

# Appendix R

# Grey Lynn Tunnel



Assessment of Landscape and Visual Effects  
Prepared for Watercare Services Ltd

20 February 2019

The logo for Boffa Miskell, featuring a large, stylized white 'C' shape on a dark teal background.

Boffa Miskell

## Document Quality Assurance

<b>Bibliographic reference for citation:</b> Boffa Miskell Limited 2019. <i>Grey Lynn Tunnel: Assessment of Landscape and Visual Effects</i> . Report prepared by Boffa Miskell Limited for Watercare Services Ltd.		
Prepared by:	Kerttu Ots Associate Principal / Landscape Architect Boffa Miskell Limited	
Reviewed by:	John Goodwin Partner / Landscape Architect Boffa Miskell Limited	
Status: [FINAL]	Revision / version: [2]	Issue date: 20 February 2019
<b>Use and Reliance</b> This report has been prepared by Boffa Miskell Limited on the specific instructions of our Client. It is solely for our Client's use for the purpose for which it is intended in accordance with the agreed scope of work. Boffa Miskell does not accept any liability or responsibility in relation to the use of this report contrary to the above, or to any person other than the Client. Any use or reliance by a third party is at that party's own risk. Where information has been supplied by the Client or obtained from other external sources, it has been assumed that it is accurate, without independent verification, unless otherwise indicated. No liability or responsibility is accepted by Boffa Miskell Limited for any errors or omissions to the extent that they arise from inaccurate information provided by the Client or any external source.		

Template revision: 20170625 0000

File ref: A08301E\_GreyLynnTunnel\_LVEA\_Final.docx

# CONTENTS

Abbreviations	1
Glossary of Key Terms	1
1.0 Executive Summary	3
2.0 Introduction	3
3.0 Methodology	4
4.0 Planning Context	5
5.0 Landscape and Site Context	5
6.0 Proposed Infrastructure	8
6.1 Construction	8
6.2 Site Reinstatement	9
6.3 Operation Phase	9
7.0 Visual Catchment and Viewing Audiences	10
8.0 Assessment of Landscape and Visual Effects	14
8.1 Effects on Landscape Character	14
8.2 Effects on Visual Amenity	15
9.0 Summary and Conclusions	17

## Appendices

Appendix 1: Assessment Methodology

Appendix 2: Maps





# Abbreviations

**AC** - Auckland Council

**AEE** - Assessment of Environmental Effects

**ATF** - Air Treatment Facility

**AUP OIP** - Auckland Unitary Plan Operative in part

**CBD** - Central Business District

**CI** - Central Interceptor

**CSO** - Combined Sewer Overflow

**GLT** – Grey Lynn Tunnel

**LVEA** - Landscape and Visual Effects Assessment

**NoR** - Notice of Requirement

**RC** - Resource Consent

**RL** - Reduced level; this is based on a mean sea level above datum

**RMA** - Resource Management Act

**TBM** - Tunnel Boring Machine

**Watercare** - Watercare Services Ltd

## Glossary of Key Terms

**Amenity** - Amenity values are those values which create the appeal of a particular place. They are the natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence and recreational attributes.

**Baseline** - The landscape and visual character as it exists at the commencement of the assessment process – i.e. prior to the development proposal under consideration.

**Building Envelope** – For the purpose of assessing the effects of the proposal on the environment, and providing the community with information about the proposal, design parameters have been developed for the site that define a three-dimensional envelope within which the construction, operation and maintenance of the future development will occur.

**Landscape Character** - Is the distinct and recognisable pattern of elements that occur consistently in a particular landscape. These elements reflect particular combinations of geology, landform, soils, vegetation, land use and human settlement.

**Landscape Capacity** - The degree to which a particular landscape character type or area is able to accommodate change without unacceptable adverse effects on its character. Capacity is likely to vary according to the type and nature of change being proposed.

**Landscape Effect** – Change in the physical landscape, which may change its character or value.

**Landscape Feature** – An element which is a small part of the landscape and has characteristics which distinguish it from the wider landscape.

**Magnitude (of change)** - A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration.

**Perception** - Combines the sensory (that we receive through our senses) with the cognitive (our knowledge and understanding gained from many sources and experiences.) The aesthetic and perceptual aspects of the landscape/seascape include such aspects as scale, openness/enclosure, form, pattern, unity, colour, movement etc.

**Residual Effects** - Those effects remaining after the implementation (where necessary) of the proposed mitigation, compensation and enhancement measures.

**Visual Amenity** – Relates to the perceptual component of amenity, that is the visual qualities perceived by people.

**Visual Effect** – Change to a specific view which may change the visual amenity experienced by people.

**Zone of Theoretical Visibility** - A map, usually digitally produced, showing areas of land within which a development is theoretically visible. Also known as an Extent of Visibility.

## 1.0 Executive Summary

Watercare Services Ltd proposes to carry out works at the eastern end of Tawariki Street, Grey Lynn to construct a new wastewater collector system (Tawariki Street Shaft Site) to be connected to the Central Interceptor. Works associated with the Tawariki Street Shaft Site will necessitate excavations for the construction of two drop shafts, underground wastewater control / grit chambers, and an above ground plant / ventilation building with integrated air vent stack.

The Landscape and Visual Effects Assessment assesses the effects of the proposed infrastructure at Tawariki Street on physical landscape elements, landscape character and visual amenity. The assessment considered both temporary construction and permanent operational effects resulting from the proposed infrastructure.

The assessment concludes that both temporary and permanent effects upon the landscape and visual amenity will be limited and localised within the site boundary and in close proximity to the site and activity.

During the construction phase the operating machinery will generate the main character change on Tawariki Street by introducing structures typical of such activity within a residential neighbourhood. Views of the construction activities will be generally contained by topography and intervening buildings / vegetation, resulting in low (less than minor) adverse effects on the wider area and low-moderate (a minor level of) adverse effects on the Tawariki streetscape amenity. High (more than minor) short term adverse effects on visual amenity are expected on a few properties, which are located on an elevated position directly opposite to the subject site.

The permanent above ground structures such as the plant / ventilation building, and air stack, will be designed to be suitable for a residential area. Therefore, the operational effects on the wider area and on the Tawariki streetscape are considered to reduce to a low (less than minor) level, with no effects on the wider surrounding urban landscape. Visual amenity effects are also evaluated as low (less than minor) on Tawariki Street and the wider area, with low-moderate (minor) adverse effects on the visual amenity of properties opposite to the subject site at Nos. 35-41 Tawariki Street.

## 2.0 Introduction

The Landscape and Visual Effects Assessment (LVEA) will form part of a Notice of Requirement (NoR) and Resource Consent (RC) application for the proposed wastewater interceptor from Tawariki Street, Grey Lynn to Western Springs Reserve ("Grey Lynn Tunnel"). The Grey Lynn Tunnel (GLT) will connect to the Central Interceptor at Western Springs.

The LVEA is prepared by registered Landscape Architects at Boffa Miskell Ltd for Watercare and examines the landscape and visual amenity effects caused by the proposed infrastructure for both the construction phase (temporary effects) and operational phase (permanent / residual effects) of the project.

The LVEA presents an assessment of the effects of the proposed infrastructure at Tawariki Street on physical landscape elements, landscape character and visual amenity:

- **Landscape effects** derive from changes in the physical landscape, which may give rise to changes in its character and how this is experienced. This may in turn affect the perceived value ascribed to the landscape.
- **Visual effects** relate to the changes that arise in the composition of available views as a result of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity<sup>1</sup>.

This assessment of landscape and visual effects report has been based on information provided by the Grey Lynn Tunnel Project Team. Details of the proposed works / development are included in the Assessment of Environmental Effects (AEE) documents, including the other specialists reports and drawings. Particular reference has been made to the Tawariki Site General Arrangement – Site Layout Plan (Drawing No. 2012917.100).

## 3.0 Methodology

This assessment of landscape and visual amenity effects has been undertaken with reference to a number of nationally and internationally recognised guidance documents. These include the Quality Planning Landscape Guidance Note<sup>2</sup> with its signposts to examples of best practice including: the UK guidelines for landscape and visual impact assessment<sup>3</sup> and the New Zealand Landscape Institute Guidelines for Landscape Assessment<sup>4</sup>. This assessment has also been undertaken with consideration of the Auckland Council Information Requirements for the assessment of Landscape and Visual Effects (September 2017)<sup>5</sup>.

Assessing the significance of landscape and visual effects involves a combination of both qualitative and quantitative processes and relies on reasoned professional judgement. While there is some scope for quantitative measurements (i.e. the amount of earthworks or vegetation removed, or numbers of trees planted) much of the assessment relies on qualitative judgement (i.e. relating to visual amenity or the change in character of an area of landscape)<sup>6</sup>. Therefore, the determination of the scale of potential landscape and visual effects can only be defined in relation to the individual development and its location.

The assessment criteria and effects ratings are set out in the assessment methodology in Appendix 1.

### Site Inspection

Site inspections were carried out on 1 June and 1 August 2018. The site visits enabled the assessors to understand the general site conditions and character and the relationship of the site to the surrounding topography, buildings and vegetation; and the likely visibility of the

<sup>1</sup> <http://www.qualityplanning.org.nz/index.php/planning-tools/land/landscape/landscape-assessment>

<sup>2</sup> <http://www.qualityplanning.org.nz/index.php/planning-tools/land/landscape>

<sup>3</sup> Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, 2013

<sup>4</sup> Best Practice Note Landscape Assessment and Sustainable Management 10.1, NZILA

<sup>5</sup> <http://www.aucklanddesignmanual.co.nz/resources/tools/landscapeandvisualeffectsassessment>

<sup>6</sup> <http://www.aucklanddesignmanual.co.nz/resources/tools/landscapeandvisualeffectsassessment>

subject site / proposed infrastructure. Key landscape / streetscape features and sensitive viewer locations were also identified during the field survey.

