

Technical Report E

Arboricultural Assessment



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| Project Name: | Greenhithe Bridge Watermain Duplication and Causeway |
| Report prepared for: | Watercare Services Limited |
| Date: | July 2015 |



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1.0 Introduction

GreensceneNZ Limited has been commissioned by *Watercare Services Limited* (Watercare) to assess the potential arboricultural effects related to the construction, operation and maintenance of Watercare's Greenhithe Bridge Watermain Duplication and Causeway Project.

The project comprises:

- The construction of a new watermain on the northern side of the Greenhithe Bridge to suplicate the existing North Harbour 1 (NH1) Watermain already located on the southern side of the bridge, and
- Widening along the northern side of the existing State Highway 18 (SH18) motorway causeway to accommodate the new watermain, as well as wastewater pipelines and associated facilities which form part of Watercare's proposed Northern Interceptor project.

The proposed water and wastewater infrastructure is required in order to maintain water and wastewater service levels and to provide for future growth.

The Greenhithe Bridge Watermain Duplication and Causeway project requires various resource consents under the Resource Management Act 1991 ("RMA"). This technical report provides specialist input for the *Greenhithe Bridge Watermain Duplication – Assessment of Effects on the Environment* report ("the main AEE") report prepared by URS New Zealand and Jacobs New Zealand Limited which supports the resource consent application. The works described in the AEE have been considered in the technical assessment presented in this report.

This report provides the following:

- A brief overview of the proposed works
- A description of the existing environment and an assessment of the actual or potential effects on the environment. This includes the identification of activities that could result in adverse effects and, in turn, identifying design refinements or construction methodologies that could avoid, remedy or mitigate such effects
- A proposed Tree Protection Methodology
- A brief outline of the statutory framework and relevant tree rules relating to arboricultural matters
- Recommended mitigation and management measures

The new watermain will eventually form part of Watercare's future North Harbour 2 Watermain project. The proposed widening of the motorway causeway will also incorporate wastewater pipelines and associated facilities which form part of Watercare's proposed Northern Interceptor project. Separate technical reports have or will be prepared for the future North Harbour 2 Watermain project and for the balance of the Northern Interceptor project.

1.1 Greenhithe Bridge Watermain Duplication and Causeway, Proposed Works

The proposed Greenhithe Bridge Watermain Duplication and Causeway (GBWD) works assessed in this report are the construction, operation and maintenance of:

- The proposed watermain from Station Street in Hobsonville, under SH18 to the coastal edge – this could involve open trenching from Station Street to SH18, and trenchless construction (pipe jacking) under SH18;

- Proposed causeway widening to accommodate the proposed watermain and wastewater pipelines – the proposed widening is approximately 860 metres in length and 15-50 metres in width along the northern side of the existing SH18 causeway;
- The proposed watermain attached to the underside of the Greenhithe Bridge; and
- A proposed watermain cross connection chamber close to the eastern abutment of the Greenhithe Bridge.

The proposed works are described in detail in the main AEE and on the drawings in AEE Vol 3. Key drawings showing the proposed works and construction methodology are copied in Appendix A of this report. The works described in the main AEE and shown on the appended drawings are assessed in this report.

2.0 Arboricultural Assessment

2.1 NH1 to NH2 cross connection and valve arrangement and micro-tunnel or pipe-jacking pit, southern side of SH18 (Site 1)

Installation of the concrete-lined steel pipeline cross connection from the NH1 pipeline on the southern side, under SH18 to the NH2 pipeline on the motorway causeway embankment on the northern side, and the associated valve arrangement chambers will require removal of vegetation. The area within the SH18 designated land where the proposed new pipeline will be constructed was re-vegetated as part of the new SH18 alignment. The vegetation is predominantly native vegetation, however there are some weed plant species present. The vegetation types are provided in Table 2 below. This vegetation is not protected by the District Plan rules or PAUP rules.

