



Huia WTP Replacement Report on Shortlist Options

Prepared for
Watercare Services Ltd

Prepared by
Tonkin & Taylor Ltd

Date
June 2017

Job Number
30848.v1



Exceptional thinking together

www.tonkintaylor.co.nz

Distribution:

Watercare Services Ltd

1 copy

Tonkin & Taylor Ltd (FILE)

1 copy

Table of contents

1	Introduction	1
1.1	Overview	1
1.2	Background and work to date	1
1.2.1	Project justification and gap analysis	1
1.2.2	The development of site principles	2
1.2.3	Initial site identification and evaluation	2
1.2.4	Scheme development	2
1.2.5	Scheme evaluation	3
1.2.6	Reporting to date	4
1.3	Shortlisted options	5
2	Description of shortlisted options	6
2.1	Introduction	6
2.2	Manuka Road site	7
2.2.1	Site characteristics	7
2.2.2	Overflow and off-spec discharges	8
2.3	Existing Huia WTP site	9
2.3.1	Site characteristics	9
2.3.2	Overflows and off-spec discharges	9
2.4	Woodlands Park Road Scheme: Ancillary structures	10
2.4.1	Raw water system	10
2.4.2	Treated water system	11
2.4.3	Wastewater Connection	11
2.4.4	Power Supply	11
2.5	Parker North site	13
2.5.1	Site characteristics	13
2.5.2	Overflow and off-spec discharges	14
2.6	Parker South site	14
2.6.1	Site characteristics	14
2.6.2	Overflow and off-spec discharges	14
2.7	Parker Road scheme: Ancillary structures	15
2.7.1	Raw water system	15
2.7.2	Treated water system	16
2.7.3	Wastewater Connection	16
2.7.4	Power Supply	16
3	Planning context	17
3.1	Waitakere Ranges Heritage Area	17
3.2	AUP Natural Heritage and Indigenous Biodiversity provisions	17
3.3	AUP Infrastructure provisions	18
3.4	Woodlands Park Road Schemes	19
3.5	Parker Road Schemes	23
4	Site Evaluation	25
4.1	Methodology	25
4.1.1	Development of further site-specific information	25
4.1.2	Engagement of additional subject matter experts (SME)	25
4.1.3	Site visits	26
4.1.4	SME assessments	26
4.1.5	Design parameters	26
4.1.6	Challenge workshop 1	27

4.1.7	Challenge workshop 2 (Operability)	27
4.1.8	Challenge workshop 3	27
4.1.9	Mana Whenua engagement	27
4.2	Shortlist reporting	28
4.3	Multi-criteria assessment results	29
4.3.1	Overall scores	29
4.3.2	Analysis of sites by criteria	32
4.4	Weighting and sensitivity analysis	41
4.4.1	Overview	41
4.4.2	Technical and engineering weighting	41
4.4.3	RMA Section 6 weighting	42
4.4.4	Overall RMA weighting	43
4.4.5	Results of weighting	44
4.4.6	Individual criteria weighting and sensitivity analysis	48
4.5	Assessment of cultural values	49
4.6	Assessment against Watercare objectives	49
5	Conclusion	54
6	Applicability	56

Appendix A :	Scoring of MCA criteria
Appendix B :	MCA scoring results by site
Appendix C :	Technical reports
Appendix D :	Sensitivity analysis
Appendix E :	Workshop minutes
Appendix F :	Site Plans

1 Introduction

1.1 Overview

Watercare Services Limited (Watercare) is responsible for the bulk and retail supply of potable water and for the collection, treatment and disposal of wastewater to around 1.4 million people in the Auckland region. Watercare is a Council Controlled Organisation (CCO), wholly owned by the Auckland Council.

