikely to be outdoors to experience odour (should the vent emissions fail to disperse).

6.11.3 Operational Air Quality Effects – Grit Trap Cleaning

The last potential source of odour is from the cleaning of the new grit trap. Grit trap cleaning will be similar in nature to that which regularly occurs to the existing trap in Tawariki Street. As the new grit trap is larger, the cleaning process will potentially take longer (up to two eight-hour days). However, as the new grit trap is further from residences and will operate under negative pressure, it is not expected that there will be any significant odour from the chamber. Any grit removed will be immediately loaded into a vacuum truck and therefore has little potential to generate odours. If necessary odour masking sprays can be used to control residual odour. Consequently, it is considered that the maintenance activity will not result in odours that are significantly different to those which currently occur.

6.11.4 Summary

Overall, the construction phase has the potential to generate odour and dust nuisances. However, these can be controlled and minimised using odour controls, such as chemical treatment, air scrubbing and dust management. As such, less than minor adverse air quality effects are anticipated during construction.

The operation of the vent is unlikely to generate noticeable odour effects, given that adequate dispersal of odour will occur and the limiting of emissions to storm events. Grit trap cleaning will also provide limited opportunity for odour emissions, particularly given that grit trap cleaning already occurs in the road reserve of Tawariki Street. Given these factors, the operational air quality effects will be less than minor.

6.12 Contamination

A limited PSI and DSI have been undertaken for the Project by AECOM (Appendix Q). The PSI concludes that it is unlikely that a HAIL activity has been undertaken (both historical and current) within the vicinity of the shaft site, while any potential HAIL activities (current or historical) on the surface of land above the tunnel alignment will be vertically remote from the underground tunnel. The DSI did not find any evidence of asbestos contamination at the shaft site, while laboratory testing did not find any contaminants in excess of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) or AUP Permitted Activity Criteria.

Overall, the Project will have less than minor contamination effects.

6.13 Earthworks Effects

As noted in Section 2, the Project earthworks meet the permitted standards of the AUP, other than for those tunnel excavations beneath a residential special character area (which will not be observable within that character area). The excavation works at the shaft site and along the tunnel route will be undertaken in a progressive manner so that no more than 2,500m^2/m^3 will be undertaken at any one time[4].

Regardless, Watercare will ensure that the works comply with Auckland Council's GD05 *"Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region"* with the use of a project specific Erosion and Sediment Control Plan (ESCP). A ESCP for the Project will address the earthworks occurring at the Tawariki Street Shaft Site. While the final controls employed under the ESCP will be detailed by the contractor, it is likely to include:

- A wheel wash for departing vehicles;
- Progressive stabilisation of worked faces;
- Silt fences or similar to prevent the flow of sediment off the site;
- Regular inspections of sediment controls, particularly after storm events; and
- Dust control.

The ESCP will be submitted to Council for certification prior to the commencement of works and a requirement to prepare the ESCP has been included as part of the proposed conditions (Appendix H). It is noted that the works are not located in proximity to any watercourses, further limiting the potential for sediment runoff to affect freshwater values.

Given the scale of earthworks proposed, the staggered approach to excavations, the use of an ESCP and the lack of any local watercourses, the Project will have less than minor effects from earthworks.

[4] This interpretation was adopted by Council for the CI deviation consent.

6.14 Conclusion

Overall, the Project will have significant positive effects by providing additional wastewater network capacity and reducing the volume and frequency of WWOs in the Cox's Bay catchment.

The Project is not expected to adversely affect any archaeological, heritage, landscape and ecological features. No buildings or services, groundwater users or groundwater quality, are predicted to be adversely affected, due to the tunnel and shaft excavation.

During the construction works, there will be adverse visual, traffic, noise and vibration effects within the immediate vicinity of the shaft site. These will generally be of a temporary and no more than minor nature and/or can be mitigated with appropriate construction management. Once completed, the Project and associated structures will be predominantly underground, while the shaft site will be reinstated in an appropriate manner. The adverse effects of the ongoing operation and maintenance are expected to be less than minor.

7. Consultation

7.1 Introduction

The purpose of the consultation undertaken to date on the Project is to assist with development and successful delivery of the project and to support the legislative requirements for the NoR and resource consent applications under the RMA.

7.2 Auckland Council

7.2.1 Local Board

The Project is within the Waitemata Local Board area. Watercare maintain continued engagement with the Waitemata Local Board regarding Watercare projects within the area and have updated the Local Board about the Project since 2018.