| Native specimens | | Exotic specimens <i>* = legally declared plant pest species</i> | |
|------------------|---------------------------------|--|-----------------------------------|
| Common name | Botanical name | Common name | Botanical name |
| Karamu | <i>Coprosma robusta</i> | Brush wattle | <i>Paraserianthes lophantha</i> * |
| Ti Kouka | <i>Cordyline australis</i> | Woolly nightshade | <i>Solanum mauritianum</i> * |
| Silver fern | <i>Cyathea dealbata</i> | Pampas grass | <i>Cortaderia selloana</i> * |
| Kanuka | <i>Kunzea ericoides</i> | Gorse | <i>Ulex europaeus</i> * |
| Mahoe | <i>Meliccytus ramiflorus</i> | Sydney Golden Wattle | <i>Acacia longifolia</i> |
| Mapou | <i>Myrsine australis</i> | Tree privet | <i>Ligustrum lucidum</i> * |
| Karo | <i>Pittosporum crassifolium</i> | | |

Table 1 – vegetation present on the southern side of SH18.

Where the proposed pipeline is to be constructed through areas of this vegetation the works site area will be minimised to avoid the unnecessary loss of existing vegetation. Setting out the parameters of the works site area in conjunction with an arborist should allow for the retention of as much of the existing vegetation as possible. Once the parameters of the works site have been established, temporary protective fencing will be erected on the periphery of the works site area to provide protection for retained existing vegetation that bounds the area.

2.2 NH1 to NH2 cross connection and valve arrangement and micro-tunnel or pipe-jacking pit and start of 1150mm CLS pipeline, northern side of SH18 (Site 2)

The site compound for this portion of the project includes the road reserve of SH18 and a portion of private property at the northern end of Squadron Drive (Lot 100 DP 475066 and Lot 1 DP 475066) with access from the Private Road that heads east of the roundabout at the northern end of Squadron Drive.

Installation of concrete-lined steel pipeline buried in the road reserve and associated site works will involve the removal of native and exotic vegetation on the road reserves, surrounding the existing stormwater sedimentation chamber, stormwater sand filter and outlet infrastructure, and the adjacent private property.

A temporary area for material lay-down and site offices and material storage will be formed adjacent to the public road portion of Private Road, between the property boundary and the formed road.

Trees growing within the adjoining private property to the north of the SH18 road reserve (locations based on existing fence lines found on site) is comprised of mature exotic trees. Some of the trees growing from the private property overhang the temporary construction lay-down area and this will result in there being works within the dripline of these trees. Excavations associated with forming this temporary lay-down area may require trees to be removed if the rootzones are compromised. Retention and protection of the trees may be possible if earthworks and soil modification are limited or avoided. Excavations for pipe installation adjacent to the boundary line will compromise trees that are immediately adjacent to the end of the public portion of Private Road, resulting in a need for trees to be removed.

Installation of a temporary construction access road (as shown on plan 2010673.008) requires the removal of a group of exotic trees growing with the southeastern corner of the private property at Lot 1 DP 475066. The temporary access route starts at the junction of the public road and the private road to the property, requiring the removal of all trees that are to the east of the private road, down to the Te Okariki Inlet. These trees form a substantial part of the vegetation on the land visible from and adjacent to the motorway. The trees are protected (when over 6m in height) according to the District Plan due to the site on which they are growing not meeting the definition of 'urban environment' according to the RMA Simplify and Streamline (2009) Bill. Resource Consent is required for their removal.

The existing vegetation that is located within SH18 boundaries appears to be no more than 10 years old. Much of the younger vegetation within the bounds of SH18 and surrounding the existing stormwater sedimentation chamber and the stormwater sand filter and outlet infrastructure will be removed to facilitate the construction of the proposed new 1150mm diameter pipeline and associated cross connection, pipe-jacking/micro-tunnel pit and valve arrangement chamber.

The vegetation types affected by the works within this area are provided in Table 2 below.

