Auckland Council

Takanini Stormwater Conveyance Channel
Urban and Landscape Design Analysis

July 2014

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1. Introduction

Auckland Council has engaged GHD to assist in analysing the urban and landscape aspects of the proposed conveyance channel for servicing the upper catchment of the greater Papakura central catchment, specifically the Takanini Structure Plan areas 2a, 2b4 and 2b, henceforth referred to as the Takanini 2a2b area.

This report has been prepared to support the Takanini Conveyance Channel Infrastructure Report (GHD, April 2014).

This report discusses the current landscape setting of the Takanini 2a2b area, and identifies the opportunities and design considerations relating to the preferred conveyance option, an open channel, as identified in the Takanini Conveyance Channel Infrastructure Report (GHD, April 2014).

1.1 Purpose and scope

This Urban and Landscape Design Analysis report provides information on the landscape / urban setting of the proposed conveyance route and outlines potential opportunities provided by the project. It covers the following sections:

- Description of the current landscape qualities within the area of designation;
- Identification of opportunities provided by the project;
- Identification of potential landscape and urban design impacts of the channel on the amenity of surrounding neighbourhood; and
- Discussion of options for mitigating potential adverse effects at the time of development, identification of any further information that will be required at the time of resource consents.

It is a high level report intended to join other specialist reports for Auckland Council purposes only and does not constitute a full landscape, visual and urban design assessment.

1.2 Project limitations

The project limitations that apply to this report are covered in the Takanini Conveyance Channel Infrastructure Report (GHD, April 2014) and should be referred to when reading this report.

2. Project background

A concept design for an open channel to capture and convey the 1% Annual Exceedance Probability (AEP) flows within the Takanini 2a2b area (outlined by the dotted purple line in Figure 1 below), has been prepared and is detailed in the Takanini Stormwater Conveyance Channel Infrastructure Report (GHD, April 2014). The following provides a brief summary of that design.

The proposed conveyance channel concept design has a length of 1,543 m along its main route which drains most of the Takanini 2a2b area. A channel branch to the north drains the remainder of the northern area and is approximately 600 m long.

The proposed channel has a maximum depth of approximately 2.7 m from the existing ground surface to the permanent water level due to the flat topography of the catchment. Weirs are proposed in the channel to reduce the groundwater drawdown in the peat soils, thereby reducing potential settlement issues.

A designation area for the channel has been based on the hydraulic conveyance width required for the channel to convey the 1% AEP event flow. The recommended designation ranges from 25 m in the south-east to 50 m in the west, as shown in Figure 1 below.

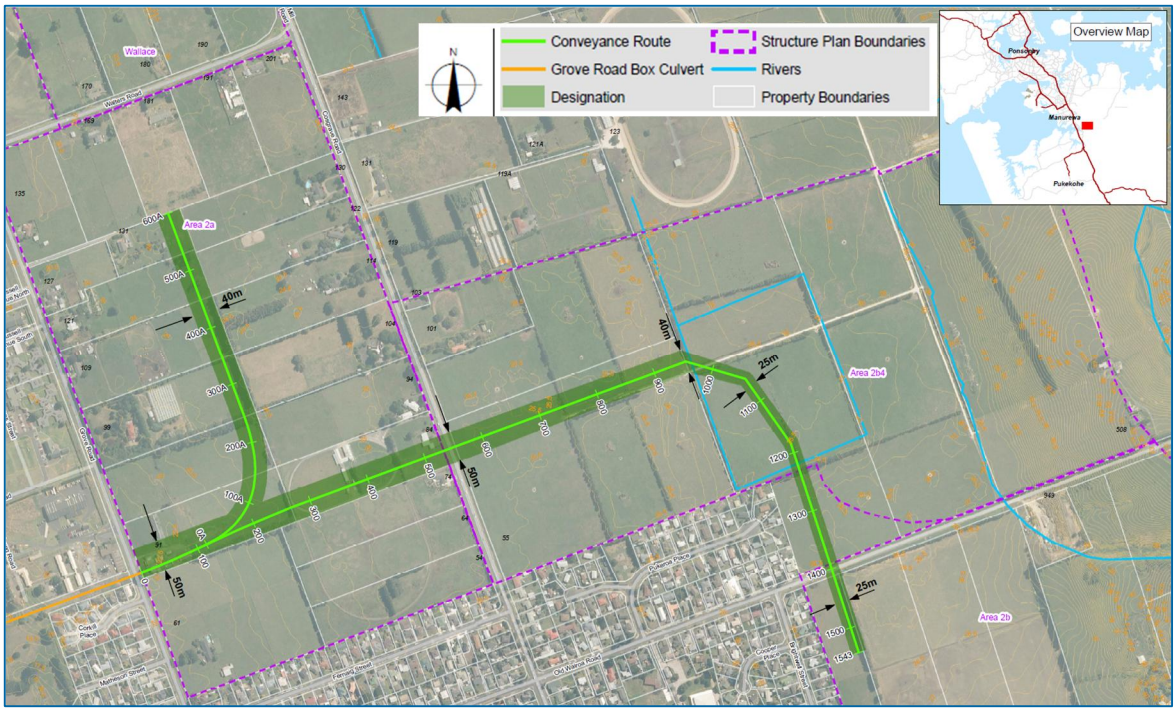


Figure 1 Proposed stormwater conveyance channel

3. Existing landscape qualities

3.1 Landscape typologies

The different aspects of the landscape that will be considered include:

- Elements – These are the individual features that make up the landscape, including headlands, ridges, hills, trees, planting, buildings and roads.
- Characteristics – This describes the particular contribution to the character of the area, usually due to a particular combination of the elements and their quality but also including experiential type characteristics such as wildness. This includes the form and patterns within the area.
- Character - The particular combination of elements and characteristics that makes the area distinct and defines what is important about the area, or the particular sense of place of different parts of the landscape. This can consist of different combinations of settlement, geology, land use and vegetation, for example.

3.2 Landscape qualities

The current landscape qualities of the area are generally made up of the rural character of the site itself and the surrounding area to the north and east of the site, and the urban fringe with the site being located on the northern edge of the urban area.

The landscape elements and characteristics of the site include large established shelterbelts breaking up the flat pastureland, with minimal other vegetation aside from that along the road edges or around houses. Post and rail or post and wire fences break up the paddocks which are on flats within the floodplain. To the far distance in the east the land rises to visible hills. There are scattered buildings across the site, either farm related or single dwellings.

Surface water drains to small dissected natural intermittent streams and farm drainage channels, connecting to the roadside table drains on Cosgrave Road and Walters Road. The area is surrounded to the south and south west by suburban residential development, primarily consisting of low density single detached dwellings.

These elements and characteristics give an overall character of flat rural pasture land typified by large shelterbelts adjacent to the suburban fringe. The proximity of the urban fringe and the abruptness of its edge provide a sense that the area is on the verge of change, with urbanisation imminent.

Due to the flat character of the topography, views are easily obstructed and are only available at the edges of open areas.

This area is to be developed in the future into residential lots. This will be a significant change in the landscape character of the area around the channel. The new character will be similar to that of the existing adjacent residential development. The channel corridor will therefore be a significant landscape element within the urban development.