In December 2018, Watercare presented the Project at a Waitemata Local Board workshop. The presentation focused on the proposal to reduce wastewater overflows, the location of the proposed works, and a programme for delivery.

The Waitemata Local Board have not raised any issues in relation to the Project. Watercare will continue to engage with the Local Board to keep them abreast of the progress.

7.2.2 Healthy Waters

Watercare have consulted with Healthy Waters about the Project. Healthy Waters support the Project (see letter in Appendix T). Watercare will continue to communicate with Healthy Waters in relation to the project delivery programme.

7.2.3 Regulatory Services

Pre-application meetings were held on 5 December 2018 and 10 January 2019 with Council's resource consent and policy staff to discuss the Project. The meeting addressed the project's background, the scope of works proposed, the consultation being undertaken and the approval types which would be sought.

Council staff requested that draft versions of the Project's technical assessments were provided prior to lodgement, as well as details of Watercare's engagement with the Local Board and mana whenua. These were then provided to Council staff.

7.3 Mana Whenua

7.3.1 Kaitiaki Managers Project List and Interested Mana Whenua Groups

Watercare has an established process for engaging with mana whenua on projects and works within the Auckland region. This process includes early notification of works to be undertaken by Watercare which do, or are likely to, require resource consent.

The Kaitiaki Managers Projects List is provided on a monthly basis to the nominated representatives of all 19 mana whenua in the Auckland Council area: Ngāi Tai Ki Tāmaki, Ngāti Maru, Ngāti Pāoa, Ngāti Rehua Ngātiwai ki Aotea, Ngāti Tamaoho, Ngāti Tamaterā Ngāti Te Ata, Ngāti Wai, Ngāti Whanaunga, Ngāti Whātua Ōrākei, Te Ahiwaru, Te Ākitai, Te Patukirikiri, Te Uri o Hau, Waikato Tainui, Te Kawerau ā Maki, Ngāti Whātua o Kaipara, Ngāti Manuhiri, and Te Rūnanga o Ngāti Whātua.

A brief summary of each Watercare project is included in the list. Mana whenua are invited to indicate which projects they have an interest in. Further information on the identified project or projects is then provided to those parties followed by further engagement, depending on the responses received.

The Project has been included on the Kaitiaki Managers Projects List provided to mana whenua since April 2018. The following mana whenua indicated that they have an interest in the proposed works:

- Te Rūnanga o Ngāti Whātua;
- Te Kawerau ā Maki;
- Ngāti Whātua Ōrākei; and
- Ngāti Maru.

Information on the proposed works was emailed to the above mana whenua following their expression of interest.

In addition to the Kaitiaki Managers Project List, the consultation process for the Project to date has included:

- A project presentation by the Project Manager to Watercare's Mana Whenua Kaitiaki Forum (MWKF) on 9 August 2018.
- A project introduction meeting attended by representatives of Ngāti Whātua Ōrākei, along with the Project Manager and Watercare RMA Planner at Watercare Head Office on 21 August 2018.

None of the interested mana whenua, nor the mana whenua in attendance at the project presentation at the MWKF, expressed concern to cultural values after having the Project explained in detail. No site visits have been requested.

Watercare will continue to engage with mana whenua that have indicated an interest in the Project.

7.3.2 Mana Whenua Engagement Summary

Engagement with each mana whenua to date are summarised in Table 5.1 below.

Mana Whenua	Date	Engagement to Date
Te Rūnanga o Ngāti Whātua	27/07/18 09/08/18	Project introduction email sent following expression of interest Te Rūnanga o Ngāti Whātua kaitiaki in attendance at MWKF presentation
Ngāti Maru	09/08/18 24/08/18	Ngāti Maru kaitiaki in attendance at MWKF presentation Project introduction email sent following expression of interest
Ngāti Whātua o Kaipara	09/08/18	Ngāti Whātua o Kaipara kaitiaki in attendance at MWKF presentation
Ngāti Whanaunga	09/08/18	Ngāti Whanaunga kaitiaki in attendance at MWKF presentation
Ngāti Tamaoho	09/08/18	Ngāti Tamaoho kaitiaki in attendance at MWKF presentation
Ngāti Tamaterā Ngāti Te Ata	09/08/18	Ngāti Te Ata kaitiaki in attendance at MWKF presentation
Te Uri O Hau	09/08/18	Te Uri O Hau kaitiaki in attendance at MWKF presentation
Ngāti Manuhiri	09/08/18	Ngāti Manuhiri kaitiaki in attendance at MWKF presentation
Te Kawerau ā Maki	10/08/18	Project introduction email sent following expression of interest
Ngāti Whātua Ōrākei	15/08/18 21/08/18	Project introduction email sent following expression of interest Meeting at Watercare Head Office attended by Ngāti Whātua Ōrākei kaitiaki. Meeting minutes/actions: · Ngāti Whātua Ōrākei requested a copy of the final Multi Criteria Analysis (MCA) report once available. Ngāti Whātua Ōrākei will review the MCA and provide their feedback on the site options. · Ngāti Whātua Ōrākei kaitiaki expressed their support on behalf of Ngāti Whātua Ōrākei in principle for the project.