| Native species | | Exotic species | |
|----------------|--------------------------------|---|----------------------------------|
| | | * = legally declared plant pest species | |
| Common name | Botanical name | Common name | Botanical name |
| Mahoe | <i>Melicactus ramiflorus</i> | Tree privet | <i>Ligustrum lucidum*</i> |
| Ponga | <i>Cyathea dealbata</i> | Chinese privet | <i>Ligustrum sinense*</i> |
| Karaka | <i>Corynocarpus laevigatus</i> | Brush wattle | <i>Paraserianthes lophantha*</i> |
| Ti Kouka | <i>Cordyline australis</i> | Woolly nightshade | <i>Solanum mauritianum *</i> |
| Karo | <i>Pitosporum crassifolium</i> | Pampas grass | <i>Cortaderia selloana *</i> |
| Flax | <i>Phormium tenax</i> | Poplar | <i>Populus sp.</i> |
| Karamu | <i>Coprosma robusta</i> | Box elder | <i>Acer negundo</i> |
| Taupata | <i>Coprosma repens</i> | Macrocarpa | <i>Cupressus macrocarpa</i> |
| Mapou | <i>Myrsine australis</i> | Japanese cedar | <i>Cryptomeria japonica</i> |
| Kanuka | <i>Kunzea ericoides</i> | Silver dollar gum | <i>Eucalyptus cinerea</i> |
| Ngaio | <i>Myoporum laetum</i> | Gum | <i>Eucalyptus spp.</i> |
| Pohutukawa | <i>Metrosideros excelsa</i> | Norfolk Island pine | <i>Araucaria heterophylla</i> |
| Manuka | <i>Leptospermum scoparium</i> | | |

Table 2 - vegetation present on the northern side of SH18 and private property to the north.

Where vegetation is removed from this area it should be replaced to mitigate the effects of vegetation removal. The re-vegetation of the SH18 area will reflect what was removed and will therefore be based around selection of native plants suitable for revegetation and rapid establishment. The replanting within the private property will be subject to the agreement reached with the landowner, but should include a comprehensive landscape mitigation planting plan suitable to offset the effects that arise from removing substantial trees.

2.3 Causeway Embankment Widening, northern side of SH18, western end of Greenhithe Bridge (Site 3)

Widening of the existing motorway causeway embankment by 15m over a distance of 860m and the associated extension of six existing stormwater pipe culverts through the causeway embankment extension will involve the removal of all vegetation located on the causeway. This vegetation includes native and exotic plant species. The native plant species include pohutukawa trees (*Metrosideros excelsa*), Muehlenbeckia shrubs (*Muehlenbeckia astonii*), and flax (*Phormium sp.*). The exotic plant species include weed plant species such as brush wattle (*Paraserianthes lophantha*) and pampas grass (*Cortaderia selloana*).

The pohutukawa trees within the causeway area include a total of 122 trees greater than 1.2m in height. The pohutukawa trees are a mix of self-seeded trees and planted trees. The planted trees, established after causeway widening completed in 2005, have stakes and ties still attached to their main stems. The self-seeded pohutukawa have colonised the causeway embankment from local seed-source. These naturally-occurring trees highlight the resilience of coastal pohutukawa and the viability of natural seed source for natural regeneration. The removal of the trees will be a temporary set-back to the process of natural regeneration.

Mitigation for the loss of these trees should be included in the design of the causeway extension. This will require provision to be made for planting pits where access to soil environments can be made to allow trees to grow in a sustainable manner. Retention of planted trees that exist along the southern edge of the proposed site works area would minimise the effects of tree removal.

At the eastern end of the widened causeway, the proposed watermain will transition upwards to connect to the underside of the Greenhithe Bridge structure on the northern side of the bridge. The pipe will run east along the full length of the bridge, a distance of approximately 470m. These proposed works will not affect any additional trees or vegetation.

2.4 NH1 to NH2 cross connection and valve arrangement, northern side of SH18, eastern end of Greenhithe Bridge (Site 4)

At the eastern end of the Greenhithe Bridge on the northern side of SH18 the proposed pipeline will then detach from the Greenhithe Bridge and drop on a to a concrete support structure (23.9m long x 8m wide) where it will transition into the existing 910mm diameter pipeline with associated valve arrangement chamber and cross connection. Installation of buried concrete-lined steel pipeline in the road reserve on the northern side, east of Greenhithe Bridge is in an area characterised by long grass that is devoid of trees. However, alongside the northeast corner of Greenhithe Bridge there are four young pohutukawa (*Metrosideros excelsa*) and four ti kouka (*Cordyline australis*) that surround a series of brass plaques that commemorate the opening of the bridge. These trees will require removal. Reinstatement of the area in a state that is commensurate with the existing environment will occur on completion of the works.

Trees on the periphery of the works site area will require protection from construction-related effects.