## 4.0 Planning Context

The proposed site is subject to the Auckland Unitary Plan Operative in Part (AUP OIP) provisions. The majority of the subject site is currently in three residential lots (Nos. 44,46 and 48 Tawariki Street), each containing a detached single family home, with the road reserve in front of these lots also forming part of the proposed site as depicted in the Site Layout Plan. The underlying zoning of the three lots and residential land opposite and to the west is zoned Residential – Mixed Housing Urban Zone<sup>7</sup>. The northern boundary of the site borders the Marist School and Church land and the eastern edge of the site borders the St Paul's School playing field grounds, both zoned as Special Purpose - Schools.

The site and surrounding land outlined above is not subject to any landscape protection, special character or heritage overlays<sup>8</sup>.

## 5.0 Landscape and Site Context

The subject site is located at the end of the cul de sac on Tawariki Street, within the residential suburb of Ponsonby, 2 km to the west of the Auckland Central Business District (CBD)<sup>9</sup>. Although the subject site area is part of Ponsonby, streets including Tawariki Street, Hukanui Crescent, Moira Street have been developed subsequent to the original grid of Ponsonby. This disassociation with the heritage of the Ponsonby area is reinforced through the Auckland Unitary Plan zoning which has most of the Ponsonby area to the north and east zoned as Residential – Single House Zone<sup>10</sup>, whereas the subject site is within Residential – Mixed Housing Urban Zone which provides for development of up to 3 storeys (maximum 12m high).

The main grid of Ponsonby is orientated along a ridge running north-south, which is followed by the main street of the suburb, Ponsonby Road, 700m away at its closest point to the subject site. The topography of the area falls from this ridge to the west towards Cox's Bay (1.1 km from the subject site).

Tawariki Street extends between Parawai Crescent 400m to the west of the subject site, and St Paul's College Sports grounds of which the subject site abuts to the east. Tawariki Street, including the subject site, is closely bounded by two large landholdings, Marist Catholic School to the north and St Paul's College grounds immediately to the east of the subject site.

St Paul's College for boys is a 7.3-hectare landholding with extensive grounds for sporting and other activities. The 300m x 130m, sports field is located approximately 7m above the Tawariki

---

<sup>7</sup> Appendix 2: Auckland Unitary Plan Zoning

<sup>8</sup> Appendix 2: Auckland Unitary Plan Overlays

<sup>9</sup> Appendix 2: Context Map

<sup>10</sup> Appendix 2: Auckland Unitary Plan Zoning

Street level and accordingly above the subject site. Topographically Tawariki Street and the houses along its northern side lie in a gully, and properties on the southern side of the street benefit from an elevated position above the gully floor.

The streetscape of Tawariki Street has an established residential character with timber weatherboard bungalows on regular sized lots, with mature trees as a feature both on the street and in front and rear gardens. Most dwellings are set back from the street, thereby creating a pleasant leafy residential character. As a cul de sac, Tawariki Street does not have through-traffic for vehicles however for pedestrians there are two footpath connections (along the west and east side of Moira Reserve) that connect with Moira Street and further to the south with Richmond Road.

Vehicle access to the cul de sac of Tawariki Street is accessed from Parawai Crescent, which links with Richmond Road, 200m to the south. Richmond Road is a major arterial corridor with a collection of local shops at the intersection with Parawai Crescent.



Photo 1: The cul de sac end of Tawariki Street, with the bank of St Paul's Collage playgrounds forming an enclosed backdrop.





Photo 2: View towards the subject site on Tawariki Street. Dwellings: No's 42 (will remain) and 44-48 Tawariki Street (will be removed).



Photo 3: View towards the subject site along well vegetated street frontage of Tawariki Street.



## 6.0 Proposed Infrastructure

The Grey Lynn Tunnel involves construction, operation and maintenance of a 1.6km gravity tunnel from Western Springs to Tawariki Street, Grey Lynn with a 4.5m internal diameter, at an approximate depth of between 15 to 62m below ground surface, depending on local topography. The tunnel will be constructed northwards from Western Springs using a Tunnel Boring Machine ("TBM"). The Grey Lynn Tunnel will connect to the Central Interceptor at Western Springs via the Western Springs shaft site.

The GLT also involves construction, operation and maintenance of two shafts and associated structures at Tawariki Street. In order to accommodate the proposed development, the removal of three dwellings, No's 44-48 Tawariki Street will be required at the cul de sac end which abuts with the western boundary of the St Paul's College playing fields. Construction works will also take place within the road reserve at the eastern end of Tawariki Street and a small area of school land (St Paul's College) bordering the end of Tawariki Street (approximately 150m<sup>2</sup>).

The timing and duration of the works will result in different types of effects during the construction and operational phases.

### 6.1 Construction

Tunnelling will be undertaken by a TBM, while the wastewater interceptor construction works at Tawariki Street, which have the potential to generate landscape and visual effects will involve the following:

- Construction of a perimeter fence up to 2.4m in height;
- Excavation and construction of 25m deep (26-27m excavated depth) / 12m excavated for TBM retrieval, and 10.8m finished inside diameter for the final drop structure;
- Construction of connections to Orakei Main Sewer and Tawariki Combined Sewer Overflow (CSO);
- Excavation and construction of control chambers approximately 10m long, 5m wide and 11m deep below ground;
- Construction of the plant / ventilation building approximately 14m long, 6m wide and 4m high with incorporated 5m high air vent stack;
- Construction of the 44m long, 3m wide and 2m high retaining wall;
- Replacement of the existing grit trap approximately 16m long, 5m wide and 13m deep;
- TBM retrieval from the Tawariki shaft; and
- Activities of the construction machinery will include shaft excavation mechanical equipment e.g. CAT 330 medium hydraulics excavators and two cranes, for the shaft construction a typical crawler 120t crane and for the TBM recovery 450t crane. The highest lift of the cranes will be 30m.

According to the Arboricultural Assessment<sup>11</sup> a number of trees within the properties boundaries and growing on the bank along site's eastern boundary, which is within the ground of St Paul's College, will require removal, or works within their root zone.

The trees identified as being potentially impacted by the proposed works, are identified as either plant pests (e.g. wattle, woolly nightshade) or only of fair condition. None of the trees are protected under the relevant rules of the AUP OIP and their removal is regarded as a permitted activity.

In order to place the proposed control chamber (for the Orakei Main Sewer) next to the bank and allow machinery to manoeuvre around, a concrete retaining wall will be erected, which will involve cut into the bank abutting with the site's eastern boundary, part of St Paul's School grounds.

## Construction Timeframe

The construction works for the main shaft, chambers and tunnel will occur at the same time as works for the Central Interceptor. Construction will be up to 2½ years total duration. The construction of the main shaft and chambers is estimated to take approximately 12 months initially, followed by a hiatus of several months waiting for the TBM to arrive at Tawariki Street Shaft Site. This will be followed by approximately 9 months of activity to remove the TBM and complete the internal structure of the main shaft.

The secondary shaft will be constructed in conjunction with the future sewers at a later date but (subject to need) within a 10-year period following construction of the main shaft and tunnel.

## Mitigation

Perimeter fences (1.8-2.4m high) will be set around the main works area to secure the site. It is likely that solid plywood wall will be used to reduce noise emissions and improve security. This fence will also screen lower level construction activities and to maintain public health and safety.

## 6.2 Site Reinstatement

The shaft roof slabs (i.e. lids) will be buried except for manholes and hatches at the ground surface which will be secured from public entry. The site will be reinstated upon completion of construction and surfaced with a mix of concrete hardstand and trafficable, grassed surface with planting along the site perimeter. Hard surfaces are proposed around the plant building and on top of the main shaft, and for access from the street to the building. The rest of the site will be in grass.

## 6.3 Operation Phase

The only facility remaining above-ground level will be the proposed plant and ventilation building. The facility will be of a small scale (single storey 14m x 6m,) located close to the site's north eastern corner and designed with materials suitable to be visually integrated into the residential area.

---

<sup>11</sup> Greenscene NZ, 2018, Assessment of Arboricultural Effects Grey Lynn Tunnel

An air vent in a form of a 5 m stack (total height) will be incorporated into the plant and control building and discharge air vertically via a roof vent. The vent stack will be designed with a flange to allow future extension of up to 8 m in total height and approximately 1 m in diameter in the unexpected event of odour issues. The height of the roofline will be 4m, so the 5m stack will be a metre above the roofline and the 8m extendable stack (only required in the event that odour nuisance occurs i.e. less than a 1 in 10-year event) will be 4m above the roofline. The stack will therefore be another above ground visible feature. This LVEA assesses the worst case scenario with a permanent vent air stack of up to 8m high (4m above the roofline).

In addition, the permanent concrete retaining wall (approximately 44m long, 3m wide and 2m high) of the bank at the end of Tawariki Street will be part of the change on the streetscape of Tawariki Street.

## Mitigation

It is expected that the proposed plant and ventilation building will be completed with a simple but appropriate design, using recessive materials and colours. This should include a design treatment to integrate the building and air vent into the surrounding residential neighbourhood.

The ventilation stack represents an industrial element and therefore recessive materials and dark colours would help to blend it with the tree-belt adjacent to the site's northern boundary on the Marist School property.

The retaining wall along the site's eastern boundary will be designed to fit into the suburban context. There are a number of decorative and colouring options for concrete walls to allow the best integration to the surrounding context. Planting could also be undertaken to assist to reduce the scale of the 2m high wall and soften its appearance.

Within the site's boundaries there would be limited space for tree planting, however this will also be considered following the second shaft construction in ten years' time along with other landscaping appropriate to this residential neighbourhood.

