

Whenuapai Redhills: Package 1


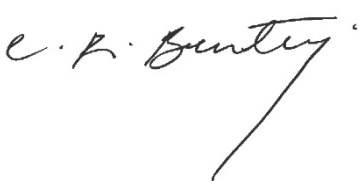
Natural Character, Landscape & Visual Effects Assessment
Prepared for Watercare
16 August 2022





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Cover photograph: The pump Station Site, Tom Lines, 2022

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1.0 Introduction

Boffa Miskell Limited (BML) has been engaged by Beca on behalf of Watercare ('the applicant') to undertake a Natural Character, Landscape and Visual Effects Assessment (LVA) associated with Package 1 of the Whenuapai Wastewater Servicing Scheme. This assessment has been considered in the context of the existing environment and the relevant planning framework.

The first part of this report sets out an understanding of the project in its broader landscape and statutory context. The second part of this report sets out an assessment of the project within its landscape context and identifies the level and nature of landscape, natural character and visual effects.

In undertaking this assessment, the author has visited the location of the proposal and its surrounds to understand its existing landscape values and character as well as the physical and visual relationship the area has with the surrounding built and natural environment. Additionally, the visual catchment and viewing audiences of the wider area have been identified and considered.

This natural character, landscape and visual amenity effects assessment is set out under the following headings:

- Project Overview;
- Assessment Approach;
- Statutory Context;
- Existing Environment;
- Assessment of Effects;
- Conclusion.

2.0 Project Overview

The Whenuapai Redhills: Package 1 Project (the Project) aims to provide wastewater servicing capacity for approximately 10,240 dwellings, or 30,720 people, in the Whenuapai catchment. This growth is projected to occur by 2041. The Project includes the following four key components (see Plate 1):

1. A **Gravity Main Pipeline** (approximately 700m long and 375 – 475 mm in diameter) between Whenuapai Village pump station on Tamiro Road and the new pump station
2. A **Pump Station** at a point where the Whenuapai and Redhills Catchments meet at 23-27 Brigham Creek Road

3. A **Rising Main** (approximately 1.5 km long and 500 mm in diameter) between the Pump Station and a proposed new break pressure chamber on Mamari Road (the boundary of Package 2)⁽¹⁾.
4. A **Break Pressure Chamber** which connects to the Massey Connector rising main (proposed under Package 2).

The Project extends from the existing Whenuapai Village pump station site in Tamiro Road in the north, across Brigham Creek Road, to Spedding Road in the south as illustrated on Plate 1 below, and Figures 1 and 2, Appendix 2).

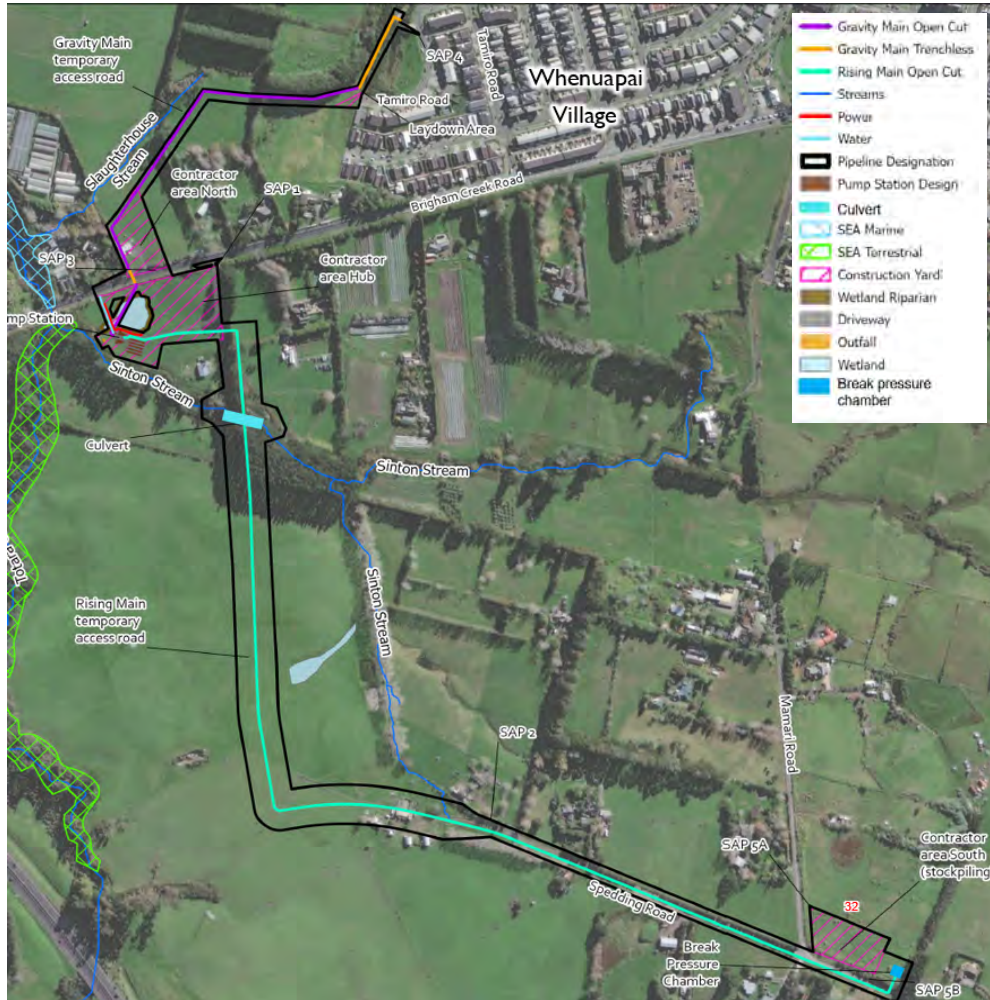


Plate 1. Package 1 – ‘the Project’ overview

2.1 Gravity Main

The construction of the gravity main is located in the northern extent of the project and will first require a contractor area in the order of 10,000 m² in size. The location of the contractor area is

⁽¹⁾ An extension of the rising main is part of ‘Package 2’ and will be designed to connect to the planned Northern Interceptor Phase 2 tunnel and deliver flows from the Whenuapai Catchment to the Rosedale Wastewater Treatment Plant for treatment. Package 2 is subject to a separate consent application.

proposed to be at 20-22 Brigham Creek Road (Plate 2). Works will include stripping topsoil and placing geofabric and compacted GAP65 (covering 5,000 m²). An 'Amenities and smoko room' and gate house will also be required.

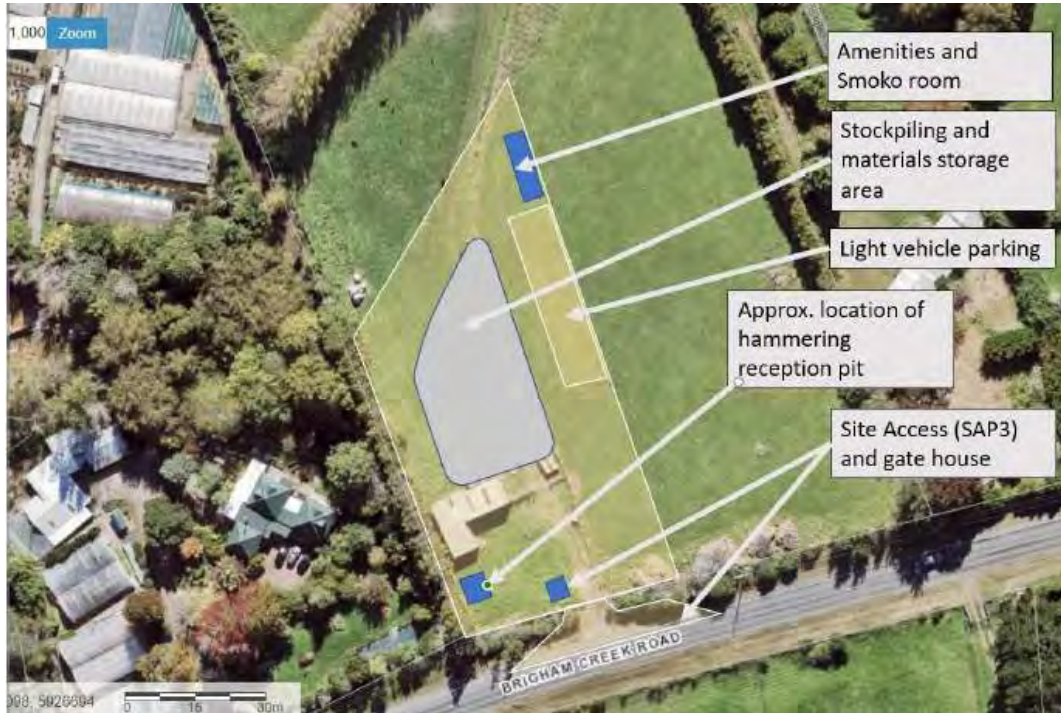


Plate 2. Proposed Contractor Area Layout (Approx.)

To construct the gravity main, a construction access road along the full alignment will also be required. This will be constructed out of GAP65 and will typically be 6 m in width. Topsoil will be stockpiled and then replaced, stabilised and reseeded to replace the grass areas and remediate the site after construction.

The gravity main pipeline will be installed via open trenching although trenchless sections are proposed at Brigham Creek Road (pipe hammering), and Tamiro Road stormwater pond embankment. If trenchless methods fail, open trenching will instead be undertaken in these locations also. As part of the Gravity pipeline works, to the north of Brigham Creek road, there will be some vegetation removal. This will predominantly be exotic tree species that form portions of existing shelterbelts. A small area of riparian planting near the Tamiro Road stormwater pond may also require removal, although it is noted that this area of planting appears relatively recently established as part of the storm water pond and it will be reinstated after the pipeline works are completed.

An open trench method will also occur south of Brigham Creek Road (through a wetland) and then meet the proposed location of the pump station. Following construction, the trench of the gravity main would be backfilled and re-grassed. Within the wetland, once backfilled, wetland riparian planting would be established and would include species such as pūriri (*Vitex lucens*), tī kōuka (*Cordyline australis*), and kahikatea (*Dacrydium dacrydioides*), to name a few. A proposed planting plan and plant schedule including grade sizes is attached in Appendix 3 of this report. This plan also includes the proposed pump station, described further below.

2.2 Pump Station

The proposed pump station is located to the south of Brigham Creek Road in the vicinity of the aforementioned wetland. The pump station will also require a contractor area located on the southern side of Brigham Creek Road. This area would include a site office and workshop area, stockpile area, material storage and turn around area, parking and a gatehouse. Similar to the rising main construction methodology, topsoil will be removed and stockpiled. GAP65 will be compacted on the site and once the works are completed, the topsoil will be replaced and grass reseeded. An indication of the Contractor Area is provided below.



Plate 3. Proposed Contractor Area Layout (Approx.)

The construction of the pump station will involve a staging plan which will commence with the deep structures, and works will continue progressively to the surface structures and civil works. Excavated material will be carted off site for disposal at a clean fill site. An emergency overflow outfall is required and would be constructed in the Sinton Stream embankment. This would require excavation with foundation and riprap in addition to a precast headwall and apron. This will require some vegetation clearance within the riparian zone of the stream. Topsoil will be re-established around the pump station and the areas of native planting will be established. This includes vegetation (including trees) within the riparian area of Sinton Stream.

Appendix 3 illustrates the proposed landscape planting around the pump station and includes similar tree species as the aforementioned wetland. Screen planting and amenity planting also form part of the mitigation response to assist in integrating the proposed above ground structures.

Most of the pump station components are located underground and will not be visible. Once completed and in operation a small number of above ground structures associated with the pump station will be visible. These are 2x gantry cranes, an electrical transformer, electrical switch room and 3x carbon filters. An illustration of these elements is shown below followed by an image of a similar pump station (noting that the proposed pump station for this project will have 2 gantry cranes and a containerised switch room).

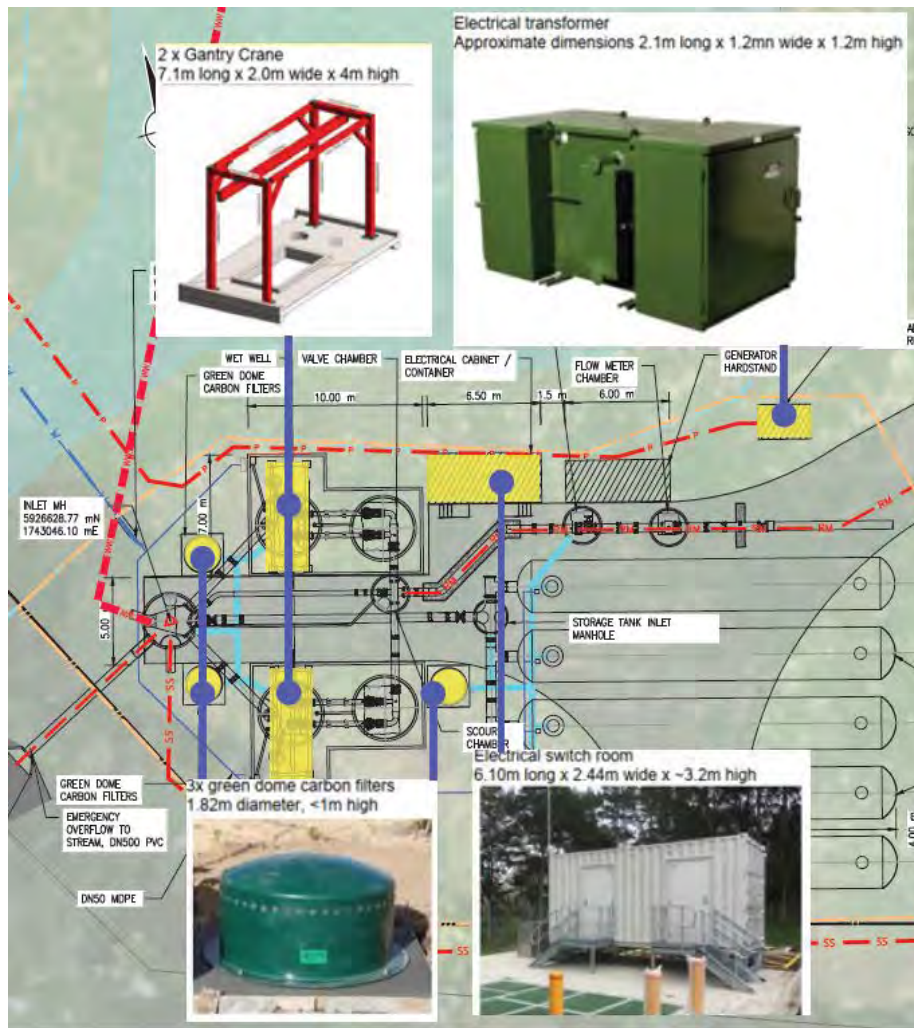


Plate 4. Proposed above ground features of pump station



Plate 5. Example pump station, Flanagan Road Pump Station in Drury.

2.3 Rising Main

A 1487 m long Rising Main is also proposed as part of the Project. This will convey flow from the aforementioned Pump Station to the proposed break pressure chamber. To construct the rising main, a contractor area would be set up along Spedding Road as indicated below. This would include similar features to that described in other contractor areas (e.g. hardstand, amenities area etc.). Once the project is completed, the area will be reinstated and regrassed.

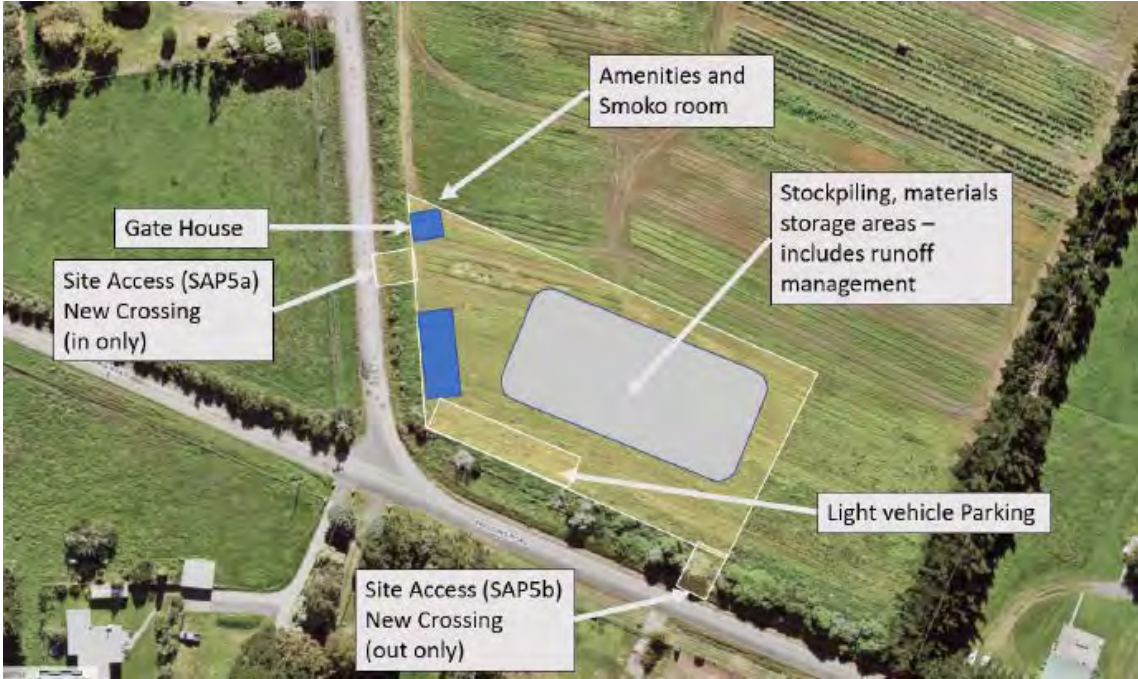


Plate 6. Proposed Contractor Area Layout (Approx.)