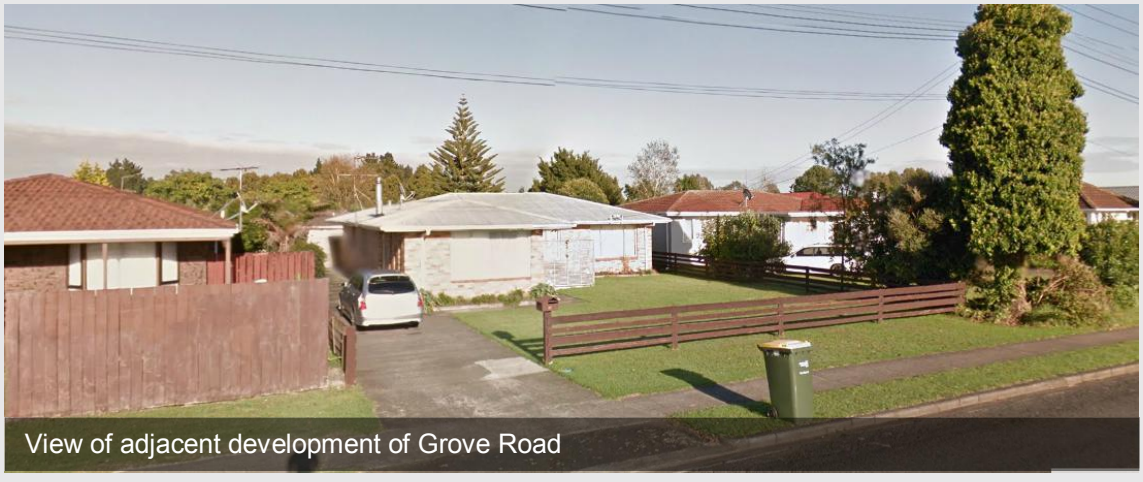
Table 1 gives a general overview of the site landscape.

Table 1 Photos showing site landscape

Site photos
 View northwest from Old Wairoa Road
 View south from Hamlin Road
 View west from Cosgrave Road

View east from Cosgrave Road

View of adjacent development on Grove Road



View of adjacent development of Grove Road

4. Issues, opportunities and design

4.1 Opportunity identification

With the proposed change in land use from pasture to residential urban development, the requirement of a wide corridor for stormwater functionality presents a significant opportunity to provide an attractive open space and green linkage through the future development in the area.

The corridor has the potential to accommodate a pedestrian and cycle route, which can connect the community and encourage healthy transport options and recreation. The route could provide a high level of connectivity through use of pedestrian/cycle bridges across the channel linking the street network, rather than the channel becoming a barrier between communities. The result would be a shaded off-road route for pedestrians and cyclists.

There is also the potential to connect to the future planned Mill Road Corridor cycleway and pedestrian amenities to create a larger network, however at the time of writing (April 2014) the location of the Mill Road Corridor was not yet confirmed by Auckland Transport. These connections would need to be designed based on any proposed future development layout.

The corridor also presents an opportunity for increased local amenity, with attractive vegetation and walkways for recreation.

Given that the channel corridor is likely to become the major landscape feature in the area once it is developed, consideration of incorporating maximum visual and community amenity into the corridor design is important. The channel itself should be designed to look as natural as possible. Views across the channel and to the channel from adjacent development should be maintained and considered in terms of the level of amenity the views will provide for those dwellings. A conceptual example of this is shown in Figure 2. This will encourage a sense of ownership by adjacent property owners.

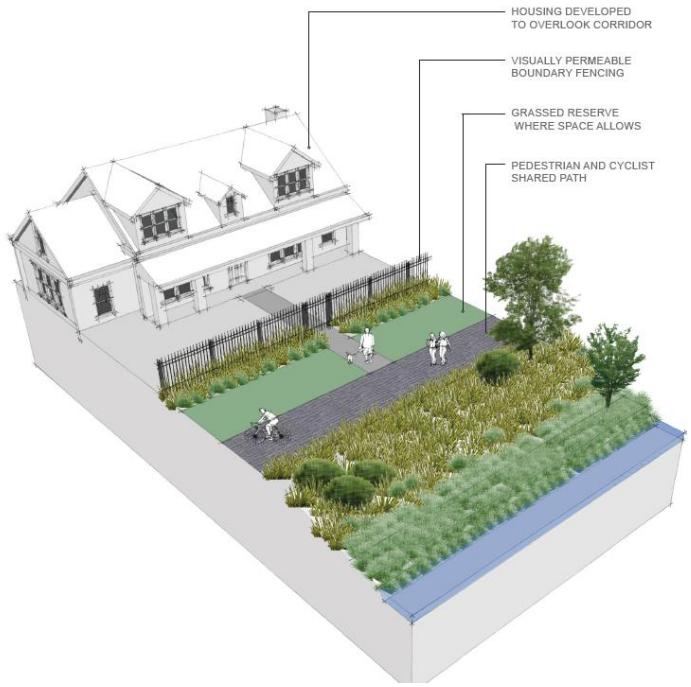


Figure 2 Views for adjacent development

Finally environmental benefits can be provided along the corridor through providing an ecological corridor through incorporating appropriate species, and environmental outcomes in any design proposal.

Suggested planting species for the proposed open channel and surrounds is included in Appendix A.

For water drawdown management purposes weirs are proposed in the channel. There are a range of weirs that can be employed; natural earth weirs, rock weirs or artificial weirs. Each has considerable benefits and disadvantages. The type of weir will be determined at detailed design stage.

4.2 Impacts

The extent of landscape impacts is determined by a number of factors including:

- The landscape character and quality into which the development is being placed;
- Any landscape functions that the area is performing and the proposal's effect on them; and
- The capacity of the landscape for accommodating change.

As the area is intended to be developed into a residential urban area, the landscape and urban effects of the channel need to be considered in this context, rather than in the current landscape conditions. In the future the channel corridor is likely to be the major public landscape and amenity feature in the area. However without adequate channel crossings for pedestrian and cycle movements, the channel has the potential to sever any future local community. Without adequate consideration of the location and quality of these crossings and level of access to the channel corridor, there is also a risk that the channel will become an under-used space, accommodating anti-social behaviour and vandalism and ultimately becoming unsafe. The potential of the channel to create a barrier to connectivity and becoming an underutilised and uncared for space are the main potential adverse effects of the channel from an urban design perspective.

The recommendations in Section 4.3 will support the design of the channel to provide a high level of amenity, to prevent severance of any future community and to prevent the corridor from becoming an unattractive urban area or at worst an unsafe space. As the area will change character entirely with its development into an urban area, there is a wide scope for how the design of the corridor could respond to the context, provided it is attractive and functional.

4.2.1 Connectivity

Pedestrian and cyclist connections across the channel as shown in Figure 3 will help prevent severance of the community. Paths should be provided on both sides of the channel to provide equal amenity and connections to both areas.

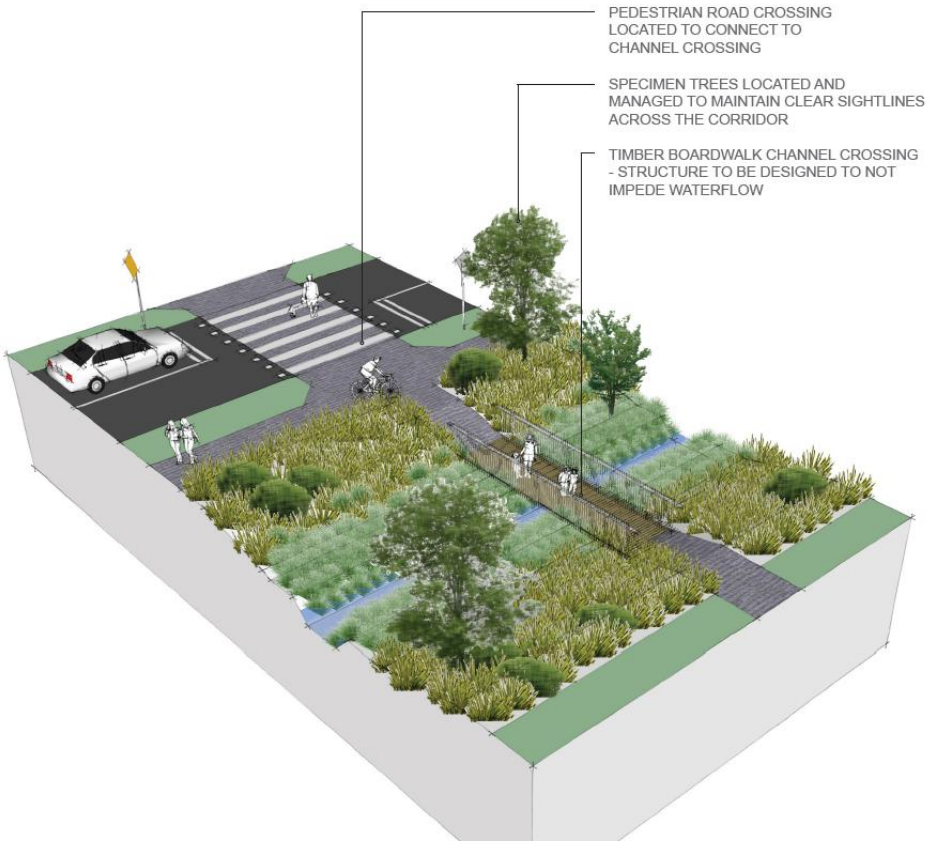


Figure 3 Pedestrian and cyclist channel crossings

4.2.2 Crime Prevention through Environmental Design (CPTED)

From a CPTED perspective, potential adverse effects could be created if the adjacent development does not provide sufficient passive surveillance, and entrapment spots are created. For this reason the reserve area should be kept as open as possible, and the design of vegetation within the channel should be such that it does not create visual obstructions or places for people to hide. This will also assist with security of any adjacent properties.

