Northern Interceptor Wastewater Project Assessment of Effects on the Environment

Volume 1 - AEE and Appendices A-D





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QUALITY STATEMENT

PROJECT MANAGER

Christopher Povey, Garrett Hall

PROJECT TECHNICAL LEAD

Chris van der Boom

PREPARED BY

Megan Couture, Grace Wilson, Jay Burgess, Chris Scrafton, Frances Lojkine, Andrew Cumberpatch, Garrett Hall

CHECKED BY

Chris Scrafton, Christopher Povey, Karen Bell

REVIEWED BY

Jim Bradley, Karen Bell, Chris Scrafton, Megan Couture

APPROVED FOR ISSUE BY

Chris van der Boom

AUCKLAND

MWH House Level 3, 111 Carlton Gore Road, Newmarket, Auckland 1023 PO Box 9176, Newmarket, Auckland 1149 TEL +64 9 580 4500, FAX +64 9 580 7600

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Executive Summary

Watercare Services Limited ("Watercare") is proposing to construct a wastewater interceptor ("the Northern Interceptor") to collect, store and convey wastewater to the Rosedale Wastewater Treatment Plant (Rosedale WWTP).

Population forecasts indicate that the Northern Waitakere area, inclusive of the North West Transformation Area ("NWTA") and South Rodney, inclusive of Kumeu, Huapai and Riverhead will grow significantly over the next 50 years. In response to the accompanying increase in wastewater flow, Watercare has assessed the existing capacity in the wastewater network. This assessment identified that by around 2020 the existing capacity will need to be increased.

In response, Watercare is proposing the Northern Interceptor to collect, store and convey wastewater to the Rosedale WWTP. During the development phase of the Northern Interceptor Project, updated long-term population forecasts with the design horizon out to 2070 showed an increase in the long-term population in Waitakere and south Rodney areas. This will require large diameter pipes to service the long-term population growth.

It was necessary to develop a solution to manage earlier flows until the catchment population grows sufficiently to ensure that pipework is not initially oversized which would increase the risk of significant operational problems including blockages, septicity, odour and corrosion due to the low flows at the outset.

The proposed solution is a smaller diameter pipe to manage earlier flows until the catchment populations grow sufficiently. Therefore, rather than construct the pipeline for ultimate flows at the outset, the following staged project was developed:

Phase One: The first phase of the Northern Interceptor is a new pipeline planned for completion by 2020 to serve the immediate population growth. This phase will transfer existing flows from the Hobsonville PS to Rosedale WWTP, via a crossing of the Upper Waitemata Harbour and through Greenhithe. Construction is expected to begin 2017-2018.

Future Phases: Future phases of the Northern Interceptor may include a new pipeline from the Westgate commercial area to the Hobsonville PS, and Concourse (Henderson) to Westgate, additional pipelines from the Hobsonville PS to Rosedale WWTP (including an additional harbour crossing), new pump stations in Hobsonville, Concourse and Greenhithe/Schnapper Rock, and associated works. The timing of these future phases will depend on the rate of population growth in north-western parts of Auckland.

These resource consent applications and Assessment of Effects on the Environment (AEE) relate to the implementation of Phase One ("The Project").

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.

The Project will have important positive effects by:

- Providing capacity in the wastewater network for future growth and development in Auckland;
- Diverting existing wastewater flows away from the Mangere WWTP;
- Reducing the potential for wastewater overflows from the existing network by providing appropriate infrastructure to service growth; and
- Having positive effects on public health and the environment through the continued effective operation of the wastewater network generally.

Northern Interceptor - Phase 1

CONTENTS

Northern Interceptor Wastewater Project - Phase 11				
Execu	Executive Summaryii			
Glossa	Glossary of Terms			
Glossa	ary of Abbreviations	.6		
1 Int	Introduction and Project Overview1			
1.1	Introduction	.1		
1.2	Project Overview	.2		
1.3 Report Structure and Purpose				
2 Pr	oject Background, Drivers and Alternatives	.4		
2.1	Northern Interceptor – Project Alternatives	.4		
2.2	Assessment of Alternatives to Service Growth	.4		
2.3	Proposed Solution – Northern Interceptor	.5		
2.4	The Development of Phase 1	.5		
2.5	Upper Waitemata Harbour Crossing Alignments	.5		
3 Pr	oject Description and Existing Environment	10		
3.1	Overview	10		
3.2	Groundwater & Geology	13		
3.3	Hobsonville Pump Station to 20 Upper Harbour Drive (includes State Highway 18 Crossing)	14		
3.4	20 Upper Harbour Drive to Causeway Widening	17		
3.5	Upper Waitemata Harbour Crossing	19		
3.6 Rahui Road to Greenhithe Road		29		
3.7	Greenhithe Road to Wainoni Park (South)	32		
3.8	Wainoni Park (South and North)	34		
3.9	Te Wharau Creek Crossing	36		
3.10	North Shore Memorial Park	38		
3.11	NSMP to North Shore Golf Club	40		
3.12	NSGC to Albany Highway	42		
3.13	Albany Highway to William Pickering Drive	44		
3.14	William Pickering Drive to Bush Road	45		
3.15 Bush Road to Rosedale WWTP		47		
3.16	Construction Management	49		
4 St	atutory Framework	50		
4.1	Resource Consents Required	50		
4.2	Requiring Authority Approvals	55		
4.3	4.3 Other Approvals			
4.4	Statutory Tests	55		

5 Co	onsultation	56
5.1	Overview	56
5.2	Auckland Council	56
5.3	Mana Whenua	57
5.4	Transport Authorities	62
5.5	Network Utilities	63
5.6	Other Agencies	63
5.7	Directly Affected Private Landowners	63
5.8	Immediately Adjacent Private Landowners	64
5.9	Other Interest Groups and Organisations	65
5.10	Public Consultation Events	66
5.11	Key Consultation Outcomes	66
6 As	ssessment of Effects on the Environment	68
6.1	Overview and Structure of Assessment	68
6.2	Positive Effects	68
6.3	Effects within the Coastal Marine Area	69
6.4	Groundwater and Settlement Effects	73
6.5	Vibration Effects	76
6.6	Noise Effects	77
6.7	Effects on Network Utilities and Infrastructure	79
6.8	Archaeological Effects	79
6.9	Maori and Cultural Heritage Effects	80
6.10	Visual and Landscape Effects	80
6.11	Recreation and Public Access Effects	82
6.12	Arboricultural Effects	84
6.13	Ecological Effects	84
6.14	Traffic Effects	86
6.15	Effects on Contaminated Land	87
7 St	tatutory Assessment	88
7.1	Overview	88
7.2	New Zealand Coastal Policy Statement 2010	88
7.3	National Policy Statement for Freshwater Management 2014	89
7.4 Hur	National Environmental Standard for Assessing and Managing Contaminants in Soil to Pr man Health 2011	otect 90
7.5	Operative Auckland Regional Policy Statement 1999	90
7.6	Proposed Auckland Regional Policy Statement	92
7.7	Works within the Coastal Marine Area	94
7.8	Works outside the Coastal Marine Area	97
7.9	Other Matters	109
8 Pa	art 2 Assessment– Purpose and Principles	112

9	Conclusion11	6
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LIST OF TABLES

Table 2-1: Alternatives to cross the Upper Waitemata Harbour	6
Table 3-1: Project Sections	12
Table 4-1: Resource Consent Requirements	51
Table 4-2: Section 104 Requirements	55
Table 5-1: Mana Whenua Entities and Involvement	59
Table 6-1: Comparison of HDD and Marine Trenching Construction	73
Table 6-2: Stream Crossings	85
Table 7-1: NES:Soil – Assessment Criteria	90
Table 7-2: Works in the Coastal Marine Area (ACRP:C and PAUP)	94
Table 7-3: ACRP:SC – Theme Assessment	97
Table 7-7-4 –ACRP:ALW Theme Assessment	
Table 7-5: ACDP:NS – Theme Assessment	
Table 7-6: ACDP:W – Theme Assessment	
Table 7-7: PAUP – Theme Assessment	
Table 7-8: Section 105 Matters	
Table 8-1: Consideration of Sections 6 and 7 of the RMA	112

LIST OF FIGURES

Figure 2-1: Map of Harbour Crossing Alternatives	7
Figure 3-1: Project Alignment – Northern Interceptor Phase 1 Route1	0
Figure 3-2: Hobsonville Pump Station (PS70)1	5
Figure 3-3: State Highway 18 Crossing to 20 Upper Harbour Drive1	6
Figure 3-4: Aerial View of Landing Site at Rahui Road (the grassed area)2	0
Figure 3-5: Rahui Road Landing Site2	0
Figure 3-6: Horizontal Directional Drilling Indicative Construction Envelope2	1
Figure 3-7: Marine Trenching Indicative Construction Envelope2	2
Figure 3-8: Proposed Horizontal Directional Drill Methodology2	3
Figure 3-9: Horizontal Directional Drill Rig in Operation (Graham Park, Tauranga)2	4
Figure 3-10: Indicative Intertidal Trenching Methodology off Temporary Berm at Rahui Road2	5
Figure 3-11: Indicative Transition Zone Trenching Methodology at Rahui Road2	6
Figure 3-12: Proposed Deep Trenching Methodology using Post-lowering Techniques (both jet trenching and mass flow excavation are shown)	g 7
Figure 3-13: Floating Pipe String for use in the Mairangi Bay Outfall Project2	8
Figure 3-14: Unformed Section of Road between Rahui Road and Traffic Road	0
Figure 3-15: Aerial View of the Intersection of Traffic Road, Rame Road, Tahinu Road and Greenhithe Road	0

Figure 3-16: Greenhithe Road running adjacent to Wainoni Park	.33
Figure 3-17: Wainoni Park	.35
Figure 3-18: Te Wharau Creek, showing Wainoni Park on the right and North Shore Memorial Park on the left	ו .37
Figure 3-19: North Shore Memorial Park	.39
Figure 3-20: Pipe Bridge site off Witton Place	.41
Figure 3-21: View of Appleby Road from the North Shore Golf Club	.43
Figure 3-22: Aerial view of Piermark Road and Bush Road Intersection	.46
Figure 3-23: Alexandra Stream and Rosedale Park	.48

APPENDICES

Appendix A	Objectives and Policies Assessment
Appendix B	Full List of Consent Requirements
Appendix C	Rules Assessment
Appendix D	Property Schedule and Certificate of Titles

Glossary of Terms

Term	Definition		
Northern Interceptor	New wastewater interceptor to convey wastewater flows from the North West Transformation area and South Rodney (Kumeu/Huapai/Riverhead) via the existing pump station at Hobsonville to the Rosedale Wastewater Treatment Plant (WWTP).		
North West Transformation Area	The North West Transformation Area (NWTA) has formerly been known as the Northern Strategic Growth Area and the Whenuapai Developmen Area		
The Project	To be completed in 2020, the Project transfers the existing Hobsonville Pump Station flows to Rosedale WWTP through a 710mm DN rising main crossing the Upper Harbour, and through Greenhithe, the North Shore Memorial Park, the North Shore Golf Club and Rosedale Industrial areas. The majority of the pipeline will be constructed by open trenching.		
dB	Decibel – The unit of sound level expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of Pr=20 μ Pa i.e. dB = 20 x log(P/Pr).		
Gravity Sewer	Is an underground carriage system specifically for transporting wastewater from residential and industrial buildings under gravity through pipes to the treatment plant.		
Horizontal Directional Drilling	A steerable trenchless method of installing underground pipes in a shallow arc along a prescribed bore path using a surface launched drilling rig.		
Micro-tunnelling	A digging technique used to construct small tunnels. The Micro-tunnel boring machine and jacking frame are installed in a shaft at the required depth. The Micro-tunnel boring machine is directed by an operator located at the surface.		
Pipe String	Lengths of individual pipe welded together and pressure tested in a safe environment to create a long string of pipe which can then be manoeuvred.		
Rising main	From the Hobsonville pump station to the Rosedale WWTP the Phase One pipeline is pressurised by pumping and is termed a rising main.		
Scour Valve	Is used to allow periodic flushing or draining of pipelines for maintenance and repair work. Scour Valves are located at low points along the pipeline to allow for complete emptying.		

Glossary of Abbreviations

Abbreviation	Definition	
AEE	Assessment of Effects on the Environment	
AMA	Auckland Motorway Alliance	
ARP:ALW	Auckland Council Regional Plan: Air, Land and Water	
ARPS	Auckland Council Regional Policy Statement	
ARP:SC	Auckland Council Regional Plan: Sediment Control	
ARP:C	Auckland Council Regional Plan: Coastal	
ASCV	Area of Significant Conservation Value	
AP	Auckland Plan	
AT	Auckland Transport	
CAR	Corridor Access Request	
CCO Council Controlled Organisation		
CHI Auckland Council's Cultural Heritage Inventory		
CIA Cultural Impact Assessment		
CMA Coastal Marine Area		
CMP Construction Management Plan		
CNVMP	Construction Noise and Vibration Management Plan	
CoPTTM	Code of Practice for Temporary Traffic Management	
Council	Auckland Council	
СРА	Coastal Protection Area	
CPTED	Crime Prevention Through Environmental Design	
CTMP Construction Traffic Management Plan		
DN Nominal Diameter		
DSI Detailed Site Investigation		
ECBF	East Coast Bays Formation	
ECI	Early Contractor Involvement	
ESCP	Erosion and Sediment Control Plan	
GBWD&C	Greenhithe Bridge Watermain Duplication & Causeway	

Abbreviation	Definition	
GRDA	Greenhithe Riding for the Disabled Association	
HAIL	Hazardous Activities and Industries List	
HDD	Horizontal Directional Drilling	
HDPE	High Density Polyethylene	
HGMPA	Hauraki Gulf Marine Park Act 2000	
HNZPTA	Heritage New Zealand Pouhere Taonga Act 2014	
KHR	Kumeu/Huapai/Riverhead	
MWKF	Mana Whenua Kaitiaki Forum	
NES:DW	National Environmental Standard for Sources of Human Drinking Water	
NES:Soil National Environmental Standard for Assessing and Managin Contaminants in Soil to Protect Human Health		
NHAGC	North Harbour Air Gun Club	
North Shore City Council District Plan Auckland Council District Plan (North Shore Section)		
NPS:FM National Policy Statement on Freshwater Management (2011)		
NSGC	North Shore Golf Club	
NSMP	North Shore Memorial Park	
NWTA	North West Transformation Area	
NZCPS New Zealand Coastal Policy Statement (2010)		
NZ Transport Agency New Zealand Transport Agency		
PAUP	Proposed Auckland Unitary Plan (Notified 30 September 2013)	
PS	Pump Station	
PSI Preliminary Site Investigation		
PSR (Auckland Council) Parks, Sports and Recreation		
RMA Resource Management Act 1991		
SCS	Soil Contaminant Standard	
SEA	Significant Ecological Area	
SH18 State Highway 18		
Watercare	Watercare Services Limited	

Abbreviation	Definition
WWTP	Wastewater Treatment Plant
Waitakere City District Plan (Operative 2003)	Auckland Council District Plan (Waitakere Section)

1 Introduction and Project Overview

1.1 Introduction

Watercare supplies potable water and collects, treats and disposes of wastewater. Watercare has supplied wholesale water supply and wastewater services since 1991. On 1 November 2010, Watercare took over ownership and management of all the water and wastewater assets within the Auckland Council area and became responsible for the fully integrated water and wastewater services.

Watercare is wholly owned by Auckland Council ("Council") and became a Council Controlled Organisation ("CCO") on 1 July 2012. The company's obligation to deliver water and wastewater services for Auckland is established under section 57(1) of the Local Government (Auckland Council) Act 2009.

Watercare's vision and key goals are set out in its Statement of Intent for the period 2014 - 2017. The vision is "outstanding and affordable water services for all the people of Auckland." "Outstanding" means Watercare will provide safe drinking water, promote efficient water use, and protect waterways and the environment through the effective transport and treatment of wastewater. "Affordable" water services means that Watercare will run an efficient business and keep the overall costs of services to customers (collectively) at minimum levels.

Watercare's service objectives require development of durable assets to meet required service delivery standards and foreseeable future needs. This includes providing sufficient capacity to convey and treat wastewater.

Watercare's wastewater network comprises approximately 7,700km of wastewater pipes and 488 pump stations. The wastewater network servicing the Auckland Isthmus is a system of large transmission interceptors and branch sewers for bulk wastewater conveyance (the transmission network), and a system of local sewers for service connections to Watercare's customers (the local network). The main wastewater treatment plants servicing metropolitan Auckland are located at Mangere in South Auckland and Rosedale on the North Shore. Wastewater from the North Shore City Council is presently treated at the Rosedale Wastewater Treatment Plant ("WWTP") in Albany, and wastewater from west Auckland was conveyed to the Mangere WWTP. Local government amalgamation in November 2010 provided the opportunity to take a more strategic approach to servicing options in the northwest wastewater network.

Population forecasts indicate that the Northern Waitakere area, inclusive of the North West Transformation Area ("NWTA") and South Rodney, inclusive of Kumeu, Huapai and Riverhead ("KHR") will grow significantly in population over the next 50 years. In response to the accompanying increase in wastewater flow, Watercare has assessed the existing capacity in the wastewater network. This assessment identified that by around 2020 the existing capacity will need to be increased. The available practical options were identified and considered to provide the required conveyance and treatment capacity.

In this context, Watercare is proposing to build new wastewater pipelines and associated infrastructure to convey wastewater from North-West of Auckland to the Rosedale WWTP in Albany. This project is known as the "Northern Interceptor".

Construction of the Northern Interceptor is intended to be staged, with the timing of various stages depending on the rate of population growth. Phase 1 of the Project involves the construction of a wastewater pipeline sufficient to carry projected flows from the Hobsonville Pump Station ("the Hobsonville PS") to the Rosedale WWTP.

The Project is within the jurisdiction of Auckland Council. Aspects of the works require resource consents under the various regional and district plans that apply to the area. This Assessment of Effects on the Environment ("AEE") and the resource consent applications identified in this report relate to the works being undertaken for the Project. An overview of the works is provided below, and the Project is described in more detail in the following sections of this AEE. Resource consents and other Resource Management Act 1991 ("RMA") approvals will be sought for future phases of the Northern Interceptor at a later date, once these works have been confirmed. The construction and operation of Phase 1 is required to meet immediate demands and does not rely on any of the future phases.

1.2 **Project Overview**

The proposed route for the Project is from the existing Hobsonville PS, under State Highway 18 ("SH18"), along the northern side of the motorway causeway, and then under the Upper Waitemata Harbour, through Greenhithe and then the commercial area of Rosedale.

Key elements of the Project include:

- Upgrading of the existing Hobsonville PS
- Installation of a pipe under SH18
- Installation of pipelines in a widened section of the existing motorway causeway
- Installation of dual pipelines across the Upper Waitemata Harbour to Greenhithe via marine trenching or horizontal directional drilling ("HDD")
- Installation of dual pipelines under Te Wharau Creek via HDD
- Construction of a pipe bridge between Witton Place and North Shore Golf Club
- Installation of dual pipelines under Alexandra Stream via HDD
- Trenched construction for pipeline installation in roads, open space and other land; and installation of associated infrastructure, including minor above ground structures.

With the exception noted below, the proposed works are described in detail in section 3 of this AEE.

Watercare is proposing some widening along the existing SH18 motorway causeway near Hobsonville to provide for proposed water and wastewater infrastructure, including a section of the NI Phase 1 pipeline. That work forms part of Watercare's proposed Greenhithe Bridge Watermain Duplication and Causeway project ("GBWD&C"), which is the subject of a separate resource consent application.

1.3 **Report Structure and Purpose**

The purpose of this AEE is to describe the Project works, to outline the consultation undertaken, and to assess the potential effects arising from the Project. The mitigation proposed to manage potential and/or actual adverse effects is also outlined.

This AEE has been prepared in accordance with the Fourth Schedule and Section 88 of the RMA and provides information in support of the resource consent applications. The scope of the resource consents sought is set out in detail in Section 4.1 of this report.

The following table outlines the structure of the resource consent documentation:

Table 1-1: Structure of Documents

	Assessment of Effects on the Environment	
	Appendix A	Objectives and Policies Assessment
Volume 1	Appendix B	Full List of Consent Requirements
	Appendix C	Rules Assessment
	Appendix D	Property Schedule and Certificate of Titles
	Technical Reports	
	Technical Report A	Assessment of Noise Effects
	Technical Report B	Assessment of Vibration Effects
	Technical Report C	Assessment of Arboricultural Effects
	Technical Report D	Assessment of Archaeological Effects
Volume 2	Technical Report E	Coastal Processes Report
	Technical Report F	Assessment of Landscape and Visual Effects
	Technical Report G	Assessment of Traffic Effects
	Technical Report H	Assessment of Contaminated Land Effects
	Technical Report I	Assessment of Ecological Effects
	Technical Report J	Assessment of Groundwater/Settlement Effects
Volume 3		Drawing Set

Volume 1 (this report) includes a description of the proposed works, construction methodologies, an assessment of effects on the environment, and consideration of the proposed works against the relevant statutory provisions.

Technical reports relied on for this assessment of effects, are contained in Volume 2.

The proposed works are described in the following sections of this report, with references to drawings contained within the separate A3 Drawing set (Volume 3), and titled "Consenting Plans" referred to hereafter as "the drawing set".

2 **Project Background, Drivers and Alternatives**

This section of the AEE sets out the background to the Project, including alternatives that have been considered in the development of the Northern Interceptor scheme.

2.1 Northern Interceptor – Project Alternatives

The wastewater infrastructure that currently serves the Northern Waitakere area and South Rodney has limited remaining capacity which will not accommodate projected future growth through the Auckland Plan ("AP") and the Proposed Auckland Unitary Plan ("PAUP"). In order to maintain service levels and to provide for growth, Watercare has identified various alternatives to provide the required conveyance and treatment capacity. These are as follows:

- **Option 1 Do nothing.** This option assumes Watercare would provide no additional wastewater conveyance or treatment capacity to service growth in the Northern Waitakere and South Rodney areas. This option would be likely to lead to an increase in the risk of overflow events due to insufficient capacity in the network to service growth or alternatively, lead to the need to place limitations on further development within the Northern Waitakere and South Rodney areas;
- **Option 2 Mangere WWTP**. This option provides for an upgrade of existing infrastructure to convey wastewater flow from Northern Waitakere (inclusive of NWTA, Whenuapai, Massey and Swanson) and South Rodney (inclusive of KHR) to the Mangere WWTP;
- **Option 3 –Rosedale and Mangere WWTPs.** This option requires the construction of a new Northern Interceptor to convey wastewater from NWTA and South Rodney to the Rosedale WWTP, and upgrade existing infrastructure to convey all remaining Northern Waitakere wastewater (Whenuapai, Massey and Swanson) to the Mangere WWTP;
- **Option 4 Rosedale WWTP.** This option requires the construction of a new Northern Interceptor to convey wastewater from Northern Waitakere (inclusive of NWTA, Whenuapai, Massey and Swanson) and South Rodney (inclusive of KHR) to the Rosedale WWTP; and
- **Option 5 New local WWTP.** This option proposes the construction of a new North Western Regional WWTP and conveyance system to service wastewater needs for Northern Waitakere (inclusive of NWTA, Whenuapai, Massey and Swanson) and South Rodney (inclusive of KHR).

2.2 Assessment of Alternatives to Service Growth

Following the development of the above five strategic alternatives, Watercare undertook an assessment process to identify the best alternative to service growth. The assessment process considered:

- 1. The development of each alternative to a sufficient level of detail to understand the key scope and requirements of the alternative;
- 2. The development of a set of criteria and associated attributes for the assessment of each of the alternatives; and
- 3. The assessment of each alternative against these criteria and comparison of the outcomes; and
- 4. Identification of a preferred alternative.

Note: It was necessary to discount Option 1 (do nothing) early in the process, as Auckland Council has planned for growth in the area to be served by the Northern Interceptor, and infrastructure is needed to support that growth.

2.3 **Proposed Solution – Northern Interceptor**

Following the assessment outlined above, Option 4 (all flows to the Rosedale WWTP – Northern Interceptor), was identified as the overall preferred solution. Option 4 was selected as the preferred solution because:

- On a technical basis it provides the most flexibility of all options in terms of the ability to stage construction and manage future demand uncertainty;
- The option provides the additional benefit of more efficiently utilising the existing capacity of the Rosedale WWTP and enable capacity at the Mangere WWTP to service growth in other parts of Auckland;
- This option has the lowest overall risk in terms of treatment requirements given available capacity at the Rosedale WWTP;
- Results in lower environmental, social and cultural effects than Options 2, 3 and 5 given the use of the Rosedale WWTP and smaller area of construction impacts; and
- Has the lowest overall cost in terms of the 50-year net present value.

2.4 The Development of Phase 1

The population forecasts for Waitakere and South Rodney indicate that the population in this area will increase substantially due to changes in land use anticipated by the PAUP and implementation of Special Housing Areas.

Developing wastewater infrastructure to service future growth (2070 horizon) requires a phased approach to ensure that pipework is not initially oversized which would increase the risk of significant operational problems including blockages, septicity, odour and corrosion due to the low flows in the early years of operation.

As a result, it was necessary to develop a solution to manage earlier flows until the catchment populations grow sufficiently for the full size pipeline. Therefore, rather than construct the pipeline for forecast ultimate flows at the outset, the following staged project was developed:

Phase One: The first phase of the Northern Interceptor is a new pipeline planned for completion by 2020 to serve the immediate population growth. This phase will transfer existing flows from the Hobsonville PS to Rosedale WWTP, via a crossing of the Upper Waitemata Harbour and through Greenhithe. Construction is expected to begin 2017-2018.

Future Phases: Future phases of the Northern Interceptor may include a new pipeline from the Westgate commercial area to the Hobsonville PS, and Concourse to Westgate, additional pipelines from the Hobsonville PS to Rosedale WWTP (including an additional harbour crossing), new pump stations in Hobsonville, Concourse (Henderson) and Greenhithe/Schnapper Rock, and associated works. The timing of these future phases will depend on the rate of growth in north-western Auckland.

This resource consent application and AEE is limited to Phase 1.

2.5 Upper Waitemata Harbour Crossing Alignments

There is a need for the Project to cross the Upper Waitemata Harbour. As such, a range of alternative route alignments through the harbour have been considered. The area considered is identified in Figure 2-1 below.

The yellow hashed area in Figure 2-1 indicates the broad area considered for the crossing of the Upper Waitemata Harbour. Within this area of investigation, a number of principles or issues presented limitations to crossing options:

a) Landing areas with significantly steep terrain should be avoided as there are technical and long term operational implications associated with pumping flows up steep gradients. As such landing areas of steep terrain (shown in red in Figure 2-1) were avoided. This precluded crossing points immediately south of the Upper Harbour SH18 bridge crossing.

- b) The extent of works required in the Coastal Marine Area ("CMA") should be (taking into account other technical limitations) minimised as far as is practicable to manage potential adverse effects associated with sedimentation and navigation. As such, an alignment to the north of Herald Island was avoided.
- c) Crossing points south of the State Highway 18 Greenhithe Bridge will result in the need for multiple pumping stations and have been discounted as being impractical.

Within the area of investigation, three options were identified:

- 1) Attachment to the State Highway 18 Greenhithe Bridge or a separate pipe bridge adjacent to the existing bridge (Green in Figure 2-1);
- 2) A pipeline within or under the CMA in the vicinity of the State Highway 18 Greenhithe Bridge (Pink in Figure 2-1); and
- 3) Crossing the Harbour north of the State Highway 18 Greenhithe Bridge (Dark Blue in Figure 2-1)

Table 2-1 below provides an assessment of these three options.

Table 2-1: Alternatives to cross the Upper Waitemata Harbour

Alternative	Description	Assessment
1 (Green in Figure 2-1)	Attachment to the State Highway 18 Greenhithe Bridge or a separate pipebridge adjacent to the existing bridge	There is design capacity on the bridge for only one pipeline and this is proposed to be used for Watercare's proposed Greenhithe Bridge Watermain Duplication. A separate pipe bridge across the harbour would need to be elevated to similar height as the Greenhithe Bridge to allow marine traffic to pass below. This is costly and would create a high visual impact. The landing area would be at an elevation that is beyond the pumping capacity of the Hobsonville Pump Station and a new pump station would be required.
2 (Pink in Figure 2-1)	A pipeline within or under the CMA in the vicinity of the State Highway 18 Greenhithe Bridge	A landing point on the north shore at this location would require some local temporary reclamation and construction of an access road to the shoreline. The route would also have to traverse through significantly steep gradient which would limit the capacity of the pipeline. The landing area would also be at an elevation that is beyond the pumping capacity of the Hobsonville Pump Station and a new pump station would be required.
3 (Dark Blue in Figure 2- 1)	Crossing the Harbour north of the State Highway 18 Greenhithe Bridge	This alignment is relatively direct and is at a relatively narrow section of the Harbour. It also presents an opportunity to coordinate other Watercare projects such as the GBWD&C project. This alignment remains at elevations that are within the pumping capacity of the Hobsonville Pump Station.

Based on the assessment of alternative crossing locations above, option 3 was selected as the preferred crossing alignment.



Figure 2-1: Map of Harbour Crossing Alternatives

2.5.1 Alternative Landing Locations

Once the preferred crossing route in principle had been identified, consideration of a preferred landing point was undertaken. The potential landing locations are delineated in Figure 2-1 above by letters A - E and can be described as follows:

- A. **Rahui Road** Is the only option that provides a viable landing option for either HDD or Marine Trenching CMA crossing techniques. Landing in the open area adjacent to the toilet block on Rahui Road. This location has the most space for construction and has relatively low elevation, reducing costs of shafts and/or engineering issues with HDD. Rahui Road also has two entry points, so with adequate signage and traffic management, closing a section of the road will have minimal impact on local residents.
- B. **Rahui Road (North)** Only a viable option for HDD. Has similar challenges to location D with insufficient working space and higher elevations and so is not preferred.
- C. **Traffic Road** Only a viable option for HDD. Landing at the end of the sealed section of Traffic Road. This is viable but the elevation difference from the causeway widening to Traffic Road is roughly 30m which is considered to be steep and thus has technical and long term operational implications. In addition the site is constrained and the width of the road would allow enough room for one lane traffic during construction.
- D. Koki/Marae Road Only a viable option for HDD. Koki and Marae Road are narrow roads (roughly 5.5m wide) on a steep gradient adding difficulty and risk to any construction work. Trenching at the top of Marae Road near Tauhinu Road would need to be deep in order to get below the highpoint along Tauhinu Road which would otherwise limit the pipeline capacity. Property access would be likely to be disrupted during construction, and this option was therefore not preferred.
- E. **Remu Place** Only a viable option for HDD. However, is too high a gradient and would require a booster pumping station to be located in private property in Remu Place. There is insufficient space in Remu Place either for the required pumping station or for a construction site, as such, is not preferred.