A temporary access road (approx. 6 m wide) will then be constructed to follow the proposed pipeline alignment which will have batter slopes and a total earthworks volume of 10,000 m³ (approx.).

The rising main will be constructed via open cut method and backfilled apart from where the pipe will cross Sinton Stream via a culvert. The culvert will be (43.14 m long x 3.5 m high and 3.5 m wide). A 5 m long wing wall, and 5 m of rip rap either side will also be required. A drawing set prepared by Crang Civil can be found in Appendix 4 of this report. Plate 7 below illustrates an extract of these drawings and Plate 8 illustrating an example. The culvert is designed to accommodate the future extension of Spedding Road. The wastewater pipe is to be buried in the fill on top of the culvert. A temporary stream diversion and coffer dam installation will be required in order to construct the culvert.

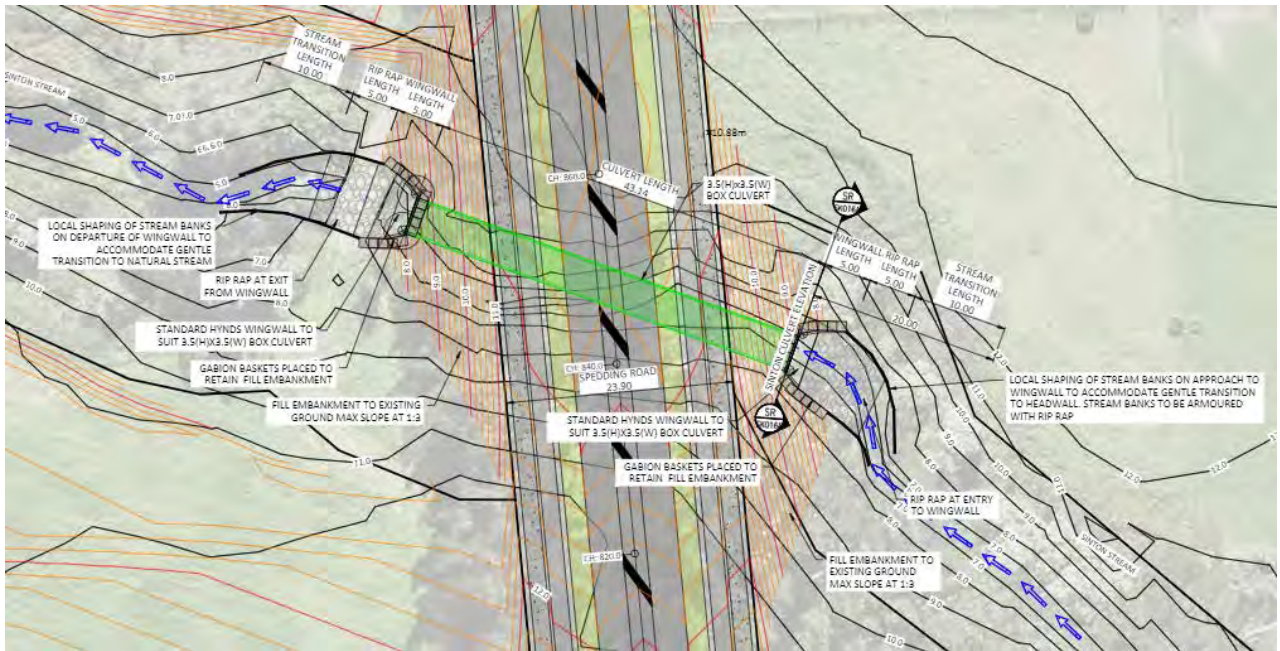


Plate 7. Proposed culvert (refer Crang Civil Drawing SK016 , illustrating future Spedding Road extension. Refer to Appendix 4



Plate 8. Example culvert, noting that more rip rap and stream flow is anticipated for this Project.

2.4 Recommended Mitigation Measures

In considering the nature of the project and the anticipated change to the receiving environment, there are a number of measures which will help to mitigate the natural character, landscape and visual effects associated with the project. It is recommended that such measures are included as part of the project and such measure have been considered in this assessment.

Mitigation measures for this project have been developed in two ways:

1. Measures that intrinsically comprise part of the design development through an iterative process;
2. Mitigation measures designed to specifically address the remaining (residual) negative (adverse) effects of the final development proposals.

Area of Works	Proposed Mitigation Measures
Gravity Main	<ul style="list-style-type: none"> - Ensure that works are contained to a defined footprint as small as practicably possible. - Minimise vegetation clearance. Areas of vegetation that is removed should be revegetated with suitable replacements. - Re-grass on top of buried infrastructure. - Recontour disturbed areas so they tie into existing contours including natural depression in identified wetland. - Provide for riparian vegetation including tree planting around the identified wetland and the Tamiro Road stormwater pond.
Pump Station	<ul style="list-style-type: none"> - Ensure that works are contained to a defined footprint as small as practicably possible. - Minimise works within stream margin as far as practicable. - Minimise vegetation clearance. Areas of vegetation that are removed should be revegetated with suitable replacements. - Paint above ground structures in recessive colours i.e. dark greys and greens. For example, Resene 'Ironsand' - Provide low level planting around curtilage of new aboveground structures.
Rising Main (including culvert)	<ul style="list-style-type: none"> - Ensure that works are contained to a defined footprint as small as practicably possible. - Minimise vegetation clearance. Areas of vegetation that is removed should be revegetated with suitable replacements. - Re-grass on top of buried infrastructure.

	<ul style="list-style-type: none"> - Minimise earthworks and recontour disturbed areas so they tie into existing contours. - Provide low level planting around curtilage of culvert, along stream margin and on fill embankments.
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This assessment has been undertaken with these recommendations adopted as part of the project. It is also recommended that the above recommendations form part of the proposed consent conditions.

3.0 Assessment Approach

This assessment has been undertaken and peer reviewed by NZILA registered landscape architects with reference to the Te Tangi A Te Manu, Aotearoa New Zealand Landscape Assessment Guidelines (2021) and Quality Planning Landscape Guidance Note¹ and its signposts to examples of best practice.

The full methodology and outline of the effects ratings used in this assessment is provided in **Appendix 1**. In summary, this assessment provides ratings based upon a combination of quantitative information where available, and qualitative professional judgements by the author. The ratings are based upon a seven-point scale which includes: very low; low; low-moderate; moderate; moderate-high; high and very high ratings. These are used within this assessment to describe the level (and significance) of the potential natural character, landscape and visual amenity effects that would result from the proposal.

In combination with assessing the significance of effects, this assessment also explains the likely nature of the effects: being a positive (beneficial) or negative (adverse) effect in the context within which it occurs. Benign (neutral) effects are also identified where it is considered that there is no identifiable landscape or visual change in the context of where it occurs.

The effects covered in this assessment include:

- Visual effects relating 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.
- Landscape character and amenity effects derived 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.
- Natural character effects, considered as they relate to a change in the baseline condition of the level of natural character.

Natural character, landscape and visual impacts result from natural or induced change in the components, character or quality of a landscape. Usually these are the result of landform or vegetation modification or the introduction of new structures, activities or facilities into the landscape. The process of change itself, that is the construction process and/or activities

¹ <https://www.qualityplanning.org.nz/node/802>

associated with the project, also carries its own visual impacts, as distinct from those generated by a completed project.

The nature of natural character, landscape and visual effects generated by any particular project can therefore be:

- positive (beneficial), contributing to the visual character and quality of the environment;
- negative (adverse), detracting from existing character and quality of environment; or
- neutral (benign), with essentially no effect on existing character or quality of environment.

The degree to which natural character, landscape and visual effects are generated by a project depends on a number of factors, these include:

- The degree to which the project contrasts, or is consistent, with the qualities of the surrounding landscape.
- The proportion of the project that is visible, determined by the observer's position relative to the objects viewed.
- The distance and foreground context within which the project is viewed.
- The area or extent of visual catchment from which the project 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 project is viewed.
- The predictable and likely known future character of the locality.
- The quality of the resultant landscape, its aesthetic values and contribution to the wider landscape character to the area.

Change in a landscape does not, of itself, necessarily constitute an adverse landscape or visual effect. Landscape is dynamic and is constantly changing over time in both subtle and more dramatic transformational ways. These changes are both natural and human induced. What is important in managing landscape change is that adverse effects are avoided or sufficiently mitigated to ameliorate the effects of the change in land use. The aim is to provide a high amenity environment through appropriate design outcomes, including planting that can provide an adequate substitution for the currently experienced amenity.

Prior to conducting the assessment, a desktop study was completed which included a review of the relevant information relating to the landscape and visual aspects of the project. This information included:

- The statutory setting of the project area and surrounding context;
- Base map data (such as contours and aerial photography);
- North-West Wild Link, Auckland Council;
- Project Drawings;
- Ecological Effects Assessment, Beca;
- Arboricultural Effects Assessment, Arborlab.

Additionally, site visits were undertaken to gauge an understanding of the potential receiving environment. These were undertaken by the assessment author on 28 February 2020 and on the 3 April 2022 in fine weather conditions. This included visiting the area to understand the physical and sensory impact the project would have on the site and the broader landscape in addition to the identification of the project's viewing audiences.

4.0 Statutory Context

As part of this assessment, there are a number of planning provisions that are relevant to this project. Specifically, they include:

4.1 The Resource Management Act 1991 (RMA)

The Project as described will occupy an area of working rural landscape set adjacent to a number of natural features. The relevant sections identified with the RMA and addressed in this report therefore relate to the following:

Section 6(a) – *the preservation of natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate, subdivision use and development*

Section 6(b) - *the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development*

Section 6(c) - *the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna*

Section 7(c) – *the maintenance and enhancement of amenity values*

Section 7(f) – *maintenance and enhancement of the quality of the environment*

4.2 Natural Character (Section 6(a))

Part 2, Section 6(a) of the RMA requires *'the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development'* as a matter of national importance.

This assessment of natural character applies to the potentially affected freshwater bodies and their margins in accordance with RMA section 6(a)². While the RMA does not provide a definition of natural character, Objective 2 of the NZCPS relates to preserving the natural character of the coastal environment and protecting natural features and landscape values through recognising the characteristics and qualities that contribute to natural character, natural features and landscape values and their location and distribution. The concept of natural

² Section 6(a) considers natural character as a matter of national importance: *...the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development*

character has been considered in a number of court decisions which have noted that “natural” and “natural character” may connote a range of qualities and features created by nature as distinct from artificial constructions, including things such as pasture, exotic trees, or wildlife, both feral and domestic.³ A definition of natural character has also been adopted in the NZCPS guidance note⁴.

Natural character comprises the natural elements, patterns and processes of waterbodies and their margins, and how they are perceived and experienced.

The degree or level of natural character within an environment depends on:

1. *The extent to which the natural elements, patterns and processes occur.*
2. *The nature and extent of modification to the ecosystems and landscape / seascape.*
3. *The degree of natural character is highest where there is least modification.*
4. *The effect of different types of modification upon natural character varies with context and may be perceived differently by different parts of the community.*

The process to assess natural character involves an understanding of the many systems and attributes that contribute to a waterbody including biophysical and experiential factors. This can be supported through the input of technical disciplines such as aquatic and terrestrial ecology, and landscape architecture, which have been drawn on for this assessment.

This natural character effects assessment involves the following steps:

- Description and assessment of the existing level of natural character;
- Description of any anticipated change to the natural character and the ongoing / future level of natural character; and
- Consideration of the significance of the effects.

4.3 Outstanding Natural Features and Landscapes (Section 6(b))

Part 2, Section 6(b) of the RMA requires *‘the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development’* as a matter of national importance.

There are no outstanding nature features or landscapes within the project area or its immediate vicinity and therefore Section 6(b) is not relevant in relation to this assessment.

4.4 Significant Indigenous Vegetation and Significant Habitats of Indigenous Fauna (Section 6(c))

Part 2, Section 6(c) of the RMA requires *‘the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna’* as a matter of national importance.

There are two Significant Ecological Areas (‘SEA’) within the area which relate to the Totara, Sinton and Slaughterhouse Streams which eventually discharge into the Waitemata Harbour.

³ *Harrison v Tasman DC* [1994] NZRMA 193 (PT); *Trio Holdings v Marlborough DC* W103A/96(PT).

⁴ NZCPS 2010 Guidance note Policy 13: Preservation of natural character

The Totara Inlet and Brigham Creek are classified as a marine SEA (SEA_M2_57b). The reach of the Totara Creek is classified as a terrestrial SEA (SEA_T_2034).

The project does not directly impact the above mentioned SEA's.

4.5 Amenity Values (Section 7(c) and 7(f))

Section 7 identifies a range of matters that shall be given particular regard to in achieving the purpose of the RMA. Section 7(c) in relation to the maintenance and enhancement of amenity values and Section 7(f) – maintenance and enhancement of the quality of the environment are particularly relevant to our assessment of this Project.

Section 2 of the RMA defines the 'environment' to include:

- (a) ecosystems and their constituent parts, including people and communities; and
- (b) all natural and physical resources; and
- (c) amenity values; and
- (d) the social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) or which are affected by those matters⁵

In relation to the amenity values of a landscape these are considered to include the “*natural and physical qualities and characteristics of an area that contribute to people’s appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes*”⁶. These aspects are considered in this report in relation to potential effects on views and visual amenity.

4.6 Auckland Council (Auckland Unitary Plan)

The site is located in the jurisdiction of the Auckland Unitary Plan (AUP) and falls under 3 zones which are Future Urban Zone (FUZ) and Open Space – Informal Recreation Zone and Residential - Mixed Housing Urban Zone. (Refer Figure 3, Appendix 2)

Future Urban Zone

The FUZ is applied to greenfield land that has been identified as suitable for urbanisation. The FUZ is a transitional zone. Land may be used for a range of general rural activities but cannot be used for urban activities until The Site is rezoned for urban purposes.

The Objectives for this zone are set out in Section H18.2 of the AUP, as follows:

- (1) *Land is used and developed to achieve the objectives of the Rural – Rural Production Zone until it has been rezoned for urban purposes.*
- (2) *Rural activities and services are provided for to support the rural community until the land is rezoned for urban purposes.*
- (3) *Future urban development is not compromised by premature subdivision, use or development.*
- (4) *Urbanisation on sites zoned Future Urban Zone is avoided until the sites have been rezoned for urban purposes.*

⁵ Resource Management Act, Part 1, 2 (1)

⁶ Resource Management Act 1991.

Policies identified in this zone are set out in Section H18.3 and include the following:

- (1) *Provide for use and development which supports the policies of the Rural – Rural Production Zone unless that use and development is inconsistent with policies H18.3(2) to (6).*
- (2) *Enable activities that are reliant on the quality of the soil or require a rural location to operate or which provide for the day to day needs of the local rural community.*
- (3) *Require subdivision, use and development to maintain and complement rural character and amenity.*
- (4) *Avoid subdivision that will result in the fragmentation of land and compromise future urban development.*
- (5) *Prevent the establishment of more than one dwelling on a site except for the provision for minor dwellings and workers' accommodation.*
- (6) *Avoid subdivision, use and development of land that may result in one or more of the following:*
 - (a) *structures and buildings of a scale and form that will hinder or prevent future urban development;*
 - (b) *compromise the efficient and effective operation of the local and wider transport network;*

Open Space – Informal Recreation Zone

A small portion of project will also take place in the Open Space – Informal Recreation Zone. The Open Space – Informal Recreation Zone applies to open spaces that range in size from small local parks to large regional parks. These areas are used for a variety of outdoor informal recreation activities and community uses, such as walking, running, cycling, relaxing and socialising, picnics, playing and enjoying the environment.

The Objectives for this zone are set out in Section H7.5.2 of the Auckland Unitary Plan, as follows:

- (1) *The open and spacious character, amenity values and any historic, Mana Whenua, and natural values of the zone are maintained.*
- (2) *Informal recreation activities are the predominant use of the zone.*
- (3) *Buildings and exclusive-use activities are limited to maintain public use and open space for informal recreation.*

Policies relevant to the project in this zone are set out in Section H.7.5.3 and include the following:

- (2) *Maintain or enhance the natural character values of open spaces by retaining significant vegetation (where appropriate and practical) and through weed removal, new planting and landscaping.*
- (4) *Limit buildings, structures and activities to those necessary to enhance people's ability to use and enjoy the open space for informal recreation.*
- (5) *Locate and design buildings and structures to:*

- a. *complement the open and spacious character, function and amenity values of the zone;*
 - b. *maintain public accessibility and minimise areas for exclusive use; and*
 - c. *protect any natural or historic heritage values.*
- (7) *Manage the intensity of activities to minimise adverse effects such as noise, glare and traffic on the amenity values of the surrounding area.*
- (9) *Avoid use and development in locations adjoining the coast or water bodies where they will have more than minor adverse effects on any of the following:*
- a. *public access;*
 - b. *the visual amenity values of the coast and water bodies;*
 - c. *areas of high natural or historic heritage value; or*
 - d. *Mana Whenua values*

Residential - Mixed Housing Urban Zone

The existing Whenuapai Village Pump Station is located within the Residential - Mixed Housing Urban Zone off Tamiro Road. The zone is a reasonably high-density zone enabling a greater intensity of development than previously provided for.

The Objectives for this zone are set out in Section H5.2 of the Auckland Unitary Plan, as follows:

- (4) *Non-residential activities provide for the community's social, economic and cultural well-being, while being compatible with the scale and intensity of development anticipated by the zone so as to contribute to the amenity of the neighbourhood.*

4.6.1 AUP Significant Ecological Area Overlay

The AUP identifies two SEA's within the area. These areas are described in Section 4.5 and include a marine SEA (SEA_M2_57b) and a terrestrial SEA (SEA_T_2034). As stated, these SEA's are not impacted by the project.