4.3 Recommended urban design principles

Urban design is as much concerned with the functionality as with the quality of place.

The detailed future development of the area is not currently known and can only be anticipated from the information in the high level planning documents outlined in the Takanini Conveyance Channel Infrastructure Report (GHD, April 2014).

The following principles are to be considered in the detailed design.

4.3.1 Respect and understand the context

The design interventions should fit sensitively within the landform and built, natural and community environments, and respond to the community setting and unique character of the area. Future development patterns and potential requirements of the new communities should be considered.

4.3.2 Appreciate and develop the area's unique character

At a finer scale streets function as liveable streets for communities provided they are walkable, landscaped, well lit, interesting and safe. The same applies for pedestrian and cycle

connections along the proposed corridor. Engineering elements can add or detract from the character of the area. The interventions should contribute to the overall quality of the public domain for the community. Vegetation contributes to the uniqueness of a place and the greening of a corridor, and scenic views contribute to the quality of a route or journey. The quality of a place can also be adversely affected by visual clutter, for example poor placement and proliferation of signs. The proposed channel provides an opportunity to improve the unique character of the area.

4.3.3 Maintain and enhance connections

The consideration of accessibility and connectivity of communities and a general permeability of movement through areas for both cyclists and pedestrians is critical. There should be avoidance where possible of negatively impacting the permeability of the area by severing the surrounding street network. Careful consideration of the crossing point locations and the quality of crossing points is important.

4.3.4 Increase and encourage choice

It is important to provide good connection and movement options. The proposed development should consider the community's proximity to amenities, the time and effort required to travel, the frequency and ease with which people can cross roads, connectedness with other communities and parts of the urban environment, access to public transport, and overall provision for walking and cycling.

Crossing points and routes should follow desire lines and not force people on to other routes.

4.3.5 Design with a social and environmental conscience

The design should aim to achieve a cost effective, sustainable and safe solution through the use of:

- Durable, relatively low maintenance outcomes that transcend the fashions and styles of the day,
- Ensuring the project is fit for purpose and facilitates good connections,
- Bringing communities together and supporting local business where appropriate,
- Avoiding adverse visual impacts,
- Achieving safe integrated and minimal maintenance design with robust durable materials fit for purpose and place,
- Self-reliant and minimal maintenance landscaping,
- Lighting should be simple, fit for purpose and designed to minimize light fixtures, and
- Avoiding opportunities for vandalism.

Urban design outcomes need not be costly, and in fact can help to 'design cost out' if considered early in the piece. Urban design should not be used as a way of adding features to a project or compensating for poor design. The design not only needs to be safe but there also needs to be a perception of safety or the route will not be used.

4.3.6 Design in collaboration

The design needs to appreciate the stormwater function of the corridor while understanding the different functions of the space including social and environmental functions, and their interrelationships and hierarchy to guide decision-making. All elements of the design must be selected with safety in mind for all users including selection, placement and maintenance of

vegetation. The design should ensure there is good passive surveillance of pedestrians and cyclists.

To achieve these outcomes, stakeholders for the different areas should be included in reviewing and providing input into the design, provided there is a shared understanding of the purpose of the design and of the range of functions in the space and their relative importance in the hierarchy.

4.3.7 Encourage and incorporate creativity

A progressive sequence of visual events can be created to make routes more attractive. This can be achieved by:

- Using natural characteristics in the landscape and material design,
- Allowing space for planting to soften built elements, and
- Providing visual stimuli and the use of a considered palette of design elements, materials and colour.

Create simple, coordinated and neat composition of elements along a corridor and consider the design of individual elements as part of the whole.

5. Design considerations / opportunities

The following considerations should be addressed in the development of any design for the channel corridor and included in a detailed landscape plan including walkway/cycleway location, planting arrangement and species, design and materials, and placement of any street furniture:

- A connection, accessibility and movement analysis should be undertaken responding to any known development plans showing location of bridges and connections including any advancement with the Mill Road Corridor location.
- Footpath and cycleway to be included on both sides of the channel and to be connected into the surrounding community. Based on the findings of the above analysis, there can be a variation in quality or level of service provided all areas are connected.
- A Crime Prevention through Environmental Design (CPTED) analysis undertaken of any future development plans to ensure surveillance is maintained and entrapment spots are eliminated. This could be achieved through encouraging suitable fence and vegetation heights adjacent to the corridor. Suitable lighting will improve safety and security at night. Adjacent properties overlooking the corridor will also improve safety and security.
- Carefully selected planting and planting arrangements will help achieve ecological, amenity and safety outcomes. Planting will need to be selected to accommodate the geotechnical and hydrological conditions.
- Plant species to be selected to provide minimum obstruction to water flows in a storm event, i.e. species selected that will 'lie flat' to allow water to pass over them easily in a storm event. Species must also be hardy to the conditions and have a high survival rate in the event of a large storm, withstanding condition changes between wet and submerged for a period of time. Ideally species selected should be native and appropriate to the ecological area, serve environmental functions such as habitat and filtration of water at low flows, and provide a high level of amenity.
- Channel design - engineering solutions are to fit within the landscape and be natural in visual character as possible, i.e. planting or planted reno-mattress as preferred solution to erosion protection etc. Where possible more variation in the channel path and slope/cross section should be included to increase habitat and ecological outcomes, water filtration at low flows and amenity. A desired outcome is for the channel to look as natural as possible within the corridor.
- Selected materials for built elements should be robust, durable and reflect the character of the area where possible.

6. Conclusion

The implementation of a stormwater conveyance channel to enable the development of the Takanini 2a2b area provides an attractive open space and green linkage through the future development of the area. Through appropriate consideration of urban design principles the stormwater conveyance channel has the potential to enhance the landscape and amenity value of the area to become a positive feature for the community.

Appendix A – Suggested planting for proposed channel and surrounds

INDICATIVE CHANNEL CORRIDOR PLANTING

Channel edge planting – up to weir level

Carex dissita	flat leaved sedge
Carex lessoniana	rautahi
Carex secta	purei
Carex virgata	small swamp sedge
Blechnum novae-zelandiae	swamp kiokio
Baumea rubiginosa	orange nut sedge
Juncus edgariae	wiwi
Cyperus ustulatus	giant umbrella sedge