Watercare operates the western dams within the Waitakere Ranges, which supply approximately 19 per cent of Auckland's water. This water is treated at the Huia and Waitakere Water Treatment Plants before being distributed primarily to west and north Auckland. The Huia Water Treatment Plant (Huia WTP) is the third most significant water treatment plant in Auckland and is a crucial component of Auckland's water supply network. Constructed in 1929 and upgraded in the 1940s and again in the mid-2000s, Huia WTP is now nearing the end of its operational life. Watercare has therefore been assessing alternative sites to construct a new Water Treatment Plant (new WTP) to replace the aging Huia WTP and to accommodate future growth in Auckland.

The overall methodology for considering and evaluating potential WTP sites is set out in the report entitled *Site alternatives assessment: Evaluation methodology, prepared by Tonkin + Taylor Ltd, December 2015 (updated February 2016)* ('Evaluation Methodology Report'). A Multi-Criteria Assessment (MCA) approach has been selected by Watercare as a tool for comparing and assessing the site options. This report presents an evaluation of the short list of potential sites.

This assessment of alternative WTP sites is driven by the requirements of the Resource Management Act 1991 (RMA), particularly section 171(1)(b) for notices of requirement and sections 88(2) and Clause 6 of Schedule 4 for resource consent applications. These provisions require any future applications for a new plant to be supported by a robust assessment of alternative options. This approach is also supported by Watercare's desire to ensure that the proposed new plant is considered strategically in terms of selecting the best option for the operation and future development of Auckland's water treatment and drinking water supply network.

1.2 Background and work to date

The overall methodology for considering and evaluating alternatives is set out in the Evaluation Methodology Report. To date this process has comprised:

1.2.1 Project justification and gap analysis

This initial work involved a review and gap analysis of existing documentation to assess the justification for replacing the Huia WTP. The results of the review and gap analysis is set out in the *Huia WTP Replacement: Project Justification Report (Draft, Nov. 2015)* ('Project Justification Report - draft') and the *Justification Gap Analysis Report (Draft, Nov. 2015)* ('Gap Analysis Report - draft') both prepared by GHD.

These reports concluded that a new WTP is required for a number of reasons, including:¹

- a The Waitakere Ranges water sources and the Huia WTP are important ongoing elements of the Auckland region's water supply system and contribute to its resilience, especially as Auckland continues to grow.
- b The existing Huia WTP is not ideally suited to manage a series of key water quality risks and the process capacity of several components does not currently achieve the plant's nameplate capacity of 126 MLD.

¹ Draft Project Justification Report, Pg. 10.

- c The existing ageing Huia WTP asset base represents a high risk when looking at a 20 to 50 year master planning horizon, and therefore new assets are required to meet Watercare's service standards.

These reports also identified the following areas where further investigation may be required:²

- a Whether it is feasible to upgrade the existing Huia WTP to 140MLD and to a high safety and environmental standard.
- b Whether it is feasible to utilise the existing Huia WTP at around 65 MLD in conjunction with establishing a new 75MLD plant at another site (or some other optimum combination of sizing between the existing Huia WTP and a new WTP).
- c Whether other system augmentation options present a more favourable solution than options for upgrading the Huia WTP.

1.2.2 The development of site principles

The site principles inform the initial site identification and overall evaluation of sites, particularly in terms of their technical feasibility and connection to the existing water supply network. These site principles and the rationale for them are set out in the *Huia WTP Site Selection Site Principles report prepared by CH2M Beca Ltd (Dec. 2015)* ('Site Principles Report'). Their application to the site identification and evaluation process is set out in the Evaluation Methodology Report.

1.2.3 Initial site identification and evaluation

The initial identification of potential sites involved using GIS tools to identify potentially suitable locations that aligned with the principles. The principles applied in this initial GIS screening approach focused on the 'technical feasibility' based principles e.g. locations outside of the Watercare dam catchments, elevation, proximity (distance of each parcel from the existing WTP and to the North Harbour 2 Watermain (WMNH2)) and slope to ensure a broad approach to the initial identification of sites. These key technical requirements were then overlaid to identify "more suitable" and "less suitable" sites on the basis of how well each site aligned with each of the principles.

