Report

Huia Site Selection: Ancillary Structures Summary Report

Prepared for Watercare Services Ltd (Client)

By CH2M Beca Limited

20 September 2016

Revision History

Revision N°	Prepared By	Description	Date
A	Jack Brennan		26/9/16

Document Acceptance

Action	Name	Signed	Date
Prepared by	Jack Brennan	J Brennan	26/9/16
Reviewed by	Dennis Hunt	D M Hunt	26 September 2016
Approved by	Clive Rundle	C Rundle	27 September 2016
on behalf of	CH2M Beca Limited		

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Appendices

1 Introduction

This report summarises the ancillary structures requirements for the two schemes that were assessed as the shortlist for the Huia site selection. The two schemes were located in Woodlands Park Road and Parker Road with two site locations assessed under each scheme. The sites assessed were:

- Woodlands Park Road – Manuka Road
- Woodlands Park Road – Existing Site
- Parker Road – Parker North
- Parker Road – Parker South

For the remainder of this report the descriptions will be provided at the scheme level, with site specific details provided where relevant. The site specifics are covered in more detail in the Shortlist Site Development Report[1].

2 Woodlands Park Road

2.1 Raw Water Infrastructure

The Woodlands Park Scheme connects to the end of the existing raw water aqueduct with a gravity supply to the existing site and a new raw water pump station to supply the Manuka Road site (Refer to Appendix A). Significant upgrades and maintenance will be needed to the aqueduct over the next 20 years due to the age and condition of this asset (refer to Appendix C).

The Upper Nihotupu Raw Watermain connection will differ between the two sites to meet the project principle of a gravity supply from this source. The Manuka Road site will require a bypass of the Raw Water Aqueduct by the upper Nihotupu raw watermain along Exhibition Drive (refer to Appendix A2). This follows the original route of this watermain, which is currently abandoned. The existing site will maintain the current connection of the Upper Nihotupu main to the Raw Water Aqueduct at Torren's Taper.

It is anticipated that the raw water system will be controlled at the sources, which is the same as current operational procedures. The system cannot be pressurised because of the gravity sections at Smiths Tunnel and the raw water aqueduct.

2.2 Treated Water Infrastructure

The treated water from both sites will flow to the treated water reservoirs on the site to the north of Woodlands Park Road. Two 25Ml reservoirs will be located at this site as per the drawings in the Shortlist Site Development Report[1]. The top water level (TWL) of the reservoirs has been set as 120m but further transmission network modelling is recommended to optimise the final level.

The reservoirs will flow into a pressurised and lined tunnel, which passes under the Scenic Drive ridge (refer to appendix A). The route of this tunnel follows the route identified as part of the North Harbour No.2 Watermain preliminary design work. This also applies to the route of the treated watermain from the outlet of the tunnel to the junction with Parrs Cross Road. A treated watermain

[1] GHD, Shortlist Site Development Report (September 2016)

has also been shown along West Coast Road, providing a cross-connection between the North Harbour No.1 and No.2 watermains.

The replacement of treated water aqueduct has been shown for the two Woodland Park Road Sites (Appendix C). This will provide increased resilience to the treated water network, allowing a direct supply to Titirangi Reservoirs. It is assumed that this will be pressurised as part of the replacement works. The connection configuration to the Treated Water Aqueduct has not be addressed as part of this project and will need to be considered at later stages of design.

2.3 Other Ancillary Infrastructure

2.3.1 Overflow/Off Spec Discharges

The layout for building on the existing site results in no overflow lagoon on the site. As a result, a direct discharge to the Little Muddy Creek Pipeline will be required. This is detailed in previous work by MWH.

The Manuka Road site has a short overflow discharge to the lagoon on the existing treatment plant. This lagoon will need to be extended, once the existing site has been demolished, to provide sufficient attenuation in an overflow event.

The overflow arrangements are covered in more detail in the off-specification water discharges report[2].

2.3.2 Wastewater Connection

The existing Huia Water Treatment Plant has a connection to the wastewater network and it has been assumed that both Woodlands Park Sites can maintain this arrangement.

The discharge of filtrate arrangements are covered in more detail in the off-specification water discharges report[2].

2.3.3 Power Supply

Watercare has already been in discussions with Vector regarding power supply to the site. A variety of options are available with differing levels of redundancy. It has been assumed that for the Woodlands Park Road schemes a new direct power supply will be provided from Atkinson Road Sub-station. Should this fail there is some capacity in the existing network plus an emergency generator on site.

[2] Tonkin and Taylor (June 2016) Huia WTP Site Selection Study- Off-Specification Water Discharges

3 Parker Road

3.1 Raw Water Infrastructure

The Parker Road Sites are not located adjacent to existing raw water infrastructure (refer to Appendix A3 and A4). To provide a raw water supply to the sites requires a tunnel from Mackies Rest. This tunnel is 1.8km to 2km in length and is on the limit of the maximum length for this size of tunnelling equipment (refer to Appendix B1 and B2). It has therefore been assumed that the tunnel will require an intermediate shaft during construction (refer to Appendix B3). The intermediate shaft will be closer to the treatment plant than it will be to Mackies Rest due to the nature of the terrain; this can be seen on the long-sections in Appendix B1 and B2.

It has been assumed that the tunnel will be jacked from the Mackies Road end. The working area is restricted at this location due to the terrain and the surrounding vegetation (refer to appendix B3). A review of the Mackies Rest was carried out with Adam Cato from March Cato Civil Engineering Contractors. Adam stated that with a small amount of vegetation clearing, the site will be appropriate for tunnel jacking. During the construction period it is likely that temporary bypass works will be required to maintain supply to the raw water aqueduct and the existing treatment plant.

It has been assumed that the tunnel will not require lining because although it will be pressurised, it will operate at a low head.

The Upper Nihotupu Watermain will need to be extended to connect to the tunnel inlet at Mackies Rest. This will involve a connection at the end of Jacobson's Tunnel. It has been assumed that the watermain will follow Exhibition Drive to the south and then Mackies Rest access track to the tunnel inlet. A more direct cross-country route should be considered at the next stage of design. A head dissipation device will be need to on the Upper Nihotupu Raw Watermain prior to the connection to the raw water tunnel.