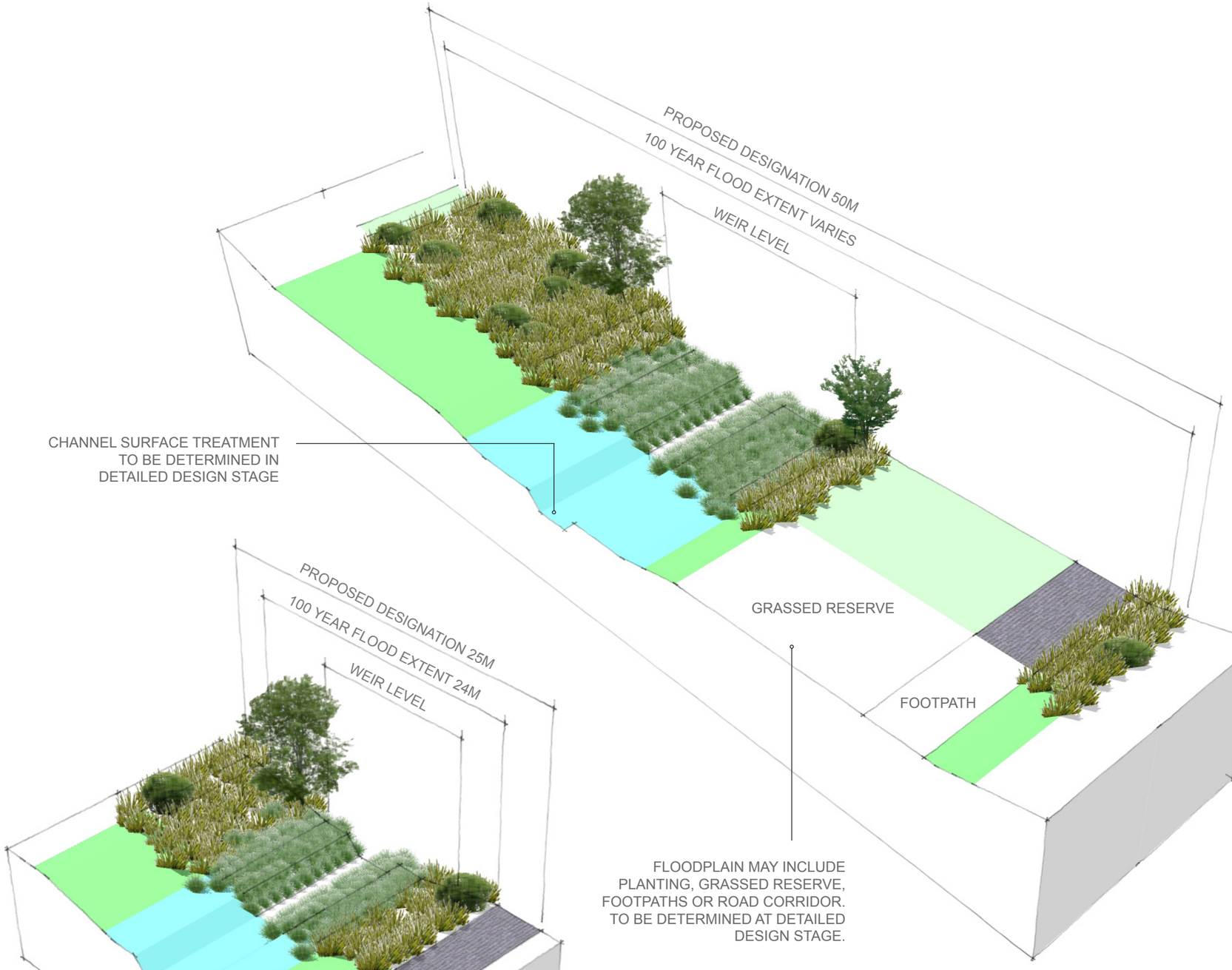
Carpodetus serratus	putaputaweta
Cordyline australis	cabbage tree
Dacrycarpus dacrydioides	kahikatea

Flood area planting – within 100 year ARI level

Cortaderia fulvida	toetoe
Carex dissita	flat leaved sedge
Carex lessoniana	rautahi
Carex secta	purei
Carex virgata	small swamp sedge
Blechnum novae-zelandiae	swamp kiokio

Phormium tenax	harakeke
Carpodetus serratus	putaputaweta
Cordyline australis	cabbage tree
Dacrycarpus dacrydioides	kahikatea
Corynocarpus laevigatus	karaka
Sophora microphylla/S.chathamica	kowhai
Melicytus ramiflorus	mahoe
Laurelia novae-zelandiae	pukatea
Syzygium maire	swamp maire

Shrubs and trees with a mature height greater than 1.5m and/ or with dense foliage should be planted individually or where in groups crown lifted to maintain clear sightlines throughout the corridor.



50M DESIGNATION TYPICAL PLANTING

25M DESIGNATION TYPICAL PLANTING

CHANNEL PLANTING

Stormwater Conveyance - Takanini Areas 2A & 2B

LANDSCAPE CONCEPT

April 2014

GHD

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	M. Clark	C. Ringrose		Ed Reid		29/04/2014
1	M. Clark	C. Ringrose		Ed Reid		24/07/2014

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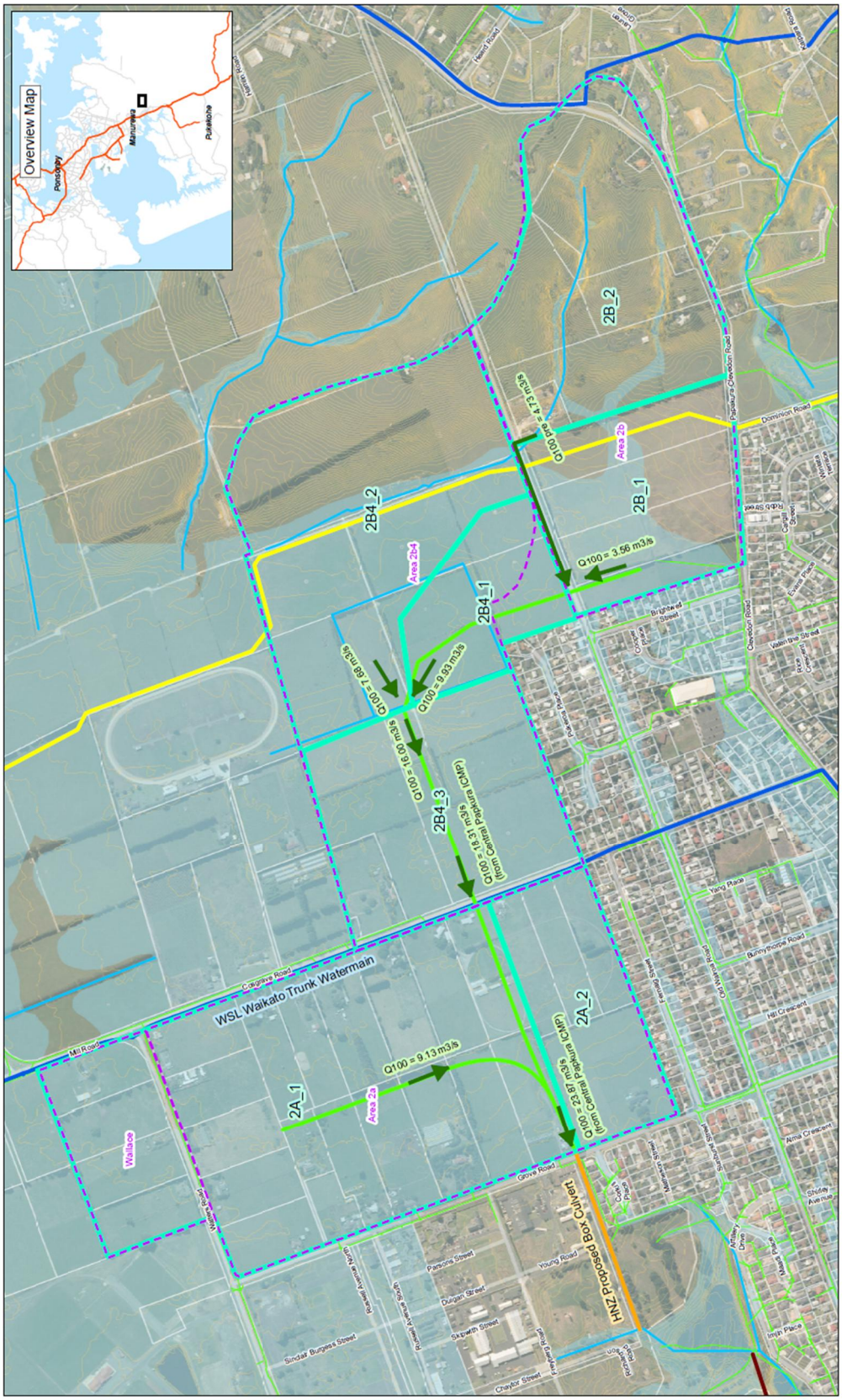
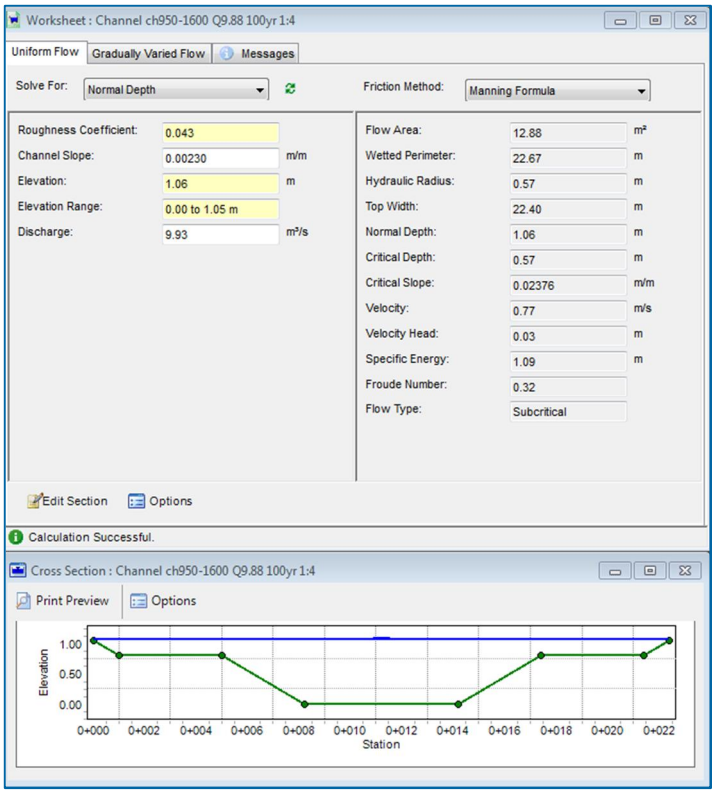
Appendix K – Updated channel cross section for south-west channel branch