4.7 Whenuapai Structure Plan

Being located in Whenuapai, the site sits within the Whenuapai Structure Plan which sets out the framework for transforming Whenuapai from a semi-rural environment to an urbanised community over the next 10 to 20 years. The plan guides future development by defining land use patterns and the location, timing and provision of infrastructure.

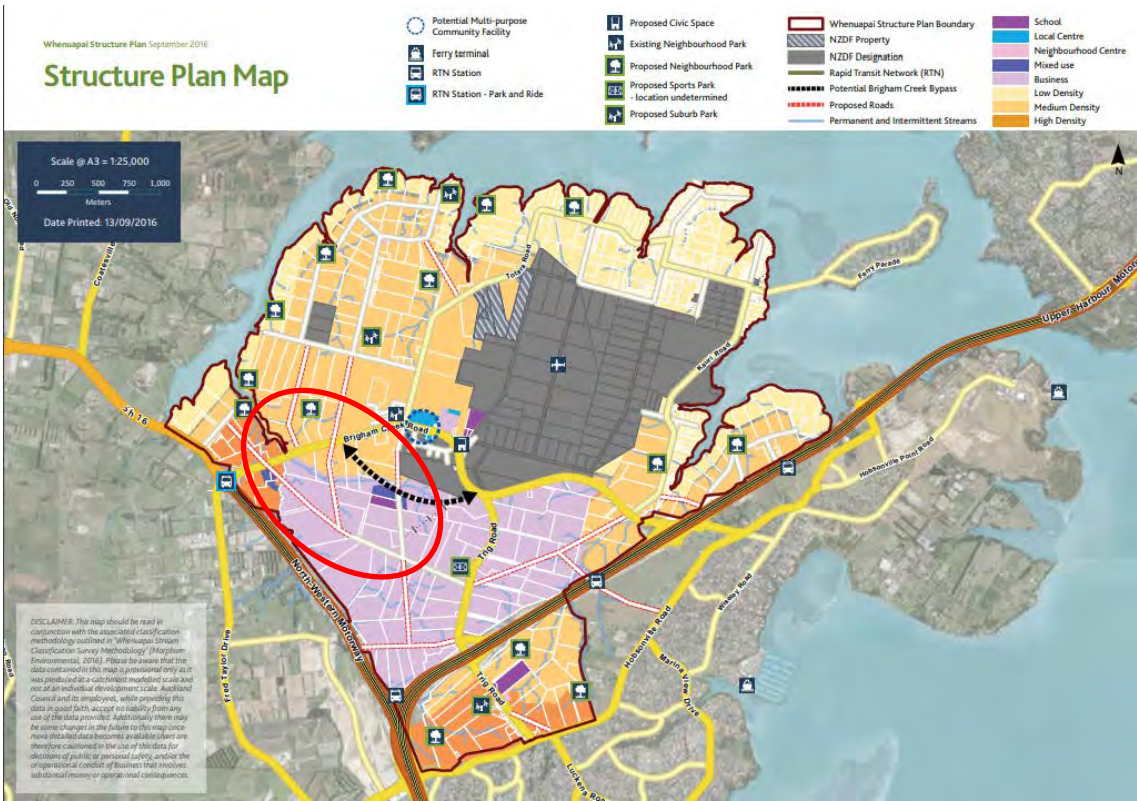


Plate 9. Structure Plan Map (approximate project area indicated by red circle)

The vision for Whenuapai in the structure plan is as follows:

Whenuapai is a liveable, compact and accessible place with a mix of high quality residential and employment opportunities. It makes the most of its extensive coastline, is well connected to the wider Auckland Region, and respects the cultural and heritage values integral to its distinctive character.

There are 7 key objectives in the structure plan which are:

1. Sustainable urban development in Whenuapai
2. Quality built urban environment
3. A well-connected Whenuapai
4. The national significance of Whenuapai Airbase
5. The provision of infrastructure
6. Enhance the natural environment and protect natural heritage
7. The provision of quality open spaces.

5.0 Existing Environment

5.1 Site Context

Refer Figure 1, Appendix 2

The site is located in the area of Whenuapai, located approximately 13 km⁷ to the north-west of Auckland's CBD. The land is gently undulating and broadly low-lying with the coastal waters associated with the upper Waitemata Harbour forming the Study area's northern boundary. The Project location and its local context is illustrated on **Figure 1** of Appendix 2.

Central to the local context is the Whenuapai airbase which is predominantly surrounded by a mix of rural agricultural areas (dominated by horticultural and pastoral grazing activities); clusters of residential development (generally associated with the coastlines of the Upper Waitemata Harbour and associated inlets and estuarine areas) and large infrastructure activities, including the recently completed SH18 motorway.

The land surrounding the project is undergoing change and this is evident with the development of the Hobsonville Peninsula to the east, Westgate to the west and more locally, a substantial amount of residential housing entered around Whenuapai Village.

Beyond SH18 to the south is the residential area of West Harbour, where its eastern extent flanks the northern shores of the Waitemata Harbour. Westpark Marina is a prominent part of this part of the harbour. Beyond the Harbour to the north are the residential suburbs of Beach Haven, Glenfield, Birkenhead and Greenhithe. Mangroves and other coastal vegetation flank the numerous smaller inlets of the harbour that assist, to some extent, in defining these suburbs. To the north east is the predominantly rural-residential areas of Coatesville and Riverhead. Further east, are rural production areas, with Kumeu and Huapai being smaller service centres to these areas.

5.2 Site specific Appraisal

Refer Figure 2-5 and VP1 to 7, Appendix 2

The existing environment can be described in relation to the proposed Project works, which are:

- Gravity Main
- Pump Station
- Rising Main

Each area of the existing environment is described in more detail below and together these are collectively referred to as the project area. The subsequent assessment of effects also follows this format.

⁷ Measured directly from the CBD north-westwards across the Waitemata Harbour to the project area.

5.2.1 Gravity Main

Landscape Attributes and Values

This area is broadly located across rural residential agricultural land on the northern side of Brigham Creek Road, in addition to a small area to the south of Brigham Creek Road. Residential and farm buildings tend to be focused along the northern interface with Brigham Creek Road. More recent, intensive residential development exists to the east which are arranged off Tamiro Road and Whenuapai Drive. These lots range from approximately 450 m² to 500 m². The north western extent of this more recent development meets a stormwater pond and the existing Whenuapai Village Pump Station. Open pasture areas are the predominant characteristic within this project area and can be broadly described as three fields (between 8,000 m² and 14,000 m²) which meet established exotic shelterbelts and the margins of Slaughter House Stream. This stream forms the northern extent of the project area and flows from east to west before discharging into Brigham Creek. The stream itself has a natural channel bed and its riparian margin supports a mix of native and exotic vegetation. The landform of this area reflects the identified waterways in that the elevation gradually reduces from east to west, with an approximate 5 m level distance.

The portion of the project area to the south of Brigham Creek Road is characterised by an open pasture field. A natural wetland has been identified within the open pasture area. The wetland has formed within a small overland flow path depression which slopes towards Sinton Stream (a small stream which drains into the larger Totara Creek). This wetland is dominated by exotic vegetation and the Ecological assessment⁸ considers that the wetland has low ecological value.

Viewing Audiences

The viewing audiences of the receiving environment are considered to be a combination of private and public viewing audiences. The private viewing audiences are those residents along Tamiro Road, Whenuapai Drive and residents along the northern side of Brigham Creek Road. Residents along Tamiro Road currently attain views towards a (exotic) tree lined margin along a portion of Slaughter House Stream, the stormwater pond and the Whenuapai Village pump Station (which is largely underground and is characterised by a concrete area). Residents along the northern interface of Brigham Creek Road tend not to obtain views towards the areas of works due to the established hedgerows and shelterbelts that line their properties. It is however noted that some views may be obtained from 28 Brigham Creek Road which has a northern aspect.

A farm building is also located on 20-22 Brigham Creek Road however, as the field it services will be impacted by the works, it is unlikely that a viewing audience associated with this facility will be present. A further private viewing audience is located along the western boundary of 20-22 Brigham Creek Road. It appears to be a private residence in addition to a plant nursery or fruit production business due to the presence of glass houses and polytunnels within the wider property. The dwelling within this property is located in the south eastern portion (west of the farm building in 20-22) and is surrounded by mature trees. Visibility from this property is expected to be restricted, and broadly limited to the second storey.

Public viewing audiences in relation to this portion of the project are those road users traveling along Tamiro Road (VP1 Appendix 2), Whenuapai Drive (western end only) (VP2, Appendix 2), and along a section of Brigham Creek Road (VP3 Appendix 2).

⁸ Ecological Assessment, BECA

5.2.2 Pump Station

Landscape Attributes and Values

The receiving environment of the proposed pump station is characterised by an open pasture field which forms part of the wider patchwork of agricultural land to the south of Brigham Creek Road. The open pasture field in which the pump station is proposed is broadly triangular in shape and 22,0000 m² in size, with the northern edge meeting Brigham Creek Road. The eastern edge of the field is defined by an established exotic shelterbelt which separates 23/27 Brigham Creek Road from the neighbouring lot at 31 Brigham Creek Road. The southern portion of the field is bordered by Sinton Stream which flows east to west, discharging into the Totara inlet. The stream supports riparian vegetation including a large stand of pine trees and is considered to have a moderate ecological value⁹. The field also features a natural wetland considered to have low ecological value (as described in the previous section), and the south eastern extent of the field includes various farm buildings and infrastructure. The location of the proposed pump station is in the western portion of the field, to the south of the existing wetland, on a broadly flat area of land.

Viewing Audiences

The viewing audiences of this project area are primarily public and restricted to road users along Brigham Creek Road (VP3, Appendix 2). These viewing audiences will be traveling at a reasonable speed (the speed limit is 80 km), and the site is at an oblique angle to their view. Heavily filtered views from some neighbouring properties on the northern side of Brigham Creek Road may also be attained.

It is anticipated that future development on this land will obtain views of the pump station and these are therefore considered. The nature of these viewing audiences is not currently known however with reference to the indicative land uses on the Whenuapai Structure Plan, it is considered that viewing audiences will be 'medium density' (residential) and 'business', and will observe the works once complete (i.e. not during construction).

5.2.3 Rising Main

Landscape Attributes and Values

The rising main project area originates from the proposed pump station to the south of Brigham Creek Road. The route of the rising main heads east for a short duration towards the boundary of 23-27 and 31 Brigham Creek Road. The Rising Main then traverses south across Sinton Stream and then across fields before changing course towards the east in alignment with Spedding Road. The rising main then travels along Spedding Road and stops at 32 Mamari Road near where a break pressure chamber will be located.

⁹ Ecological Assessment, Beca



Plate 10. View of Spedding Road condition (looking east)

Much of the receiving environment includes open pasture fields (either side of Sinton Stream), and the Spedding Road reserve, although the receiving environment also includes Sinton Stream in addition to areas of vegetation. Exotic shelterbelt planting borders 23-27 Brigham Creek Road, effectively dividing these two properties. Pine forest planting in addition to primarily riparian margin planting exists along Sinton Stream with the pine forestry restricted to a small block, south of Sinton Stream (VP4 and VP5, Appendix 2). A wetland has also been identified approximately 60 m east of the rising main and associated designation. The wetland area has been surveyed as being highly modified and degraded as it is in a paddock with unrestricted stock access and exotic pasture grasses are dominant. This wetland will not be impacted by the project.

Sinton Stream has been broadly described as part of the pump station and flows east to west and meets the Totara Inlet. The topographical nature of the stream contains a relatively wide margin of approximately 30m. The upper banks of the stream sit around 10 m RL, with the lower banks and stream bed broadly at 4 m RL. The stream is culverted as part of a farm track in the eastern portion of wider landholding, located in the vicinity of the proposed rising main culvert.

Viewing Audiences

The viewing audiences of the rising main will include public and private viewing audiences. Road users of both Brigham Creek Road (VP3, Appendix 2), and Spedding Road (VP6 and 7, Appendix 2), will have the opportunity to view the works, with those on Brigham Creek Road having oblique and brief views towards the project area where the rising main leaves the pump station and begins the route south across Sinton Stream. Spedding Road users will observe the works of the rising main as it runs along the Spedding Road corridor.

Private viewing audiences are broadly restricted to those residents along Brigham Creek Road and Spedding Road. Most of the effects on these viewing audiences will be in relation to the construction phases rather than operation.

5.3 Natural Character Attributes and Values (Project Area)

The primary aspects of Natural Character are considered to be the biophysical (abiotic and biotic) landscape attributes reflecting the extent to which natural elements, patterns and processes occur and the extent to which human modification has occurred. Secondary experiential aspects associated with the context of such waterbodies and their margins has also been considered.

5.3.1 Biophysical – Abiotic Attributes

The key abiotic attributes of the project include the geology, water catchments and landform, formed predominantly by geological and coastal processes. The Project area is made up of sedimentary rocks¹⁰, which are a common composition of the wider area.

The Project sits within the Whenuapai water catchment which is broadly defined by the Whenuapai area which includes the coastline of the upper Waitemata harbour, Brigham Creek, Rarawaru Creek, Kotukutuku Inlet, Te Turerenga Inlet, Waiarohia Inlet, Wallace Inlet and Te Okoriki Inlet near the Upper Harbour Bridge. The catchment as a whole remains broadly intact although a mix of rural land uses, the RNZAF Base (Whenuapai Airport) and residential land uses will mean that aspects of the catchment's watercourses will be managed (such as culverts).

The landform of the project area is influenced by the surrounding streams being Slaughter House Stream, Sinton Stream, Totara Creek, Totara Inlet and Brigham Creek whereby the gently rolling terrain reduces in elevation towards these streams and the Totara Inlet. A natural depression where a wetland has formed also exists. Overall, the abiotic attributes of the streams and wetland are often intact although bridges and culverts do occasionally exist (e.g. across Sinton Stream and Totara Creek).

Overall, it is considered that the biotic attributes hold a moderate degree of natural character value.

5.3.2 Biophysical – Biotic Attributes

The biotic attributes of the receiving environment are the living organisms which shape an ecosystem. This aspect in part relies on the surveys undertaken by the project Ecologist and Arboriculturist, with their findings outlined in their respective assessments.

A native fauna survey was undertaken as part of the Ecological Assessment and bats, birds and lizards were considered. Long tailed bat species were recorded in the wider area as part of surveying although this was not recorded along riparian margins and shelterbelt vegetation along Sinton Stream (where works are to occur). As bats have a threatened national conservation status, although there was not a high level of activity, the ecological values of any present bats have been assessed as very high in the ecological assessment. Several common indigenous and exotic native birds were also recorded, and the ecological value of these species was considered low. Lizards were also surveyed however only the exotic Plague Skink was recorded as being present. This does not discount the possibility of the native Copper

¹⁰ <https://ourevironment.scinfo.org.nz>

Skink being present in the area. Nevertheless, the ecological assessment considered very low ecological value due to the limited likelihood of native species being present.

Freshwater fish were also considered, and the area includes a range of species including shortfin eel, longfin eel and a variety of other native fish species. The ecological assessment considered that the ecological value of the freshwater fish was very high. Macro invertebrate were also considered and according to the ecological assessment have a low ecological value.

In relation to flora / vegetation, the majority of the project area is grazed farmland, with exotic trees and shrubs which form the recognisable shelterbelts and riparian margins. Native riparian vegetation exists near Slaughter House Stream which appears closely linked to the stormwater pond planting associated with the neighbouring residential development. Species along Sinton Stream are primarily exotic or of invasive species including tree privet, bamboo, woolly nightshade to name a few. Pine and eucalyptus also exist. Indigenous species include wheki, ponga, tauhinu and red matipo.

In relation to the identified wetlands to the south of Brigham Creek Road, both are primarily dominated by exotic vegetation including exotic pasture grasses and exotic wetland vegetation with low ecological value¹¹.

With the above considered, it is recognised the biotic natural character values vary greatly where they align to the ecological values of the area. Overall, it is considered that the biotic natural character values are moderate, noting that whilst exotic and invasive species are present, and many native species are relatively common (e.g. vegetation), some rare and threatened species exist.

5.3.3 Experiential Attributes

Experiential attributes comprise the interpretation of human experience of the waterbodies that occur within the project area. As established, the majority of the project area is grazed farmland or alongside residential development. Sinton Stream and Slaughter House Stream are considered to have low or moderate-low experiential values due to the presence of modification (e.g. culverts), exotic or invasive species and/or limited riparian margins. The identified wetland to the south of Brigham Creek Road is considered to have very low experiential natural character values due to its limited habitat and prominent exotic vegetation.

6.0 Assessment of Effects

6.1 Construction Effects

A project of this nature will mean that construction activities will take place over a number of months. Specifically, it is anticipated that the project will occur over 18-20 months in total and the presence of construction activities within the receiving environment will be staged / sequenced.

Many aspects in relation to construction will be in relation to establishment of contractor areas, stripping of topsoil (together with spoil stockpiling areas), and establishment of temporary

¹¹ Ecological Assessment, Beca

access along the route. It is envisaged that there will be three phases of works which will work in parallel. These independent works would be the gravity main, pump station and rising main. The approximate phasing of the works would be as follows¹²:

Gravity Main: Establish Contractor Area (CA) North. Commence installation of gravity main temporary access road once CA North is established. The gravity main works are estimated to take in the order of 14 months.