Following the above assessment process, alternative 3 to cross the Harbour north of the SH18 Greenhithe Bridge was selected and landing site A was selected as it is the most practical to construct and is not anticipated to generate inappropriate or unmanageable adverse effects.

2.5.2 Construction Methodologies

Following the identification of the preferred alignment to cross under the Upper Waitemata Harbour, the following three construction techniques were considered:

- 1. Pipe installation in a conduit installed by Micro-tunnelling;
- 2. Horizontal directional drilling; and
- 3. Marine Trenching.

Micro-tunnelling would be difficult, more expensive than alternative construction methods and technically problematic. In order to locate the micro-tunnel in suitable ground conditions under the harbour it would need to start at a depth of roughly 20 – 25m deep. Because of the diameter of the micro-tunnel needed to house dual pipelines, intermediate shafts would need to be installed across the harbour at roughly 350m intervals. This would result in up to 3 marine shafts in the harbour, some up to 30m deep, which would be difficult to install. As such micro-tunnelling was deemed to be an unnecessary construction and financial risk.

Both HDD and marine trenching have been used successfully in other marine pipeline projects in Auckland and New Zealand. HDD is an established technique for installing pipelines under harbours, rivers, creeks and major infrastructure. The required crossing length is near to the recognised limits for this technology and will require specialist contractors and equipment.

Marine trenching is a specialised, but well established method of construction through marine environments. The major challenges with this work are associated with managing impacts within the marine environment during the trenching operations.

Through extensive Early Contractor Involvement ("ECI") both HDD drilling and marine trenching were assessed. Both options were identified as being feasible construction methodologies to cross the Harbour.

Consents for both HDD and marine trenching methods are being sought by Watercare to cross the Upper Waitemata Harbour to provide the contractor with flexibility in relation to the choice of construction method. Accordingly the effects of both methods are assessed within this AEE, though only one will be utilised. Section 3 of the AEE provides a more detailed description of these two construction methods.

It is also noted that HDD is the proposed construction methodology to cross Te Wharau Creek and Alexandra Stream.

3 Project Description and Existing Environment

3.1 Overview

The purpose of the Project is to transfer wastewater flows from the Hobsonville PS to the Rosedale WWTP. The proposed alignment is shown in Figure 3-1 below.



Figure 3-1: Project Alignment – Northern Interceptor Phase 1 Route

The main sections of the Project include:

- Hobsonville PS to 20 Upper Harbour Drive (includes SH18 crossing);
- 20 Upper Harbour Drive to Causeway;
- Pipe along Causeway (part of GBWD&C Project);
- Upper Waitemata Harbour crossing;
- Rahui Road to Greenhithe Road;
- Greenhithe Road to Wainoni Park south;
- Wainoni Park (south and north);
- Te Wharau Creek crossing;
- North Shore Memorial Park;
- North Shore Memorial Park to North Shore Golf Club;
- North Shore Golf Club to Albany Highway;
- Albany Highway to William Pickering Drive;
- William Pickering Drive to Bush Road; and
- Bush Road to Rosedale WWTP (includes Alexandra Stream crossing).

Based on the preliminary design to date, the proposed nominal diameters ("DN") and materials associated with the pipeline are:

- 710mm DN High Density polyethylene ("HDPE") pipeline in land sections and pipe bridge; and
- Twin 550mm DN HDPE pipelines at the crossings of the Waitemata Harbour, Te Wharau Creek and Alexandra Stream.

Various components of the Project include:

- A Pump Station ("PS") upgrade at the existing Hobsonville PS site;
- Pipeline (as described above);
- Air and scour valves including connection and overflow pipelines;
- Harbour crossings by either HDD or marine trenching at the Waitemata Harbour crossing and HDD at Te Wharau Creek and Alexandra Stream crossings;
- Pipe bridge at Witton Place; and
- Site investigation works as part of detailed design stages e.g. further geotechnical testing, boreholes and testpits in the CMA and in land.

All dimensions, areas and volumes provided are approximate and it is possible that some details may change as the design and construction methods are finalised. Any refinements that may occur during this process are not expected to alter the assessment of effects on the environment set out later in this report.

A number of components of the project have multiple methodologies available for construction. Where this is the case, potential options are described. The proposed methodology will be finalised once a contractor has been appointed. The assessment of potential effects in Section 6 of this Report is considered to be sufficiently broad to address effects from different construction methodologies.

This section of the Report describes the various sections of the Project in geographical order, starting from the Hobsonville PS and then working northwards towards the Rosedale WWTP. For ease of reference, the alignment has been divided into sections. These are described in Table 3-1. Drawings can be found in the drawing set (Volume 3). For each of the sections, information is provided on the

existing environment, the regional and district plan zoning and overlays, and the proposed construction methodology.

This first part of this section, following the identification of project sections, describes the geology and groundwater. An overview of general construction management follows the description of project in section 3.17.

Table 3-1: Project Sections

Report Section	Location [general area]	Drawing Reference (Volume 3)
3.3	Hobsonville PS to 20 Upper Harbour Drive (includes SH18 crossing)	2012100.001 2012101.001 2012101.002
3.4	20 Upper Harbour Drive to Causeway Widening	2012100.001
3.5	Upper Waitemata Harbour crossing	2012100.002 2012100.003 2012101.003 2012101.004 2012101.005 2012101.006
3.6	Rahui Road to Greenhithe Road	2012100.003 2012100.004 2012101.005 2012101.006
3.7	Greenhithe Road to Wainoni Park (south)	2012100.004 2012100.005
3.8	Wainoni Park (south and north)	2012100.006 2012101.007
3.9	Te Wharau Creek crossing	2012100.006 2012101.007 2012101.008
3.10	North Shore Memorial Park ("NSMP")	2012100.007
3.11	NNSMP to North Shore Golf Club ("NSGC")	2012100.007 2012101.009
3.12	NSGC to Albany Highway	2012100.008
3.13	Albany Highway to William Pickering Drive	2012100.008
3.14	William Pickering Drive to Bush Road	2012100.009
3.15	Bush Road to Rosedale WWTP	2012100.009 2012101.010 2012101.011

3.2 Groundwater & Geology

A detailed description of the geology, hydrogeology and groundwater within the project area is described in the Groundwater and Surface Settlement Assessment (Technical Report J) in Volume 2 of this Report.

In summary, the geology beneath the alignment is identified as generally being Puketoka Formation and East Coast Bays Formation ("ECBF"). The Rosedale and Hobsonville section of the alignment are indicated to be underlain by Puketoka Formation, while the Upper Waitemata Harbour is indicated to be underlain by ECBF.

Puketoka Formation is described in the Technical Report as consisting of pumiceous mud, sand and gravel with muddy peat and lignite; rhyolite pumice, including non-welded ignimbrite, tephra and alluvial pumice deposits. ECBF is described as consisting of alternating sandstone and mudstone with variable volcanic content and interbedded volcaniclastic grit beds.

The groundwater investigations suggest that the majority of the Project alignment is underlain by an unconfined aquifer where hydrostatic groundwater pressures are generally encountered between 1 and 3m below the ground level.

3.3 Hobsonville Pump Station to 20 Upper Harbour Drive (includes State Highway 18 Crossing)

3.3.1 Existing Environment, Zoning and Notations

Land Use	Land use is primarily residential in nature, with development underway of the Hobsonville Peninsula. The area surrounding the Hobsonville PS has been substantially modified due to ongoing residential development of the peninsula, and the construction of the bridge/motorway.		
Community and Recreational Facilities	A small reserve which contains a stormwater detention pond is located immediately adjacent to the Hobsonville PS site. Works will be undertaken within the western boundary of this reserve.		
Watercourses	With the exception of the stormwater detention pond noted above, no significant watercourses have been identified in this location.		
Verstation and	Immediately east and west of the Hobsonville PS is an area of bush, approximately 1.9ha in size. The bush area comprises mainly exotic vegetation with 10 – 15m high wattle trees (<i>Acacia</i> sp.) forming a patchy canopy with emergent pine trees (<i>Pinus</i> sp.), low stature exotic vegetation such as pampas (<i>Cortaderia</i> sp.) and green goddess (<i>Zantedeschia aethiopica</i>).		
Ecology	sinense), gorse (<i>Ulex europaeus</i>) and a variety of pasture grasses/weeds associated with urban scrub areas have colonised more open areas. A small pond is present within the bush area towards the Upper Harbour Highway, with common early succession native plantings, approximately 4 – 5 years in age, surrounding the pond and the SH18 batters. The only natural native vegetation identified includes sporadic karamu (<i>Coprosma robusta</i>) shrubs and clusters of tree ferns (<i>Cyathea dealbata</i>).		
Historic Heritage and Archaeological Values	No archaeological or historic heritage remains were identified within the Hobsonville section of the Project.		
Zoning (Operative Regional and District Plans)	ACRP:ALW Urban Air Quality Management Area	ACDP:W Human Environment Special Area (Hobsonville Base Village) Transport Environment (SH18) Natural Area General Natural Area Restoration Natural Area Coastal Natural Area Ecological Linkage Opportunity	
Zoning (PAUP)	Zoning Public Open Space – Conservation Strategic Transport Corridor	Overlays Aquifer Natural Hazards – Coastal Inundation Stormwater Management Area (Flow 1) Hobsonville Base sub-Precinct B	
Designation(s), Requiring Authority and/or other notations	MD1 (Minister of Defence, RNZAF airfield, Auckland) NZTA4 (NZ Transport Authority, State Highway 18) [No. 6741 PAUP]		

3.3.2 **Description of Works**

3.3.2.1 Hobsonville Pump Station

Reference drawing No.'s 2012100.001 & 2012101.001



Figure 3-2: Hobsonville Pump Station (PS70)

It is proposed to upgrade the Hobsonville PS. As part of the upgrade, an access road will be constructed which will provide access from Buckley Avenue, through the site adjacent to the west of the PS site and into the northern portion of the PS site.

Approximately 2,700m³ of spoil will be removed from the site. Trench excavations will either be supported by trench box systems or sheet piling. Some excavations will require dewatering with site pumps. Any overflow will be settled and discharged into the existing site stormwater system located adjacent to the PS. As such there will be no additional stormwater discharge from the site associated with the construction. Finished contours will be achieved with imported clean fill and topsoil.

Permanent works at this site will include:

- Improvements to site roads;
- A new access road and vehicle crossing;
- A chemical storage and dosing facility;
- Installation of a 710mm DN pipeline from the southern side of the PS; and
- Landscaping and planting.

The above will involve the following construction activities:

- Temporary and permanent site fencing;
- Establishment of temporary hardstand, storage, office and parking areas;
- Clearance of vegetation and removal of trees;
- Formation of an access road and associated earthwork activities;
- Open trenching and installation of pipe section;
- Installation of a new chemical storage and dosing facility;

- Trenching and installation of stormwater drainage sumps and pipework discharging into the existing drainage system;
- Installation of new pumps, pipes, valves and associated equipment within the PS; and
- Removal of spoil.

The expected duration of these works is approximately 8-10 months.

3.3.2.2 SH18 Crossing to 20 Upper Harbour Drive

Reference drawing No.'s 2012100.001 & 2012101.002



Figure 3-3: State Highway 18 Crossing to 20 Upper Harbour Drive

The 710mm DN HDPE pipeline will be installed in a concrete conduit beneath the motorway. The concrete conduit will be installed by micro-tunnelling using concrete pipe sections. A shaft of approximately 6m x 8m will be constructed in the north end of the existing Hobsonville PS site (southern side of SH18). A receiving shaft of similar dimensions will be installed on the north side of the motorway. Approximately 900m³ of spoil will be removed from site. The pipeline will be pulled into the concrete conduit by a winch on the south side of the motorway. The works will be managed from the office facilities on the southern side of SH18 at Hobsonville PS.

The proposed works will involve the following construction activities:

- Vegetation removal;
- Installation of jacking and receiving shafts to facilitate micro-tunnelling activities;
- Trench excavation to provide slip-lining trench for pipeline;
- Micro-tunnelling under SH18;
- Pipe welding and installation by slip-lining; and
- Removal of spoil.

The expected duration of these works is approximately 3-5 months.

3.4 **20 Upper Harbour Drive to Causeway Widening**

Land Use	The primary land use in this location is SH18, the main east/west link between Waitakere and the North Shore.		
Community and Recreational Facilities	The Greenhithe Bridge cycleway runs along the northern boundary of SH18.		
Watercourses	On the northern side of the SH18 causeway is an intertidal mangrove area and good quality riparian margins.		
	 The vegetation growing on the rocky substrate adjacent to the Greenhithe Bridge is described as consisting of sporadic small trees and shrubs including small pohutukawa trees (<i>Metrosideros 17pprox</i>), flax (<i>Phormium</i> spp.) pohuehue (<i>Muehlenbeckia</i> spp.) (native), gorse and pampas (exotic). At the south western point of the intertidal mangrove area an extensive fringe of salt marsh vegetation is noted that is dominated by thickets of tussock swamp twig rush (<i>Machaerina juncea</i>), oioi (<i>Apodasmia similis</i>), Salt marsh ribbon wood (<i>Plagianthus divaricatus</i>) and sea rush (<i>Juncus kraussii var. australiensis</i>). Terrestrial vegetation in this area is noted as including; manuka, flax, mahoe (<i>Melicytus ramiflorus</i>), mapou, karamu, tree ferns (native) and Chinese privet (exotic). There are open grass areas surrounding a stream which is noted as have been managed and planted, possibly in relation to construction happening on adjacent land. There is a second area of sparse salt marsh vegetation identified as being at the south eastern point of the intertidal zone, with predominant species being tussock swamp twig rush, oioi, sea rush and forest sedge (<i>Carex sp.</i>). 		
Vegetation and Ecology			
Historic Heritage and Archaeological Values	A previously recorded shell midden site (R11/495) was not located and may have been destroyed. The area within which it was originally recorded has been completely modified through the construction of the bridge/motorway and pedestrian/cycleway as well as the motorway fence and rock wall revetment.		
Zoning (Operative Regional and District Plans)	ACRP:ALW Urban Air Quality Management Area	ACDP:W Human Environment Transport Environment (SH18) Natural Area General Natural Area Restoration Natural Area Coastal Natural Area Ecological Linkage Opportunity 20m Coastal Edge	
Zoning (PAUP)	Zoning Strategic Transport Corridor	Overlays Aquifer Natural Hazards – Coastal Inundation Stormwater Management Area (Flow 1)	
Designation(s), Requiring Authority and/or other notations	NZTA4 (NZ Transport Authority, State Highway 18) [No. 6741 PAUP]		

3.4.1 Existing Environment, Zoning and Notations

3.4.2 **Description of Works**

Reference drawing No. 2012100.001

The 710mm DN HDPE pipeline will be installed within the boundaries of the existing New Zealand Transport Agency ("NZ Transport Agency") designation by conventional open trenching adjacent to SH18 and the roundabout at the northern end of Squadron Drive. The pipeline will traverse within and along the designation boundary onto the causeway connecting with the 710mm DN pipeline that will be installed as part of the GBWD&C project.

The proposed works will involve the following construction activities:

- Establishment of temporary access and construction compound to the east of Squadron Drive, and subsequent reinstatement of compound;
- Vegetation removal;
- Topsoil stripping, trench excavation and removal of spoil;
- Delivery, stringing, welding and installation of pipes;
- Importing and placement of backfill; and
- Spreading topsoil and grassing.

The expected duration of these works is approximately 2-5 months.

3.5 Upper Waitemata Harbour Crossing

Land Use	Coastal Marine Area		
Community and Recreational Facilities	A mooring area (No. 42 Herald Island/Greenhithe) is identified in the Upper Waitemata Harbour. Presently, there are approx. 263 moorings in this location, and use of this area consists of boating, fishing, etc.		
General Setting	The Upper Waitemata Harbour is at the head of a complex, deeply indented and infilled drowned river valley estuary. Seven shallow tidal creeks drain into the main body which in turn connect with the relatively broad and open Middle Waitemata Harbour.		
Tidal setting	The creeks are largely intertidal, with narrow central channels. Approximately 50% of the Harbour is intertidal. At high tide, water depth over the intertidal areas is 1-2m.		
Vegetation and Ecology	 A majority of the habitat affected by the Project footprint is soft gloopy mud, a small area of mangrove habitat is also affected at the northern point of the footprint crossing of the Waitemata Harbour. A description of the taxa present and the Shannon-Weiner diversity index values for Upper Waitemata Harbour are contained within Technical Report I. No threatened species were identified within the samples taken. 		
Zoning (Operative Regional and District Plans)	ACRP:C General Management Area Mooring Management Area	Area of Significant Conservation Value ("ASCV") 30, Upper Waitemata Harbour	
Zoning (PAUP)	Zoning General Coastal Marine Mooring	N/A	
Designation(s), Requiring Authority and/or other notations	N/A		

3.5.1 Existing Environment, Zoning and Notations

3.5.2 **Description of Works**

Reference drawing No.'s 2012100.002, 2012100.003, 2012101.003, 2012101.004, 2012101.005 & 2012101.006



Figure 3-4: Aerial View of Landing Site at Rahui Road (the grassed area)



Figure 3-5: Rahui Road Landing Site

The project requires the crossing of the Upper Waitemata Harbour. This will involve the establishment of two 550mm DN HDPE pipelines crossing the harbour from a point on the widened causeway to a landing point on the reserve at Rahui Road.

As mentioned previously, consents for both HDD (Option 1) and marine trenching (Option 2) are being sought to provide the contractor flexibility with respect to construction methodology. Indicative routes for both methods can be seen in Figure 3-6 and Figure 3-7 below and are described in the following sections.



Figure 3-6: Horizontal Directional Drilling Indicative Construction Envelope



Figure 3-7: Marine Trenching Indicative Construction Envelope

Each method is contained within an 'envelope' where construction activities will occur. The effects assessment considers the effects of construction activities on the environment within these areas with respect to each construction method. Once a contractor has been appointed to the project, a construction methodology will be chosen and only one of the routes and methods identified will be constructed.

The two construction method options and landing points were identified following a detailed consideration of options. See section 2.5 of this Report for further details.

3.5.3 **Option 1: Horizontal Directional Drilling ("HDD")**

A drill rig, supporting equipment and works area will be established at the proposed construction platform on the causeway widening area (adjacent to SH18). An exit pit and works area will also be established at the Rahui Road site. The drill rig will be used to drill and ream a hole slightly larger than the pipe diameter from the construction platform to Rahui Road. A pipestring will be pulled through the hole from the Rahui Road side using the same or another drill rig. This process will be repeated for the installation of the second pipeline.

It is anticipated that the depth of the pipeline will arc along the route between approximately 4m and 30m below sea level.

Once completed all machinery and temporary facilities associated with the directional drilling operation will be removed from both the causeway and Rahui Road sites.



Figure 3-8: Proposed Horizontal Directional Drill Methodology



Figure 3-9: Horizontal Directional Drill Rig in Operation (Graham Park, Tauranga)¹

The proposed works will include the following construction activities:

- Site establishment at each landing site (along causeway widening, and at Rahui Road). This will include working areas, welfare, offices and storage containers;
- Construction of hardstand and parking areas at both the causeway and Rahui Road sites. This will potentially include the demolition of the toilet block located at Rahui Road and the construction of a new toilet block on completion of pipework construction (as agreed with the landowner);
- Set up for directional drilling activities, which will include drill rod racks and associated plant at the Rahui Road site;
- Set up for directional drilling activities, which will include installation of mud separators, drill rod racks, mud storage containers and associated plant at the causeway site
- Pipe installation including pilot holes, back reaming, laying out and welding pipestrings along the causeway widening, pipe pulling and testing. The overall pipe sting at this location will be a kilometre long. The pipe string will therefore need to be assembled at the southern (drilling) end and can be laid out for its full length alongside SH 18.
- On the southern side of the crossing (causeway widening site) the Project will connect with the 710mm DN pipeline that will be installed as part of the GBWD&C project; and
- Disposal of spoil offsite.

The expected total duration of these works is approximately 4 - 6 months. The expected period of time for heavy equipment located at Rahui Road is anticipated to be for no more than 4 weeks per "pipe pull" (will occur twice).

3.5.4 **Option 2: Marine Trenching**

As shown in Figure 3-7, an indicative construction envelope has been identified for the Upper Waitemata Harbour crossing by marine trenching. Within this envelope the actual trench width is anticipated to be approximately 20m comprising of a 5m wide base and 3:1 batter slope.

¹ Note: The area of works shown in Figure 3-9 is indicative only, and is intended to show the typical setup for a single horizontal directional drill.

To give effect to this construction option, it is anticipated that marine trenching will be undertaken in four main components:

- 1. Works on land;
- 2. Trenching and laying of the pipe within the intertidal/shallow areas at the Rahui Road end of the crossing;
- 3. Trenching and laying of the pipe within the transition zone to deeper water; and
- 4. Trenching and laying of the pipe in deeper water across the middle of the harbour.

Works on land: Two site compounds will be set up at either side of the harbour crossing (at the causeway widening adjacent to SH18 and Rahui Road). On the southern side of the crossing (causeway widening site) the Project will connect with the 710mm DN pipeline that will be installed as part of the GBWD&C project.

Trenching and laying of pipe within intertidal area (Rahui Rd): Within the intertidal areas at Rahui Rd, the trench will likely be excavated by long reach excavation equipment operating on a temporary berm (see Figure 3-10 below). This temporary berm is proposed to be constructed on top of a geotextile mat placed within the intertidal area. Drawing 2012100.003 shows the indicative extent of the temporary berm. The excavated material will either be placed adjacent to the excavated trench for use in backfilling once the pipe is installed, or it will be trucked off-site and stockpiled for subsequent backfilling of the trench.

The pipe will be laid and fitted with concrete collars at regular intervals to counteract buoyancy of the pipe. Based on the pipe size, the concrete collars will be spaced approximately 4-6m apart.



Figure 3-10: Indicative Intertidal Trenching Methodology off Temporary Berm at Rahui Road

Transition Zone (Rahui Road): At the transition between intertidal trenching and deep water trenching (i.e. where the intertidal area is below -2m Chart Datum; -3.5 Local Level Datum) a barge mounted dredge unit can be safely utilised to excavate the trench (as shown in Figure 3-11). Other construction options could include the use of a mobile hydraulic jetting technique.


Figure 3-11: Indicative Transition Zone Trenching Methodology at Rahui Road

Transition Zone (Causeway): At the causeway site, the trench can be excavated directly from the causeway into the deeper water.

Trenching and laying of pipe in deeper water: Methods such as a jet trenching (fluidisation), or a mass flow excavation using low head fan unit could be used for the trenching and laying of pipe in deeper water. These devices are towed by a barge and will be used to either sink the pipe through the marine sediments to the required depth or to form a trench in which the pipeline can settle.

Trenching by Fluidisation

Trenching by fluidisation is achieved by using jets of water to displace sediment from the trench. Jet trenching machines can be operated from small barges and supply boats, and are therefore ideal for shore approaches in very shallow water. These machines are typically 3-6m long, weigh 3-9 tonnes and can be operated in deeper water from a small vessel. This option would effectively self-bury the pipe and no backfilling would be required.

Mass Flow Excavation

Mass flow excavation is a non-contact method for controlled flow excavation of trenches. The pipeline is often located on the existing seabed prior to using the mass flow excavator, with the mass flow excavator travelling along the length of the pipe forming the trench the pipe settles into.

Alternatively the trench can be formed first with the pipe placed in subsequently. These devices typically operate at 1 m above the seabed. The device draws in seawater from the side pipes and jets water out from the vertical down pipe at velocities of up to 10 m/s (flows up to 4 m³/sec). The bed material is shifted and trenched with the force of the jet.

The pipe will be laid and fitted with concrete collars at regular intervals to counteract buoyancy of the pipe. Based on the pipe size, the concrete collars will be spaced approximately 4-6m apart.

It is anticipated that pipe strings will be welded along the SH18 in the area of the causeway widening, in approximately 300m sections, these sections will be towed onto the Upper Waitemata Harbour into an area reserved by the use of buoys, tug boats will be used to keep the floating pipe strings in place. The pipelines will be gently sunk to the marine floor; divers will then bolt together the flanged connections with a custom spool piece.

Figure 3-12 shows the indicative pipe laying methodology whereas Figure 3-13 shows the floating pipe string used in the Mairangi Bay outfall project.



Figure 3-12: Proposed Deep Trenching Methodology using Post-lowering Techniques (both jet trenching and mass flow excavation are shown)



Figure 3-13: Floating Pipe String for use in the Mairangi Bay Outfall Project

The above will likely include the following construction activities:

- Site establishment at each landing site (along causeway widening, and at Rahui Road). This will include working areas, welfare, offices and storage containers;
- Construction of hardstand and parking area at both the causeway and Rahui Road construction sites;
- Moving of identified moorings;
- Placement of a barge in the Upper Waitemata Harbour;
- Excavation of a trench up to 20m wide on the seabed;
- Formation and removal of a temporary berm in the intertidal area at Rahui Road to be used for pipe trenching;
- Stringing and welding of pipe sections;
- Pulling of pipe into position, sinking and laying in trench and connection of flanged and bolted pipe sections; and
- Backfilling of trenches.

The expected duration of these works is approximately 3 – 5 months.

3.6 Rahui Road to Greenhithe Road

3.6.1 Existing Environment, Zoning and Notations

Land Use	Land use surrounding the alignment in this location is predominately residential, with a reserve at the landing site (see below).			
Community and Recreational Facilities	The area around the landing site is presently used by the Tauhini Sea Scouts, who have a scout den at 17 Rahui Road. This facility is occasionally used by the group to launch cutters and sunburst boats from the boat ramp.			
Vegetation and Ecology	Vegetation near Rahui Road, at the northern end of the Upper Waitemata Harbour crossing, is identified as consisting of mixed native and exotic coastal forest. To the north of where the proposed alignment comes ashore, large pohutukawa, kowhai (<i>Sophora sp.</i>) and mangrove trees form a 10-15m patchy canopy. Between and beneath the large trees are mapou, karamu, karo (<i>Pittosporum crassifolium</i>), astelia (<i>Astelia banksii</i>), kawakawa (<i>Macropiper excelsum</i>) (native), tree privet (<i>Ligustrum lucidum</i>) and ginger (<i>Hedychium gardnerianum</i>) (exotic). This segment of coastal forest is approximately 100m in length and varies in width from 10–25 m.			
	South of where the proposed alignment comes ashore is a much larger area of coastal forest that follows the coast around to the Greenhithe Bridge, and varies in width from 30m to almost 200m in places. Immediately adjacent to the coast, the forest primarily features large pine trees, with various sized pohutukawa trees dotted in between. Other native and exotic trees and shrubs present include manuka (<i>Leptospermum scoparium</i>), karamu, akepiro (<i>Olearia furfuracea</i>), kumarahou (<i>Pomaderris kumeraho</i>) (native), wattle, boneseed (<i>Chrysanthemoides monilifera</i>), cotoneaster (<i>Cotoneaster coriaceus</i>), ginger, tree privet and brush wattle (<i>Paraserianthes lophantha</i>) (exotic).			
	Further inland, kanuka, tanekaha (<i>Phyllocladus trichomanoides</i>), karo, mingimingi (<i>Leucopogon fasciculatus</i>), mahoe, mapou, silverfern, kawakawa, astelia, are also found beneath pine trees as well as the exotic species wandering jew (<i>Tradescantia fluminensis</i>), gorse, climbing asparagus (<i>Asparagus scandens</i>) and jasmine (<i>Jasminum polyanthum</i>) (exotic).			
	A small area of bush, approximately 0.15ha in size, exists adjacent to the unformed section of Traffic Road. The bush area features a mainly native 10–15m kanuka canopy, with tanekaha, kamahi (<i>Weinmannia racemosa</i>) and cabbage trees (<i>Cordyline australis</i>). Other plant species identified as being present in the understory include silver fern, mapou, flax, mahoe (native), with exotic species ginger, agapanthus (<i>Agapanthus praecox</i>) and montbretia (<i>Crocosmia x crocosmiiflora</i>) also present.			
Historic Heritage and Archaeological	Two sites are currently recorded within the Auckland Council Cultural Heritage Inventory ("CHI") as being located within the coastal reserve. The sites comprise the Sea Scouts building (CHI 19648) and a remnant wharf site. Neither of these sites will be affected by the proposed works.			
Values	No archaeological or historic heritage remains were identified within the area of proposed works at Rahui Road and Traffic Road.			
Zoning (Operative Regional and District Plans)	e ACRP:ALW ACRP:ALW ACRP:ALW ACCP: NS Recreation 3 [Recreation 1] Road Reserve			
Zoning (PAUP)	Zoning Coastal Transition Public Open Space – Informal Recreation Road	Overlay Significant Ecological Area – Land Natural Hazards – Coastal Inundation		

3.6.2 **Description of Works**

Reference drawing No.'s 2012100.003, 2012100.004, 2010101.005 & 2012101.006



Figure 3-14: Unformed Section of Road between Rahui Road and Traffic Road



Figure 3-15: Aerial View of the Intersection of Traffic Road, Rame Road, Tahinu Road and Greenhithe Road

The twin 550mm DN HDPE pipelines crossing the harbour will converge back to a 710mm DN rising main in a covered pit located at Rahui Road. From there, the pipeline will be installed by open trenching across Rahui Road, and along the unformed section of road between Rahui Road and Traffic Road, on

to Traffic Road to the intersection with the southern end of Rame Road and onto Greenhithe Road at the Tauhinu Road Roundabout. The pipe will generally follow the northern side of Greenhithe Road close to the kerb line.