The raw water aqueduct will not be required for this scheme and therefore will be abandoned. This also applies to the Upper Nihotupu Raw Watermain after Jacobson's Tunnel. This can be seen on Appendix C.

It is anticipated that the raw water system will be controlled at the sources, which is the same as current operational procedures. The system cannot be pressurised because of the gravity section at Smiths Tunnel.

3.2 Treated Water Infrastructure

The two Parker Road sites will have treated water pump stations that pump to the treated water reservoirs. The TWL of the reservoirs has been set at 120m. The reservoir elevation is relatively flexible at these two sites and further analysis is required to determine the optimal top water level.

The treated watermain passes down Parker Road and West Coast Road before connecting to the proposed North Harbour No.2 Watermain route at the junction of Parrs Cross Road. The watermain continues along West Coast Road to provide a cross connection with the North Harbour No.1 Watermain (refer to Appendix A3 and A4). This is necessary to provide supply to the east because this scheme has no direct connection to Titirangi Reservoirs. The treated water aqueduct will be abandoned (refer to appendix C).

3.3 Other Ancillary Infrastructure

3.3.1 Overflow/Off Spec Discharges

The Parker Road Sites both have available space to construct lagoons with appropriate attenuation times. Discharge from the lagoons will be via short gravity pipelines to the neighbouring Allen Swamp. The overflow arrangements are covered in more detail in the off-specification water discharges report[2].

3.3.2 Wastewater Connection

There is no wastewater network in Parker Road. It has been assumed that a new 150mm gravity pipeline, 3km in length, will need to connect to the closest wastewater network in Glen Eden. At the next stage of design a more comprehensive review of this pipeline will be needed to check the pipe size and long-section implications.

The discharge of filtrate arrangements are covered in more detail in the off-specification water discharges report[2].

3.3.3 Power Supply

It has been assumed that for the Parker Road schemes a new direct power supply will be provided from Oratia Sub-station. Should this fail there is some capacity in the existing network plus an emergency generator on site.

4 Summary

A summary of the ancillary infrastructure requirements for the four short-listed sites is provided in Table 1.

Table 1 - Site Summary Table

Scheme	PARKER ROAD		WOODLANDS PARK ROAD	
Site	**Parker North Site**	**Parker South Site**	**Manuka Road Site**	**Existing Plant Site**
Raw Water Infrastructure				
Connection to Aqueduct	At Mackies Rest prior to the start of the aqueduct		At the outlet of the aqueduct into a new pump station. 400m of rising main in Woodlands Park Rd	At the outlet of the aqueduct directly into the plant
Upper Nihotupu Raw Watermain connection	550mm watermain along Exhibition Drive and the Mackies Rest Access Track		550mm watermain along Exhibition Drive from Torren's Taper to Woodlands Park Rd	No change required
Raw Water Tunnel	2km, 2m diameter tunnel with intermediate access shaft	1.8km, 2m diameter tunnel with intermediate access shaft	N/A	
Treated Water Infrastructure				
Pipeline: WTP to Reservoirs	Pumped main 165m long	Pumped main 140m long	Falling main 550m long	Pumped main 530m long
Treated Water Tunnel	N/A		800m tunnel as per North Harbour No.2 Watermain	
Pipeline: Reservoirs to Network	Parker Road and West Coast Rd, 5.3km long	Parker Road and West Coast Rd, 5km long	Follows North Harbour No.2 Watermain route (4km)	
Power Supply				
Connection to grid	Single dedicated line from Oratia sub-station plus connection to local network		Single dedicated line from Atkinson Road sub-station plus connection to local network	
Off-Spec Water				
Overflow	Lagoon and discharge pipe to Allen Swamp		Extend existing lagoon	Little Muddy Creek pipeline
Wastewater	150mm sewer, 3km long connecting to closest network on West Coast Road		Connection to existing sewer network. Minimal additional infrastructure required	
Upgrades to existing infrastructure				
Upper Nihotupu Raw Watermain	Replacement of the pipeline between the dam and the end of Jacobson's Tunnel		Replacement of the pipeline between the dam and Torren's Taper	
Raw Water Aqueduct	Not required		Maintenance/upgrades required	
Treated Water Aqueduct	Not required		Optional: new connection and relining	

Appendix A

Overview Plans

A1 – Existing Site

GIS@beca.com

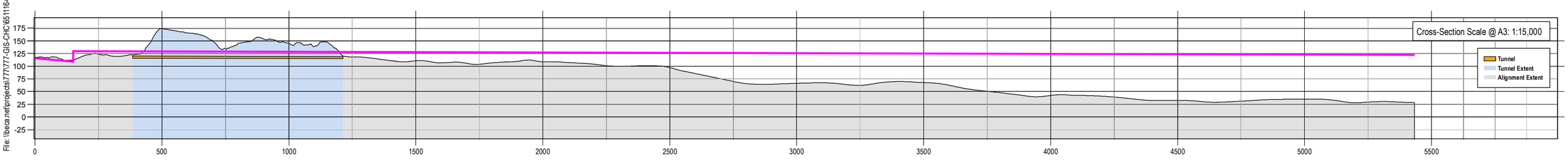
1200mm diameter trenched watermain

2000mm diameter tunnel with 1200mm diameter pipe

WTP
Tunnel
Treated Watermain

Map Scale @ A3: 1:10,000
0 125 250
Meters

N



Revision	Author	Verified	Approved	Date
1	CP	DRAFT	DRAFT	7/07/2016

Title:

Existing Site

Alignment Overview

Client: Watercare Services Ltd

Project: Huia WTP Upgrade

CH2M Beca

Discipline: GIS

Drawing No: GIS-6511164-042-01

Author: Beca

Date: 8/07/2016

File: \\beca.net\projects\7777\777-GIS-CHC\6511164 (Huia)\55_Workspaces\01_mxd\AGIS-6511164-042_01_Overview.mxd