Mana Whenua	Date	Engagement to Date
	01/11/18	Copy of Final MCA Report provided by email to Ngāti Whātua Ōrākei kaitiaki

Table 5.1 – Mana Whenua Engagement Summary

7.4 Auckland Transport

Watercare will be designating the road reserve at the eastern end of Tawariki Street for the Project. Watercare have met with Auckland Transport (AT) to discuss the proposed works and will continue to communicate with both the AT consenting and Corridor Access Request (CAR) teams. AT will be involved during the preparation and implementation of any required Traffic Management Plan(s) for the Project.

7.5 Network Utilities

As stated in Section 5.5 above, the Project interfaces with other utility services. Communication with these agencies will occur prior to the commencement of construction.

7.6 Private Landowners

All of the directly affected landowners at the Tawariki Street Shaft Site (i.e. land to be designated) have been contacted by Watercare. The directly affected landowners are listed in Section 2.3.3 above. These include two private landowners, Housing New Zealand, and Auckland Transport. Consultation undertaken with Auckland Transport is summarised earlier. Negotiations with the private landowners and Housing New Zealand are underway.

Landowners adjacent to the shaft site, along the proposed construction traffic route (i.e. Tawariki Street, Mokau Street and Moira Street) and above the tunnel alignment (within the 40 m horizontal corridor) have also been contacted by Watercare. A flyer providing information of the Project has been sent to all these landowners (Appendix U).

Once the detailed design is completed and the final alignment known, Watercare will formally notify landowners directly above the tunnel alignment in accordance with the Local Government Act. This process requires either that the owners' prior written consent is obtained, or the owners are given an opportunity to object to the works at a formal hearing. This is a separate process effectively dealing with Watercare obtaining a property right for its proposed works, rather than the environmental and resource management approvals to be sought under the RMA.

7.7 Summary

Generally, the parties consulted to date have been supportive of the overall project and have requested to be updated on the progress of the Project. Further information has also been requested and provided in relation to the potential effects of the Project. Consultation will continue with these parties to ensure that they are informed of the Project progress and management of potential effects.

8. Notification

8.1 Resource Consents

For a resource consent application, the consent authority must decide whether to give public or limited notification of the application in accordance with sections 95A and 95B of the RMA.

8.1.1 Public Notification (Section 95A)

The steps that must be followed by the consent authority when deciding whether or not to publicly notify a resource consent application are set out in section 95A of the RMA.

Step 1: Mandatory public notification in certain circumstances

It is considered that no mandatory notification is required as:

- The applicant has not requested that the application is publicly notified (s95A(3)(a));
- There are no outstanding or refused requests for further information (s95C and s95A(3)(b)); and
- The application does not involve any exchange of recreation reserve land under s15AA of the Reserves Act 1977 (s95A(3)(c)).

Step 2: If not required by step 1, public notification precluded in certain circumstances

The application is not precluded from public notification as:

- The activities are not subject to a rule or national environmental standard (NES) which precludes public notification (s95A(5)(a)); and
- The application for resource consent is not a controlled activity, a subdivision of land, a residential activity, a boundary activity or prescribed activity (s95A(5)(b)).

Step 3: If not precluded by step 2, public notification required in certain circumstances

The application does not require public notification as:

- The activities are not subject to a rule or national environmental standard (NES) which requires public notification (s95A(5)(a)); and
- The activities will not have adverse effects on the environment that are more than minor (s95A(8)(b) and s95D).

In accordance with section 95D of the RMA, a consent authority must disregard any effects on persons who own or occupy the land in, on, or over which the activity will occur, and any adjacent land when deciding whether an activity will have or is likely to have adverse effects on the environment that are more than minor. The adjacent properties of the Project are identified in Appendix C and any adverse effects on these properties should be disregarded.

As concluded in Section 6.14 above, the Project is not expected to adversely affect any archaeological, heritage, landscape and ecological features. No buildings or services, groundwater users or groundwater quality, are predicted to be adversely affected, due to the tunnel and shaft excavation. There will be adverse visual, traffic, noise and vibration effects during the construction phase on the Project. These effects will be temporary and are no more than minor beyond the adjacent land. The adverse effects of the ongoing operation and maintenance are expected to be less than minor.

