Northern Interceptor Project: Notices of Requirement

Assessment of Natural Character Landscape and Visual Effects
Prepared for Watercare Services Limited

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Boffa Miskell

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Executive Summary

This application requires designation under the Resource Management Act 1991 (RMA). The Notices of Requirement (NoR) for designations include both the NoR – NI (Waitakere) and NoR – NI (North Shore). It is anticipated that the construction of the project will be staged and therefore temporary visual effects will not occur simultaneously or over a wide area. Permanent visual effects will predominantly result from the removal of vegetation and the presence of built structures. These effects will be associated with three pump stations (No. 56 The Concourse, and Wainoni Park North and South), a pipe bridge (crossing Manutewhau Creek) and surface features such as manhole covers, inlet vents, biotrickling filters and biofilters. Overall, the successful integration of these features requires consideration of the final appearance and placement of the structures in relation to the surrounding land use, activities, and viewing audiences.

Temporary and permanent natural character and landscape effects will largely be due to the removal of vegetation of native or exotic origin. Removal of vegetation in public open spaces and particularly streams will alter the character of these areas by heightening the impression of further human modification.

It is considered that the adverse natural character, landscape and visual effects anticipated in the construction and operation phase of the project can be managed and mitigated to result in low adverse effects overall and therefore ‘translate’ to a ‘less than minor’ effect.

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List of Abbreviations

AEE	Assessment of Effects on the Environment
BML	Boffa Miskell Limited
BPC	Break Pressure Chamber
CMA	Coastal Marine Area
CPTED	Crime Prevention Through Environmental Design
GPC	Greenhithe Pony Club
NoR	Notice of Requirement
NSAGC	North Shore Air Gun Club
NSDTC	North Shore Dog Training Club
NSGC	North Shore Golf Club
NSMP	North Shore Memorial Park
PAUP	Proposed Auckland Unitary Plan
RMA	Resource Management Act 1991
SH16	State Highway 16
SH18	State Highway 18
SEA	Significant Ecological Area
Watercare	Watercare Services Limited
WWTP	Wastewater Treatment Plant

1.0 Introduction

The purpose of this report is to provide an assessment of the natural character, landscape and visual effects of the proposed Northern Interceptor Project (referred to in this report as the **Project**) and recommend mitigation measures to be reviewed and considered in further stages of the project.

Further information on the proposed works is included in the Assessment of Effects on the Environment (**AEE**) which includes technical reports by other specialists and a full drawing set of the proposed corridor. A large majority of the proposed works occurs within road corridors or on parks or reserves owned by Auckland Council. A section of the corridor is associated with the coastal margins of the Waitemata Harbour.

This assessment has been undertaken by a professional landscape architect with reference to the Quality Planning Landscape Guidance Note[1] and its signposts to examples of best practice[2].

The contents of this assessment have been developed using information provided by the Northern Interceptor Project Team. The designs provided to Boffa Miskell Ltd (**BML**) are of a conceptual level and are therefore expected to be further developed and defined as the project progresses. Site surveys and site visits relevant to the assessment of the natural character, landscape and visual effects have been conducted by BML.

It is envisaged that as the proposal moves through further stages of the design process, further refinement of the scheme will enable any identified adverse effects to be appropriately managed so that effects could be avoided, remedied or mitigated if required.

Based on the information provided, the assessment outlines and recommends potential avoidance and mitigation measures to be considered by Watercare Services Limited (**Watercare**) and their advisors associated with further phases of design and construction during the approval phases of the project.

This report provides an assessment of the natural character landscape and visual effects for both the construction (temporary works) and operation (permanent works) of the project along the proposed pipe line corridor and associated project sites.

A series of plans and illustrations have been prepared to support the assessment. These plans include:

- Landscape Context Plan
- NoR – NI (North Shore) Landscape Context Plan
- NoR – NI (Waitakere) Landscape Context Plan

[1] http://www.qualityplanning.org.nz/index.php/planning-tools/land/landscape

[2] Including: Guidelines for Landscape and Visual Impact Assessment ("GLVIA") 3rd Edition, Landscape Institute (UK) and IEMA (2013); and, Best Practice Note 10.1, Landscape Assessment and Sustainable Management, NZILA

2.0 Project Description

Boffa Miskell Limited (BML) has been commissioned by Watercare Services Limited (Watercare) to assess the potential natural character, landscape and visual effects related to the construction, operation and maintenance of Watercare's proposed Northern Interceptor.

The Northern Interceptor comprises a new wastewater interceptor and associated infrastructure, from the existing storage tank located at The Concourse, Henderson to the Rosedale Wastewater Treatment Plant (WWTP). It will divert flows from three existing branch sewers (Swanson, Whenuapai and Massey) and connect flows originating from the North West Transformation Area (including Red Hills, Massey North, Kumeu, Riverhead, Huapai and Whenuapai). These flows will be transferred north to the Rosedale WWTP, rather than south to the Mangere WWTP

Phase 1 of the Northern Interceptor was granted consent in January 2016. Phase 1 will transfer existing flows from the existing Hobsonville Pump Station to the Rosedale WWTP. The section of the Northern Interceptor between Hobsonville Road and the western abutment of the Greenhithe Bridge, is in the same corridor as a water infrastructure project, the North Harbour No. 2 Watermain. A notice of requirement for the works within the shared corridor, which include this portion of the Northern Interceptor, was lodged with the Council in June 2016.

This technical report provides specialist input for the Northern Interceptor Assessment of Effects on the Environment (AEE), prepared by MWH New Zealand Limited which supports the Notices of Requirement (NoR) for the remainder of the route (Project), these being NoR – NI (Waitakere) and NoR – NI (North Shore).

The works within NoR - NI (Waitakere) will transfer wastewater flows from The Concourse Storage Tank to Hobsonville Road, where it will connect with the works in the shared corridor.

The works within NoR - NI (North Shore) will transfer wastewater flows from the edge of the future harbour crossing at the eastern abutment of the Greenhithe Bridge to the Rosedale WWTP.

Construction will be staged in response to growth in the area.

The Project and a detailed construction methodology and drawings are described in detail in the AEE. In summary, the Project works included within NoR – NI (Waitakere) and NoR – NI (North Shore) will comprise of the following elements:

- A new Pump Station at the Concourse Storage Tank site which will divert flow north away from the Western Interceptor;
- A new Booster Pump Station at Wainoni Park to accommodate additional flows from the Northwest Transformation Area;
- A new Intermediate Pump Station at Wainoni Park North to accommodate further growth in the Northwest Transformation Area, and the diverted flows from the Concourse Storage Tank site (Swanson and Waitakere);
- Installation of a wastewater pipe from the Concourse Storage Tank to Hobsonville Road;
- Installation of a wastewater pipe from the eastern abutment of the Greenhithe Bridge, to the Rosedale WWTP;
- Duplication of the rising main section of wastewater pipe from the Intermediate Pump Station at Wainoni Park North to the Rosedale WWTP;
- Associated structures at connection points, including access shafts, drop shafts, flow control structures, etc.;

- Biofilters at some connection points which will comprise of a bark bed (sizes vary) with timber edge approximately 300mm in height and a fan room (sizes vary);
- Biotrickling filter and activated carbon filter, approximately 5.2m in height and
- Installation of a pipe bridge at Manutewhau Reserve, West Harbour.

This report provides the following:

- A description of the particular receiving environment(s) potentially affected by the Project;
- Description of specific aspects of the Project in relation to the subject area being investigated;
- Description of the investigations undertaken to assess the natural character, landscape and visual effects and assessment of effects of the proposed works within the technical field (without mitigation);
- Recommended mitigation and management measures and resultant post mitigation assessment of effects;
- An assessment of the actual or potential effects on the environment (construction, operation and maintenance). This includes the identification of activities that could result in potential adverse effects and, in turn, identifying design refinements or construction methodologies that could avoid, remedy or mitigate such effects;
- Conclusions.

3.0 Assessment Methodology

Boffa Miskell have undertaken the following steps in preparing this assessment of landscape and visual effects:

i. Review of documents, plans and other material

ii. Project familiarisation

iii. Assessment of Effects

iv. Recommended Mitigation and Management Measures

These steps are described below:

3.1 Document Review

This assessment of natural character, landscape and visual effects is based upon a review of a number of documents and mapping resources including the New Zealand Coastal Policy Statement 2010 (**NZCPS**), Auckland Regional Plan (**ARP**) Coastal, the Auckland Council Regional Policy Statement (**ACRPS**), Natural Character Assessment Auckland Region (2009) prepared by Stephen Brown Environments, and the Proposed Auckland Unitary Plan (**PAUP**). In addition, documents and designs which have been prepared for the concept design of the Northern Interceptor have also been examined.

In addition, an Arboricultural assessment conducted by Greenscene Arboriculture Ltd. has been relied on for assessing the effects of any tree and vegetation removal which may be required at various locations along the project corridor.

The AEE describes the proposed works in more detail and includes a drawing set which should be referred to when reading this technical report.

3.2 Project Familiarisation

To understand the project a drive-by survey and walkover of the project area was undertaken by BML, including corridors and location of the main elements, such as proposed pump station sites. Photographs using a Canon SLR camera, were taken at project locations which are proposed to feature above ground elements, and also of the surrounding area to capture the landscape and visual context of the project. In addition, aerial photography and ground contours have been available for the project and these have been used to assist our analysis of the potential effects.

The project intersects with a number of private properties. It is understood that many of the private properties will not be directly impacted by the proposed works (due to the use of trenchless construction methodologies) and therefore access to these locations has not been sought. Those areas which are likely to be affected, and which are privately owned have been visually surveyed from publicly accessible locations where possible, with reference to aerial imagery.

It has been noted that certain sections of the project are proposed to be located adjacent to or within the context of the consented Northern Interceptor Phase 1, Hobsonville Pump Station to Rosedale. These areas include Greenhithe Road, Wainoni Park, North Shore Memorial Park (**NSMP**), North Shore Golf Club (**NSGC**), Appleby Road, Albany Highway, John Glenn Avenue, William Pickering Drive, Peirmark Drive, Bush Road and Rosedale Park.

The current alignments and extent of the designation boundary does not intersect with any Regionally Significant Landscapes identified in the ACRPS. In addition, works within the Coastal Marine Area (**CMA**) are not included in this assessment as they are to be considered at a later date when all necessary regional consents are sought. Although the CMA is not anticipated to be directly affected, the designation boundary does adjoin two Coastal Protection Areas (**CPA**) as identified in the ARP, namely 'CPA 55a Te Atatu – Henderson Creek', and 'CPA 57 – Herald Island to Lucas Creek' and therefore related mitigation measures are outlined in **Section 5**.

For a number of areas subsequent visits have been made to review revisions to the design and to take additional photos.

3.3 Assessment of Effects

Effects will include:

- **Natural Character Effects**: this concerns preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development. This is measured by the

effect the development has on the natural elements, patterns and processes of the watercourses and their margins.

- **Landscape Effects**: The physical impact / removal of landscape features, including vegetation and earthworks.
- **Visual Effects**: The visual change to the environment as experienced by residents and visitors. Visual Effects can be fixed (as in a view from a house) or transitory (i.e. from a vehicle on a road, a boat on the water or from within a park/ reserve).