A manual screening assessment, including fatal flaws analysis, was then undertaken in a workshop to determine whether or not sites should be included on a preliminary long list of sites that would be subject to further evaluation. This manual screening process took into account site size, shape and topography, level and type of development in the vicinity of the site. The presence of Significant Ecological Area (SEA) and/or Outstanding Natural Landscape (ONL) features on a site was also considered.

Sites that were not taken forward onto the long list, along with the reason(s) for this, are documented in the *Site Identification and Evaluation Report, CH2M Beca Limited (Dec. 2015)* ('Site Identification and Evaluation Report').

1.2.4 Scheme development

Through the process set out above, a preliminary long list of 21 sites was identified for further consideration and evaluation in the MCA process. This list was then further refined into eight schemes based on similar geographical locations, hydraulic characteristics, and pipeline routes and network connections. Scheme development focused on the ancillary structures required to service the new WTP and reservoirs (e.g. pipelines, tunnels, pumping stations).

The eight schemes and the corresponding sites are shown in Figure 1.1 below. Scheme development is more fully described in the *Huia Water Treatment Plant Site Selection: Long-list Option*

² Draft Gap Analysis Report, Pg. 5.

Development report prepared by CH2M Beca Limited (25 May 2016) (Long-List Option Development Report).

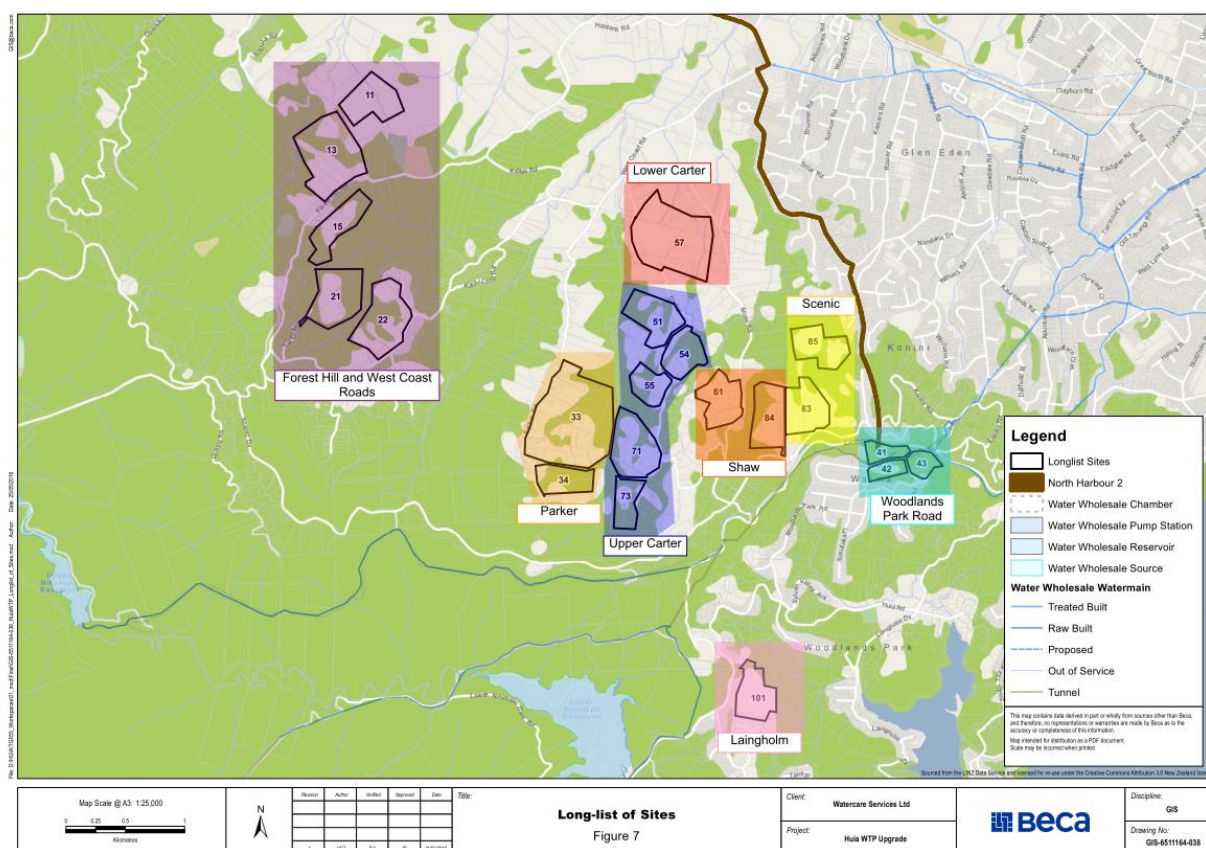


Figure 1.1: Map showing long listed schemes and corresponding sites (Source: Beca Limited, drawing no. GIS-6511164-038).

1.2.5 Scheme evaluation

As noted above, the preliminary long list of 21 sites was grouped into eight schemes that were determined based on similar geographical locations, hydraulic characteristics, and pipeline routes and network connections.