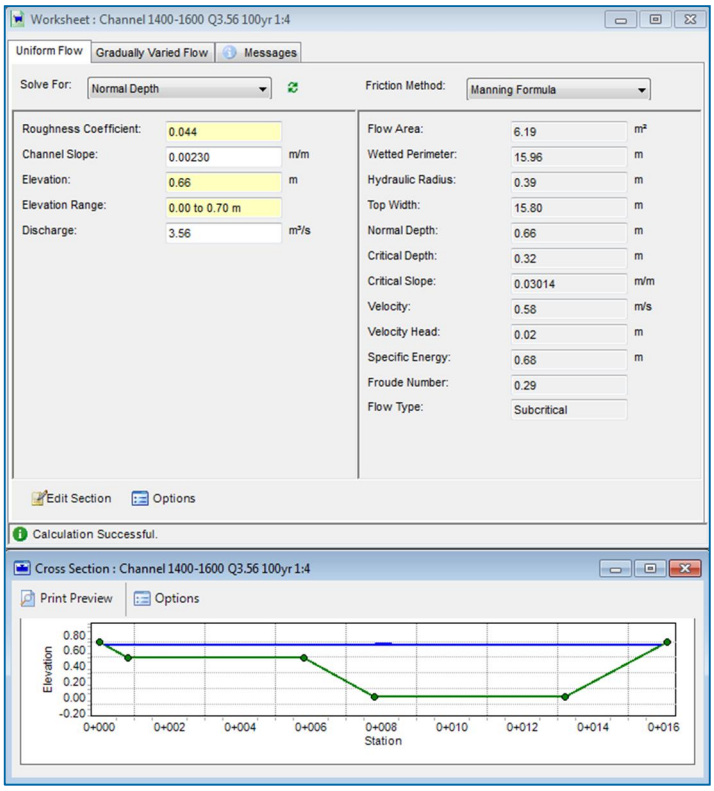
Updated flows to cater for new development information



Updated channel cross section to cater for new development information



Appendix K Figure 1 Revised cross section for CH954 – 1411



Appendix K Figure 2 Revised cross section for CH1411 – 1543

Appendix L – Northern channel alignment options memo

Memorandum

08 March 2014

To			
Copy to			
From	Jesse Peeters	Tel	0220917580
Subject	Northern Branch Options	Job no.	51/32174/03

1 Introduction

The Wallace catchment and approximately half of the 2a catchment naturally drain away from the Takanini 2a2b discharge point, however they have been included in the Takanini 2a2b conveyance catchment to maximise the area of benefit of the project and reduce the flooding issues of the Takanini South Catchment.

Five options have been proposed to drain the 2a and Wallace catchments:

- Option 1: A channel offset from the property boundaries that maximises the area of benefit but dissects a number of properties.
- Option 2: A channel along the property boundaries that reduces the impact on affected land owners but also has a reduced area of benefit.
- Option 3: A channel along the property boundaries that ties into the main channel via a curve through 91 Grove Road that maximises the area of benefit but has a larger land take.
- Option 4: A Channel alongside Grove Road that maximises the area of benefit but removes the road frontage from the properties along Grove Road.
- Option 5: A channel similar to Option 2 with a pipe and overland flowpath alongside Grove Road to increase the area of benefit.