Pump Station: Establish Contractor Area Hub. The construction of the Contractor Area Hub area is assumed to take approximately 6-8 weeks. Pump station works can get underway once the Contractor Area Hub area is constructed. Pump station construction duration is likely to be in the order of 16 months from commencement on site until pre-commissioning completion.

Rising Main: Establish CA South yard area. The construction of the CA Hub area is assumed to take approximately 4 weeks. Commencement of the earthworks on Spedding Road rising main follows CA South construction. The rising main works are estimated to take in the order of 14 months.

6.1.1 Gravity Main

Effects on Landscape Attributes and Values

During construction areas of grass will be stripped and topsoil stockpiled. These areas are primarily in relation to the contractor area and length of the gravity main (including access road). To the north of Brigham Creek Road, open cut areas along the gravity main will result in earthworks within agricultural fields. It is considered that the agricultural fields do not contain high landscape value and any effects will be localised resulting **low** temporary adverse effects. Temporary effects in relation to works within the Brigham Creek Road Corridor are also anticipated to be **low**.

Trenching works through the wetland (south of Brigham Creek Road) will result in effects to both vegetation and the landform / natural depression in the area. Effects on vegetation values will be limited due to the dominance of exotic wetland vegetation. Notwithstanding, wetlands are considered to have a higher value, particularly due to their decline nationally. It is considered that the temporary effects upon the wetland through open cut trenching will therefore be **moderate-high**.

Other areas of vegetation are likely to be affected where they intersect with the gravity main and access road alignment. These areas are primarily exotic shelterbelt plantings and this vegetation is not currently protected. A limited area of riparian margin planting associated with the Slaughter House Stream may require some removal which is considered to result in temporary **moderate** adverse effects.

Viewing Audiences

During construction both the identified public and private viewing audiences will obtain views of the works. Brigham Creek Road users would attain short term views of some works and the contractor area to the north. These viewing audiences would also obtain views to the south towards the wetland. Views would also be obtained of the pump station works and rising main works which is also considered. Views will be fleeting and transitory and it is considered that these viewing audiences have a low sensitivity. During construction it is considered that these

¹² Construction Methodology, Brian Perry Civil

road users will experience low adverse visual effects. Road users along Tamiro Road and Whenuapai Drive are similarly considered to experience **low** adverse effects.

Residential viewing audiences i.e. northern side of Brigham Creek Road, Tamiro Road and Whenuapai Drive, will obtain fixed views of the works however these views will be temporary (during construction). Moreover, change during construction will be broadly linear (along i.e. length of the gravity main), low in elevation and of a scale that can be readily absorbed in the open nature of the views. With the above considered it is determined that the adverse visual effects during construction on residential viewing audiences will be **low-moderate**.

6.1.2 Pump Station

Effects on Landscape Attributes and Values

The temporary effects on the attributes and values of the receiving environment of the pump station are in relation to landform modification (including Sinton Stream margin), and vegetation removal.

During construction areas of grass will be stripped and topsoil stockpiled. These areas are primarily in relation to the contractor area. It is considered that the localised landform effects (through minor grading and topsoil stripping) in addition to the removal of grass, will be temporary (as it will be reinstated), and consequently adverse effects will be **low**.

Removal of material for the construction of the pump station will result in adverse effects however, it is considered that there are no notable values associated with the area of land in relation to the pump station footprint. This is not to discount works associated with the wetland which are covered under the Gravity Main section of this assessment.

Modification to the Sinton Stream margin, as a result of the provision for an emergency overflow, will create adverse temporary effects and impact a portion of the Sinton Stream margin which is unmodified. This area is however, considered relatively discreet / contained and will occur in the upper portion of the bank and not impact an entire embankment. Adverse effects in relation to these works are considered to be **low**.

Limited vegetation removal in the riparian margin is required in relation to the pump station and this will primarily impact exotic and invasive species which have established along the margins of Sinton Stream. Some native vegetation will however undoubtedly be impacted. Temporary effects in relation to vegetation removal are anticipated to be **low**.

Effects on Visual Amenity

Road users along Brigham Creek Road would form the viewing audiences during construction of the pump station. These viewing audiences will experience fleeting and transitory views at an oblique angle as they pass the site. It is considered that due to their low sensitivity to the change proposed and short term views, any temporary effects on these road users would be **very low**.

6.1.3 Rising Main

Effects on Landscape Attributes and Values

Landform modification through open cut trenching and the provision for the temporary access road will occur resulting in **low** effects as these areas remain within agricultural fields, avoid wetlands and streams, and are not considered to be areas of high value.

The construction of the proposed culvert will however involve modification to the Sinton Stream. This will impact a total length of 63 m (structure 43.14 m long x 3.5 m high x 3.5 m wide box culvert, plus apron and riprap), and involve temporary damming and diversion (for approximately 12 weeks). It is considered that the temporary diversion of the stream and effects on the stream embankments will result in **moderate-high** adverse effects, albeit at a local level (i.e. the majority of the stream will remain unaffected).

In relation to vegetation, areas of exotic pasture will be removed along the alignment of the rising main pipeline, in addition to rank grass along the Spedding Road corridor. Exotic shelterbelt vegetation is proposed to be removed along the pipeline alignment (northern section) in addition to an area of pine forest. Limited native vegetation may also be removed along the margins of Sinton Stream in relation to the culvert alignment. Tree planting, primarily exotic, will also be removed along Spedding Road (within the road reserve and private property). Overall, it is considered that there will be **low-moderate** effects during construction.

Effects on Visual Amenity

During construction viewing audiences along Brigham Creek Road will notice the removal of exotic shelterbelt vegetation and more distantly Pine removal on the southern side of Sinton Stream. Works in the form of machinery will be visible in the landscape. Although these works will be visible alongside the works in relation to the gravity main and pump station, views from Brigham Creek Road will remain short term and/or make up a small portion of their view, for a temporary period.

For those road users and residents along Spedding Road, works will be temporary. Moreover, works along Spedding Road although proximate, will be associated with recognisable works within road corridors or fields adjacent to roads with earthworks or major farm infrastructure operations. Overall, for road users it is anticipated that **low** effects will occur, and **low-moderate** effects will occur for residential viewing audiences.

6.1.4 Effects on Natural Character Values

The effects on the abiotic attributes during construction will be a result of excavation within a wetland and within stream margins. A trenched method is proposed through the wetland between the pump station and Brigham Creek Road and in this respect, it is considered that temporary effects on the abiotic attributes of this wetland feature will be **moderate-high** as it will be heavily impacted by the works and effectively bisect the feature.

Effects on stream margins will be upon Sinton Stream only, with effects on other nearby streams avoided. The effects on Sinton Stream will be in relation to the emergency overflow outfall (next to the pump station), and the section of the stream where the culvert will be located. The emergency overflow outlet will impact the upper portion of the stream embankment. It is considered that this area of works will be relatively limited, and effects are in part reduced due to it occurring on the upper embankment of the stream.

Works in relation to the proposed culvert will impact the margins and stream bed in another section of Sinton Stream. Natural character values have been in part reduced due to the localised modification in relation to an existing culvert and therefore this area of the stream has been partly compromised. With the above in mind, it is considered that the adverse effects will be **moderate**.

In relation to effects to biotic attributes, some riparian vegetation will be removed around the Slaughter House and Sinton Streams. This does however include a large stand of mature pine trees. Riparian planting along Slaughter House Stream includes some mixed native vegetation

growing adjacent to the existing Whenuapai Village Pump Station, much of this appears to have been established as part of the adjacent stormwater pond planting and therefore has not naturally established. A limited range of common native plant species may also be affected along Sinton Stream, although a large number of exotic (and weed) species exist. Overall, it is considered that the removal of native vegetation during construction will result in **low-moderate** effects to the biotic attributes.

The experiential effects in relation to construction will be limited as the wetlands, streams and their margins occur within the context of a managed and partly modified farm environment alongside residential development. Modification to these features will however reduce the natural character values of these features during construction.

In relation to the identified wetland near the proposed pump station, it is considered temporary experiential effects will be very low due to the degraded nature of the feature and its context within the farmland. Effects along Slaughter House Stream are also considered to be limited due to the presence of exotic vegetation, relatively recently established riparian vegetation and man-made infrastructure.

Works associated with Sinton Stream are also anticipated to have a limited impact on the experiential attributes due to the nature of the managed farmland character, existing culvert and presence of exotic vegetation, and with the above considered, temporary adverse effects on the experiential values are anticipated to be **low-moderate**.

6.2 Operation Effects

6.2.1 Gravity Main

Effects on Landscape Attributes and Values

Following construction of the gravity main, it is not anticipated that there will be any further effects on the identified landscape attributes and values of this project area. Any disturbance to the wetland located south of Brigham Creek Road will have been appropriately mitigated through backfilling, recontouring / shaping of the depression in the overland flow path. Vegetation will have been established as part of the project's response and include wetland riparian planting together with appropriate indigenous tree species as indicated in Appendix 3.

Due to the current (poor) condition of the wetland, it is considered that **low** beneficial residual effects are anticipated as a result of the proposed mitigation planting due to the project. For the remaining areas north of Brigham Creek Road which form the remaining part of the project's receiving environment, it is considered that there will be **very low** adverse effects on the landscape attributes and values.

Effects on Visual Amenity

In relation to visual amenity, apart from the planting around the wetland, there will be no visible aboveground elements of the gravity main section of the project. It may however be registered that some exotic trees associated with the existing shelterbelt vegetation patterns will have been removed. It is therefore considered that for those viewing audiences attaining views in the project area to the north of Brigham Creek Road, **very low**, adverse visual effects will be attained. For those with views south of Brigham Creek Road (restricted to road users), it is considered that the brief views of the planted wetland will result in **very low** beneficial effects.

6.2.2 Pump Station

Effects on Landscape Attributes and Values

Following construction and during operation, the pump station will support a number of established areas of amenity planning as indicated in Appendix 3. These areas include a combination of low amenity planting, screen planting and stream bank reinstatement planting in the southern and eastern portions. Overtime and once planting has become established (i.e. 5 years), it is considered that there will be **very low** beneficial effects on the attributes and values.

Effects on Visual Amenity

As established, the majority of the pump station components are located below ground and will therefore not be visible. For those elements that are required to be above ground, whilst many of these are not architecturally designed or integrated with amenity as a key matter, planting as previously described will surround the pump station and above ground elements and will provide a sufficient level of visual mitigation to viewing audiences being either those travelling along Brigham Creek Road, or future viewing audiences in the vicinity which may exist across the balance of the surrounding land. With the above in mind, it is considered that adverse visual effects would be **low**.

6.2.3 Rising Main

Effects on Landscape Attributes and Values

The trenched areas of the rising main will have been backfilled and will broadly reflect the gently rolling terrain in the agricultural fields, or landform characteristics of the roadside environment.

The presence of the culvert will have altered the values of the Sinton Stream at a localised level where a portion of the stream embankments will have been modified to support the proposed culvert. At completion of the works the temporary stream diversion would have been removed and local reshaping of the stream banks on approach and departure of the culvert will also have occurred. With the above in mind, it is considered that overall, adverse effects would be **moderate**.

Removed vegetation as part of the rising main will have included exotic pines and a mix of native vegetation along the Sinton Stream margin. Some tree removal would also have occurred along Spedding Road. Vegetation will be established in the vicinity of the new culvert, although it is recognised that aspects of this vegetation would be removed in the future if Spedding Road was extended.

The project Arborist notes that “*overall it has been assessed that there are no significant individual trees that should be retained*”¹³. Notwithstanding this, a total of 220 trees are proposed to mitigate tree removal across the project (i.e. Gravity Main, Pump Station and Rising Main sections). It is these new areas of tree planting that will contribute to mitigating the tree removal along Spedding Road. Overall and once replacement vegetation is established, it is considered that there will be **very low** adverse effects on the vegetation values for the Rising Main section.

Effects on Visual Amenity

With most areas of the rising main covered / backfilled, the only permeant visible element will be the culvert. From Brigham Creek Road or existing residential properties, it is not anticipated to

¹³ Arboricultural Report, Arborlab

be particularly visible due to intervening vegetation and landform conditions. Any views afforded from Brigham Creek Road will also be brief and oblique, with the culvert positioned in a low-lying portion of the landscape. Overall, it is considered that views would generate no more than **low** adverse effects. For any future development within the area (i.e. realising the aspirations of the Whenuapai Structure Plan), the culvert will have formed part of the existing environmental condition and infrastructure network.

6.2.4 Effects on Natural Character Values

In relation to the abiotic attributes, the primary residual effects will be as a result of the emergency overflow outfall and culvert of the Sinton Stream. The completed emergency outfall will have impacted a small portion of the bank and any residual effects will be **low**. Whilst a section of streambed will be effectively lost as a result of the culvert, the utilisation of a compacted clay substrate will provide some relationship to the existing natural clay channel bed. Modification of the stream banks as a result of the culvert will reduce the level of abiotic values however, the works will also remove an existing culvert associated with the farm. Overall, it is considered that the permanent adverse effects on the abiotic attributes of Sinton Stream will be **moderate**.

Residual effects on the biotic values will have reduced from those levels in construction following new riparian planting. This will occur in areas along Slaughter House Stream (near the Tamiro Pump Station, a reach of Totara Creek, Sinton Stream (near culvert margins), and also around the wetland. Once established (i.e. 5 years), it is considered this vegetation will reduce adverse biotic natural character effects to **very low**.

Residual experiential effects will remain particularly where permanent changes have occurred along Sinton Stream. It is considered that these will remain as **moderate** as these structures will remain present within the stream corridor and will continue to influence the natural characteristics.

7.0 Conclusion

In summary, natural character and landscape effects will primarily be generated as a result of the project impacting wetland, a stream and native riparian vegetation. The removal of native vegetation will be mitigated through new riparian margin planting along Slaughter House Stream and Totara Creek. The identified wetland impacted by open trenching will also be reinstated and appropriate wetland planting will be established which will provide greater vegetation values that are currently observed. Effects on the Sinton Stream margin will be permanent, through the presence of an emergency overflow outlet and proposed culvert, which will affect the landscape and natural character values of the stream to a **moderate** level.

Visual effects will also be greatest during construction however these will be temporary in nature. Visual effects on residents will generally affect those along Tamiro Road, Brigham Creek Road and Spedding Road. The latter roads support a limited number of residents and adverse effects will be limited. Similarly, effects for those at Tamiro Road will be limited to **low-moderate**. Overall, any effects on residents during construction will be no more than **low-moderate**. Construction effects for road users will be more limited due to their short-term experience of the change, the often oblique angle of their views, or works occurring in road

corridors which are not wholly uncharacteristic. Once the project is completed, any residual effects on the project's viewing audiences will be no more than **low**.

Appendix 1: Landscape and Visual Effects Assessment Methodology

Introduction

The Natural Character, Landscape and Visual Effects Assessment (NCLVEA) process provides a framework for assessing and identifying the nature and level of likely effects that may result from a proposed development. Such effects can occur in relation to changes to physical elements, changes in the existing character or condition of the landscape and the associated experiences of such change. In addition, the landscape assessment method may include (where appropriate) an iterative design development processes, which seeks to avoid, remedy or mitigate adverse effects (see **Figure 1**).

This outline of the landscape and visual effects assessment methodology has been undertaken with reference to the **Draft Te Tangi A Te Manu: Aotearoa New Zealand Landscape Assessment Guidelines** and its signposts to examples of best practice, which include the **Quality Planning Landscape Guidance Note**¹⁴ and the **UK guidelines for landscape and visual impact assessment**¹⁵.

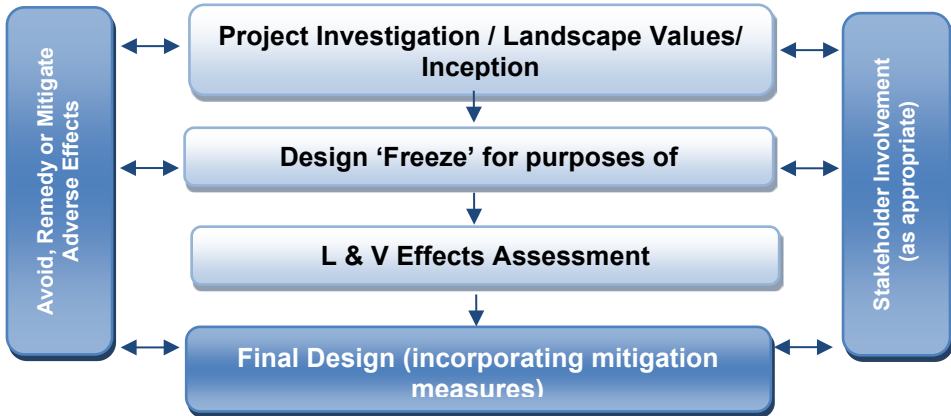


Figure 1: Design feedback loop

When undertaking any landscape assessment, it is important that a **structured and consistent approach** is used to ensure that **findings are clear and objective**. Judgement should be based on skills and experience and be supported by explicit evidence and reasoned argument.

While natural character, landscape and visual effects assessments are closely related, they form separate procedures. Natural character effects consider the characteristics and qualities and associated degree of modification relating specifically to waterbodies and their margins, including the coastal environment. The assessment of the potential effects on landscape

¹⁴ <http://www.qualityplanning.org.nz/index.php/planning-tools/land/landscape>

¹⁵ Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3)

considers effects on landscape character and values. The assessment of visual effects considers how changes to the physical landscape affect the viewing audience. The types of effects can be summarised as follows:

Natural Character effects: *Change in the characteristics or qualities including the level of*

Landscape effects: *Change in the physical landscape, which may affect its characteristics*

Visual effects: *Change to views which may affect the visual amenity experienced by people*

The policy context, existing landscape resource and locations from which a development or change is visible, all inform the 'baseline' for landscape and visual effects assessments. To assess effects, the first step requires identification of the landscape's **character** and **values** including the **attributes** on which such values depend. This requires that the landscape is first **described**, including an understanding of relevant physical, sensory and associative landscape dimensions. This process, known as landscape characterisation, is the basic tool for understanding landscape character and may involve subdividing the landscape into character areas or types. The condition of the landscape (i.e. the state of an individual area of landscape or landscape feature) should also be described together with, a judgement made on the value or importance of the potentially affected landscape.