The following methodology has been adopted within this assessment to ensure that the likely effects of both the construction phases (which are temporary in nature) and those of the operational phase (which are permanent) are addressed. Effects will include

- **Construction Phase:** This part of the assessment is described under the following headings:
    - Natural Character, Landscape and Visual Effects – Describes the anticipated effects on the natural character and landscape including those which are likely to alter the landform, vegetation, watercourses, as well as the anticipated effects on the visual amenity as a result of the construction phases of the project. It will also include temporary activities such as the presence of temporary structures and machinery.
    - Level of Temporary Effects – Provides an overall judgement as to the level (significance) of the temporary effects
- **Operational Phase:** A description of the completed works and the level (significance) of any permanent natural character, landscape and visual effects.

For each of the effects anticipated in the construction phase and operation phase, a level of effect rating has been given. This rating is based upon the assumption that all mitigation measures proposed in **Section 5** of this assessment have been fully adopted as part of the project.

The rating scale is as follows:

Table 1: Level of Effect Rating Scale

Very High Adverse Effects	(-5)
High Adverse Effects	(-4)
Moderate Adverse Effects	(-3)
Low Adverse Effects	(-2)
Very Low Adverse Effects	(-1)
Neutral Effects	(0)
Very Small Beneficial Effects	(+1)
Small Beneficial Effects	(+2)
Moderate Beneficial Effects	(+3)
Highly Beneficial Effects	(+4)
Very High Beneficial Effects	(+5)

For assessment purposes under the RMA, any effects that rate -1 and -2 are considered to be *less than minor*; whereas a score of -3 are considered *minor*, and scores of -4 and -5 are considered to be *more than minor*.

A definitions table is provided in **Appendix 1**.

3.4 Recommended Mitigation and Management Measures

The assessment includes appropriate project specific mitigation measures which are recommended for consideration and inclusion within the project to assist in the mitigation of any potential effects identified within this report.

4.0 Assessment of Effects

The following section describes the existing environment and construction activities by geographic extent, and as outlined in the indicative concept design. This description of the environment and proposed construction activities then informs the landscape and visual assessment of potential effects likely resulting from the construction and operation of the project.

The assessment is divided into the two components of the project, the NoR Northern Interceptor (Waitakere) and the NoR Northern Interceptor (North Shore). Each route will be described in sections, commencing in the south and extending in a northerly direction.

Each section contains a reference number which corresponds to the associated location figures. **Figure 2** illustrates the route and sections of the NI Waitakere component and **Figure 3** illustrates the route and sections of the NI North Shore component.

4.1 Notice of Requirement Northern Interceptor (Waitakere)

NoR: NI (Waitakere) comprises of the transfer of wastewater from the existing Concourse Storage Tank to the Waitakere shared corridor point of connection at Hobsonville Road **(refer Figure 2**).

The project commences at its southernmost point at the property occupied by the existing Concourse Storage Tank facility to the east of the State Highway 16 (**SH16**) Lincoln Road off-ramp. The project progresses northeast through the industrial development along Concourse Road and beyond a tributary of Henderson Creek. Further north, the project extends through the existing residential areas and reserves within Massey East, Royal Heights and West Harbour before terminating to the north of Hobsonville Road.

The extent of each of the below sections is illustrated in Figure 2.

4.1.1 W1: The Concourse to Selwood Drive

4.1.1.1 Overview

Located in a *Working* zone under the Auckland Council District Plan Operative Waitakere Section, and within a *Heavy Industry* zone as listed under the Proposed Auckland Unitary Plan (**PAUP**), this area occupies a segment of land bisected by SH16 to the south and Henderson Creek to the north. The built environment consists of large industrial buildings and warehouse structures accessed off The Concourse. The project's southernmost point is at No. 56 The Concourse. This property is located on a flat piece of land populated by unmanaged grass. Within the property, a wastewater storage tank exists into which the new works are proposed to connect. The Concourse road corridor (where the project is located) comprises a single lane carriageway with adjacent footpaths, grass berms and occasional trees.

Beyond the designation boundary there are limited areas where views of the project may be afforded, the most notable of these are the road users and pedestrians travelling along The Concourse, particularly those visiting the Waitakere Refuse and Recycling Centre – which neighbours No. 56. Distant views towards the project (beyond 1000m) may be afforded by residential properties along Waimumu Road and Keegan Drive.

The anticipated works in this area of the corridor include the following:

- Formation of a construction yard at No. 56 The Concourse, including removal of approximately 90m^2 of native shrub roadside, topsoil, excavation and delivery and storage of materials;
- Construction of a Pump Station within the property, approximately 5m high, 15m long, 8m wide and a depth of 10m below ground level. Mechanical and electrical equipment such as pumps, valves, pipes, transformer, gantry crane, contractor facilities and extraction fans would

be installed within the structure. Ancillary above ground structures such as chemical dosing facility, biofilter bark bed, and control room will also be built;

- Excavation by open trenching and laying of pipeline within No 56 The Concourse before leaving the property and continuing open trenching along The Concourse until Selwood Road;
- Additional undertakings likely to be expected are site establishment, trench spoil removal, traffic management and site reinstatement.

4.1.1.2 Construction Phase

Duration

The expected duration of the works in this area is as follows:

- Approximately 1.5-2 years for the construction of the pump station at the Concourse Storage Tank site;
- Approximately 2 to 5 months for the installation of the pipeline to Selwood Road.

Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Removal and pruning a number of trees within No 56 The Concourse;
- Construction and visibility of an external construction fence around 56 The Concourse, to screen activities beyond from public view;
- Visibility of the construction of the pump station;
- Visibility of the excavation and laying of pipeline;
- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects - **Very Low (-1) Adverse Effects**

These effects are as a consequence of the removal of vegetation to facilitate the erection of a construction fence, contractor facilities and open trenching method for installation of the pipeline.

Visual Amenity Effects - **Very Low (-1) Adverse Effects**

The visual effects are considered to be very low as construction is either taking place behind a construction fence, within an area associated with heavy industry or within the road corridor where works of this nature (i.e. trenching to install or upgrade service infrastructure) are a typical and somewhat anticipated activity.

4.1.1.3 Operation Phase

Following construction the following permanent and visible features will remain:

- Pump station with ancillary above ground structures such as chemical dosing facility, biofilter bark bed, (fan room incorporated within pump station), control room and driveway extension.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the landscape and visual amenity effects would be:

Landscape Effects – **Neutral (0) Effects**

The replanting of vegetation along the boundaries of No. 56 The Concourse will re-establish the planted boundary treatment. The above ground structures (pump station) will be characteristic and generally in keeping with the industrial forms and structures within the wider visual context of the site.

Visual Amenity Effects – **Neutral (0) Effects**

The presence of a pump station in the proposed *Heavy Industry* zoning (in the proposed Auckland Unitary Plan) would amount to a neutral effect. It is considered that the remaining above ground structures will not impede on any views and will be in keeping with the industrial character of the wider area, and most likely could occur as a permitted activity under the District Plan / PAUP. Therefore, the permanent visual effects are considered neutral.

4.1.2 W2: Selwood Drive to Huruhuru Road

4.1.2.1 Overview

The project continues across Selwood Road before entering the Radio New Zealand lot 2-12 Selwood Road before terminating at the embankment of the Henderson Creek tributary, which is identified as CPA 55a Te Atatu – Henderson Creek. Selwood Road's environs consist of similar land uses as those observed along The Concourse, with a mix of existing heavy and light industrial activities with further activities proposed to be provided for under the PAUP zoning.

At the junction of The Concourse and Selwood Road and into No's 2-12 Selwood Road, the project will be visible by the immediate viewing audience of road users and pedestrians travelling along The Concourse, Selwood Road and Lincoln Road. The project is also likely to be viewed from residential dwellings along Triangle and Waimumu Road to the west, and Colwill Road to the north at minimum distances of 400 and 800m respectively.

The project then continues into Taitapu Park on the eastern side of the Henderson Creek tributary, before proceeding through the residential area along Kopi Place. To reach Huruhuru Road, the project must pass between No's 16 and 35 Kopi Place.

Close proximity views may be afforded towards the project in Taitapu Park and along Kopi Place. Most notable are the reserve users of Taitapu Park and residents and road users along Kopi Place. Beyond the immediate environs, it is anticipated that the project occupying Taitapu Park, would be visible to road users of SH16 as well as north facing residents along Triangle Road.

The anticipated works include the following:

- Excavation by open trenching and laying of pipeline within Selwood Drive before leaving the property and continuing open trenching along

The Concourse for approximately 720m until it intersects with Selwood Road;

- Additional undertakings likely to be expected are trench spoil removal, traffic management and site reinstatement;
- Activity within the coastal environment of Henderson Creek.

4.1.2.2 Construction Phase

Duration

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

Natural Character, Landscape and Visual Changes

The natural character, landscape and visual effects resulting from construction will be:

- Visibility of the excavation and laying of pipeline within Taitapu Park, Kopi Place and Huruhuru Road;
- Vehicle movements associated with construction activity.
- Activity close or within the coastal environment of Henderson Creek.

Level of Temporary Effects

Landscape Effects - **Neutral (0) Effects**

No trees or vegetation are anticipated to be affected in relation to the project, therefore the temporary landscape effects are considered neutral.

Visual Amenity Effects – **Very Low (-1) to Low (-2) Adverse Effects**

It is anticipated that distant views towards the construction works would primarily be from road users along SH16 and residents along Triangle Road which is likely to result in very low adverse effects. However, construction works would take place in Taitapu Park and along Kopi Place thereby affecting views from nearby properties. Nevertheless, the majority of works would be taking place within the road reserve and it is considered that activities in this area can be anticipated from time to time by viewing audiences. Therefore, the temporary visual effects are considered very low in the road reserve and low for works within Taitapu Park.

Natural Character Effects - **Very Low (-1) Adverse Effects**

The natural elements of the environment consist of Henderson Creek and vegetated embankments. This environment has some degree of perceived naturalness due to the tidal influences on the landscape and CMA. The designation corridor does not affect the CMA however works are adjacent to the CMA and are within the coastal environment in the context of these indigenous natural elements, patterns and processes. Within this environment significant elements of human modification are present including SH16, Radio New Zealand, industrial and residential land uses. The works will occupy a small area of the coastal environment where areas of human modification are present

and are not anticipated to impact the vegetation or watercourse. The temporary natural character effects are considered very low.

4.1.2.3 Operation Phase

Following construction, it is anticipated that no permanent above ground (visible) features will remain.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5** (including mitigation measures relating to construction in close proximity to the watercourse), it is considered that the landscape and visual amenity effects would be:

Landscape Effects – **Neutral (0) Effects**

No permanent landscape effects are anticipated as a result of the project. Therefore, the permanent landscape effects are considered neutral.

Visual Amenity Effects – **Neutral (0) Effects**

No permanent visual effects are anticipated as a result of the project. Therefore, the permanent visual effects are considered neutral.

Natural Character Effects – **Neutral (0) Effects**

No permanent natural character effects are anticipated as a result of the project. Therefore, the permanent natural character effects are considered neutral.

4.1.3 W3: Huruhuru Road to Cedar Heights Avenue

4.1.3.1 Overview

The project continues northwards along Huruhuru Road between mostly single storey residential dwellings prior to dropping down and crossing Lowtherhurst Reserve and Rarawaru Stream. The reserve in this area largely consists of open grass areas and clusters of shrubs and trees along its edges. The tributary is densely vegetated with a variety of tree and shrub species closely surrounding the watercourse. The project then returns to residential suburbs, ascending for a short duration up Redwood Drive before travelling along Cedar Heights Avenue to the Jarrah Place intersection.