## 7.0 Visual Catchment and Viewing Audiences

The subject site is topographically well sited, benefiting from an enclosed low level (approx. contour level of RL12m) location on a gully floor. The St Paul's Collage playgrounds (approx. contour level of RL22m) rises immediately to the east of the site, screening views from the east of any structure up to approximately 8-10m above the site's ground level. Properties and associated vegetation on top of the slope of the gully rising to the south of the subject site will intervene in many views from the south. In views from the north the mature tree-belt on the northern slope of the gully obscures visibility of the site. Views from the west along / from Tawariki Street are also screened / densely filtered by the intervening dwellings and associated vegetation.

On this basis, it is considered that potential visibility of the majority of the proposed development will be largely restricted to close proximity properties / viewers, which are located opposite to the subject site at the end of Tawariki Street. Limited filtered views may also be afforded from Moira Reserve and from some properties along this street that are located to the

south of the site. Existing mature treebelt on the north western boundary of Moira Reserve screens views from properties further to the south-west.

However, the proposed development involves high structures such as cranes (up to 30m high) and a permanent vent air stack (if 4m above the roofline) which could be seen within the wider area.

In order to assist in evaluating potential visual effects arising from the cranes and air vent, a Zone of Theoretical Visibility (ZTV) map<sup>12</sup> was generated to identify the potential extent of the related visibility over the surrounding area and to identify potentially affected viewing audiences. The potential visibility of the cranes' hoists is illustrated by the ZTV in Figures 5 and 6 respectively.<sup>13</sup>

The ZTV of the cranes indicates potential distant sporadic visibility along Summer Street and from upper level buildings in the Ponsonby / Grey Lynn area, and close proximity views along the eastern end of Tawariki Street, Moira Reserve and a few houses to the south, and also St Paul's School Playground.

Based on the ZTV and site / surrounding area inspection the following sensitive viewing audience (as identified in Figure 4) is identified for this assessment:

- the closest residences (No 35-41) immediately adjacent to the site's southern boundary (Photo 4);
- property No 42 next to the site's western boundary (Photo2);
- Moira Reserve playground (Photo 5);
- the path which connects Tawariki Street and Moira Street (Photo 5);
- four houses (No 22-28), located to the south on the northern side of Moira Street (Photo 6); and
- properties on John Street close to its intersection with Summer Street (Photo 8).



Photo 4: View of the closest residences (No 35-41) immediately adjacent to the site's southern boundary.

<sup>12</sup> Appendix 2: Visibility Analysis - Above Ground

<sup>13</sup> Appendix 1: ZTV Methodology



Photo 5: View from the footpath to the east of the Moira Reserve towards the subject site.



Photo 6: View is taken from Moira Reserve, towards the properties alongside its southern boundary.





Photo 7: View is taken at the driveway to the church of 'Our Lady of Perpetual Help', towards the subject site.



Photo 8: View towards the subject site on John Street close to its intersection with Summer Street.

## 8.0 Assessment of Landscape and Visual Effects

The degree to which landscape character and visual effects are generated by a proposal depends on a number of factors. These include:

- The degree to which the proposal contrasts, or is consistent, with the qualities of the surrounding landscape;
- The proportion of the proposal that is visible, determined by the observer's position relative to the objects viewed;
- The distance and foreground context within which the proposal is viewed;
- The area or extent of visual catchment from which the proposal is visible;
- The number of viewers, their location and situation (static or moving) in relation to the view;
- The backdrop and context within which the proposal is viewed;
- The predictable and likely known future character of the locality; and
- The quality of the resultant landscape, its aesthetic values and contribution to the wider landscape / streetscape character to the area.

In urban areas, and in particular those areas identified for more intensive future forms of urban residential and mixed-use living, change including the introduction of taller and larger scaled buildings with bigger footprints can be expected. The appropriateness of such buildings will depend on their context and the way in which they are designed and positioned to relate to the public realm and their neighbours, having regard to the outcomes expected by the Unitary Plan standards.

The significance of effects has been determined according to the seven-point rating scale set out in Appendix 1.

### 8.1 Effects on Landscape Character

The location of the subject site within a quiet residential area is considered relatively sensitive to the proposed development, the construction of which will involve mobile / moving machinery that will temporarily block the pedestrian path to the east of the Moira Reserve. However, the enclosed setting of the subject site is zoned as Residential – Mixed Housing Urban and its location is outside of any protected landscape overlays, makes the site less sensitive in comparison to surrounding urban areas.

#### Short Term / Temporary

The construction works will affect the existing character of the Tawariki streetscape, however activities such as the removal of houses and site vegetation are permitted activities ensuring the type of change is applicable in Residential – Mixed Housing Urban Zone. The ground effects due to the excavation works will be limited within the site's boundary and will be largely

restored. On this basis the operating machinery will generate the main character change by introducing construction structures on Tawariki Street and affecting the surrounding urban landscape character. Large cranes are not typically seen as being part of suburban character and it is therefore considered that construction works will have **moderate** short term adverse effects on the Tawariki streetscape and **low** adverse effect on the wider urban landscape for the duration of the works.

## Long Term / Permanent

The permanent change on the Tawariki streetscape by the proposed infrastructure is evaluated **low** adverse and **very low** neutral on the wider urban landscape. This is based on the plant / ventilation building, and air vent stack being designed as being appropriate for a suburban setting e.g. through the use of appropriate materials and colours that are visually recessive. The magnitude of change will be limited, and the scale and type of change is not out of character with Residential – Mixed Housing Urban Zone, where areas for infrastructure facilities are part of the urban environment. The enclosed setting at the end of Tawariki Street limits the magnitude of change. In the case of the proposed development the selection of the site has been part of the process in avoiding the potential adverse effects caused by the type of the works / infrastructure proposed, resulting in the site being located at the end of Tawariki Street.

## Summary Table: Landscape Effects

Landscape Effects on	Short Term Effects	Long Term Effects
Tawariki streetscape	Moderate	Low
Wider urban landscape	Low	Very low

## 8.2 Effects on Visual Amenity

Assessment of the visual effects of the proposed infrastructure relates to changes in the visual amenity of the range of potential viewing audiences i.e. the degree of change in character and quality of views. Visual effects result from changes to specific views experienced by people.

Generally residential and recreational viewers are considered as a sensitive viewing audience to the type of change proposed.

## Short Term / Temporary

Although views of the construction activities will be generally contained by topography and intervening buildings / vegetation, with only upper parts of the cranes' hoists potentially visible within the wider area, close to the site the effects on visual amenity are considered to result in **high** level adverse effects on a limited number of properties (Nos 41, 39 and 37), which are located directly opposite to the subject site and will therefore overlook the works from an elevated position above the subject site.

Viewers in the property at No. 42 on the site's western boundary, although slightly less affected due to the dwelling being at the same level as the subject site, and not being orientated towards the site, are also considered to be adversely affected to a moderate-high level.

The magnitude of change will drop immediately beyond the boundaries of the above named closest properties.



Views from Moira Reserve playground (Photo 5) to the south of the subject site are regarded to be less affected, although occupying an elevated location above the site, a clear view over the site is not available due to the intervening dwellings and vegetation, however the upper parts of the cranes will be seen by playground users. Also a few properties on the eastern end of Moira Street, approximately 90m to the south of the subject site, will have views of operating cranes on the site from second storey windows, which look over from their rear north facing gardens.

Crane hoists are a relatively slim tilted vertical structure, the visual appearance of which is somewhat transparent, and more easily obscured / filtered by intervening trees / buildings than a solid object. Due to the low level location of the site it is expected that only the upper part of the cranes hoists would be seen in the wider area. As shown by the view at the driveway to the church of 'Our Lady of Perpetual Help' (Photo 7), the upper parts of the hoists would be difficult to distinguish when appearing on the backdrop of distant landform. Whereas in the view from John Street and the St Paul's College playing fields (Photo 8) the hoists would be seen against the skyline.

Therefore, beyond immediate proximity the magnitude of change drops resulting in **moderate-low** adverse effects from the above Tawariki Street / Moira Street and the Marist School area, and **low** adverse effects on the wider area.

## Long Term / Permanent

As already noted above demolition and tree removal are permitted activities and although visible from adjacent properties, the completion of these activities is considered as an expected change within Residential – Mixed Housing Urban Zone, although causing a temporary deterioration in the existing close proximity views.

The proposed permanent infrastructure will constitute a minor element of the view from these properties which will not be prominent and not readily detected by the majority of other viewers in the local area.

The permanent above ground structures such as the plant / ventilation building, and air stack, will be designed to be suitable for a residential area.

The proposed plant / ventilation building and air vent stack will be located on the north eastern boundary of the site therefore appearing in views from the south against the backdrop of the trees within the school grounds to the north. In more distant views from the east (from John Street) across the St Paul's Playground the stack will appear on the backdrop of the vegetation associated to Tawariki Street.

Visual amenity effects of the permanent facility on the wider area and the Tawariki streetscape are considered to reduce to **very low** neutral and **very low** adverse on the visual amenity of a few properties opposite to the proposed infrastructure on Tawariki Street.

## Summary Table: Visual Effects

Visual Effects on	Short Term Effects	Long Term Effects
Few opposite properties (Nos 41, 39, 37)	High	Low
Beyond immediate proximity of the site	Moderate-low	Very low
Wider urban area	Low	Very low

## 9.0 Summary and Conclusions

Overall the proposal is considered to generate temporary adverse effects up to high (more than minor) for construction in respect of a small number of houses immediately opposite and adjacent to the site. The scale of permanent effects will be equally localised to the site's proximity, however reduced to a low to very low level (less than minor) due to the integration of above ground facilities into a suburban context. With increasing distance, the magnitude of change will reduce rapidly, resulting in a very low level of effects on the Tawariki streetscape. It is therefore considered that the Tawariki streetscape and the surrounding area will have the capacity to absorb the proposed infrastructure.