Natural Character Effects

In terms of the RMA, natural character specifically relates to the coastal environment as well as freshwater bodies and their margins. The RMA provides no definition of natural character. RMA, section 6(a) considers natural character as a matter of national importance:

...the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development.

Natural character comprises the natural elements, patterns and processes of the coastal environment, waterbodies and their margins, and how they are perceived and experienced. This assessment interprets natural character as being the degree of naturalness consistent with the following definition:

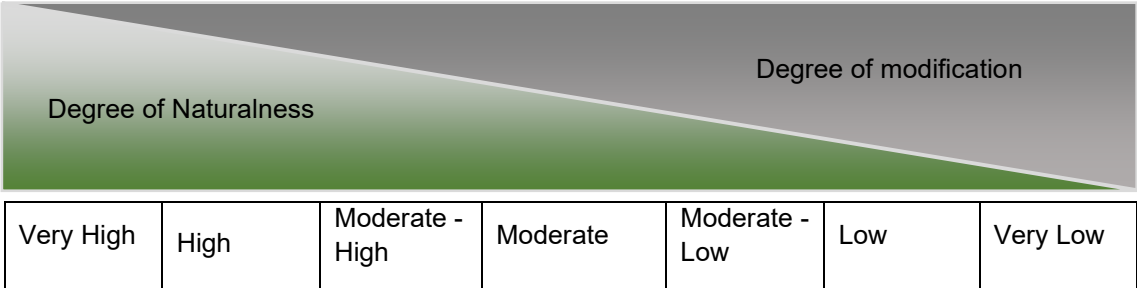
Natural character is a term used to describe the naturalness of waterbodies and their margins. The degree or level of natural character depends on:

- *The extent to which natural elements, patterns and processes occur;*
- *The nature and extent of modifications to the ecosystems and landscape/seascape;*
- *The highest degree of natural character (greatest naturalness) occurs where there is least modification; and*
- *The effect of different types of modification upon the natural character of an area varies with the context and may be perceived differently by different parts of the community.*

The process to assess natural character involves an understanding of the many systems and attributes that contribute to waterbodies and their margins, including biophysical and experiential factors. This can be supported through the input of technical disciplines such as marine, aquatic and terrestrial ecology, and landscape architecture.

Defining the level of natural character

The level of natural character is assessed in relation to a seven-point scale. The diagram below illustrates the relationship between the degree of naturalness and degree of modification. A high level of natural character means the waterbody is less modified and vice versa.

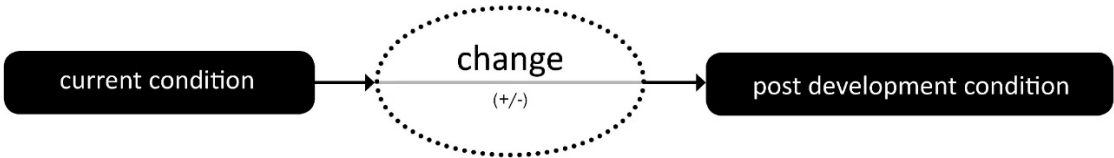


Scale of assessment

When defining levels of natural character, it is important to clearly identify the spatial scale considered. The scale at which natural character is assessed will typically depend on the study area or likely impacts and nature of a proposed development. Within a district or region-wide study, assessment scales may be divided into broader areas which consider an overall section of coastline or river with similar characteristics, and finer more detailed 'component' scales considering separate more local parts, such as specific bays, reaches or escarpments. The assessment of natural character effects has therefore considered the change to attributes which indicate levels of natural character at a defined scale.

Effects on Natural Character

An assessment of the effects on natural character of an activity involves consideration of the proposed changes to the current condition compared to the existing. This can be negative or positive.



The natural character effects assessment involves the following steps;

- assessing the existing level of natural character;
- assessing the level of natural character anticipated (post construction); and
- considering the significance of the change

Landscape Effects

Assessing landscape effects requires an understanding of the landscape resource and the magnitude of change which results from a proposed activity to determine the overall level of landscape effects.

Landscape Resource

Assessing the sensitivity of the landscape resource considers the key characteristics and qualities. This involves an understanding of both the ability of an area of landscape to absorb change and the value of the landscape.

Ability of an area to absorb change

This will vary upon the following factors:

- Physical elements such as topography / hydrology / soils / vegetation;
- Existing land use;
- The pattern and scale of the landscape;
- Visual enclosure / openness of views and distribution of the viewing audience;
- The zoning of the land and its associated anticipated level of development;
- The scope for mitigation, appropriate to the existing landscape.

The ability of an area of landscape to absorb change takes account of both the attributes of the receiving environment and the characteristics of the proposed development. It considers the ability of a specific type of change occurring without generating adverse effects and/or achievement of landscape planning policies and strategies.

The value of the Landscape

Landscape value derives from the importance that people and communities, including tangata whenua, attach to particular landscapes and landscape attributes. This may include the classification of Outstanding Natural Feature or Landscape (ONFL) (RMA s.6(b)) based on important physical, sensory and associative landscape attributes, which have potential to be affected by a proposed development. A landscape can have value even if it is not recognised as being an ONFL.

Magnitude of Landscape Change

The magnitude of landscape change judges the amount of change that is likely to occur to areas of landscape, landscape features, or key landscape attributes. In undertaking this assessment, it is important that the size or scale of the change is considered within the geographical extent of the area influenced and the duration of change, including whether the change is reversible. In some situations, the loss /change or enhancement to existing landscape elements such as vegetation or earthworks should also be quantified.

When assessing the level of landscape effects, it is important to be clear about what factors have been considered when making professional judgements. This can include consideration of any benefits which result from a proposed development. **Table 1** below helps to explain this process. The tabulating of effects is only intended to inform overall judgements.

Contributing Factors		Higher	Lower
Landscape (sensitivity)	Ability to absorb change	The landscape context has limited existing landscape detractors which make it highly vulnerable to the type of change resulting from the proposed development.	The landscape context has many detractors and can easily accommodate the proposed development without undue consequences to landscape character.
	The value of the landscape	The landscape includes important biophysical, sensory and shared and recognised attributes. The landscape requires protection as a matter of national importance (ONF/L).	The landscape lacks any important biophysical, sensory or shared and recognised attributes. The landscape is of low or local importance.
Magnitude of Change	Size or scale	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 aesthetic or perceptual change apparent.
	Geographical extent	Wider landscape scale.	Site scale, immediate setting.
	Duration and reversibility	Permanent. Long term (over 10 years).	Reversible. Short Term (0-5 years).

Table 1: Determining the level of landscape effects

Visual Effects

To assess the visual effects of a proposed development on a landscape, a visual baseline must first be defined. The visual ‘baseline’ forms a technical exercise which identifies the area where the development may be visible, the potential viewing audience, and the key representative public viewpoints from which visual effects are assessed.

Field work is used to determine the actual extent of visibility of the site, including the selection of representative viewpoints from public areas. This stage is also used to identify the potential ‘viewing audience’ e.g. residential, visitors, recreation users, and other groups of viewers who can see the site. During fieldwork, photographs are taken to represent views from available viewing audiences.

The viewing audience comprises the individuals or groups of people occupying or using the properties, roads, footpaths and public open spaces that lie within the visual envelope or ‘zone of theoretical visibility (ZTV)’ of the site and proposal.

The Sensitivity of the viewing audience

The sensitivity of the viewing audience is assessed in terms of assessing the likely response of the viewing audience to change and understanding the value attached to views.

Likely response of the viewing audience to change

Appraising the likely response of the viewing audience to change is determined by assessing the occupation or activity of people experiencing the view at particular locations and the extent to which their interest or activity may be focussed on views of the surrounding landscape. This relies on a landscape architect’s judgement in respect of visual amenity and the reaction of people who may be affected by a proposal. This should also recognise that people more susceptible to change generally include: residents at home, people engaged in outdoor recreation whose attention or interest is likely to be focussed on the landscape and on particular views; visitors to heritage assets or other important visitor attractions; and communities where views contribute to the wider landscape setting.

Value attached to views

The value or importance attached to particular views may be determined with respect to its popularity or numbers of people affected or reference to planning instruments such as viewshafts or view corridors. Important viewpoints are also likely to appear in guide books or tourist maps and may include facilities provided for its enjoyment. There may also be references to this in literature or art, which also acknowledge a level of recognition and importance.

Magnitude of Visual Change

The assessment of visual effects also considers the potential magnitude of change which will result from views of a proposed development. This takes account of the size or scale of the effect, the geographical extent of views and the duration of visual change, which may distinguish between temporary (often associated with construction) and permanent effects where relevant. Preparation of any simulations of visual change to assist this process should be guided by best practice as identified by the NZILA¹⁶.

When determining the overall level of visual effect, the nature of the viewing audience is considered together with the magnitude of change resulting from the proposed development.

Table 4 has been prepared to help guide this process:

Contributing Factors		Higher	Lower	Examples
The Viewing Audience (sensitivity)	Ability to absorb change	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. Views from transport corridors.	Dwellings, places of work, transport corridors, public tracks
	Value attached to views	Viewpoint is recognised by the community such as an important view shaft, 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.	Acknowledged viewshafts, Lookouts
Magnitude of Change	Size or scale	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 views 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.	- Higher contrast/ Lower contrast. - Open views, Partial views, Glimpse views (or filtered); No views (or obscured)
	Geographic extent	Front on views. Near distance views; Change visible across a wide area.	Oblique views. Long distance views. Small portion of change visible.	- Front or Oblique views. - Near distant, Middle distant and Long distant views
	Duration and reversibility	Permanent. Long term (over 15 years).	Transient / temporary. Short Term (0-5 years).	- Permanent (fixed), Transitory (moving)

Table 2: Determining the level of visual effects

Nature of Effects

In combination with assessing the level of effects, the landscape and visual effects assessment also considers the nature of effects in terms of whether this will be positive (beneficial) or negative (adverse) in the context within which it occurs. Neutral effects can also occur where landscape or visual change is benign.

¹⁶ Best Practice Guide: Visual Simulations BPG 10.2, NZILA

It should also be noted that a change in a landscape does not, of itself, necessarily constitute an adverse landscape or visual effect. Landscape is dynamic and is constantly changing over time in both subtle and more dramatic transformational ways; these changes are both natural and human induced. What is important in managing landscape change is that adverse effects are avoided or sufficiently mitigated to ameliorate the effects of the change in land use. The aim is to provide a high amenity environment through appropriate design outcomes.

This assessment of the nature effects can be further guided by **Table 2** set out below:

Nature of effect	Use and Definition
Adverse (negative):	The activity 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 / or visual amenity values
Neutral (benign):	The activity would be consistent with (or blend in with) the scale, landform and pattern of the landscape maintaining existing landscape and / or visual amenity values
Beneficial (positive):	The activity would enhance the landscape and / or visual amenity through removal or restoration of existing degraded landscape activities and / or addition of positive elements or features

Table 1: Determining the Nature of Effects

Cumulative Effects

This can include effects of the same type of development (e.g. bridges) or the combined effect of all past, present and approved future development¹⁷ of varying types, taking account of both the permitted baseline and receiving environment. Cumulative effects can also be positive, negative or benign.

Cumulative Landscape Effects

Cumulative landscape effects can include additional or combined changes in components of the landscape and changes in the overall landscape character. The extent within which cumulative landscape effects are assessed can cover the entire landscape character area within which the proposal is located, or alternatively, the zone of visual influence from which the proposal can be observed.

Cumulative Visual Effects

Cumulative visual effects can occur in combination (seen together in the same view), in succession (where the observer needs to turn their head) or sequentially (with a time lapse between instances where proposals are visible when moving through a landscape). Further visualisations may be required to indicate the change in view compared with the appearance of the project on its own.

Determining the nature and level of cumulative landscape and visual effects should adopt the same approach as the project assessment in describing both the nature of the viewing audience and magnitude of change leading to a final judgement. Mitigation may require broader consideration which may extend beyond the geographical extent of the project being assessed.

Determining the Overall Level of Effects

The landscape and visual effects assessment conclude with an overall assessment of the likely level of landscape and visual effects. This step also takes account of the nature of effects and the effectiveness of any proposed mitigation. The process can be illustrated in Figure 2:

¹⁷ The life of the statutory planning document or unimplemented resource consents.



Figure 2: Assessment process

This step informs an overall judgement identifying what level of effects are likely to be generated as indicated in **Table 3** below. This table which can be used to guide the level of natural character, landscape and visual effects uses an adapted seven-point scale derived from Te Tangi A Te Manu.

Effect Rating	Use and Definition
Very High:	Total loss of key elements / features / characteristics, i.e. amounts to a complete change of landscape character and in views.
High:	Major modification or loss of most key elements / features / characteristics, i.e. little of the pre-development landscape character remains and a major change in views. <i>Concise Oxford English Dictionary Definition</i> <i>High: adjective- Great in amount, value, size, or intensity.</i>
Moderate- High:	Modifications of several key elements / features / characteristics of the baseline, i.e. the pre-development landscape character remains evident but materially changed and prominent in views.
Moderate:	Partial loss of or modification to key elements / features / characteristics of the baseline, i.e. new elements may be prominent in views but not necessarily uncharacteristic within the receiving landscape. <i>Concise Oxford English Dictionary Definition</i> <i>Moderate: adjective- average in amount, intensity, quality or degree</i>
Low-Moderate:	Minor loss of or modification to one or more key elements / features / characteristics, i.e. new elements are not prominent within views or uncharacteristic within the receiving landscape.
Low:	Little material loss of or modification to key elements / features / characteristics. i.e. modification or change is not uncharacteristic or prominent in views and absorbed within the receiving landscape. <i>Concise Oxford English Dictionary Definition</i> <i>Low: adjective- 1. Below average in amount, extent, or intensity.</i>
Very Low:	Negligible loss of or modification to key elements/ features/ characteristics of the baseline, i.e. approximating a 'no change' situation and a negligible change in views.

Table 3: Determining the overall level of landscape and visual effects

Determination of “minor”

Decision makers determining whether a resource consent application should be notified must also assess whether the effect on a person is less than minor¹⁸ or an adverse effect on the environment is no more than minor¹⁹. Likewise, when assessing a non-complying activity, consent can only be granted if the s104D ‘gateway test’ is satisfied. This test requires the decision maker to be assured that the adverse effects of the activity on the environment will be ‘minor’ or not be contrary to the objectives and policies of the relevant planning documents.

These assessments will generally involve a broader consideration of the effects of the activity, beyond the landscape and visual effects. Through this broader consideration, guidance may be sought on whether the likely effects on the landscape or effects on a person are considered in relation to ‘minor’. It must also be stressed that more than minor effects on individual elements

¹⁸ RMA, Section 95E

¹⁹ RMA Section 95D

or viewpoints does not necessarily equate to more than minor landscape effects. In relation to this assessment, moderate-low level effects would generally equate to ‘minor’

The third row highlights the word ‘significant’. The term ‘significant adverse effects’ applies to particular RMA situations, namely as a threshold for the requirement to consider alternative sites, routes, and methods for Notices of Requirement under RMA s171(1)(b), the requirements to consider alternatives in AEEs under s6(1)(a) of the 4th Schedule. It may also be relevant to tests under other statutory documents such as for considering effects on natural character of the coastal environment under the NZ Coastal Policy Statement (NZCPS) Policy 13 (1)(b) and 15(b).