The above will include the following construction activities:

- Vegetation clearance and tree removal;
- Construction of temporary access along the unformed section of road between Rahui Road and Traffic Road;
- Trench excavation and removal of spoil;
- Delivery and installation of pipes, imported fill and concrete; and
- Road surface reinstatement.

The expected duration of these works is approximately 2 - 5 months.

3.7 Greenhithe Road to Wainoni Park (South)

3.7.1 Existing Environment, Zoning and Notations

Land Use	The predominant land use in this area is residential, with areas of open space throughout.			
Community and Recreational Facilities	Located on Greenhithe Road (near Roland Road) is Collins Park. Access to the park is primarily via Greenhithe Road, with a walking path providing access at the southern end of the park via Shiloh Way. The park presently contains a cricket pitch and a youth facility (skate park). Adjacent to Collins Park to the west is the Greenhithe Playcentre, and an early childhood education facility. Along the Greenhithe Road is the Greenhithe Fire Station and Greenhithe town centre, containing shops, restaurants and offices. Greenhithe Primary School is located adjacent to the Greenhithe Road/Churchhouse Road/Isobel Road roundabout			
Vegetation and Ecology	On the northern side of Greenhithe Road, a stream contains a forested riparian zone consisting of a native and exotic 10 – 15m canopy, which varies in width from 30 – 50m. Canopy tree species include tanekaha, puriri (<i>Vitex lucens</i>) (native), and cherry tree (<i>Prunus</i> sp.) with emergent pines above. The developed and dense understory includes tree ferns, flax, hangehange (<i>Geniostoma ligustrifolium</i>), mapou, karo, mahoe, kawakawa (native), wattle, woolly nightshade (<i>Solanum mauritianum</i>), blackberry (<i>Rubus fruticosus</i>), green goddess (exotic) and common ornamental garden plants. The upstream side is more open and consists of several large canopy trees including a single rimu tree (<i>Dacrydium cuppressinum</i>), ribbonwood (<i>Hoheria populnea</i>), kanuka (native), eucalyptus tree (<i>Eucalyptus</i> sp.) and magnolia tree (<i>Magnolia</i> sp.) (exotic). Vegetation in understory is sparse but does include karo, hangehange, maupo (native) and common ivy (<i>Hedera helix</i>) (exotic).			
Historic Heritage and Archaeological Values	Presently, there are three historic heritage sites recorded along Greenhithe Road (refer Technical Report C). These include Old Greenhithe School within Collins Park, Collins house (20 Greenhithe Road) and St Michael and All Angels Anglican Church (12 Greenhithe Road). These sites will not be affected as a result of the proposed works. No archaeological sites were identified along this section of the proposed alignment.			
Zoning (Operative Regional and District Plans)	ACRP:ALW Urban Air Quality Management Area ACDP: NS Road Reserve			
Zoning (PAUP)	oning (PAUP) Zoning Road Stormwater Management Area (Flow			

3.7.2 **Description of Works**

Reference drawing No. 2012100.004 & 2012100.005



Figure 3-16: Greenhithe Road running adjacent to Wainoni Park

The 710mm DN HDPE pipeline will be installed by open trenching along Greenhithe Road. As the pipe exits Rame Road and crosses the Tauhinu Road roundabout it passes close to the existing North Harbour Watermain.

The above will include the following construction activities:

- Vegetation clearance and tree removal;
- Saw cutting and breaking out of road pavement and concrete driveway;
- Temporary relocation of minor services;
- Trench excavation and removal of spoil;
- Delivery and installation of pipes, imported fill and concrete; and
- Road surface reinstatement.

The expected duration of these works is approximately 2 – 5 months.

3.8 Wainoni Park (South and North)

3.8.1 Existing Environment, Zoning and Notations

Land Use	The land use in this location is recreational.			
Community and Recreational Facilities	Wainoni Park, located further down Greenhithe Road, is presently used for equestrian activities in Wainoni Park South by the Greenhithe Pony Club, and in Wainoni Park North by the Greenhithe Riding for the Disabled. The majority of the park is in pasture. Both groups are understood to share resources from time to time. Facilities at the GHPC include an all-weather arena, cross country course, sheds and Clubhouse. The park is also used by the North Harbour Air Gun Club.			
Watercourses	At the northern end of Wainoni Park, the proposed alignment crosses over an unnamed permanent stream that flows northeast towards the main stem of Lucas Creek (Te Wharau Creek). The soft bottomed stream is soft-bottomed and varies in width from 0.25–2.5m wide with a maximum depth of approximately 0.2m during dry weather. A 5m long culvert has been installed near where the proposed alignment crosses the stream, while a dam structure is present approximately 10m upstream of the culvert. The stream has received high sediment loads, and flows into a pond near the outlet at Te Wharau Creek.			
	At the southern end of Wainoni Park, the proposed alignment crosses over the headwaters of a permanent stream which is also an unnamed tributary of Lucas Creek. Within Wainoni Park, this headwater stream flows into the same tributary that was crossed near Sunnyview Road.			
Vegetation and Ecology	with a diameter of 0.9m. On the Wainoni Park side of Greenhithe Road (outside the works footprint), the stream contains an early succession forested riparian zone with a 10–15m high dense canopy and developed understory. The riparian zone varies in width from 15–80m. The canopy consists of kanuka (native), wattle and tree privet (exotic) with emergent pines overtop. Other species present in the canopy and understory includes native totara (<i>Podocarpus totara</i>), mapou, karamu, hangehange, tree ferns, kawakawa, forest sedges (<i>Carex</i> spp.), small ferns, and exotic species including wandering jew, Chinese privet, honeysuckle (<i>Lonicera japonica</i>) and fatsia (<i>Fatsia japonica</i>).			
Historic	Identified archaeological sites within Wainoni Park are focused around the northern edge that is bounded by Te Wharau Creek. The sites comprise shell midden deposits related to pre- European Maori settlement of the Creek, located around the coastal edge.			
Heritage and Archaeological Values	The proposed alignment will pass in close proximity to site no. R10/1187, at the northern end of Wainoni Park. This site is identified in the PAUP as a Site and Place of Value to Mana Whenua. This site comprises of shell midden (predominantly cockle, with charcoal and bunt stone) and extends from the foreshore bank onto the mudflats. Sections of the midden remain relatively intact, but do not appear to extend into the bank for more than 0.5m.			
Zoning (Operative Regional and District Plans)	ACRP:ALW Urban Air Quality Management Area	ACDP: NS Recreation 4 Recreation 1		
Zoning (PAUP)Zoning Public Open Space – Sport and Active Recreation Public Open Space Conservation		Overlay Stormwater Mangement Area (Flow 1) Stormwater Management Area (Flow 2) Significant Ecological Area – Land Sites and places of Value to Mana whenua		

3.8.2 **Description of Works**



Reference drawing No.'s 2012100.006 & 2012101.007

Figure 3-17: Wainoni Park

The alignment follows Greenhithe Road until around 77 Greenhithe Road, where it turns northwards and enters into Wainoni Park. The pipeline will be conventionally trenched through the reserve, and will cross a small unnamed permanent stream at the northern end of the park by open trench. Ongoing consultation with various park stakeholders including Auckland Council, Upper Harbour Local Board, Greenhithe Pony Club and Greenhithe Riding for the Disabled has informed the proposed alignment though the park.

The above will include the following construction activities:

- Vegetation clearance
- Construction of temporary access ways
- Stripping and stockpiling of topsoil
- Temporary bunding and diversion of stream
- Trench excavation and removal of spoil
- Delivery and installation of pipes, imported fill and concrete
- Park surface reinstatement and planting

It is noted that the temporary bunding and diversion of the stream occurs regularly on linear projects and there are well established procedures to mitigate effects.

The expected duration of these works is approximately 3 – 5 months.

3.9 **Te Wharau Creek Crossing**

3.9.1	Existing Environment, Zoning and Notations	
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Land Use	Coastal Marine Area.			
Community and Recreational Facilities	There are presently no community or recreational facilities in this location.			
Watercourses	Te Wharau Creek is identified as a Coastal Protection Area 2 in the ACRP:C, and as a Significant Ecological Area – Marine 2 in the PAUP. This area and the adjacent Lucas Creek is noted as being the <i>best example of the muddy mangrove-lined inlets of the inner Waitemata Harbour.</i>			
Vegetation and Ecology	Early succession forest is adjacent to Lucas Creek on the Memorial Park side and runs alongside the coastal edge. The forest has a 5–15m kanuka canopy that also comprises tree ferns, mahoe, mapou, manuka (native) and gorse (exotic). The understory is developed in most places and consists of hangehange, forest sedges, <i>Coprosma</i> spp., mingimingi, totara, astelia (native), honey suckle and Chinese privet (exotic). A small stream network flows through the forested area and out into Lucas Creek.			
Historic Heritage and Archaeological Values	No historic heritage or archaeological values were identified within Te Wharau Creek. The Lucas Creek shoreline has been identified in the CIAs as an area of spiritual value, taonga, and environmental and cultural values.			
Zoning (Operative Regional and District Plans)	ACRP: C Coastal Protection Area 2 (within an 30, Upper Waitemata Harbour)			
Zoning (PAUP)	General Coastal Marine Overlay Significant Ecological Area – Marine 2			

3.9.2 **Description of Works**

Reference drawing No.'s 2012100.006, 2012101.007 & 2012101.008



Figure 3-18: Te Wharau Creek, showing Wainoni Park on the right and North Shore Memorial Park on the left

It is anticipated that the Te Wharau Creek crossing will be undertaken by HDD. A drill rig and works area will be established at the entry and exit location. The drill rig will be used to drill and ream a 600mm hole from the entry pit to the exit pit. Whilst this drilling is being undertaken the pipestring will be prepared and laid out at the exit location (this location to be confirmed at the time of construction). The drill rig will pull the pipestring through the previously drilled 600mm hole.

The drill rig will then be shifted to drill and ream another 600mm hole offset to the existing pipe alignment. As this occurs the second pipestring will be constructed at the exit location. The drill rig will pull the pipestring through the previously drilled hole.

Once the above is complete, all machinery associated with the directional drilling operation will be removed from both sites.

The proposed works will include the following construction activities:

- Site establishment at each landing site. This will include working areas, welfare, offices and storage containers;
- Construction of hardstand and parking areas at both sites;
- Set up for directional drilling activities, which will include drill rod racks and associated plant at the exit site;
- Set up for directional drilling activities, which will include installation of mud separators, drill rod racks, mud storage containers and associated plant at the entry site; and
- Pipe installation including pilot holes, back reaming, laying out and welding pipe strings, pipe pulling and testing.

The expected duration of these works is approximately 4 – 6 months.

3.10 North Shore Memorial Park

3.10.1 Existing Environment, Zoning and Notations

Land Use	The land use in this location is cemetery, chapel and crematorium		
Community and Recreational Facilities	NSMP is a Council owned and operated facility and is one of the largest cemeteries in the Auckland region. The 90 acre Memorial Park is accessed from Schnapper Rock Road in Albany, and is surrounded by residential development to the north, east and south. Lucas Creek marks the boundary of the Memorial Park to the west.		
Watercourses	No significant watercourses were identified in this location.		
Vegetation and Ecology	The alignment will run adjacent to an early succession forest, consisting of a 10–15m dense kanuka canopy with emergent pine trees overtop. The developed understory contains tree ferns, hangehange, karamu, mapou, karo, tanekaha, mingimingi, toropapa (<i>Alseuosmia</i> sp.) (native) and gorse (exotic). Plant diversity is greater in the riparian zones and further includes <i>Coprosma</i> spp., mahoe, lemonwood, totara, kawakawa, titoki, kahikatea and karaka (native).		
Historic Heritage and Archaeological Values	Three recorded archaeological sites are located within the vicinity of the cemetery. The sites all comprise coastal shell midden deposits, and are all located within the heavily vegetated area along the southern boundary of the property. All of the recorded sites are located away from the proposed alignment and will not be affected. No archaeological or historic heritage remains were identified by the archaeologist as being located within the area of proposed works at NSMP.		
Zoning (Operative Regional and District Plans)	ACRP:ALW Urban Air Quality Management Area	ACDP: NS Special Purpose 4 (Cemetery and Crematorium)	
Zoning (PAUP) Zoning Special Purpose		Overlay Significant Ecological Area – Land Stormwater Management Area (Flow 2) Sites and places of Value to Mana whenua	

3.10.2 **Description of Works**

Reference drawing No. 2012100.007



Figure 3-19: North Shore Memorial Park

At this location, the 710mm DN HDPE pipeline will be installed by open trench. The route will follow planned road alignments in the southern undeveloped section of NSMP until aligning under the existing site loop road on the eastern side through to the NSMP entrance on Schnapper Rock Road. Ongoing consultation with NSMP has helped in the development of the route in this location.

The above will include the following construction activities:

- Formation of temporary access ways;
- Vegetation clearance and tree removal;
- Stripping and stockpiling topsoil;
- Saw cutting and breaking out road pavement;
- Trench excavation and removal of spoil;
- Delivery and installation of pipes, imported fill and concrete; and
- Park and road surface reinstatement

The expected duration of these works is approximately 2 – 5 months.

3.11 NSMP to North Shore Golf Club

3.11.1 Existing Environment, Zoning and Notations

Land Use	The primary land use in this location is residential, with single and multiple-storey dwellings			
Community and Recreational Facilities	No community or recreational facilities are located in this section of the proposed route.			
Watercourses	A hard-bottomed stream and gulley system is located at Witton Place, flowing west towards the main stem of Lucas Creek.			
Vegetation and Ecology	The stream contains an early succession forested riparian zone with a 10–15m high dense kanuka canopy with emergent pines overtop. The riparian zone varies in width from 40m to over 100m. Beneath the kanuka canopy, a mainly native and dense understory consists of tree ferns, karamu, mapou, tanekaha, mahoe, five-finger (<i>Pseudopanax arboreus</i>) (native) and Chinese privet (exotic). Native plantings have also been planted adjacent to nearby houses.			
Historic Heritage and Archaeological Values	No archaeological or historic heritage remains were identified with the proposed area of works.			
Zoning (Operative Regional and District Plans)	ACRP:ALW Urban Air Quality Management Area Urban Air Quality Management Area			
Zoning (PAUP)	Zoning RoadOverlay Greenhithe sub-precinct A Stormwater Management Area (Flow 2)Large LotSignificant Ecological Area – Land			

3.11.2 **Description of Works**

Reference drawing No.'s 2012100.007 & 2012101.009



Figure 3-20: Pipe Bridge site off Witton Place

Upon exiting NSMP the 710mm DN HDPE pipeline will installed by open trenching across Schnapper Rock Road, through the passageway between 30 and 32 Newbury Place, across Aberley Road, along Witton Place and down the private right of way between 9 and 17 Witton Place.

The pipeline will surface in the private right of way north of Witton Place and will be carried across the gully into 84 Laurel Oak Drive on a pipe bridge. The pipeline will continue north to NSGC in an open trench through 84 Laurel Oak Drive.

Access at this site will be required for excavators, a crane, and deliveries of pipes. It is anticipated that this will be via a temporary haul road from the NSGC in the north and via the walkway between 9 and 17 Witton Place. Vegetation will need to be removed, embankments will need to be benched to form a temporary haul road and work platforms created for pipe bridge construction.

The above will include the following construction activities:

- Vegetation clearance and tree removal
- Construction of temporary access ways and formation of work platforms
- Saw cutting and breaking out of road pavement and driveways
- Trench excavation and removal of spoil
- Delivery of materials
- Pipe bridge construction comprising:
 - Boring of piles, placement of concrete and reinforcement and installation of precast concrete columns
 - Excavation, erection of formwork and placement of concrete and reinforcement for bridge abutments

- Erection of scaffolding for pipe bridge access
- o Installation of precast concrete culvert to carry the pipeline
- \circ $\;$ Stringing, welding and installation of the pipeline within the culvert
- Removal of temporary access ways and work platforms
- Road, driveway and grass surface reinstatement

The expected duration of these works is approximately 4 – 6 months.

3.12 NSGC to Albany Highway

3.12.1 Existing Environment, Zoning and Notations

Land Use	Land use in this location is primarily recreational (golf club) with residential and community uses located near the intersection of Appleby Road with Albany Highway.			
Community and Recreational Facilities	The NSGC is a 27-hole golf club. To the north of the NSGC is Kristin School. Albany Junior High School is located further to the east. Lucas Creek marks the boundary of the course to the west.			
Watercourses	Stream and gully system at the southern end of the NSGC.			
Vegetation and Ecology	The proposed alignment runs adjacent to and crosses over the stream and gully system. In this area is a small pond, wetland, temporary stream system, which in combination with surrounding vegetation is approximately 1.1ha in area. The system has undergone extensive modification with a man-made pond and wetland as well as a network of culverts.			
Historic Heritage and Archaeological Values	No archaeological or historic heritage remains were identified within the proposed area of works.			
Zoning (Operative Regional and District Plans)	ACRP:ALW Urban Air Quality Management Area ACDP: NS Recreation 4 Road Reserve			
Zoning (PAUP)	Zoning Public Open Space – Sport and Active Recreation RoadOverlay Stormwater Management Area (Flow 2)Significant Ecological Area – Land			

3.12.2 **Description of Works**

Reference drawing No. 2012100.008



Figure 3-21: View of Appleby Road from the North Shore Golf Club

At this location, the 710mm DN HDPE pipeline will be installed by open cut, following the route around the back of the car park and then along the golf club access road.

The proposed works in this section will include the following construction activities:

- Vegetation clearance and tree removal;
- Formation of temporary access ways;
- Stripping and stock piling of topsoil;
- Saw cutting and breaking out of road pavement;
- Trench excavation and removal of spoil;
- Delivery and installation of pipes and imported fill and concrete; and
- Road and grass surface reinstatement.

The expected duration of these works is approximately 3 – 5 months.

3.13 Albany Highway to William Pickering Drive

3.13.1 Existing Environment, Zoning and Notations

Land Use	The land use surrounding the alignment in this location is predominately residential and commercial.		
Community and Recreational Facilities	Inspire Church is located east of Albany Junior High School, where the project alignment follows John Glenn Avenue and William Pickering Drive.		
Watercourses	No significant watercourses have been identified in this location.		
Vegetation and Ecology	The works along this section of the proposed route will be confined to the road reserve.		
Historic Heritage and Archaeological Values	No archaeological or historic heritage remains were identified with the proposed area of works.		
Zoning (Operative Regional and District Plans)	ACRP: ALW Urban Air Quality Management Area Urban Air Quality Management Area		
Zoning (PAUP)	Zoning Road Public Open Space Informal Recreation Light Industry		
Designation(s), Requiring Authority and/or other notations	190 (Auckland Transport, road widening); [No. 1469 PAUP]		

3.13.2 **Description of Works**

Reference drawing No. 2012100.008

The 710mm DN HDPE pipeline will be installed by open trenching along Albany Highway and then across 325 Albany Highway to 14 John Glenn Avenue. The pipeline then extends along John Glenn Avenue to the intersection with William Pickering Drive, then along William Pickering Drive to the intersection with Piermark Drive.

The proposed works in this section will include the following construction activities:

- Stripping and stock piling of topsoil;
- Saw cutting and breaking out of road pavement;
- Trench excavation and removal of spoil;
- Delivery and installation of pipes, imported fill and concrete; and
- Road and grass surface reinstatement.

The expected duration of these works is approximately 2 -5 months.

3.14 William Pickering Drive to Bush Road

3.14.1 Existing Environment, Zoning and Notations

Land Use	The land use surrounding the alignment in this location is predominantly commercial.			
Community and Recreational Facilities	No community and recreational facilities have been identified in this portion of the route.			
Watercourses	No significant watercourses have been identified.			
Vegetation and Ecology	The works along this section of the proposed route will be confined to the road reserve.			
Historic Heritage and Archaeological Values	No archaeological or historic heritage remains were identified with the proposed area of works.			
Zoning (Operative Regional and District Plans)	ACRP: ALW Urban Air Quality Management Area ACDP: NS Road Reserve			
Zoning (PAUP)	Zoning Road			

3.14.2 **Description of Works**

Reference drawing No. 2012100.009



Figure 3-22: Aerial view of Piermark Road and Bush Road Intersection

At this location, the 710mm DN HDPE pipeline will be installed by open trenching along Piermark Road. As the pipe crosses William Pickering Drive it must pass beneath a large stormwater pipe before continuing down the length of Piermark Road, crossing Bush Road and down the driveway between 169 and 179 Bush Road.

The proposed works in this section will include the following construction activities:

- Saw cutting and breaking out of road pavement;
- Trench excavation and removal of spoil;
- Temporary relocation of minor services;
- Delivery and installation of pipes, imported fill and concrete; and
- Road surface reinstatement.

The expected duration of these works is approximately 2 – 5 months.

3.15 Bush Road to Rosedale WWTP

3.15.1 Existing Environment, Zoning and Notations

Land Use	Land use in this location transitions from commercial to recreational as the alignment enters Rosedale Park. The area west of Alexandra Stream within the Park is presently undeveloped.			
Community and Recreational Facilities	Rosedale Park is a regional facility that offers passive and active recreational opportunities, and is the home field for Albany United Football Club, and North Harbour Softball Association. Rosedale Pony Club and North Harbour BMX also utilise the Park, and there are a number of cricket pitches provided. Access to club facilities is provided off Jack Hinton Drive.			
	to the south and west. The Rosedale WWTP is I	located on the eastern side of the park.		
Watercourses	The proposed alignment crosses over Alexandra Stream, part of a stream and gully system. The soft bottomed permanent stream is part of the headwaters of Lucas Creek, flowing north through the park. The stream section varies in size from 1.8–4.6m and has a maximum depth of over 2m.			
	Adjacent to Alexandra Stream is a forested riparian zone with a 10–15m high dense will (<i>Salix</i> spp.) canopy with emergent pine overtop. Beneath the canopy, native and exotic s are present throughout the understory and include tree ferns, mahoe, mapou, <i>Coprosma</i> mapou, karo, cabbage trees (native), wattle and privet (exotic).			
Vegetation and Ecology	Further east towards the Rosedale WWTP, a small tributary drains into the main stem. A large portion of this tributary has been modified through the addition of a pond and an extensive network of culverts. Riparian vegetation is similar to the main stem with large emergent pines over a mixture of native and exotic species. The proposed alignment crosses the tributary over an area with culverts and a native hedge row comprising 10 m high karaka, ngaio (<i>Myoporum laetum</i>) karo and puriri.			
Historic Heritage and Archaeological Values	No archaeological or historic heritage remains were identified with the proposed area of works.			
Zoning (Operative Regional and	ACRP: ALW ACDP: NS Becreation 4			
District Plans)				
Zoning (PAUP)	ng (PAUP) Zoning Light Industry Public Open Space – Sport and Active Recreation Significant Ecological Area			
Designation(s), Requiring Authority and/or other notations	 63 (future substation, United Networks Ltd.); [No. 8868 PAUP] 163 (Watercare, odour buffer); [No. 9310 PAUP] 179 (Vector, telecom); [No. 8842 PAUP] 179A (Transpower, telecom) 164 (Watercare, Wastewater Treatment Plant); [No. 9311 PAUP] 			

3.15.2 **Description of Works**

Reference drawing No.'s 2012100.009, 2012101.0010 & 2012101.011



Figure 3-23: Alexandra Stream and Rosedale Park

The pipeline enters Rosedale Park at the rear of 169 Bush Road. Prior to crossing Alexandra Stream, the single 710mm DN HDPE pipeline will bifurcate to twin 550mm DN pipelines to cross over Alexander Stream to the south side where it combines to a single 710mm DN pipeline that continues through Rosedale Park and across Jack Hinton Drive into Rosedale WWTP. The 710mm DN pipeline in Rosedale Park will be installed by open trench.

The pipelines crossing under Alexandra Stream will be installed by HDD. The methodology for this will be the same as the HDD described above at the Te Wharau Creek HDD crossing.

The proposed works in this section will include the following construction activities:

- Site establishment at each landing site, including working areas, welfare, offices and storage containers;
- Construction of hardstand and parking areas;
- Vegetation clearance and tree removal;
- Set up for directional drilling activities;
- HDD pipe installation as described for the Te Wharau Creek crossing;
- Stripping and stock piling of topsoil;
- Saw cutting and breaking out of road pavement;
- Trench excavation and removal of spoil;
- Delivery and installation of pipes, imported fill and concrete; and
- Connection to the Rosedale WWTP (works within the existing Rosedale WWTP designation will be undertaken under a separate Outline Plan process).

The expected duration of these works is approximately 2 – 4 months.

3.16 **Construction Management**

Construction is expected to be undertaken between 2017-. The approximate duration of each of the component work phases has been set out earlier in this report.

Once a contractor is appointed, and prior to the start of the main construction programme, a Construction Management Plan ("CMP") or plans will be prepared which set out the detail of the proposed construction methodology and describe the mitigation measures to be taken to minimise potential adverse effects and ensure compliance with consent conditions.

The construction management plan will address a range of construction issues, including:

- Health and safety
- Construction management of works in land
- Construction management of works in the CMA
- Traffic management
- Construction noise and vibration management
- Contaminated land management
- Tree protection
- Accidental discovery protocols (archaeological sites)
- Erosion and sediment control
- Dust management
- Groundwater and settlement monitoring
- Hazardous substances management
- Communications management

Management plans addressing specific construction issues listed above will be incorporated in the main construction management plan for the project or prepared as standalone plans as appropriate.

The vast majority of the proposed route is conventional construction and it is expected to occur within normal working hours – that is, 7:00am to 6:00pm Monday to Saturday inclusive. However there may be occasions where it is necessary to undertake construction activities outside of normal 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; emergency works; or to tie in with tidal cycles (for works in the CMA).

At some specific sites, the proposed construction methods will require 24 hour operations. These sites are the proposed crossings of the Upper Waitemata Harbour, Te Wharau Creek and Alexandra Stream. It is also possible that some identified road crossings in heavily trafficked areas will require work to be undertaken outside normal working hours to minimise effects on traffic. For works outside of normal working hours, appropriate measures will be implemented as set out in the Construction Noise and Vibration Management Plan ("CNVMP") for the site.

Reinstatement at all sites following construction will generally involve replacing what was at the site prior to construction in a like for like manner where appropriate and practicable, or as otherwise agreed with the landowner. At most sites this is likely to involve a combination of re-grassing or repaving, replanting, and replacement of facilities that have been removed (e.g. footpaths and street). Any construction access roads not required for maintenance access will also be removed.

Reinstatement within the road corridor will be as agreed with Auckland Transport ("AT").

4 Statutory Framework

4.1 Resource Consents Required

Table 4.1 below summarises the resource consents required for the Project. Resource consents are required from Auckland Council for the Project.

A comprehensive list of resource consent requirements and permitted activities that form part of the proposed works is provided as Appendix B and an assessment against relevant rules and assessment criteria is provided as Appendix C.