A2 – Manuka Road

550mm diameter trenched watermain

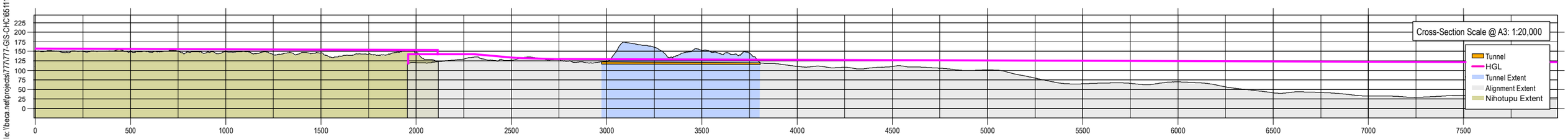
1200mm diameter trenched watermain

2000mm diameter tunnel with 1200mm diameter pipe

Raw Water Pump Station
WTP
Nihotupu Watermain
Treated Watermain
Tunnel
Raw Watermain

Map Scale @ A3: 1:15,000
0 125 250
Meters

N



Revision	Author	Verified	Approved	Date
2	CP	JF	JB	14/07/2016
1	CP	JF	JB	7/07/2016

Title:

Manuka Site

Alignment Overview

Client: Watercare Services Ltd

Project: Huia WTP Upgrade

CH2M Beca

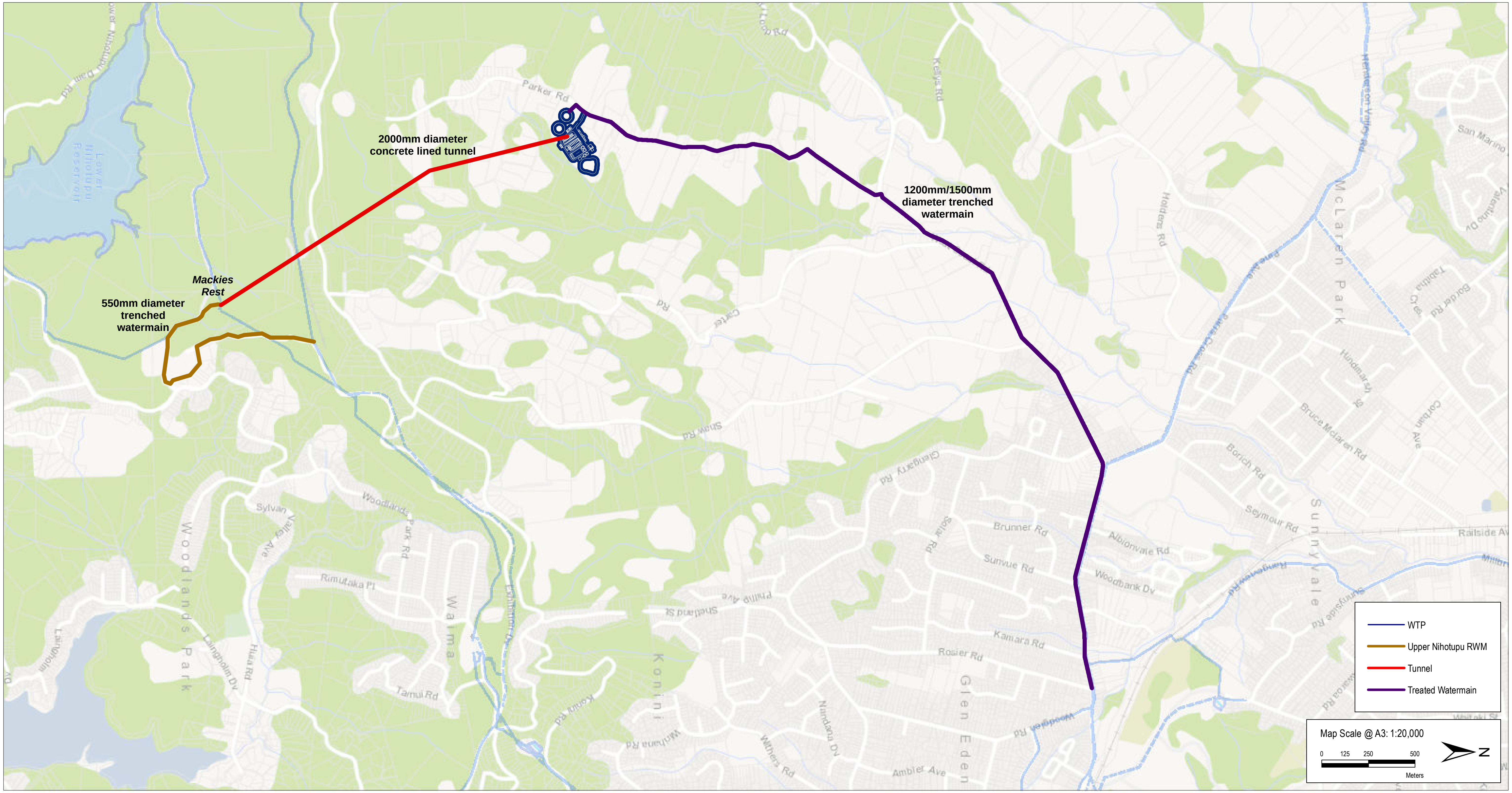
Discipline: GIS

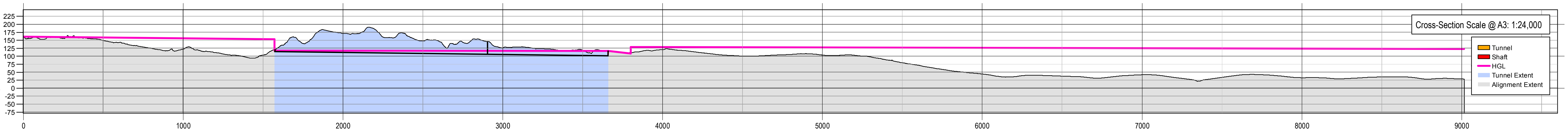
Drawing No: GIS-6511164-043-01

A3 – Parker North

GIS@beca.com

File: \\beca.net\projects\77\77-GIS-CHC6511164 (Huia)\55_Workspaces\01_mxd\GIS-6511164-033A_01_Overview.mxd Author: Beca Date: 11/07/2016

