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Ecological Assessment - Northern Interceptor Project

Prepared for Watercare Services Limited

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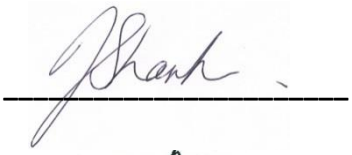

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REVISION SCHEDULE

Rev No.	Date	Description	Prepared by	Reviewed	Approved
1	03/03/16	1st DRAFT	C Wedding, M Delaney, J Shanks	G Don	G Don
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Executive Summary

Bioresearches Group Limited was commissioned by Watercare Services Limited (Watercare) to assess the potential ecological effects related to the construction, operation and maintenance of Watercare's Northern Interceptor (the Project). The Project spans the areas of the former Waitakere and North Shore City Councils and has been divided into two separate Notices of Requirement (NoR) accordingly. These are NoR: NI (Waitakere) and NoR: NI (North Shore).

The ecological assessment provides a description of the terrestrial and aquatic (freshwater and coastal area) values of the Project. Potential adverse effects of the Project are discussed and recommendations for avoiding and minimising these are provided.

NoR: NI (Waitakere): The Concourse to Hobsonville Road

Six sites of interest were identified along the NoR: NI (Waitakere), with the highest area of ecological value being recorded at Lowtherhurst Reserve, where indicative trenched construction would impact on vegetation and Rarawaru Stream, within a Significant Ecological Area (SEA). Where any vegetation, fauna habitats or stream crossings within the proposed designation may be affected within the next 20 years, recommendations are provided to mitigate this through avoidance of the largest trees, revegetation, preclearance surveys and fauna relocation where necessary. These mitigation actions would reduce these effects to less than minor.

Five other sites supported vegetation or stream crossings that may be affected by trenched construction or shaft locations. These ecological values were generally of low to moderate value, where the vegetation was generally young or planted. While potential effects pre-mitigation are considered minor, preclearance surveys for native lizards and nesting birds were recommended to avoid mortality to these species, as they are protected under the Wildlife Act 1953.

The coastal area and some freshwater watercourses are crossed, or in close proximity to the proposed designation in some areas and standard recommendations are provided to reduce the potential effects of sedimentation on habitat and water quality to less than minor.

NoR: NI (North Shore): The Eastern Abutment of the Greenhithe Bridge to Waste Water Treatment Plant

Vegetation at the Eastern Abutment of the Greenhithe Bridge represented the only site where terrestrial ecological values within the proposed designation were considered to be of greater than low value. Some open trenching may be within the dripline of kanuka scrub along the Lucas Creek Estuary (North Shore Memorial Park). Though the vegetation is of low botanical value, it does provide an important buffer to the estuary. Other botanical and fauna habitat areas of generally low value were identified at North Wainoni Park and the North Shore Golf Course.

Recommended mitigation, avoidance of the largest trees, revegetation, preclearance surveys and fauna relocation are provided and these actions would reduce any potential effects to less than minor.

The coastal area and some freshwater watercourses are crossed, or in close proximity to the proposed designation in some areas and standard recommendations are provided to reduce the potential effects of sedimentation on habitat and water quality to less than minor.

Glossary of Terms and Abbreviations

[standard list to be provided by MWH]

CONTENTS

1 Introduction and Project Description

Bioresearches Group has been commissioned by Watercare Services Limited (Watercare) to assess the potential ecological 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 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.; and
- Installation of a pipe bridge at Manutewhau Reserve, West Harbour.

This report provides the following:

- A description of the environmental baseline for 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 ecological values 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.

2 Assessment Methodology

The assessments contained in this report were undertaken by three ecologists with expertise in the fields of botany, fauna and aquatic ecology.

Ecologists assessed the vegetation, potential habitats and water courses along the Project designations using a combination of desktop and field assessments. The designation corridor was driven and areas of vegetation patches and stream crossings were recorded.

Areas of particular focus included those identified from the Concept Design (Appendix I) as indicative trenched construction, indicative pipeline bridge or shafts. The areas considered to have potential to impact on terrestrial and aquatic ecological values were identified from aerial imagery.

Site visits were undertaken over the entire designation to ascertain the actual or potential presence of ecological values at present, or likely to be present over the next 20 years having regard to vegetation maturity and potential for land use change.

Database searches for native fauna, including invertebrates, lizards, birds and bats were undertaken and these records were then compiled for locations along the designation corridor where their habitats were potentially present.

Fauna considered in this assessment included all those that are protected by the Wildlife Act 1953 (all native lizards, birds and bats) and particular note was given where species with a conservation rating of nationally “At Risk” or higher, were present.

A review of Bioweb, a Department of Conservation (DOC) administered database of amphibians and reptiles in New Zealand, indicated up to five species were present within five kilometres of the proposed designation. These are listed below:

Copper skink, *Oligosoma aeneum*	Not Threatened.
Ornate skink, *Oligosoma ornatum*	At Risk- declining
Forest gecko, *Mokopirirakau granulatus*	At Risk- declining
Elegant gecko, *Naultinus elegans*	At Risk- declining
Pacific gecko, *Dactylocnemis pacificus*	At Risk- Relict

The habitats found along the designation alignment are not suitable for native frogs. Common native invertebrates are expected to be present in habitats impacted by the Project however the occurrence of threatened species is unlikely, given the degree of habitat modification that has occurred and the high degree of isolation of vegetated areas from mature remnants of indigenous habitat.

A review of the New Zealand freshwater fish database (NZFFD, administered by NIWA) was undertaken. Species presence was considered in qualifying stream value.