Step 4: Special circumstances

Section 95A(9) of the RMA states that an application may be publicly notified if 'special circumstances' exist, notwithstanding the satisfaction of the statutory tests that would allow for non-notification. 'Special circumstances' are not defined in the Act. Case law has identified 'special circumstances' as something outside the common run of things which is exceptional, abnormal or unusual but less than extraordinary or unique. A 'special circumstance' would be one which makes notification desirable despite the general provisions excluding the need for notification. The local authority should be satisfied that public notification may elicit additional information on the aspects of the proposal requiring resource consent.

In the recent decision of Urban Auckland v Auckland Council (2015) a number of additional potential grounds for special circumstances were identified:

- Public ownership of the appellant, an asset or the application site;
- Long standing public knowledge of a proposal;
- National significance of a proposal;
- Failure to properly assess the potential adverse effects of a proposal;
- Significant public interest and controversy;
- Breach of a legitimate expectation from Council that a proposal would be notified; and
- Making an error of law in considering the status of an application for the purposes of determining notification.

Although a small section of the road reserve (Tawariki Street) will be occupied during the construction phased of the Project, this area is not required for permanent works and will be reinstated in an appropriate manner. As such, this is not considered a special circumstance which warrants the public notification of the application. There are no other 'special circumstances' that exist to justify the public notification of this application.

Public notification conclusion

Overall, it is considered that public notification of the application is not required because:

- Watercare does not request public notification;
- The Project will not have adverse effects on the environment that are more than minor; and
- There are no 'special circumstances' that exist to justify the public notification of the application.

8.1.2 Limited Notification (Section 95B)

The steps that must be followed by the consent authority when deciding whether or not to limited notify a resource consent application are set out in section 95B of the RMA.

Step 1: Certain affected protected customary rights groups must be notified

There are no protected customary rights groups or customary marine title groups affected by the proposed activity (s95B(2)) and the shaft site is not subject to a statutory acknowledgement under schedule 11.

Step 2: If not required by step 1, limited notification precluded in certain circumstances

The application is not precluded from limited notification as:

- The activities are not subject to a rule or national environmental standard (NES) which precludes public notification (s95B(6)(a)); and
- The application for resource consent is for a restricted discretionary activity and is therefore not precluded from public notification (s95B(6)(b)).

Step 3: If not precluded by step 2, certain other affected persons must be notified

In accordance with section 95E of the RMA, a person is an affected person if the consent authority decides that the activity's adverse effects on the person are minor or more than minor (but are not less than minor).

Based on the assessment in Section 6 of this AEE, the following persons (owners and occupiers) are potentially affected by this application due to the minor adverse visual, traffic, noise and vibration effects during the construction phase on the Project:

- 1 – 41 and 2 – 48 Tawariki Street, Grey Lynn;
- 1 – 31 and 2 – 28 Moira Street, Grey Lynn;
- 1 – 5 and 4 Mokau Street, Grey Lynn;
- 235 Richmond Road, Grey Lynn;
- 183 Richmond Road (St Paul's College), Grey Lynn; and
- 82 Kelmarna Avenue (Marist School), Herne Bay.

Further to these potentially adversely affected persons, Watercare request that the property owners and occupiers above the tunnel alignment (within the 40 m horizontal corridor) are also provided the opportunity to submit on the application as these properties form part of the subject site and this is consistent with the notification approach of the CI and subsequent deviation consent. Effects on these properties will be less than minor as discussed in Section 6 above. A list of the properties above the tunnel alignment within the 40m horizontal corridor is provided in Appendix C.

Step 4: Further notification in special circumstances

It is not considered that there are any special circumstances relevant to this application.

Limited notification conclusion

Based on the above, the application should proceed on a limited notified basis to the affected persons identified above.

8.2 Notice of Requirement

Sections 169 (1)(b), 149ZCB and 149ZCC of the RMA state that the consent authority must decide whether to give public or limited notification of an NoR.

8.2.1 Public Notification (Section 149ZCB)

A consent authority may, at its discretion, decide to publicly notify a notice of requirement (s149ZCB(1)). Notwithstanding that discretion, public notification is required where:

- The applicant requests public notification (s149ZCB(2)(b)).
- A rule in a district or regional plan or a national environmental standard requires public notification (s149ZCB(2)(c)).