RMA	Consent Type	Geographic Extent	Works	Activity	Rule	Overall Activity Status
Auckl	and Council	District Plan (North Shore	Section)			
S9	Land use	 Works within the road corridor. Works within a riparian margin at: Wainoni Park north Witton Place Alexandra Stream 	Construction works	 Earthworks, works and vegetation removal: outside of the road corridor which expose more than 300m² surface area of bare earth in aggregate over a site at any one time within a foreshore yard or a riparian margin that involves the destruction or removal of any tree located in public reserves or recreation land within the root zone of any trees on roads or within a reserve 	8.4.2.4(a); 8.4.6.3(a); 8.4.6.3(b); 9.4.1.4(b) and 9.4.1.4(f)	Discretionary
S9	Land use	 Wainoni Park north North Shore Memorial Park Area between Shnapper Rock Road and North Shore Golf Club Witton Place (pipe bridge) 	Permanent works	 Underground network utilities in Structure Plan and Public Open Space Zones. Installation of a pipe bridge. 	14.4.2(60), 14.4.2(61) and 14.4.2 (62)	
Auckl	and Council	District Plan (Waitakere Se	ction)			
S9	Land use	 Works within the Hobsonville Pump Station. SH18 corridor 	Construction works	 Earthworks, works and vegetation removal: within the General Natural Area exceeding 300m³; not meeting the standards of rules OSE 9.2 and 9.3; not meeting the standards in rules TER 5.1 and 5.2; within the dripline of native vegetation; that involves the clearance, alteration and pruning of native and exotic vegetation which is more than 6m in height or more than 600mm in girth; not meeting the standards of rules RNA 2.1 and 2.2 or CAN 2.1, 2.2 and 2.3 	GNA 3.4; OSE 9.4; TER 5.3; GNA 2.2; GNA 2.3; CNA 2.2; CNA 2.2; SAR 21.3 and RNA 2.3	Discretionary

Table 4-1: Resource Consent Requirements

RMA	Consent Type	Geographic Extent	Works	Activity	Rule	Overall Activity Status		
S9	Land use	Hobsonville Pump Station	Permanent works	Construction of a new vehicle crossing	TER 7.3	Limited Discretionary		
Auckl	Auckland Council Regional Plan (Sediment Erosion Control Section)							
S9	Land use	Project wide	Earthworks	Earthworks, Roading, Tracking and Trenching within and outside of the Sediment Control Protection Area of an area greater than 0.25ha	5.4.3.1	Restricted Discretionary		
Auckl	and Council	Regional Plan (Coastal Sec	tion)					
s12	Coastal Permit	 Upper Waitemata Harbour Te Wharau Creek 	Construction works associated with marine trenching (at Upper Waitemata Harbour) and HDD (at both geographic extents)	 Earthworks, works and vegetation removal including the: Displacement of the foreshore/seabed; Removal of vegetation (inc. mangroves) 	16.5.17			
s12	Coastal Permit	 Upper Waitemata Harbour Te Wharau Creek 	Permanent works associated with marine trenching (at Upper Waitemata Harbour) and HDD (at both geographic extents)	 Placement of structures and temporary structures in the CMA Occupation of the CMA Removal of moorings Moorings outside of mooring management area or mooring zone New moorings within the mooring management area Placement of structure entirely below the surface of the foreshore/seabed Occupation of space entirely below the seabed Placement of structure entirely below the surface of the foreshore/seabed Occupation of space entirely below the surface of the foreshore/seabed within a Coastal Protection Area ("CPA") Occupation of space entirely below the seabed within a CPA 	12.5.18; 10.5.5; 10.5.9; 16.5.17	Discretionary		

Auckl	Auckland Council Regional Plan (Air, Land and Water)						
S14	Water Permit	Project wide (isolated locations)	Take and/or diversion of groundwater	 Take and/or diversion of groundwater due to construction and dewatering 	6.5.43; 6.5.77	Restricted Discretionary	
S13	Land Use	Unnamed streams near or at: • North Shore Golf Club; • Wainoni Park (north); • North Shore Memorial Park; • Near Sunnyview Road	Construction works and permanent works	 The use and placement of structures in, on, under or over the bed of a permanent river and stream and any associated bed disturbance and diversion of water disturbance, removal, damage or destruction of an exotic or indigenous plant or part of any plant, or the habitats of any such plants, or of animals 	7.5.12; 7.5.19	Discretionary	
S15	Discharge Permit	• Wainoni Park	Discharge of contaminants from construction works	 Discharge of contaminants to land or water from land containing elevated levels of contaminants 	5.5.63; 5.5.44	Controlled	
NES for Assessing and Managing Contaminants in Soil to Protect Human Health							
S9	Land use	Project wide (isolated locations)	Construction works	Earthworks above permitted limits	Reg. 9	Controlled	
Propo	sed Aucklar	nd Unitary Plan					
S9	Land use	Project wide	Construction works	 Earthworks, works and vegetation removal including: Earthworks undertaken by network utilities greater than 2500m² or 2500³ in Public Open Space Zones, Significant Ecological Areas or within the 100 year flood plain Tree trimming, alteration or removal carried out by a network utility operator Vegetation alteration or removal within 10m of an urban stream Vegetation alteration or removal within an SEA 	H.4.2.1.1; H.4.2.1.2; H.3.1.1; H.4.3.1.1; and H.4.3.1.2	Discretionary	
S9	Land use	Hobsonville PS	Permanent works	Installation of a new vehicle crossing	H.1.2	-	
S9	Land use	Witton Place	Permanent works	Aboveground pipelines and fittings for the conveyance of wastewater	H.1.1.1		
S13	Land use	Unnamed permanent	Construction	Bed disturbance, diversion of water and the	H.4.13.1	Discretionary	

		streams near or at: • NSGC • Wainoni Park (north)	works	incidental temporary damming of water in an SEA		
s12	Coastal Permit	 Upper Waitemata Harbour Te Wharau Creek 	Construction works associated with marine trenching (at Upper Waitemata Harbour) and HDD (at both geographic extents)	 Earthworks, works and vegetation removal including the: Displacement of the foreshore/seabed; Removal of vegetation (inc. mangroves) 	I.6.1.4	
s12	Coastal Permit	 Upper Waitemata Harbour Te Wharau Creek 	Permanent works associated with marine trenching (at Upper Waitemata Harbour) and HDD (at both geographic extents)	 Placement of structures in the CMA Occupation of the CMA Removal of moorings Moorings outside of mooring management area or mooring zone New moorings within the mooring management area Placement of structure entirely below the surface of the foreshore/seabed Occupation of space entirely below the seabed Placement of structure entirely below the surface of the foreshore/seabed Occupation of space entirely below the surface of the foreshore/seabed within an SEA Occupation of space entirely below the seabed within an SEA 	I.6.1.10	Discretionary
S14	Water Permit	Project wide (isolated locations)	Take and/or diversion of groundwater	 Take and/or diversion of groundwater due to construction and dewatering 	H.4.17.1	Restricted Discretionary
S15	Discharge Permit	All construction sites	Discharge of contaminants from construction works	 Discharge of wastewater and/or washwater into water or onto land from construction related activity 	H.4.18.1	Controlled

4.2 **Requiring Authority Approvals**

Some of the construction sites in the North Shore City Council District Plan are subject to designations of other requiring authorities. These include:

- Road widening (No. 190): Auckland Transport
- Future substation (No. 63): United Networks Ltd.
- Telecom (No. 179): Vector
- Telecom (No. 179A): Transpower
- All vested roads (no ref number) Auckland Transport

Within the Waitakere City District Plan, some of the construction sites are subject to designations of the following requiring authorities:

- RNZAF Airfield (MD1): Minister of Defence
- State Highway 18 (NZTA4): NZ Transport Agency

Consultation undertaken to date with above Requiring Authorities is summarised in Section 5 of this report. Where Requiring Authority approvals are required under sections 176(1)(b) and 177(1) of the RMA, these will be sought prior to construction.

4.3 **Other Approvals**

Other approvals may be identified in the technical specialist reports, and may include those under the s12 of the Heritage New Zealand Pouhere Taonga Act ("HNZPTA") 2014, the Reserves Act 1997, Public Works Act 1982, and Building Act 2004. Corridor Access Request ("CAR") will also be required for those works within the road reserve.

4.4 **Statutory Tests**

Section 104 of the RMA sets out the matters a consent authority must, subject to Part 2 of the RMA have regard to when considering resource consent applications. The matters that are relevant in considering this application are:

Table 4-2. Section 104 Requirements	Table	4-2:	Section	104	Req	juirements
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	Section 104 requirement	Relevant section of this Report
a.	Any actual and potential effects of allowing the activity.	Section 6
b.	Any relevant provisions of a National Environmental Standard	Section 7.2
C.	Other regulations	Section 7.13
d.	Any relevant provisions of a National Policy Statement	Section 7.3
e.	Any relevant provisions of a New Zealand Coastal Policy Statement	Section 7.4
f.	Any relevant provisions of a Regional Policy Statement or Proposed Regional Policy Statement	Section 7.5 and 7.6
a	Any relevant provisions of a Plan or Proposed Plan	Section 7.7, 7.8, 7.9, 7,10, 7,11 and 7,12
h.	Any other matters the consent authority considers relevant and reasonably necessary to determine the application	Section 7.15

5 **Consultation**

5.1 **Overview**

The primary objective of the consultation process has been to assist with development of the project to date and to identify matters to be considered in subsequent design and implementation phases. This section of the report identifies the parties involved to date, and summarises the key matters raised and Watercare's response.

The parties involved in the consultation process to date (May 2015) are:

- Local boards;
- Council staff particularly the Parks, Sports and Recreation ("PSR") and regulatory teams;
- Mana whenua;
- Transport Authorities Auckland Transport and New Zealand Transport Agency;
- Other network utilities;
- Other agencies Heritage New Zealand Pouhere Taonga and Department of Conservation;
- Directly affected landowners;
- Landowners adjacent to key construction sites; and
- Other interest groups and organisations.

The consultation process has been led by Watercare, and will continue during the design development, pre-construction and construction phases.

5.2 Auckland Council

5.2.1 Local Boards

The project is within the Upper Harbour Local Board area. Watercare staff attended meetings with the Local Board several times in 2014 and 2015 to discuss the proposed works. Watercare's proposed Greenhithe Bridge Watermain Duplication and Rosedale WWTP Expansion projects were also discussed. Board members' key concerns related to the potential impacts of the proposed Northern Interceptor project in parks, primarily Wainoni Park, and also the implications on the Rosedale WWTP.

The parks and reserve areas of Greenhithe are highly valued. Key aspects discussed with the Local Board and PSR representatives have been the need for works within parks, the alternatives considered, the extent and duration of construction activities, and the location and design of permanent above ground features.

The proposed works in Wainoni Park have been the main area for discussion, with the Local Board and PSR's preference being that infrastructure should be located outside of Wainoni Park.

As a result of initial feedback received, Watercare reviewed the proposed alignment of the Northern Interceptor Phase 1 pipeline, and is reviewing the concept and possible alignments for the future phases of the Northern Interceptor project.

The proposed Northern Interceptor Phase 1 pipeline has now been realigned to follow the south and eastern boundaries of the park as far as possible, in order to reduce the potential construction effects. The final alignment of the pipeline will continue to be developed in consultation with the Local Board and PSR staff, along with the details of proposed reinstatement on completion of works.

When flows increase in the future, a Booster Pump Station may need to be located along the Northern Interceptor Phase 1 pipeline route, and due to hydraulic requirements, that pump station and associated facilities may need to be located within or adjacent to Wainoni Park. Future phases of the Northern Interceptor project may also involve further works within Wainoni Park, but those future phases are independent of the final location of the Northern Interceptor Phase 1 pipeline. Consultation on all aspects of the Northern Interceptor Project will continue with the Local Board, PSR and other parties.

5.2.2 Parks, Sports and Recreation

The project involves works within a number of parks and reserves managed by PSR. These are Wainoni Park, Rosedale Park and a small reserve adjacent to the Scout Hall on Rahui Road. Initial discussions have taken place with representatives of PSR regarding the proposed alignment and facilities to be located within parks.

The key areas of concern raised by PSR have been similar to those raised by the Local Board in relation to works in parks, and are summarised earlier. Other matters discussed with PSR have been the scope of existing Reserve Management Plans, the status of coastal land and esplanade reserves, integration of works at Rosedale Park and the implications on the various park user groups including the Greenhithe Pony Club, Riding for the Disabled and the North Harbour Air Gun Club.

5.2.3 Regulatory

Pre-application meetings with Council's Major Infrastructure Projects Resource Consents team commenced in early 2014. Discussion at these meetings covered matters such as the need and scope for the project, the statutory requirements and process, and the potential effects of the works. Other meetings have also taken place with Council's technical specialists on coastal matters and works in contaminated land.

5.3 Mana Whenua

Watercare has led the consultation process to date with mana whenua. Watercare's summary of the consultation undertaken, and the key matters raised, is set out below.

5.3.1 Mana Whenua Participants

Mana whenua have a strong historical and cultural relationship with the land, water and harbours traversed by Watercare's proposed Greenhithe Bridge Watermain Duplication and Causeway, North Harbour 2 ("NH2") Watermain and Northern Interceptor projects ("the projects"). As these projects cover similar geographic areas, consultation activities have been combined where appropriate.

The 19 mana whenua entities in the Auckland Council area with a potential interest in the projects are:

<u>Ngāi Tai Ki Tāmaki</u>	Ngāti Te Ata	Te Akitai*
<u>Ngāti Manuhiri</u>	Ngāti Wai	<u>Te Kawerau a Maki</u>
<u>Ngāti Maru</u>	<u>Ngāti Whanaunga</u>	Te Patukirikiri
Ngāti Paoa	Ngāti Whatua o Kaipara	<u>Te Rūnanga o Ngāti Whatua</u>
Ngāti Rehua Ngatiwai Ki Aotea	<u>Ngāti Whatua o Orakei</u>	Te Uri o Hau
Ngāti Tamaoho	Te Ahiwaru	Waikato Tainui

Ngāti Tamaterā

Mana whenua underlined in the above list have indicated a particular interest in the projects and have participated to the greatest extent in the consultation process to date.

5.3.2 Consultation Process

The consultation process has involved:

- Initial briefing to Watercare's Mana Whenua Kaitiaki Forum ("MWKF") in July 2013;
- Initial briefing meetings in late 2013 with mana whenua who indicated an interest in the project;
- Further consultation with interested mana whenua, including meetings and site visits as appropriate;
- Update on the projects to all mana whenua entities in November 2014 to confirm those parties already involved in the process, and to invite others to participate if they wished to do so;
- Further engagement with the interested mana whenua entities;
- Preparation of Cultural Impact Assessments ("CIA").

In the early consultation phase, the now-proposed GBWD&C project was presented as part of the NH2 project. Early mana whenua consultation records therefore only refer to the NH2 project. The GBWD&C was subsequently developed as a standalone physical works package, and the later mana whenua consultation records reflect that.

5.3.3 Kaitiaki Managers' Projects List

An established process is in place for mana whenua engagement on projects initiated by Watercare. This process includes early notification of works to be undertaken by Watercare which do or are likely to require a resource consent.

A "Kaitiaki Managers Projects List" is provided on an approximately monthly basis to nominated representatives of all 19 mana whenua in the Auckland Council area. A brief summary of each project is included in the list, along with an identification of the applicable PAUP CIA rules. 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 projects have been included on the Kaitiaki Managers Projects List provided to mana whenua since July 2013. Eight mana whenua entities indicated that they have an interest in this project, being:

- <u>Ngāi Tai Ki Tāmaki</u>
- <u>Ngāti Manuhiri</u>
- <u>Ngāti Maru</u>
- Ngāti Whanaunga
- Ngāti Whatua o Orakei
- <u>Te Akitai</u>
- Te Kawerau a Maki
- Te Rūnanga o Ngāti Whatua

5.3.4 Cultural Impact Assessments

CIAs have been prepared for the projects to date by Te Kawerau a Maki, Ngati Maru, Ngati Manuhiri and Ngai Tai Ki Tamaki.

The reports prepared are:

- North Harbour No. 2 Watermain, Ngati Maru, July 2014
- Cultural Impact Assessment Report Northern Interceptor, Ngai Tai Ki Tamaki, January 2015
- Cultural Impact Assessment Report Greenhithe Bridge Duplication, Ngai Tai Ki Tamaki, January 2015
- Cultural Impact Assessment Northern Interceptor, Ngati Maru, January 2015
- Cultural Impact Assessment for Northern Interceptor Henderson to Rosedale, Te Kawerau a Maki February 2014

Key points raised in those reports are summarised within the following discussion.

5.3.5 Mana Whenua Involvement

The 19 mana whenua entities in the Auckland Council area, and their engagement in the projects to date is summarised in the table below.

Mana Whenua	Involvement to Date
Ngāi Tai Ki Tāmaki	Ngai Tai Ki Tamaki was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in July 2013. Ngai Tai did not register their interest in the projects at that stage.
	An update on the projects was provided to all mana whenua in November 2014, including an invitation to participate in further consultation. Ngai Tai responded confirming they have an interest in the projects and requested further involvement.
	A meeting was held in November 2014 to update Ngai Tai on the process to date and to provide further information on the projects. Ngai Tai has requested further involvement and have prepared a CIA for each project.
Ngāti Manuhiri	Ngati Manuhiri was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in July 2013. Ngati Manuhiri registered their interest in the projects at that time.
	An introductory letter was sent in November 2013 including an overview of the projects and requesting confirmation of their interest.
	The works and proposed alignments were discussed at a meeting in February 2014 and the draft archaeological assessment for the NH2 watermain project provided in March 2014. Ngati Manuhiri confirmed their primary interest is in the works north of the Greenhithe Bridge, particularly works in coastal areas, stream crossings and mitigation planting. Cultural monitoring was requested for works near any known recorded archaeological sites.
	An update on the projects was provided in November 2014, including a request to meet to discuss the projects. Ngati Manuhiri responded confirming they wish to prepare a CIA.
	An update meeting was held with Ngati Manuhiri and Te Kawerau a Maki in November 2014. Concerns regarding proposed Northern Interceptor works within the North Shore Memorial Park were raised. Ngati Manuhiri confirmed that although their primary interest lies north of the Greenhithe Bridge, they support Te Kawerau a Maki's views on proposed works in the Upper Harbour, and also the identified opportunities to recognise cultural values. In November 2014, Ngati Manuhiri assisted Clough & Associates with their archaeological assessment of the proposed Northern Interceptor alignment in the Greenhithe area. A further site visit was held with Ngāti Manuhiri in May 2015.
Ngāti Maru	Ngati Maru was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013. Ngati Maru registered their interest at that time.
	An introductory letter was sent in November 2013 including an overview of the projects and requesting confirmation of their interest.
	Watercare met with Ngati Maru in December 2013 and provided an overview of the works. Items discussed included construction methodology, services relocation, potential for discovery of koiwi and lava caves during construction, and potential cultural monitoring requirements in some areas.
	Further updates on the projects were provided to Ngati Maru at regular meetings during 2014. Ngati Maru confirmed their primary area of interest is in the proposed works north of the Greenhithe Bridge.
	Watercare received a CIA from Ngati Maru in July 2014 relating to the NH2 project. Ngati Maru's main concerns were discussed in the CIA, including the potential impact on land of significance to Ngati Maru due to its past history and usage, and the potential for disturbance of remaining historical evidence. The project corridor intercepts two historic coastal settlement areas accessed by the Marutahu people in the west for fishing, hunting and trapping. Cultural

Mana Whenua	Involvement to Date
	monitoring has been requested.
	In mid-December 2014, Ngati Maru advised that they would defer to Ngati Manuhiri for the proposed works in Greenhithe, but advised that they wished to prepare a CIA for the Northern Interceptor.
	Watercare received a CIA from Ngati Maru in January 2015 for the Northern Interceptor Project. Ngati Maru's main concerns relating to the Northern Inteceptor project mirrored those they had for the NH2 project described above.
Ngāti Whatua o Orakei	Ngāti Whatua o Orakei was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013, and registered their interest at that time.
	An introductory letter was sent in November 2013 including an overview of the projects and requesting confirmation of their interest.
	Watercare met with Ngāti Whatua o Orakei in February 2014. Points discussed included the opportunity for Ngati Whatua to be involved in possible cultural arts initiatives, the use of native vegetation for reinstatement planting, extent of mangrove removal associated with the proposed causeway widening, and the effects of stormwater and wastewater discharges.
	An e-mail confirming Ngāti Whatua o Orakei's key points of interest was received following the meeting. This included avoiding cultural heritage and archaeological sites, and opportunities for works around waterways to enhance ecological function and native habitat / biodiversity.
	Watercare met again with Ngāti Whatua o Orakei in May 2014 to provide an update on the projects. Topics discussed included the potential integration of project works with future cycleway development, the methodology for stream crossings, riparian planting and proposed causeway widening.
	An update on the projects was provided to Ngāti Whatua o Orakei in November 2014, including a request to meet to discuss the project. No response was received.
	Ngāti Whatua o Orakei attended a site visit in May 2015 and raised concerns regarding works within the CMA and alternatives considered.
Te Akitai	Te Akitai was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013, and registered their interest at that time.
	An introductory letter was sent in November 2013 including an overview of the projects and requesting confirmation of their interest.
	At a meeting in December 2013, Te Akitai indicated their particular areas of interest on the NH2 watermain related to any potential discharges, stream crossings, areas of work not within road reserve, and landscape modifications.
	General project updates were provided to Te Akitai at regular meetings during 2014, and a written update provided in November 2014.
	The need for the proposed causeway widening at Hobsonville, and the options considered were a key point of discussion at a meeting with Te Akitai in November 2014.
Te Kawerau a Maki	Te Kawerau a Maki was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013, and registered their interest at that time.
	An introductory letter was sent in November 2013 including an overview of the projects and requesting confirmation of their interest. Watercare met with Te Kawerau a Maki later that month to provide an overview of the NH2 and Northern Interceptor projects. Potential areas of interest to Te Kawerau a

Mana Whenua	Involvement to Date	
	Maki were discussed. This included Lucas Creek as a significant cultural area, preference for works to take place where land has already been modified rather than coastal areas, and opportunities for ecological enhancement.	
	Te Kawerau a Maki's initial CIA for the Northern Interceptor project was received in February 2014. The main points noted, and which confirmed the points discussed at the previous meeting, were:	
	 Their preference for works to take place within the road corridor or other modified sites and to avoid the shorelines and waterways. Any works within the coastal environment should be deep or well under harbour channels. Ecological enhancement will be necessary where works pass through the coastal environment. A taniwha is present in the South East portion of the project corridor; therefore works around Hellyers Creek should be avoided. Lucas Creek and Bomb Point should be avoided due to high environmental and cultural values, and the future development of a Marae. 	
	Watercare and Te Kawerau a Maki met again in March 2014. Feedback from Te Kawerau a Maki included support for integration of the NH2 project works with future cycleway development, their preference for the proposed pipelines to be located within roads and motorway corridors, and opportunities for stream crossings to include enhancement works.	
	An update meeting was held with Ngati Manuhiri and Te Kawerau a Maki in November 2014. The significance of the Upper Harbour and Lucas Creek to Te Kawerau a Maki was restated. Opportunities for ecological restoration at stream crossings and at the proposed causeway widening were discussed. It was also suggested that a cultural art work could be installed on the widened causeway, acknowledging the history and significance of the area. Te Kawerau a Maki prepared an addendum to their initial CIA on the Northern Interceptor project in December 2014. Additional concerns raised in this addendum included works within the CMA (both at the Upper Waitemata Harbour and Te Wharau Creek) and the pipeline route through North Shore Memorial Park. A further site visit was held with Te Kawerau a Maki in May 2015 where they reiterated their earlier concerns.	
Te Rūnanga o Ngāti Whatua	Te Runanga o Ngati Whatua was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013. They did not register an interest in the projects.	
	An update on the projects was provided to all mana whenua in November 2014, including an invitation to participate in further consultation. Te Rūnanga o Ngāti Whatua responded requesting that Watercare provide them with the responses received from mana whenua engaged in the projects to date and would provide their confirmed position following this.	
Ngāti Tamaoho	Ngati Tamaoho was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013. They did not register an interest in the projects.	
	An update on the projects was provided to all mana whenua in November 2014, including an invitation to participate in further consultation. Ngati Tamaoho responded confirming that they would defer to mana whenua already engaged in the projects.	
Ngāti Whatua o Kaipara	Ngati Whatua o Kaipara was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013. They did not register an interest in the projects.	
	An update email was sent regarding the NH2 project in May 2014, advising which iwi were involved at that time, and offering further information or a meeting to discuss the project. No response was received.	
Mana Whenua	Involvement to Date	
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	An update on the projects was provided to all mana whenua in November 2014, including an invitation to participate in further consultation. No response was received from Ngāti Whatua o Kaipara.	
Ngati Whanaunga	Ngati Whanaunga was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013. They did not register an interest in the projects.	
	An update email was sent regarding the NH2 project in May 2014, advising which iwi were involved at that time, and offering further information or a meeting to discuss the project. No response was received.	
	An update on the projects was provided to all mana whenua in November 2014, including an invitation to participate in further consultation. No response was received from Ngāti Whanaunga.	
	Ngati Whanaunga registered their interest in the projects for the first time via the Kaitiaki Managers Projects List in February 2015. Updated information on the projects was provided to Ngati Whanaunga including another invitation to participate in further consultation, no further response was received.	
Te Uri o Hau	Te Uri o Hau was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013. They did not register an interest in the projects.	
	An update on the projects was provided to all mana whenua in November 2014, including an invitation to participate in further consultation. Te Uri o Hau responded confirming that the projects are outside their statutory area of interest.	
Waikato Tainui	Waikato Tainui was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013. They did not register an interest in the projects.	
	An update on the projects was provided to all mana whenua in November 2014, including an invitation to participate in further consultation. Waikato Tainui responded requesting that Watercare undertake a full assessment against the Waikato Tainui Environmental Plan to ensure consistency with it.	
Ngati Paoa	Ngati Paoa, Ngāti Rehua Ngatiwai Ki Aotea, Ngāti Tamaterā, Ngāti Te Ata, Te	
Ngāti Rehua Ngatiwai Ki Aotea	Ahiwaru and Te Patukirikiri were initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013. They did not register an interest in the projects.	
Ngāti Tamaterā	An update on the projects was provided to all mana whenua in November	
Ngāti Te Ata	2014, including an invitation to participate in further consultation. responses were received from Ngati Paoa, Ngāti Rehua Ngatiwai Ki Aot Ngāti Tamaterā, Ngāti Te Ata, Te Ahiwaru or Te Patukirikiri.	
Te Ahiwaru		
Te Patukirikiri		
Ngāti Wai	Ngati Wai was advised of the projects via the MWKF and distribution of the Kaitiaki Managers Projects List in 2013. They did not register an interest in the projects.	

Ngati Wai was initially advised of the projects via the MWKF and distribution of the Kaitiaki Managers.

5.4 **Transport Authorities**

The project interfaces with the State Highway and local road network at a number of locations, as summarised earlier in this report. Meetings with representatives of the NZ Transport Agency, Auckland Motorway Alliance ("AMA") and AT have taken place to discuss the proposed works.

5.4.1 NZ Transport Authority and AMA

Watercare, NZ Transport Agency and AMA staff have met on a number of occasions during 2014 and 2015 to discuss the organisations' various projects in the northern and northwestern parts of Auckland,

including the Northern Interceptor works within the motorway corridor. This liaison will continue into the future and will include detailed consideration of the proposed Northern Interceptor Phase 1 works under and along the motorway corridor. Detailed design reports will be submitted to NZ Transport Agency and AMA as part of the CAR.

5.4.2 Auckland Transport

Initial discussions with Auckland Transport have canvassed the general scope of the project and the potential opportunities to integrate future works, including installing a small section of the Phase 1 pipeline as part of the upgrade to Albany Highway. Trenching activities within road carriageways are common throughout Auckland and there are well established procedures in place to manage the associated traffic impacts.

Auckland Transport will be closely involved in detailed design of the project and during preparation and implementation of the required Traffic Management Plans. CARs will be submitted to Auckland Transport for approval for all works within roads. As roads in the North Shore section of the District Plan are also designated, works undertaken in North Shore roads will also require written approval under section176 of the RMA. AT in its provision of the Works Access Permit provides its approval under section176.

5.5 **Network Utilities**

The project interfaces with other utility services along the full length of the proposed route and at the Rosedale WWTP.

Initial discussions have taken place with Vector in relation to the proposed works in Albany and the protocols and requirements for working in the vicinity of those critical assets.

The proposed pipeline route passes through land owned by Vector at 179 Bush Road. The proposed alignment of the Northern Interceptor may require the existing facilities at this site to be relocated within the same site.

Consultation will continue with Vector as the design progresses. Other network utility companies will be contacted during the design process in order to confirm the locations of existing services or any future development plans in the vicinity of the proposed construction sites.

5.6 Other Agencies

5.6.1 Heritage New Zealand

Although no known archaeological sites will be affected by the proposed works, Watercare is consulting with Heritage New Zealand in regard to the project and will be seeking an authority under Section 44(a) of the HNZPTA to cover all works undertaken for the project as a precaution.

5.7 **Directly Affected Private Landowners**

The directly affected landowners are listed in Appendix C. These include private landowners, Crown agencies, Auckland Council and Auckland Transport.

All owners of land in which the proposed works are to be located have been contacted by Watercare. The consultation undertaken with the directly affected landowners (if not summarised earlier in this section) is summarised below.

5.7.1 North Shore Memorial Park – Schnapper Rock Road

The proposed alignment for the Phase 1 pipeline passes through an undeveloped section of North Shore Memorial Park before continuing along the existing access road to Schnapper Rock Road.

Watercare has met with representatives of North Shore Memorial Park and Auckland Council's Specialist Parks department on numerous occasions to discuss the proposed works.

North Shore Memorial Park is generally receptive to the proposed works and has identified opportunities for the Phase 1 pipeline route to follow the alignment of a proposed new access road in an undeveloped southern section of the Memorial Park.

Watercare will continue to work collaboratively with North Shore Memorial Park to ensure that the proposed alignment and timing of the works will coincide as far as possible with the planned

development of the Memorial Park and in a manner that will be beneficial to both projects. Special construction management plans will be developed with input from NSMP staff to ensure that construction activities within the park are managed in a way that recognises the sensitive nature of the setting.

5.7.2 North Shore Golf Club – 51 Appleby Road

The proposed alignment for the Phase 1 pipeline follows the western and northern boundaries of the practice range at the North Shore Golf Club and then crosses through the edge of the car park before following the driveway to Appleby Road.

Watercare has held several meetings with the General Manager of the North Shore Golf Club who also raised the project at the club's September 2014 Board Meeting.

The North Shore Golf Club has been generally receptive toward the proposed works and liaised with Watercare to identify the proposed alignment as being one with minimal impact on golfing activities.

Consultation will continue with the North Shore Golf Club and property access and occupation arrangements will be finalised as the design progresses.

5.7.3 Residential Landowners

There are three private residential properties impacted. The owners of these properties have been contacted by Watercare.

5.7.4 Commercial Landowners

5.7.4.1 3rd Fairway Developments Ltd – 84 Laurel Oak Drive

3rd Fairway Developments Ltd owns a large section of vacant land immediately to the south of the North Shore Golf Club, accessed from Laurel Oak Drive. The proposed alignment of the Phase 1 pipeline crosses the eastern extent of this property before entering the North Shore Golf Club.

5.7.4.2 **14 John Glenn Avenue**

14 John Glenn Avenue is a vacant commercial lot between Albany Highway and John Glenn Avenue. Watercare has met with representatives of the owners of 14 John Glenn Avenue to ensure that the proposed pipeline alignment does not conflict with the development plans for the site. This consultation is ongoing.

5.7.4.3 Bush Road Enterprises Limited – 169 Bush Road

Bush Road Enterprises Limited owns the land at 169 Bush Road. This site is currently being used by a range of businesses associated with the manufacture and fit-out of mobile homes. The proposed alignment of the Phase 1 pipeline enters the site at the existing driveway at the south western corner and follows the driveway through to the western boundary where it enters Rosedale Park.

5.7.4.4 General Comment

Watercare has consulted with representatives from each of the commercial properties listed above and all have been generally receptive to the proposed works with only minor changes to the proposed alignment being required as a result.

The effects on these private properties include both temporary and permanent effects. Depending on the extent of work at each site, Watercare will seek agreements for access and occupation at each of these properties.

At the time of writing this report, the necessary property access and occupation arrangements are not finalised, but initial discussions have commenced. Matters raised by directly affected landowners will be addressed as part of the ongoing negotiations between each of the landowners and Watercare.

5.8 Immediately Adjacent Private Landowners

5.8.1 Hobsonville Point

The proposed works are located adjacent to the land owned (or formerly owned) by the Hobsonville Land Company (on the south side of the motorway) and Summerset Holdings Limited (on the north side

of the motorway). Consultation has taken place with these companies during development of the project to date. The parties are generally supportive of the proposed infrastructure development, but with a particular interest in the timing of works relative to other construction projects, and the management of effects during construction.

The land located on the northern side of the motorway between the Summerset Retirement Village and the motorway causeway is in private ownership. The proposed works are located in close proximity to that property and the proposed temporary access road for the causeway widening extends through the property. Watercare has met with the owner and an understanding of the objectives and intentions of both parties has been developed. Watercare will continue to consult with the owner to ensure these objectives are met.