Additional temporary landscape and visual amenity effects will occur with the construction of the second shaft, this however will be temporary, resulting in minor adverse landscape effects on the Tawariki streetscape and the same high level effects on the visual amenity from adjacent properties. Due to the first shaft and associated structures already being in place at the time, the permanent landscape and visual amenity effects associated with the second shaft will reduce to low (less than minor) and then neutral on its completion.

The key conclusions of the assessment are:

- The site is not covered by any landscape protection overlays;
- The site is away from the heritage area of Ponsonby;
- The siting of the proposed infrastructure takes advantage of the enclosed setting of the subject site;
- The overall visual catchment is limited and confined to the site's proximity visibility of a few properties opposite to the proposed development on Tawariki Street; and
- The permanent above ground structures such as the plant / ventilation building, and air stack, will be designed to be suitable for a residential area.

# Appendix 1: Assessment Methodology

Table 1: Determining the significance of landscape effects

Contributing Factors		Higher	Lower
Sensitivity	<b>Susceptibility to change</b>	The landscape is strongly distinctive with important biophysical, sensory and associative aspects. There is an absence of landscape detractors which make it highly vulnerable to the type of change which would result from the proposed development.	The landscape lacks any distinctive biophysical, sensory or associative aspects. It has many detractors and has the ability to accommodate the proposed development without undue consequences to landscape character.
	<b>The value of the landscape</b>	The landscape requires protection as a matter of national importance (ONF/L).	The landscape is of low or local importance.
Magnitude of Change	<b>Size or scale</b>	Total loss or addition of key features or elements. Major changes in the key characteristics of the landscape, including significant aesthetic or perceptual elements.	The majority of key features or elements are retained. Key characteristics of the landscape remain intact with limited aesthetics or perceptual change apparent.
	<b>Geographical extent</b>	Landscape character area scale.	Site scale, immediate setting.
	<b>Duration and reversibility</b>	Permanent. Long term (over 10 years).	Reversible. Short Term (0-5 years).

Table 2: Determining the significance of visual effects

Contributing Factors		Higher	Lower
Sensitivity	<b>Susceptibility to change</b>	Views from dwellings and recreation areas where attention is typically focussed on the landscape.	Views from places of employment and other places where the focus is typically incidental to its landscape context.
	<b>Value attached to views</b>	Viewpoint is recognised by the community such as identification on tourist maps or in art and literature. High visitor numbers.	Viewpoint is not typically recognised or valued by the community. Infrequent visitor numbers.
Magnitude of Change	<b>Size or scale</b>	Loss or addition of key features in the view. High degree of contrast with existing landscape elements (i.e. in terms of form scale, mass, line, height, colour and texture). Full view of the proposed development.	Most key features of view retained.  Low degree of contrast with existing landscape elements (i.e. in terms of form scale, mass, line, height, colour and texture). Glimpse / no view of the proposed development.
	<b>Geographical extent</b>	Front on views. Near distance views; Change visible across a wide area.	Oblique views. Long distance views. Small portion of change visible.
	<b>Duration and reversibility</b>	Permanent. Long term (over 15 years).	Transient. Short Term (0-5 years).

Table 3: Determining the nature of effects

Nature of effect	Use and Definition
<b>Adverse (negative):</b>	The proposed development would be out of scale with the landscape or at odds with the local pattern and landform which results in a reduction in landscape and visual values
<b>Neutral (benign):</b>	The proposed development would complement (or blend in with) the scale, landform and pattern of the landscape maintaining existing landscape and visual values
<b>Beneficial (positive):</b>	The proposed development would enhance the scale, landform and pattern of the landscape, improving the landscape and visual quality through removal of damage caused by existing land uses or addition of positive features

Table 4: Determining the overall significance of landscape and visual effects

Effect Rating	Use and Definition
<b>Very High:</b>	Total loss to the characteristics or key attributes of the receiving environment and /or visual context amounting to a complete change of landscape character.
<b>High:</b>	Major change to the characteristics or key attributes of the receiving environment and /or the visual context within which it is seen; and/or a major effect on the perceived amenity derived from it. <u>Oxford English Dictionary Definition</u> <i>High: adjective- 1. Extending above the normal level. 2. Great in amount, value, size, or intensity.</i>
<b>Moderate-High:</b>	A moderate - 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 moderate - high level of effect on the perceived amenity derived from it.
<b>Moderate:</b>	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. <u>Oxford English Dictionary Definition</u> <i>Moderate: adjective- average in amount, intensity, or degree</i>
<b>Moderate - Low:</b>	A moderate - 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 moderate - low level of effect on the perceived amenity derived from it.
<b>Low:</b>	A 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 a low effect on the perceived amenity derived from it. <u>Oxford English Dictionary Definition</u> <i>Low: adjective- 1. Below average in amount, extent, or intensity.</i>
<b>Very Low:</b>	Very low or no modification to key elements/ features/ characteristics of the baseline or available views, i.e. approximating a 'no change' situation.

# Zone of Theoretical Visibility (Viewshed) Mapping

The term ‘Zone of Theoretical Visibility’ (ZTV) is used to describe the area over which a infrastructure or structure can theoretically be seen and is generated from a Digital Terrain Model (DTM). It is also known as a Zone of Visual Influence (ZVI), Visual Envelope Map (VEM) or Viewshed Map.

There are a number of software packages that will generate a ZTV Analysis – Boffa Miskell uses ArcGIS for this. A DTM is generated from either LIDAR data, contours, or break-lines (or a combination of all of these). Observer points are added to the DTM and the resulting ZTV is then produced as an overlay over a topographic base, typically as a transparent colour. The coloured areas represent where a infrastructure or structure is ‘theoretically visible’.

Traditionally, ZTV mapping is based on ‘bare ground’ LIDAR or contour data, and therefore does not take into account the screening effects of intervening vegetation or structures in the landscape. However, it is now possible to include ‘above ground’ or ‘first response’ LIDAR data, which records the top of forest and vegetation canopies. This enables a ZTV analysis to take vegetation or man-made features into account, producing a much more accurate result. However, it still fails to illustrate the effects of partial screening (e.g. winter time vegetation or forestry can be felled). Neither does the ZTV take account of the effects of distance.

A ZTV analysis also takes into account factors relating to the curvature of the earth and light refraction, which increases over distance.

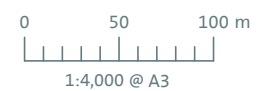
It should be remembered that while ZTV is a useful assessment tool, is important to recognise its limitations.

For this project, the following parameters were used:

Nature of target points:	crane
No of target points:	1
Location of target points:	the subject site
Height of target points:	25m
Observer Eye Height:	1.7m
Coefficient of Earth Curvature and Refraction:	0.07
Base Spheroid used for computation:	WGS 84

## Appendix 2: Maps





Legend



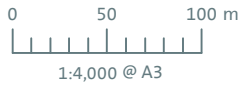
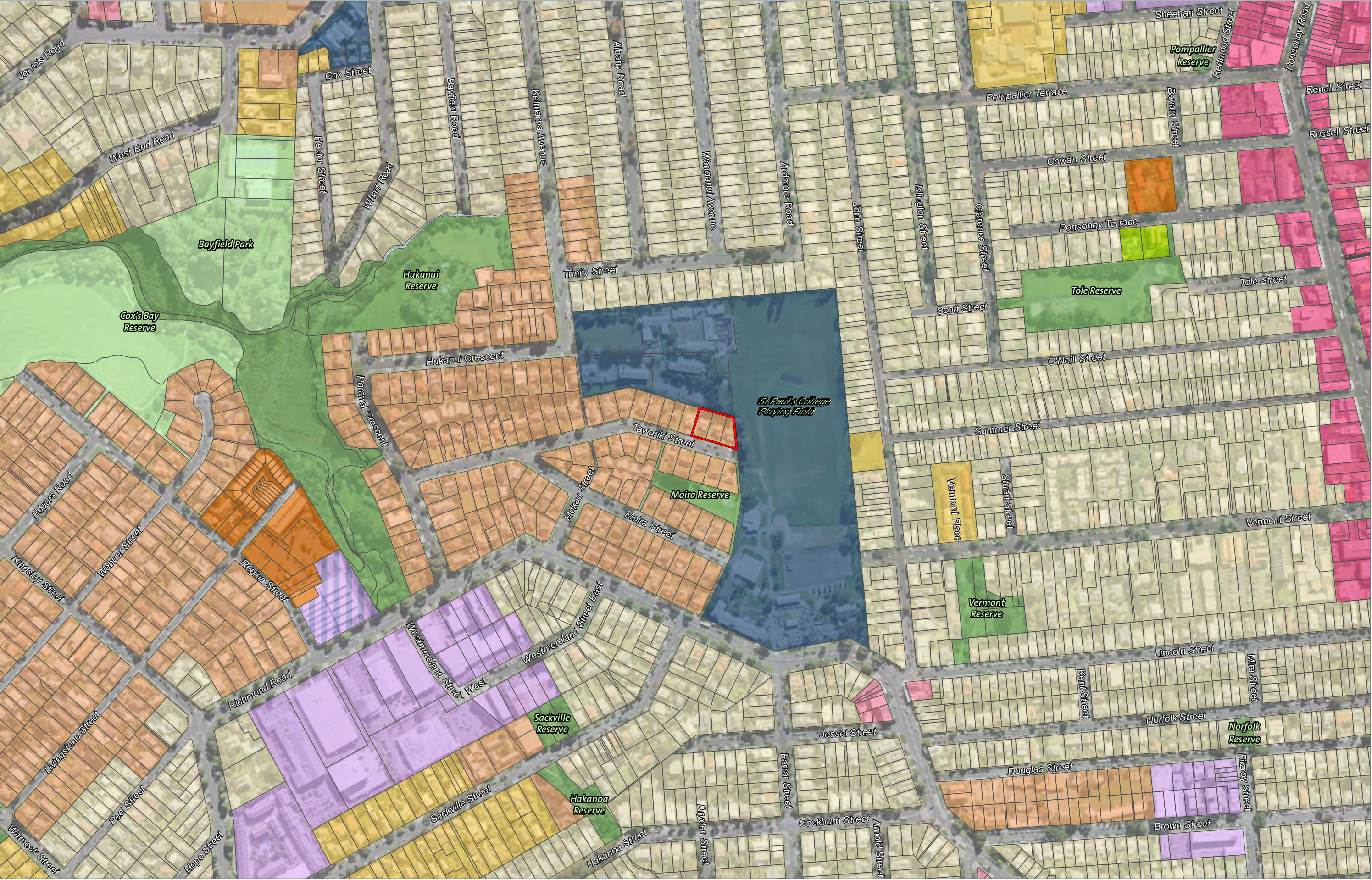
-  Contours
-  Land Parcels
-  Site Location