Views towards the project are likely to be afforded for road users and residents along Huruhuru Road, Redwood Road, Cedar Heights Road and Jarrah Place. Recreational viewing audiences within the eastern areas of Lowtherhurst Reserve may also observe the construction works associated with the project from a close distance. Due to the low elevation of the reserve and Rarawaru Stream, it is anticipated that surrounding residents and road users will obtain views towards the construction works. In particular, these viewing audiences include 5 to 10 residential properties, road users along Huruhuru and road users along Lowtherhurst Road to the south east, Triangle Road and SH16 to the west and Redwood Drive and Hanui Place to the north.

The anticipated works include the following:

- Excavation by open trenching and laying of pipeline within the road corridor of Huruhuru Road and Redwood Drive;
- Excavation by open trenching and laying of pipeline within Lowtherhurst Reserve;
- Site establishment and traffic management along the corridor and at each shaft and landing site including in Cedar Heights Avenue;
- Construction of a Break Pressure Chamber (BPC) at approximately 5m long, 2m wide and 4.5m below ground at the corner of Jarrah Place and Cedar Heights Avenue;
- Installation of three standard manholes (400mm access cover) near BPC;
- Other construction activities such as trench spoil removal and site reinstatement;

As noted previously in Section 1, the design is presently at a conceptual level. As the design progresses and further investigations are undertaken, it is understood that a biotrickling filter may be required in the vicinity of Cedar Heights Avenue and Jarrah Place.

If required, this may require the removal of a dwelling in this area to facilitate the formation of a construction yard and contractor facilities, construction of hard standing and parking areas, construction of a service building containing the biotrickling filter, (approximately 35m^2 at 5m wide by 7m long by 5.2m in height), and construction / installation of 500mm diameter ventilation ductwork (buried).

As the requirement for and/or location for this facility in the event it is required is uncertain at present, it has not been included in the designation, and the effects have not been assessed in this Report. However, in the event that the removal of a dwelling is required, mitigation measures may include planting within the property, and the built structures taking the form and appearance of a residential building.

If it is determined that a biotrickling filter is needed, an alteration to the designation will be sought in the future, and the effects on the environment will need to be assessed at that time.

4.1.3.2 Construction Phase

Duration

The expected duration of the trenching activities is approximately 2-5 months. The expected duration of construction activities at each of the microtunnel pit sites is approximately 4-5 months. The expected duration of works for the BPC

and works within No 30 Cedar Heights Avenue, including the biotrickling filter, is approximately 4-5 months.

Natural Character, Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Removal and pruning a number of trees and vegetation within Lowtherhurst Reserve;
- Visibility of the excavation and laying of pipeline along Huruhuru Road, Lowtherhurst Reserve and Cedar Heights Avenue;
- Visibility of the excavation and construction of the BPC at the corner of Jarrah Place and Cedar Heights Avenue;
- Visibility of manholes in road reserve;
- Vehicle movements associated with construction activity;
- Works within and around Rarawaru Stream.

Level of Temporary Effects

Landscape Effects - **Low (-2) Adverse Effects**

These effects are as a consequence of the disturbance to Rarawaru Stream and the removal of vegetation and trees within Lowtherhurst Reserve within the path of open trenching and pipeline installation.

Visual Amenity Effects - **Low (-2) Adverse Effects**

It is anticipated that views towards construction works within the road corridor would primarily be from road users and residents along Huruhuru Road, Redwood Drive, and Cedar Heights Avenue. The works within road corridors, from time to time can be generally expected and are temporary, and experienced for a limited duration. In addition, views into Lowtherhurst Reserve are restricted by perimeter vegetation and audiences within the reserve are low in number.

Natural Character Effects - **Low (-2) Adverse Effects**

The natural elements of the coastal environment consist of Rarawaru Stream and its vegetated embankments which have some degree of perceived naturalness. The designation corridor includes a section of the stream and the vegetated embankments which will be affected by the works, resulting in the loss of some vegetation and disturbance to the waterway. The temporary natural character effects are considered low as the affected area is limited and temporary in nature within a modified part of the coastal environment.

4.1.3.3 Operation Phase

Following construction the permanent visible features that will remain will be:

- Manholes to access the BPC at the corner of Jarrah Place and Cedar Heights Avenue;

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the natural character landscape and visual amenity effects would be:

Landscape Effects – **Very Low (-1) Effects**

In is anticipated that vegetation removed within Lowtherhurst Reserve would be replanted, and over time, return to its previous condition.

Visual Amenity Effects – **Very Low (-1) Adverse Effects**

The establishment of replacement vegetation within Lowtherhurst Reserve is likely to return the existing view to its original condition. In addition, the anticipated permanent visible features within the road corridor are similar in character to typical elements expected within these areas.

Natural Character Effects – **Neutral (0) Effects**

The revegetation and mitigation to the stream embankments and absence of any visible built structures would allow the natural character to return to its previous condition once vegetation has become established.

4.1.4 W4: Cedar Heights Avenue to Holmes Reserve

4.1.4.1 Overview

This section of the project is constructed using trenchless technologies. From the Jarrah place intersection, the project continues beneath Cedar Heights Avenue to Makora Park. The project then continues to travel beneath the Waitakere Badminton Centre land at No. 163 Royal Road before crossing Royal Road, traversing under private property and Holmes Drive South before arriving in Holmes Reserve.

Cedar Heights Avenue is occupied by low density residential dwellings offset from grass berms either side of the road leading into Makora Park. The park itself features open grass areas for informal recreation. A small pathway follows the project as it negotiates its way along the eastern boundary through a narrow belt of trees before continuing along the eastern edge of the Waitakere Badminton Centre land, which consists of a large recreational building surrounded by car parking. Holmes Reserve sits between the residential properties along Moire Road and Holmes Drive South. The reserve is heavily vegetated with a small open grass area along Holmes Drive South. The reserve is accessed from Holmes Drive South, Luxor Place and Glenbury Place however access in the past has been restricted and no defined walking trails exist through the reserve.

Viewing audiences are likely to include residents and road users along Cedar Heights Avenue, Royal Road, Moire Road, Holmes Drive South and residents overlooking Holmes Reserve.

The anticipated works include the following:

- Site establishment and traffic management at each temporary shaft, including in Cedar Heights Avenue, Makora Park, the open grassed area at the corner of Royal Road and Moire Road as well as at Holmes Drive Reserve;
- Removal of isolated areas of road pavement, driveways and grass areas;
- Construction of hard standing and parking areas in Makora Park and Holmes Reserve;
- Excavation and construction of a drop structure within grass area between Royal Road and Moire Road;
- Construction of a biofilter (bark bed totalling approximately 275m^2 and fan room, 20m^2 with 4m eave height) within grass area between Royal Road and Moire Road;
- Installation of 500mm diameter ductwork (buried);
- Installation of manhole cover over drop structure (to sit flush with surrounding ground level);
- Surface reinstatement such as roads, driveways and grass areas.

4.1.4.2 Construction Phase

Duration

The expected duration of construction activities at each of the microtunnel pit sites with the inclusion of the biofilter is approximately 4-5 months.

Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Removal of grass areas within Makora Park, the open grassed area at the corner of Royal Road and Moire Road as well as at Holmes Reserve;
- Visibility of biofilter. Specifically, this includes a bark bed, 275m^2 with timber edge approximately 300mm in height and a fan room,20m^2 with 4m eave height;
- Visibility of earthworks and installation of 500mm diameter ductwork; Visibility of working areas at shaft sites;
- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects - **Low (-2) Adverse Effects**

It is not anticipated that works within Cedar Heights Avenue would generate any landscape effects, however construction works within Makora Park, the corner of Royal Road and Moire Road as well as at Holmes Reserve will require removal of grass areas (largely for temporary site access), nevertheless the overall level of temporary effects is considered low.

Visual Amenity Effects – **Low (-2) to Moderate (-3) Adverse Effects**

It is anticipated that views towards construction works within the road corridor would primarily be from road users and residents along Cedar Heights Avenue and therefore visual effects are considered to be low. Areas of the project, located within reserves or grass areas are generally contained by low lying areas or adjacent residential properties. Although residents in the immediate area will be impacted, a small number would be affected and therefore the level of visual effects is considered to be low to moderate given their close proximity.

4.1.4.3 Operation Phase

Following construction the permanent visible features that will remain will be:

- Manhole cover which sits over the drop structure. The manhole cover will be located within the grass area between Royal and Moire Road and sit flush with surrounding ground level. During maintenance periods a 3x2m cage and portable crane will be present;
- Visibility of cage above drop structure during maintenance;
- Permanent 3.5m wide all-weather access with turning circle or reverse to turn;
- Visibility of biofilter(s) with associated fan room.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the landscape and visual amenity effects would be:

Landscape Effects –**Low (-2) Adverse Effects**

There would be some low landscape effects resulting from the inclusion of some permanent features including a manhole cover, biofilter and fan room as well as the all-weather road access.

Visual Amenity Effects –**Low (-2) Adverse Effects**

Permanent visible features within the road corridor are similar in character to typical elements expected within these areas, however the addition of a biofilter and manhole cover with cage (present during ongoing maintenance periods), and permanent all-weather road access within the grass road reserve area will result in a change to the pre-existing condition. Overall, the manhole cover and access road, sitting at grade within the grass area, and the biofilter sensitively located would not be visually intrusive within this roadside environment. The level of effect given is therefore low.

4.1.5 W5: Holmes Reserve to Holmes Drive

4.1.5.1 Overview

The designation corridor remains within Holmes Reserve and emerges at property No 15 Berkshire Terrace. The project continues through the residential streets of Ruze Vida Drive and Jaedwyn Drive before extending into Lendich Reserve via trenchless technologies.

The reserve contains a small playground community basketball facility surrounded by an open grassed area. Also existing in the reserve is a stormwater pond encircled by vegetation occupying the southern area of the park. This vegetation offers some screening from the adjacent residential properties.

The project then exits the reserve via trenched technology, and gently ascends the suburban road before intersecting with No's 33 and 35 Jaedwyn Drive. A small stream, proposed to be crossed via pipe bridge, runs within the boundary of Manutewhau Reserve which is located between Jaedwyn Drive, Holmes Drive, Oriel Avenue and Cecil Beatt Place. The stream is heavily vegetated with a variety of native and exotic trees. The stream and associated vegetation is overlooked by the neighbouring residential properties. A walkway from Oriel Avenue to Holmes Drive meanders along the northern edge of the Manutewhau Reserve between the stream and residential properties of Oreil Avenue. After crossing the Stream the project continues, via trenched technology, for a short section before returning to trenchless technology along Holmes Drive.

The anticipated works include the following:

- Site establishment and traffic management at each shaft and landing site including Holmes Reserve, property at No 15 Berkshire Terrace, and properties at Ruze Vida Drive, Jaedwyn Drive, Manutewhau Reserve and Holmes Drive;
- Formation of a construction yard and contractor facilities at No's 33 and 35 Jaedwyn Drive;
- Removal of isolated areas of road pavement, driveways and potentially playground equipment and vegetation clearance;
- Removal of properties at Jadewynn Drive, and Berkshire Terrace;
- Construction of hard standing and parking areas in No 15 Berkshire Terrace, Manutewhau Reserve, and No's 33 and 35 Jaedwyn Drive;
- Construction of a pipe bridge;
- Installation of standard manhole (400mm access cover) in Lendich Reserve;
- Excavation by open trenching and laying of pipeline within the road corridor Jaedwyn Drive and No's 33 and 35 Jaedwyn Drive;
- Surface reinstatement such as roads, driveways and grass areas.