Since early discussions on the project, sites have been sold and houses constructed along Squadron Drive, Station Street and the surrounding roads of the Hobsonville Point development. Consultation with these new landowners, and others in proximity to the proposed works in both Hobsonville Point and Greenhithe, will take place during further project development.

5.8.2 Greenhithe, Albany and Rosedale

The consultation to date has focussed on those parties whose land is directly affected by or required for the proposed works. Landowners and occupiers along the proposed route will be contacted as part of the pre-construction and construction phases of the project to provide information on the proposed works, to request information on any special access or other requirements, and to ensure potentially affected parties have a key point of contact during construction activities. This communication is an integral part of Watercare's construction works throughout Auckland and is a well-established process.

5.9 **Other Interest Groups and Organisations**

5.9.1 Tauhinu Sea Scout Group

The Tauhinu Sea Scout Group runs various outdoor activities with a strong focus on water activities such as rowing and sailing and have use of the Sea Scout Hall on Rahui Road. The Scouts primarily use the Salthouse boat ramp on Rame Road to launch their vessels but also use the Rahui Road boat ramp on occasion. Watercare has met with the committee of the Tauhinu Sea Scout Group who are understanding of the need for the proposed works and have identified opportunities to accommodate the needs of both parties. This consultation is ongoing.

5.9.2 Greenhithe Pony Club

The Greenhithe Pony Club leases the grounds at Wainoni Park South from Auckland Council and adjoins the land leased by Greenhithe Riding for the Disabled Association at Wainoni Park North. The pony club's facilities include a cross country course, all weather floodlit arena, equipment sheds, covered grooming area and clubhouse. The pony club are generally supportive of the proposed works and have indicated that the proposed construction works within Wainoni Park can be accomodated with sufficient notice. Furthermore, opportunities have been identified to achieve mutually beneficial outcomes such as alleviating safety concerns with the existing access road by creating a new accessway for construction. Watercare will continue to consult with the Greenhithe Pony Club as the project progresses.

5.9.3 **Greenhithe Riding for the Disabled Association**

The Greenhithe Riding for the Disabled Association ("GRDA") is a non-profit organisation that provides opportunities for anyone with a disability to enjoy horse riding and horse related activities. The GRDA leases the grounds at Wainoni Park North.

Watercare has met with the GRDA to discuss its facilities and operations on site. The GRDA were understanding of the need to provide for critical infrastructure and identified potential opportunities for improvements to their facilities that could be incorporated into the proposed works. Such opportunities included upgrading the GRDA's existing access road, recontouring land with excess spoil and improving drainage. Watercare will continue to consult with GRDA to further refine these potential opportunities and ensure that the needs of both parties can be accommodated.

5.9.4 North Harbour Air Gun Club

The North Harbour Air Gun Club ("NHAGC") leases land at the northern-most part of Wainoni Park North. The club shoots paper target, metallic silhouettes and field targets at the northern-most part of Wainoni Park. The club have a storage container on site and hold shooting events on alternate Sundays. Watercare has discussed the proposed works with the president of the NHAGC, who is understanding of the need for critical infrastructure. The opportunity to provide an earth bund around the edge of the shooting area to increase safety was also identified and may be incorporated into the proposed works subject to Council approval. Watercare will continue to consult with the NHAGC to ensure that any concerns about impacts on their operations are appropriately addressed and to further explore any opportunities for beneficial outcomes.

5.10 Public Consultation Events

Public consultation events were held at the following locations:

- Albany Junior High School, Appleby Road (March 26, 2015[,])
- Hobsonville Point Primary School, De Havilland Road (March 30, 2015)
- North Shore Dog Club, Wainoni Park (March 31, 2015).

The public consultation events were advertised in local newspapers and a targeted mail-out was sent to residences in close proximity to the proposed works and to local community organisations and residents groups.

Matters raised at these events included:

- Queries around the proposed alignments (particularly through Greenhithe) and alternatives considered
- Concerns with regard to the stability of existing trees located near properties adjacent to Wainoni Park
- Concerns with regard to the removal of trees at 84 Laurel Oak Avenue
- Confirmation that the proposed pipelines are to be installed below ground
- Queries relating to the timing and duration of construction activities in residential areas
- Broader inquiries with regard to the wastewater network outside the scope of the proposed works

5.11 Key Consultation Outcomes

5.11.1 Summary of Key Issues

Generally, the parties consulted to date have been supportive of the overall project, acknowledging the need for new infrastructure to support Auckland's future growth and development.

The main outcome of the consultation process to date has been the changes in alignment and refinements made along the proposed route and at some key sites.

Identifying opportunities to achieve mutually beneficial outcomes with affected landowners and occupiers has also formed a key part of the consultation and will continue as the design is further developed.

5.11.2 Ongoing Consultation

The ongoing consultation process prior to construction will incorporate:

- Targeted and wider community consultation during the statutory process (2015);
- Consultation with directly affected parties on matters of detail to be incorporated in final design (2015 – 2016);
- Consultation with directly affected parties prior to construction to develop the details of the construction methodology and construction management plans.

A detailed project communications plan will also be developed prior to construction. The communications plan will cover matters such as:

- The methods of consultation and liaison with key stakeholders, owners and occupiers of neighbouring properties and the wider community regarding the likely timing, duration and effects of construction works;
- Name and contact details for the nominated community liaison person and alternative contact details in the event of that person not being available (to ensure a contact person is available by telephone 24 hours per day seven days per week during the construction phase); and
- Procedures to record and respond to complaints.

The communications plan will be implemented during construction, and updated and revised as appropriate.

6 Assessment of Effects on the Environment

6.1 **Overview and Structure of Assessment**

Sections 6.2 to 6.16 of this report provide an assessment of the potential effects of the Project on the environment.

The assessment of effects is structured as follows:

- Section 6.2 Assessment of positive effects
- Section 6.3 Effects within the Coastal Marine Area
- Section 6.4 through to 6.15 –Other effects on the environment

For further details and assessment on the above matters, refer to the referenced technical reports contained within Volume 2.

6.2 **Positive Effects**

The Project constitutes an integrated and cost effective solution for the network, addressing the capacity of the network to provide for increased growth in the area. Once completed the Project will facilitate the continued effective operation of the wastewater network generally, and provide capacity in the wastewater network for future growth and development in the Auckland region.

Once completed the Project will provide the following key benefits:

- The provision of capacity in the wastewater network for future growth and development in Auckland;
- Reducing the potential for wastewater overflows from the network by providing appropriate infrastructure to service growth;
- Positive effects on public health and the environment through the continued effective operation of the wastewater network generally.

6.2.1 Network Capacity

The Three Waters Strategic Plan (Watercare, 2008) identified the need for additional trunk sewer capacity to provide for Auckland's growth.

Watercare has adopted the Council's medium growth scenario (issued 9 May, 2011) for its long-term strategic planning purposes. This scenario forecasts a population increase across the Auckland region from 1.48 million people to 1.75 million by 2022 and 1.95 million by 2031. There are around 1.26 million people connected to Watercare's metropolitan wastewater system. This is forecast to grow to 1.65 million people by 2031.

The capacity of the existing network is insufficient to cater for this predicted population growth. Based on current projections, without the provision of additional wastewater conveyance or treatment capacity to service growth in the Northern Waitakere and South Rodney areas, Watercare would be unable to service any additional growth in the Whenuapai Branch sewer catchment in the near future and the Western Interceptor catchment from 2035 without the risk of significant increases in the frequency and associated effects of wastewater overflows.

The alternative to not increasing the capacity of the network is that the Council does not enable the land to be developed or that Aucklanders accept degraded environmental outcomes. This would not be consistent with the Auckland Plan strategic direction for providing for, improving and protecting strategic infrastructure.

6.2.2 Benefits of the Wastewater Network

Aucklanders expect that infrastructure will be planned, delivered and maintained in a way that will make Auckland liveable and resilient. (Auckland Plan Strategic Direction 12). The ongoing operation of a reticulated wastewater system that includes uninterrupted wastewater treatment is expected by urban Auckland's residents, businesses and visitors.

The need for a reticulated wastewater system to support Auckland's population growth was first recognised in the late 19th century to address concerns about the discharge of raw wastewater into local

streams and bays. Development of the current wastewater network and treatment systems, and subsequent upgrades undertaken over the years since have resulted in a significant reduction in the incidence of water-borne diseases, considerable improvements in water quality of freshwater and coastal environments, and avoidance of adverse effects on amenity caused by untreated wastewater.

The ongoing operation of the wastewater network of which this project is part has significant positive public health, social, environmental and cultural effects.

6.2.3 **Overflow Mitigation**

Wet weather overflow mitigation is also required in the Northern Waitakere area to meet Regional Plan targets of no more than two events per discharge location per year in the separated network. Watercare needs to progress the development of overflow mitigation options, such as the proposed Northern Interceptor scheme, to achieve targeted levels of service. The proposed works will reduce the potential for overflows. This will in turn:

- Minimise potentially harmful pathogens reaching freshwater and coastal environments;
- Minimise the potential for adverse amenity effects on public areas and recreation values and
- Assist in the restoration of the mauri of waterways and coastal waters.

6.3 Effects within the Coastal Marine Area

There are two sites where works will occur in the CMA. These are the Upper Waitemata Harbour crossing from SH18 to Rahui Road, and the crossing of Te Wharau Creek.

As discussed above, it is proposed to cross Te Wharau Creek by the use of HDD and to cross the Upper Waitemata Harbour by the use of either HDD or marine trenching. The following sections of the report assess the potential effects of both of these construction activities.

6.3.1 Horizontal Directional Drilling

6.3.1.1 Effects of HDD

HDD is unlikely to result in any significant adverse effects on the CMA, as it avoids disturbance of the surface of the foreshore and seabed.

The twin pipelines will be installed at depths of between 4m and 30m below sea level in the Upper Waitemata Harbour, and a similar depth below the bed of Te Wharau Creek. At these depths the construction and ongoing presence of the pipelines will have no effects on coastal processes or on the ecological values of the Upper Waitemata Harbour. While Te Wharau Creek is listed as a CPA 2 the use of HDD to construct the pipelines in this area avoids any adverse effects on the ecological values noted for the CPA, as it will be below the surface of the seabed. The occupation of areas under the seabed in both the Upper Waitemata Harbour and Te Wharau Creek will not cause adverse effects on any other users of the CMA.

There is a risk with HDD that hydrostatic pressure release during drilling will result in the release of drilling fluid to the coastal marine area. Hydrostatic pressure release could occur as a result of excessive fluid pressures in the drill hole, loss of circulation of fluids in the drill hole, or as a result of the ground conditions through which the HDD is occurring (for example if faulting or weak ground conditions are encountered). Toxic additives are generally not necessary for HDD drilling fluids, and the overall toxicity of the fluids is therefore typically low.

Should hydrostatic pressure release result in a release of drilling fluids, the proposed depth of the HDD beneath the seabed provides some mitigation against drilling fluids reaching the surface. If drilling fluids do reach the surface, the primary effects would be from the increase in sediment in the area of the release. Effects of increased sediment as a result of marine trenching have been assessed and are discussed in section 6.3.1.2 below. Any drilling fluid release would be substantially less than this (as a result of the implementation of measures outlined in a Drilling Fluid Management Plan) and therefore the effects would not be significant.

It is important to emphasise that the primary mechanism for managing environmental effects of hydrostatic pressure release is to adopt procedures to ensure that release does not occur, primarily through:

- Designing the HDD alignment so that it is in consistent ground conditions;
- Designing the composition of the drilling fluids so that they are appropriate for the expected ground conditions;
- Regular site inspections of the drilling compounds to ensure no drilling fluid leakage is occurring;
- Tracking the drilling fluid volume at the rig site and instituting inspection procedures if volume losses exceed acceptable thresholds.

All procedures relating to drilling fluid management will be outlined in a Drilling Fluid Management Plan, which will ensure that all practicable safeguards are implemented in order to minimise the risk of release of drilling fluids into the environment.

6.3.1.2 Mitigation of HDD Effects

The potential adverse effect in the coastal marine area as a result of the HDD operation relates to the potential release of drilling fluids. A Drilling Fluid Management Plan will be established so that all reasonable measure are taken to minimise the potential for drilling fluid release.

Design of the HDD alignment has provided mitigation for any drilling fluid release through the depth of the drill hole below the seabed. If a drilling fluid release was to occur there is a significant layer of marine muds over the drill hole before any drilling fluid would reach the surface. If drilling fluid did reach the surface, sedimentation effects are not likely to be significant.

6.3.2 Marine Trenching

Marine trenching may cause adverse effects, arising from the disturbance of the foreshore and seabed during construction. Direct effects will be temporary and will cease following completion of construction activities, and seabed communities will recover relatively quickly after completion of construction. Under normal operation the permanent presence of the pipelines within the seabed following construction will not cause adverse effects.

Effects of marine trenching may arise in terms of:

- Effects on coastal processes
- Effects on ecology, including marine benthic invertebrates, fish and coastal birds
- Noise effects
- Effects on navigation and recreation

6.3.2.1 Effects on Coastal Processes

The marine trenching will cause physical disturbance of the seabed through excavation of the trench through the intertidal area at Rahui Road and the transitional areas at the causeway and Rahui Road, and through the jet trenching or mass flow excavation through the sub-tidal area. An assessment of effects on coastal processes has been undertaken for the Project (Technical Report E).

The trenching in the intertidal area at Rahui Road will be done by machinery working from a temporary construction berm with sediment from the trench either stockpiled on either side of the trench or removed offsite for storage prior to being brought back to site for backfilling the excavated trench. A fixed silt fence will be installed around the seaward perimeter of the works, and the excavation is likely to be carried out at low tide to reduce effects on coastal water quality. These two measures will ensure that there is no significant silt discharge outside the construction work area. If sediment other than that excavated from the trench is used for backfilling there could be effects if the sediment properties are different from the surrounding sediment in the intertidal area. This effect can be managed by careful selection of the backfilling material.

In the transition areas between intertidal and sub-tidal areas of the harbour, marine trenching is likely to be carried out by hydraulic back-hoe excavators mounted on a barge. There will be some release of suspended sediment into the water column as the excavator lifts the sediment out of the water. The sediment in this area is predominantly sands with minor silt content (less than 10%) and will therefore largely settle within 50m of the dredged area. The technical assessment carried out in Technical Report

E concludes that suspended sediment rates are unlikely to be increased above 50mg/l of ambient concentrations at a distance of 100m from the work area, and that sediment will settle within a period of 4 to 8 hours. In the context of the size of the Upper Waitemata Harbour and the relatively short period for sediment settlement, the affected area will not be significant.

In the sub-tidal area, jet trenching and mass flow excavation have different potential effects arising from sediment disturbance. Technical Report E provides the results of a case study of jet trenching off the east coast of the United States, which is broadly applicable to the Upper Waitemata Harbour. Based on the range of results obtained in this study, Technical Report E concludes that jet trenching will create significant rates of suspended sediment within the channel near the seabed at the location of the jet. The majority of the suspended sediment will be confined to the channel, with less than 50 to 100 mg/L expected in the intertidal area (similar to observed suspended sediment concentrations in the intertidal area). Technical Report E concludes that the sediments will settle out within 1 to 2 tidal cycles and the net effect will be slight increases in the height of the suspended sediment on aquatic ecology are discussed below.

In relation to the mass flow excavation trenching method, Technical Report E concludes that, based on the understanding of the physical processes operating in the harbour, the sediment properties and the relatively shallow water depths, with this trenching method there are likely to be significant levels of suspended sediment through the water column in the immediate vicinity of the works. Sediment concentrations similar to those anticipated at the seabed for the jet trenching excavation method could be expected over up to 70% of the water column for mass flow excavation, and they are therefore likely to result in a greater visible effect at the water surface. The duration of the effect is still likely to be relatively short (4 to 6 hours) due to the sediment properties, as discussed above for excavation by jet trenching. There is a greater risk that suspended sediment concentrations on the adjacent intertidal area will be increased, due to the greater depth of the water column affected. However, the increased suspended sediment is unlikely to result in any measureable change to the existing sedimentation patterns within the harbour.

With respect to long terms effects of marine trenching, provided that the pipes are installed at a sufficient depth not to be exposed, there will be no long term effects on coastal processes. Provision has been made in the construction methodology for at least 2m of cover over the pipes once installed. For the jet trenching excavation method, cover for the pipelines is provided through the resettling of the fluidised bed material. For the mass flow excavation method, cover will be provided either by backfilling, or allowing natural processes to cover the pipelines through natural sediment movement. As with the intertidal trenching, if backfilling material is introduced, it will not be significantly different from the surrounding sediment, in order to avoid adverse effects.

6.3.2.2 Effects on Ecology

As discussed above, marine trenching is likely to result in short term increases in suspended sediment. This will cause temporary and localised water quality effects. Settled sediment may also cause effects on the benthic communities. Direct physical disturbance of the benthic communities will also occur along the trenching alignment. An assessment of Ecological Effects, including effects in the coastal marine area, has been undertaken for the Project (Technical Report I).

Marine habitat characteristics along the marine trenching alignment and an analysis of the benthic species present is contained in Technical Report I. In summary, benthic communities vary along the proposed alignment. Different community structures are present in the sub-tidal channel compared to the inter-tidal areas, as would be expected. Benthic marine communities within the channel were generally found to be more diverse, but the species found along the alignment are generally typical of those found elsewhere in the Upper Waitemata Harbour. No threatened species were identified in the samples, but cockles, an important kaimoana species were found in the intertidal area near Rahui Road. The diversity of marine fish species frequenting the proposed alignment across the harbour is likely to be similar to that generally recorded in the Upper Waitemata Harbour.

As outlined in Technical Report I, physical disturbance of the benthic communities that live on or near the seabed within the footprint of the trench (from both the trenching activity and the placement of the temporary construction berm in the intertidal area at Rahui Road) is a potentially significant short-term effect, but should not result in any long-term adverse effects. Technical Report I notes that previous scientific work on this type of disturbance has shown that the recovery of the marine benthic communities is relatively rapid, with few signs of effects observable 12 months after the disturbance. Residual effects in the medium to long term will therefore be no more than minor.

In relation to increased suspended sediment and sediment deposition outside the trenching alignment, Technical Report I notes that in the immediate area of the trenching alignment (i.e. within tens of metres) there will be some deposition that will affect benthic communities in the short term. Similar to the physical disturbance, these effects are likely to be relatively short-term, and recovery is anticipated to be rapid. Mobile species, such as finfish, will move away to avoid localised areas of elevated suspended sediment levels. Technical Report I concludes that, given the natural suspended sediment and depositional characteristics of the Upper Waitemata Harbour, the effects are expected to be no more than minor in the medium to long term (1 year post construction).

The works are not expected to cause any measurable adverse effects on coastal birds. The area of intertidal trenching through the Upper Waitemata Harbour will result in a temporary loss of foraging habitat for coastal birds, but this loss is restricted to a confined area close to Rahui Road. Given the extent of the remaining available foraging habitat within the Upper Waitemata Harbour and the temporary nature of the loss as a result of trenching activities, adverse effects on foraging birds will be no more than minor.

6.3.2.3 Noise Effects

Technical Report A has assessed the effects of noise for construction works in coastal waters (without mitigation) and notes that there could be significant effects where marine trenching in the intertidal area is carried out early in the morning or late at night near the shoreline. Marine trenching in the intertidal area is likely to be somewhat dependent on tidal conditions, and effects of noise can be mitigated by giving careful consideration to when the works are carried out. Engagement with potentially affected receivers is also recommended and management of the marine trenching through the Construction Noise and Vibration Management Plan.

In terms of underwater noise compliance the levels of underwater noise generated by the various proposed marine trenching methods are expected to comply with the requirements of the PAUP. The zone of influence on marine life would be small and would result in temporary behavioural response changes (i.e. avoidance of the area) only in close proximity to the works.

6.3.2.4 Effects on Navigation and Recreation

It is anticipated that marine trenching will result in temporary adverse effects on navigation and recreation during construction. For example, the laying of an extensive length of pipe across the Upper Waitemata Harbour will require machinery, boats and floating lengths of pipe to be present on the surface of the harbour prior to the pipes being installed under the seabed. The envelope within which the marine trenching alignment will be located covers a significant area of the Mooring Management Area/Mooring Zone in the Upper Waitemata Harbour. Effects on navigation and recreation will be managed by engagement with the Auckland Harbourmaster with a view to identifying mitigation options prior to construction commencing.

6.3.2.5 Mitigation

Potential adverse effects from marine trenching can be mitigated by a number of measures:

- Minimising the works footprint and the duration of the works will minimise disturbance to the benthic communities and loss of coastal bird foraging habitat, and reduce the length of time that increased suspended sediment levels may occur
- Implementing a construction methodology to minimise the dispersion of suspended sediment for example through the use of silt fences and silt screens around the working area
- Monitoring suspended sediment levels around the works area, and ceasing work if levels exceed a predetermined trigger
- Replacement of any moorings that need to be removed to enable marine trenching to occur
- Engagement with the Auckland Harbourmaster

Provided these mitigation measures are implemented, the effects of the works in the coastal marine area will be no more than minor, with the exception of the physical disturbance of the benthic marine community within the footprint of the marine trenching works. While the effects on this community will be significant, they will be relatively short term and localised. Effects on the benthic marine community of the Upper Waitemata Harbour as a whole will not be significant.

6.3.3 **Risks and Benefits of HDD and Marine Trenching**

As well as the environmental effects associated with HDD and marine trenching there are also a number of operational risks that need to be considered with regards to identifying a preferred crossing option for the Upper Waitemata Harbour crossing.

The HDD and marine trenching construction methods are compared in Table 6-1 below.

Table 6-1: Comparison of HDD and Marine Trenching Construction

Construction Element	Horizontal Directional Drilling	Marine Trenching	
Site Establishment in CMA	 Permanent 4,300 m² construction platform in CMA at SH18 causeway 	 Temporary access berm in CMA at Rahui Road (approx. 6m wide at the top of the berm by 125m in length) 	
Installation of pipelines across Upper Waitemata Harbour	 Once the construction platform is established, HDD will take 4 – 6 months to complete 	 Marine trenching across the harbour will be approximately 20m wide (comprising of a 5m wide base and 3:1 batter slope) and will take 3 – 5 months to complete 	
Permanent Occupation of CMA	• 4,300 m ²	• None	
Total duration of works (including site establishment prior to construction and reinstatement upon completion	• 4 – 6 months	• 3 – 5 months	
Night time works required	 Night time works will be required during pipestring pulls. In total, there will be two pulls, each of an approximate duration of 2 weeks. 	• None	
Key risks and issues for construction management	 Drilling fluid release Risk of hole collapse leading to stoppage of drilling operation and potential loss of equipment Risk of exceeding night time acoustic standards 	 Temporary sedimentation and impact on benthic communities during trenching Potential temporary impact on recreation and navigation 	

6.4 Groundwater and Settlement Effects

An assessment of groundwater and settlement effects has been undertaken for the Project (Technical Report J).

6.4.1 **Overview**

In general terms, the potential effects that are relevant in relation to land settlement and groundwater levels are:

- Surface settlement arising from the construction of the pipeline (mechanical settlement); and
- Groundwater lowering (drawdown) that might occur during construction, or persist after construction is complete. Groundwater drawdown may also cause surface settlement (groundwater drawdown settlement).

Potential effects can be further grouped in relation to the proposed construction methodologies:

- Open trench excavation;
- Micro-tunnelling;
- HDD.

The following sections discuss potential effects in relation to each of the proposed construction methodologies. With proposed mitigation measures in place, the groundwater and settlement effects of the Project will be no more than minor

6.4.2 **Open Trench Excavation**

6.4.2.1 Potential Settlement Effects

Most of the route will be constructed by open trench excavation. The greatest potential impact is therefore likely to be general surface settlement and potential effects on buried services.

The depth of trenching will typically vary between 2.5m and 4m below ground level. These sorts of excavation depths are routinely undertaken for pipeline projects in Auckland and New Zealand. Short sections of deeper trenching are proposed where conflict with existing services has been identified, and these areas are likely to require more careful design to avoid adverse settlement effects.

Close to the open trench excavation, mechanical settlement of up to 80mm could occur. However, it is expected to reduce to minimal levels (5mm or less of settlement) within 10-15m from the excavations. Through most of the proposed alignment construction will occur in road reserve and parks and reserves and will therefore be well removed from nearby buildings or structures.

At some locations, restricted access means that the open trench excavation will need to occur in relatively close proximity to buildings or other significant assets. The locations include:

- 11 Traffic Road;
- 30 34 Newbury Place, 222 224 Schnapper Rock Road;
- 1 13 Appleby Road;
- 327 Albany Highway;
- 325 Albany Highway and 14 John Glenn Ave;
- 169 174 Bush Road.

Technical Report J notes that the potential settlement experienced at these locations is not likely to exceed the criteria set by the relevant district plan rules, with the possible exception of the sites at 169 - 174 Bush Road. As described in section 6.4.2.2 construction methodologies are available to mitigate potential adverse settlement effects on these sites.

Construction of trenches also has the potential to result in significant groundwater drawdown effects where trenches are constructed in the Tauranga Group soils (which occur over much of the proposed alignment) and below groundwater level. Technical report J concludes that total settlement caused by groundwater drawdown for the open trench excavation is not expected to exceed 50mm (the recommended limit for building safety) and will reduce to minimal levels within 5m of the open trench excavation.

At three locations along the proposed alignment, groundwater drawdown as a result of open trench excavation is expected to exceed 2m. The locations include:

- Tauhinu Road crossing;
- Commercial properties near William Pickering Drive; and
- William Pickering Drive crossing.

Technical Report J notes that, in addition to settlement effects due to groundwater drawdown into open trenches, the backfilling of trenches could potentially result in long term changes in groundwater flow. These effects can be controlled to be no more than minor by appropriately specifying the backfill of the trenches.

Buried services have the potential to be adversely affected by the open trench excavation methods, however buried services are generally considered to be more flexible and construction methodologies are available to mitigate potential adverse settlement effects on buried services.

6.4.2.2 Proposed Mitigation for Open Trench Excavation Techniques

The following construction methodologies can be used in areas where it is necessary to reduce the likelihood of settlement occurring:

- Trench shields comprising steel frames which support the side walls once the excavation is complete. Props can be installed across the trench to increase the robustness of the retention system; and
- Sheet piles are likely to be installed at deeper sections of the alignment where potential for groundwater drawdown is large and to ensure that the trench remains stable. The sheet piles are driven or vibrated into place and support the sides of the trench providing a safer work environment. Props may be required across the trench to reduce deformations that might result in mechanical surface settlement.

6.4.3 Micro-tunnelling

6.4.3.1 **Potential Settlement Effects**

Micro-tunnelling is only planned for a relatively short length of the pipeline to be installed under SH18. The potential for effects associated with micro-tunnelling are therefore localised to the SH 18 crossing, and particularly to SH18 and the Hobsonville PS.

Technical Report J outlines that the estimated mechanical settlement as a result of the micro-tunnelling is up to 5mm at the southern end of the micro-tunnelling alignment, and up to 20mm at the northern end. These estimates are within the thresholds routinely required by NZ Transport Agency to avoid damage to SH18.

Technical Report J also outlines the estimated settlement that will result from groundwater drawdown. Without mitigation, at the southern end of the micro-tunnelling alignment settlement as a result of groundwater drawdown could be up to 35mm, and at the northern end, up to 5mm. At the southern end this amount of settlement would exceed NZ Transport Agency requirements, but can be reduced as outlined in section 6.4.3.2 below.

Groundwater drawdown around the micro-tunnelling alignment is predicted to be up to 3m at the southern end, but negligible at the northern end as the pipe alignment rises and the groundwater depth increases. At the southern end during construction, Technical Report J notes that the potential for groundwater drawdown is linked to the length of time portions of the excavation are open, prior to the final pipeline being installed. Typical construction operations restrict this period as a matter of course, hence minimising the potential for drawdown to fully develop. Drawdown is therefore likely to be less than 3m in reality.

At the southern temporary access shaft the adjacent Hobsonville PS is supported on driven steel piles, making it less vulnerable to settlement effects. The Hobsonville PS is also likely to be located a sufficient distance from the access shaft not to be affected by the estimated groundwater drawdown. The retention design for both access shafts will be subject to detailed design to provide a safe work environment for construction workers and machinery.

6.4.3.2 Proposed Mitigation for Micro-Tunnelling

Preliminary analysis undertaken as part of the preparation of Technical Report J suggests that approximately 15 to 20mm of settlement may occur at the southern end of the micro-tunnel as a result of groundwater drawdown if the micro-tunnel operation is complete within 12 weeks and the pipeline is made watertight upon completion. Operating the micro-tunnelling machine in closed mode will further reduce the potential for settlement and ensure that settlement complies with the NZ Transport Agency guidelines and has no more than minor adverse effects.

Specific retention design at each of the access shafts, where settlement is likely to be greatest, will ensure the safety of workers and machinery and avoid damage to the surrounding area through settlement.

Combined with installation of watertight seals at pipe joints, the potential for short and long term groundwater drawdown as a result of micro-tunnelling can be readily mitigated, such that settlement estimates are within acceptable limits.

6.4.4 HDD/Marine Trenching

HDD and marine trenching are planned for the crossing of the Waitemata Harbour, whereas HDD only is planned for the Te Wharau Creek and Alexandra Stream crossings. Because these areas are relatively removed from buildings, and the extent of HDD at Alexandra Stream is relatively short, the potential for effects on property or buildings associated with this aspect of the works is therefore very low.

6.4.5 **Proposed Monitoring Programme**

A monitoring programme should be implemented to monitor the construction of the Project, specifically targeting those areas where a greater level of settlement risk is expected that have the potential to effect existing buildings and services: The monitoring programme could include:

- A network of surface level monitoring marks installed on representative, or critical, cross sections to the pipeline alignment;
- Additional surface level monitoring marks located on or near settlement sensitive structures and building condition surveys including photographs; and
- Piezometers installed in close proximity to pipelines or manholes to monitor groundwater level response to construction (for approximately 12 months) within geological units with potential to consolidate.

6.5 Vibration Effects

As indicated in Technical Report B, vibration effects from the Project will potentially affect a range of receivers.

The current environment along the project route comprises a combination of residential, commercial, educational, open space and arterial roading land uses. The primary existing source of vibration along the project route is therefore likely to be vehicles utilising the roading network. In this type of environment vibration levels beyond 5 m from the edge of pavements would generally be expected to be at or below perception levels.