Figure 1: Landscape Context





Data Sources: LINZ Data Service (Aerials, Cadastre), Auckland Unitary Plan Zoning, Boffa Miskell

Projection: NZGD 2000 New Zealand Transverse Mercator

Legend

- Unitary Plan Zoning
- Single House
- Mixed Housing Urban
- Mixed Housing Suburban
- Terrace Housing and Apartment Buildings
- Neighbourhood Centre
- Town Centre

- Mixed Use
- General Business
- Informal Recreation
- Sport and Active Recreation
- Community
- Special Purpose
- Water [i]

 Site Location

**A08301E GREY LYNN TUNNEL**

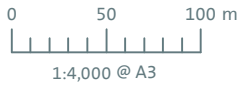
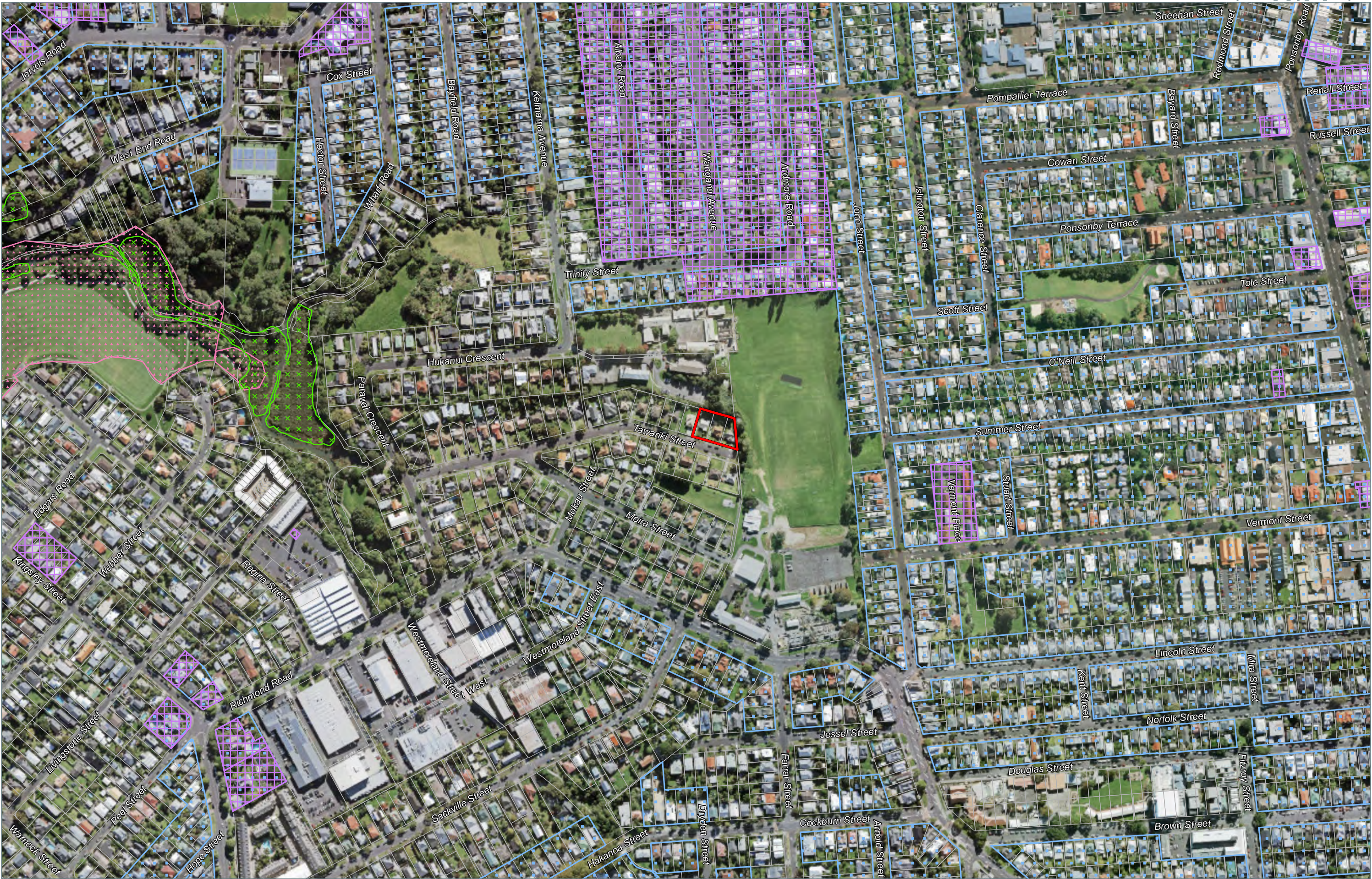
**Figure 2: Auckland Unitary Plan Zoning**

Date: 14 February 2019 | Revision: 0

Plan prepared by Boffa Miskell Limited

Project Manager: John.Goodwin@boffamiskell.co.nz | Drawn: SGA | Checked: KOT










1:4,000 @ A3

Data Sources: LINZ Data Service (Aerials, Cadastre), Auckland Unitary Plan Overlays, Boffa Miskell

Projection: NZGD 2000 New Zealand Transverse Mercator

- Legend**
-  Site Location
  -  Historic Heritage Overlay Extent of Place
  -  Special Character Areas Overlay Residential and Business
  -  Sites and Places of Significance to Mana Whenua Overlay
  -  Significant Ecological Areas (Terrestrial)

**A08301E GREY LYNN TUNNEL**

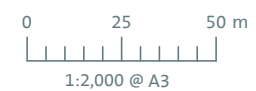
**Figure 3: Auckland Unitary Plan Overlays**

Date: 14 February 2019 | Revision: 0




Plan prepared by Boffa Miskell Limited

Project Manager: John.Goodwin@boffamiskell.co.nz | Drawn: SGa | Checked: KOT





Legend

-  Contours
-  Site Location
-  Land Parcels









- Legend
- Air Vent Stack (8m height)
  - Areas of Visibility
  - Site Location

Note\* - The visibility analysis was performed using the above-ground 2013 LiDAR that includes buildings and vegetation.

**Figure 6: Visibility Analysis of the Air Vent Stack**



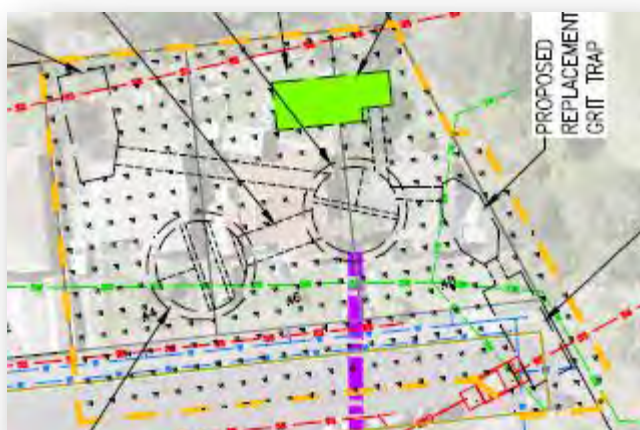
# Appendix S



# Assessment of Arboricultural Effects

---

Tawariki Street, Grey Lynn Drop Shaft Site



---

**Report compiled by:** Allan Homes

---

**Report reviewed by:** Stacy Colyer

---

**Date:** 20<sup>th</sup> February 2019

---

## TABLE OF CONTENTS

TABLE OF CONTENTS .....	1
1. Executive Summary .....	2
2. Introduction .....	3
3. Tree Assessments .....	6
4. Summary and Conclusions.....	9
Appendix A – Tree Details.....	10
Appendix B - Photos .....	155

## **1. EXECUTIVE SUMMARY**

- 1.1 GreensceneNZ Limited has been commissioned by Watercare Services Limited (Watercare) to prepare this arboricultural report relating to the construction of a proposed wastewater interceptor from Western Springs Park, Western Springs to Tawariki Street, Grey Lynn (Grey Lynn Tunnel).
- 1.2 Works associated with the Grey Lynn Tunnel also involve the construction, operation and maintenance of two shafts and associated structures at the eastern end of Tawariki Street, Grey Lynn. The majority of the above ground construction works will take place at 44, 46 and 48 Tawariki Street (Tawariki Street Shaft Site), as well as works also taking place within the adjacent road reserve at the eastern end of Tawariki Street and within a small area of St Paul's College land (bordering the end of Tawariki Street).
- 1.3 To facilitate the construction of the two shafts and associated structures at the eastern end of Tawariki Street, there is a requirement to remove 18 single trees/groups of trees growing either within or immediately adjacent to the property boundaries of No.44, 46 and 48 Tawariki Street and St Pauls College. None of these trees are protected by relevant rules in the Auckland Unitary Plan – Operative in Part (AUP(OP)) and consent is not required for their removal.
- 1.4 There are also trees growing in close proximity to the proposed works that are to be retained. These trees are not protected by the relevant rules under the Auckland Unitary Plan – Operative in Part (AUP (OP)) and no consent is required to work in proximity to the trees. Nevertheless, this report recommends best-practical tree protection methodology be implemented in order to ensure that there are no long-term health and safety issues relating to the identified trees once the proposed works have been completed.