4.1.5.2 Construction Phase

Duration

The expected duration of the works in this area is as follows:

- Approx. 4-5 months at each of the microtunnel pit sites;
- Approx. 5 months for the construction of the pipe bridge;
- Approx. 2 months for trenching activities.

Natural Character, Landscape and Visual Changes

The natural character, landscape and visual effects resulting from construction will be:

- Pruning and removal of vegetation in properties 33 and 35 Jaedwyn Drive and Manutewhau Reserve;
- Visibility of working areas along designation corridor and at temporary shaft sites;
- Presence of pipe bridge crossing Manutewhau Creek;
- Removal of properties located at No15 Berkshire Terrace, and No's 33 and 35 Jaedwyn Drive;
- Presence of crane at No's 33 and 35 Jaedwyn Drive during construction phase for construction of pipe bridge;
- Erection of temporary fencing to screen construction activities;
- Vehicle movements associated with construction activity;
- Pipe works within the vicinity of the watercourse in Manutewhau Reserve.

Level of Temporary Effects

Landscape Effects - **Moderate (-3) Adverse Effects**

Construction works within No 15 Berkshire Terrace and Manutewhau Reserve, with relation to the pipe bridge, will result in the removal of a sizeable area of vegetation therefore the overall level of temporary effects is considered moderate.

Visual Amenity Effects - **High (-4) Adverse Effects**

It is anticipated that views of the construction works are afforded by surrounding residents of the designation boundary. Predominant visual effects would be on the neighbouring properties of No 15 Berkshire Terrace, and No's 33 and 35 Jaedwyn Drive where vegetation and house removal as well as the presence of construction activities would be in close proximity. It is also anticipated that for the construction of the pipe bridge a crane and contractor facilities would be present at 33 and 35 Jaedwyn Drive during construction which would result in temporary adverse visual effects to surrounding residents. In addition to these areas, construction works within Manutewhau Reserve, where the pipe bridge is proposed to be located, would require the clearance of vegetation including screening trees, and therefore the temporary effect will be prominent. Therefore, the level of visual effects is considered to be high particularly from residents in close proximity to the works.

Natural Character Effects - **Moderate (-3) Adverse Effects**

The natural elements of the environment consist of a small stream and vegetation within Manutewhau Reserve which have some degree of perceived naturalness. The designation corridor includes a section of the stream and vegetated embankments which will be affected by the works. This will include the loss of some vegetation and disturbance to the waterway during

construction and installation of the pipe bridge. The temporary natural character effects are considered moderate as the affected area is limited and temporary in nature.

4.1.5.3 Operation Phase

Following construction the permanent visible features that will remain will be:

- Presence of permanent standard manhole (400mm access cover) in Lendich Reserve;
- Pipe bridge from 33 and 35 Jaedwyn Drive to Holmes Drive;
- Vacated lots at No 15 Berkshire Terrace, and No's 33 and 35 Jaedwyn Drive.

It is not yet determined what the end use of the vacated lots (No 15 Berkshire Terrace, and No's 33 and 35 Jaedwyn Drive) will be. Therefore, these have been assessed as worst case scenario. If vacated lots were redeveloped into open space, some beneficial landscape and visual effects would be anticipated.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the natural character, landscape and visual amenity effects would be:

Landscape Effects – **Low (-2) Adverse Effects**

The removal and subsequent replanting and establishment of vegetation within No 15 Berkshire Terrace and Lendich Reserve would return the areas to their previous condition. However due to the pipe bridge within Manutewhau Reserve, limited vegetation setback for maintenance would result in the permanent loss of vegetation. Therefore, the level of permanent landscape effects is low.

Visual Amenity Effects – **Low (-2) Adverse Effects**

The key permanent visual change would be the presence of a pipe bridge as well as the removal of No 15 Berkshire Terrace, and No's 33 and 35 Jaedwyn Drive resulting in the absence of residential dwellings in these lots. The pipe bridge, crossing Manutewhau Creek, would visually bisect the vegetated corridor and therefore appear more visually prominent; however, with appropriate design and revegetation to the area including good canopy tree species, the bridge would not be visually dominant or intrusive. The absence of residential dwellings may provide some benefits to the surrounding residents through additional open space. The level of effect given is therefore low.

Natural Character Effects – **Low (-2) to Moderate (-3) Adverse Effects**

The revegetation and mitigation to the stream embankments will reduce the level of permanent effects, however the presence of the pipe bridge bisecting this environment will have a permanent effect on the natural character. Therefore, the permanent natural character effects are considered low to moderate.

4.1.6 W6: Holmes Drive to Hobsonville Road

4.1.6.1 Overview

The project continues northwards along Holmes Drive via trenchless and trenched technologies before passing under Oriel Avenue and into St. Margaret's Park. The park features two generous recreational areas linked by a tree lined corridor abutted by residential properties. The park is visited by viewing audiences likely to be engaging in formal and informal recreation activities.

As the project exits the northern end of the park via trenchless technology, it passes under the residential dwellings at No 40 Oriel Avenue, No's 10-14, 16 and 18 Peterhouse Place, No's 10, 12, 17 and 19 Magdalen Place, No's 29, 31 and 33 Hobsonville Road before reaching its connection point and termination of this phase north of Hobsonville Road.

The anticipated works include the following:

- Site establishment including contractor facilities and traffic management at each shaft and landing site including Holmes Drive and St. Margaret's Park;
- Permanent shaft in St. Margaret's Park;
- Construction of permanent 3.5m wide all-weather access with turning circle or reverse to turn;
- Removal of isolated areas of road pavement, driveways and vegetation clearance;
- Construction of hard standing and parking areas;
- Visibility of biofilter. Specifically, this includes a bark bed, 165m^2 with timber edge approximately 300mm in height and a fan room, 20m^2 with 4m eave height;
- Excavation by open trenching and laying of pipeline within the road corridor of Holmes Drive;
- Surface reinstatement such as roads, driveways and grass areas.

4.1.6.2 Construction Phase

Duration

The expected duration of the works in this area is as follows:

- Approx. 4-5 months at each of the microtunnel pit sites;
- Approx. 2-3 months for trenching activities.

Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Pruning and removal of vegetation in St. Margaret's Park;
- Visibility of working areas along designation corridor and at shaft sites;
- Construction of biofilter;

- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects - **Low (-2) Adverse Effects**

Construction works within St. Margaret's Park will result in the removal of some existing grass areas and vegetation. Up to 24 trees may be affected to a low degree by construction works, which will primarily involve minor pruning and works within the dripline of the tree. The overall level of temporary effects is considered low.

Visual Amenity Effects - **Low (-2) Adverse Effects**

It is anticipated that views towards construction works within the road corridor would primarily be from road users and residents along Holmes Drive which are considered to be low given works within road corridors from time to time can be generally expected. In addition, views into St. Margaret's Park are restricted by perimeter vegetation and audiences within the reserve are limited in number, therefore the visual effects are also considered to be low.

4.1.6.3 Operation Phase

Following construction the permanent visible features that will remain will be:

- Permanent standard manhole (400mm access cover) in St. Margaret's Park.
- Permanent 3.5m wide all-weather access with turning circle or reverse to turn;
- Visibility of biofilter with fan room.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the landscape and visual amenity effects would be:

Landscape Effects – **Low (-2) Adverse Effects**

The removal and subsequent replanting and establishment of vegetation and grass areas within St. Margaret's Park would change the pre-existing condition of the park to a low degree, due to the permanent establishment of the manhole cover, biofilter and all-weather access road.

Visual Amenity Effects – **Low (-2) Adverse Effects**

Permanent visible features within the road corridor are similar in character to typical elements expected within these areas, however the addition of a biofilter and manhole cover and permanent all-weather road access within the park will result in a change to the pre-existing condition. Overall, the manhole cover and access road will sit at grade within the grass and the biofilter will be sensitively located within this roadside environment. The level of effect given is therefore low.

4.2 Notice of Requirement Northern Interceptor (North Shore)

NoR: NI (North Shore) comprises of the transfer of wastewater flows via pipeline from the eastern abutment of the Greenhithe Bridge to the Rosedale WWTP. Pump Stations and associated structures in addition to new pipeline corridors will also be constructed. Construction is planned to respond to growth in the area and will be staged.

The project commences at the eastern abutment of the Greenhithe Bridge (outside of the CMA) continuing northwards for a short distance along SH18 Upper Harbour Highway before passing through suburban streets and a number of reserves, notably Wainoni Park and NSMP. The project continues through the NSGC, and then eastwards over Albany Highway eventually terminating at the Rosedale WWTP (**refer Figure 3**).

The extent of each of the below sections is illustrated in Figure 3.

4.2.1 N1: The Eastern Abutment of the Greenhithe Bridge to Collins Park

4.2.1.1 Overview

It is anticipated that the project will surface at the Eastern Abutment of the Greenhithe Bridge, within the property boundary of No 15 The Knoll, after passing through the Knoll Reserve occupying the adjacent embankment. The construction methodology would be either a trenching or trenchless method near the eastern abutment of the Greenhithe Bridge and into a BPC. Therefore, the project occupies a broad area to allow design and construction flexibility which will not be finalised until a later date closer to construction. The area is adjacent to the SH18 Upper Harbour Highway (SH18), the Waitemata Harbour, and within a recently cleared embankment. To the east of the embankment, residential properties of The Knoll sit amongst lots with mature native vegetation including the Significant Ecological Area (SEA), SEA_T_8319, which indicates that the landscape is of high ecological quality and high sensitivity.

The project continues eastwards via trenchless technology, aligned to the SH18 carriageway before continuing north along the residential street of Tauhinu Road. Approximately 750m along the road, the project then moves east, beneath residential properties of Tauhinu Road, Shiloh Way, and Greenhithe Road before reaching Collins Park.

Residents at No's 6 and 8 Tauhinu Road, No's 4, 4a, 6, 6A, 8 and 8A Shiloh Way, No's 5B, 7B, 11B and 13B Greenhithe Road are within the designation corridor, and are therefore likely to have some visibility of the future works.

The anticipated works include the following:

- Site establishment and traffic management at each temporary shaft and landing site including The Knoll and Tauhinu Road;
- Excavation by open trenching and laying of pipeline within the property No 15 The Knoll;

- Construction of a break pressure chamber at approximately 9m long, 4m wide and 7m below ground at No 15 The Knoll;
- Construction of a biotrickling filter and activated carbon unit at break pressure chamber (70m², 10m x 7m at 5.2m in height) within No 15 The Knoll;
- Installation of 675mm diameter ductwork (buried);
- Installation of three standard manholes (400mm access cover) near BPC;
- Removal of isolated areas of road pavement, driveways and vegetation clearance;
- Construction of hard standing and parking areas;
- Surface reinstatement such as roads, driveways and grass areas.