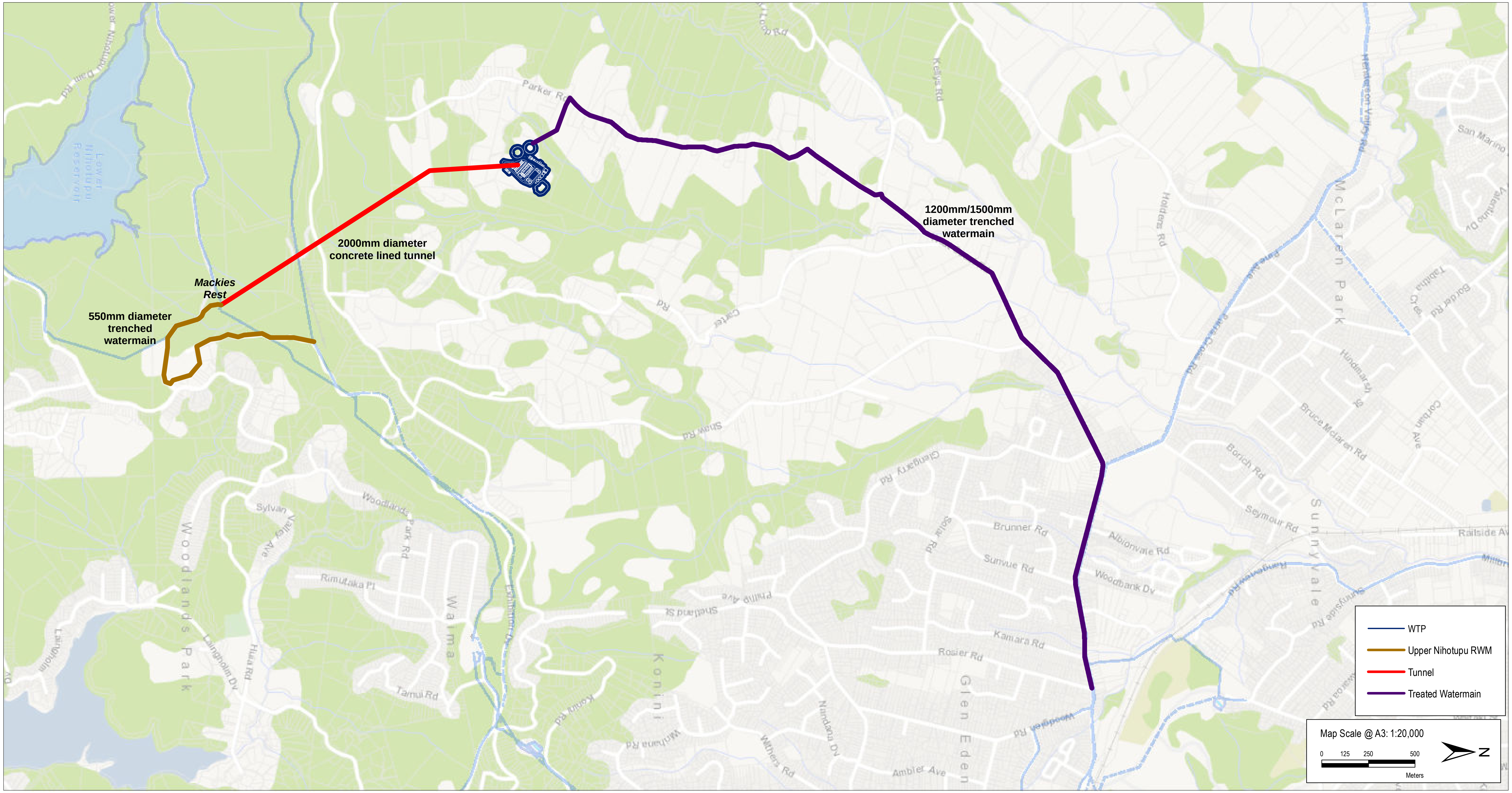


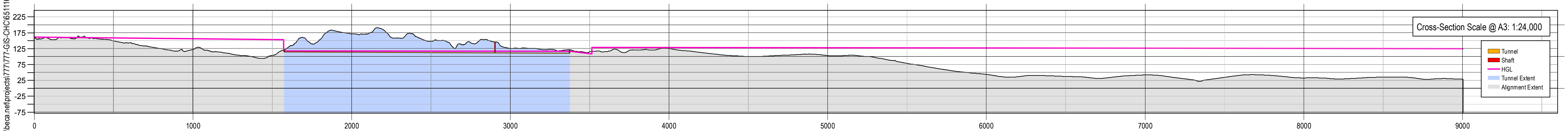


This map contains data derived in part or wholly from sources other than Beca, and therefore, no representations or warranties are made by Beca as to the accuracy or completeness of this information. Map intended for distribution as a PDF document. Scale may be incorrect when printed. Service Layer Credits: Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence	Revision	Author	Verified	Approved	Date	Title: **Parker - North** Alignment Overview	Client: Watercare Services Ltd	Discipline: GIS
	2	CP	JG	JG	8/07/2016		Project: Huia WTP Upgrade	Drawing No: GIS-6511164-033A-01
	1	CP	DRAFT	DRAFT	7/07/2016			

CH2M Beca

A4 – Parker South





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Revision	Author	Verified	Approved	Date
2	CP	JG	JG	8/07/2016
1	CP	DRAFT	DRAFT	7/07/2016

Title:

Parker - South

Alignment Overview

Client: **Watercare Services Ltd**

Project: **Huia WTP Upgrade**

CH2M Beca

Discipline: **GIS**

Drawing No: **GIS-6511164-033B-01**

GIS@beca.com

Author: Beca Date: 8/07/2016

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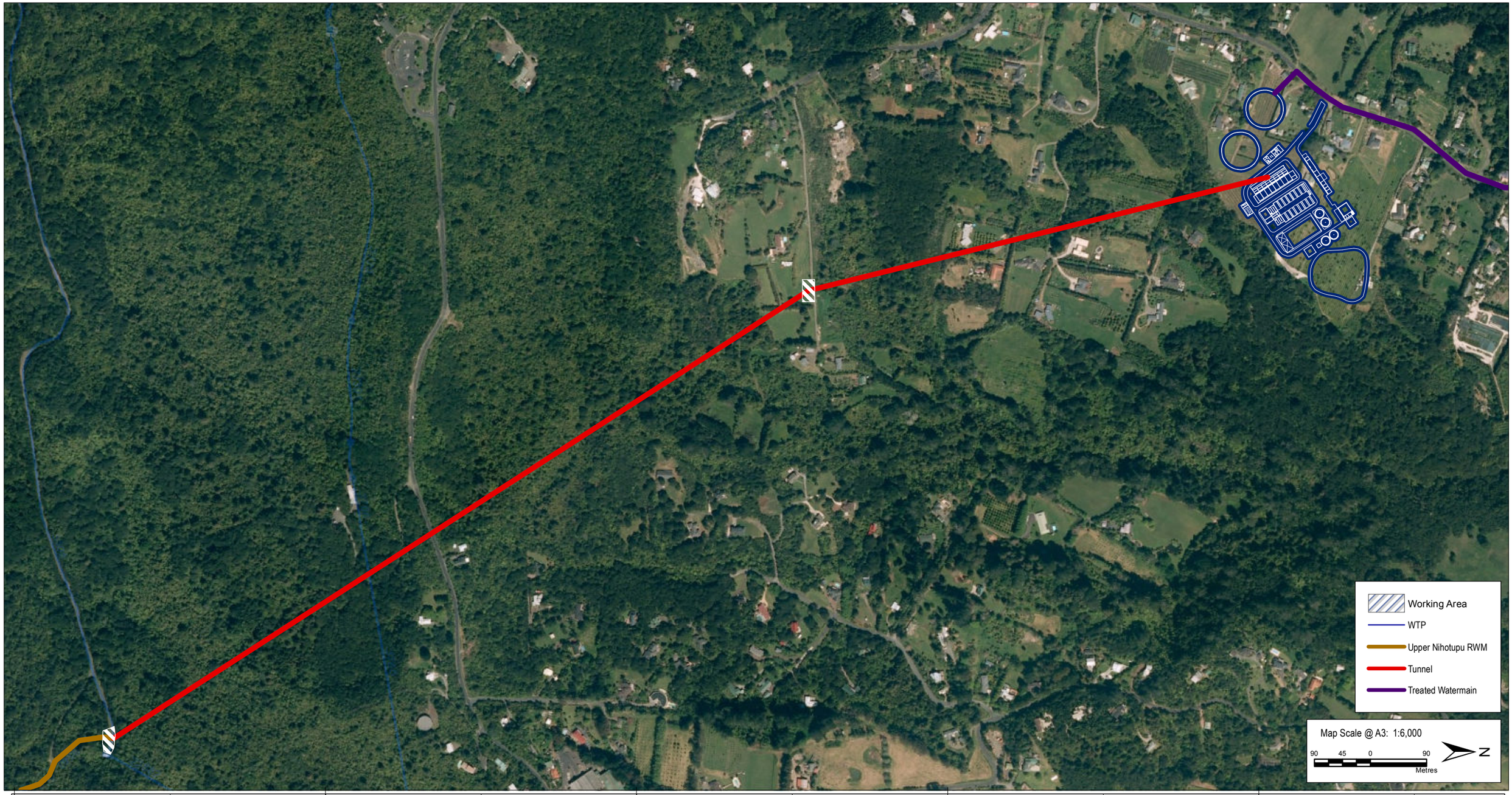
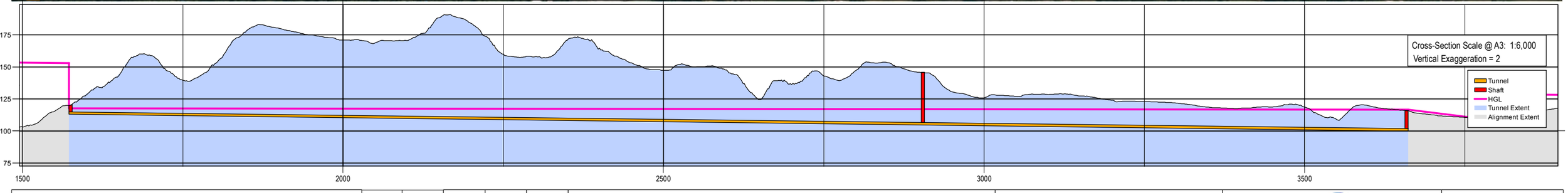
Appendix B

Parker Scheme Tunnel Details

B1 – Parker North Tunnel

GIS@beca.com





Revision	Author	Verified	Approved	Date
1	CP	JF	JB	11/07/2016

Title:

Parker - North

Tunnel Detail

Client: Watercare Services Ltd

Project: Huia WTP Upgrade

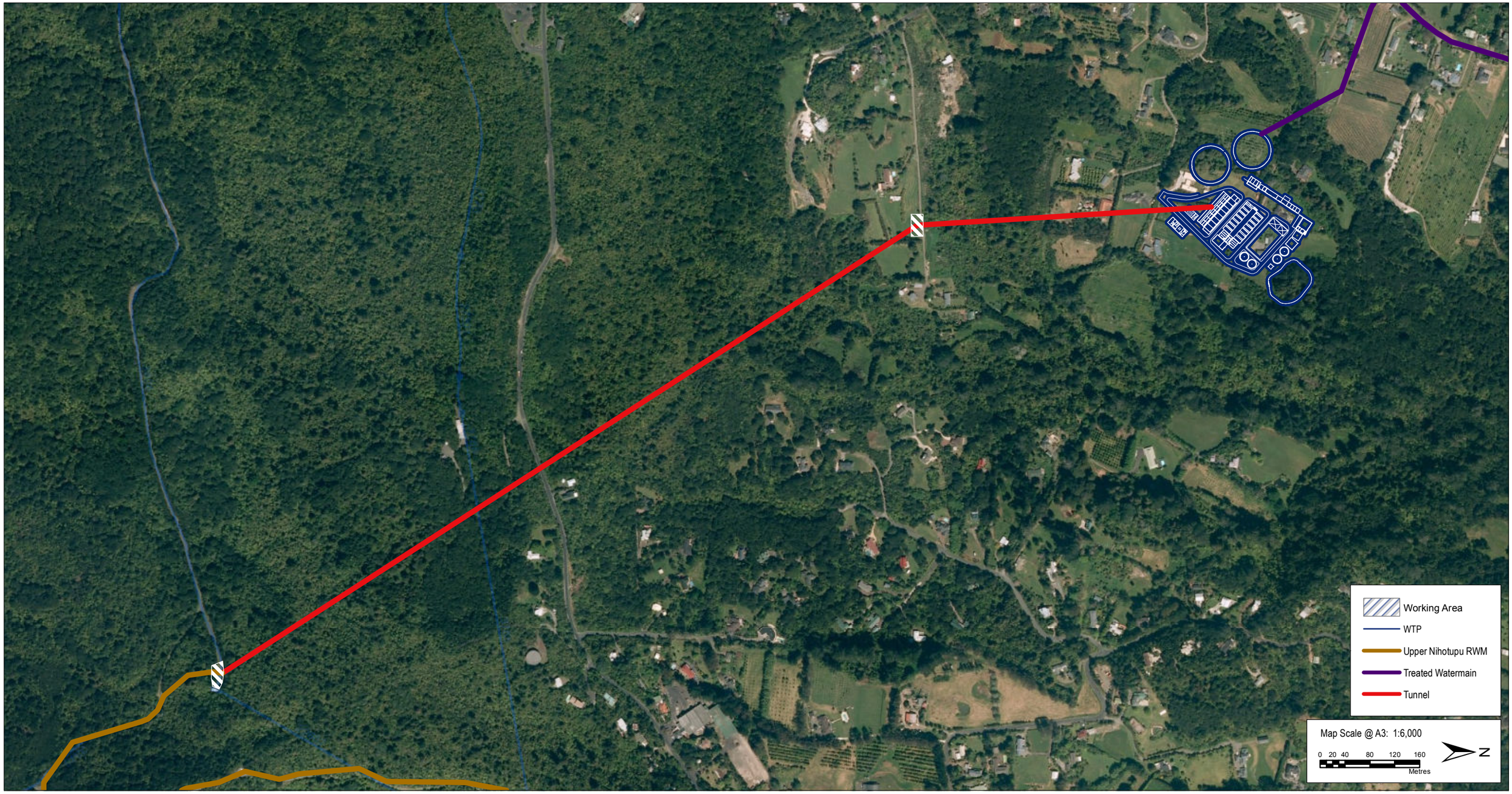
CH2M Beca

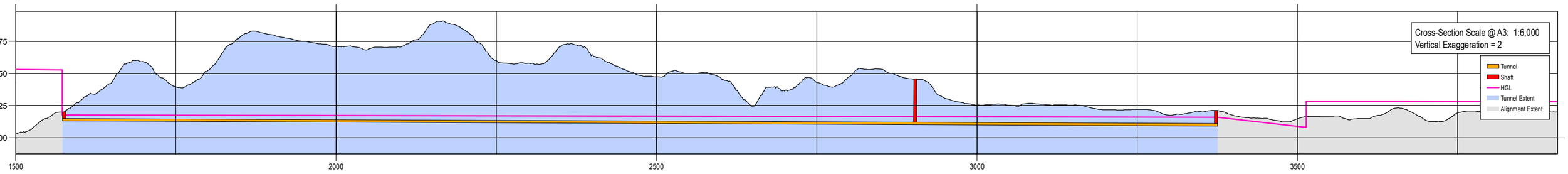
Discipline: GIS

Drawing No: GIS-6511164-033A-02

File: \\beca.net\projects\777\777-GIS-CHC\6511164 (Huia)\55_Workspaces\01_mxd\AGIS-6511164-033A_02_Tunnel.mxd Author: Beca Date: 11/07/2016

B2 – Parker South Tunnel





Revision	Author	Verified	Approved	Date
1	CP	JF	JB	7/07/2016

Title:

Parker - South

Alignment Overview

Client: **Watercare Services Ltd**

Project: **Huia WTP Upgrade**

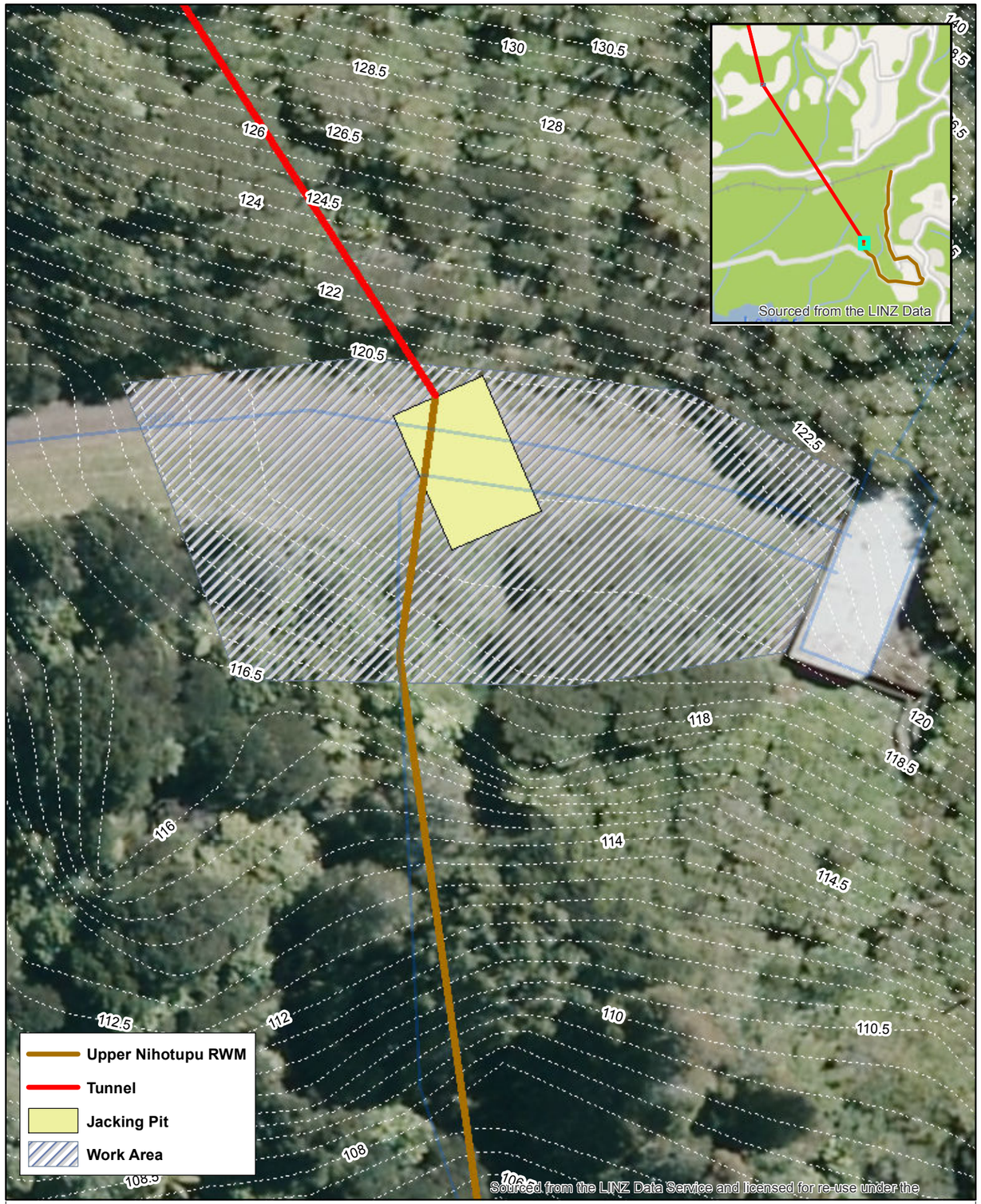
CH2M Beca

Discipline: **GIS**

Drawing No: **GIS-6511164-033B-02**

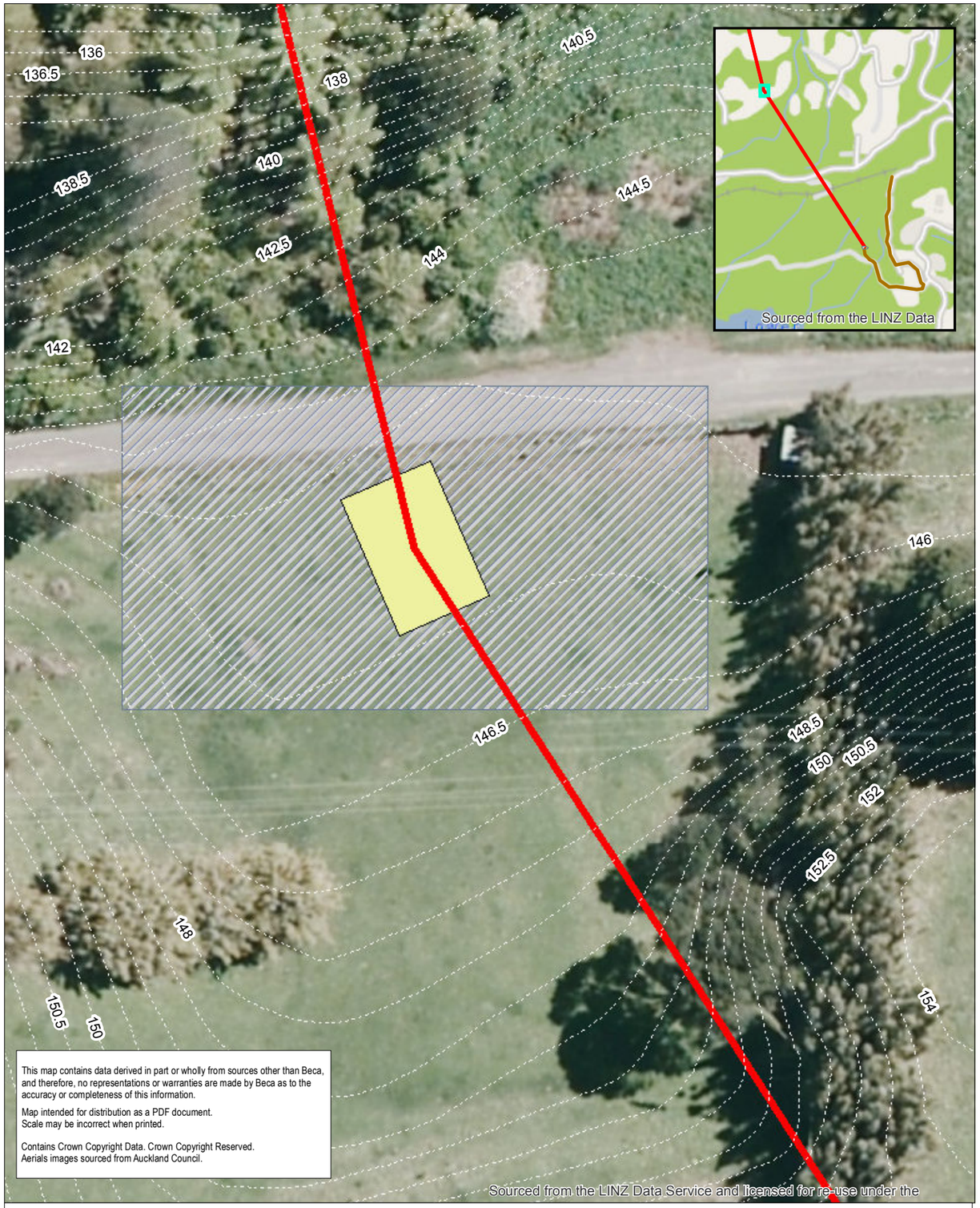
B3 – Jacking Pit Locations (Parker Sites)