### **Recommendations**

- 1.5 In relation to the Grey Lynn Tunnel, the following specific best-practical tree protection recommendations are made:
- (a) All arboricultural works associated with the Tawariki Street Drop Shaft Site shall be carried out in accordance with the Arboricultural Assessment report by GreensceneNZ Limited dated 9<sup>th</sup> November 2018 submitted with the application.
  - (b) Prior to works proceeding, Landowner Consent/approval shall be obtained from the legal tree owners if an assessment prior to works commencing identifies that the works may impact a tree/group of trees.
  - (c) The consent holder shall employ a suitably experienced arborist (appointed arborist) to monitor, direct and supervise all works that may affect all trees that have been identified in the Arboricultural Assessment report as being 'retained'.
  - (d) Prior to works commencing, a pre-commencement meeting between the consent holder, the project manager/site supervisor and the consent holder's appointed arborist shall be held on site. This meeting shall discuss the proposed works, how they are to be undertaken, all relevant conditions of consent as they relate to trees, tree protection methodologies, as well as protective fencing installation and maintenance requirements.



- (e) The consent holder shall ensure that all contractors, sub-contractors and work site supervisory staff who are carrying out works covered by this consent are advised of all relevant conditions of consent as they relate to trees.
- (f) A copy of the Tree Protection Methodology as outlined in the Arboricultural Assessment report shall be available at all times on the work site.

## 2. INTRODUCTION

- 2.1 Watercare is the water and wastewater service provider for Auckland. Watercare is proposing to construct the Grey Lynn Tunnel, a wastewater interceptor from Tawariki Street, Grey Lynn to Western Springs Reserve. The Grey Lynn Tunnel will connect to the Central Interceptor at Western Springs.
- 2.2 This report and assessment is submitted to accompany an application for resource consents and a Notice of Requirement (NoR) by Watercare for the construction, operation and maintenance of the Grey Lynn Tunnel.

### Project Overview

- 2.3 The Grey Lynn Tunnel involves the elements as shown in the drawings and outlined in the reports which form part of the application.

#### Grey Lynn Tunnel

- (a) The Grey Lynn Tunnel involves the construction, operation and maintenance of a 1.6km gravity tunnel from Western Springs to Tawariki Street, Grey Lynn with a 4.5m internal diameter, at an approximate depth of between 20 to 60m below ground surface, depending on local topography. The tunnel will be constructed northwards from Western Springs using a Tunnel Boring Machine (TBM). The Grey Lynn Tunnel will connect to the Central Interceptor at Western Springs via the Western Springs shaft site.

#### Tawariki Street Shaft Site

- (a) The Grey Lynn Tunnel also involves the construction, operation and maintenance of two shafts and associated structures at the Tawariki Street Shaft Site.

The Tawariki Street Shaft Site will be located at 44-48 Tawariki Street, where the majority of the construction works will take place. Construction works will also take place within the road reserve at the eastern end of Tawariki Street and a small area of school land (St Paul's College) bordering the end of Tawariki Street (approximately 150m<sup>2</sup>).

The Tawariki Street Shaft Site will involve the following components:

#### Main Shaft

- (i) A 25m deep shaft, with an internal diameter of approximately 10.8m, to drop flow from the existing sewers into the Grey Lynn Tunnel;
- (ii) Diversion of the Tawariki Local Sewer to a chamber to the north of the shaft. This chamber will be approximately 12m long, 5m wide and 5m deep below ground, and will connect to the shaft via a trenched sewer;

- (iii) Diversion of the Orakei Main Sewer to a chamber to the south of the shaft. This chamber will be approximately 10m long, 5m wide and 11m deep below ground;
- (iv) Construction of a stub pipe on the western edge of the shaft to enable future connections (that are not part of this proposal) from the Combined Sewer Overflows (CSO) network;
- (v) Construction of a grit trap within the property at 48 Tawariki Street to replace the existing grit trap located within the Tawariki Street road reserve. The replacement grit trap will be approximately 16m long, 5m wide and 13m deep below ground;
- (vi) Permanent retaining of the bank at the end of Tawariki Street to enable the construction of the chamber for the Orakei Main Sewer. The area of the bank requiring retaining will be approximately 44m long, 3m wide and 2m high; and
- (vii) An above ground plant and ventilation building that is approximately 14m long, 6m wide and 4m high. An air vent in a form of a stack will be incorporated into the plant and ventilation building and discharge air vertically via a roof vent. The vent stack will be designed with a flange to allow future extension of up to 8m in total height and approximately 1m in diameter in the unexpected event of odour issues.

#### Tawariki Connection Sewer Shaft – Secondary Shaft

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

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

2.4 The Grey Lynn Tunnel represents a key component for the upgrading and reorganisation of Auckland's metropolitan wastewater network, as it will:

- (a) increase the capacity of the metropolitan wastewater network, thereby supporting the intensification of the Auckland urban area;
- (b) assist in reducing the frequency of storm-related overflow events from the combined wastewater / storm water network;
- (c) improve network reliability and enable future upgrades and improvements to the network.

### **General Comment**

- 2.5 This report has been compiled with reference to Plan No.2012917.100 prepared by Jacobs AECOM on behalf of Watercare and provided to *GreensceneNZ Limited* for the purpose of undertaking an arboricultural assessment of the proposed works. The general location of the works is outlined in Section 2 - Figure 1 of this report. The proposed site works layout is outlined in Section 2 - Figure 2 of this report.
- 2.6 This report provides information relating to the arboricultural 'characteristics' of the surrounding area and identifies trees located within the Tawariki Street Shaft Site and within the western aspect of St Pauls College, Grey Lynn that may be affected by the proposed works associated with the Grey Lynn Tunnel. This report provides details relating to:
- Information relating to all trees that may be impacted by the proposed works;
  - Reference to the relevant statutory rules;
  - Recommendations that aim to minimise the impact the proposed works may have on trees that have been identified to be retained growing adjacent to the proposed works (this being the hedgerow growing within the College grounds whose canopies overhang the rear yards of the residential sites. The hedgerow is recommended for retention, if possible, due to visual screening purposes)
  - Street trees that may require canopy lifting over the carriageway. Note that Council Parks Department are to undertake this work as standard tree maintenance practices
- 2.7 The purpose of this report is to provide an assessment of the potential impact that the installation of the tunnel drop shafts and associated infrastructure may have on privately owned trees located within the vicinity of the proposed works at the Tawariki Street Shaft Site.
- 2.8 In order to facilitate the above works, it has been assessed that there is a requirement to either remove or work within the root zone of 18 single/groups of trees that are growing either within or immediately adjacent to the work site. None of the trees proposed to be removed or that are to be retained and have works undertaken within their root zones are protected under the relevant AUP rules.
- 2.9 As identified above, there are a number of non-protected trees growing within close proximity to the proposed works site that may be affected by the construction aspect of the proposed works but whose removal is not required in order to facilitate the works. Appropriate consideration should be given to these trees to ensure that no long-term arboricultural health and safety issues arise as a result of the proposed works.
- 2.10 Details pertaining to the potentially affected trees and their growing locations are provided within the tree details tables contained in the appendices of this report.
- 2.11 The proposed site works layout is outlined in Figure 1 below.

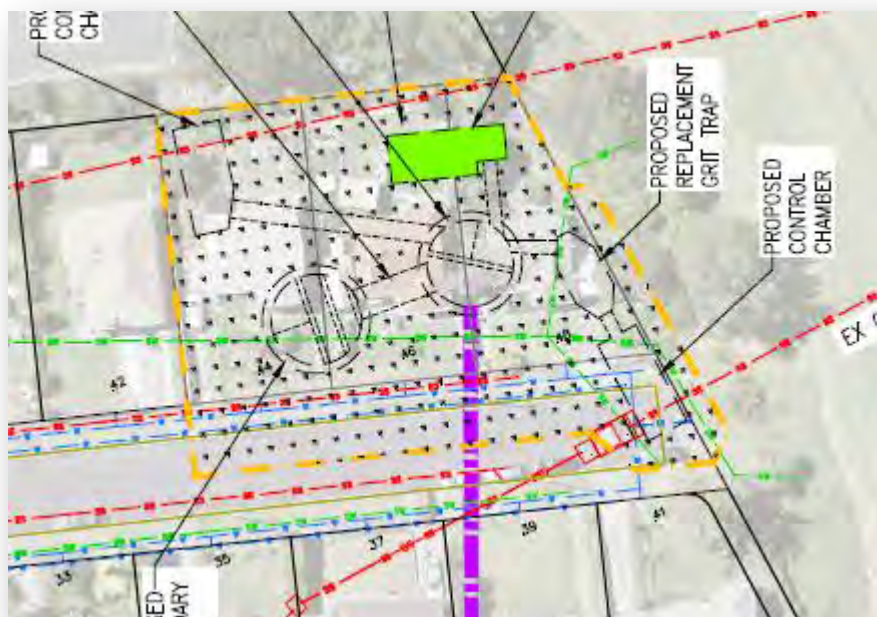


Figure 1: Aerial view of the proposed site works layout

### 3. TREE ASSESSMENTS

- 3.1 Works associated with the Tawariki Street Shaft Site will necessitate excavations for the construction of two drop shafts, three underground wastewater control chambers, an above ground plant room (to house power supplies, controls for penstocks and an air vent), a below ground grit chamber and an associated wastewater piping network.
- 3.2 The proposed works are located within the root zone of a number of trees growing within and immediately adjacent to Nos.44, 46, and 48 Tawariki Street, Grey Lynn and within the grounds of St Paul's College, Grey Lynn.
- 3.3 There are 18 single specimens/groups of trees that are growing either within or immediately adjacent to the Tawariki Street Shaft Site that have been identified as needing to be removed, or retained and have works undertaken within their root zones, in order for the proposed works to be undertaken. For a visual indication of the growing locations of the subject trees, please refer to the appendices of this report.
- 3.4 None of the identified trees/groups of trees are protected under the relevant AUP(OP) rules and therefore they can be removed or have works undertaken within their root zones as a permitted activity.
- 3.5 The relevant specifications in relation to the identified trees are contained within the tree details tables in the appendices of this report.
- 3.6 As the physical boundary lines of properties were not marked out on site during the assessment, in some cases accurately determining tree ownership of specimens growing along the perceived site boundary lines was difficult. This issue relates to the acmena hedge line growing at the rear of Nos.44, 46 and 48 Tawariki Street (these being the only specimens as part of the '18 trees/groups of trees' that are to be retained and have works undertaken within their root zones). Once surveying of the work site has occurred, then

conformation as to whether the hedgerow can be successfully retained or not will be confirmed.