- The activity will have, or is likely to have, more than minor adverse effects (s149ZCB(2)(a)). Similar for resource consents, the consent authority must disregard the effects of a notice of requirement on the land to which the requirement relates and any adjacent land in undertaking this assessment (s149ZCE(a)).

Public notification of a notice of requirement is precluded where a rule or national environmental standard precludes it and the applicant has not otherwise requested public notification (s149ZCB(3)). However, even where notification is precluded, a consent authority may still publicly notify a notice of requirement where it considers special circumstances exist (s149ZCB(4)).

Public notification conclusion

Overall, it is considered that public notification of the NoR is not required because:

- Watercare does not request public notification;
- No rule in a district or regional plan or a national environmental standard requires the public notification of the NoR;
- The Project will not have adverse effects on the environment that are more than minor; and
- There are no 'special circumstances' that exist to justify the public notification of the NoR.

8.2.2 Limited Notification (Section 149ZCC)

Where a consent authority decides not to publicly notify a notice of requirement, it must then (s149ZCC(1)):

- identify any affected protected customary rights groups and / or affected customary marine title groups; and
- decide if there are any affected persons under s 149ZCF.

Limited notification must be given to any affected groups, irrespective of whether public or limited notification is precluded by a rule or national environmental standard (s149ZCC(3)). For affected persons, essentially the same test as for resource consents is applied when determining whether a person is "affected" by a notice of requirement (s149ZCC(1)).

Limited notification must be given to affected persons unless a rule or national environmental standard precludes it (s149ZCC(2)); the person has given their written approval (s149ZCE(3)(a)); or it is unreasonable for the requiring authority to seek an affected person's written approval (s149ZCE(3)(b)). The special circumstances test does not apply to decisions whether to limited notify notices of requirement.

Limited notification conclusion

Based on the assessment provided in Section 8.1.2 above, the NoR should proceed on a limited notified basis to the affected persons identified above.

8.3 Summary

Based on the above, the NoR and resource consents application for the Project should proceed on a limited notified basis to the affected persons identified in Section 8.1.2 above.

9. Statutory Context

9.1 Actual and Potential Effects on the Environment (s104(1)(a))

This section of the RMA requires that regard is given to any actual and potential effects on the environment of allowing the activity.

Comment

An assessment of the actual and potential environmental effects on the environment of the Project is included in Section 6 of this report. The Project is not expected to adversely affect any archaeological, heritage, landscape and ecological features. No buildings or services, groundwater users or groundwater quality, are predicted to be adversely affected, due to the tunnel and shaft excavation.

During the construction works, there will be adverse visual, traffic, noise and vibration effects within the immediate vicinity of the shaft site. These will generally be of a temporary and no more than minor nature and/or can be mitigated with appropriate construction management. Once completed, the Project and associated structures will be predominantly underground, while the shaft site will be reinstated in an appropriate manner. The adverse effects of the ongoing operation and maintenance are expected to be less than minor.

9.2 National Environmental Standard (s104(1)(b)(i))

This section of the RMA requires that regard is given to any relevant provisions of a national environmental standard (NES).

Comment

The NES Soil applies to activities that disturb the soil if the relevant piece of land is, or has previously been, a HAIL site.

As noted in the PSI and DSI (Appendix Q), it is unlikely that a HAIL activity has been undertaken (both historical and current) within the vicinity of the shaft site, while any potential HAIL activities (current or historical) on the surface of land above the tunnel alignment will be vertically remote from the underground tunnel. Furthermore, soil and laboratory testing did not find any contaminants in excess of the NESCS. As such, resource consent is not required under the NESCS.

9.3 Other Relevant Regulations (s104(1)(b)(ii))

This section of the RMA requires that regard is given to any relevant provisions of any other regulations.

Comment

No other regulations are considered relevant to the application.

9.4 National Policy Statements (s104(1)(b)(iii))

This section of the RMA requires that regard is given to any relevant provisions of a National Policy Statement (NPS).

Comment

The NPS for Freshwater Management 2014 (NPSFM) of relevance, given the role the Project will have in the improvement of freshwater quality. As noted in Sections 1 and 6 of this AEE, one of the key benefits of this Project is the reduction in WWOs from the local wastewater network. The Project will provide increased network capacity and hence reducing pressure on the network during storm event and ensuring that a greater volume of wastewater flows proceed to the Mangere WWTP rather than being discharged into local watercourses.

The reduced frequency in overflows will assist Watercare's, Auckland Council's and community efforts to improve the water quality of the affected watercourses. This is consistent with Objective A1 of the NPSFM and will help with safeguarding public health and restoring the life-supporting capacity and ecological values of these watercourses.