To ensure that a range of options across a range of locations was considered, Watercare determined that all eight schemes would proceed to the longlist MCA. This also reflected Watercare's desire, outlined in Section 1.1 above, to ensure that the proposed new plant is considered strategically in terms of selecting the best option for the operation and future development of Auckland's water supply network.

Within each of the eight schemes a preferred site for further evaluation was identified based on a high level MCA. This assessment focused on a comparison of the sites within each scheme rather than across the schemes to identify the site which scored the best for each scheme. This was on the basis that as all eight schemes would proceed to the longlist MCA, the "best" option for each scheme should be subject to further assessment.

This was considered the optimal way to proceed in that it allowed for an evaluation of each of the sites within a scheme to determine their relative suitability to accommodate a treatment plant layout, ensuring a like-for-like comparison to arrive at the best option (site) for each of the schemes. The wider site options for the preferred schemes could then be revisited at the shortlist stage to

determine whether any of these options should be subject to further evaluation through the shortlist process.

As a result, the eight sites with the best MCA scores were not necessarily taken forward to the full long list assessment. Instead, where a group of options from the preliminary long list displayed similar characteristics they were grouped into a scheme and the “best” option for each scheme was chosen to move forward to the long list. The eight longlisted schemes and the corresponding preferred site were then subject to evaluation through the MCA longlist assessment as set out in the *Huia WTP Replacement: Report on Longlist Options, prepared by Tonkin + Taylor Ltd, June 2016* (Longlist Report).

1.2.6 Reporting to date

A full list of the project reporting to date is set out in Table 1.1 below.