GIS@beca.com



Mackies Rest

Work Area - 700m^2



Intermediate Shaft

Work Area - 700m^2

Map Scale @ A3: 1:300

0 4 8 16

Metres

N

Revision	Author	Verified	Approved	Date
1	CP	JF	JB	08/07/2016

Parker - Work Area Detail

Client: **Watercare Services Ltd**

Project: **Huia WTP Upgrade**

CH2M Beca

Discipline: **GIS**

Drawing No: **GIS-6511164-033-02**

Author: Beca GIS Date: 11/07/2016

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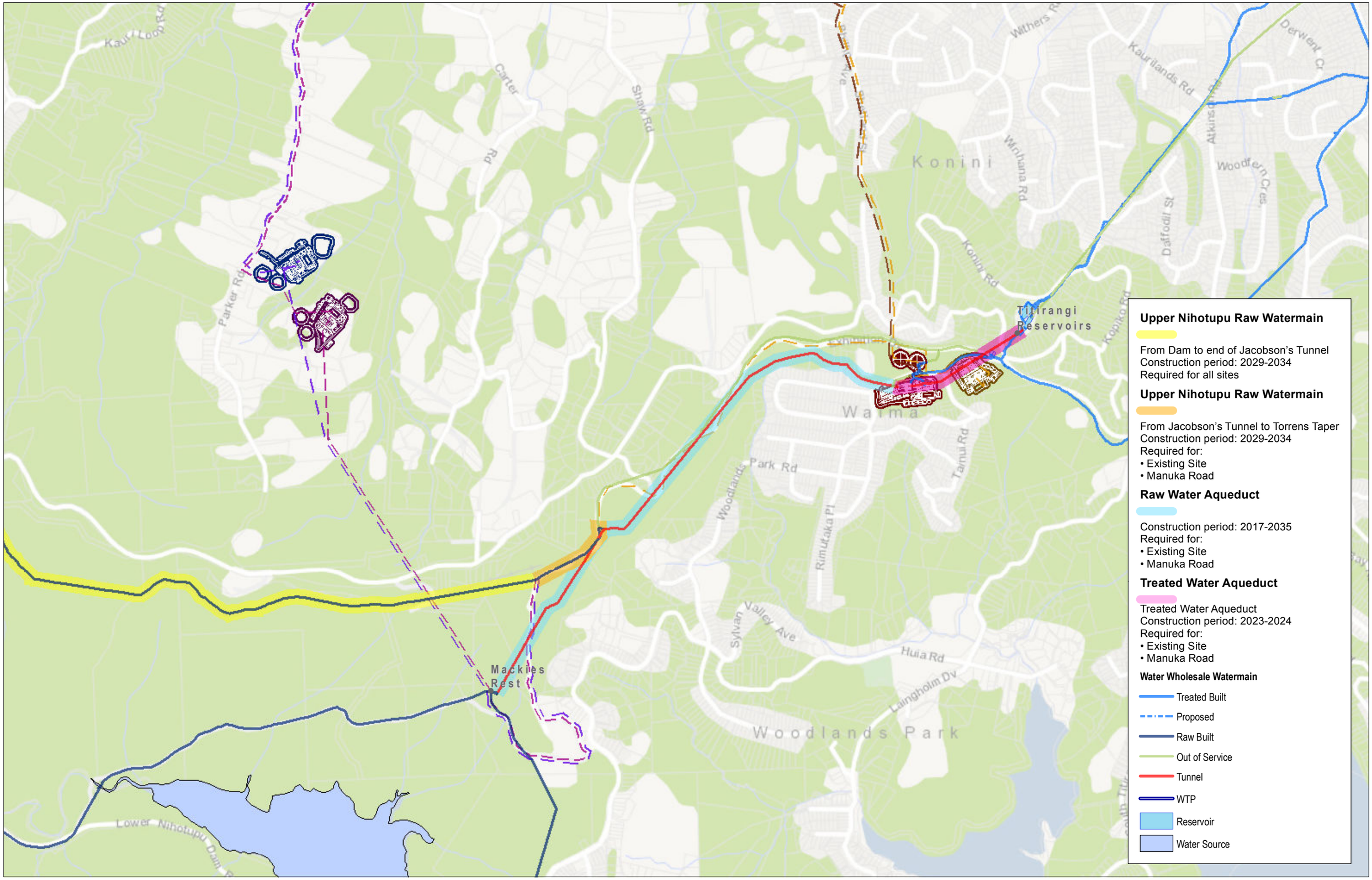
Appendix C

Raw Water Upgrades

GIS@beca.com



Upper Nihotupu Raw Watermain

From Dam to end of Jacobson's Tunnel
Construction period: 2029-2034
Required for all sites

Upper Nihotupu Raw Watermain

From Jacobson's Tunnel to Torrens Taper
Construction period: 2029-2034
Required for:
- Existing Site
- Manuka Road

Raw Water Aqueduct

Construction period: 2017-2035
Required for:
- Existing Site
- Manuka Road

Treated Water Aqueduct

Treated Water Aqueduct
Construction period: 2023-2024
Required for:
- Existing Site
- Manuka Road

Water Wholesale Watermain

- Treated Built
- Proposed
- Raw Built
- Out of Service
- Tunnel
- WTP
- Reservoir
- Water Source

Map Scale @ A3: 1:15,000

0 125 250
Meters

N

Revision	Author	Verified	Approved	Date
1	CP	DRAFT	DRAFT	28/07/2016

Title: **Raw Water Infrastructure Upgrades**

Client: **Watercare Services Ltd**

Project: **Huia WTP Upgrade**

CH2M Beca

Discipline: **GIS**

Drawing No: **GIS-6511164-090-01**

File: \\beca.net\projects\77\7777-GIS-CHC\6511164 (Huia)\55_Workspaces\01_mxd\GIS-6511164-090_01_NetworkOverview.mxd Author: Beca Date: 28/07/2016