2.1 Assessment Method

The assessment of effects was based on current ecological values and potential ecological values after 20 – 30 years when project impacts are expected to occur. Planted native vegetation may have matured and naturally regenerating native vegetation may have reached a later successional stage with associated higher values. Similarly, the potential for some habitats to be colonised by uncommon fauna (threat ranking of 'At Risk' or greater) was also considered.

The potential values are only speculative as the actual ecological values after 2 -3 decades will be highly dependent on the management of these areas in the interim, such as weed management and the rate of growth of trees and vegetation. It is assumed that no native vegetation will be removed in the meantime, and that ecological values would gradually increase (vegetation growth, habitat maturity) over time.

Generally, any minor ecological effects would be mitigated through reinstatement of any disturbed areas of native vegetation and moderate effects would require more extensive mitigation actions to compensate for lost ecological values. Where there would be ecological effects on high value vegetation or habitats it is expected that methods would be sought to avoid the area. Negligible effects would not require mitigation.

Ecological values described in this report are detailed and identified in Table 1 below. Note that sites with currently low values could have higher values after 20 years or more, which may move them into the "moderate" category. Similarly naturally regenerating vegetation may have reached a more mature stage after this time period with resulting higher ecological values.

Table 1. Ecological descriptors and corresponding values and effect (potential and actual) pre-mitigation.

Vegetation/ / Habitat / Stream Description	Ecological Value Descriptor	Actual or potential ecological effect of the Project
Entirely or predominantly exotic pest plants, may have some scattered common natives. May support some habitat value to common native fauna, though potential habitats are largely occupied by introduced fauna. Stream has a combination of very low levels of: shading, hydrologic heterogeneity, aquatic habitat diversity, and riparian integrity. As well as potentially high levels of anaerobic processes.	Very Low	Less than Minor
Planted young (<20 years) native vegetation comprising common species. Vegetation is generally of small size (<15m tall) Potential habitat likely to support some common native fauna. Stream has a combination of low levels of: shading, hydrologic heterogeneity, aquatic habitat diversity, and riparian integrity. As well as potentially moderate to high levels of anaerobic processes.	Low	Minor
Naturally regenerating kanuka/ broadleaf forest with understorey or older areas of restoration planting with larger canopy trees and natural regeneration of an understorey occurring. Large planted native trees >15m tall. Potential habitat likely to support common native fauna. Some Nationally 'At Risk' species may also occur. Stream has a combination of moderate levels of: shading, hydrologic heterogeneity, aquatic habitat diversity, and riparian integrity. As well as potentially moderate to low levels of anaerobic processes.	Moderate	Moderate (More than minor)
Naturally regenerating podocarp broadleaved forest with mature trees. Potential habitat likely to support common native and Nationally 'At Risk' or 'Threatened' fauna. Stream has a combination of high levels of: shading, hydrologic heterogeneity, aquatic habitat diversity, and riparian integrity. As well as potentially low levels to no anaerobic processes.	High	Moderate or greater (More than minor)

3 Description of Receiving Environment

3.1 Notice of Requirement Northern Interceptor (Waitakere)

3.1.1 The Concourse to Selwood Road

The concept design indicates trenched construction from the Concourse to Selwood Road, within the road corridor.

Native revegetation (<6 years old) along the road frontage of the site includes cabbage trees (*Cordyline australis*), kohuhu (*Pittosporum tenuifolium*), flax (*Phormium tenax*), tarata (*Pittosporum eugenioides*) and puka *(Griselinia lucida*). This vegetation is outside the boundary fence of the site. In the northwest corner of the site are a group of native and exotic trees >10m tall including 2 pohutukawa (*Metrosideros excelsa*), a golden totara (*Podocarpus totara*), a large pin oak (*Quercus palustris*) and several other exotic trees. Ecological values within this area are currently very low. A new pump station will be constructed in this part of the site, within Watercare's existing designation.[1]

3.1.1.1 Assessment of Effects

Pohutukawa and totara trees may have grown to significant size over the next 20 years, potentially providing habitat and food for native fauna as well as stepping stone habitat to the coastal fringe through an industrial area that is largely devoid of native vegetation. Removal of these trees and other maturing native vegetation along the road frontage would potentially have minor to moderate ecological effects depending on how large the trees have grown.

3.1.2 Selwood Road to Huruhuru Road

The concept design indicates trenched construction from Selwood Road to Huruhuru Road through Taitapu Park. Taitapu Park supports some planted vegetation along the western bank of the Henderson Creek. The designation boundary abuts the coastal area on either side of the Henderson Creek.

It is understood that the pipeline will likely cross the Coastal Marine Area (CMA), at a later stage, from the south eastern side of a tributary of the Henderson Creek into Taitapu Park on the north western side. Vegetation fringing the creek on the south eastern side is composed of pest plants such as brush wattle (*Paraserianthes lophantha*) and pampas (*Cortaderia selloana*). On the northwestern side within Taitapu Park young revegetation planting of common native shrubs such as kanuka (*Kunzea robusta*), cabbage tree, karamu (*Coprosma robusta*), flax, tarata and mahoe (*Melicytus ramiflorus*) are found along the coastal edge. These values are currently low.