Table 1.1: Project reports

Report	Reference	Content / subject matter
Evaluation Methodology Report	<i>Site alternatives assessment: Evaluation methodology, prepared by Tonkin + Taylor Ltd, December 2015 (updated February 2016)</i>	The overall methodology for considering and evaluating alternatives (as noted in Section 1 above).
Project Justification Report - Draft Gap Analysis Report - Draft	<i>Huia WTP Replacement: Project Justification Report, prepared by GHD, Draft November 2015 Justification Gap Analysis Report, prepared by GHD, Draft November 2015</i>	A review of the project justification for replacing the Huia WTP including a gap analysis of existing documentation.
Site Principles Report	<i>Huia WTP Site Selection Site Principles report prepared by CH2M Beca Ltd, December 2015</i>	The development of site principles to inform the initial site identification and overall evaluation of sites, particularly in terms of their technical feasibility and connection to the existing water supply network.
Site Identification and Evaluation Report	<i>Site Identification and Evaluation Report, prepared by CH2M Beca Limited, December 2015</i>	Initial site identification using GIS tools to identify potentially suitable locations that aligned with the site principles. Followed by a manual screening assessment including fatal flaws analysis to determine a preliminary list of 21 potential sites that would be subject to further evaluation.
Scheme Option Development Report	<i>DR*AFT Huia Water Treatment Plant Site Selection: Long-list Option Development, prepared by CH2M Beca Ltd, February 2016</i>	Grouping of the sites identified in the preliminary list of 21 potential sites into eight schemes based on location, hydraulic characteristics and connections to the existing and planned future network.
Off-spec Discharges Report	<i>Huia WTP Replacement, Options for Off-Spec Discharges, prepared by Tonkin & Taylor Ltd, draft April 2016</i>	Desktop assessment of options for discharging off-spec water for the eight longlisted schemes (assessing one site for each of these schemes).
Longlist Cost Estimate Summary Report	<i>Long List Evaluation Cost Estimate Summary, prepared by CH2M Beca Limited, May 2016</i>	Describes the cost estimate approach and summarises and compares the costs for each scheme.

Report	Reference	Content / subject matter
Longlist Report	<i>Huia WTP Replacement: Report on Longlist Options, prepared by Tonkin + Taylor Ltd, June 2016</i>	MCA undertaken on the eight long listed schemes, with the best site for each scheme assessed based on a generic site layout, along with the ancillary structures required (pump stations, tunnels and pipelines).

1.3 Shortlisted options

As set out in the Longlist Report, on the basis of the investigations and assessment completed to date, Watercare determined that it would take the top two schemes from the longlist assessment through into the detailed shortlist stage, being Parker Road and Woodlands Park Road. The wider site options for these schemes were then revisited to determine whether other sites within the preferred schemes should be subject to further evaluation through the shortlisting stage. As discussed below, this resulted in four sites in total proceeded through into the shortlist assessment process, two for each of the shortlisted schemes as described further below.

Previous work on the siting of a new WTP had focused on the Manuka Road site which is owned by Watercare and designated for 'water supply purposes – water treatment plants and associated structures'. This longstanding designation signals to the community the future use of the site for a public work. While Watercare has undertaken a 'first principles' approach to investigating and assessing alternatives sites, the Woodlands Park Road scheme/Manuka Road site is considered to be the yardstick against which other sites are assessed. Watercare therefore determined that it would only take forward a scheme and associated site option(s) which were at least as good as the Woodlands Park Road scheme. The only scheme option which fitted this direction was the Parker Road scheme, which at the long list assessment was the preferred scheme by some margin.

The Manuka Road site was identified as the preferred site for the Woodlands Park Road scheme. However, at the conclusion of the longlisting stage Watercare resolved to further investigate the option of rebuilding on the existing Huia WTP site and in particular, to determine whether or not this option was feasible from a water supply and network operations and resilience perspective. This had previously been identified as a gap which needed further work and could not be discounted at this stage (see the draft Gap Analysis Report prepared by GHD, November 2015). Therefore the existing Huia WTP site has also been considered in this shortlist options assessment process.

Through the long list stage, a large parcel of potentially suitable land was identified on Parker Road (Parker 3) that aligned well with the site principle requirements. The Parker 3 site has extensive areas with suitable ground levels to accommodate a treatment plant without the need for raw water pumping. On further inspection two distinct areas were identified within the larger parcel of land, both of which would be able to accommodate the development of a WTP. As a result, two options for the Parker Road scheme - labelled Parker North and Parker South - have been developed and assessed through the shortlist stage.

2 Description of shortlisted options

2.1 Introduction

As set out in Section 1.4 above, the Parker Road scheme and Woodlands Park Road scheme have been subject to further assessment through the shortlisting stage. Four sites in total have been examined as part of the shortlisting process, two for each of the shortlisted schemes. These sites were identified previously through the initial site identification and evaluation process and are set out in Table 2.1 below. Technical reports which describe the sites and associated ancillary infrastructure are identified in Table 2.2 and are contained in Appendix C. Relevant plans are contained in Appendix F.