The sources of vibration from the proposed project construction activities are expected to come from excavators, trucks, compaction plant, generators, cranes and trench shields. The activities that will generate the most significant vibration effects (pile driving and sheet piling) will be undertaken in locations where there are no sensitive receivers in the vicinity.

For all activities, Technical Report B notes that the appropriate standard to use for assessing and managing vibration effects is DIN4150-3:1999 "Structural Vibration – Part 3: Effects of Vibration on Structures". The limits contained in the Standard ensure a low risk of damage to residential and sensitive structures, and also provide an acceptable level of disturbance to most receivers for short duration activities during normal working hours. Night time activities that could cause vibration effects are generally not proposed in residential areas.

For the open trench excavation the typical plant operations using conventional excavators and handling equipment are not expected to exceed the DIN4150:1999 standards at distances of greater than 5m. The likelihood that occupants of dwellings or commercial buildings will experience discomfort is expected to be low at distances of over 10m and vibrations will be barely perceptible beyond 10-12m.

There are a small number of properties (identified in Table 4 in section 8.4 of Technical Report B) where the works may result in a minor risk of disturbance to residents, but any disturbance is expected to be for short periods that can be addressed by application of appropriate mitigations measures. In all cases there are no risks of damage to structures.

Technical Report B notes that the rate of construction progress expected to be achieved means the period of any disturbance to residents will be relatively short. Tolerance to this level of vibration tends be increased compared to long term continuous vibration, and the effects are therefore anticipated to be no more than minor.

The operational vibration effects of the project are expected to be negligible and require no specific mitigation.

6.5.1 Mitigation

The proposed alignment is generally at least 15 metres from occupied buildings; a distance where the effects of vibrations from construction plant identified as suitable to complete the works are expected to be less than minor.

A range of potential vibration management and mitigation measures are however available to mitigate effects during construction. These include:

- Communication with adjacent affected residents/business owners
- Coordination with affected residents/business owners to carry out works with greater potential for vibration disturbance when they are likely to be out
- Consideration of an alternative method of construction with reduced vibration effects where full compliance with the vibration limits cannot be achieved
- Obtaining agreement with affected parties to apply higher criteria for specific activities

These measures could form part of the CNVMP for the project, which will be prepared and submitted to Council prior to the project commencing.

6.6 Noise Effects

As indicated in Technical Report A, the Project will potentially affect a range of receivers; including residential, commercial, educational and recreational land uses.

The majority of the project (open trench excavation) is typical construction work which is carried out almost on a daily basis within Auckland and has been successfully mitigated and managed in many other construction projects. These construction activities are generally expected to comply with the project construction noise criterion under NZS 6803:1999 (Monday to Saturday daytime) for the nearest affected receivers within residential zones.

However, there are a range of site specific construction activities which will generate high noise levels, albeit short-term, in close proximity to receivers within residential zones. These construction activities may result in temporary exceedances of the project construction noise criterion and as such will require careful management and mitigation to ensure any effects on these surrounding receivers are reasonable.

Situations where temporary exceedances are predicted to occur include the following:

- Site establishment and construction activities adjacent to Summerset Village retirement home (SH18 to Widened Causeway section), where effects will be short-term and transitory;
- Site establishment, construction activities and road surface reinstatement activities adjacent to
 residential dwellings and commercial and educational premises on Rahui, Traffic and Greenhithe
 Roads and Te Wharau Drive (Rahui Road to Wainoni Park North sections), where the cutting and
 breakup of the road surface would be the greatest source of noise, but would be very short term
 (only a few hours in any one location);
- Site establishment, construction activities and road surface reinstatement activities in some locations on Schnapper Rock Road, Newbury Place, Aberley Road and Witton Place if activities occur within 5 – 20m of dwelling facades (NSMP to NSGC section).
- Pipe bridge construction activities adjacent to residential dwellings on Witton Place and Laurel Oak Drive and site establishment and road surface reinstatement activities at some residential dwellings and ABC Childcare if activities occur in close proximity to them on St Andrews Way, Appleby Road and Albany Highway (NSCG to Albany Highway section).
- Site establishment, construction activities and road surface reinstatement activities if activities occur within 15 – 25m of commercial premises on John Glenn Avenue, William Pickering Drive, Piermark Drive and Bush Road (Albany Highway to William Pickering Drive and William Pickering Drive to Bush Road sections).

In addition, careful management and effective consultation and communication will be required where construction activities are proposed to be undertaken outside of normal construction hours within residential zones. As indicated in Technical Report A, the night-time noise criterion of 45 dB is expected to be exceeded for the following:

- HDD drill rig operations adjacent to residential dwellings on Rahui Road (Upper Waitemata Harbour Crossing section).
- HDD drill rig operations adjacent to residential dwellings on Birchwood Grove, Monkton Close and Kerema Way (Te Wharau Creek Crossing section).

Night-time construction activities proposed within the northern sections of the project route (Albany Highway to William Pickering Drive and William Pickering Drive to Bush Road sections) are however expected to comply with the 75 dB noise criterion under NZS 6803:1999 which applies to commercial and industrial areas.

6.6.1 Mitigation

A range of potential noise management and mitigation measures are available. These will be implemented as part of a CNVMP.

A CNVMP will be implemented on site for each specific area of work and some specific activities where exceedance of the relevant criteria is likely, and should be kept up to date regarding actual timing/equipment use and methodologies, should these change throughout the construction process.

The primary mitigation measures for project construction noise effects are summarised below.

Communication and Consultation

The most important tool for managing construction noise is consultation and communication. For this project, the recommended daytime criterion is predicted to generally be achieved at dwellings which are located 20 metres or more distance from trenching works. For activities such as saw cutting and asphalt breakup this distance increases although is dependent upon intervening screening.

Notwithstanding the general project updates and communications that would occur with the public, any residents affected by noise levels higher than the recommended criteria would need to be consulted in relation to the proposed works, including timing. Communication should occur with the identified households prior to works being carried out, by means of letter drop.

A high level of community engagement will be required for residents likely to be affected by HDD activities at Rahui Road and adjacent to NSMP, where exceedances of the night time noise criterion are likely during drilling and pipe-pulling operations. Special construction management plans will be developed with input from NSMP staff to ensure that construction activities within the park are managed in a way that recognises the sensitive nature of the setting.

Timing of activities

General construction hours span two time periods in the Construction Noise Standard, namely 0630 - 0730 hrs and 0730 - 1800 hrs. Of these periods, the 0630 - 0730 hours period, often termed the 'morning shoulder', has a significantly lower noise limit than the daytime period.

Therefore, a potential risk exists for construction activities to exceed the morning shoulder criterion by a significant margin, unless early morning site activities are appropriately managed. Two examples would be where trucks with engines running queue up outside the site gates prior to site opening, and also crane lift of heavy items delivered by truck during this period.

The management of these issues could take the form of preventing trucks from queuing/idling outside the construction site gates and scheduling heavy deliveries to occur after 0730 hrs.

Noise Barriers

In general, placing solid barriers, such as sheets of plywood, between dwellings and the construction activities can reduce noise levels by up to 10 decibels. However, the second floor of a two-storey dwelling would not be protected due to its elevated nature. This would also be the case for dwellings naturally elevated above sites.

Avoidance of Unnecessary Noise

At many construction sites it can be observed that some construction practices unnecessarily increase noise levels. Those include the sounding of horns when a truck is fully laden, the air break release of trucks and the utilisation of audible, often tonal, reversing alarms.

Those issues can be avoided or noise levels reduced by means of changed construction site management, fitting of mufflers to trucks and the replacement of audible reversing alarms with visual or lower noise broadband audible reversing alarms.

Other unnecessary noise may include shouting, loose tail gates and radios. All of these can be avoided with good site management.

Mitigation of Noise from HDD operations

Mitigation measures for HDD drilling and pipe-pulling operations can include super-silenced generators, enclosing the hydraulic power packs and the mud/slurry pumps. Noise barriers may be effective in locations such as North Shore Memorial Park. At Rahui Road, where residents receiving noise would be elevated above the construction site compound, specific mitigation measures would need to be discussed with affected residents during the time period when night-time activities are necessary.

6.7 Effects on Network Utilities and Infrastructure

The project interfaces with other utility services along the full length of the proposed route and at the Rosedale WWTP. Key aboveground infrastructure that the alignment will interface with includes the Hobsonville PS, Rosedale WWTP, transport infrastructure (including SH18, Albany Highway and the local roading network), power and telephone lines (Rahui Road and Witton Place) and street lighting. Below ground infrastructure includes wastewater pipes, stormwater drains and fittings, gas, fibre and communications, as well as water supply mains and electricity transmission lines.

The proposed pipeline route passes through land owned by Vector at 179 Bush Road. The proposed alignment may require the existing services at this site to be relocated within the same site.

As outlined in section 5.5 of this report, initial discussions have taken place with Vector in relation to the proposed works in Albany and the protocols and requirements for working in the vicinity of those critical assets. Consultation will continue with Vector as the design progresses.

With respect to works within the road corridor, meetings with representatives of the NZ Transport Agency, AMA and AT have taken place to discuss the proposed works.

Presently, it is understood that overhead electricity and telephone lines will require temporary removal at Rahui Road and Witton Place, to enable access for construction equipment (HDD drill rigs and cranes). This may also occur at other locations along the route and will be confirmed in the detail design stage.

6.7.1 Mitigation

Prior to works being undertaken, a CAR will be submitted to Auckland Transport for approval for all works within roads. To manage and avoid any adverse effects relating to construction traffic, a detailed Construction Traffic Management Plan ("CTMP") for the project will be developed and submitted to Auckland Transport for approval prior to the commencement of works. Included in this will be the identification of traffic management measures, which should meet or exceed the requirements in the NZ Transport Agency Code of Practise for Temporary Traffic Management ("COPTTM").

Network utility companies will be contacted during the design process in order to confirm the locations of existing services or any future development plans in the vicinity of the proposed construction sites, such as those within Vector's site at 179 Bush Road. Where Requiring Authority Approvals are required under sections 176(1)(b) and 177(1) of the RMA, these will be sought prior to construction.

6.8 Archaeological Effects

As discussed in Technical Report D, multiple archaeological and historic heritage sites have previously been recorded in the vicinity of the project alignment. However, the proposed works will have no effects on these sites. A recorded midden site R10/1187 was identified within the vicinity of works within Wainoni Park, near the proposed construction site compound for the HDD works under Te Wharau Creek, but not directly affected by the proposed alignment.

While no archaeological or historic heritage sites have been identified as a result of the survey and assessment, it is considered possible that unidentified subsurface remains may be present in coastal areas at Wainoni Park, North Shore Memorial Park and Rahui Reserve.

6.8.1 Mitigation

An Authority for the project will be applied for under Section 44(a) of the HNZPTA as a precaution prior to the start of earthworks. This will establish appropriate procedures for the management of any archaeological remains should they be discovered.

As a precaution, the midden site at Wainoni Park will be temporarily marked out or fenced off prior to the start of earthworks to protect it from accidental damage from heavy machinery.

6.9 **Maori and Cultural Heritage Effects**

A description of consultation with mana whenua is contained in section 5.3 of this report. Of the 19 iwi contacted, 8 mana whenua entities indicated interest in the project. Te Kawerau a Maki, Ngati Maru, Ngati Manuhiri and Ngai Tai Ki Tamaki have prepared CIAs. Overall, the CIA's did not identify any specific sites of cultural significance. The CIAs did emphasise the interest, values and traditions that each individual iwi has within the Project area and desire for the protection of any wahi tapu and taonga that may be potentially affected by the Project.

6.9.1 Mitigation

All the CIAs considered there to be the potential for cultural or archaeological material to be encountered during the construction works. All the CIAs requested that in the event that remains of potential historical or cultural value are discovered or exposed as a result of the Project works that work cease in the vicinity of the find and not re-commence until appropriate protocols/process are undertaken.

It is considered that, with the adoption of appropriate protocols, any potential adverse effects on cultural values can be appropriately managed.

6.10 Visual and Landscape Effects

6.10.1 Effects of Works within the Road Reserve

As outlined in Technical Report F, the majority of the route traverses urban landscapes that are already highly modified by roading, residential, commercial, industrial and recreational development. Large sections of the works are proposed to be constructed within the road corridor which provides the context within which they will be seen – road works and excavations are common sights within the Auckland Isthmus.

The main visual effects of the Project within these areas will be during and soon after its construction. These effects will diminish over a short period of time once the sites are reinstated to their preconstruction state. As the works are primarily within the modified road carriageway there will be negligible landscape effects.

6.10.2 Effects of Works outside the Road Reserve

Works will be undertaken within Wainoni Park, Te Wharau Creek, NSMP, NSGC and Rosedale Park.

Due to Wainoni Park's large catchment and viewing audience and the contrasting characteristics of the works with the surrounding landscape, the Project will result in moderate visual effects during construction. There will be low-moderate landscape effects due to the restricted modification to landform and landcover.

Within Te Wharau Creek, the main visual effects will result from the drilling rig and associated infrastructure. Due to the very restricted visual catchment and viewing audience, the Te Wharau Creek crossing works will result in low-moderate visual effects. There will be low landscape effects due to the minimal vegetation removal required for the works (through HDD).

The construction of the pipeline through the NSMP and NSGC will have a number of adverse visual and landscape effects due to the natural state of the NSMP and NSGC at present, as well as the NSMP's role as a place of mourning and remembrance. However, these effects will be temporary in nature during and immediately following the construction period. The main visual effects will result from vegetation removal, the trenching and stockpiling of backfill and construction traffic movements.

The visual effects of the construction works in Rosedale Park will be low-moderate due to the contrasting characteristics of the construction works with the natural character of the park. Vegetation removal will result in a noticeable visual change. The site is however visually well contained from the surrounding area by the vegetation, which will help moderate the effects. The landscape effects will be low-moderate due to the HDD drilling methodology, minimising surface disruption.

6.10.3 Effects of Permanent, Aboveground Works

At the Hobsonville PS, a new chemical storage and dosing facility, access road, turning areas, permanent hard standing areas, and permanent wire mesh site fencing will all be permanent features of the site following construction.

At Witton Place, the main visual effects will result from the vegetation removal, trenching and stockpiling of backfill, the pipe bridge construction and construction activity. The construction of the pipe bridge will be visually well contained being located within the vegetated gully, however the vegetation clearance will be highly noticeable.

The construction works at the Witton Place pipe bridge site will result in a high visual effects rating due to the removal of the existing vegetation required for the construction of temporary access ways, formation of the work platforms and construction of the pipe bridge. The construction activity will be highly visible for localised residents in the vicinity of the works. There will similarly be high landscape effects due to the vegetation required to construct the pipe bridge, work platforms and open cut trenches.

6.10.4 Mitigation

With the exception of the works at the Hobsonville PS and Witton Place, there are no above ground permanent structures that will require mitigation.

At the Hobsonville PS, Technical Report F recommends mitigation planting within the site along the Buckley Avenue road frontage to the west of the existing pump station and in the western corner of the site. Following planting establishment the visual and landscape effects of the permanent works will be low. The new chemical storage and dosing facility will be read as an integral component of the existing pump station. The permanent hard standing areas will not look out of place as the surrounding Hobsonville Point residential area is in a state of rapid urbanisation and construction.

The following mitigation measures are recommended to reduce any adverse effects following the construction of the pipe bridge at Witton Place:

- Removal of construction access tracks and work platforms;
- Replacement planting of indigenous tree species within the gully where vegetation clearance has occurred to mitigate the tree removal required for the works. The extent to which planting is required will be determined following the clearance of trees;
- A detailed landscape planting plan commensurate with the scale of vegetation clearance required to establish the site compound will be prepared prior to reinstatement of the site.

Following construction, provided that the above mitigation measures are implemented and following replacement planting establishment the visual and landscape effects of the permanent works would reduce to moderate and the works will integrate into the surrounding streetscape and gully system.

The following mitigation measures are recommended in Technical Report F to reduce any adverse effects for the rest of the works following construction

- Replacement vegetation planting, grassing and reseeding in areas subject to vegetation removal;
- Reinstatement and regrassing of the Rahui Road landing site;
- Mitigation planting in the unformed portion of Traffic Road to replace the removed vegetation;
- A landscape enhancement planting plan to show the planting that is required to mitigate the effects of the tree removal once the full extent of the tree removal within Traffic Road has been confirmed;
- Consultation with AC Parks and the Local Board to ensure the design and reinstatement works are integrated with existing park features and any future plans proposed for Wainoni Park and NSMP;
- Removal of hard standing areas and temporary accessways and reinstatement to pre-construction condition or similar, in agreement with the landowner

Following construction, and with the proposed mitigation measures in place, both the visual and landscape effects of the permanent works will be negligible-low as the surrounding land will be restored to a similar nature as presently exists. Technical Report F concludes that the temporary and permanent adverse landscape and visual effects of the Project can be remedied and mitigated to result in no more than minor effects overall.

6.11 Recreation and Public Access Effects

The effects of the works on parks and facilities whose primary purpose is to provide for sport and recreation activities for the well-being of the community, and those facilities that are used by individuals, families, groups and teams as defined in the PAUP have been assessed.

A number of reserves, public open spaces and recreational facilities will be affected by the Project:

- The Sea Scouts Hut at Rahui Road;
- Wainoni Park (south and north);
- North Shore Memorial Park;
- North Shore Golf Club;
- Rosedale Park.

As part of the consultation process (discussed in Section 5 of this report) Watercare has consulted with a number of groups and clubs concerning the proposed works to identify matters to be considered, values associated with these facilities, and potential effects that the works may have. Construction sites and works through these areas have been designed to minimise disruption on recreation and public access as far as practicable, and access to sports fields will be retained.

6.11.1 Sea Scouts Hut at Rahui Road

In relation to the Sea Scouts hut at Rahui Road, in order to facilitate the Project in this location, the removal of a toilet block, and the preparation of the site to receive supporting equipment (e.g. HDD drill rig, excavation equipment, etc.) may be required if HDD is the preferred methodology for crossing the harbour. The site compound that will be established at this site will extend from the road reserve and across Rahui Road, to the boundary of the site where access to the boat ramp currently exists, cutting off access for boats and pedestrians making the boat ramp inaccessible during the time that the site is being used.

The length of time the site compound will be established is dependent on the construction methodology chosen to cross the Upper Waitemata Harbour, but between 3 - 6 months' work at the site may be required. As noted in section 5.9.1 of this report, Watercare has met with the committee of the Tauhinu Sea Scout Group, who are understanding of the need for the proposed works and have identified opportunities to accommodate the needs of both parties. Watercare will continue to consult with the Sea Scout Group as the works are developed and implemented.

Once the site is disestablished and pipe construction works have finished, the toilet bock will be reconstructed (if removed), and the site reinstated in consultation with the landowner.

6.11.2 Collins Park

Collins Park is not directly affected by the proposed works, but open trench excavation will be undertaken in the road reserve and verge along the northern boundary of the park. Access to the park at Greenhithe Road may be temporarily disrupted when construction activities are undertaken at this location. Use of the Park is not anticipated to be affected during the proposed works.

6.11.3 Wainoni Park (South and North)

The alignment will enter Wainoni Park south (opp. 77 Greenhithe Road), and travel northwards along the boundary of the park to Wainoni Park north. Construction through the park will consist of open trench excavation until reaching the HDD construction site near Te Wharau Creek.

To facilitate the works during construction, fencing and jumps within the Greenhithe Pony Club's crosscountry course may need to be temporarily relocated as machinery moves through, and access for horses, ponies, and riders/users may need to be restricted at times. Although most of the effects on the Pony Club stem from construction activities, a few minor aboveground structure (e.g. manhole covers) will be required along the alignment as a permanent feature. A number of aboveground structures exist in the paddocks already, which are fenced off to prevent injuries to animals and the structures themselves. A similar treatment will be required for the manhole covers within the Park, which may affect some use of areas by riders within the Club. The proposed alignment has been located along the eastern boundary of the Park as far as possible to minimise this disruption.

Access to the park from Churchhouse Road should not be impacted. Access to walking facilities, paths and sports fields (outside the Pony Club) will also be retained.

Opportunities have also been identified in conjunction with Greenhithe Pony Club to alleviate safety concerns with the existing access road by creating a new accessway for construction. Consultation with Greenhithe Pony Club will continue as the Project progresses.

6.11.4 North Shore Memorial Park

Works undertaken in this area will follow future planned and existing road alignments from the HDD landing point until meeting the existing road that travels eastwards to the entrance to NSMP in order to avoid effects on users of the Park as far as possible. Construction activities will consist of open trench excavation through the existing open field and road reserve. Consultation has been ongoing with NSMP, to ensure that the works coincide as far as possible with planned development.

Although access to NSMP will not be closed off, construction activities will disrupt the experience of visitors to the park, and access from the ring road and car park may be restricted at times as works approach this area. Indicative timeframes for construction activities through NSMP Park are 2 – 5 months, and effects on park users are therefore likely to be of relatively short duration. As noted previously, special construction management plans will be developed to ensure that construction activities within the park are managed in a way that recognises the sensitive nature of the setting, and careful management of construction traffic and the timing of works will be required to ensure visitors are not disrupted.

6.11.5 North Shore Golf Club

The alignment enters into the NSGC at the western boundary. It then enters into the car parking area near the Clubhouse and follows the road reserve to Albany Highway.

Watercare has worked with the NSGC to identify an alignment that has minimal effect on golfing activities. Where the alignment runs along the boundary of the site, disruption to visitors to the golf club should be minimal, although works may be audible. As works enter into the car parking area, visitors may experience a temporary disruption to parking and access to the grounds as works travel through the car park towards Appleby Road. While works will occur in the North Shore Golf Club for up to 5 months, the works across the car parking area (which are likely to be the most disruptive to golf club users) will only occur for a small proportion of this time.

6.11.6 Rosedale Park

The proposed alignment enters into Rosedale Park North at the western boundary (via 169/179 Bush Road), crossing beneath Alexandra Stream and landing near the car parking area. The route then generally follows the road reserve prior to entering into the Rosedale WWTP in order to minimise effects on park users.

The preparation of a site compound to receive supporting equipment (e.g. HDD drill rig, excavation equipment, etc.) will be required on either side of Alexandra Stream. On the eastern side of the Stream, the site compound that will be established at this site will extend from outside the Stream to the road reserve, resulting in temporary effects on traffic travelling through the park. An assessment of these effects and mitigation measures are discussed in Section 6.14 of this report. Although access to the park may be disrupted, access to facilities, paths and sports fields should not be impacted during construction.

6.11.7 General Mitigation Measures

Construction sites and works through the parks and reserves have been designed to avoid effects on recreation and public access as far as practicable. Further mitigation measures generally include:

- Reinstatement works will be developed in conjunction with PSR, Local Boards, and landowners where required, and will consider the long term goals as identified in relevant Reserve Management Plans
- Fencing off of construction activities and sites
- Use of Crime Prevention through Environmental Design ("CPTED") measures at construction sites
- The development and implementation of a traffic management plan
- Ongoing communication with affected parties around timing and staging of works

6.12 Arboricultural Effects

As discussed in Technical Report C the Project will require the removal of areas of vegetation and individual trees, and works within the dripline of trees. There are no scheduled or heritage trees (as per relevant District Plans) that are adversely affected by the proposed works. However there are a number of trees protected by the conditions of the relevant Operative District Plan rules. Several sites contain large mature trees and stands of native vegetation that are important to the local environment.

Works within the road carriageway should have no more than minor effects on the roots of trees, as the incidence of tree roots below the sealed surfaces is expected to be minimal.

6.12.1 Mitigation

The following outlines the methodologies for tree protection to manage construction activities. The following mitigation measures apply project wide where appropriate:

- Where existing large trees are being removed the removal process should be undertaken by skilled persons in accordance with the accepted industry standards;
- Where existing vegetation is removed, this should be replaced by planting of native trees and quality specimen trees;
- Where the vegetation being removed is part of a continuous area of vegetation replanting should be done so the existing natural environment is replicated or enhanced. This will require removal and control of weed species as well as tree planting/revegetation.
- A Replacement Planting Protocol in accordance with the recommendations of Technical Report C should be adopted;
- Where existing stand-alone trees are required to be removed these will be replaced in consultation with the asset manager or land owner for the site, as necessary. Where larger trees (exceeding 4m in height) are required to be removed, these should, with the agreement of the land-owner, be replaced with 2 replacement trees;
- Works should occur in accordance with tree protection measures that are suitable for the scale of the pipe installation operations and site specific works to prevent harm to the trees adjacent to the route;
- The removal of existing protected vegetation, and replacement planting shall be undertaken in accordance with good practices and the recommendations of the Tree Protection Methodology outlined in Technical Report C;
- Works undertaken within the rootzone of trees and vegetation (including protected) should be undertaken in accordance with the recommendations of the Tree Protection Methodology outlined in Technical Report C.

Subject to the adoption of the management techniques outlined above, any potential arboricultural effects can be appropriately managed and the overall effects of the proposal can be considered to be no more than minor.

6.13 Ecological Effects

6.13.1 Terrestrial Ecosystems

As discussed in more detail in Technical Report I, the proposed alignment will require the removal of vegetation at seven of the 19 ecological sites that were assessed, including two Significant Ecological Areas ("SEA") and five areas of ecological interest which contain potential habitats for native species. The total amount of vegetation required for removal is approximately 4,000m², including the loss of 1,600 m² (0.16 ha) of vegetation located within two SEAs as follows:

- SEA T-8406 in Wainoni Park North (1,000m²) vegetation that will be affected includes early succession native and exotic forest that supports native birds and is likely to support the legally protected copper skinks and possibly supports several "At Risk" lizards. The effect of the vegetation removal has been determined to be more than minor.
- SEA-T-8047 Witton Place (600m²) consisting of early succession and predominantly native forest that supports native birds and is also likely to support the legally protected copper skinks and possibly supports several "At Risk" lizards. This is considered significant due to the threat status

and rarity of the SEA, the fact that this environment acts as corridors and stepping stones for native wildlife between large habitat areas, migration pathways, and buffering. The effect of the vegetation removal on this area has been determined to be more than minor.

Areas of ecological interest that comprise non-significant vegetation and that require vegetation removal include:

- Vegetation at Hobsonville Pump Station (1,000 m²) this vegetation consists of early succession native and exotic forest that supports native birds, and is likely to support the legally protected copper skink and possibly supports several "At Risk" lizards. The effect of the vegetation removal has been identified to be potentially more than minor;
- Vegetation close to Rahui Road (300 m²);
- Vegetation adjacent to and immediately north of SEA-T-8047(400 m²);
- Vegetation in Rosedale Park immediately East of SEA-T-8082/8084 (700 m²);

Forest and scrub areas to be cleared comprise of native species common throughout the early succession forested areas within the North Shore area and the wider Auckland Region. These areas are unlikely to include any nationally threatened or at-risk plants.

The clearance of vegetation may also introduce forest edge conditions, as many of the sites requiring vegetation removal are along the edge of the forest or riparian areas. This is likely to have a minimal effect on the remaining vegetation. Although there are sites where vegetation removal is required through the middle of the forest (approx. 10m width), the edge effects of this are likely to be negligible.

6.13.2 Freshwater Ecosystems

The Project traverses a number of streams or creeks between Hobsonville and Rosedale. These streams and the proposed construction methodology are indicated in Table 6-2 below:

Location	Description of Crossing
Sunnyview Road	Crosses above existing culvert; no streamworks
Wainoni Park South	Crosses above existing culvert; no streamworks
Wainoni Park North	Open trench with overpumping of stream
Te Wharau Creek	HDD below tidal section
NSMP	Crosses above existing culvert; no streamworks
Witton Place/Laurel Oak Drive	Pipe bridge – vegetation clearance; no streamworks
Alexandra Stream (Rosedale Park)	HDD under stream
Jack Hinton Drive tributary (Rosedale Park)	Open trench (intermittent stream)

Table 6-2: Stream Crossings

As indicated in Technical Report I, the effects on the freshwater environment are likely to be limited to the temporary disturbance due to the proposed open trench excavation across two streams at Wainoni Park north and in Rosedale Park. This disturbance could lead to short term increases in sedimentation and reductions in water quality, and native fish species may require relocation if works are likely to directly affect them (e.g. over-pumping of sections of stream, so that in stream works can be carried out 'in the dry'). The streams at sites where vegetation clearance will take place will also be affected by the reduction in channel shading and input of organic detritus.

At Alexandra Stream, where HDD activities will occur under the watercourse, there is risk of drilling fluid escaping into the watercourse, which may adversely affect the ecological quality of the watercourse. Risks of drilling fluid release are discussed in more detail in section 6.3.1 of this report. A Drilling Fluid Management Plan will be in place to minimise the potential for drilling fluid release.

6.13.3 Mitigation

With regards to effects on terrestrial ecosystems, the following mitigation measures are recommended in Technical Report I:

- Where practicable, vegetation removal is undertaken outside of peak bird breeding season, particularly when fledglings will be present (November–March);
- Native skinks should be salvaged prior to and during vegetation clearance associated with construction activities;
- In areas requiring vegetation removal identified as lizard habitats (at Hobsonville PS, Rahui Road, Wainoni Park North, Witton Place and Rosedale Park), cut vegetation should be left on site for at least 3 days prior to removal, to provide affected lizards (i.e. geckos) an opportunity to disperse into remaining vegetation;
- Check machinery before coming on site for any seeds or fragments of exotic pest plants; and
- A 2 (replacement): 1 (loss) ratio of native revegetation is undertaken within or in close proximity to affected areas for the purposes of replacing lost vegetation and habitats for native species.

As noted above, direct effects in the freshwater environment are likely to be limited to open trench excavation across two streams (one permanent, one intermittent). To mitigate adverse effects that may arise from construction activities, the following mitigation measures are recommended in Technical Report I:

- To address stream bed disturbance, possible increases in sedimentation and decreases in water quality, the installation of temporary dams and overpumping of streams is recommended while trenching is being undertaken. This will help to minimise any sedimentation or water quality effects. At the completion of construction within the stream footprint, the affected section of stream should be reinstated to as natural a form as possible;
- The effect of the vegetation clearance can be minimised by replanting the affected stream banks as soon as possible after completion of works;
- Fish salvage work will also be required to relocate native fish species out of the affected stream area, if works are likely to directly affect them (e.g. over-pumping of sections of stream, so that instream works can be carried out 'in the dry');
- In addition to the above mitigation, an Erosion and Sediment Control Plan ("ESCP") will be implemented in accordance with TP90;
- The risk of drilling fluid being released into watercourses during HDD will be managed through the development of a drilling fluid management plan.