[1] Designation No. WSL8 in the Operative Auckland Council District Plan (Waitakere Section) and No. 9327 in the Proposed Auckland Unitary Plan (Notified 30 September 2013)

Figure 1. Vegetation at Taitapu Park

3.1.2.1 Assessment of Effects

Vegetation and Flora

Young planted native vegetation along the coastal fringe within Taitapu Park will have matured over the next 20 years and should have established a closed canopy of trees with some natural regeneration occurring (depending on the way in which it is managed). The vegetation buffers the upper tributary of Henderson Creek. The installation of the open trenched pipeline would necessitate the removal of a small section of this vegetation with the potential loss of several medium sized native trees such as kanuka, tarata etc. This would have generally minor effects on the overall botanical values of the site although it will temporarily fragment the coastal band of vegetation at this point.

Fauna

Planted vegetation at Taitapu Park supports indigenous copper skinks (NZTA 2010) and may also support other native lizard species, as well as nesting or roosting habitat for native birds. Fauna habitat values at Taitapu Park are likely to increase slightly as the vegetation matures.

Removal of this vegetation would result in some habitat loss, injury or mortality to common native birds and lizards. These effects would be minor-moderate.

Aquatic

Although no physical works are proposed to occur within the coastal area, surrounding works may have moderate adverse effects on the freshwater/marine ecology of Henderson Creek, through sediment runoff, without appropriate mitigation (e.g. standard sediment control measures, bank stabilisation and revegetation).

3.1.3 Huruhuru Road to Cedar Heights Avenue

The concept design indicates trenched construction along Huruhuru Road, through Rarawaru Stream and SEA _T_4654 (SEA) within Lowtherhurst Reserve. The vegetation within these areas is predominantly native and provides suitable habitat for at least five native lizard species, four of which have a threat classification of "At Risk" (Hitchmough et al. 2013). These species are listed in Section 3.

Much of the pipeline designation through Lowtherhurst Reserve is in mown grass, however the native vegetation surrounding Rarawaru stream within the SEA where the pipeline bridge will cross into Cedar Heights Avenue is of moderate quality. It includes tall rewarewa (*Knightia excelsa*) 15 – 20m tall, towai (*Weinmannia silvicola*), and tall kanuka with typical understorey shrubs and tree ferns. The Rarawaru stream flows over a rock substrate.

On the Redwood Drive side of the reserve a tall redwood (*Sequoia sempervirens*) of medium age is located on the northern edge of the SEA.

The Rarawaru Stream has a moderate to high ecological value. This high value is attributed to the high level of shading, lack of fine sediment and a high level of hydrologic heterogeneity, including pools, riffles, runs, chutes and small cascades. The historic records held on the New Zealand Freshwater Fish Database (NZFFD) held by NIWA, shows that at least three native fish species are found within the Rawawaru Stream, one of which has a threat classification of "At Risk" (Goodman et al. 2014). These species are:

Banded kokopu, *Galaxias fasciatus*	Not Threatened
Shortfin eel, *Anguilla australis*	Not Threatened
Inanga, *Galaxias maculatus*	At Risk- declining

Figure 2. Vegetation at Lowtherhurst Reserve (SEA).

3.1.3.1 Assessment of Effects

Vegetation and Flora

The native vegetation surrounding the stream at the proposed trench crossing point is of good quality although it constitutes a fairly narrow band along both sides of the stream. Loss of a section of the vegetation on each side of the stream would fragment the riparian vegetation and result in edge effects on the remaining vegetation on each side. Loss of mature flowering and fruiting canopy trees would also have moderate effects on the botanical values of the site.

Fauna

Vegetation within SEA_T_4654 at Lowtherhurst Reserve supports suitable potential habitat for at least five indigenous lizard species, four of which have a National threat classification of 'At Risk'. Threat rankings for some of these species, particularly those 'At Risk', may increase over the next 20 years.

The vegetation also has the potential to support roosting and nesting habitat for a range of common native bird species, including kereru, a keystone species (Mander et al. 1998). A keystone species, such as kereru, is one that plays a crucial role in maintaining ecosystem functions (e.g. seed dispersal). Keystone species are considered to trigger higher ecological value than other non-threatened species.

Removal of this vegetation would result in some habitat loss, injury or mortality to common native birds and lizards, some of which may have a threat ranking of Nationally At Risk or higher.

These effects would be moderate.

Aquatic

The Rawawaru Stream supports native fish populations; one species has a National threat classification of 'At Risk'. Threat rankings for some of these species, particularly those 'At Risk', may increase over the next 20 years as some national populations are in decline.

Trenched construction through the Rawawaru Stream would potentially result in sedimentation, habitat loss and injury or mortality to native fish. These effects would be moderate, assuming the stream would be reinstated.

Although no physical works are proposed to occur within Rawawaru stream, the construction of the piped bridge as well as surrounding works may have adverse effects on the freshwater ecology of the stream due to sediment runoff and vegetation clearance. These effects would be minor, without appropriate mitigation (e.g. standard sediment control measures, bank stabilisation and revegetation).

3.1.4 Cedar Heights Avenue to Holmes Reserve

The concept design indicates trenchless construction along Cedar Heights Avenue from Jarrah Place to Holmes Reserve. The trenchless construction runs parallel with a minor tributary of the Manutewhau Stream. There are shafts located along Cedar Heights Avenue (within the road corridor), on bare ground at 78 Cedar Heights Ave and 13 Holmes Drive South. There are no shafts indicated within Holmes Reserve.

The trenched construction continues up Cedar Heights Avenue to the corner of Jarrah Place. A medium sized titoki tree (*Alectryon excelsus*) and a large liquidambar tree (*Liquidambar styraciflua*) are located outside 22 Cedar Heights Drive. A medium sized pohutukawa on the 21 Cedar Heights Avenue is close to the location of a break pressure chamber on the corner of Jarrah Place and Cedar Heights Avenue.