4.2.1.2 Construction Phase

Duration

The expected duration of the works for the construction of the break pressure chamber, ductwork and biofilter is approximately 6-8months. The expected duration of works at each of the microtunnel pits is approximately 4-6 months.

Natural Character, Landscape and Visual Changes

The natural character, landscape and visual effects resulting from construction will be:

- Pruning and removal of vegetation in The Knoll reserve and No 15 The Knoll;
- Visibility of working areas along designation corridor and at shaft sites including the BPC;
- Visibility of biotrickling filter and fan room 20m^2 x 4m eave height.
- Visibility of earthworks and installation of 675mm diameter ductwork;
- Vehicle movements associated with construction activity;
- Activity within the coastal environment.

Level of Temporary Effects

Landscape Effects - **Moderate (-3) Adverse Effects**

Construction works will not take place within the CMA, however, construction within The Knoll reserve and private property No 15 The Knoll will affect an area of existing vegetation and trees within an SEA area. It is anticipated that a 10m wide band of vegetation would be removed (across approximately 100m) in the reserve and property from the foreshore to the BPC and biotrickling filter. It is noted that large areas of vegetation have recently been removed from the property during construction of a residential dwelling with no certainty as to future replanting. The overall level of temporary effects is considered moderate.

It is not considered that any landscape effects will exist along Tauhinu Road or within properties of Tauhinu Road, Shiloh Way, and Greenhithe Road.

Visual Amenity Effects – **Moderate (-3) Adverse Effects**

It is anticipated that views towards works within the road corridor would primarily be from road users and residents along Tauhinu Road. The effects are considered to be low given construction works within road corridors from time to time can be generally expected. However, vegetation clearance will increase the degree of views into 15 The Knoll. Therefore, views are anticipated from SH18 and private properties of the Knoll as well as Austin Road and Remu Place in close proximity to the works. Because of this highly visible area and the viewing audience being in close proximity to prominent visible works and vegetation removal, the visual effects are considered moderate.

Natural Character Effects - **Moderate (-3) Adverse Effects**

The natural character of the environment consists of the upper Waitemata Harbour and the vegetated harbour embankments. The works will result in the loss of some vegetation within The Knoll reserve and No 15 The Knoll. Although a moderate effect on the natural character is considered, these effects are predominantly temporary in nature and affecting a limited area of vegetation.

4.2.1.3 Operation Phase

Following construction the permanent visible features that will remain will be:

- Manholes to access BPC within property 15 The Knoll;
- Visibility of biotrickling filter and fan room;
- Visibility of permanent 3.5m wide all-weather access with turning circle or reverse to turn (note most of this access already exists, providing access to 15 The Knoll).

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5** (including mitigation measures relating to construction in close proximity to the CMA), it is considered that the natural character, landscape and visual amenity effects would be:

Landscape Effects – **Low (-2) Adverse Effects**

The removal and subsequent replanting and establishment of vegetation within 15 The Knoll, both along the pipeline corridor and above the BPC would greatly reduce the permanent landscape effects. Although there would remain some isolated unvegetated areas, including manhole cover locations and biotrickling filter, and fan room location, the permanent level of landscape effects is considered low.

Visual Amenity Effects –**Low (-2) Adverse Effects**

The revegetation along disturbed areas along the pipeline corridor and above the BPC within No 15 The Knoll in addition to the existing screening vegetation along SH18 would result in limited visual change. However, the inclusion of a 70m^2 biotrickling filter and fan room will form a noticeable change to surrounding residents of 15 The Knoll. Permanent visible features within the road corridor along Tauhinu Road are also similar in character to typical elements expected within these areas.

Natural Character Effects – **Very low (-1) Adverse Effects**

The revegetation of the reserve and private property will reduce the level of permanent effects however the presence of manhole covers over the BPC and the presence of a biotrickling filter will still have a very low permanent effect on the natural character.

4.2.2 N2: Collins Park to Wainoni Park

4.2.2.1 Overview

This section of the project includes the works between Collins Park and the south western portion of Wainoni Park. Two shaft sites are located in the park for conducting trenchless pipe installation. The project then exits the park and continues eastwards through a vegetated gully and beneath the residential properties No's 23, 25, 27, 27, 29A, and No 62 Greenhithe Road. The project continues under Greenhithe Road between residential properties either side of the road as well as Greenhithe School before continuing beneath No's 2 and 4 Churchouse Road and entering Wainoni Park where a temporary shaft is proposed. The project extends to Greenhithe Road to accommodate site access and the landing site. The project then continues further into Wainoni Park via trenchless technology.

Collins Park is surrounded by residential properties on its southern, eastern, and western sides with Greenhithe Road to the north. The park consists of level open grass areas and semi-mature trees scattered around the edge. A Lions Club, playground, youth facility, and public toilets also occupy the northern and western areas of the park.

Recreational and residential viewing audiences are present at Collins Park and Wainoni Park. Recreational viewing audiences are likely to be engaging in activities including dog walking, cricket and informal recreation. Road users along Greenhithe and Churchouse Road are also within the view catchment.

The anticipated works include the following:

- Site establishment at each temporary shaft and landing site including Collins Park and Wainoni Park;
- Construction of hard standing and parking areas;
- Construction of permanent site access via gravel driveway from Greenhithe Road;
- Construction of a drop structure in Collins Park;

- Construction of a biotrickling filter and activated carbon unit area 60m² (6m x 10m by 5.2m in height) in Collins Park and fan room 20m² x 4m eave height;
- Surface reinstatement such as roads, driveways and grass areas.

4.2.2.2 Construction Phase

Duration

The expected duration of the works for construction at each of the microtunnel pits including the biotrickling filter is between approximately 3-4 and 6-8 months, depending on location.

Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Removal of grass areas in Collins and Wainoni Park;
- Visibility of working areas along designation corridor and at shaft sites;
- Visibility of drop structure in Collins Park;
- Visibility of biotrickling filter and fan room;
- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects – **Very Low (-1) Adverse Effects**

Construction works within Collins Park and Wainoni Park will only likely involve the removal of grass areas, therefore temporary landscape effects are considered very low.

Visual Amenity Effects – **Moderate (-3) Adverse Effects**

It is anticipated that construction works including increased vehicle movements in close proximity to existing residents within Collins Park and Wainoni Park will be quite visible from a number of locations and viewing audiences including park users and residents. The visual presence of machinery in the park are considered to be temporary elements, visible for a limited duration. However, this combined with the construction of the biotrickling filter, in Collins Park will result in temporary adverse visual effects which are considered moderate.

4.2.2.3 Operation Phase

Following construction the permanent visible features that will remain will be:

- Manhole cover which sits over the drop structure. The manhole cover will be located within the eastern most portion Collins Park and sit flush with the surrounding ground level. During maintenance periods a 3x2m cage and portable crane will be present;
- Visibility of permanent 3.5m wide all-weather access with turning circle or reverse to turn;
- Visibility of biotrickling filter and fan room.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the landscape and visual amenity effects would be:

Landscape Effects –**Low (-2) Adverse Effects**

The removal and subsequent reinstatement of grass areas within Collins Park and Wainoni Park greatly reduce the permanent landscape effects following the temporary works. However, as reseeding of grass cannot take place where the proposed manhole cover, biotrickling filter, fan room, and all-weather access road are located, grass loss in these areas is considered to be a low permanent effect.

Visual Amenity Effects – **Low (-2) Adverse Effects**

A permanent manhole cover, over the drop structure, biotrickling filter, fan room and all-weather access road within the grass area of Collins Park will bring a noticeable visual change. However, these elements are generally located along the edges of the park and are therefore less visually prominent from users within the park. Base on this, the level of effect is low.

4.2.3 N3: South Wainoni Park

4.2.3.1 Overview

Two project areas occur in South Wainoni Park. The first is the continuation of the pipeline corridor via trenchless technology with an access road servicing a shaft towards the south western corner of the park. The second is the area proposed for the construction of a new pump station, located at the south eastern corner of the park entered via Orwell Road.

South Wainoni Park covers over 17ha of park land. Playing fields, paddocks, vegetated streams and shallow gullies feature throughout the park landscape. A wide range of elements and activities within the park include the Greenhithe Pony Club (**GPC**) and the North Shore Dog Training Club (**NSDTC**). Both the GPC and NSDTC are located within the designation boundary. Due to the park's open character, a wide viewing catchment exists, affecting audiences to the south primarily including riders and spectators of the GPC, members and visitors of the NSDTC as well as road users and residents along Orwell Road and Greenhithe Road. Informal sports and recreation activities are also likely to take place in other open spaces within the southern area of the park.

The anticipated works include the following:

- Site establishment at each shaft and landing site within South Wainoni Park;
- Removal of isolated areas of road pavement, driveways, GPC sheds and vegetation clearance;
- Construction of hard standing and parking areas in South Wainoni Park including within areas occupied by GPC and NSDTC;
- Installation of standard manhole (400mm access cover);

- Construction of a Pump Station at approximately 6m high, 7m wide, 15m long and at a depth of 6m below ground level. The pump station will consist of mechanical and electrical equipment such as pumps, valves, pipes, transformer, gantry crane, extraction fans as well as an ancillary above ground structure consisting of facilities, such as a chemical dosing facility, biofilter of approximatley150m^2 bark bed with 40m^2 building for electrical and mechanical equipment including fan room, and a control room. The final design of the external appearance of the Pump station has yet to be fully determined. However, it is anticipated that the primary pump station structure will be rectangular in form and composed of pre-painted longrun steel;
- Access to this pump station would be off Orwell Road;
- Construction of a 6m high, 400mm diameter inlet vent shaft in open grass area near micortunnel pit 11.
- Surface reinstatement such as roads, driveways and grass areas.

4.2.3.2 Construction Phase

Duration

The expected duration of the works for construction at each of the microtunnel pits is between approx. 3-4 and 6-8 months, depending on location. The anticipated duration of construction for the pump station is 1 to 1.5 years.

Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Pruning and removal of vegetation (including grass areas);
- Visibility of working areas along designation corridor and at shaft sites;
- Visibility of pump station working areas;
- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects – **Moderate (-3) Adverse Effects**

Construction works within South Wainoni Park will likely involve the removal of a number of trees and grass areas, therefore temporary landscape effects are considered moderate.

Visual Amenity Effects – **Moderate (-3) Adverse Effects**

It is anticipated that works within South Wainoni Park will be quite visible from a number of locations and viewing audiences including the GPC, NSDTC and residents on Orwell Road (particularly from No's 3, 7, 9 and 11) approximately 50m from the proposed pump station. Additionally, road users and residents along Churchouse Road and Greenhithe Road will experience adverse visual effects relating to the construction of the inlet vent shaft. Because of this, the visual effects are considered moderate.

4.2.3.3 Operation Phase

Following construction the permanent visible features that will remain will be:

- Standard manhole (400mm access cover) in Wainoni Park;
- Pump station with ancillary above ground structures such as chemical dosing facility, biofilter (bark bed with fan room), control room;
- Newly formed driveway providing access to pump station;
- A 6m high, 400mm diameter inlet vent shaft, located adjacent to trees in south east portion of park, near micortunnel pit 11. It is anticipated that visually recessive panels and vegetation would be incorporated around the inlet shaft.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the landscape and visual amenity effects would be:

Landscape Effects –**Low (-2) Adverse Effects**

The removal and subsequent replanting and establishment of vegetation within South Wainoni Park and around the pump station and inlet vent greatly reduces the permanent landscape effects. However, as planting cannot take place where the pump station, manhole or vent are located, vegetation loss in these areas is permanent. Notwithstanding this, the level of landscape effects is considered low.