3.0 Tree Protection Methodology

- 3.1 Where the clearance of vegetation is required to complete construction of the pipeline duplication and Northern Interceptor, the works will be carried out in a manner that avoids harm to protected trees and other native vegetation that is to be retained.
- 3.2 All protected trees proposed to be retained and growing in close proximity to the works associated with the pipeline construction and associated works, are to be protected in a manner that ensures that potential adverse effects are avoided and/or minimised.
- 3.3 A suitably experienced arborist (appointed arborist) should be engaged to provide specific advice in relation to the protection of trees and their roots whilst works are being carried out.
- 3.4 Areas for stockpiling materials and for storing machinery that are within the dripline area of trees that are to be retained should include measures to avoid soil excavation, modification and compaction. This should include emplacement of materials such as geotextile fabric, coarse metal aggregates and/or wood-chip mulch on existing ground level to prevent compaction of top soil. The site lay-down area should be confirmed with the appointed arborist prior to commencement of the works on each site.
- 3.5 Where appropriate, protective fencing (consisting of 1.8 metre high pole mesh fencing or protective water-filled barriers or acceptable equivalent) is to be erected and positioned between the line of works and all permeable areas within the dripline of protected trees so as to restrict access to/storage on such areas. The protective fencing is to be erected prior to any works occurring in close proximity to protected trees.
- 3.6 All excavation machinery is to operate from outside the dripline of protected trees unless the machinery can operate from and remain fully on top of an existing impermeable hard surface or temporary surface emplaced for this purpose.

- 3.7 Treatment of tree roots associated with the pipeline installation and open cut trenching works is to be undertaken in the following manner:
- a) All exposed tree roots are to be retained and protected from damage and from drying-out by a covering of hessian (or accepted equivalent) that is to be kept damp until the excavated area can be backfilled.
 - b) Roots that require removal, will be cleanly cut back to the edge of excavations with a sharp implement such as a handsaw or a pair of secateurs. All root pruning that is required will be undertaken by the appointed arborist.
 - c) When backfilling an excavated area, a 50mm layer of sand, topsoil or other suitable approved materials will surround all retained roots.
- 3.8 Removal of vegetation within the works site areas will be mitigated by replacement planting of suitable species in locations where they were removed from or in new areas where there is agreement from respective landowners, Council and/or Transit New Zealand representatives.

4.0 Arboricultural Planning Assessment

4.1 Auckland Council District Plan – Waitakere Section 2003:

4.1.1 *Coastal Natural Area Rule 2 – Vegetation Alteration*

- *Rule 2.2 Controlled Activities – (a)*

Any vegetation alteration of exotic vegetation less than 6 metres in height (as measured at 1.4m above the ground) and less than 600mm in girth or vegetation listed in the Environmentally Damaging Plants Appendix and the Removable Vegetation Appendix to a total cleared area greater than 500m².

Comment: The proposed works required to establish a proposed access road, parking and turning area from Station Street, Hobsonville to the southern end of the proposed pipeline cross connection will require the removal of more than 500m² of exotic vegetation, inclusive of vegetation listed in the *Environmentally Damaging Plants Appendix and the Removable Vegetation Appendix*.

- *Rule 2.4 Discretionary Activity*

The clearance of any vegetation not meeting the standards in Rules 2.1, 2.2 and 2.3 for the establishment of a building platform, driveway or infrastructure provided that clearance on any site or proposed site does not increase the total cleared area (including any existing cleared area) of the net site area to more than 300m².

Comment: The proposed works required to establish a proposed access road, parking and turning area from Station Street, Hobsonville to the southern end of the proposed pipeline cross connection and works proposed on the northern side of the existing stormwater infrastructure (sedimentation chamber and sand filter) located on the northern side of SH18 and at the western end of the causeway will require the removal of native vegetation from within areas with a Coastal Natural Area zoning beyond 500m² (inclusive of existing cleared areas).

4.1.2 *Riparian Margin / Coastal Edges Natural Area (15m) Rule 2 – Vegetation Alteration*

- *Rule 2.4 Discretionary Activity*

The clearance of native vegetation for the purposes of establishing driveways, roads or infrastructure not meeting the standards in Rule 2.3(b).