The trenchless section from Jarrah Place passes under Makora Park under a group of tall pine trees (*Pinus radiata*) which may have tap roots 5 -6 m deep depending on soil type. The botanical values of the vegetation through this section are very low.

3.1.4.1 Assessment of Effects

Trenching and construction of the break pressure chamber on the corner of Jarrah Place may affect the roots of a pohutukawa tree in the vicinity at 21 Cedar Heights Avenue which may increase significantly in size within 20 years if it remains in situ over that timeframe. The effects on the tree may be moderate to significant and could result in its removal. The overall effects on the botanical values of the locality are likely to be minor however.

3.1.5 Holmes Reserve to Holmes Drive

The concept design indicates trenchless construction from Holmes Reserve to Manutewhau Reserve. The trenchless construction crosses a confluence of two minor tributaries of the Manutewahu Stream within the property of 15 Berkshire Terrace.

Vegetation within Holmes Reserve is generally a mixture of exotic trees such as poplar (*Populus* sp), pine and wattles (*Acacia* sp) with young natives such as kanuka and karamu. A proposed drop structure located within the reserve is within a grassed area. Young native vegetation along the Tihema Stream at the pipe crossing site within the Manutewhau Reserve includes kanuka, kohuhu (*Pittosporum tenuifolium*), silver tree fern (*Cyathea dealbata*), karamu, mapou (*Myrsine australis*) and cabbage trees (*Cordyline australis*). The botanical values are low. The pipe crosses from the properties at 33 & 35 Jaedwyn Drive to the southern end of Holmes Drive.

Trenched construction is proposed from Manutewhau Reserve to Holmes Drive. The trenched construction crosses over an overland flow path, of less than minor ecological value, within the Manutewhau Reserve. An indicative pipe bridge would cross Tihema Stream, which flows through native vegetation at 113A Oreil Avenue (Manutewhau walk). This riparian corridor is designated SEA _T_4866 and SEA_T_2040. The vegetation within these areas is predominantly native and provides suitable habitat for at least five native lizard species, four of which have a threat classification of “At Risk” (Hitchmough et al. 2013). The Tihema Stream is of moderate ecological value.

Figure 3. Riparian vegetation along Tihema Stream (SEA).

3.1.5.1 Assessment of Effects

Vegetation and Flora

The native vegetation along the Tihema Stream in the vicinity of the proposed pipeline crossing is designated SEA _T_4866 and SEA_T_2040. It is regenerating kanuka scrub with common shrubs and tree ferns. The pipe crossing would fragment the riparian vegetation, however the botanical effects would be minor and could be mitigated with replacement planting post construction.

Fauna

The Tihema Stream riparian corridor supports suitable potential habitat for at least five indigenous lizard species, four of which have a National threat classification of 'At Risk'. Threat rankings for some of these species, particularly those 'At Risk', may increase over the next 20 years.

The vegetation also has the potential to support roosting and nesting habitat for a range of common native bird species, including kereru, a keystone species (Mander et al. 1998).

Removal of this vegetation would result in some habitat loss, injury or mortality to common native birds and lizards, some of which may have a threat ranking of Nationally At Risk or higher.

These effects would be moderate.

Aquatic

Sediment runoff and vegetation clearance from the trenchless construction and the associated shaft within the property 15 Berkshire Terrace would result in potential adverse effects on the two minor tributaries adjacent to the property. These effects would be minor, without appropriate mitigation (e.g. standard sediment control measures, bank stabilisation and revegetation).

Trenched construction through the overland watercourse within the Manutewhau Reserve would have less than minor effects.

The Tihema Stream within this area is of moderate ecological value and provides suitable habitat for native fish. Although no physical works are proposed to occur within the stream, the construction of the piped bridge as well as surrounding works may have an adverse effect on the freshwater ecology of the stream due to sediment runoff and vegetation clearance. These effects would be minor, without appropriate mitigation (e.g. standard sediment control measures, bank stabilisation and revegetation).

3.1.6 Holmes Drive to Hobsonville Road

The concept design indicates trenchless construction along Holmes Drive to Hobsonville Road. A short (c. 50m) length of trenched construction is proposed along Holmes Drive where the road crosses a culverted section of the Manutewhau Stream and SEAs _T_4866 and T_2040. This area is within the existing road corridor.

Shafts associated with the trenchless construction from Holmes Drive to Hobsonville Road are indicated along Holmes Drive or at areas of bare ground at St. Margarets Park. These areas have no ecological value.

The shaft proposed for the southern end of St Margaret's Park is located partially within a group of trees containing a tall totara (15m), a large plane tree (*Platanus* x *acerifolia*) and cypress trees (*Cupressus* sp) with a sparse understorey of native shrubs such as karamu, kohuhu and mapou.

3.1.6.1 Assessment of Effects

Botanical effects would be minor and could be avoided if the shaft at the southern end of St Margaret's Park was sited to avoid the group of trees containing the totara tree. Less than minor effects on terrestrial ecology values, are expected from the construction or operation of the project, either at present or over the next 20 years.

3.2 Notice of Requirement Northern Interceptor (North Shore)

3.2.1 The Eastern Abutment of the Greenhithe Bridge to Collins Park

The proposed designation boundary borders the coastal edge and indicates trenched construction through the Eastern Abutment of the Greenhithe Bridge, which supports native scrub that is covered by SEA_T_8319. The pipeline at this location will surface within private property at 15 The Knoll into a break pressure chamber. The pressure chamber is likely to be approximately 9m long, 4m wide and 7m below ground level and will require permanent entry facilities through manholes.