Technical Report I concludes that if the above recommendations are implemented to avoid, remedy and mitigate the adverse ecological effects associated with the Project, the net residual effects will be no more than minor.

6.14 Traffic Effects

As discussed in Technical Report G, the primary traffic effects are associated with works undertaken in the transport corridor rather than from traffic associated with the transport of materials and staff to and from the work sites.

The construction works will involve the operation of heavy machinery, open excavations and the storage of plant and works materials in close proximity to the public road corridor.

An examination of the crash record for the pipeline route has not identified any specific road safety concerns and it is considered that subject to the use of appropriate mitigation and management measures existing levels of road safety can be maintained.

6.14.1 Proposed Mitigation

A Construction Traffic Management Plan (CTMP) for the project will be submitted to AT and the NZ Transport Agency, for approval, prior to the commencement of works.

Overall, it is considered that, subject to the adoption of the mitigation measures proposed in Technical Report G, adverse traffic effects can be appropriately managed.

6.15 Effects on Contaminated Land

A preliminary site investigation has been undertaken along the proposed alignment for the Northern Interceptor (refer Technical Report H), including review of a Council 'Site Contamination Enquiry' and records of pollution incidents, review of historical aerial photos and a site drive-by inspection. Based on this information the following Hazardous Activities and Industries List ("HAIL") activities were identified along the proposed alignment:

- Use of persistent pesticides at former and existing horticultural land and sports turfs;
- Intentional or accidental release of hazardous substances which could migrate onto the land that comprises the proposed alignment:
 - Discharge of sludge into land at the former New Zealand Defence Force Wastewater Treatment Plant at Hobsonville;
 - A former airstrip near Hobsonville;
 - Former and existing horticultural activities;
 - Electric equipment storage facility in Rosedale; and
 - A dye spill incident at Unity Drive North, Rosedale, in 2008;
- Intentional or accidental release of hazardous substances as a result of placement of contaminated fill during construction of roads along the proposed alignment.

The existence of HAIL sites along the proposed alignment means that a detailed site investigation has also been undertaken of those areas. Soil and sediment samples were taken from land on or adjacent to the HAIL sites and tested for a range of contaminants, including metals, polyaromatic hydrocarbons and total petroleum hydrocarbons. Areas on or adjacent to former horticultural areas were also tested for organochlorine pesticides.

Key findings of this detailed site investigation are discussed below:

- Analytical results of soil samples collected along the alignment indicated no exceedances of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES:Soil) commercial or recreational land use Soil Contaminant Standard ("SCS"). In only one section of the alignment (Wainoni Park), available soil testing information indicates that contaminant concentrations above the ARP: ALW/PAUP permitted criteria for discharges could be present;
- The investigations indicated that contaminant concentrations were largely below published background concentrations. However, in relatively short sections of the alignment, contaminant concentrations slightly above published background concentrations were identified in near surface soils (less than 1m depth); and
- Sediment samples collected from the Upper Waitemata crossing indicated arsenic concentrations could be present above published background concentrations adopted by Auckland Council as the default for cleanfill material. This means that any sediment, if it requires disposal at a landfill (unlikely), may not be able to be disposed of to a cleanfill.

The results of the detailed site investigation indicate that contaminant concentrations are not at levels that would pose a human health risk to construction workers and the general public.

6.15.1 Mitigation

A Ground Contamination Site Management Plan has been prepared for the project (refer Technical Report H). This plan specifies standard earthworks procedures to ensure that any environmental effects as a result of disturbing potentially contaminated land will be no more than minor.

7 Statutory Assessment

7.1 Overview

Section 104 of the RMA sets out the matters a consent authority must, subject to Part 2 of the RMA, have regard to when considering resource consent applications. The various effects of the Project, as required by Section 104(1)(a) of the RMA, are assessed within Section 6 of the AEE Report. The matters that are of relevance in considering these applications, as required by Section 104(1)(b) of the RMA, are the following statutory standards, policy statements and plans:

- New Zealand Coastal Policy Statement, 2010 ("NZCPS")
- National Policy Statement for Freshwater Management, 2014 ("NPS:FM")
- National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health, 2011 ("NES:Soil")
- Auckland Regional Policy Statement, 1999 ("ARPS")
- Proposed Auckland Regional Policy Statement, 2013 ("PARPS")
- Auckland Council Regional Plan: Coastal, 2004 ("ACRP:C")
- Auckland Council Regional Plan: Sediment Control, 2001 ("ACRP:SC")
- Auckland Council Regional Plan: Air, Land and Water, 2010 ("ACRP:ALW")
- Auckland Council District Plan: North Shore Section, 2002 ("ACDP:NS")
- Auckland Council District Plan: Waitakere Section, 2003 ("ACDP:W")
- Proposed Auckland Unitary Plan, 2013 ("PAUP")²

7.2 New Zealand Coastal Policy Statement 2010

The NZCPS sets out objectives and policies in order to achieve the purpose of the RMA in relation to the coastal environment of New Zealand.

The NZCPS took effect on 3 December 2010 and replaces the NZCPS 1994. It contains objectives and policies which include those aimed at safeguarding the integrity, form, functioning and resilience of the coastal environment and sustaining its ecosystems, and preserving the natural character of the coastal environment. Local authorities are required by the RMA to give effect to the NZCPS through plans and policy statements.

The key objectives and policies of the NZCPS in relation to the Project are:

Objective 1 – safeguarding the integrity, form, functioning and resilience of the coastal environment. While there will be short term effects on water quality and marine benthic ecosystems as a result of the crossing of the Upper Waitemata Harbour if it is completed by marine trenching, overall the works will have no effect on the integrity, form, functioning and resilience of the coastal environment.

Objective 4 – maintaining and enhancing the public open space qualities and recreation opportunities of the coastal environment. While there will be short term restrictions on public access and recreation in the coastal environment as a result of construction activities, the restrictions will not exceed 6 months in any specific location, and there will be no permanent restriction. Where temporary restrictions are necessary, Watercare will continue to consult with affected organisations to identify opp ortunities to address restrictions.

Objective 6 – enabling people and communities to provide for their social, economic and cultural wellbeing and their health and safety through subdivision, use and development, while recognising a number of listed matters. The Project has been developed to avoid as far as practicable adverse effects on the coastal environment. In the overall context of the Project the area of the coastal environment affected is relatively small. The provision of infrastructure to service growth in the area is essential in order to enable the people and communities of those areas to provide for their social and economic wellbeing and for their health and safety by providing for appropriate conveyance of sewage to the Rosedale WWTP.

² It is noted that number of PAUP rules have legal effect in terms of section 86B of the RMA

Policy 6 – Activities in the coastal environment. Policy 6 recognises that the provision of infrastructure is important to the social, economic and cultural well-being of people and communities. The Project is therefore consistent with Policy 6.

Policy 11 – Indigenous biological diversity. In relation to Policy 11(a), indigenous taxa that are listed as threatened or at risk (Policy 11(a)(i)) within the project area include banded rail (at Te Wharau Creek), potentially shags roosting or nesting in coastal trees near Rahui Road, and other coastal birds using intertidal foraging areas adjacent to the Project footprint. Banded rail are also likely to appear on the International Union for Conservation of Nature and Natural Resources taxa lists (Policy 11(a)(ii)). Effects on banded rail have been avoided by the adoption of HDD at the Te Wharau Creek crossing point, and as noted in section 6.3 of this report the availability of foraging habitat for coastal birds within the Upper Waitemata Harbour means that the area affected by marine trenching (if that is the option selected) will be no more than minor. None of the matters listed in Policy 11(a)(iii) – (v) are present in the Project area. In relation to Policy 11(a)(vi) Wainoni Park (north) was established with the intention that it would provide for a variety of recreational needs in the future.

The management philosophy for the park is 'to enhance the natural landscape and to encourage and facilitate the public use of the park by providing and maintaining facilities appropriate for active and passive recreation in accordance with the needs of both the local and wider community. As such, it has not been set aside specifically for protection of biological diversity and Policy 11(a)(vi) is not relevant. Policy 11(b) sets out a number of components of the coastal environment where significant adverse effects are to be avoided, and other adverse effects are to be avoided, remedied or mitigated. Adoption of HDD for the Te Wharau Creek crossing will avoid adverse effects on important mangrove habitat.

While the Upper Waitemata Harbour is likely to provide habitats of indigenous species that are important for recreational, commercial, traditional or cultural purposes, habitats important to migratory species and ecological corridors, the relatively short term nature of the effects as a result of construction activities, and the lack of permanent effects means that the works are consistent with Policy 11(b)(iv) - (vi).

Policy 22 – Sedimentation. Policy 22(2) requires that use and development is not to result in a significant increase in sedimentation in the coastal marine area. As discussed in section 6.3 of this report, while marine trenching (if selected as the option for crossing the Upper Waitemata Harbour) will result in suspension and dispersal of sediment, significant increases in sedimentation within the Upper Waitemata Harbour are not anticipated as a result of the works.

The proposed works are therefore consistent with the requirements of the NZCPS.

7.3 National Policy Statement for Freshwater Management 2014

The NPS:FM sets out the objectives and policies for freshwater management under the RMA. Decisionmakers under the RMA must have regard to the objectives and policies when making resource consent decisions.

Objective A1 refers to the need to safeguard the life-supporting capacity of freshwater environments by sustainably managing the use and development of land and the discharge of contaminants, while Objective A2 requires that the overall quality of fresh water within a region is maintained or improved.

When considering an application for a discharge, the consent authority must under the NPS:FM have regard to the following matters:

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

As shown on the Project drawings, erosion and sediment control measures in accordance with TP90 will be implemented throughout the Project area during all land disturbance works. These measures are

expected to safeguard the life-supporting of the waterbodies and ensure the overall freshwater quality is maintained.

The Ecological Assessment (Technical Report I) concludes the effects of the short-term works within the unnamed stream at Wainoni Park will be minor.

The applications for the discharge of washwater from construction sites and the discharges from land containing of elevated levels of contaminants are also expected to avoid adverse effects on the life supporting capacity of fresh water and avoid potential contamination effects that will have an adverse effect on the health of people and communities.

7.4 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011

The Resource Management NES:Soil relates to the assessment and management of health effects from exposure to contaminants in soil.

The NES:Soil applies a framework for assessing contaminants in soil and provides a national set of planning controls and soil contaminant values. Regulation 8 of the NES:Soil permits the disturbance of a piece of land that has been identified as being contaminated, but only if no more than 25m³ per 500m² is disturbed. Open trench excavation will disturb more than this volume of soil, therefore consent is sought under the NES:Soil.

As noted in Section 5 of the Ground Contamination Assessment/Detailed Site Investigation ("DSI") (Technical Report H), if an activity is not permitted, resource consent is required under Clause 9 of the NES:Soil as a controlled activity. Comment on the requirements of the NES:Soil is provided in Table 7-1 below.

Rule	Criteria	Comment
NES, Clause 9 Disturbing soil	 DSI must exist DSI must state that soil contamination does not exceed applicable standard in regulation 7 Consent authority must have DSI Conditions on consent must be complied with Control reserved over: Adequacy of DSI How the activity must be managed, monitored and reported on Transport, disposal and tracking of soil and other materials Timing and nature of review of consent conditions Duration of consent 	 A DSI has been prepared and provided as part of this application The DSI states that soil contamination does not exceed applicable standards in the NES The Ground Contamination Site Management Plan (as part of Technical Report H) outlines how these matters will be addressed

Table 7-1: NES:Soil – Assessment Criteria

7.5 **Operative Auckland Regional Policy Statement 1999**

The ARPS became operative on 31 August 1999. The focus of the ARPS is the management, use, development, and protection of natural resources of the Auckland Region. The aim of the ARPS is to achieve certainty through integrated, consistent and coordinated management of the Auckland Region's resources.

The key objectives and policies of the ARPS (including Strategic Objectives and Policies) in relation to the Project are summarised and assessed below.

• To ensure that provision is made to accommodate the Region's growth in a manner which gives effect to the purposes and principles of the Resource Management Act 1991 and Section 40 of the

Local Government (Auckland) Amendment Act 2004, and is consistent with these Strategic objectives and with the provisions of this RPS (Strategic Objective 2.6.1).

- To enable the redevelopment, operation and maintenance of existing and provision of new regionally significant infrastructure (Strategic Objective 2.6.17).
- The operation of existing regionally significant infrastructure and the provision of new or upgraded regionally significant infrastructure shall:

(i) Be consistent with the Strategic Direction of the Regional Policy Statement;

(ii) Support and reinforce the Regional Growth Strategy and the proposed outcomes of that strategy; and

(iii) Ensure that any adverse effects of those activities on the environment (including human health) are avoided, remedied or mitigated in a manner consistent with the relevant provisions of this RPS (Strategic Policy Infrastructure 2.6.14.1).

• Provision is to be made to enable the safe and efficient operation, maintenance and development of regionally significant infrastructure which is necessary for the social and economic wellbeing of the region's people (Strategic Policy Infrastructure 2.6.14.2).

The Project, which is regionally significant infrastructure, will provide additional wastewater conveyance and treatment infrastructure to service the increasing urban development in the Northern Waitakere and South Rodney regions, including the NWTA. The construction and operation of the Project will provide necessary infrastructure that supports the economic and social wellbeing of the region.

- To preserve the natural character of the coastal environment, whilst ensuring that the use of the coastal environment by those industries and activities which serve the needs of the Region and which depend on a coastal location is appropriate and efficient (Strategic Objective 2.6.10).
- To preserve the natural character of the coastal environment, while enabling appropriate subdivision, use and development, including network utilities (Objectives 7.3.1, 7.3.3 and 7.3.4).
- To reduce the risk of environmental damage from subdivision, use and development within the coastal environment arising from uncertainty or lack of knowledge about coastal processes (Objective 7.3.5).

The infrastructure has a functional need to locate in the coastal environment, and long-term will not affect natural character as the pipelines are being installed beneath the seabed. Construction of the pipelines by marine trenching in the Upper Waitemata Harbour, if that is the option selected, may cause some minor effects on natural character during the intertidal construction period, but these will be temporary in nature and natural coastal processes will resolve the effects following the completion of the trenching activity.

- To sustain the mauri of natural and physical resources in ways which enable provision for the social, economic and cultural wellbeing of Maori (Objective 3.3.1).
- To involve Tangata Whenua in resource management processes in ways which:
 - (i) take into account the principles of the Treaty of Waitangi, including rangatiratanga;
 - (ii) have particular regard to the practical expression of kaitiakitanga (Objective 3.3.3).
- To recognise and provide for the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga of the coastal environment (Objective 7.3.9).

Watercare has engaged with tangata whenua throughout the investigation of alternatives and development of the Project, with the proposed route avoiding as far as practicable any ancestral lands, water, sites, waahi tapu and other taonga identified as being of significance to tangata whenua.

A range of mitigation measures, such as erosion and sediment controls in accordance with TP90 during construction, will be undertaken which will assist in sustaining the mauri of natural resources such as waterbodies and the coastal environment.

• To protect outstanding natural features and landscapes, areas of significant indigenous vegetation and significant habitats of indigenous fauna, and significant historic and cultural places and areas in the coastal environment (Objective 7.3.2).

The proposed alignment passes through Te Wharau Creek, identified as a significant ecological area. In order to avoid effects on this area, HDD has been selected as the crossing option. The Project is not expected to adversely affect any known outstanding natural features, landscapes or significant historic and cultural places and areas in the coastal environment.

• To maintain and enhance public access to and along the CMA and to publicly-owned land in the coastal environment and enable an appropriate range of recreational opportunities to be undertaken in the coastal environment (Objectives 7.3.6 and 7.3.7).

Public access will only be restricted temporarily to the extent necessary to carry out the works in a safe manner, and will only be restricted for the relatively short period of construction in the CMA. While the works will result in occupation of the CMA, each set of twin pipelines will be located at a sufficient depth below the seabed that they will not affect other recreational opportunities within the CMA.

• To maintain water quality in water bodies and coastal waters which have good water quality, and to enhance water quality which is degraded particularly for the following purposes:

(i) Estuaries and harbours: protection of aquatic ecosystems, recreation, fishing and shellfish gathering, cultural and aesthetic purposes.

- (ii) Open coastal waters, including parts of the Hauraki Gulf: its natural state.
- (iii) Groundwater: water supply.

(iv) Lakes, rivers and streams: protection of aquatic ecosystems, recreation, food gathering, water supply, cultural and aesthetic purposes... (Objective 8.3.1)

The Project will involve construction activities such as the potential marine trenching across the Upper Waitemata Harbour and the open trench across the unnamed tributary of Te Wharau Creek in Wainoni Park North. These activities will result in disturbances that could lead to some short term increases in sedimentation and reduction in water quality. Notwithstanding these temporary adverse effects, the Project is expected to maintain overall water quality.

• To remedy or mitigate any adverse effects of existing contaminated sites (Objective 17.3.1).

The Preliminary Site Investigation ("PSI") for the Project (refer Technical Report H) has identified a number of HAIL activities along the proposed alignment. On this basis a Ground Contamination Site Management Plan has been prepared which specifies procedures relating to the disturbance of potentially contaminated land.

7.6 Proposed Auckland Regional Policy Statement

Chapter 1B of the PAUP contains the PARPS, which provides the over-arching objectives and policies to achieve integrated management of Auckland's natural and physical resources.

The key objectives and policies of the PARPS in relation to the Project are considered to be located in B3.2 Significant Infrastructure and Energy:

Objective 2:

The benefits of significant infrastructure which service the wider community, Auckland or New Zealand are recognised, including:

- a. The essential services provided by infrastructure networks, which provide for the functioning of communities, businesses and industry.
- b. Enabling economic growth.
- c. Providing for public health, safety and the well-being of people and communities.
- d. Contributing to a well-functioning and liveable Auckland.

- e. Protecting the quality of the natural environment.
- f. Enabling interaction and communication.

Objective 3:

Development, operation, maintenance, and upgrading of significant infrastructure is provided for and enabled, while managing any adverse effects it may have on:

- a. Areas with significant landscape, cultural and historic heritage, and natural ecological and biodiversity values
- b. The health, safety and amenity of communities.

B5.1 Recognition of Te Tiriti o Waitangi partnerships and participation

Objective 1:

 Mana Whenua can exercise Tino Rangatiratanga through participation in resource management processes and decisions

B6.3 Freshwater and Gothermal Water

Objective 2:

• The quality of freshwater and the natural and cultural values of freshwater systems are maintained and restored and enhanced where they have been degraded below levels necessary to safeguard life supporting capacity and meet community values

B7.4 Managing the Hauraki Gulf /Te Moana Nui o Toi /Tikapa Moana

Objective 4:

• The life-supporting capacity and ecological values of the Gulf and its marine ecosystems are protected, and where appropriate, enhanced

The Project, which is significant infrastructure, will enable additional wastewater conveyance infrastructure to service the increasing urban development surrounding area. Construction activities will be managed through a construction management plan to ensure any adverse effects are avoided, remedied or mitigated as far as practicable.

Of note in relation to the RPS layer in the PAUP is the interim guidance released by the Independent Hearing Panel. Interim Guidance on Section B3.2 has been released (dated 27 February 2015). While this is not a recommendation or binding on future decisions it does indicate a view of the panel in relation to networks. The guidance notes that to enable infrastructure to be effective and efficient especially in network configurations the Panel thinks that the RPS should recognise that infrastructure must be located in (including traversing) sensitive areas where there is a functional need for it to do so (that is the function of the infrastructure required such a location) or there is some technical or other operational need in the circumstances for such a location."

Watercare has engaged with mana whenua throughout the development of the project, with the proposed project route avoiding as far as practicable any ancestral lands, sites, waahi tapu and other taonga of significance to tangata whenua.

In order to maintain the water quality and values of the freshwater bodies within the project area, any works within stream beds will be temporary and mitigation measures, such as the implementation of erosion and sediment controls, will be implemented throughout construction.

Construction of the pipelines by marine trenching in the Upper Waitemata Harbour (part of the wider Hauraki Gulf) may have a significant, but short term effect on the benthic ecology within the footprint of the trench.

7.7 Works within the Coastal Marine Area

The following table summarises the key themes of the relevant objectives and policies of the ACRP:C and the PAUP and provides an assessment against these themes.

Table 7-2:	Works in	the Coastal	Marine	Area	(ACRP:C and F	'AUP)
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Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
Recognition of coastal processes and maintenance or enhancement of water quality	ACRP:C Objective 5.3.1 Policy 10.4.5 PAUP Objective C.5.15.3 Policy C.5.2.5	 Coastal processes and water quality may be affected on a short-term basis by the works in the Upper Waitemata Harbour, particularly if marine trenching is selected as the construction method. Effects are likely to be generally confined to the works area and will be temporary in nature. Mitigation measures have been recommended to minimise adverse effects on water quality. Use of HDD for the crossing of Te Wharau Creek means that adverse effects on coastal processes and water quality will be avoided. 	As has been outlined, coastal processes and water quality may be affected on a short-term basis by the works in the Upper Waitemata Harbour, but there will be no long term effects.
Recognising natural character of the coastal environment and avoiding, remedying or mitigating adverse effects	ACRP:C Objective 3.3.1 Policies 3.4.1, 3.4.2, 3.4.3, 3.4.4 PAUP Objectives D.5.1.15.3 and D.5.1.15.8	 Works in the coastal marine area will not affect natural character in the long-term, as the pipelines are being installed beneath the seabed. Construction of the pipelines by marine trenching in the Upper Waitemata Harbour may cause some minor effects on natural character during the intertidal construction period, but these will be temporary in nature and resolved by natural coastal processes following the completion of trenching activity. Use of HDD for the crossing of Te Wharau Creek means that adverse effects on natural character of the CMA will be avoided in this area. 	be no long term effects. The construction of the pipelines by marine trenching may cause some minor effects on natural character during the intertidal construction period, but there will be no long term effects.
Use and development of the CMA, including occupation, and recreational needs	ACRP:C Objectives 7.3.1, 7.3.2, 9.3.1, 9.3.2, 10.3.1, 11.3.1, 16.3.1, 35.3.1 Policies 7.4.1, 10.4.2, 10.4.4, 10.4.10, 10.4.12,	 The proposed works are to provide a critical piece of a network that is considered to be regionally significant infrastructure. Provision of the infrastructure will allow communities to provide for their social, economic and cultural wellbeing. The proposed works have a functional need to locate in the CMA in order to make efficient use of resources by taking as direct a route as possible from Hobsonville to Rosedale. While the works will result in occupation of the CMA, each set of twin pipelines will be located at a sufficient depth below the seabed that they will not affect other 	Consistent with this theme

Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
	10.4.13, 10.4.15, 10.4.16, 12.4.1, 12.4.3, 12.4.12, 12.4.13, 12.4.15, 16.4.1, 16.4.2, 35.4.1, 35.4.2, 35.4.3 PAUP	 people's use of the CMA. Public access will only be restricted temporarily to the extent necessary to carry out the works in a safe manner, and will only be restricted for the relatively short period of construction in the CMA. A construction methodology has been developed to, as far as possible, avoid, remedy and mitigate adverse effects during construction. Any adverse effects that do arise will be managed through the development and implementation of a CMP. 	
	Objectives D.5.1.4.2, D.5.1.13.1, D.5.1.13.2, D.5.1.13.7 and D.5.15.3		
	Policies D.5.1.4.2, D.5.1.4.4, D.5.1.4.5, D.5.1.4.8, D.5.1.10.9, D.5.1.13.2, D.5.1.13.3, D.5.1.13.4, D.5.1.13.12, D.5.1.15.7, D.5.1.15.8, D.5.1.15.18 and D.5.1.15.21		
Effects on coastal ecology	ACRP:C Objectives 5.3.2, 5.3.3 Policies 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 10.4.6, 10.4.7, 10.4.12	 Use of HDD for the crossing at Te Wharau Creek (and potentially for the crossing of the Upper Waitemata Harbour) will avoid any adverse effects on coastal ecology, and acknowledges the values of the Coastal Protection Area around Te Wharau Creek. Marine trenching in the Upper Waitemata Harbour will have a significant, but short term effect on the benthic ecology within the footprint of the trench. Recovery of benthic communities is anticipated within a year of completion of the works. 	Marine trenching will have a significant, but short-term and localised effect on the benthic ecology within the footprint of the proposed works. However, the

Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
	PAUP Objective D.5.1.10.3 Policy D.5.1.15.6	 However, it is considered that long term adverse effects will be appropriately managed with the adoption of appropriate mitigation measures. The relatively small area of the works compared to the balance of the Upper Harbour, and the selected route for the marine trenching through mostly deep water habitat, will mean that adverse effects on the intertidal habitat for foraging coastal birds will be minimised. 	works will not affect the overall integrity, functioning, resilience, and life-supporting capacity of the coastal environment, and will not affects the CPA at Te Wharau Creek. In light of this, the proposed works are considered to be consistent with this theme.
Recognition of tangata whenua values	ACRP:C Objectives 6.3.1, 6.3.2 Policy 6.4.1(d) PAUP Policies C.5.15.1.6, C.5.15.1.8, C.7.3.7	 Consultation with iwi and Cultural Impact Assessments that have been prepared for the Project highlight the special significance of water to tangata whenua and their historical connection to the Waitemata Harbour. Minimising adverse effects on water quality is considered to be fundamental in sustaining the mauri of water. The implementation of erosion and sediment control measures in a manner consistent with TP 90 will assist in maintaining water quality during construction. The mauri of native vegetation and natural processes may be impacted through the removal of vegetation required to facilitate the works. Construction activities will be temporary in nature during and immediately following the construction period and will be mitigated through replacement planting. 	Consistent with this theme

7.8 Works outside the Coastal Marine Area

The following tables provide an assessment against the relevant objectives and policies (grouped by theme) and then offers comment on the consistency of the proposed works with respect to the relevant plans.

Table 7-3: ACRP:SC – Theme Assessment

Theme	Relevant Objectives/ policies	Comment	Consistency with relevant theme
Managing effects of land disturbance	Objective 5.1.1, Policy 5.2.1, 5.2.2	 Erosion and sediment control measures will be implemented for the duration of the land disturbances activities required as part of the Project to prevent the discharge of sediment laden water to watercourses and the coastal environment. Measures will be implemented in accordance with TP 90. Indicative measures are shown on the project consenting drawings contained as Volume 3. 	Consistent with this theme
Tangata whenua and cultural heritage	Policy 5.1.2 Policy 5.2.2 (iv) and (v)	 Consultation with iwi and Cultural Impact Assessments that have been prepared for the Project highlight the special significance of water to tangata whenua, and how minimising adverse effects on water quality is fundamental is sustaining the mauri of water. The implementation of erosion and sediment control measures will assist in maintaining water quality during construction. Watecare's proposed project route has avoided as far as practicable any ancestral lands, sites, waahi tapu and other taonga of significance to tangata whenua. 	Consistent with this theme
Water Quality	Objective 5.1.1 Policy 5.2.1	• Erosion and sediment control measures will be implemented in accordance with TP90 for the duration of the land disturbances activities required as part of the Project to prevent the discharge of sediment laden water to nearby waterbodies. Indicative measures are shown on the project consenting drawings.	Consistent with this theme
Table 7-7-4 – ACRP: ALW Theme Assessment

Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
Recognition and provision of infrastructure	Objective 2.2.3.4, 5.3.7, 7.3.2 and 7.3.3 Policy 2.2.4.4	 The increasing urban development in the Northern Waitakere and South Rodney regions, including the NWTA, requires additional wastewater conveyance and treatment infrastructure to service this growth. The construction and operation of the Project will therefore provide infrastructure that supports the economic and social wellbeing of the region. The project is expected to cause some adverse effects due to construction activities. However, these effects will be temporary and will be managed though a construction management plan which seeks to avoid, minimise or mitigate any adverse effects. 	Consistent with this theme
Tangata whenua and cultural heritage	Objectives 2.3.3.1 and 2.3.3.2 Policy 2.3.4.2	 Consultation with iwi and Cultural Impact Assessments that have been prepared for the Project highlight the special significance of water to tangata whenua and their historical connection to the Waitemata Harbour. Minimising adverse effects on water quality is considered to be fundamental in sustaining the mauri of water. The implementation of erosion and sediment control measures in a manner consistent with TP 90 will assist in maintaining water quality during construction. Watercare's proposed project route has also avoided as far as practicable any ancestral lands, sites, waahi tapu and other taonga of significance to tangata whenua. 	Consistent with this theme
Groundwater and settlement	Objectives 6.3.3, 6.3.8, Policies 6.4.1, 6.4.35, 6.4.49	 The groundwater and settlement assessment report contained as Technical Report J considers the project works have the potential to result in surface settlement that arises from construction of the pipeline and also groundwater lowering (drawdown), but with implementation of appropriate mitigation measures, effects are no more than minor. The proposed construction methodologies for the project are commonly used for the installation of pipelines throughout Auckland and New Zealand. In addition, a monitoring programme will be implemented to monitor construction of the pipelines and manholes, specifically targeting those areas where effects on the roads, existing buildings and services are possible. 	Consistent with this theme
Construction related stormwater	Objectives 5.3.1, 5.3.5, 6.3.2, Policies 5.4.2	 Temporary impervious areas at construction sites will be subject to low vehicle traffic and there will be limited sources of contaminants. Erosion and sediment control measures in accordance with the TP. 90 will be 	Consistent with this theme

Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
discharges		implemented to prevent sediment laden discharges.	
Contaminated land	Objective 5.3.16 Policies 5.4.37, 5.4.37A	 The investigations undertaken as part of the Ground Contamination Assessment, contained as Technical Report H indicate that contaminant concentrations within the project area are not at levels that would pose human health risks to construction workers and the general public. Construction can also be managed using standard earthworks procedures to ensure that any effects on the environment from the presence of these contaminants will be less than minor. 	Consistent with this theme
Natural character, water bodies and ecosystems	Objectives 2.1.3.1, 2.1.3.2 and 7.3.1 Policies 2.1.4.1, 2.1.4.2, 2.1.4.6, 2.1.4.9, 2.2.4.13, 7.4.1 and 7.4.3	 The infrastructure associated with the Project will generally be sub-surface, and any infrastructure located above ground will not be within areas of high natural character, with the exception of the pipe bridge at Witton Place. Here, construction works will occur within the riparian margins and stream bed. Effects on the stream will be temporary in nature. With the adoption of recommended mitigation measures (refer to Technical Report I), it is considered that potential adverse effects can be appropriately managed. Effects on streams will generally be avoided through the proposed construction methodology, which includes: HDD beneath the bed of Alexandra Stream at Rosedale Park; The installation of pipe bridge across the unnamed stream/gully at Witton Place; and The implementation of erosion and sediment control measures in line with TP 90's requirements during all land disturbances activities to prevent sediment laden discharges. Where the trenching of a stream is required, the effects include temporary stream bed disturbance, possible increases in sediment and a decrease in water quality. These effects will be mitigated by installing temporary dams and over-pumping the stream while trenching is being undertaken. Fish salvage work will also be required prior to works commencing to relocate native fish species out of the affected stream area, if works are likely to directly affect them. 	Consistent with this theme

Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
		identified (refer to section I of this Report).	