Table 2.1: Shortlisted schemes and corresponding sites

Scheme name	Key scheme characteristics	Corresponding site(s) the scheme applies to	Original site no.
Woodlands Park Road	<ul style="list-style-type: none"> Raw water connection at end of aqueduct: <ul style="list-style-type: none"> Gravity supply to existing Huia WTP. Raw water pumping at Manuka Road. Also for Manuka Road, raw water aqueduct bypassed via a replacement of the currently abandoned Upper Nihotupu raw watermain along Exhibition Drive. Treated water directly to Titirangi Reservoirs: <ul style="list-style-type: none"> Pumping required from existing Huia WTP. Gravity supply from Manuka Road. Treated water to future planned network (current WMNH2 route) via treated water tunnel. 	Woodlands Park 3 - Manuka Road	43
		Woodlands Park 2 - Existing Huia WTP	42
Parker Road	<ul style="list-style-type: none"> Raw water tunnel from Mackies Rest (approx. 1.8-2km). Treated watermain down Parker Road and West Coast Road to connect with existing network on West Coast Road. Treated water pumping required. 	Parker 3 – Parker North and Parker South	33

Table 2.2: Shortlist technical reporting

Report	Reference	Content / subject matter
Ancillary Structures Summary Report	<i>Huia Site Selection: Ancillary Structures Summary Report, prepared by CH2M Beca Limited, dated 20 September 2016.</i>	Description of the ancillary infrastructure required for each scheme – specifically raw water and treated water infrastructure and other ancillary infrastructure.
Shortlist Site Development Report	<i>Huia WTP Site Selection Study: Shortlist Site Development Report, prepared by GHD, dated September 2016.</i>	Documents the development of the design concepts of the four shortlisted sites.
Updated site plans	<i>Various drawing references, prepared by GHD, dated September 2016 and updated March 2017.</i>	Revised site plans attached to the Shortlist Site Development Report based on a 160ML plant rather than a 140ML plant.

Report	Reference	Content / subject matter
Shortlist Site Development Report – draft Addendum	<i>DRAFT Addendum to the Shortlist Site Development Report (2016), prepared by GHD, dated May 2017.</i>	Supplements the Shortlist Site Development Report. Documents changes to the design criteria and describes changes to the site layouts incl. changes that might affect site evaluations.
Shortlist Cost Report	<i>Huia Site Selection Short-list Cost Estimate, prepared by CH2M Beca Limited, dated May 2017.</i>	Describes the cost estimate approach and summarises and compares the costs for each site.
Shortlist NPV Report	<i>Huia Water Treatment Plant – NPV Assessment, prepared by CH2M Beca Limited, dated May 2017.</i>	Describes the Net Present Value (NPV) assessment of the four options
Shortlist Off-spec Discharges Report	<i>Huia WTP Site Selection Study, Off-Specification Water Discharges', prepared by Tonkin & Taylor Ltd, dated July 2016.</i>	Information on options for the discharge of off-specification (off-spec) water and contingency discharges from each of the four sites).
System Overview Plans	<i>Huia WTP Upgrade: Huia Site Selection System Overview. Drawing numbers GIS-6511164-034-01 to 04, Prepared by CH2MBeca, dated March 2017.</i>	Series of drawings showing system overview for the four sites i.e. ancillary infrastructure connection to raw and treated water network.
Constructability Comparison Report	<i>Draft: Huia Site Options Constructability Comparison. Prepared by CH2MBeca, dated 30 March 2017.</i>	Draft report on the constructability of the four site options with a focus on the ancillary infrastructure.