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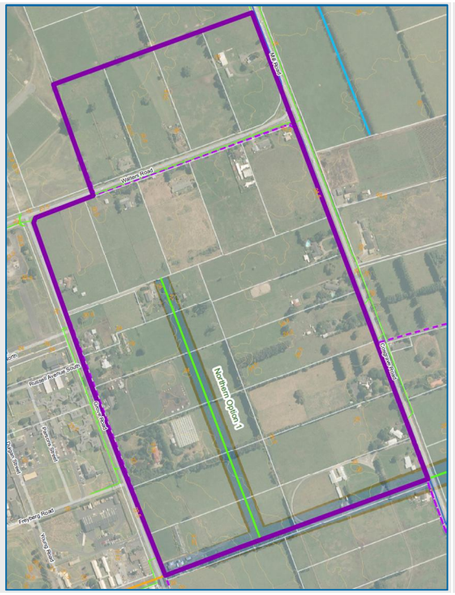
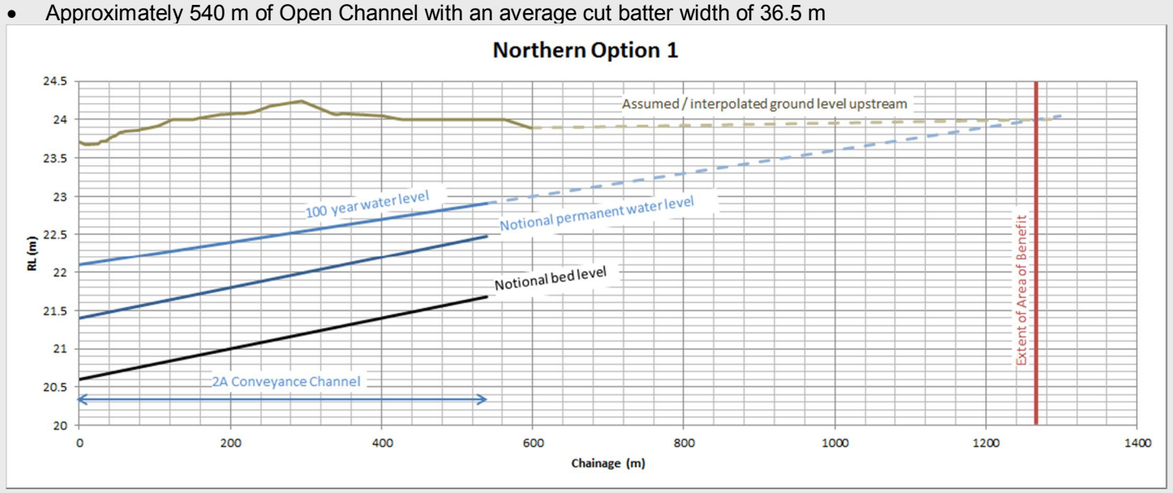
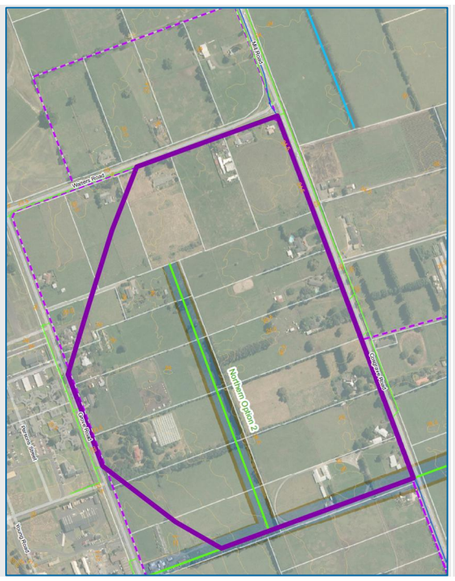
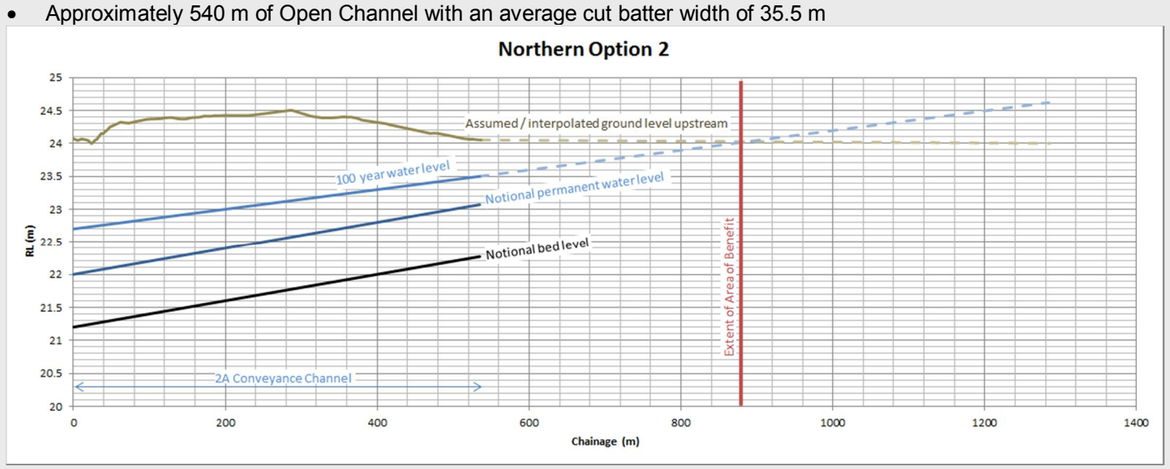
Memorandum

Options	Option details and Longsection	Pros	Cons
Option 1 	• Approximately 540 m of Open Channel with an average cut batter width of 36.5 m 	• Increased area of benefit (can drain entire structure plan catchment area) • Reduced land take if council is not required to purchase land cut off from road access	• Dissects properties, cutting off road access to part of the lots. Council may be required to purchase this land.
Option 2 	• Approximately 540 m of Open Channel with an average cut batter width of 35.5 m 	• Shallower section reduces settlement effects • Doesn't dissect any properties and requires reduced land take.	• Reduced area of benefit due to shallow section