In addition, the Project represents the integrated management of water resources, with the improved management of wastewater flows, as well as supporting the wellbeing of local natural freshwater systems. As such, the Project is also consistent with Objective C1.

Lastly, Watercare will continue to work with tangata whenua in recognition of the important culture values which tangata whenua have for freshwater resources. This includes engagement through Watercare's Kaitiaki Forum. The reduced frequency of WWOs will also assist in restoring the mauri of local watercourses. Given this, the Project is consistent with Objective D1.

Overall, the Project is consistent with the NPSFM.

The Project is also consistent with the NPS on Urban Development Capacity 2016 (NPSUDC) which recognises the national significance of:

- Urban environments and the need to enable such environments to develop and change; and
- Providing sufficient development capacity to meet the needs of people and communities and future generations in urban environments.

As noted in Sections 1 and 6 above, the Project will allow for added capacity across the wider wastewater network and directly benefits downstream areas, such as the Central Business District and Freemans Bay, allowing for urban intensification and addition development capacity.

9.5 New Zealand Coastal Policy Statement (s104(1)(b)iv))

This section of the RMA requires that regard is given to any relevant provisions of a New Zealand Coastal Policy Statement (NZCPS).

Comment

As the Project is not located in the Coastal Marine Area and is away from the coast, the NZCPS is not considered relevant.

9.6 Regional Policy Statement or Proposed Regional Policy Statement (s104(1)(v))

Section 104(1)(b)(v) of the RMA requires that regard is given to any relevant provisions of a regional policy statement or proposed regional policy statement.

Comment

An assessment of the proposal against the Regional Policy Statement (RPS) section of the AUP is provided in Appendix G, and included assessment against:

- B1 – Ngā take matua ā-rohe – Issues of regional significance;
- B2 – Tāhuhu whakaruruhau ā-taone – Urban growth and form;
- B3 – Ngā pūnaha hanganga, kawekawe me ngā pūngao – Infrastructure, transport and energy
- B6 – Mana Whenua; and
- B7 – Toitū te whenua, toitū te taiao – Natural resources.

In summary, the Project is considered consistent with the RPS given its role in providing efficient and resilient infrastructure services to the community. The Project will ensure that adequate wastewater network capacity is provided in support of urban intensification and population growth, while also allowing for improvements in the overall environmental performance of the network given the Project's role in reducing WWOs.

The Project's construction will give rise to temporary effects, principally at the shaft site, given the scale of works proposed and the impacts of construction traffic on the immediate road network. However, these construction effects will be suitably managed and mitigated by standard construction practices, including the use of an ESCP, traffic management and regular communication with surrounding residents. Longer-term effects from the above-ground infrastructure at Tawariki Street will be minimised by ensuring the Project's structures are similar in size and scale to the surrounding residential dwellings, while air discharges from the tunnel will be treated to AUP standards. Watercare will also continue to work with mana whenua to ensure that the cultural effects of the Project are suitably managed.

9.7 Plan or Proposed Plan (s104(b)(iv))

This section of the RMA requires that regard is given to any relevant provisions of a plan or proposed plan.

Comment

Appendix G provides an assessment of the proposal against the relevant objectives and policies contained within the AUP in the following chapters. The relevant objectives and policies are not subject to any appeals and hence are operative under the AUP.

- Chapter E2 – Water Quantity, Allocation and Use;
- Chapter E11 – Land Disturbance (Regional);
- Chapter E12 – Land Disturbance (District);
- Chapter E25 – Noise and Vibration;
- Chapter E26 – Infrastructure; and
- Chapter H5 – Residential Mixed Housing Zone.

In summary, the Project is consistent with the objectives and policies of the AUP given the chosen project location, the construction methodology selected, and the scale of effects anticipated during both the construction and operation of the Project.

The AUP recognises the benefits of infrastructure and the value of investment in this type of works, as well as the need for the safe, efficient and secure servicing of new and existing development in the Auckland Isthmus. The Project is a vital component of Auckland's future wastewater network and has been subject to an alternative analysis to ensure than an appropriate and efficient wastewater asset is delivered to the community.

Watercare has also sought to avoid significant disruption to residents, with construction related effects managed and mitigated by the measures proposed in the draft conditions. This includes the use of a CNVMP, a CTMP, ongoing engagement, and an ESCP.