<u>Less than Minor</u>		<u>Minor</u>	<u>More than Minor</u>			
Very Low	Low	Low-Moderate	Moderate	Moderate-High	High	Very High
					Significant	

Table 4: Determining adverse effects for notification determination, non-complying activities and significance

Appendix 2: Graphic Supplement

WHENUAPAI REDHILLS: PACKAGE 1
GRAPHIC SUPPLEMENT
APPENDIX 2
AUGUST 2022



Whenuapai Redhills Package 1



Contents

FIGURES

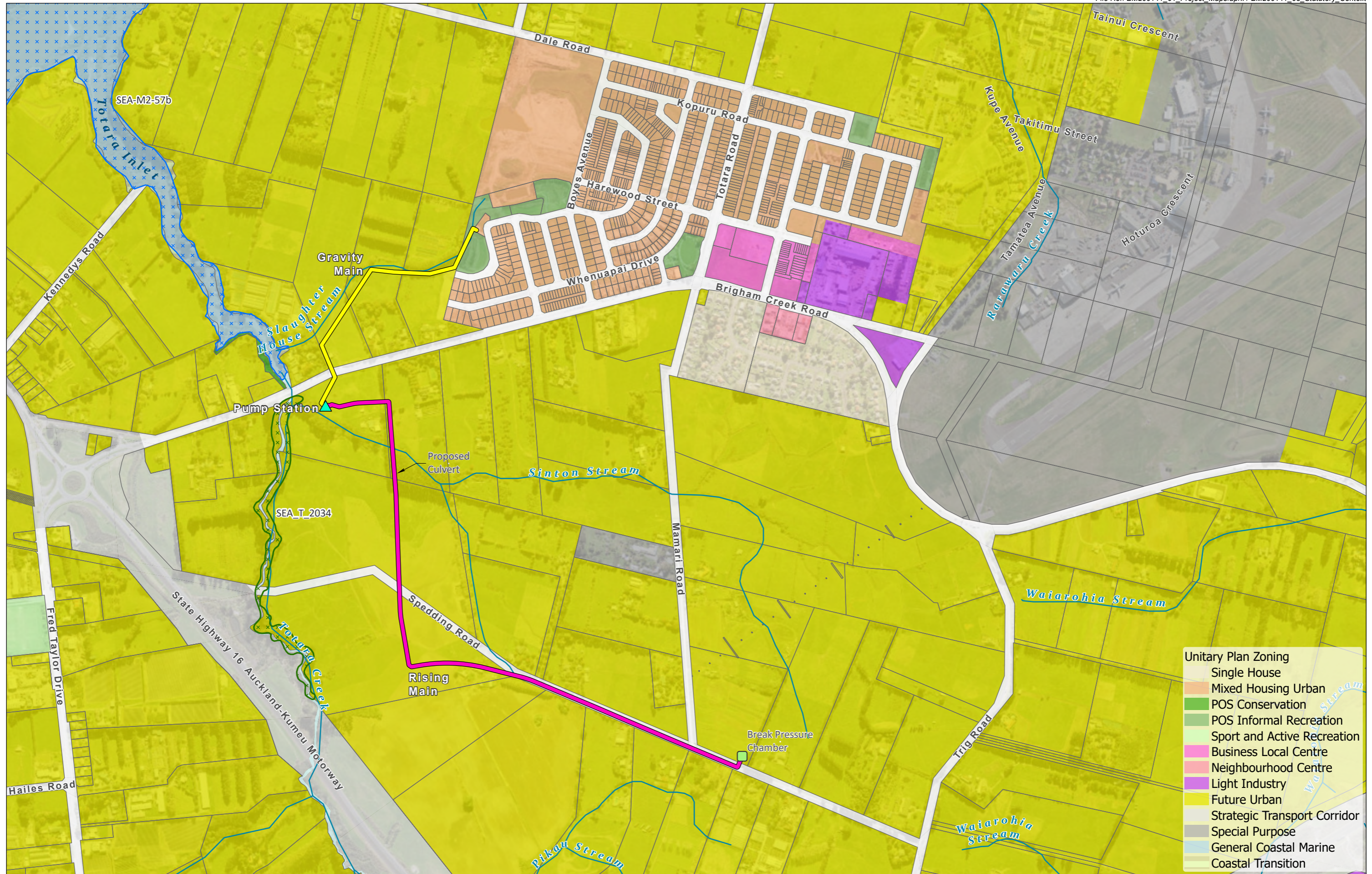
Figure 1	Site Context
Figure 2	Site Location
Figure 3	Statutory Context
Figure 4	Elevation and Streams
Figure 5	Viewpoint Locations

VIEWPOINT PHOTOGRAPHS

VP 1	View from Tamiro Road - Panorama (Existing)
VP 2	View from Whenuapai Drive - Panorama (Existing)
VP 3	View from Brigham Creek Road - Panorama (Existing)
VP 4	View towards proposed culvert site - Panorama (Existing)
VP 5	Example of culvert site receiving environment - Panorama (Existing)
VP 6	View from Spedding Road (1 of 2) - Panorama (Existing)
VP 7	View from Spedding Road (2 of 2) - Single Frame (Existing)







Unitary Plan Zoning	
[Light Yellow]	Single House
[Orange]	Mixed Housing Urban
[Green]	POS Conservation
[Light Green]	POS Informal Recreation
[Light Blue]	Sport and Active Recreation
[Pink]	Business Local Centre
[Light Purple]	Neighbourhood Centre
[Purple]	Light Industry
[Yellow]	Future Urban
[Grey]	Strategic Transport Corridor
[Dark Grey]	Special Purpose
[Blue]	General Coastal Marine
[Light Blue]	Coastal Transition

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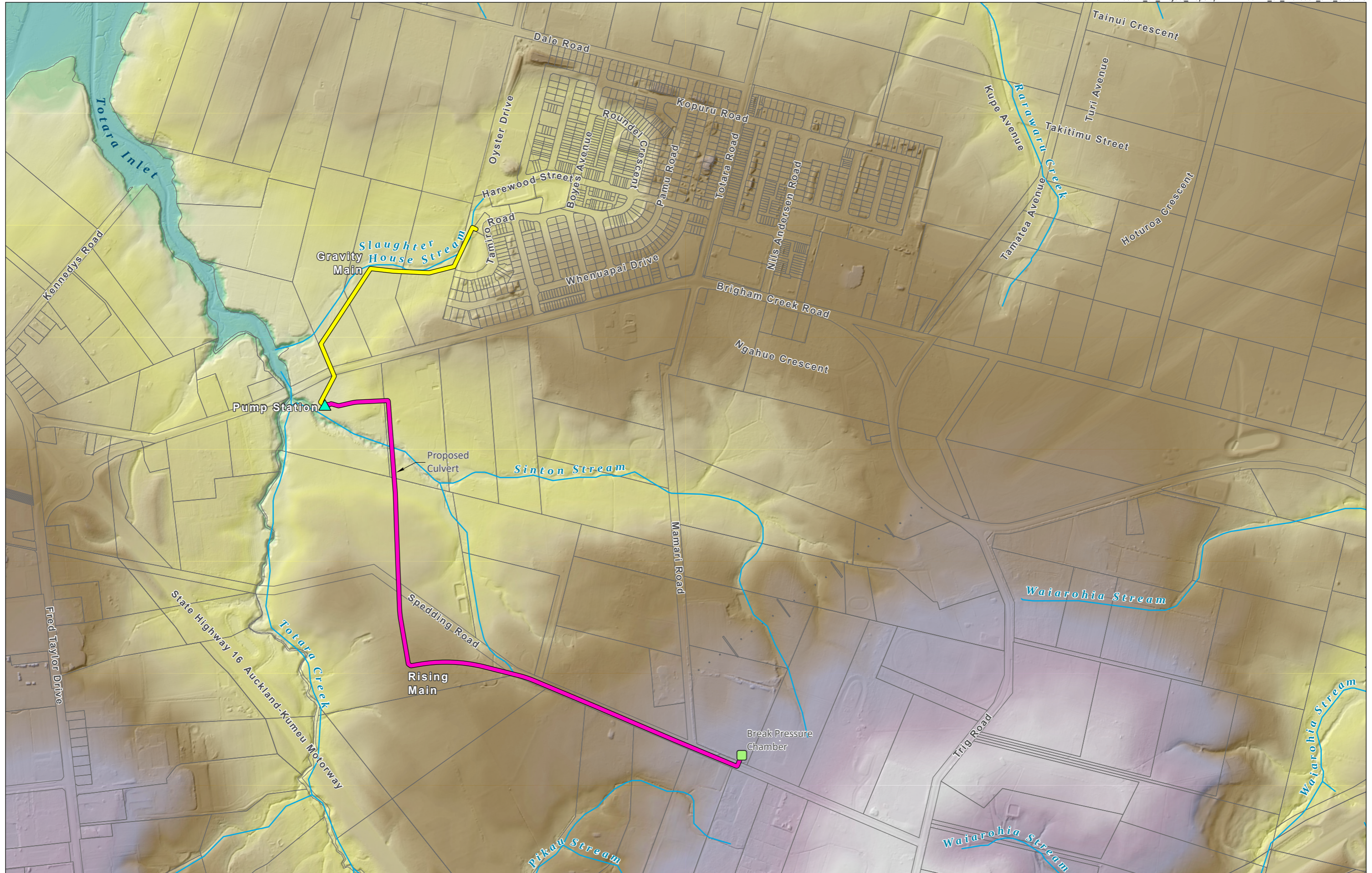
Data Sources: Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors, LINZ (River Names, Parcels)

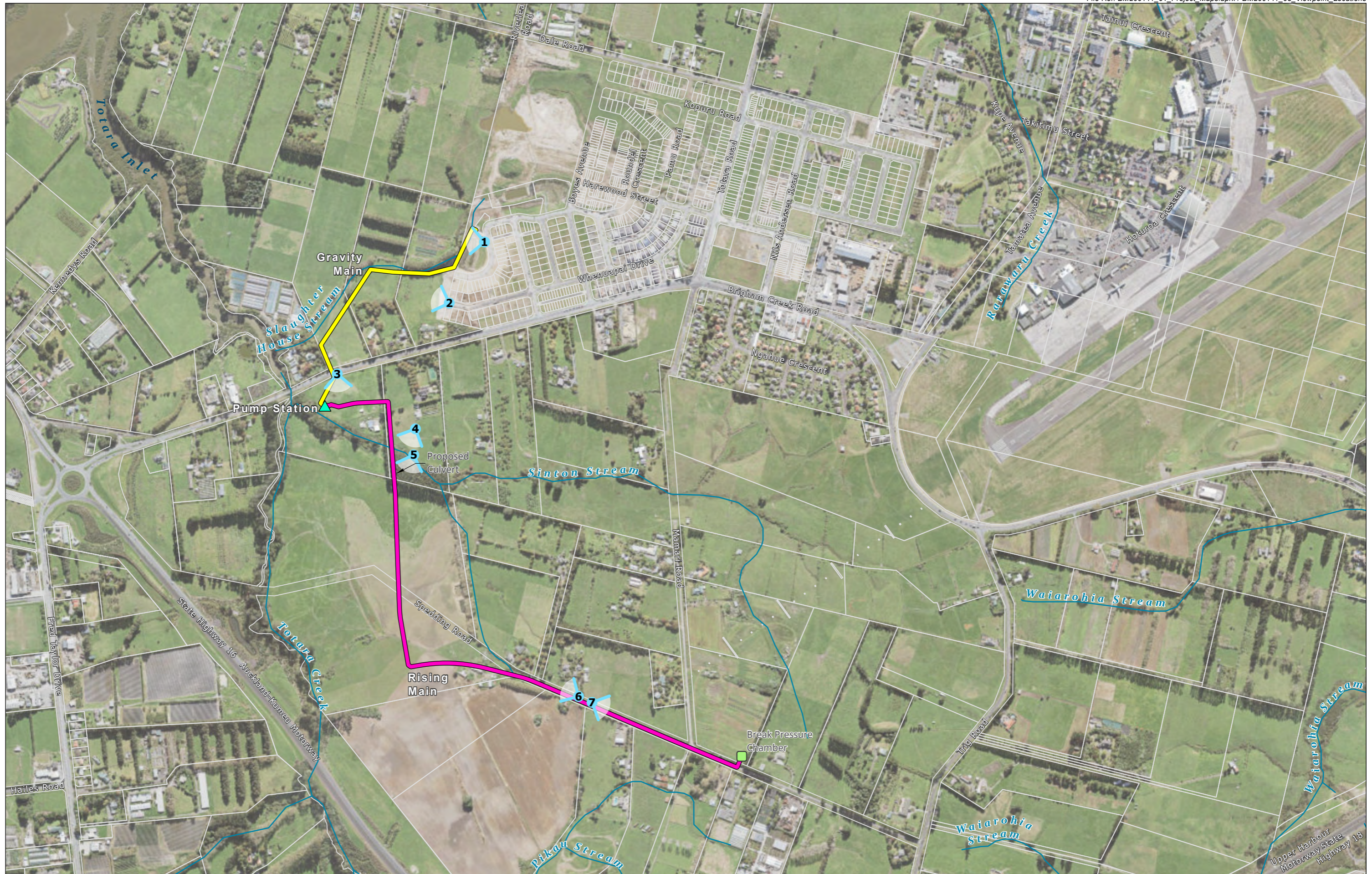
Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- ▲ Pump Station
- Rising Main
- Gravity Main
- Break Pressure Chamber
- Streams
- x x Terrestrial
- x x Marine 2
- Land Parcels

Figure 3







Existing View



Existing View



Existing View



Existing View



Existing View

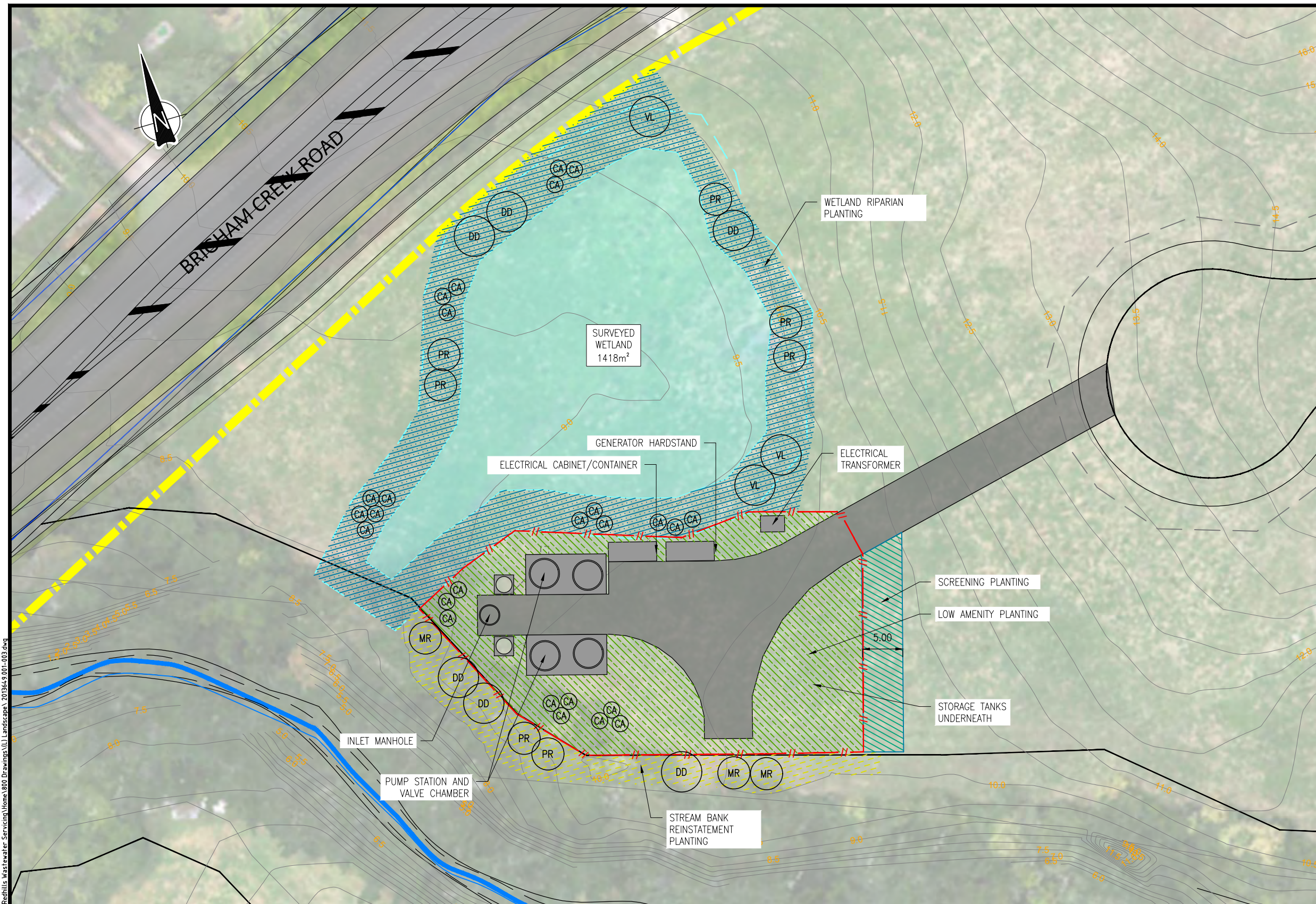


Existing View



Existing View

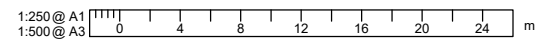
Appendix 3: Wetland and Pump Station Landscape Concept



- LEGEND:**
- EXISTING LOT BOUNDARY
 - EXISTING GROUND LEVEL
 - POTENTIAL 8m SET BACK
 - SITE SECURITY FENCE
 - WETLAND BOUNDARY
 - STREAM
 - HARD STAND
 - WETLAND RIPARIAN PLANTING
 - LOW AMENITY PLANTING
 - SCREENING PLANTING
 - STREAM BANK REINSTATEMENT PLANTING

- TREES**
- CORDYLINE AUSTRALIS
 - DACRYCARPUS DACRYDIODES
 - MYRSINE AUSTRALIS
 - PLAGIANTHUS REGIUS
 - VITEX LUCENS

PLANTING PLAN
SCALE 1:500(A3)



DETAILED DESIGN
NOT FOR CONSTRUCTION

ISSUE	DATE	AMENDMENT	BY	APPD.
1	01-22	DETAILED DESIGN ISSUE	AL	CN

DESIGNED	AL	07-21
DES. APPROVED	CN	07-21
DRAWN	AL	07-21
DWG. APPROVED	CN	07-21
WSL DESIGN MGMT.	-	-
WSL PROJ. LEAD	-	-

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WHENUAPAI-REDHILLS WASTEWATER SERVICING PACKAGE 1
WASTEWATER PUMP STATION (DPISH)
PLANTING PLAN



CAD FILE	2013646.001-003	DATE	14-01-2022
ORIGINAL SCALE	A3 AS SHOWN	CONTRACT No.	6484-6934
REF No.	12508391 3-AWD32	DWG No.	2013649.001
ISSUE	1		

GENERAL NOTES:

THE GENERAL PHILOSOPHY FOR THE LANDSCAPE DESIGN ON THE PROJECT IS TO PROMOTE BIODIVERSITY AND ADD AMENITY VALUES THROUGH AN ENVIRONMENT SENSITIVE AND PLACE-BASED APPROACH. THE DESIGN WILL LOOK TO INCORPORATE LOW MAINTENANCE, SUSTAINABLE AND ENVIRONMENTALLY INTERVENTIONS.