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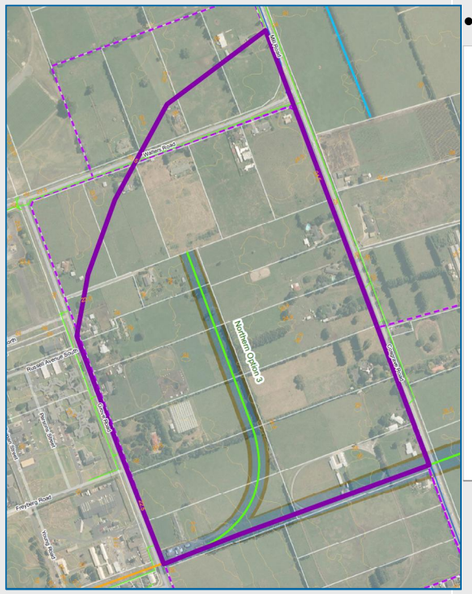
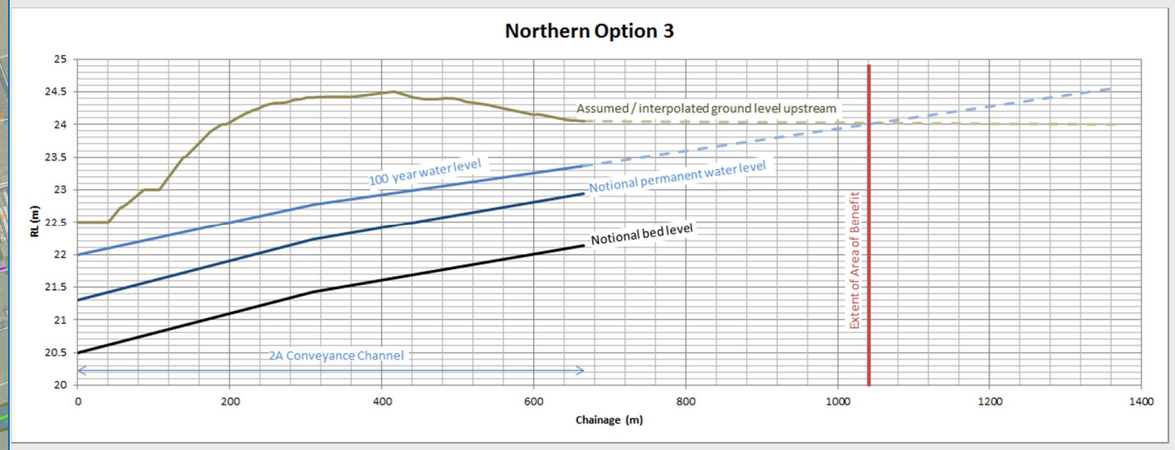
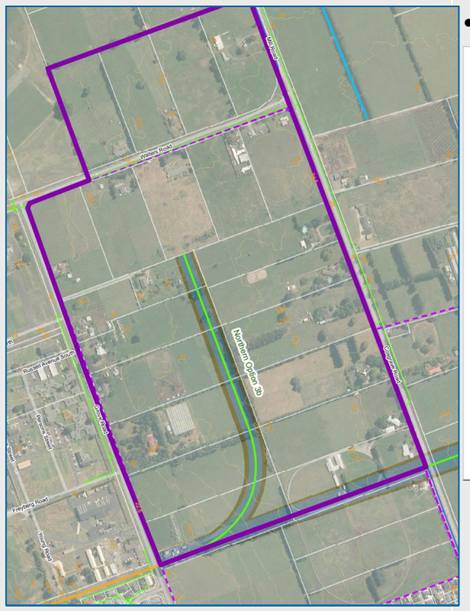
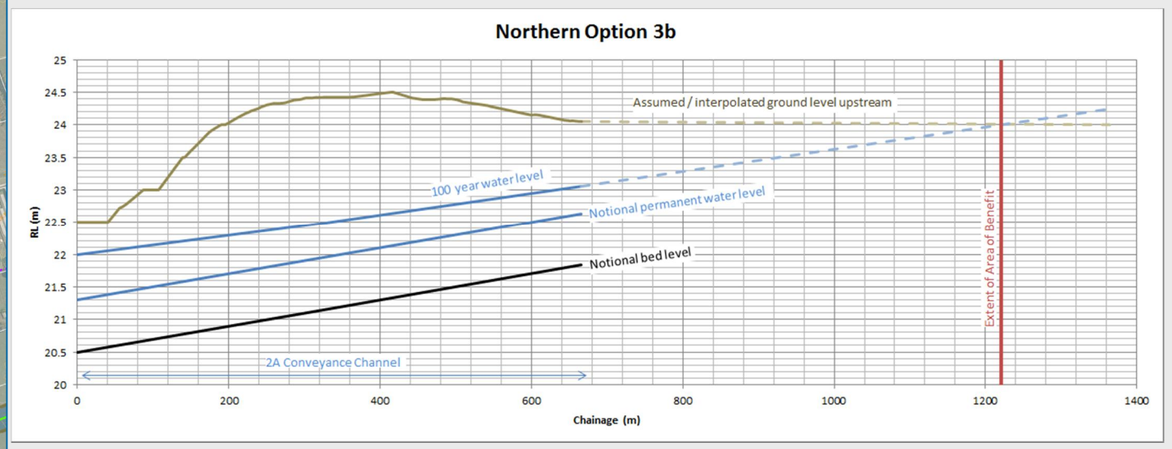
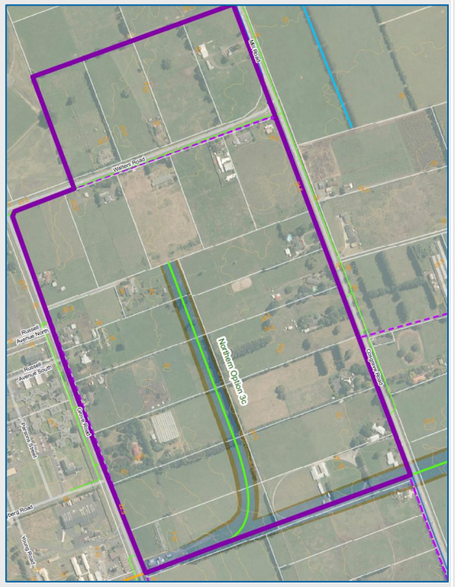
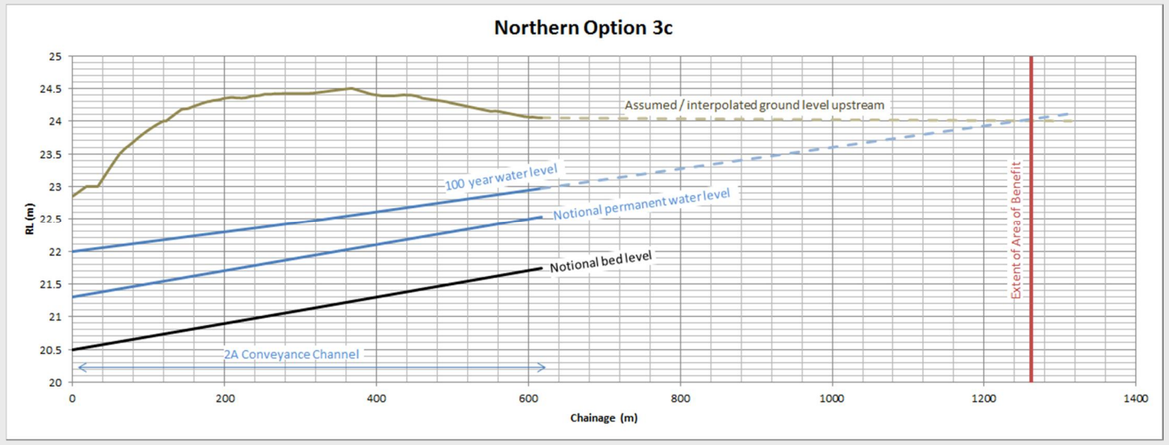
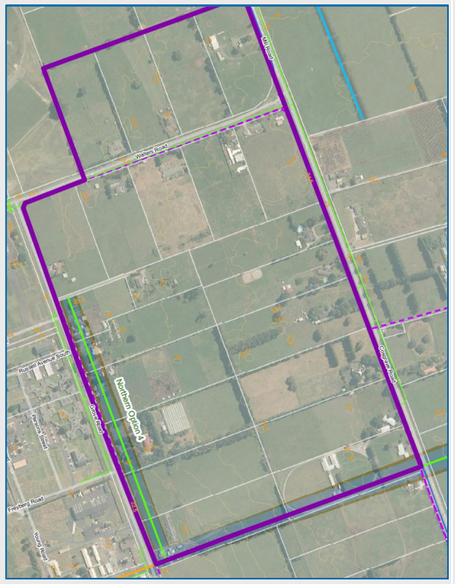
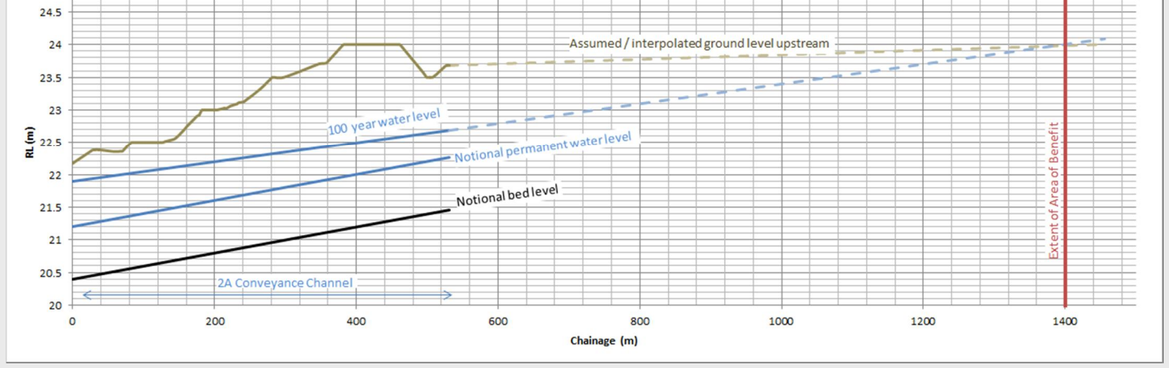
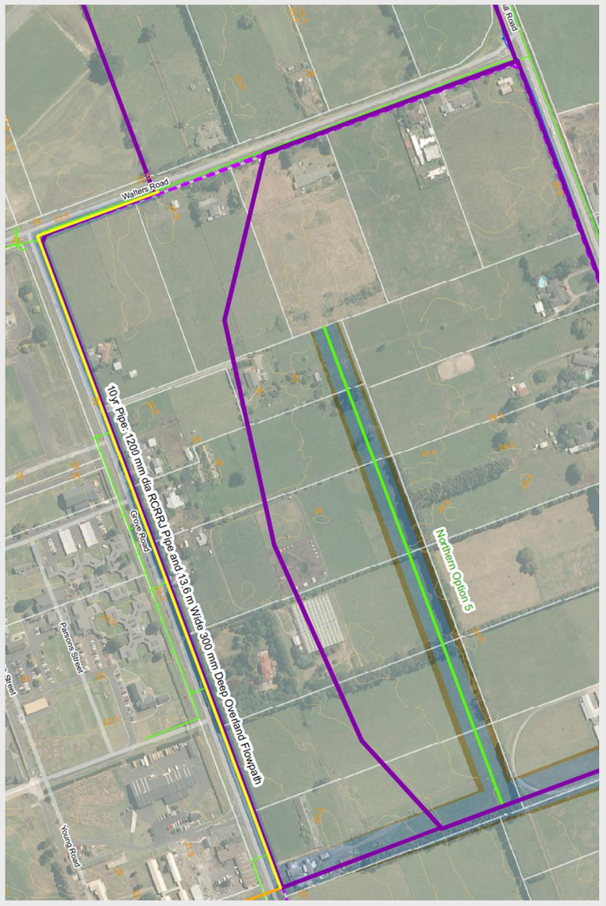
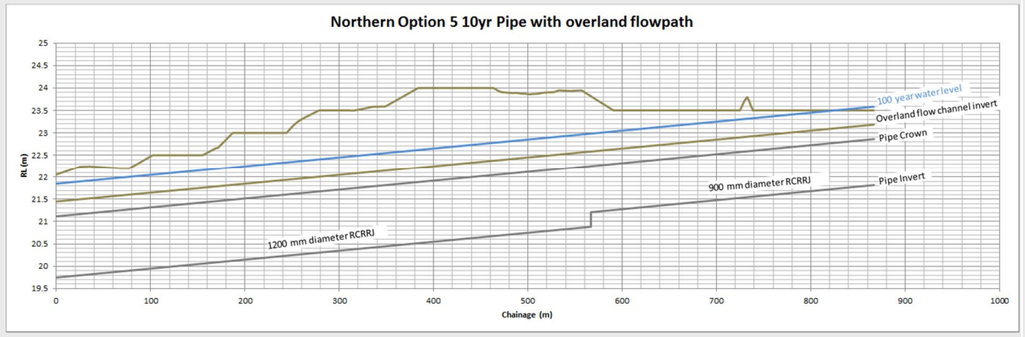
Option 3		• Approximately 670 m of Open Channel with an average cut batter width of 34.5m 	• Reduced depth of channel due to steeper downstream section therefore reduced settlement effects and cut batters. • Reduced land take due to alignment with property boundaries • Curved alignment downstream provides a less engineered and more naturalised appearance to the channel.	• Reduced area of benefit • Curved alignment at downstream end requires greater land take and results in less developable land. • Less area of benefit than option 3b due to shallower channel.
Option 3b		• Approximately 670 m of Open Channel with an average cut batter width of 36 m 	• Increased area of benefit • Curved alignment downstream provides a less engineered and more naturalised appearance to the channel. • Reduced land take due to alignment with property boundaries	• Higher settlement effects and cut batters than Option 3 due to increased channel depth • Curved alignment at downstream end requires greater land take and results in less developable land.