The vegetation within 15 The Eastern Abutment of the Greenhithe Bridge is a mixture of open ground with kikuyu (*Pennisetum clandestinum*), a gravel driveway and kanuka scrub under a broken canopy of black wattle (*Acacia mearnsii*). Understorey plants include tauhinu (*Pomaderris amoena*), kumerahou (*P. kumeraho*), mingimingi (*Leptocophylla juniperina*) and corokia (*Corokia buddleioides*). Several large kahikatea trees (*Dacrycarpus dacrydioides*) were noted in the gully between 15 and 9 The Eastern Abutment of the Greenhithe Bridge.

The vegetation within these areas is mixed native and exotic scrub which provides suitable habitat for at least five native lizard species, four of which have a threat classification of “At Risk” (Hitchmough et al. 2013). Forest gecko, copper skink and ornate skink have been recorded from SEA_T_8319.

The pipe will pass under young native revegetation planting along Tauhinu Road and the jack station on the corner of Tauhinu Road and Pounamu Place may be within the root zone of a medium sized pohutukawa tree situated at 66 Tauhinu Road.

Indicative trenchless construction is proposed within the designation where it extends along Tauhinu Road to Collins Park and crosses or runs parallel to multiple unnamed watercourses.

Two shafts are located at Collins Park in the southwest and north east corners. The southwestern shaft is under a stand of golden macrocarpa trees (*Cupressus macrocarpa*) where ecological values are low and the north eastern shaft is situated in generally open ground with scattered native specimen trees where the ecological values are also low.

The eastern most shaft is located on an overland flow path indicated by the Auckland Council GIS Viewer.

Figure 4. Vegetation at The Eastern Abutment of the Greenhithe Bridge (SEA).

3.2.1.1 Assessment of Effects

Vegetation and Flora

The construction of the break pressure chamber at 15 The Knoll, may impact on the kanuka scrub community at the site depending on the exact location. The effects of the loss of c.50m^2 of this vegetation would be minor and could be mitigated through replanting post construction. It would be important to ensure the trenchless pipeline is not sited near the large kahikatea trees further to the north west of 15 The Knoll to avoid any root disturbance to these mature trees.

The potential effects of the jack station on the pohutukawa tree at 66 Tauhinu Road and the two shafts within Collins Park are likely to be minor.

Fauna

Vegetation within SEA_T_ SEA_T_8319 at The Eastern Abutment of the Greenhithe Bridge supports suitable potential habitat for at least five indigenous lizard species, four of which have a National threat classification of 'At Risk'. Threat rankings for some of these species, particularly those 'At Risk', may increase over the next 20 years. It is noted that the forest gecko, copper skink and ornate skink have been recorded from SEA_T_8319. The vegetation also has the potential to support roosting and nesting habitat for a range of common native bird species.

Removal of this vegetation would result in some habitat loss, injury or mortality to common native birds and lizards, some of which may have a threat ranking of Nationally At Risk or higher.

These effects would be moderate.

Aquatic

Although no physical works are proposed to occur within the coastal area, surrounding works may have moderate adverse effects on the marine ecology of the Waitemata Harbour, through sediment runoff, without appropriate mitigation (e.g. standard sediment control measures, bank stabilisation and revegetation).

The overland flow path located on the eastern side of Collins Park has less than minor ecological value and as such the shaft construction at this site will have negligible effects.

3.2.2 Collins Park to Wainoni Park

The indicative concept design indicates trenchless construction from Collins Park to Wainoni Park, with shafts located along areas of open ground. These areas of open ground have no significant ecological value. The proposed designation crosses or runs parallel to multiple unnamed watercourses within this area.

3.2.2.1 Assessment of Effects

Negligible effects are expected from the construction or operation of the project, either at present or over the next 20 years.

3.2.3 South Wainoni Park

The indicative concept design indicates trenchless construction below South Wainoni Park, with a shaft located on open ground. There are no ecological values associated with the shaft location.

It is understood that a new pump station will be constructed in the south eastern corner of Wainoni Park off Orwell Road. Associated above ground structures will be required. At this location the vegetation is mainly stands and specimens of exotic trees such as macrocarpa, pines, and wattles. A few kanuka and cabbage trees are also found in the vicinity. Ecological values are low.

An outfall pipe at South Wainoni Park will extend to an unnamed watercourse.

3.2.3.1 Assessment of Effects

Removal of exotic trees and a limited number of kanuka and cabbage trees at the proposed pump station site will have less than minor effects on the botanical values of the park. Therefore no significant adverse effects are expected from the construction or operation of the project, either at present or over the next 20 years.

3.2.4 North Wainoni Park to North Shore Memorial Park

The indicative concept design indicates trenchless construction below North Wainoni Park, with three shafts which are all located on open ground, although the northern two are adjacent to young native restoration planting along a watercourse. There are no ecological values associated with the current shaft locations.

A future pump station and some indicative trenched construction (c. 80 m) is proposed at the northern end of North Wainoni Park within the Riding for the Disabled site. This area supports some exotic scrub that may currently support native skink habitat. Large macrocarpa trees, pines and poplars are also present; however these have low ecological values.

The indicative concept design indicates a shaft within close proximity to the coastal edge of Te Wharau Creek and trenchless construction under the Te Wharau Creek.