- 3.7 If the hedgerow requires removal, then, as the hedgerow is not protected under the AUP(OP) rules, Watercare will work with the tree owner to manage the effective resolution of this issue. If the hedgerow is to be retained, appropriate tree protection methodologies should be employed to ensure their long-term viability is not compromised.
- 3.8 Protection measures to support the effective retention of the hedgerow are outlined in Section 3 - Tree Protection Methodology of this report.
- 3.9 In addition, to gain access to the Tawariki Street Shaft Site, associated heavy haulage vehicles will have to use Tawariki Street, Moira Road and Mokau Street. Whilst there are no vehicular/tree conflicts on Tawariki Street and Moira Road, on Mokau Street there are three pohutukawa street trees located in the berm that have low hanging branches. Canopy lifting will be required to provide unimpeded access to high sided vehicles. As this is considered to be a 'tree maintenance' issue, the Auckland Council Parks Department will be responsible for attending to this matter. Given that Council will be undertaking the required tree pruning works within the context of their global tree management consent, no further comment in respect to this issue is provided in this report.

#### **AUP(OP) PROVISIONS**

- 3.10 The trees identified as being potentially impacted by the proposed works (by either removal or works within their root zone) are not protected under the relevant rules of the AUP(OP). The proposed works have therefore been assessed as a permitted activity (i.e. resource consent is not required)

#### **Arboricultural Planning Assessment: Nos.44, 46, and 48 Tawariki Street, Grey Lynn**

<b>Zoning:</b>	Residential – Mixed Housing Suburban Zone
<b>Designation:</b>	Nil (as they relate to trees)
<b>Rules:</b>	The proposed tree removals are a Permitted Activity There are no rules protecting any vegetation located within the properties of Nos.44, 46 and 48 Tawariki Street

#### **Arboricultural Planning Assessment: St Pauls College (183 Richmond Road), Grey Lynn**

<b>Zoning:</b>	Special Purpose –School Zone
<b>Designation:</b>	Nil (as they relate to trees)
<b>Rules:</b>	The proposed tree removals and works within the root zone are a Permitted Activity There are no rules protecting any vegetation growing with the St Pauls College grounds that may be affected by the proposed works

#### **Tree Protection Methodology**

- 3.11 Trees that do not require removal, but have the potential to be affected by the proposed works at the Tawariki Street Shaft Site and are worthy of retention, shall be protected from damage for the duration of the works. This is to be achieved by compliance with the following best-practical specific tree protection methodologies:

#### General

- 1.1 A suitably experienced arborist is to be employed by Watercare (appointed arborist) to monitor, supervise and direct all works within the root zone of trees that are to be retained (retained trees) for the duration of the proposed works.
- 1.2 The appointed arborist shall implement the Site Specific Tree Protection Methodology outlined below, and provide feedback and guidance to the contractors in respect to construction methodologies and machinery requirements in relation to all works within the root zone of the retained trees.
- 1.3 Prior to works commencing, a meeting shall be arranged by Watercare so that the Site Specific Tree Protection Methodology and conditions of consent are explained by the appointed arborist to all contractors, sub-contractors and work site supervisory staff that are carrying out any works within the root zones of the retained trees. All aspects of the works that may affect the canopy and/or root zone of the retained trees shall be discussed and methodologies agreed with the appointed arborist.
- 1.4 The following Site Specific Tree Protection Methodology shall be available at all times on the work site.

#### Site Specific Tree Protection Methodology: Root Zone

- 1.5 'Root Zone' (RZ) is defined as the "circular area of ground around the trunk of a protected tree, the radius of which is the greatest distance between the trunk and the outer edge of the canopy. For columnar crown species, the protected root zone is half the height of the tree." There are no protected trees located within the work zone at the Tawariki Street Shaft Site, however retained trees shall be protected so as to ensure that their long-term health, safety and/or longevity is not compromised.
- 1.6 Prior to any works commencing on site, the appointed arborist shall determine the placement of suitable protective fencing (i.e. 1.8 metre high pole/wire mesh fencing material with ground anchor spikes or accepted alternative) at the extent, where practicable, of the RZ of the retained trees. The protective fencing shall remain in place for the duration of the works. The appointed arborist shall monitor the condition of the protective fencing for the duration of the works.
- 1.7 Additional protection measures may be necessary where placement of the protective fencing is impractical and/or the RZ extends past site perimeter fencing. This may include appropriate ground protection measures. Provision should also be made, where practicable, to protect the trunk and low branches of the retained trees from mechanical damage, including stem and branch wraps.
- 1.8 Within the RZ of the retained trees, the following provisions shall apply:
  - a) No site huts, temporary structures, machinery, fuel, materials, spoil or equipment should be stored or temporarily placed unless they can be kept wholly within the bounds of an existing load bearing surface.
  - b) No adjustments to the tree protection fencing should occur without prior consultation and agreement from the appointed arborist.
  - c) Only those works specified in consent conditions and shown on the approved plans should be carried out and only under the direct supervision of the appointed arborist to enable the continued health and long-term viability of the retained trees.
- 1.9 All excavations within the RZ of retained trees shall be carried out under the direct supervision of the appointed arborist.
- 1.10 Root remediation associated with the works within the RZ of retained trees shall be undertaken in the following manner:
  - a) All roots over 50mm in diameter should be retained where possible. Where root retention is unfeasible, approval for the removal of such roots must be obtained from the appointed arborist prior to their removal being undertaken;

- b) All root pruning is to be undertaken either by the appointed arborist or under the direction of the appointed arborist in accordance with correct arboricultural practices.
  - c) Records of all root pruning, including size of roots removed and photographs, must be maintained by the appointed arborist and supplied to Auckland Council's Resource Consents Monitoring Team Leader upon request.
- 1.11 Excavations within the RZ of retained trees shall be lined with a suitable plastic medium prior to any concrete pour. The plastic is to remain in place as a permanent root barrier.
- 1.12 No washing of equipment or machinery shall be undertaken within the permeable RZ of retained trees. Special attention shall be paid to concrete products and petrol/diesel operated machinery so as to not contaminate the soil within the RZ of retained trees.

Site Specific Tree Protection Methodology: Tree Trimming / Removal

- 1.13 All pruning of retained trees must be undertaken either by the appointed arborist or under the direction of the appointed arborist in accordance with correct arboricultural practices.
- 1.14 All tree removals must ensure that adjacent vegetation/trees that are to be retained are not damaged during the tree removal process.

#### **4. SUMMARY AND CONCLUSIONS**

- 4.1 The proposed construction works requires the removal and/or works within the root zone of 18 trees/groups of trees growing within and immediately adjacent to the Tawariki Street Shaft Site and within the grounds of St Paul's College, Grey Lynn. These trees are not identified as protected within the AUP(OP).
- 4.2 There are trees adjacent to the Tawariki Street Shaft Site, which will potentially have works occurring within their root zones. These trees are not protected under the relevant AUP(OP) rules. Watercare will work with the tree owner in relation to the desired outcome for successful retention or effective mitigation.