Table 7-5: ACDP:NS – Theme Assessment

Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
Managing effects of land disturbance	Policies 9.3.1.2, 9.3.1.5, 9.3.1.7, 9.3.1.8, and 14.3.2.1	 Erosion and sediment control measures will be implemented for the duration of the land disturbances activities required as part of the project to prevent the discharge of sediment laden water to nearby waterbodies, particularly in areas on slopes and land subject to instability Measures will be implemented in accordance with TP 90 and the indicative measures are shown on the project consenting drawings. Network utility companies will be contacted during the design process in order to confirm the locations of existing services or any future development plans in the vicinity of the proposed construction sites, such as those within Vector's site at 179 Bush Road. Where Requiring Authority Approvals are required under sections 176(1)(b) of the RMA, these will be sought prior to construction. 	Consistent with the theme
Infrastructure	Objective 14.3.1.1 Policies 14.3.2.3 and 14.3.2.7	 Once completed the Project will facilitate the continued effective operation of the wastewater network generally, and provide capacity in the wastewater network for future growth and development in the Auckland region. The Project will provide regionally significant infrastructure that directly supports the social, economic, environmental and cultural wellbeing of the whole community. As with other underground network utilities, the proposed pipeline will be co-located within the road reserve while avoiding impacts on other network utilities as far as practicable. 	Consistent with the theme
Amenity	Objectives 8.3.4, 9.3.1 and 14.3.1.2 Policies 8.3.4.6,	• The most significant changes and resultant effects on visual amenity will arise from vegetation removal, earthworks, trenching and construction activity and construction vehicle movements. As discussed in Section F, these effects can be appropriately managed.	Consistent with the theme

Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
	9.3.1.1, 9.3.1.2, 14.3.2.5, 14.3.2.6	• The effects on amenity within areas zoned Recreation 1 will be temporary, and upon completion of the construction works, the sites will be reinstated and replanting will occur ensuring that there is no permanent effect on the amenity, public use and enjoyment of these areas. In addition, as the pipeline will be underground, no effects on the future development of the reserves are anticipated	
Community	Objective 14.3.1.3 Policy 14.3.2.6	 Measures will be used to mitigate the effects of construction activity such as the use of traffic management measures, and mobile noise barriers where necessary. The proposed alignment traverses a number of reserves and public open spaces. Construction sites and works through these areas have been located and designed to minimise disruption on recreation and public access as far as practicable, and access to sports fields will be retained. At Wainoni Park, works will disrupt the normal activities associated with the Pony Club, as areas may need to be fenced off from users, and facilities (fences/jumps) relocated. In light of this, there will be temporary effects on public access during construction, and short-term effects on amenity. The Project will have little effect on the future development of the reserve. The provision of equipment and facilities for truck cleaning is proposed where there is exposed ground on the site that is traversed by site vehicles. This will prevent excavated materials being deposited onto the local road network and causing a hazard or nuisance. 	Consistent with this theme
Natural character, features and ecosystems	Objectives 8.3.2, 8.3.4, 9.3.1 Policies 8.3.2.1, 8.3.2.6, 8.3.2.8, 8.3.4.1, 8.3.4.3, 8.3.4.6, 9.3.1.1, 9.3.1.2, 14.3.2.4	 Earthworks and vegetation removal will adversely affect several areas along/adjacent to the alignment. The works have been designed as far as practicable to avoid ecosystems and habitats, however, where vegetation removal and earthworks are required measures remedy and mitigate these effects are contained within the Ecological Assessment [Technical Report I]. Subject to the implementation of the proposed mitigation outlined within this report, it is considered that the residual net effects on ecosystems and habitats will be appropriately managed. Measures have been proposed to mitigate adverse ecological effects and overall the effects can be appropriately managed. The Project is expected to cause some adverse effects due to construction 	The works are generally consistent with this theme, however, some removal of coastal vegetation will be required to enable the proposed works.

Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
		 activities relating to emissions of noise, vibration, etc. However, these effects will be temporary and will be managed through a construction management plan which seeks to avoid, minimise or mitigate any adverse effects. The construction of the pipeline through Wainoni Park, North Shore Memorial Park and North Shore Golf Club will have a number of adverse visual and landscape effects due to the natural state of the parks at present and their recreational and memorial use. These will however be temporary in nature during and immediately following the construction period and will be mitigated through replacement planting. 	
Effects on the coastal environment	Objective 8.3.1 Policies 8.3.2.4, 8.3.2.5, 8.3.1.5 and 8.3.1.6	 Some coastal vegetation (mangrove seedlings at Rahui Road site) may require removal as part of the proposed works. The works have been designed to avoid vegetation removal as far as practicable. No disturbance of wildlife habitats, shellfish beds, rocky shore ecosystems, and important fishery habitats is anticipated as these have not been identified within the vicinity of the Project. The most appropriate means of managing these effects are to minimise the works footprint and the duration of works. These objectives have been central to the development of the construction method. As noted in the Ecological Assessment [Technical Report I] short-term, construction related effects may be managed by standard construction management techniques, such as sediment control, drilling fluid management, appropriate storage of environmentally hazardous substances so that they do not find their way into coastal environments, and selection of tracking routes to, through and around the active construction site, which avoid areas of highest ecological value. As outlined above, erosion and sediment control measures will be implemented in accordance with TP90. The above measures should mitigate any adverse effects that may arise on accesvetams as a result of construction activities. 	Consistent with the theme

Table 7-6: ACDP:W – Theme Assessment

Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
Water Quality	Objective 1 Policies 1.5, 1.6, 1.7, 1.8, 1.14	 Erosion and sediment control measures will be implemented in accordance with TP90 for the duration of the land disturbances activities required as part of the Project to prevent the discharge of sediment laden water to nearby waterbodies. Indicative measures are shown on the project consenting drawings. 	Consistent with the theme
Natural character, features and ecosystems	Objective 2, 5 and 7 Policies 1.6, 2.4, 2.10, 2.12, 5.1, 5.2, 5.3, 5.4, 5.6 and 7.4	 The proposed works will be undertaken in a highly modified environment (SH18, Hobsonville PS), and in an area that is presently undergoing extensive development as generally anticipated by the planning framework of the ACDP:W. The removal of vegetation (both native and exotic) will be required to facilitate construction activities. As noted in the Arboriculutral Assessment, vegetation removal will be undertaken in accordance with good practices and the recommendations of the Tree Protection Methodology. As the permanent works will be located below ground, activities will not impede the regeneration, or future regeneration, of native vegetation. Construction activities will be temporary in nature during and immediately following the construction period and will be mitigated through replacement planting. 	Consistent with the theme
Land disturbance	Objective 3 Policies 1.8, 1.9, 3.2, and 3.5	 As noted above, erosion and sediment control measures will be implemented in accordance with TP90 to minimise any sediment discharges. Land disturbance activities outside of the CMA will be predominantly open cut, and are to be undertaken progressively in stages. This will minimise the proportion of soil/rock exposed at any one time, minimising any adverse effects on the surrounding topsoil and soil structure. 	Consistent with the theme
Tangata Whenua	Objective 8 Policies 8.1, 8.2, 8.4 and 8.5	 As outlined in Section 5 of this report, consultation with mana whenua is ongoing and a number of Cultural Impact Assessments have been prepared that identify matters of significance. The implementation of erosion and sediment control measures outlined above should avoid any adverse effects on the mauri of waterbodies and riparian margins around the coastal environment The mauri of native vegetation and natural processes may be impacted through the removal of vegetation required to facilitate the works. Construction activities 	Consistent with the theme

Theme	Relevant Objectives/ policies	Comment	Consistent with relevant theme
		will be temporary in nature during and immediately following the construction period and will be mitigated through replacement planting.	
Amenity	Objective 10 Policies 10.2, 10.10, 11.2, 11.4, 11.7, 11.10 and 11.13	 The proposed works will be undertaken in a highly modified environment (SH18, Hobsonville PS), and in an area that is presently undergoing development anticipated by the planning framework of the ACDP:W. As identified in the Landscape and Visual Assessment, the new chemical storage and dosing facility will be read as an integral component of the existing pump station. The permanent hard stand areas will not look out of place as the surrounding Hobsonville Point residential area is in a state of rapid urbanisation and construction. Following completion of the works, replacement planting will assist in returning sites to their previous appearance. Furthermore, noise mitigation measures will be implemented on-site and be monitored to ensure that proposed works do not have a detrimental impact on the health and safety of sensitive receivers. 	Consistent with the theme

Table 7-7: PAUP – Theme Assessment

Theme	Relevant Objectives/policies	Comment	Consistency with relevant theme
Providing for infrastructure	Objectives C.1.1.1, C.1.1.2, C.1.1.3, C.1.1.4 and C.4.1.3 Policies C.1.1.1, C.1.1.3, C.1.1.4, C.1.1.5, C.1.1.6, C.1.1.9, C.4.1.1 and C.5.15.1.7	 The increasing urban development in the Northern Waitakere and South Rodney regions, including the NWTA, requires additional wastewater conveyance infrastructure to service this growth. The construction and operation of the project will provide infrastructure that supports the economic and social wellbeing of the region. The project is expected to cause some adverse effects due to construction activities. However, these effects will be temporary and will be managed through a construction management plan which seeks to avoid, minimise or mitigate any adverse effects. As with other underground network utilities, the proposed pipeline will be co- located with other network utilities within the road reserve as far as practicable. The proposed works seek to utilise new technological advances (HDD) as far as practicable 	Consistent with the theme
Land Disturbance	Objectives C.5.2.1 and C.5.2.3 Policies C.5.2.1, C.5.2.2, C.5.2.3 and C.5.2.5	 Erosion and sediment control measures will be implemented for the duration of the land disturbance activities required as part of the project to prevent the discharge of sediment laden water to watercourses and the coastal environment. Measures will be implemented in accordance with the Auckland Regional Council Technical Publication No. 90. Indicative measures are shown on the project consenting drawings. The Cultural Impact Assessments prepared as part of the Project highlight the special significance of water to tangata whenua and the historical connection to the Waitemata Harbour. Minimising adverse effects on water quality is considered to be fundamental in sustaining the mauri of water. The implementation of erosion and sediment control measures will assist in maintaining water quality during construction. Watercare's proposed project route has also avoided as far as practicable any ancestral lands, sites, waahi tapu and other taonga of significance to tangata whenua. The proportion of the catchment exposed at any one time will be minimised. 	Consistent with the theme

Theme	Relevant Objectives/policies	Comment	Consistency with relevant theme
		The land disturbance activities required as part of the project, predominantly trenching, will be undertaken progressively in stages.	
Natural character, features, water bodies and ecosystems	Natural Heritage Objective C.4.1.1 Policies C.4.1.1 and C.4.1.4 Vegetation Management Objective C.5.3.1 Policies C.5.3.1, C.5.3.2, C.5.3.5 and C.5.3.6 Lakes, rivers and streams Objectives C.5.14.1, C.15.14.2, C.5.14.4 and C.5.14.5	 The infrastructure associated with the project will generally be sub-surface, and any infrastructure located above ground will not be within areas of high natural character. Effects on streams will generally be avoided through the proposed construction methodology, which includes: HDD beneath the bed of Alexandra Stream at Rosedale Park; The installation of pipe bridge across the unnamed stream/gully at Witton Place; and The implementation of erosion and sediment control measures during all land disturbances activities to prevent sediment laden discharges. Where the trenching of one stream is required, the effects include temporary stream bed disturbance, possible increases in sediment and a decrease in water quality. These effects will be mitigated by installing temporary dams and over-pumping the stream while trenching is being undertaken. Fish salvage work will also be required to relocate native fish species out of the affected stream area, if works are likely to directly affect them. 	Some removal of vegetation at riparian margins will be required to enable the proposed works.
	Policies C.5.14.1, C.5.14.2, C.5.14.4, C.5.14.6, C.5.14.7 and C.5.14.12	related to vegetation clearance. A range of mitigation measures and options have been identified (refer to section 6.13 of this Report).	
Contaminated Land	Objective C.5.6.1 Policies C.5.6.2 and C.5.6.3	 The investigations undertaken as part of the Ground Contamination Assessment, contained as Appendix H, indicate that contaminant concentrations within the project area are not at levels that would pose human health risks to construction workers and the general public. Construction can also be managed using standard earthworks procedures to ensure that any effects on the environment from the presence of these contaminants will be less than minor. 	Consistent with the theme
Water quality and quantity	Water quality Objective C.5.15.1.3,	• The groundwater and settlement assessment report contained as Appendix J considers the project works have the potential to result in surface settlement	Consistent with the theme

Theme	Relevant Objectives/policies	Comment	Consistency with relevant theme
	C.5.15.1.4 and C.5.15.1.5 Policies C.5.15.1.2, C.5.15.1.6, C.5.15.1.8 and C.5.15.1.23 Water quantity Objective C.5.15.2.1 Policies C.5.15.2.5, C.5.15.2.6, C.5.15.2.7, C.5.15.2.18 and C.5.15.2.19,	 that arises from construction of the pipeline and also groundwater lowering (drawdown), but with implementation of appropriate mitigation measures, effects are no more than minor. The proposed construction methodologies for the project are however frequently used for the installation of pipelines throughout Auckland and New Zealand. In addition, a monitoring programme will be implemented to monitor construction of the pipelines and manholes, specifically targeting those areas where effects on existing buildings and services are possible. The construction activities associated with the project will in some areas be located adjacent to waterbodies, but are permitted activities. The level of contamination within the washwater is not expected to be high given project construction plant will be required to be maintained to a high standard (to ensure no oil leaks, etc.) and kept free of dust/dirt where practicable. The expected volume of washwater and method of discharge is not known at this stage. It is however envisaged that the collection, treatment and disposal of any washwater discharge would utilise the temporary stormwater controls established on-site as part of the land disturbance activities. 	
Amenity	Noise and Vibration Objectives C.7.3.1, C.7.3.2, C.7.3.3, C.7.3.7 and C.7.3.9 Policies C.7.2.2, C.7.3.2, C7.3.7 and C.7.3.10	 As noted above, the proposed works are expected to cause some temporary adverse effects due to construction activities. Construction methodology and management procedures will help to avoid, minimise or mitigate these effects. Some construction methodologies (if employed) will cause more than minor adverse effects at properties adjacent to construction sites. These activities may also occur during the night, exceeding night-time noise criteria. Construction methodology and management procedures in the project CNVMP will help to avoid, minimise or mitigate these effects. 	Consistent with the theme
Mana Whenua	Objective C.5.15.2.5 Policy C.5.2.4, C.5.14.4, C.5.14.5, C.5.15.1.5 and C.5.15.2.18	• Consultation with iwi and Cultural Impact Assessments that have been prepared for the Project highlight the special significance of water to tangata whenua and their historical connection to the Waitemata Harbour. Minimising adverse effects on water quality is considered to be fundamental	Consistent with this theme

Theme	Relevant Objectives/policies	Comment	Consistency with relevant theme
		 in sustaining the mauri of water. The implementation of erosion and sediment control measures in a manner consistent with TP 90 will assist in maintaining water quality during construction. The mauri of native vegetation and natural processes may be impacted through the removal of vegetation required to facilitate the works. Construction activities will be temporary in nature during and immediately following the construction period and will be mitigated through replacement planting. 	

7.9 **Other Matters**

7.9.1 **RMA Section 105**

Section 105(1) of the RMA requires the consent authority to have regard to a number of matters, in addition to those matters in section 104(1), when considering an application for a discharge permit. The required assessment is provided in Table 7-8 below.

Table 7-8: Section 105 Matters

Matter		Comment
a)	the nature of the discharge and the sensitivity of the receiving environment to adverse effects	The nature of the discharges and the sensitivity of the receiving environment have been described within Sections 3 and 6 and Technical Report I describes the streams and the coastal marine area.
b)	the applicant's reasons for the proposed choice	Proposed discharges are associated with construction activities and are thus considered to be necessary to support the construction of the Project.
с)	any possible alternative methods of discharge, including discharge into any other receiving environment	All discharges associated with the Project are temporary in nature and as such, alternative discharge options considered are associated with alternative construction options. See section 2 for the consideration of alternatives.

7.9.2 Hauraki Gulf Marine Park Act 2000

When assessing applications for activities within the Gulf and its catchment, the consent authority is required to have regard to sections 7 and 8 of the Hauraki Gulf Marine Park Act 2000 ("HGMPA") as though they were a national policy statement.

The HGMPA provides special recognition of the Hauraki Gulf and this has implications for the resource management framework. RMA plans and applications must have particular regard to the provisions of sections 7 and 8 of the HGMPA.

Section 7 provides that the interrelationship between the Hauraki Gulf, its islands, and catchments and the ability of that inter relationship to sustain the life-supporting capacity of the environment of the Hauraki Gulf and its islands are matters of national significance.

Section 8 of the HGMPA provides a number of objectives to manage the Hauraki Gulf including; the protection and, where appropriate, the enhancement of the life-supporting capacity of the environment and the natural, historic and physical resources of the Hauraki Gulf, its islands, and catchments. This includes those resources with which mana whenua have an historic, traditional, cultural, and spiritual relationship and those resources which contribute to the recreation and enjoyment of the Hauraki Gulf for the people and communities of the Hauraki Gulf and New Zealand.

The project has a functional need to locate in the coastal environment. Coastal processes and water quality may be affected on a short-term basis by the works in the Upper Waitemata Harbour (part of the Hauraki Gulf) particularly so if marine trenching is the preferred construction method. Effects are likely to be generally confined to the works area and not be of such a duration as to be more than minor. Mitigation measures have been recommended to minimise adverse effects on water quality.

In respect to the life-supporting capacity of the Hauraki Gulf, construction of the pipelines by marine trenching may have a significant, but short term effect on the benthic ecology within the footprint of the trench. The option of HDD would avoid these effects.

Given the pipelines are being installed beneath the seabed, once construction is completed the project is not expected to compromise the use of the Hauraki Gulf by the people and communities for economic activities and recreation.

7.9.3 National Environmental Standard for Sources of Drinking Water

The Resource Management (National Environmental Standard for Sources of Human Drinking Water) Regulations 2007 ("NES:DW") seeks to reduce the risk of contaminating New Zealand drinking water sources such as rivers and groundwater. It does this by requiring regional councils to consider the effects of activities on drinking water sources in their decision making.

On the basis that there are no registered drinking-water supplies from any creek downstream of the site, the proposed discharges associated with the Project will not be contrary to clauses 7 and 8 of the NES:DW.

7.9.4 Local Government Act 2002 and Local Government (Auckland Council) Act 2009

Under Section 59(1) of the Local Government Act 2002, Watercare's principal objective, as a CCO, is to:

- a) Achieve the objectives of its shareholders, both commercial and non-commercial, as specified in the statement of intent; and
- b) Be a good employer; and
- c) Exhibit a sense of social and environmental responsibility by having regard to the interests of the community in which it operates and by endeavouring to accommodate or encourage these when able to do so; and
- d) If the council-controlled organisation is a council-controlled trading organisation, conduct its affairs in accordance with sound business practice.

Watercare is also subject to particular statutory obligations as an Auckland water organisation under the Local Government (Auckland Council) Act 2009. Section 57 (1) of that Act says that Watercare must, amongst other things:

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

7.9.5 Heritage New Zealand Pouhere Taonga Act 2014

The HNZPTA seeks to promote the identification, protection, preservation, and conservation of the historical and cultural heritage of New Zealand.

Section 42 of the HNZPTA states that no person may modify or destroy, or cause to be modified or destroyed, the whole or any part of that site if that person knows, or ought reasonably to have suspected, that the site is an archaeological site unless an authority is granted by Heritage New Zealand (formerly the New Zealand Historic Places Trust) under the HNZPTA.

The archaeological assessment contained as Technical Report D has concluded that the project will not affect any known archaeological sites. However, given there is the potential for subsurface archaeological remains to be exposed during land disturbance activities (particularly the coastal areas around Rahui Reserve, Wainoni Park North and the southern edge of North Shore Memorial Park), it is recommended that an authority is applied for under Section 44(a) of the HNZPTA.

This authority will be sought by Watercare prior to construction commencing.

7.9.6 Reserves Act 1977

The Reserves Act 1977 is administered by the Department of Conservation and provides for the acquisition of land for reserves, and the classification and management of reserves (including leases and licences). The long term occupation of reserves by Watercare will need to be authorised by the Council under the Reserve Act. The form of the authorisation will be determined in the future.

7.9.7 Wildlife Act 1953

The Wildlife Act 1953 protects most species of wildlife (including mammals, birds, reptiles and amphibians), native or introduced, and provides that no-one may kill or have in their possession any such bird or animal, unless they have a permit.

As set out in Section 6 of this AEE, potential effects on wildlife, specifically birds and lizards, have been considered and mitigation measures provided where necessary. These may include requirements to obtain permits under the Wildlife Act to salvage lizards and birds.

7.9.8 Utilities Access Act 2010

The Utilities Access Act 2010 establishes a framework for a national code of practice to regulate how utility operators (including water and wastewater operators) and corridor managers coordinate their activities relating to access to transport corridors.

Under the Act, the National Code of Practice for Utility Operators' Access to Transport Corridors has been developed and came into effect on 1 January 2012. The Code seeks to minimise disruptions to roads, motorways, and railways caused by work by utility operators and maintain safety.

The construction activities associated with the project will be undertaken in accordance with the requirements of the Code and any required Corridor Access Requests will be sought from Auckland Transport and the NZ Transport Agency prior to construction commencing.

8 Part 2 Assessment– Purpose and Principles

The following table provides an assessment of the Project against the RMA Principles:

Table 8-1: Consideration of Sections 6 and 7 of the RMA

Matters of National Importance	Assessment
	The Project, which is regionally significant infrastructure, will provide additional wastewater conveyance and treatment infrastructure to service the increasing urban development. As the crossing from Hobsonville to Greenhithe is required, works within the CMA are not considered inappropriate.
	HDD (Upper Waitemata Harbour and Te Wharau Creek):
	It is anticipated that, during construction it is likely that there will be adverse effects on the natural character of the coastal environment. Adverse effects are limited to the construction sites at the causeway widening and at Rahui Road. Adverse effects are associated with construction activities (e.g. the presence of the drilling rig and vegetation removal) which are considered to be temporary in nature.
	There are not considered to be any significant adverse effects associated with permanent works.
	Marine Trenching (Upper Harbour Harbour):
(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands and lakes and rivers and their margins and the	It is anticipated that, during construction it is likely that there will be adverse effects on the natural character of the coastal environment. Adverse effects are limited to the CMA and the construction sites at the causeway widening and Rahui Road. Adverse effects are associated with construction activities e.g. temporary structures in the CMA, presence of barges etc. These adverse effects are considered to be temporary in nature. There are not considered to be any significant adverse effects associated with permanent works.
protection of them from	Wainoni Park north:
use and development.	Construction activities will have a temporary adverse effect on the permanent stream at Wainoni Park north (refer Section 6.13) as construction activities require open trenching through the stream to install the pipeline. The adoption of the recommended mitigation measures outlined in Section 6.14 will ensure that any potential adverse effects on the stream can be appropriately managed.
	Witton Place:
	At Witton Place, the Project will cross a stream and gully system. At this location, construction works will occur within the riparian margins and stream bed. Effects on the stream will be temporary in nature. With the adoption of recommended mitigation measures, it is considered that potential adverse effects can be appropriately managed.
	Alexandra Stream:
	Effects on Alexandra Stream will generally be avoided through the proposed construction methodology (HDD) beneath the bed of Alexandra Stream at Rosedale Park.
(b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and	No outstanding natural features or landscapes are anticipated to be affected by the Project.

Matters of National Importance	Assessment
development:	
(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:	As discussed in Section 6.13, the Project will involve the removal of vegetation at two SEAs and five areas of ecological interest which contain potential habitats. With the adoption of recommended mitigation measures, it is considered that potential adverse effects can be appropriately managed.
(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:	The Project will limit public access to and along isolated areas of the CMA and rivers during construction activities. Public access will be limited for health and safety reasons. It is considered that alternative access will be available for the temporary duration of construction activities.
(e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:	See Section 6.9 for details. It is considered that the adoption of appropriate protocols will ensure that the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga will be appropriately managed.
(f) the protection of historic heritage from inappropriate subdivision, use, and development:	See Section 6.8. The Project will have no effect on any known site of historic heritage. An Authority for the project will be sought under Section 44(a) of the HNZPTA as a precaution prior to the start of earthworks.
(g) the protection of protected customary rights	There are no known protected customary rights that will be affected by the Project.
Other Matters	Assessment
(a) kaitiakitanga:	See Section 5.3 and 6.9. Engagement with tangata whenua has been ongoing throughout the Project and CIA's have been prepared to guide the Project. The engagement with tangata whenua will appropriately provide for kaitiakitanga.
(aa) the ethic of stewardship	See above.
(b) the efficient use and development of natural and physical resources	See Section 6.2. The Project will enable the further growth of the NWTA in a manner that will result in positive public health and amenity effects. It is considered that the project constitutes the efficient use and development of natural and physical resources.
(ba) the efficiency of the end use of energy	Not considered relevant.
(c) the maintenance and enhancement of amenity values	As discussed in Section 6, there is the potential for temporary adverse amenity effects associated with the construction of the Project. Key amenity values potentially affected include visual, acoustic and vibration effects. Generally, it is considered that these potential effects can be appropriately managed and that they are temporary in nature.
(d) intrinsic values of ecosystems	As discussed in Section 6.13, the Project will involve the removal of vegetation at two SEAs and five areas of ecological interest which contain potential habitats. With the adoption of recommended mitigation measures, it is considered that potential adverse effects can be appropriately managed.
	As discussed in Section 6.3.2.2, marine trenching will likely result in physical disturbance of the benthic communities that live on or near the seabed within the footprint of the trench (from both the trenching activity

Matters of National Importance	Assessment
	and the placement of the temporary construction berm in the intertidal area at Rahui Road). This is considered to be a potentially significant short-term effect, but should not result in any long-term adverse effects on ecosystems.
	The Project constitutes the provision of wastewater infrastructure to an area that is facing significant growth pressures and is approaching capacity. Without the Project (and assuming growth continues) it is possible that there could be significant adverse effects on ecosystems associated with increased wastewater overflows.
(f) maintenance and enhancement of the quality of the environment	See Section 6. Temporary adverse effects on the quality of environment are anticipated; however it is considered that they can be appropriately managed. In the long term, it is considered that the quality of the environment will be maintained.
(g) any finite characteristics of natural and physical resources	Land is a finite resource. The Project will enable the efficient development of the NWTA.
(h) the protection of the habitat of trout and salmon	No known habitat of trout or salmon will be affected by the Project.
(i) the effects of climate change	Not considered relevant.
(j) the benefits to be derived from the use and development of renewable energy	Not considered relevant.

With regards to Section 8 – Treaty of Waitangi, refer to Sections 5.3 and 6.9. Engagement with tangata whenua has been ongoing throughout the Project and CIAs have been prepared to guide the Project. The ongoing engagement with tangata whenua will ensure appropriate regard has been had for treaty matters.

Taking the above into account, it is considered that overall the Project is generally consistent with Sections 6, 7 and 8 of the RMA.

With regard to the purpose of the RMA, the issues once distilled down, relate to balancing the community, district-wide, and region-wide benefits of the Project against the adverse construction and operation effects on individuals and the local community and whether there are appropriate mitigation measures that can effectively manage these effects.

With regards to the positive effects of the Project, it is considered that the Project is necessary to enable the further growth of the NWTA in a manner that will ensure that associated wastewater will be appropriately managed. It is considered that, without the Project:

- The growth of the NWTA will result in infrastructure exceeding capacity, potentially resulting in significant adverse effects associated with increased wastewater overflows; or
- Restrictions will likely be required on the growth of the NWTA. See Section 6.2 for further details.

With regards to adverse effects, as outlined in Section 6, it is considered that adverse effects are predominately associated with the construction of the Project and are thus generally temporary in nature. Further, it is considered that, with the adoption of the proposed mitigation measures, generally adverse effects can be appropriately managed.

Taking the above into account, it is considered that the Project constitutes the sustainable management of natural and physical resources.

9 **Conclusion**

The Project will form an integral part of Auckland's wastewater network and, as outlined above will have significant positive effects, particularly by providing necessary infrastructure for the continued growth of the NWTA.

During construction, there will be a range of potential and actual adverse effects within the vicinity of the construction areas, but, with the adoption of proposed mitigation measures, any adverse effects will be temporary in nature and can be appropriately managed.

Once completed, the majority of the Project works will be underground and temporary construction areas will be reinstated in an appropriate manner.

It is considered that the Project is consistent with the purpose of the RMA in that it allows for the management of natural and physical resources in a way that enables people and communities to provide for their social, economic and cultural wellbeing and for their health and safety. The Project generally gives effect to, or is consistent with, the objectives and policies of the relevant statutory plans. Where policy inconsistencies arise, it is considered that recommended mitigation measures will ensure that any associated adverse effects will be appropriately managed.