Comment: The proposed works required to establish a proposed access road, parking and turning area from Station Street, Hobsonville to the southern end of the proposed pipeline cross connection and works proposed on the northern side of the existing stormwater infrastructure (sedimentation chamber and sand filter) located on the northern side of SH18 and at the western end of the causeway will require the removal of native vegetation from within areas with a Riparian Margin / Coastal Edges Natural Area (20m) zoning.

4.1.3 Managed Natural Area Rule 2 – Vegetation Alteration

- *Rule 2.3 Limited Discretionary Activity*

Clearance of any native vegetation not meeting the standards in Rules 2.1, and 2.2 provided the clearance is for the establishment of a building platform, driveway or infrastructure and provided further that cutting and clearance on any site or proposed site does not increase the total cleared area of the net site area to more than 300m².

Comment: The proposed works on the northern side of the existing stormwater infrastructure (sedimentation chamber and sand filter) located on the northern side of SH18 and at the western end of the causeway will require the removal of up to 300m² of native vegetation from within areas with a Managed Natural Area zoning.

4.2 Auckland Council District Plan – North Shore Section 2003:

4.1.4 Rule 8.4.6.3 Protection of Trees on Roads and Reserves

- *8.4.6.3a) i) & iii) states that any cut or alteration and works within the rootzone of any tree located on any road, public reserve or recreational land is considered to be a Limited Discretionary Activity.*

Comment: The proposal requires excavations to be undertaken within the dripline of trees located within road reserve of SH18.

- *8.4.6.3b) i) states that any destruction or removal of any tree located within road reserve, public reserves and/or recreational land is considered to be a Discretionary Activity.*

Comment: The proposal requires the removal of trees which are located within road reserve of SH18.

4.1.5 Rule 8.4.6.1.3 Discretionary Activities

- *8.4.6.1.3 a) i) states any trimming, alteration, or removal of any pohutukawa (Metrosideros excelsa) of 3 metres or more in height located within the Coastal Conservation Area, shall be assessed as a Discretionary Activity.*

Comment: There are pohutukawa trees located within the proposed works site area at the eastern end of the Greenhithe bridge and on the northern side of SH18 that will require removal to facilitate the proposed works.

4.3 Proposed Auckland Unitary Plan

According to the Proposed Auckland Unitary Plan the site is subject to various rules and designations.

4.1.6 Section 4.3, 1.2 Vegetation Management in Overlays

- *According to the Activity Table any vegetation alteration or removal within areas that are encompassed by Significant Ecological Areas overlays requires consent to a Discretionary Activity.*

Comment: Locations along the northern edge of Greenhithe Bridge causeway contain a Natural Resource: Significant Ecological Areas overlay.

4.4 Summary

It has been established that the proposed development works will require removal of native and exotic vegetation to allow for the water pipe installation and associated activities. The native and exotic vegetation is afforded protection from the Operative Auckland Council District Plan (Waitakere and North Shore Sections) and the Proposed Auckland Unitary Plan. Accordingly, the works will require resource consent for a Discretionary Activity.

5.0 Conclusions

- 5.1 It is proposed to construct the North Harbour No.2 water pipeline across Greenhithe Bridge, with cross connections to the North Harbour No.1 at Station Street, Hobsonville and at the eastern end of Greenhithe Bridge.
- 5.2 The proposed works will require the removal of vegetation from four areas along the route, including within one private property. These areas are depicted on the site plans in Appendix A of this report.
- 5.3 Provided the proposed works are carried out in accordance with the tree protection methodology contained in Section 5 of this report and replacement planting is carried out within locations in the vicinity of where vegetation is removed, adverse effects on protected vegetation will be suitably avoided and mitigated.
- 5.4 The vegetation that is affected by the works on public and state highway land consists of small, recently planted trees within the road reserve of SH18. The proposal results in a temporary set-back to the establishment of vegetation within the areas of works.
- 5.5 The vegetation that is affected by the works on private property consists of large, mature exotic trees. The proposal results in adverse effects from the removal of mature trees, which will be mitigated by replanting.