THE PLANTING AREAS WITHIN THE PROJECT ARE THE IMMEDIATE SURROUNDING OF THE PUMP STATION AND WETLAND AND WILL BE DESIGNED WITH A NATIVE PLANT PALETTE.

PLANTING AREAS TO BE DEFINED AS:

- WETLAND RIPARIAN PLANTING
- PUMP STATION LOW AMENITY PLANTING
- PUMP STATION SCREENING PLANTING
- STREAM BANK REINSTATEMENT PLANTING

TREES WILL BE PLACED WITHIN PLANTING AREAS TO ADD AMENITY VALUE AND TO PROVIDE SCREENING EFFECTS AND BIODIVERSITY. THE TREES SELECTED ARE WET SOIL TOLERANT SPECIES INCLUDING CABBAGE TREE, KAHIKATEA, MAHOE, RIBBONWOOD AND PURIRI. THEY WILL BE POSITIONED TO AVOID OBSTRUCTING THE UNDERGROUND SERVICES.

PLANT SCHEDULE								
Code	Botanical Name	Common Name	Unit/ Grade	Max. Growth Size (H x W)	Plant Spacing (mm)	Percentage Mix	TOTAL (no.)	
Wetland Riparian Planting								
CAR GEM	Carex geminata	Cutty Grass	1L/PB2	1.0 x 1.0m	750	10%	180	
CAR VIR	Carex virgata	Pukio / Swamp Sedge	1L/PB2	1.0 x 1.0m	750	20%	360	
COR FUL	Cortaderia fulvida	Toetoe	1L/PB2	1.5 x 1.5m	1000	30%	300	
PHO COO	Phormium cookianum	Wharariki / Mountain Flax	1L/PB2	1.5 x 1.5m	1000	10%	100	
PHO TEN	Phormium tenax	Harakeke / NZ Flax	1L/PB2	3.0 x 2.0m	1000	30%	300	
Pump Station Low Amenity Planting								
CAR TES	Carex testacea	Grass / Sedge	2L/PB3	0.6 x 0.6m	500	20%	530	
CAR VIR	Carex virgata	Pukio / Swamp Sedge	1L/PB2	1.0 x 1.0m	500	20%	530	
COR FUL	Cortaderia fulvida	Toetoe	1L/PB2	1.5 x 1.5m	1000	10%	66	
DIA NIG	Dianella nigra	Turutu	2L/PB3	0.5 x 0.5m	500	10%	265	
PHO 'EG'	Phormium 'Emerald Gem'	Dwarf Flax	2L/PB3	0.6 x 0.6m	500	20%	530	
PHO 'JS'	Phormium 'Jack Spratt'	Ornamental Flax	2L/PB3	0.6 x 0.6m	500	20%	530	
Pump Station Screening Planting								
HEB STR	Hebe stricta	Koromiko	2L/PB3	2.5 x 1.5m	1000	25%	31	
KUN ERI	Kunzea ericoides	Kanuka	2L/PB3	10.0 x 4.0m	2000	25%	31	
LEP SCO	Leptospermum scoparium	Manuka	2L/PB3	4.0 x 3.0m	2000	25%	31	
PHO TEN	Phormium tenax	Harakeke / NZ Flax	1L/PB2	3.0 x 2.0m	1000	25%	31	
		Mahoe						
Stream Bank Reinstatement Planting								
COR FUL	Cortaderia fulvida	Toetoe	1L/PB2	1.5 x 1.5m	1000	30%	92	
PHO COO	Phormium cookianum	Wharariki / Mountain Flax	1L/PB2	1.5 x 1.5m	1000	30%	92	
PHO TEN	Phormium tenax	Harakeke / NZ Flax	1L/PB2	3.0 x 2.0m	1000	40%	122	
							Sub Total	4121

TREE SCHEDULE							
Code	Botanical Name	Common Name	Unit/ Grade	Max. Growth Size (H x W)	Plant Spacing (mm)	TOTAL	
CA	Cordyline asutralis	Cabbage Tree / Ti Kouka	PB18	10.0 x 2.0m	as shown	26	
DD	Dacrycarpus dacrydioides	Kahikatea / White Pine	PB18	30.0 x 10.0m	as shown	6	
MR	Melicytus ramiflorus	Mahoe / Whiteywood	PB18	5.0 x 4.0m	as shown	3	
PR	Plagianthus regius	Manatu / Ribbonwood	PB18	12.0 x 4.0m	as shown	7	
VL	Vitex lucens	Puriri	PB18	10.0 x 10.0m	as shown	3	
						Sub Total	45

DETAILED DESIGN
NOT FOR CONSTRUCTION

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			DES. APPROVED	CN	07-21
			DRAWN	AL	07-21
			DWG. APPROVED	CN	07-21
			WSL DESIGN MGMT.	-	-
			WSL PROJ. LEAD	-	-
1	01-22	DETAILED DESIGN ISSUE		AL	CN
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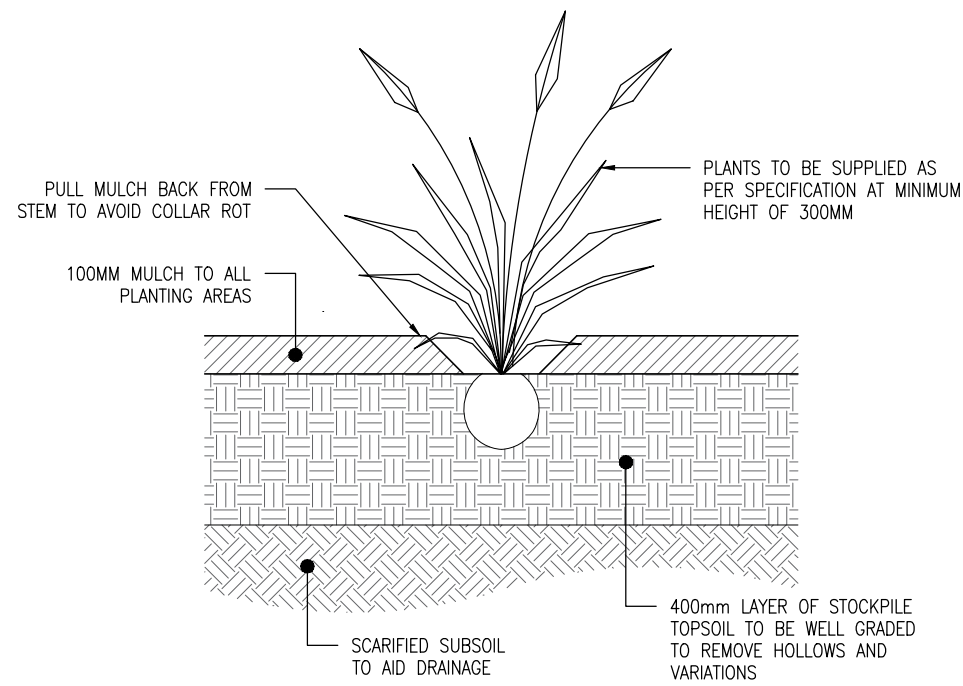


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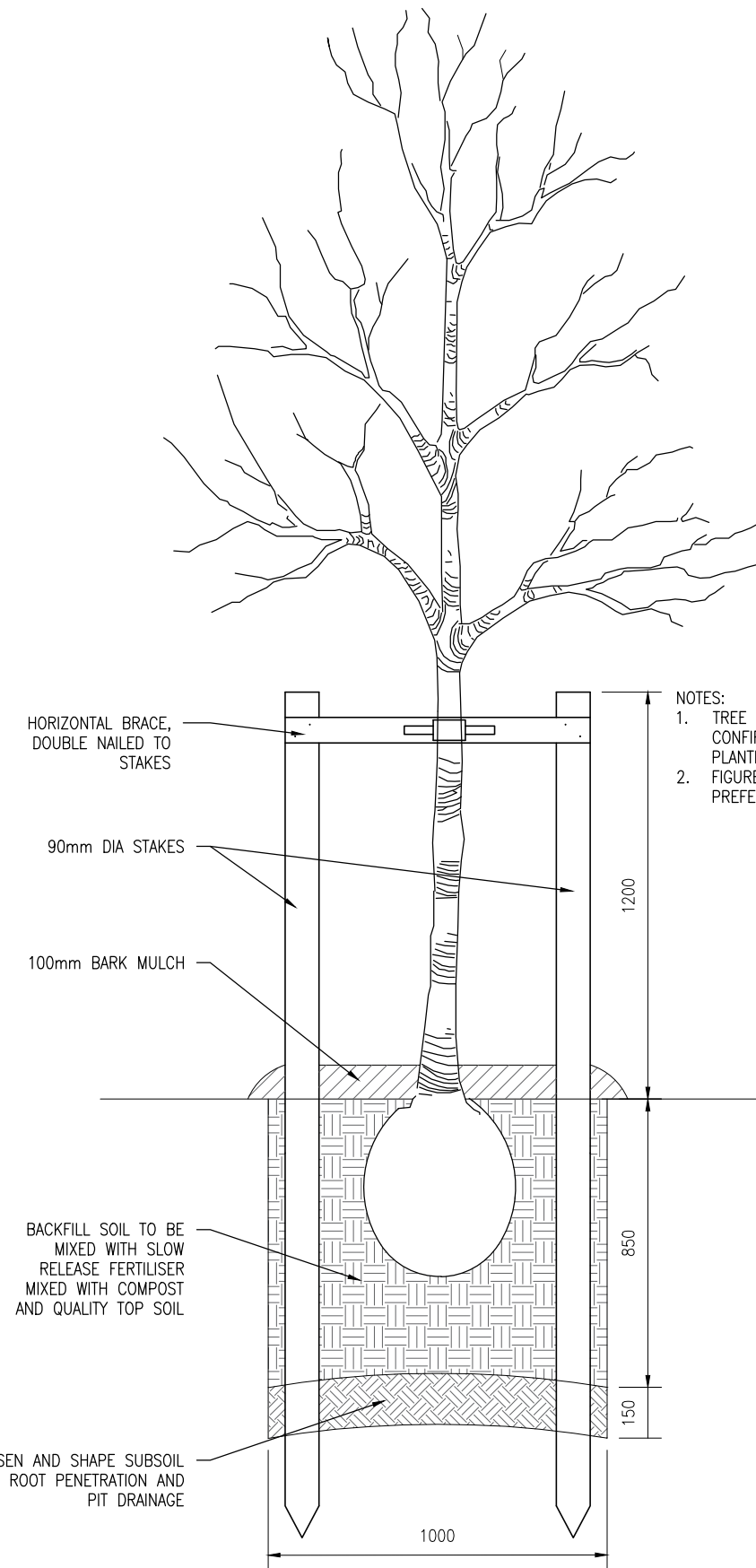
WHENUAPAI-REDHILLS WASTEWATER SERVICING PACKAGE 1
WASTEWATER PUMP STATION (DPISH)
PLANT SCHEDULE



CAD FILE	2013649.001-003	DATE	14-01-2022
ORIGINAL SCALE	A3	CONTRACT No.	6484-6934
	NOT TO SCALE		
REF No.	12508391	3-AWD32	
DWG No.	2013649.002	ISSUE	1



TYPICAL SHRUB PLANTING DETAIL
SCALE 1:20(A3)



- NOTES:
1. TREE AND PLANTING LOCATIONS TO BE CONFIRMED ON SITE ON SITE PRIOR TO PLANTING.
 2. FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALED DIMENSIONS.

TYPICAL TREE PLANTING DETAIL
SCALE 1:20(A3)

1:10 @ A1
1:20 @ A3
0 100 200 300 400 500 600 700 800 900 1000 mm

DETAILED DESIGN
NOT FOR CONSTRUCTION

DESIGNED	AL	07-21		
DES. APPROVED	CN	07-21		
DRAWN	AL	07-21		
DWG. APPROVED	CN	07-21		
WSL DESIGN MGMT.	-	-		
WSL PROJ. LEAD	-	-		
ISSUE	DATE	AMENDMENT	BY	APPD.
1	01-22	DETAILED DESIGN ISSUE	AL	CN

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WHENUAPAI-REDHILLS WASTEWATER SERVICING PACKAGE 1
WASTEWATER PUMP STATION (DPISH)
PLANTING DETAILS

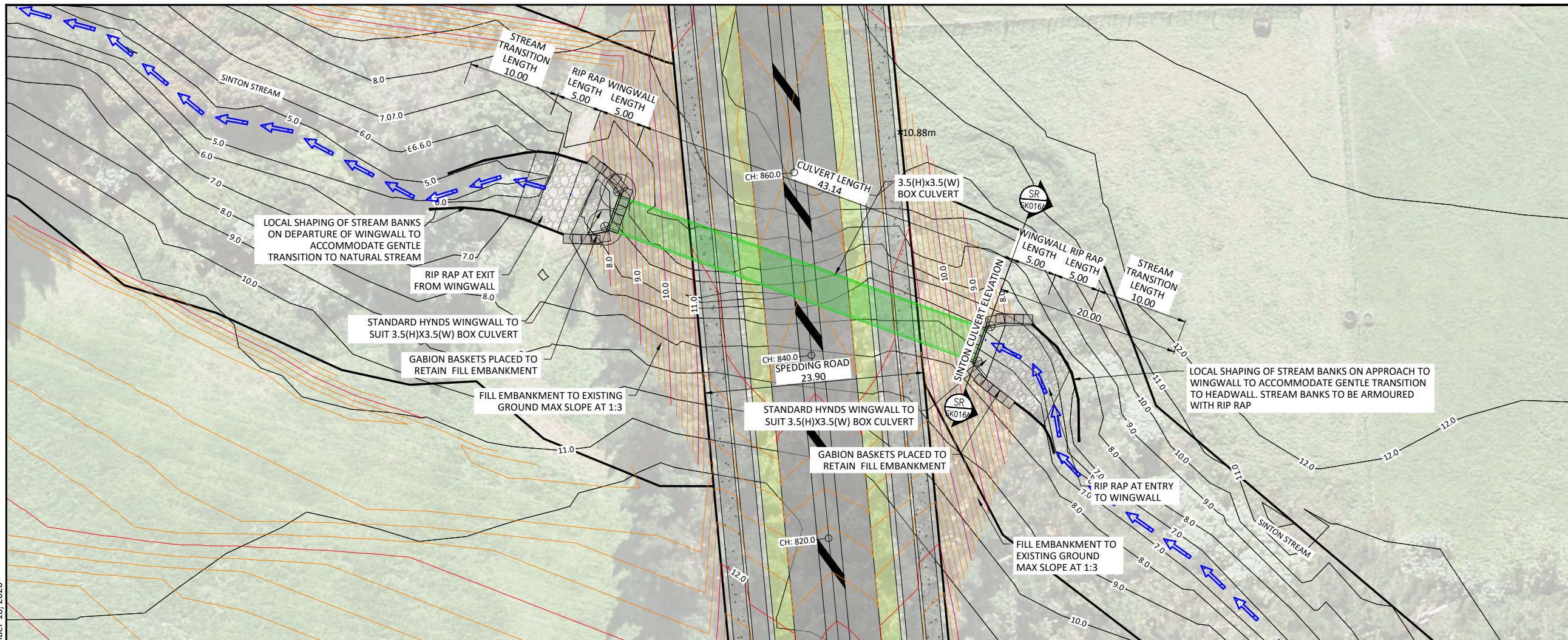


CAD FILE	2013649.001-003	DATE	14-01-22
ORIGINAL SCALE	A3 AS SHOWN	CONTRACT No.	6484-6934
REF No.	12508391 3-AWD32		
DWG No.	2013649.003	ISSUE	1

U:\Projects\NZ-SA-3-AWD32.00_Whenuapai-Redhills Wastewater Servicing\Home\800 Drawings\1\1\1 Landscape\1 2013649.001-003.dwg

Appendix 4: Proposed Culvert Drawings

SAVED: P:\1300 - Oyster Spedding Road\5.0 Drawings\SKETCHES\SK016 Sinton Stream Bridge Detail.dwg - September 10, 2020. PRINTED: September 10, 2020



- LEGEND:**
- 15.0 PROPOSED GROUND LEVEL
 - 16.0 EXISTING GROUND LEVEL
 - EXISTING ABUTTAL BOUNDARY
 - STREAM

- NOTES:**
1. DIMENSIONS AND AREAS ARE SUBJECT TO FULL AND FINAL SURVEY.
 2. EXISTING CONTOURS ARE AT 1.0m INTERVALS.
 3. PROPOSED CONTOURS ARE AT 0.1m INTERVALS.
 4. DETAILED DESIGN TO BE CONFIRMED AT ENGINEERING APPROVAL STAGE.
 5. STREAM PROFILE INFERRED FROM SURVEYED CROSS SECTIONS.