2.2 Manuka Road site

The Manuka Road site encompasses all three properties owned by Watercare on Woodlands Park Road and has a total area of approximately 146,300m². The WTP would be located on the corner of Manuka Road and Woodlands Park Road directly across from the existing site, with the storage lagoon located on the existing Huia WTP site expanded to accommodate up to 12ML, and two large reservoirs of 25ML each located on the opposite side of the road, as shown in Figure 2.1 below.

The land is designated by Watercare for water supply purposes – water treatment plants and associated structures, and has previously been investigated for a new WTP.

2.2.1 Site characteristics

The site characteristics are described in detail in the Shortlist Site Development Report. In summary:

- Relatively constrained site due to available land, topography and dense vegetation within the site. This option provides a moderate-low level of flexibility and requires the efficient use of space i.e. stacking of process structures and tanks as an unstacked layout is not feasible. However a 160MLD plant layout is feasible on the site.
- Reasonable access to and from the site along Woodlands Park Road. Good onsite access and vehicle circulation.
- Five properties adjoin the southern boundary of the Manuka Road site and an additional 11 properties are located on the ridge above the reservoirs.
- Site slopes gently from the road to the south with a steep drop off along the eastern boundary of the site and steep grades along the southern boundary which restrict site layout.

- Main geotechnical constraints are possible slope stability issues and the presence of non-engineered fill or weak colluvial soils. Lagoon slope stability will need to be carefully assessed.
- Manuka Road site as well as the reservoir location is densely vegetated and covered by a Significant Ecological Area (SEA) overlay (refer Section 3 below). A stream flows through the reservoir site, however there are no named streams which flow through the WTP site itself.