Option 3c		• Approximately 620 m of Open Channel with an average cut batter width of 37 m 	• Increased area of benefit • Curved alignment downstream provides a less engineered and more naturalised appearance to the channel (however less so than 3 and 3b due to sharper bend) • Reduced land take due to alignment with property boundaries • Sharper bend reduces the amount of unusable land for development.	• Requires longer distance between main channel weirs at connection point to drop 100 year flood level, and therefore potentially slightly increasing settlement effects at this location • Increased land take due to extra width required in the main channel downstream of connection • Potentially increased settlement effects settlement effects
Option 4		• Approximately 540 m of Open Channel with an average cut batter width of 32 m 	• Reduced land take • Increased area of benefit	• Cuts off road frontage for entire properties along Grove Road

Option 5



- Approximately 540 m of Open Channel with an average cut batter width of 35.5 m
- Apprximately 566 m of 1200 mm diameter RCRRJ pipe
- Approximately 300 m of 900 mm diameter RCRRJ pipe
- Approximately 866 m of 13.6 m wide 400 mm deep overland flow channel



- Increased area of benefit (can service entire structure plan catchment area)
- No dissection of properties

- Expensive due to pipe construction and channel construction
- Risks associated with pipe construction in peat
- Costs associated with pipe maintenance

Memorandum

Regards

Jesse Peeters
Graduate Engineer

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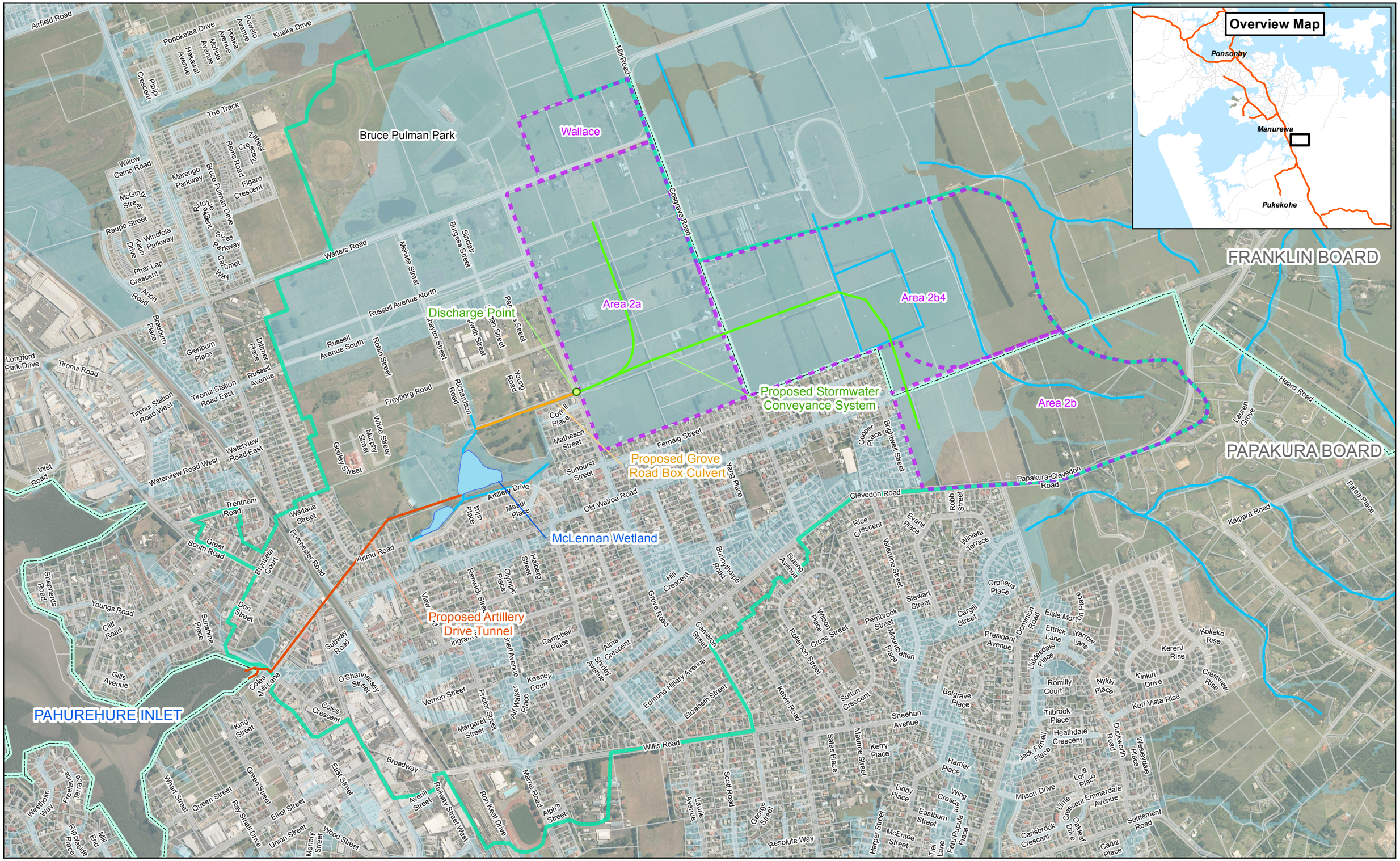
Appendix M - Proposed channel layout and designation extent

Appendix M1 – Proposed Papakura Central Stormwater Improvements

Appendix M2 – Proposed Stormwater Channel Layout and Designation Extent

Appendix M3 – Proposed Stormwater Designation Mapbook



Paper Size A3 (1:12000 Scale)

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: NZGD 2000
Grid: NZGD 2000 New Zealand Transverse Mercator

N

- Old Wairoa Road Catchment
- Wallace; Area 2b4; Area 2b; Area 2a
- Rivers
- Conveyance Channel Route
- Grove Road Box Culvert
- Proposed Artillery Drive Tunnel
- Property Boundaries
- Wetlands
- Floodplain
- Board Boundaries

Auckland Council
Takanini 2a2b Conveyance

Job Number	51-31962-00
Revision	B
Date	11 Jul 2014

Proposed Papakura Central Stormwater Improvements Appendix M1

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Data source: Auckland Council - Utilities, Aerials, Floodplains, Contours. November 2013. GHD: OldWairoa_Catchment_10012014, Wetlands_GHD_10012014, Conveyance_Route_GHD_16122013, 2a2b_Catchment_GHD_21112013, AucklandCouncilBoard_interest_Coastline, Rivers_within_study_area_GHD_29112013. Created by: jopeeters / kmcdonald / jopeeters