Longer term operational effects have also been addressed by limiting the size of the plant room, providing screening of the Tawariki Street Shaft Site from neighbouring residences, landscaping of the new retaining wall at St Paul's College, and the use of air scrubbing to minimise the release of offensive odours during tunnel venting. These measures will provide for the maintenance of amenity values within Tawariki Street and its surrounds.

9.8 Other Legislative and Planning Requirements (s104(1)(c))

9.8.1 Auckland Plan 2050

The Auckland Plan is the guiding strategic document for the Auckland Region and was a statutory requirement under section 69 of the Local Government (Auckland Council) Act 2009. The Auckland Plan was first released in 2012 and updated in 2018, and gives the strategic direction for Auckland's growth, management of the natural environment, and infrastructure investment. The Project will help facilitate the sustainable growth of the Auckland Isthmus by providing additional wastewater network capacity.

Consideration has been given to minimising the adverse environmental effects of the Project, while also ensuring that an appropriate level of infrastructure investment is made at the times it is required by the local community. As such, the Project is consistent with the Auckland Plan 2050.

9.8.2 Auckland Council 30 Year Infrastructure Strategy

Auckland Council is required under the Local Government Act to provide a 30-Year Infrastructure Strategy as part of its Long-Term Plan. The current strategy was prepared with the 2018 – 2028 Long Term Plan and identifies the need to co-ordinate infrastructure planning and investment to enable growth.

As highlighted throughout the AEE, the Project is critical for the growth of urban Auckland, within an area determined by the AUP as an appropriate location for intensification. The Project is recognised as a mechanism to 'unlock' the potential for brownfield development and ensure that planned development yields occur, thereby supporting the investment goals of the strategy.

9.9 Section 104C Assessment

Noting the matters for resource consent (as identified in Section 2.4 of the AEE), assessment is required against the relevant criteria of E7.8 and E26.6.7. These assessment matters have been discussed in detail in Section 6 of the AEE and it was determined that the earthworks and groundwater related effects of the Project will be addressed through the use of both the proposed ESCP and GSMCP. Furthermore, the groundwater effects of the Project are not anticipated to cause either saline intrusion of the aquifer, significant ground settlement or affect the other permitted groundwater users. Given these factors, the Project is consistent with the assessment criteria of E7.8 and E26.6.7

9.10 Recommendation by a Territorial Authority (s171)

Section 171 of the RMA sets out the matters which are to be taken into consideration by Council when considering a NoR. These matters have been addressed throughout the AEE and associated technical assessments and as they relate to the Project are as noted:

- Effects on environment and Part 2 of the RMA addressed in Sections 6 and 9;
- Relevant provision of policy statements and plans have been addressed in Sections 9.6 and 9.7 (Appendix G);
- Adequate consideration of alternative sites, routes and methods has been addressed in Appendix F and summarised in Section 4 above;
- Whether the works and designation are reasonably necessary to achieve the objectives for which the designation is sought. The proposed works and designation are considered reasonably necessary because:
    - The proposed works will assist in the efficient operation of the metropolitan wastewater network;
    - The proposed works will enable Watercare to comply with the statutory purpose of the RMA to promote the sustainable management of natural and physical resources;

- The designation will allow Watercare and/or its authorised agents to undertake works for the construction, operation and maintenance of the metropolitan wastewater network and its associated ancillary components;
- The designation will enable works to be undertaken in a comprehensive and integrated manner; and
- The designation provides for a type of land use not otherwise provided for in the Residential – Mixed Housing Zone.

· Other matters that inform the territorial authority's consideration are contained within this AEE, notably within Sections 6 and 9.

Given the above factors, it is considered that Auckland Council should recommend that the NoR by Watercare be confirmed.

9.11 Part 2 Matters – Purpose and Principles (s5, 6, 7 & 8)

Part 2 of the RMA provides a common set of principles to be applied to the management of all resources.

9.11.1 Section 5 Assessment

The RMA has a single overarching purpose: to promote the sustainable management of natural and physical resources. Sustainable management is defined in section 5 of the RMA as:

> *...managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –*
>
> *(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
>
> *(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
>
> *(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

Comment

The effects of the Project are addressed in Section 6 of this report. The Project represents the sustainable use of natural and physical resources, providing a vital infrastructure service in a manner which avoids significant effects on the community and the natural environment. The Project will provide additional capacity for the metropolitan wastewater network, supporting the intensification of the Auckland Isthmus. As such, the Project will assist in the delivery of additional housing and business space for Auckland's residents, thereby enabling the community's economic and social wellbeing.

Furthermore, the Project will assist in reducing the frequency of WWOs, helping improve the water quality of local watercourses. This will assist in the reducing the environmental footprint of the wastewater network and will assist in ongoing efforts to restore Cox's Creek and other urban streams.