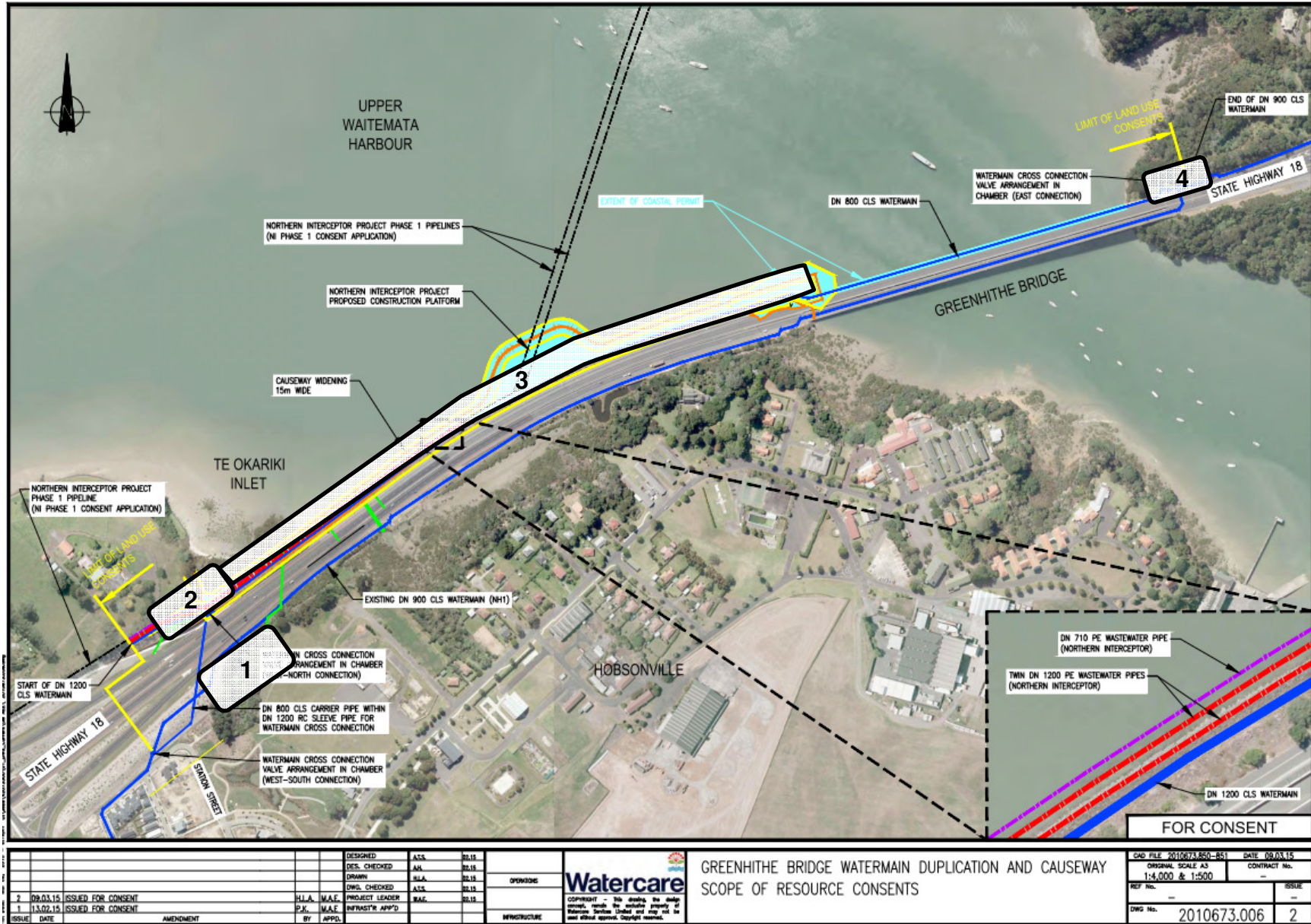
APPENDIX A

TREE/VEGETATION REMOVAL AREAS

KEY

- 1 – NH1 to NH2 cross connection and valve arrangement and micro-tunnel or pipe-jacking pit, southern side of SH18
- 2 – NH1 to NH2 cross connection and valve arrangement and micro-tunnel or pipe-jacking pit and start of 1150mm CLS pipeline, northern side of SH18
- 3 – Causeway Embankment Widening, northern side of SH18, western end of Greenhithe Bridge
- 4 – NH1 to NH2 cross connection and valve arrangement, northern side of SH18, eastern end of Greenhithe Bridge

Greenhithe Bridge Watermain Duplication and Causeway



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