Visual Amenity Effects – **Low (-2) Adverse Effects**

An appropriately sited and designed pump station, ancillary buildings and inlet vent, fully integrating mitigation measures would result in the permanent features not being visually dominant or intrusive within the presence of existing buildings and structures associated with the GPC and NSDTC. The arrangement and external appearance of the new structures will be designed so rural design elements are incorporated, and vegetation is established to provide screening to sensitive viewing audiences.

4.2.4 N4: North Wainoni Park to North Shore Memorial Park

4.2.4.1 Overview

The project exits South Wainoni Park and enters North Wainoni Park continuing through the park's paddocks, a shallow gully and a playing field via a combination of open trenching and trenchless technology, before terminating at the northern end of North Wainoni Park near the Greenhithe Riding for the Disabled and North Shore Air Gun Club (**NSAGC**). An existing unpaved access road, included in the project area, enters North Wainoni Park from Churchouse Road and follows the park's boundary to the aforementioned facilities. This northern area features fenced paddocks bisected by shelterbelts and is enclosed with boundary vegetation. Wide mangrove embankments around this area then lead down to Te Wharau Creek (CPA 57 – Herald Island to Lucas Creek). Viewing audiences within the park include visitors to the playing fields and neighbouring playground, riders and visitors to Greenhithe Riding for the Disabled and visitors to the NSAGC. Residents within the properties along the

southern and eastern side of Birchwood Grove in North Wainoni Park (particularly those within No. 15 Birchwood Grove due to the property's close proximity to the project), as well as residents across Te Wharau Creek, notably Schopolo Place, Kerema Way, Kittiwake Drive and Rangi Ave are also likely to be included in the view catchment.

The anticipated works include the following:

- Excavation by open trenching and laying of pipeline within North Wainoni Park;
- Site establishment at each shaft including North Wainoni Park and NSMP;
- Removal of isolated areas of vegetation;
- Construction of hard standing and parking areas;
- Construction of a Pump Station at approximately 6m high, 25m wide, 18m long and at a depth of 15m below ground level. The pump station would consist of mechanical and electrical equipment such as pumps, valves, pipes, transformer, gantry crane, extraction fans as well as an ancillary above ground structure consisting of facilities, such as a chemical dosing facility, biofilter bark bed, (fan room incorporated within pump station) and a control room. Access to this pump station would be off Churchouse road along a metal driveway servicing NSAGC and Greenhithe Riding for the Disabled;
- Surface reinstatement such as roads, driveways and grass areas.

4.2.4.2 Construction Phase

Duration

The expected duration of the works for construction at the microtunnel pit is approx. 2-4 months, and the anticipated duration of the pump station is 1 to 2 years. Trenchless construction under Te Wharau Creek (including set up on the landward site of the Creek) will be approx. 9-11 months.

Natural Character, Landscape and Visual Changes

The natural character, landscape and visual effects resulting from construction will be:

- Removal of vegetation and grass areas in North Wainoni Park;
- Removal of grass areas at NSMP shaft site;
- Visibility of working areas along designation corridor and at shaft sites;
- Visibility of the construction of the Pump Station;
- Vehicle movements associated with construction activity;
- Works in association to Te Wharau Creek coastal environment.

Level of Temporary Effects

Landscape Effects – **Moderate (-3) to High (-4) Adverse Effects**

Construction works associated with the pipe line installation and pump station within North Wainoni Park would involve the removal of trees and grass areas. These trees within the designation area consist of species such as English Oak (Querus robur) and Monterey cypress (Cuppressus macrocarpa) and reach a height of approximately 20m. Construction works in the NSMP associated with pipe line installation will likely involve the removal some grass areas. Overall the temporary landscape effects are considered Moderate to High.

Visual Amenity Effects – **Moderate (-3) to High (-4) Adverse Effects**

Trenchless technologies within the park will produce some adverse visual effects due to the presence of work areas. However, the most predominant visual change would result from the removal of screening vegetation and construction activities around the proposed pump station. These changes will be visible from distant residential properties including Schopolo Place, Kerema Way, Kittiwake Drive and Rangi Ave. In addition to these properties, close proximity properties in Birchwood Grove, as well as park facilities including Riding for the Disabled and NSAGC will be impacted. Works within the NSMP will also generate adverse visual effects to sensitive viewing audiences. Therefore, the visual effects are considered moderate to high for close proximity viewing and distant residential viewing audiences.

Natural Character Effects – **Moderate (-3) Adverse Effects**

The natural character of the coastal environment consists of the northern most point of Wainoni Park and the mangrove embankments of Te Wharau Creek. The designation corridor does not enter the CMA however works are proposed within its vicinity and will therefore impact vegetation in the coastal environment. These areas include the vegetation within the northern most point of North Wainoni Park and NSMP which have some degree of perceived naturalness. The temporary natural character effects are considered moderate as the affected area is limited and temporary in nature.

4.2.4.3 Operation Phase

Following construction the permanent visible features that will remain will be:

- Pump station with ancillary above ground structures such as chemical dosing facility, biofilter (bark bed with fan room), and control room.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5** (including mitigation measures relating to construction in close proximity to a watercourse), it is considered that the landscape and visual amenity effects would be:

Landscape Effects –**Moderate (-3) Adverse Effects**

Replanting and establishment of vegetation and grass areas along the pipe line corridor within Wainoni Park and NSMP would reduce the permanent landscape effects. There would be some permanent loss of vegetation which is unable to be replaced, including some mature trees previously existing before the pump station and ancillary structures and therefore the level of landscape effects overall is considered moderate.

Visual Amenity Effects –**Low (-2) to Moderate (-3) Adverse Effects**

The introduction of the pump station and ancillary buildings would bring visual change within the park. Affected viewing audiences in the construction phase would now afford views of the completed buildings within the park landscape. Nevertheless, mitigation measures as outlined in **Section 5**, such as designing the external appearance of the structures to be in harmony with existing built structures such as rural buildings and sheds which currently exist within the park in addition to the establishment of vegetation to provide screening will assist in the pump station not being as visually dominant. Therefore, the level of visual effects is reduced to low to moderate.

Natural Character Effects – **Low (-2) to Moderate (-3) Adverse Effects**

The primary residual effects would result from the presence of the pump station and reduction in vegetation cover. Revegetation where practical around the pump station will slightly reduce the effects on the natural character however the presence of the pump station (amongst other rural buildings currently existing) will form a permanent built feature in the coastal environment. Therefore, the permanent natural character effects are considered low to moderate.

4.2.4.4 Cumulative natural character landscape and visual effects

The cumulative effects generated from the pipeline corridor, pump stations and consented Northern Interceptor Phase 1 works are considered to be moderate. The primary permanent visible structures would be located in the context of existing built structures and the pump stations will be designed to reflect the form and materials of rural buildings. In addition, both pump stations are proposed to be located at a considerable distance (approximately 930m) away from one another, which will enable them to be partially obscured by existing and proposed vegetation.

4.2.5 N5: North Shore Memorial Park to Schnapper Rock Road

4.2.5.1 Overview

The project traverses the coastal edge of the NSMP via trenched construction methods and extends within the park towards Schnapper Rock Road. The project typically follows the road and pathway design of the NSMP's proposed development (which would be in place by the time construction associated with the project occurs) before aligning to the park's existing internal roads.

The NSMP is a memorial park abutting Te Wharau to the south, Lucas Creek to the west, NSGC to the north, and the residential suburbs of Schnapper Rock to the east. Situated in manicured grounds, the park consists of open grassed areas, shallow vegetated gullies, a pond and gardens nearby burial plots. The project continues via open trench methods and exits the NSMP onto Schnapper Rock Road before continuing north.

Viewing audiences within this area are typically associated with those visiting the NSMP, who would most likely be visiting the cemetery with an expectation of tranquillity. There would also be viewing audiences associated with

Schnapper Rock Road, and these are likely to include passing motorists, pedestrians and residents within the nearby dwellings.

The anticipated works include the following:

- Excavation by open trenching and laying of pipeline within NSMP;
- Pipe installation via trenchless technology;
- Removal of isolated areas of vegetation within NSMP;
- Construction of hard standing and parking areas;
- Surface reinstatement such as roads, driveways and grass areas.

4.2.5.2 Construction Phase

Duration

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

Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Removal of vegetation in NSMP;
- Visibility of working areas along designation corridor and at shaft sites;
- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects – **Low (-2) Adverse Effects**

Construction works within NSMP will likely involve the removal of a small number of trees and grass areas, therefore temporary landscape effects are considered low.

Visual Amenity Effects – **Moderate (-3) Adverse Effects**

It is anticipated that views towards construction works within NSMP will be visible from visitors to the park as well as some residents along the southern and eastern edges of Schnapper Rock Road. Because this method of pipe installation is particularly visible and is in the presence of sensitive viewing audiences the temporary visual effects is considered moderate.

4.2.5.3 Operation Phase

Following construction, no permanent visible features will remain.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the landscape and visual amenity effects would be:

Landscape Effects – **Neutral (0) Effects**

The removal and subsequent replanting and establishment of vegetation and reinstatement of grass areas NSMP greatly reduce the permanent landscape effects. The level of landscape effects is considered neutral as the landscape would be returned to a similar condition prior to construction.

Visual Amenity Effects – **Neutral (0) Effects**

No permanent visual features will remain after construction. In addition, re-established replacement planting overtime will return the site to a similar condition. It is therefore considered that the level of effect is neutral given the visual amenity would be returned to its condition prior to construction.

4.2.1 N6: Schnapper Rock Road to North Shore Golf Course

4.2.1.1 Overview

After leaving the NSMP, the project continues along Schnapper Rock Road via open trench construction, and into Wharepapa Reserve before passing under a tributary of Lucas Creek via trenchless technology, and entering the NSGC. The project then returns to open trench construction.

Schnapper Rock Road abuts the NSMP's eastern boundary, and features residential dwellings along its eastern side, with a number of recently constructed dwellings at the northern end of the road, close to its terminus at Wharepapa Reserve. The Wharepapa Reserve features a small grassed area and playground surrounded by mature trees. The Reserve is understood to be used by local residents, in particular dog walkers.

The anticipated works include the following:

- Excavation by open trenching and laying of pipeline along Schnapper Rock Road and Wharepapa Reserve;
- Site establishment at each shaft and landing site including Wharepapa Reserve and NSGC;
- Removal of isolated areas of vegetation in Wharepapa Reserve;
- Construction of hard standing and parking areas;
- Pipe installation by trenchless technology;
- Surface reinstatement such as roads, driveways and grass areas;

4.2.1.2 Construction Phase

Duration

Once within the NSGC, the concept design indicates that the pipeline will be installed by trenched construction. The expected duration of these works is approximately 2-5 months for trenching, and 5-6 months for trenchless installation of the pipeline.

Natural Character, Landscape and Visual Changes

The natural character, landscape and visual effects resulting from construction will be:

- Pruning and removal of vegetation in Wharepapa Reserve;
- Visibility of working areas along designation corridor;
- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects – **Low (-2) Adverse Effects**

Construction works along Schnapper Rock Road, Wharepapa Reserve and NSGC will likely involve the removal of a small number of trees and grass areas, therefore temporary landscape effects are considered low.