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PROPOSED SINTON STREAM CULVERT

SCALE : A1 @ 1:250 & A3 @ 1:500

REVISION	CHANGES	CHECKED	DATE
4	CULVERT DIMENSION AMENDED	CG	07/09/20
3	GABION WALLS ADDED	CG	23/07/20
2	UPDATED TO BOX CULVERT	CG	25/06/20
1	CULVERT EMBEDMENT INCREASED	CG	09/04/20

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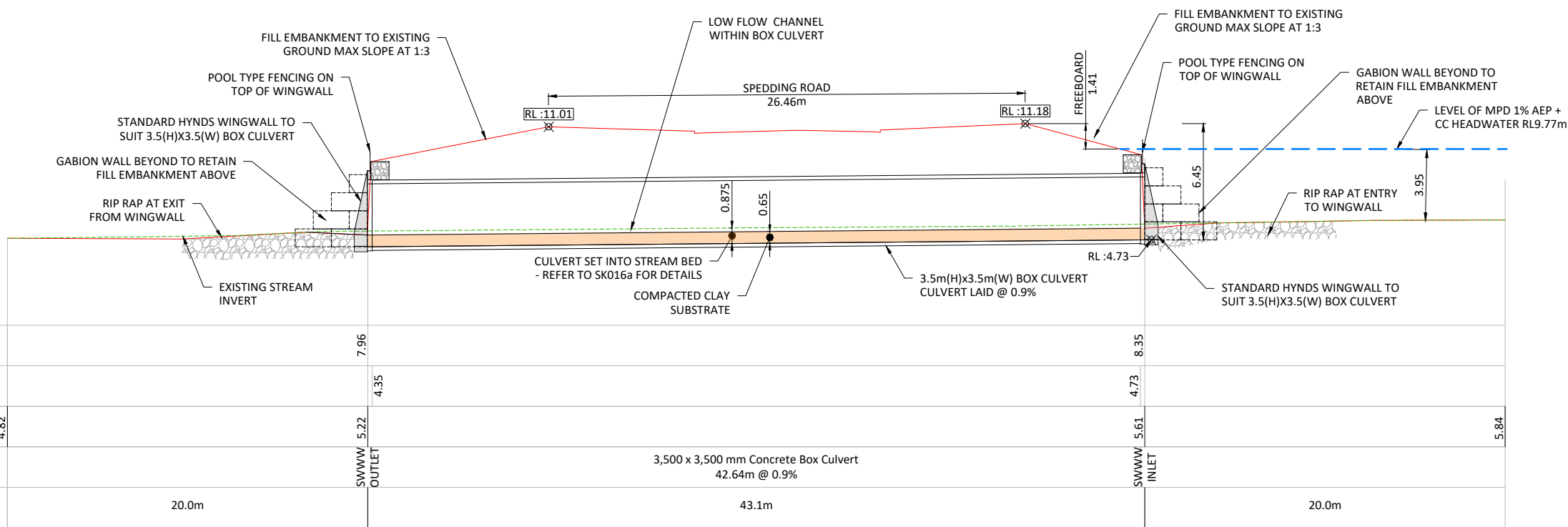
phone +64 09 320 3325
web www.crangcivil.co.nz
address Unit 4, 517 Mount Wellington Highway, Auckland
post PO Box 42-089, Orakei, Auckland 1745, NZ

CLIENT
OYSTER CAPITAL

PROJECT
SPEDDING ROAD
WHENUAPAI

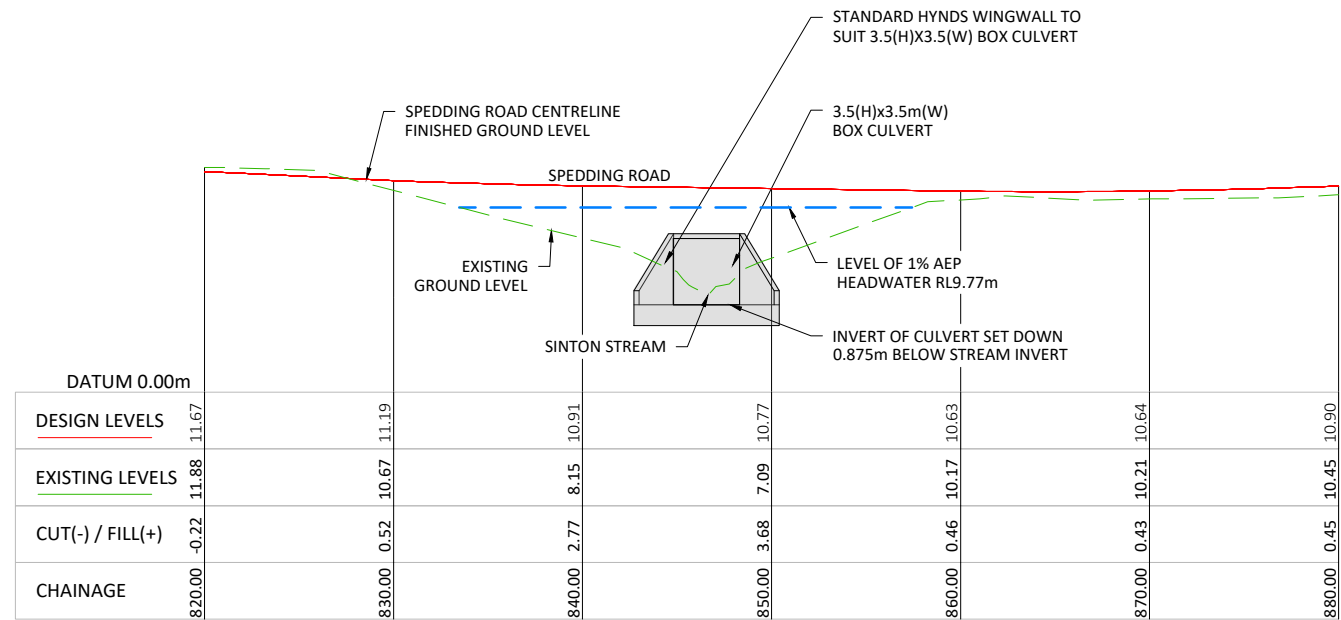
TITLE
SINTON STREAM CULVERT
PLAN & LONGSECTION

DATE	JUNE 2019	SCALE
DRAWN	CG	A1 1:250
DESIGNED	CG	A3 1:500
PROJECT No	1300	DRAWING No SK016
		REVISION 4

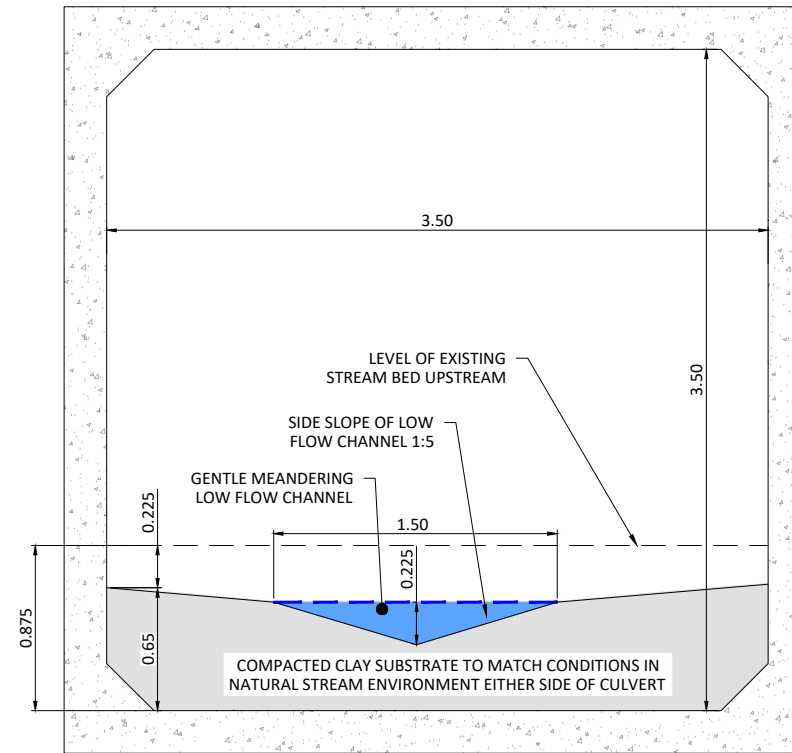


SINTON STREAM CULVERT
SCALE 1H:1V

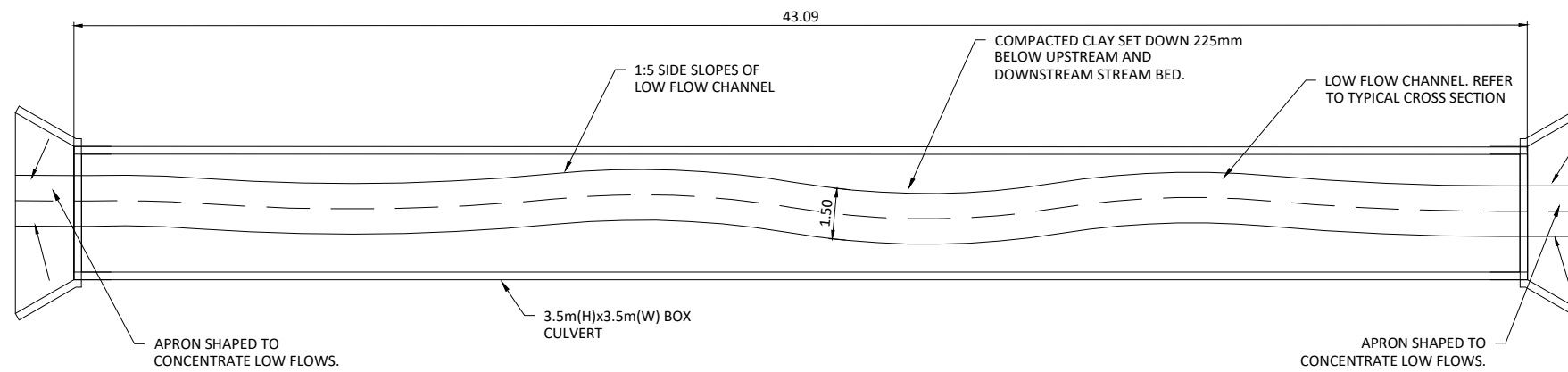
	OUTLET	CULVERT	INLET
DATUM 0.00m			
LID LEVEL	7.96		8.35
PIPE INVERT LEVEL	4.35	4.73	5.84
EXISTING LEVELS	5.22		
PIPE DETAILS	3,500 x 3,500 mm Concrete Box Culvert 42.64m @ 0.9%		
DISTANCE BETWEEN CONNECTIONS	20.0m	43.1m	20.0m



SINTON CULVERT ELEVATION
SCALE 1H:1V



BOX CULVERT LOW FLOW CHANNEL
SCALE: NTS



BOX CULVERT LOW FLOW CHANNEL ALIGNMENT
SCALE: NTS

NOTES:

- DIMENSIONS AND AREAS ARE SUBJECT TO FULL AND FINAL SURVEY.
- DETAILED DESIGN TO BE CONFIRMED AT ENGINEERING APPROVAL STAGE.
- STREAM PROFILE INFERRED FROM SURVEYED CROSS SECTIONS.

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REVISION	CHANGES	CHECKED	DATE
5	CULVERT DIMENSION AMENDED	CG	07/09/20
4	ROCK TYPE UPDATED	CG	23/07/20
3	FISH PASSAGE ADDED	CG	14/07/20
2	UPDATE TO BOX CULVERT	CG	25/06/20

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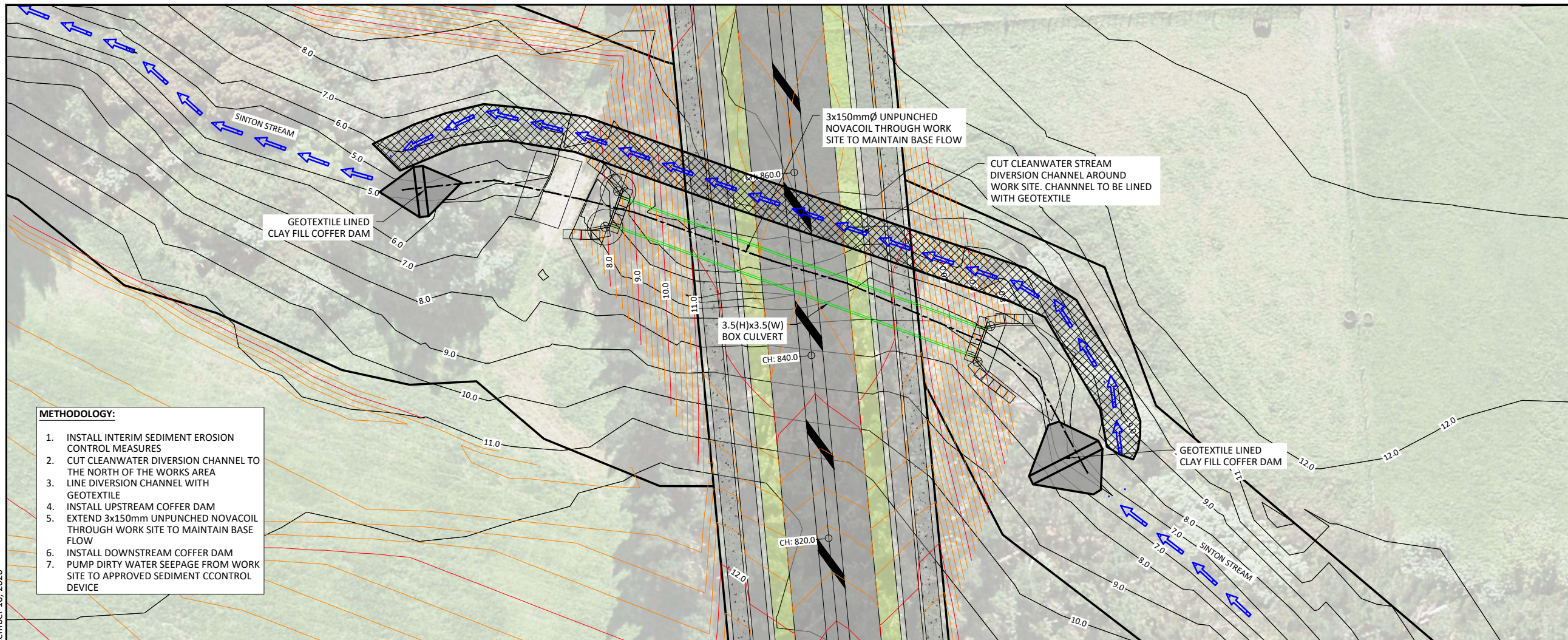
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PROJECT
SPEDDING ROAD
WHENUAPAI

TITLE
SINTON STREAM
CULVERT DETAILS

DATE	SCALE
APRIL 2020	A1 1:200
DRAWN CG	A3 1:400
DESIGNED CG	REVISION
PROJECT No 1300	DRAWING No SK016A
	5

SAVED: P:\1300 - Oyster Spedding Road\5.0 Drawings\SKETCHES\SK016B Sinton Stream Temp Diversion.dwg - September 7, 2020. PRINTED: September 10, 2020



- METHODOLOGY:**
1. INSTALL INTERIM SEDIMENT EROSION CONTROL MEASURES
 2. CUT CLEANWATER DIVERSION CHANNEL TO THE NORTH OF THE WORKS AREA
 3. LINE DIVERSION CHANNEL WITH GEOTEXTILE
 4. INSTALL UPSTREAM COFFER DAM
 5. EXTEND 3x150mm UNPUNCHED NOVACOIL THROUGH WORK SITE TO MAINTAIN BASE FLOW
 6. INSTALL DOWNSTREAM COFFER DAM
 7. PUMP DIRTY WATER SEEPAGE FROM WORK SITE TO APPROVED SEDIMENT CONTROL DEVICE

- LEGEND:**
- 15.0 16.0 PROPOSED GROUND LEVEL
 - 15.0 16.0 EXISTING GROUND LEVEL
 - EXISTING ABUTTAL BOUNDARY
 - STREAM

- NOTES:**
1. DIMENSIONS AND AREAS ARE SUBJECT TO FULL AND FINAL SURVEY.
 2. EXISTING CONTOURS ARE AT 1.0m INTERVALS.
 3. DETAILED DESIGN TO BE CONFIRMED AT ENGINEERING APPROVAL STAGE.
 4. STREAM PROFILE INFERRED FROM SURVEYED CROSS SECTIONS.

PROPOSED TEMPORARY STREAM DIVERSION
SCALE : A1 @ 1:250 & A3 @ 1:500

DRAFT ISSUE
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REVISION	CHANGES	CHECKED	DATE
1	CULVERT DIMENSIONS AMENDED	CG	07/09/20
0	ORIGINAL ISSUE	CG	06/06/19

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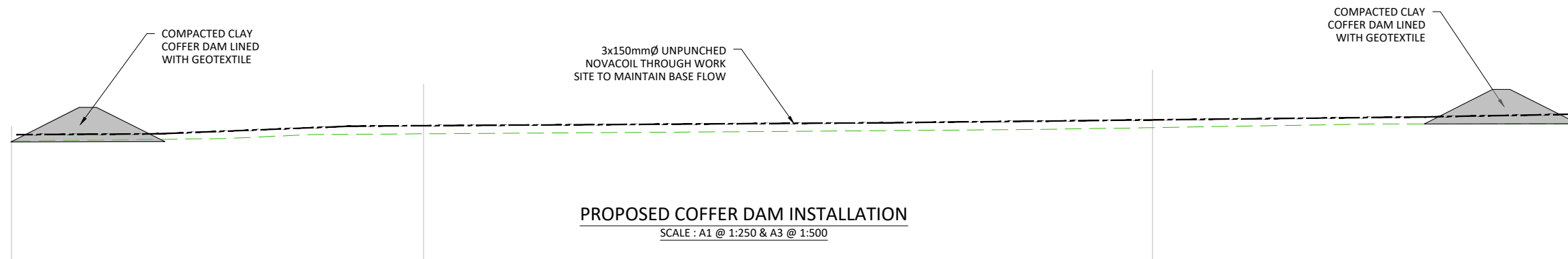
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PROJECT
SPEDDING ROAD WHENUAPAI

TITLE
TEMPORARY STREAM DIVERSION PLAN

DATE	SCALE
JUNE 2019	A1 1:250
DRAWN CG	A3 1:500
DESIGNED CG	REVISION 1
PROJECT No 1300	DRAWING No SK016B



PROPOSED COFFER DAM INSTALLATION
SCALE : A1 @ 1:250 & A3 @ 1:500