3.2.4.1 Assessment of Effects

<u>Vegetation and Flora</u>

The northernmost two jack stations will need to carefully sited to avoid damage to the adjacent revegetated stream margins which will have grown and matured over the next 20 years. The shafts will need to be sited outside the drip line of the native vegetation. Large macrocarpa trees, pines and poplars on the proposed pump station site in the northern corner of the park have low botanical values. The loss of these trees could be readily mitigated with some native revegetation planting at the site. Effects will be less than minor if mitigation planting is undertaken and it is expected that such planting will also be required to screen the pump station and tie it into the visual landscape.

<u>Fauna</u>

Vegetation at the northern end of North Wainoni Park, and at the vicinity of the future pump station supports potential habitat for two indigenous lizard species, one of which has a National threat classification of 'At Risk'. The threat ranking for ornate skink (currently Nationally At Risk) may increase over the next 20 years, as it is currently in chronic decline (Hitchmough et al. 2013). The vegetation also has the potential to support roosting and nesting habitat for banded rail, however the current value of these habitats for both lizards and birds is low. This value has potential to increase over the next 20 years.

Removal of this vegetation could result in some habitat loss, injury or mortality to common native birds and lizards, some of which may have a threat ranking of Nationally At Risk or higher.

These effects would be minor.

Aquatic

Although no physical works are proposed to occur within the coastal area, surrounding works may have moderate adverse effects on the marine ecology of the Te Wharau Creek, through sediment runoff, without appropriate mitigation (e.g. standard sediment control measures, bank stabilisation and revegetation). There should be no adverse effects from the trenchless construction under the Te Wharau Creek.

3.2.5 North Shore Memorial Park to Schnapper Rock Road

The indicative concept design indicates trenched construction through North Shore Memorial Park, The designation is largely contained within open ground or along road ways that have no significant ecological value. The open trench may be within the drip line of a band of tall (>10m) kanuka scrub that fringes the Lucas Creek Estuary along the north western edge of the park. The understorey is composed of common shrubs such as mapou, mahoe, silver tree fern, and karamu. This vegetation has generally low botanical values, however it buffers the estuary beyond and has moderate ecological value for this reason.

The proposed trenched construction runs parallel and in close proximity to the coastal edge of Lucas Creek and a detention pond. The proposed trenched construction also runs across several unnamed watercourses as indicated by the Auckland Council GIS Viewer.

3.2.5.1 Assessment of Effects

Vegetation and Flora

The trenched pipeline along the northern edge of the North Shore Memorial Park adjacent to the Lucas Creek Estuary should be sited outside the dripline of the tall kanuka scrub that fringes the shoreline to avoid damage to this buffering vegetation. Other than this the botanical effects of the project are expected to be negligible.

Fauna

Negligible effects are expected from the construction or operation of the project, either at present or over the next 20 years.

Aquatic

Although no physical works are proposed to occur within the coastal area or detention pond, surrounding works may have moderate adverse effects on the marine ecology of Lucas Creek, through sediment runoff, without appropriate mitigation (e.g. standard sediment control measures, bank stabilisation and revegetation).

3.2.6 Schnapper Rock Road to North Shore Golf Course

The indicative concept design indicates trenched construction along Schnapper Rock Road through to Wharepapa Reserve. The designation generally contains the road corridor and open ground at Wharepapa Reserve and has no significant ecological value. A very large pine tree here adjacent to the proposed pipeline route may complicate the open trench construction due to its large and extensive roots.

The indicative concept design indicates a shaft within close proximity to the coastal edge of Lucas Creek and trenchless construction under a tributary of Lucas Creek.

3.2.6.1 Assessment of Effects

Vegetation and Flora

Less than minor adverse effects are expected from the construction or operation of the project, either at present or over the next 20 years.

Fauna

Negligible adverse effects are expected from the construction or operation of the project, either at present or over the next 20 years.

Aquatic

Although no physical works are proposed to occur within the coastal area, surrounding works may have moderate adverse effects on the marine ecology of Lucas Creek, through sediment runoff.

3.2.7 North Shore Golf Course to Appleby Road

The indicative concept design indicates trenchless construction from Wharepapa Reserve under a tributary of Lucas Creek will continue into the south-western corner of the North Shore Golf Course for approximately 300m. From this point trenched construction will then continue along the south eastern boundary of the golf course and across the carpark to Appleby Road. Indicative trenched construction along the southern edge of the golf course passes through the edge of predominantly exotic (bamboo) vegetation and across open ground to Appleby Road.

Ecological values through this area are currently very low.

3.2.7.1 Assessment of Effects

Vegetation and Flora

The trenched portion of the pipeline will only impact weedy vegetation along the southern edge of the golf course and will not reduce the botanical values of the site.

Fauna

The exotic and weedy vegetation along the edge of the existing golf course may provide some habitat value to native skinks, though this value is currently very low. There is some potential for the habitat values at this location to increase, though it is considered more likely they will decrease in time.

Removal of this vegetation could result in some habitat loss, injury or mortality to a few individual native skinks, although these effects would be less than minor.

3.2.8 Appleby Road to William Pickering Road

The indicative concept design indicates trenched construction along formed road ways where there are no ecological values.

3.2.8.1 Assessment of Effects

Less than minor effects are expected from the construction or operation of the project, either at present or over the next 20 years.

3.2.9 William Pickering to Bush Road

The indicative concept design indicates trenched construction along formed road ways where ecological values are negligible.

3.2.9.1 Assessment of Effects

Less than minor effects are expected from the construction or operation of the project, either at present or over the next 20 years.