Visual Amenity Effects – **Moderate (-3) Adverse Effects**

It is anticipated that views towards works along Schnapper Rock Road will be from residents along the road, visitors to the NSMP, Wharepapa Reserve and visitors to NSGC. This method of works will be particularly visible however some of viewing audiences will be experiencing visual impacts towards locations within the road corridor were works are an anticipated activity. However, visitors in Wharepapa Reserve and NSGC will be impacted in areas where works are not anticipated and therefore audiences are likely to be more sensitive. Therefore, the level of visual effects is considered moderate.

Natural Character Effects – **Low (-2) Adverse Effects**

The natural elements of the coastal environment consists, of a tributary of Lucas Creek and the associated vegetated embankments and open space which have some degree of perceived naturalness. The designation corridor does not bisect the CMA however works do occur within the coastal environment which include Wharepapa Reserve and NSGC. It is anticipated that some vegetation removal will occur in this area. The temporary natural character effects are considered low as the affected area is limited and temporary in nature.

4.2.1.3 Operation Phase

Following construction, no permanent visible features will remain.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the natural character, landscape and visual amenity effects would be:

Landscape Effects – **Neutral (0) Effects**

The removal and subsequent replanting and establishment of vegetation in Wharepapa Reserve will greatly reduce the permanent landscape effects. The level of landscape effects is considered neutral as the landscape would be returned to a similar condition prior to construction.

Visual Amenity Effects – **Neutral (0) Effects**

No permanent visual features will remain after construction. In addition, re-established replacement planting overtime will return the site to a similar condition. It is therefore considered that the level of effect is neutral given the visual amenity would be returned to its condition prior to construction.

Natural Character Effects – **Neutral (0) Effects**

No permanent natural character effects are anticipated as a result of the project. Therefore, the permanent natural character effects are considered neutral.

4.2.2 N7: North Shore Golf Course to Appleby Road

4.2.2.1 Overview

The NSGC consists of a manicured 27 hole golf course featuring elements typically associated with golfing activities including, greens, sand bunkers, fairways, tees and vegetation between the fairways. The golf course is bounded by residential suburbs to the south and east, the Kristin School campus to the north and Lucas Creek to the west. The project passes through the NSGC grounds, including the clubhouse car park and golf course driveway via open trenching, before connecting to Appleby Road. The likely viewing audiences typically comprise visitors and patrons of the NSGC. Residents within the properties situated along the northern side of Laurel Oak Drive, and western side of English Oak Drive and St Andrews Way are also likely to be afforded views towards the project.

The anticipated works include the following:

- Excavation by open trenching and laying of pipeline within NSGC and Appleby Road;
- Traffic management;
- Removal of isolated areas of vegetation and grass areas;
- Removal of an area of car park;
- Construction of hard standing and parking areas;
- Surface reinstatement such as roads, driveways and grass areas.

4.2.2.2 Construction Phase

Duration

The concept design indicates that a gully along the private access road may require widening to allow the construction of the pipeline alongside an existing pipeline in this location. The expected duration of these works is approximately 2-5 months.

Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Pruning and removal of vegetation including grass areas in NSGC;
- Visibility of working areas along designation corridor;
- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects – **Low (-2) Adverse Effects**

Construction works within NSGC will likely involve the removal of a small number of trees along the NSGC driveway and grass areas within the grounds of the golf course, therefore temporary landscape effects are considered low.

Visual Amenity Effects – **Moderate (-3) Adverse Effects**

It is anticipated that works within NSGC and along Appleby Road will be visible from visitors to the golf course as well as some residents along Laurel Drive, English Oak Drive, St Andrews Way and Appleby Road as well as visitors and students of Albany Junior High School. Because this method of pipe installation will be particularly visible and is in the presence of sensitive viewing audiences the temporary visual effects is considered moderate.

4.2.2.3 Operation Phase

Following construction, no permanent visible features will remain.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the landscape and visual amenity effects would be:

Landscape Effects – **Neutral (0) Effects**

The removal and subsequent replanting and establishment of vegetation and reinstatement of grass areas within the NSGC will greatly reduce the permanent landscape effects. The establishment of replacement planting overtime returning the landscape to a similar condition, therefore the level of landscape effects is considered neutral.

Visual Amenity Effects – **Neutral (0) Effects**

No permanent visual features will remain after construction. In addition, re-established replacement planting overtime will return the site to a similar condition. It is therefore considered that the level of effect is neutral given the visual amenity would be returned to its condition prior to construction.

4.2.3 N8: Appleby Road to William Pickering Drive

4.2.3.1 Overview

The project travels along Appleby Road via open trenching, past residential dwellings (along its northern flanks) and Albany Junior High School (to the south) before turning northwards along the Albany Highway and passing in front of six residential properties. After a short distance, the project bisects No. 14 John Glenn Avenue and travels along an industrial area before reaching William Pickering Drive. The potential viewing audiences associated with this section of the project includes local residents, road users and school visitors (particularly along Appleby Road and Albany Highway) and similarly road users and construction workers / future employees and customers associated with the developing industrial area along John Glenn Avenue.

The anticipated works include the following:

- Excavation by open trenching and laying of pipeline along Appleby Road, Albany Highway, 14 John Glenn Avenue, John Glenn Avenue and William Pickering drive;
- Traffic management;
- Construction of hard standing and parking areas;
- Surface reinstatement such as roads, driveways.

4.2.3.2 Construction Phase

Duration

The concept design indicates that a gully along the private access road may require widening to allow the construction of the pipeline alongside an existing pipeline in this location. The expected duration of these works is approximately 2-5 months.

Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Visibility of working areas along designation corridor and at shaft sites;
- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects – **Neutral (-0) Effects**

No trees or vegetation are anticipated to be affected in relation to the project, therefore the temporary landscape effects are considered neutral.

Visual Amenity Effects – **Low (-2) Adverse Effects**

It is anticipated that works will be visible from road users, residents and industry business owners along Appleby Road, Albany Highway, 14 John Glenn Avenue, John Glenn Avenue and William Pickering Drive. However, although the method of pipeline installation is a particularly visible method, works would be restricted to the road corridors, apart from one section within the property of 14 John Glenn Avenue. Therefore, temporary visual effects are considered low.

4.2.3.3 Operation Phase

Following construction, no permanent visible features will remain.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the landscape and visual amenity effects would be:

Landscape Effects – **Neutral (0) Effects**

No trees or vegetation are anticipated to be affected in relation to the project, therefore the permanent landscape effects are considered neutral.

Visual Amenity Effects – **Neutral (0) Effects**

As no permanent visible features are anticipated, the permanent visual effects are considered neutral.

4.2.4 N9: William Pickering to Bush Road

4.2.4.1 Overview

After leaving John Glenn Avenue, the project continues south along William Pickering Drive and then eastwards through the industrial area along Piermark Drive before reaching No. 179 Bush Road. This section of the project primarily passes industrial land uses along single lane carriageways accommodating approximately 5m wide grass berms with footpaths. Audiences are therefore likely to be afforded views of the project from within the aforementioned road corridors, as well as from within the adjacent industrial / business properties.

The anticipated works include the following:

- Excavation by open trenching and laying of pipeline along William Pickering Drive, Piermark Drive and Bush Road;
- Traffic management;
- Construction of hard standing and parking areas;
- Surface reinstatement such as roads and driveways.

4.2.4.2 Construction Phase

Duration

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

Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Visibility of working areas along designation corridor;
- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects – **Neutral (0) Effects**

No trees or vegetation are anticipated to be affected in relation to the project, therefore the temporary landscape effects are considered neutral.

Visual Amenity Effects – **Low (-2) Adverse Effects**

It is anticipated that works will be visible from road users, residents and industry business owners along William Pickering Drive, Piermark Drive and Bush Road. However, although the method of pipeline installation is a particularly visible method, works would be restricted to the road corridors. Therefore, temporary visual effects are considered low.

4.2.4.3 Operation Phase

Following construction no permanent visible features will remain.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the landscape and visual amenity effects would be:

Landscape Effects – **Neutral (0) Effects**

No trees or vegetation are anticipated to be affected in relation to the project, therefore the permanent landscape effects are considered neutral.

Visual Amenity Effects – **Neutral (0) Effects**

As no permanent visible features are anticipated, the permanent visual effects are considered neutral.

4.2.5 N10: Bush Road to Rosedale Wastewater Treatment Plant

4.2.5.1 Overview

The project exits Bush Road after a short distance and crosses through the industrial property at No 169 Bush Road and the Bush Road Zone Substation at No 179 Bush Road. The project follows a private driveway the Bush Road Zone Substation before entering No 169 Bush Road crossing the Alexandra Stream and entering Rosedale Park. From this location the project follows Jack Hinton Drive and terminates at the Rosedale Waste Water Treatment Plant. Viewing audiences are likely to include road users and nearby employees / visitors to the businesses along Bush Road, as well as maintenance personnel at the Bush Road Zone Substation. Viewing audiences within Rosesdale Park and Jack Hinton Drive are also anticipated to be afforded views towards the project.

The anticipated works include the following:

- Excavation by open trenching and laying of pipeline along Bush Road, 169 and 179 Bush Road and Jack Hinton Drive;
- Site establishment at each shaft and landing site within Rosedale Park;
- Removal of isolated areas of road pavement, driveways, vegetation and grass areas in Rosedale Park;
- Construction of hard standing and parking areas;
- Pipe installation by trenchless technology;
- Surface reinstatement such as roads, driveways and grass areas.

4.2.5.2 Construction Phase

Duration

The expected duration of these works is approximately 2-4 months for trenched construction, and 5-6 months for trenchless construction under Alexandra Stream.

Landscape and Visual Changes

The landscape and visual effects resulting from construction will be:

- Pruning and removal of vegetation and grass areas in Rosedale Park;
- Visibility of working areas along designation corridor;
- Vehicle movements associated with construction activity.

Level of Temporary Effects

Landscape Effects –**Low (-2) Adverse Effects**

Construction works along Bush Road are not anticipated to result in landscape effects. Works within Rosedale Park, particularly along Jack Hinton Drive, will result in the loss of some grass areas and vegetation alongside the road; however, the level of landscape effects is considered low.

Visual Amenity Effects – **Low (-2) Adverse Effects**

It is anticipated that views towards works along Bush Road and within private properties of Bush Road will generate some level of visual effects however these temporary activates would be taking place within road corridors on private driveways in industrial areas. However, works within Rosedale Park are anticipated to be visible from visitors to the park who have elevated sensitivities, although works within this area are contextually adjacent to the existing WWTP and largely along the road corridor.

4.2.5.3 Operation Phase

Following construction no permanent visible features will remain.

Level of Permanent Effects

Following completion of the works and appropriate remedial and mitigation measures in line with those described in **Section 5**, it is considered that the landscape and visual amenity effects would be:

Landscape Effects – **Neutral (0) Effects**

The removal and subsequent replanting and establishment of vegetation within Rosedale Park would greatly reduce the permanent landscape effects. The establishment of replacement planting overtime returning the landscape to a similar condition, the level of landscape effects is considered neutral.

Visual Amenity Effects – **Neutral (0) Effects**

As no permanent visible features are anticipated, the permanent visual effects are considered neutral.