## APPENDIX A – TREE DETAILS

**Table 1:** Tree Details - No.44 Tawariki Street, Grey Lynn

Tree No.	Species	Health & Form	Height (m)	Girth (mm)	C/S PRZ (m)	Comments & Proposed works
1	acmena ( <i>Syzygium smithii</i> )	Fair	2.5	200	1.9	Fair specimen. Growing in front yard of site. Private tree. Remove
2	figus ( <i>figus benjamina</i> )	Poor	5	350	2.6	Listed as a pest plant. Poor specimen. Growing in front yard of site. Private tree. Remove
3	woolly nightshade ( <i>Solanum mauritianum</i> )	Fair	3	200	2.2	Listed as a National Plant Pest. Fair specimen. Growing in rear yard of site. Private tree. Remove



**Figure 1:** Tree Location Plan – No.44 Tawariki Street

**Table 2:** Tree Detail - No.46 Tawariki Street, Grey Lynn

Tree No.	Species	Health & Form	Height (m)	Girth (mm)	C/S PRZ(m)	Comments & Proposed works
1	lemon ( <i>Citrus limon</i> )	Fair	2	200	1.4	Fair specimen. Growing in front yard of site. Private tree. Remove
2	lemon ( <i>Citrus limon</i> )	Fair	3	200	1.8	Fair specimen. Growing in rear yard of site. Private tree. Remove
3	ponga x 3 ( <i>Cyathea dealbata</i> )	Fair	2 – 3.5	200	3	Fair specimen. Growing in rear yard of site. Private tree. Remove

**Figure 2:** Tree Location Plan - No.46 Tawariki Street

**Table 3:** Tree Detail - No.48 Tawariki Street, Grey Lynn

Tree No.	Species	Health & Form	Height (m)	Girth (mm)	C/S PRZ(m)	Comments & Proposed works
1	magnolia ( <i>magnolia denudate</i> )	Fair	2	200	2.5	Fair specimen. Growing in front yard of site. Private tree. Remove
2	Italian cypress ( <i>Cupressus sempervirens</i> )	Fair	6	300	1.5	Fair specimen. Growing near southeastern corner of dwelling. Private tree. Remove
3	olive ( <i>olea europaea</i> )	Fair	3.5	400	3.5	Fair specimen. Growing on western side of dwelling. Private tree. Remove
4	pohutukawa ( <i>metrosideros excelsa</i> )	Fair	3.5	200	2.7	Fair specimen. Growing in rear yard of site. Private tree. Remove
5	wisteria ( <i>wisteria disambiguation</i> )	Fair	3	200	6	Fair specimen. Growing near northwestern corner of dwelling. Private tree. Remove

**Figure 3:** Tree Location Plan - No.48 Tawariki Street

**Table 4:** Tree Detail - St Pauls College, Grey Lynn

Tree No.	Species	Health & Form	Height (m)	Girth (mm)	C/S PRZ(m)	Comments & Proposed works
1	olive ( <i>olea europaea</i> )	Fair	3.5	400	3.5	Fair specimen. Growing adjacent to public walkway within College grounds. Private tree. Remove
2	phoenix palm ( <i>Phoenix canariensis</i> )	Fair	3.5	1300	3.5	Fair specimen. Growing on bank within College grounds. Private palm. Remove.
3	poplar x 5 ( <i>Populus alba</i> )	Fair	11-13.5	400	14 (as a group)	Fair specimens. Growing on bank within College grounds. Private trees. Remove.
4	wattle x 7 +( <i>Acacia spp</i> )	Fair	7 - 13	200 - 400	4 - 12	Listed as a Pest Plant Surveillance – Whole Region. Fair specimens. Growing on bank within College grounds. Private trees. Remove.
5	wattle x 5 +( <i>Acacia spp</i> )	Fair	7 - 13	200 - 400	4 - 12	Listed as a Pest Plant Surveillance – Whole Region. Fair specimens. Growing on bank within College grounds. Private trees. Remove.
6	wattle x 4 ( <i>Acacia spp</i> )	Fair	7 - 13	200 - 400	4 - 12	Listed as a Pest Plant Surveillance – Whole Region. Fair specimens. Growing on bank within College grounds. Private trees. Remove.
7	acmena ( <i>Syzygium smithii</i> ) hedge row	Fair	6	350	3.5	Fair specimens. Formed as a hedgerow. Growing within College grounds. Overhanging rear yard of residential sites. Retain and protect





**Figure 4: Tree Location Plan - St Pauls College**



## APPENDIX B - PHOTOS



**Photo 1:** Depicts a row of acmena trees behind No.46 Tawariki Street



**Photo 2:** Depicts weed species located within the College grounds

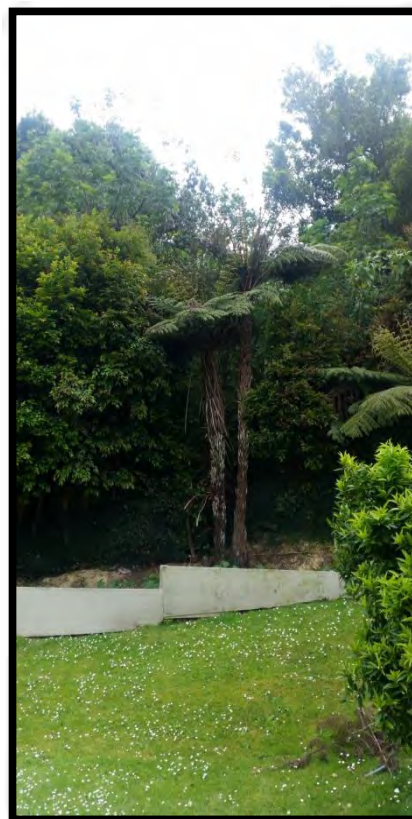
e



**Photo 3:** Depicts poplar trees to the left, a phoenix palm in the centre and a redwood tree (not impacted by the works) to the right



**Photo 4:** Depicts a ficus tree



**Photo 5:** Depicts ponga trees





**Photo 6:** Depicts a row of acmena trees

# Appendix T

20<sup>th</sup> February 2019

To whom it may concern,

The following letter is in support of Watercare's resource consent application for the Grey Lynn wastewater tunnel. Healthy Waters does not make formal submissions on Watercare's consent applications, however given the significance of this project to joint water quality outcomes we would like to provide a written endorsement in support of the project and application.


Watercare and Healthy Waters have worked together on stormwater and wastewater related matters since amalgamation in 2010 and this relationship and cooperation has continued to grow and become more productive.

The Central Interceptor Project has been a major step forward towards addressing some of our most significant combined stormwater and wastewater overflows in Auckland. However, in 2017 the Mayor posed a challenge to both Healthy Waters and Watercare to find a way to accelerate other works in the Western Isthmus from Hillsborough to St Marys Bay, to address long held public concerns over the effects of combined wastewater overflows.

A joint Healthy Waters and Watercare working group was established and together developed the Western Isthmus Water Quality Improvement Programme, a cost effective, timely and integrated infrastructure improvement programme to enable growth and reduce wet weather overflows. The Grey Lynn Tunnel represents a significant contribution from Watercare to the Western Isthmus programme of works that together with Healthy Waters separation and stormwater improvement projects will bring forward water quality improvements in the catchment by up to 10 years. Funding commitments from the mayors water quality targeted rate and Watercare will help to deliver these programmes of work.

Healthy Waters supports Watercare's resource consent application for the Grey Lynn Tunnel and looks forward to continuing the collaboration to achieve better water quality outcomes for the people of Auckland while also accommodating future growth.

Yours faithfully



Craig McIlroy  
General manager Healthy Waters

# Appendix U

# Grey Lynn wastewater tunnel

## Project overview

Grey Lynn and surrounding areas have some of the oldest wastewater pipe networks in Auckland with many, such as the Orakei main sewer, built early last century. As Auckland continues to grow, our networks are under increased pressure. As a result, diluted wastewater overflows into local waterways in the Cox's Bay and Grey Lynn catchments almost every time it rains.

### Project overview

The Grey Lynn Tunnel is designed to intercept and divert overflows from local networks in Grey Lynn and the Orakei main sewer. Once completed, the wastewater flows will be transported through the proposed Grey Lynn tunnel via the Central Interceptor to our largest wastewater plant in Mangere for treatment.

The new tunnel will be built deep underground by tunnel boring machine which will minimise disruption along the pipeline route. A construction site will be located at the end of Tawariki Street where we will build a shaft to extract the tunnel machine and divert in the wastewater flows once the tunnel is formed.



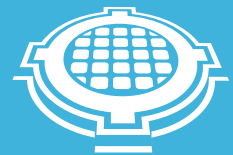
*A view from the walkway through Cox's Bay Reserve.*

### The proposed tunnel will:

- reduce diluted wastewater overflows, resulting in better water quality and surrounding environment
- cater for the growing Auckland population, now and for the next 100 years
- enable future connections and continued improvements to the wastewater system in the area
- be constructed by tunnel boring machine underground to limit effects on residents along the pipeline route
- be 4.5 metres in diameter, large enough for a double decker bus to travel through.

### Fast facts

## Reducing overflows



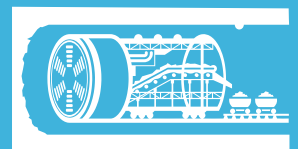
## Catering for population growth



## Works start in 2023

The tunnel will be built by

## Tunnel Boring Machine (TBM)



### Tawariki Street site

The works at the Tawariki Street site will commence in 2023. The tunnel will be created by machine deep underground from an existing site at Western Springs. Visible construction will be contained to the Tawariki site where we will create a shaft to extract the machine once tunnelling is complete. The main works at this site will be the shaft construction which is expected to take eight months to complete. Further works will also be required for connection to the local sewers, operational structures, removal of the tunnelling machine, closing the shaft and commissioning the tunnel. The total site occupation for construction could be up to two and a half years.

### How could the works affect you?

- construction works for the shaft and related structures will take place on private property and some works in the road at the end of Tawariki Street cul-de-sac
- work hours at the shaft site will be between 7am-6pm Monday to Friday, and 8am-6pm Saturday
- the works will involve up to five truck movements an hour during peak construction, specifically during the creation of the shaft
- there will be some noise and effects from construction, however we will ensure this is kept within Auckland Council consent requirements
- traffic management will be in place to minimise safety risk to road users, the works may at times affect street parking around the site and truck routes.



#### What happens next?

Resource consent applications for the proposal are due to be lodged with the Auckland Council in early 2019. Decisions made regarding wastewater servicing are important, not just for the current communities but for future generations too. Watercare has undertaken various technical and environmental assessments to inform the resource consent application and designation of the proposed tunnel shaft and site.

Construction is proposed to start at the Tawariki Street shaft site in 2023. The details of the works will be confirmed after the consents are obtained and a contractor is engaged. We will then be able to provide further details on how they intend to do the required work and specific timings.

### Keeping you informed

If you would like to receive updates on the project, please contact:



[greylynntunnel@water.co.nz](mailto:greylynntunnel@water.co.nz)



[www.watercare.co.nz/About-us/Projects-around-Auckland](http://www.watercare.co.nz/About-us/Projects-around-Auckland)