3.2.10 Bush Road to Rosedale Wastewater Treatment Plant

The indicative concept design indicates trenched construction along open ground from Bush Road to Rosedale Park. Trenchless construction is proposed for a crossing of Alexandra Stream which is contained within SEA _T_8084 and 8082. Trenched construction from Rosedale Park to the Rosedale Treatment Plant follows road ways and open ground where ecological values are negligible.

3.2.10.1 Assessment of Effects

Less than minor effects are expected from the construction or operation of the project, either at present or over the next 20 years.

4 Recommended Mitigation and Management Measures

Vegetation and Flora

Assessment of the botanical values of areas of identified native vegetation should generally be undertaken at the time of detailed design and immediately prior to the construction of open trenching, installation of shafts and jacking stations and the construction of pump stations. During detailed design attention should be given to avoiding effects on mature native trees as identified for each location, including siting structures away from the driplines of mature native trees and areas of native vegetation. In the case of the Lowtherhurst Reserve a trenchless pipeline under the Rarawaru Stream and riparian vegetation is not possible and therefore the pipeline bridge and trenched construction should avoid the largest native trees where practicable.

Generally, the Project only impacts on small areas of mostly young native vegetation, where trenched construction, shafts or pipeline bridges are proposed. Mitigation for vegetation loss would take the form of post construction replacement planting and maintenance until canopy closure or for a minimum of two years from planting whichever is the greater. Mitigation planting at Lowtherhurst Reserve may require a greater level of compensation for vegetation removed, due to the higher botanical values within this SEA. A suitable mitigation planting plan for all affected areas should be developed by a qualified plant ecologist.

For Lowtherhurst Reserve, a mitigation plan should be developed well ahead of construction and replacement planting of the canopy and understorey species that will be lost carried out well ahead of this time. This will reduce the time between loss of mature trees and their replacement. Mitigation planting should occur at suitable sites within the affected reserve and be contiguous with existing similar native vegetation. The mitigation plan should also include replacement planting at the impact site post construction.

Fauna

Preclearance surveys for lizards and nesting birds should be undertaken where they have been identified as potentially present. A Lizard Management Plan should be prepared to address the potential presence and management of geckos and /or skinks within these areas.

Locations recommended for fauna (lizards and nesting birds) management are:

- Taitapu Park
- Lowtherhurst Reserve
- Tihema Stream Riparian Corridor
- The Eastern Abutment of the Greenhithe Bridge
- North Wainoni Park
- North Shore Golf Course edge

Where any vegetation clearance is mitigated in accordance with these recommendations, the potential effects would be minor to less than minor.

Aquatic

Any construction or earthworks in close proximity to a watercourse (within 10m) or coastal areas should be timed to avoid predicted heavy rain and should incorporate standard sediment controls (TP90 – Erosion and Sediment Control: Guidelines for Land Disturbing Activities in the Auckland Region), as a minimum, to prevent sediment runoff into any watercourses or marine environments.

All bare ground exposed by site works should be stabilised and replanted with appropriate vegetation as soon as practicable. With the exception of the Rawawaru Stream crossing, where any construction or earthworks in close proximity to a watercourse (within 10m) or coastal areas is mitigated in accordance with these recommendations, the potential effects would be less than minor.

In the case of the Rawawaru Stream crossing works, any works within the stream would be considered a discretionary activity under the Proposed Auckland Unitary Plan, as the stream falls within a SEA. As for mitigation and recommended management measures, in addition to the above sediment control mitigation, the works would usually require a full ecological assessment as well as a fish recovery and relocation management plan. If the Rawawaru Stream crossing works is mitigated in accordance with these recommendations, the potential effects would be less than minor. Notwithstanding these comments, we understand that a full assessment of effects for works within watercourses associated with this Project will be undertaken at an appropriate time as part of the necessary resource consent process.

5 Conclusions

Vegetation and Flora

The vegetation found within the NI Project is mainly areas of young native revegetation within parks and reserves or amenity trees along streets. There are significant numbers of weedy species, particularly wattle, pine and macrocarpa trees in a number of locations. Effects on the botanical values of the vegetation and flora are expected to be temporary and minor if good quality replacement planting is carried out immediately following construction. The removal of any weedy tree species will be beneficial. Moderate effects of the construction of the pipeline bridge on the good quality native vegetation surrounding the Rawawaru Stream in the Lowtherhurst Reserve will need to be adequately mitigated. This would involve replacement planting of the site post construction and additional planting and/or other actions such as weed control. Key areas where effects on native vegetation and flora need to be managed are Taitapu Park, Lowtherhurst Reserve, the Tihema Stream crossing within the Manutewhau Reserve, The Eastern Abutment of the Greenhithe Bridge, Wainoni Park North (jack stations) and North Shore Memorial Park.

Fauna

Potential effects of the NI Project on habitat values to native fauna are associated with trenched construction only. Shafts associated with trenchless construction are located on open ground and these do not impact on habitat values at present, nor would they be expected to over the next 20 years.

Trenched construction would have low to moderate impact on fauna habitat values at six locations, including at Taitapu Park, Lowtherhurst Reserve, Tihema Stream Riparian Corridor, The Eastern Abutment of the Greenhithe Bridge, North Wainoni Park and North Shore Golf Course edge.

Provided that the recommended preclearance surveys for lizards and nesting birds are undertaken and a Lizard Management Plan is prepared and implemented, these effects would be less than minor.

Aquatic

All proposed works within proximity of watercourses or coastal areas can be mitigated with standard sediment control measures, bank stabilisation and revegetation.