Watercare has and will continue to work with mana whenua, principally through its Kaitiaki Forum. The cultural values of freshwater are recognised by Watercare, and the Project's reduction in WWOs will assist efforts to restore the mauri of local freshwater resources.

Finally, Watercare has proposed a range of measures during both the construction and ongoing operation of the Project to address potential adverse effects. The use of standard construction management practices, such as erosion and sediment controls, will ensure that the construction phase will have no more than minor adverse effects. The Project has also been designed to maintain local amenity values and allow for surrounding residents to continue the use of their properties.

9.11.2 Section 6 Assessment

Section 6 of the RMA asserts that in achieving the purpose of the Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for matters of national importance. The specified matters of importance of relevance to this Project are:

> *(e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga;*

Comment

As stated previously, Watercare have worked with mana whenua to ensure that Project avoids the disturbance of any taonga or waahi tapu. The Project will also deliver significant benefits to improving water quality, allowing for continued restoration of the mauri of local freshwater resources.

Watercare will also continue to work with mana whenua, through its Kaitiaki Forum, to ensure that the Project incorporates the aspirations of Maori.

9.11.3 Section 7 Assessment

Under Section 7 of the RMA, other matters that all persons exercising functions and powers under the Act, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to:

> *(a) kaitiakitanga;*
>
> *(b) the efficient use and development of natural and physical resources;*
>
> *(c) the maintenance and enhancement of amenity values;*
>
> *(f) maintenance and enhancement of the quality of the environment;*

Comment

The Project will deliver benefits to both the community and the natural environment, given its role in supporting urban intensification and reducing WWOs. The Project also represents the efficient use of natural and physical resources by allowing for the redirection of wastewater flows from the Orakei Main Sewer to the CI, thereby freeing up capacity in the Orakei Main Sewer for downstream development. This is a more efficient use of infrastructure investment than the replacement of the Orakei Main, which would require significant civil works and disruption in wider urban area.

The Project is also largely underground and for most of its route will be unnoticed by residents. The only surface works are located at Tawariki Street and will be screened by a boundary wall and landscaping, thereby maintaining the surrounding amenity and character values. Furthermore, the reduction in wet weather overflows will assist in the improvement of water quality and the environmental values associated with local watercourses.

9.11.4 Section 8 Assessment

Section 8 of the RMA requires that in achieving the purpose of the Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi.

Comment

Watercare has consulted and engaged with mana whenua throughout the development of the Project through its Kaitiaki Forum. Consideration has been given to how the Project can support the cultural values of mana whenua associated with freshwater as well as the improvements that the Project will provide to the overall

environmental performance of the wastewater network. Furthermore, the Project will support the economic wellbeing of mana whenua, by providing for additional housing and business development in the urban area.

10. Conclusion

The Project represents an important wastewater investment for the future of Auckland. By constructing a new wastewater tunnel, shafts and associated underground connections, the Project will enable the delivery of additional housing and business development capacity in the urban area, while also assisting in improving water quality by reducing the frequency of WWOs.

The Project is also integrated with other network improvements and provides flexibility for future investment, thereby future proofing the wastewater network and avoiding the costly replacement of existing infrastructure assets. It does so in a manner which avoids significant adverse effects and Watercare has provided a range of measures to ensure that the construction and operational effects of the Project are no more than minor.

Lastly, the Project is consistent with the relevant statutory planning documents and regulatory tests, thereby by satisfying the requirements of the RMA for Auckland Council to recommend confirmation by Watercare of the designation and grant the associated resource consents.

Appendix A. Land Requirement Plan

Appendix B. Certificates of Title

Appendix C. Schedule of Properties on Tunnel Route

Appendix D. Tunnel Long Section

Appendix E. Tawariki Street Shaft Site Layout Plans

Appendix F. Assessment of Alternatives Report

Appendix G. Assessment of AUP Objectives and Policies

Appendix H. Proposed Conditions

Appendix I. Ecological Assessment

Appendix J. Archaeological and Historic Heritage Assessment

Appendix K. Traffic Impact Assessment

Appendix L. Noise Assessment

Appendix M. Vibration Assessment

Appendix N. Groundwater Assessment

Appendix O. Settlement Assessment

Appendix P. Air Quality Assessment

Appendix Q. Contamination Report

Appendix R. Visual Impact and Landscape Assessment

Appendix S. Arborist Report

Appendix T. Healthy Waters Letter in Support

Appendix U. Flyer to Landowners