5.0 Mitigation Measures

The following outlines and describes the recommended landscape and visual mitigation measures relevant to the project. These have been grouped into the proposed activities relating to the project. The objective of the mitigation measures is to ultimately reduce anticipated landscape and visual effects outlined in **Section 4** of this report.

Table 2: Mitigation Measures

Activity	Landscape & Visual Mitigation Measures
Installation of pipe line via trenched & trenchless technology	• Limit works area to the greatest extent practicable • Works within road reserve should wherever practicable aim to be located within the carriageway • Works areas within public reserves should be limited as far as practicable • Avoid removal of trees and vegetation where possible • Consider final treatment of drop shafts. This could include backfilling if access is not required, or covering in soil and re-grassing or other suitable material whilst still allowing for required periodic access. Alternatively, consider creating a seating area in conjunction with large drop shaft lids, maintaining provision for future access when required • Manholes in open grass areas should sit flush with the finished ground level and soil areas reseeded as soon as practicable (within the next planting season (April to September). • Remove construction access roads apart from those providing access for maintenance within reserves. Consider reinstating surface with “grass cell” or similar reinforcing and re-grass to provide all-weather trafficable access for maintenance vehicles • Re-seal asphalt roads and concrete surfaces • Reinstate vegetation and grass areas • Reinstate children’s playground equipment in public spaces (if affected) • Works adjacent to CMA and within watercourses should: o Conduct the construction phase as quickly as possible and during low flows to reduce effects on the quality of water and marine ecology o Minimise excavation and disturbance of watercourse / coastal edge o Keep contaminants such as concrete and soil stockpiles out of the stream channel o Consider diverting water from the site away from watercourse / coastal edge during construction, Erect silt fences o Recontour disturbed watercourse banks o Provide replacement planting above watercourse in disturbed areas

Break Pressure Chamber	• Limit works area to the greatest extent practicable • Avoid removal of trees and vegetation where possible • Reinstate vegetation and/or vegetated above BPC
Pipe Bridge	• Limit works area to the greatest extent practicable • Minimise removal of trees and vegetation • Restore disturbed ground around the pipe bridge to a condition suitable for planting. • Prepare a detailed landscape and planting plan in line with CPTED principles • Remove construction access apart from those providing access for maintenance. Retain with “grass cell” or similar reinforcing and re-grass to provide all-weather trafficable access for maintenance vehicles if practicable • Consider pedestrian access and cycle access across pipe bridge for the benefit of the wider community • Appropriately integrate pipe bridge design and use recessive materials
Pump Station(s) and Ancillary Buildings / Structures, including biofilters, biotrickling filters, inlet vent and activated carbon units	• Limit works area to the greatest extent practicable • Limit height of structure as far as practicable • Avoid locating in visually prominent location, ideally clustered around built structures (where possible) • Use a dark, recessive and low-reflective colour where practicable • Consider low planting around the base • Consider establishment of vegetation, including trees, in areas which are highly visible to viewing audiences prior to any works. This vegetation should be located where it may remain during the construction and operation of the project, and therefore provide visual mitigation of the works and permanent features. • During construction phase consider installation of construction fencing with interpretive panels in selected areas which are visible to the public, to provide information about the project and its progress • Avoid removal of trees and vegetation where possible • Restore disturbed ground around the pump stations and ancillary buildings / structures including biofilters, biotrickling filters, inlet vent and activated carbon units to a condition suitable for planting • Prepare a detailed landscape and planting plan in line with CPTED principles

	• Remove construction access roads apart from those providing access for maintenance within reserves. Consider reinstating surfaces with “grass cell” or similar reinforcing and re-grass to provide all-weather trafficable access for maintenance vehicles • Appropriately integrate building / structure design suitable for the receiving environment, and use recessive materials and colours for pump stations and ancillary buildings / structures

6.0 Conclusions

The below conclusions consist of an overall summary of assessment effects followed by conclusions and recommendations.

Following construction and after the implementation of mitigation measures, the level of landscape and visual effects differs. The below tables summarise the level of effects anticipated on the natural character, landscape and visual amenity of the proposed works.

Table 3: Summary of Assessment Effects during Construction Phase (with mitigation measures implemented)

Name	Level of Landscape Effects	Level of Natural Character Effects	Level of Visual Effects
Notice of Requirement Northern Interceptor (Waitakere)			
W1: The Concourse to Selwood Drive	-1	NA	-1
W2: Selwood Road to Huruhuru Road	0	-1	-1 / -2
W3: Huruhuru Road to Cedar Heights Avenue	-2	-2	-2
W4: Cedar Heights Avenue to Holmes Reserve	-2	NA	-2 / -3
W5: Holmes Reserve to Holmes Drive	-3	-3	-4
W6:Holmes Drive to Hobsonville Road	-2	NA	-2
Notice of Requirement Northern Interceptor (North Shore)			
N1: The Eastern Abutment of the Greenhithe Bridge to Collins Park	-3	-3	-3

N2: Collins Park to Wainoni Park	-1		NA		-3	
N3: South Wainoni Park	-3		NA		-3	
N4: North Wainoni Park to North Shore Memorial Park	-3	-4	-3		-3	-4
N5: North Shore Memorial Park to Schnapper Rock Road	-2		NA		-3	
N6: Schnapper Rock Road to North Shore Golf Course	-2		-2		-3	
N7: North Shore Golf Course to Appleby Road	-2		NA		-3	
N8: Appleby Road to William Pickering Drive	0		NA		-2	
N9: William Pickering to Bush Road	0		NA		-2	
N10: Bush Road to Rosedale Wastewater Treatment Plant	-2		NA		-2	

The below table outlines the summary of assessment effects during operation:

Table 4: Summary of Assessment Effects during Operation Phase (with mitigation measures implemented)

Name	Level of Landscape Effects	Level of Natural Character Effects	Level of Visual Effects
Notice of Requirement Northern Interceptor (Waitakere)			
W1: The Concourse to Selwood Drive	0	NA	0
W2: Selwood Road to Huruhuru Road	0	0	0
W3: Huruhuru Road to Cedar Heights Avenue	-1	0	-1
W4: Cedar Heights Avenue to Holmes Reserve	-2	NA	-2
W5: Holmes Reserve to Holmes Drive	-2	-2 -3	-2
W6: Holmes Drive to Hobsonville Road	-2	NA	-2
Notice of Requirement Northern Interceptor (North Shore)			

N1: Eastern Abutment of the Greenhithe Bridge to Collins Park	-2	-1		-2	
N2: Collins Park to Wainoni Park	-2	NA		-2	
N3: South Wainoni Park	-2	NA		-2	
N4: North Wainoni Park to North Shore Memorial Park	-3	-2	-3	-2	-3
N5: North Shore Memorial Park to Schnapper Rock Road	0	NA		0	
N6: Schnapper Rock Road to North Shore Golf Course	0	0		0	
N7: North Shore Golf Course to Appleby Road	0	NA		0	
N8: Appleby Road to William Pickering Drive	0	NA		0	
N9: William Pickering to Bush Road	0	NA		0	
N10: Bush Road to Rosedale Wastewater Treatment Plant	0	NA		0	

It is anticipated that the construction of the project will be staged and therefore temporary visual effects will not occur simultaneously or over a wide area. Where the public are in close proximity to the works in reserve areas fencing may include branded screens with viewing holes to the site and interpretive panels providing key information on the project and its progress.

Permanent visual effects will predominantly result from the removal of vegetation and the presence of built structures. These are the three pump stations (No. 56 The Concourse, and Wainoni Park North and South), a pipe bridge (crossing Manutewhau Creek), biofilters (including service buildings), biotrickling filters and activated carbon units, inlet vent, and surface features such as manhole covers which are proposed to sit flush within road corridors and open grass areas.

The current design proposal for the Wainoni Park pump stations are anticipated to take on the appearance of rural building forms and materials currently existing in the landscape context. In addition, the pipe bridge may be designed in a way which is aesthetically pleasing and visually interesting which the public may use as a pedestrian and cycle bridge. Additional permanent adverse visual effects unable to be effectively mitigated by vegetative screening will require alternative mitigation techniques. This may include further alternatives to design considerations in relation to the external appearance of the built structures.

Overall, the successful integration of these features requires consideration for the final appearance and placement of the structures in relation to the surrounding land use, activities, and viewing audiences. In the detailed design stage, other appropriate design techniques should be explored, including materials, colour and planting to further mitigate and integrate the structures into the context they sit within.

Natural character and landscape effects will largely be due to the removal of vegetation of native or exotic origins as detailed in the broad Arboriculturalist assessment. Removal of vegetation in public open spaces and particularly streams will alter the character of these areas by heightening the impression of further human modification. Within reserves, some smaller grade trees exist, which may have the ability to be transplanted to other areas of the reserve. In all areas however, replacement planting and revegetation to compensate vegetation loss should be achieved.

As the designation corridor, method of construction and design of the project evolves, all practicable design options should be explored to reduce landscape and visual effects and include appropriate urban design elements. Involvement of key stakeholders through consultation should be considered, where works are located in public open space.

Through this assessment it is considered that the adverse natural character, landscape and visual effects anticipated in the construction and operation phase of the project can be managed and mitigated to result in low adverse effects overall.

Appendix 1: Effects Ratings and Definitions

Landscape and Visual Amenity Effects – Rating System	
Effects Rating and Definitions *Note: Ratings may be positive (e.g. high level of enhancement) or negative (e.g. high adverse effect).*	
Adverse Effects Rating	Use and Definition
No Effect (Neutral)	The development/activity would have no effect on the receiving environment.
Very Low	Use The development/activity would: Have a very low effect on the character or key attributes of the receiving environment and/or the visual context within which it is seen; and/or Have a very low effect on the perceived amenity derived from it. *Oxford English Dictionary Definition* *Very: adverb- **1.** In a high degree. **2.** With superlative or own without qualification: the very best quality.* *Low: adjective- **1.** Below average in amount, extent, or intensity. **2.** Lacking importance, prestige, or quality; inferior.*
Low	Use The development/activity would: Have low level of effect on the character or key attributes of the receiving environment and/or the visual context within which it is seen; and/or Have low level of effect on the perceived amenity derived from it. *Oxford English Dictionary Definition* *Low: adjective- **1.** Below average in amount, extent, or intensity. **2.** Lacking importance, prestige, or quality; inferior.*
Moderate	Use The development/activity would: Have a moderate level of effect on the character or key attributes of the receiving environment and/or the visual context within which it is seen; and/or Have a moderate level of effect on the perceived amenity derived from it. *Oxford English Dictionary Definition* *Moderate: adjective- average in amount, intensity, or degree*
High	Use The development/activity would: Have a high level of effect on the character or key attributes of the receiving environment and/or the visual context within which it is seen; and/or Have a high level of effect on the perceived amenity derived from it. *Oxford English Dictionary Definition* *High: adjective- **1.** Extending above the normal level. **2.** Great in amount, value, size, or intensity. **3.** Great in rank or status.*

Very High	Use The development/activity would: Significantly change the characteristics or key attributes of the receiving environment and /or the visual context within which it is seen; and/or Have a significant effect on the perceived amenity derived from it. *Oxford English Dictionary Definition* *Very: adverb- **1.** In a high degree. **2.** With superlative or own without qualification: the very best quality.* *High: adjective- **1.** Extending above the normal level. **2.** Great in amount, value, size, or intensity. **3.** Great in rank or status.*