Table 2 Notice of Requirement (Waitakere) Potential Adverse Effects before and after Mitigation

Receiving Environment		Potential adverse effects without mitigation	Proposed Mitigation	Potential adverse effects with mitigation
The Concourse to Selwood Road	Vegetation	Minor-moderate	Avoidance of large native trees Replacement planting	Less than minor
	Fauna	Minor	Avoidance of large native trees Replacement planting	Less than minor
	Aquatic	NA	NA	NA
Selwood Road to Huruhuru Road	Vegetation	Minor	Replacement planting	
	Fauna	Minor-moderate	Fauna management Plan and preclearance lizard surveys	Less than minor
	Aquatic	Moderate	Standard sediment control measures	Less than minor
Huruhuru Rd to Cedar Heights Ave	Vegetation	Moderate	Avoid mature native trees. Mitigation planting.	
	Fauna	Moderate	Fauna management Plan and preclearance lizard surveys	Less than minor
	Aquatic	Minor-moderate	Standard sediment control measures	Less than minor
Cedar Heights Ave to Holmes Reserve	Vegetation	Minor	Avoid native specimen trees/replacement planting	Less than minor
	Fauna	NA	NA	NA
	Aquatic	NA	NA	NA
Holmes Reserve to Holmes Dr	Vegetation	Minor	Replacement planting	
	Fauna	Moderate	Fauna management Plan and preclearance lizard surveys	Less than minor
	Aquatic	Minor	Standard sediment control measures, bank stabilisation and revegetation	Less than minor
Holmes Dr to Hobsonville Rd	Vegetation	Minor	Avoid native trees/replacement planting	Less than minor
	Fauna	NA	NA	NA
	Aquatic	NA	NA	NA

Table 3 Notice of Requirement (North Shore) Potential Adverse Effects before and after Mitigation

Receiving Environment		Potential adverse effects without mitigation	Proposed Mitigation	Potential adverse effects with mitigation
Eastern Abutment of the Greenhithe Bridge to Collins Park	Vegetation	Minor	Replacement Planting, avoid potential disturbance to roots of large kahikatea trees	Less than minor
	Fauna	Moderate	Fauna management Plan and preclearance lizard surveys	Less than minor
	Aquatic	Minor-moderate	Standard sediment control measures, bank stabilisation and revegetation	Less than minor
Collins Park to Wainoni Park	Vegetation	Less than minor	None	Less than minor
	Fauna	NA	NA	NA
	Aquatic	NA	NA	NA
South Wainoni Park	Vegetation	Less than minor	None	Less than minor
	Fauna	NA	NA	NA
	Aquatic	NA	NA	NA
North Wainoni Park to NS Memorial Park	Vegetation	Minor	Avoidance of native vegetation/replacement planting	Less than minor
	Fauna	Minor	Fauna management Plan and preclearance lizard surveys	Less than minor
	Aquatic	Less than minor	Standard sediment control measures, bank stabilisation and revegetation	Less than minor
NS Memorial Park to Schnapper Rock Rd	Vegetation	Minor	Avoid coastal kanuka fringing the estuary	
	Fauna	Less than minor	None	Less than minor
	Aquatic	NA	NA	NA
Schnapper Rock Rd to NS Golf Course	Vegetation	Less than minor	None	Less than minor
	Fauna	Less than minor	None	Less than minor
	Aquatic	Less than minor	None	Less than minor
NS Golf Course to Appleby Rd	Vegetation	Less than minor	None	Less than minor
	Fauna	Less than minor	Fauna management Plan and preclearance lizard surveys	Less than minor
	Aquatic	NA	NA	NA
Appleby Rd to William Pickering Dr	Vegetation	Less than minor	None	Less than minor
	Fauna	Less than minor	None	Less than minor
	Aquatic	Less than minor	None	Less than minor
William Pickering Dr to Bush Rd	Vegetation	Less than minor	None	Less than minor
	Fauna	Less than minor	None	Less than minor
	Aquatic	Less than minor	None	Less than minor
Bush Rd to Rosedale WWTP	Vegetation	Less than minor	None	Less than minor
	Fauna	Less than minor	None	Less than minor
	Aquatic	Less than minor	None	Less than minor

6 References

Goodman, J., Dunn, N. Ravenscroft, P., Allibone, R., Boubee, J., David, B., Griffiths, M., Ling, N., Hitchmough R. and Rolfe, J. (2014). Conservation status of New Zealand freshwater fish, 2013. New Zealand Threat Classification Series 7, May 2014. Department of Conservation. 12pp.

Hitchmough, R., Anderson, P., Barr, B., Monks, J., Lettink, M., Reardon, J., Tocher, M., Whitaker, T. (2013). Conservation status of New Zealand Reptiles, 2012. New Zealand Threat Classification Series 2. Department of Conservation, Wellington. 16p.

Mander, C., Hay, R., Powlesland, R. (1998). Monitoring and management of kereru (*Hemiphaga novaeseelandiae*). Department of Conservation Technical Series No. 15. Wellington.

NZ Transport Agency (2010). Western Ring Route SH16 Henderson Creek to Huruhuru Road Bridge. Ecological Assessment Report. 24 pp.

Robertson, H., Dowding, J., Elliott, G., Hitchmough, R., Miskelly, C., O'Donnell, C., Powlesland, R., Sagar, P., Scofield, P., Taylor, G. (2013). Conservation status of New Zealand birds, 2012. New Zealand Threat Classification Series 4. Department of Conservation, Wellington. 22 p.