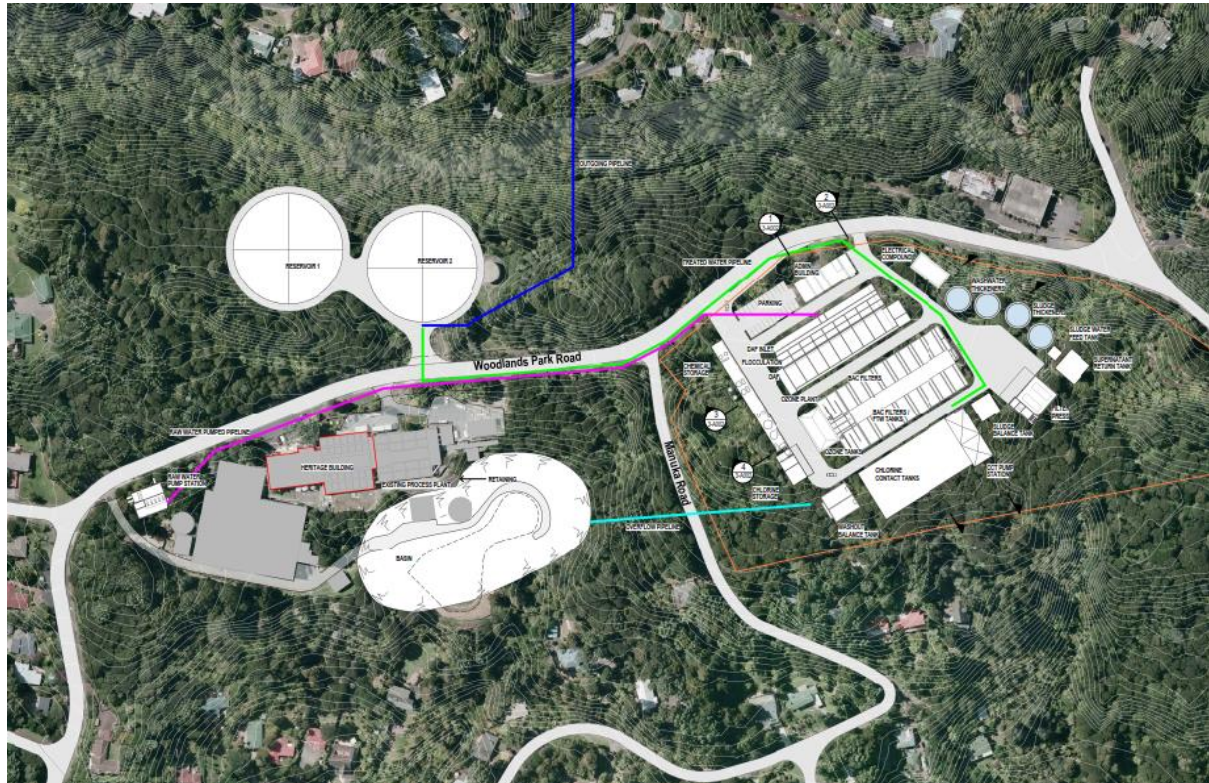


Figure 2.1: Manuka Road site layout, taken from “Manuka Road Option: Overall Site Plan”, Drawing Number 51-3357501-3-A001 Revision B, drawn by GHD and dated March 2017.

2.2.2 Overflow and off-spec discharges

The existing Huia WTP lagoon would need to be expanded to accommodate up to 12ML and provide attenuation of off-spec discharges. A range of options have been considered for the discharge of off-spec water from the Manuka Road site including:

- Discharge to Clarkes Bush Gully at 35 MLD (or other acceptable flow rate) as first preference as soon as a discharge occurs, and then excess flows discharge to the attenuation pond and into Armstrong Gully.
- Increase the attenuation storage available at the existing treatment plant to 12,000 – 15,000m³, either by increasing the pond volume or by using existing tanks at the plant and discharge all overflows and off-spec discharges from the Manuka Road WTP to this enlarged attenuation pond with excess discharges then directed to Armstrong Gully.

These options are detailed further in previous reports including the Shortlist Off-spec Discharges Report.

2.3 Existing Huia WTP site

The existing Huia WTP site option encompasses two properties owned by Watercare on Woodlands Park Road and has a total area of approximately 103,800m². The construction of a new WTP on the existing Huia WTP site involves the demolition of the existing WTP infrastructure while retaining the existing heritage building. Two large reservoirs of 25ML each would be located on the opposite side of the road as shown in below. As noted in relation to the Manuka Road site, the land is designated by Watercare for water supply purposes – water treatment plants and associated structures.

2.3.1 Site characteristics

The site characteristics are similar to the adjoining Manuka Road site characteristics described in Section 2.2 above. In summary:

- Small and constrained site due to available land, topography, dense vegetation within the site, and the requirement to work around the existing heritage building which would need to be retained. This option provides a low level of flexibility and requires the efficient use of space i.e. stacking of process structures and tanks as an unstacked layout is not feasible. However a 160MLD plant layout is feasible on the site.
- Similar to Manuka Road, there is reasonable access to and from the site via Woodlands Park Road. Moderate onsite access and vehicle circulation.
- Twelve properties adjoin the boundary of the existing Huia WTP and an additional 11 properties are located on the ridge above the reservoirs.
- Existing Huia WTP site as well as the reservoir location is densely vegetated including some areas of significant vegetation included in an SEA overlay (refer Section 3 below). A stream flows through the reservoir site and is piped beneath Woodlands Park Road and the existing Huia WTP site.
- Site has a moderate to steep slope towards the south, with very steep slopes along the eastern and southern boundaries of the site.
- Main geotechnical constraints are possible slope stability issues and the presence of non-engineered fill or weak colluvial soils.

2.3.2 Overflows and off-spec discharges

As set out in the Shortlist Off-spec Water Discharges Report, the new WTP would occupy the entire site on which the existing Huia WTP is located including the land occupied by the existing attenuation pond. There is no other land available on site for constructing an attenuation pond, therefore any overflows or off-spec discharges from the plant would need to be capable of being discharged at the full plant capacity of 160 MLD. A flow of this magnitude could not be discharged to Armstrong Gully as a planned/regular discharge. Therefore options for piping the discharge direct to Little Muddy Creek would need to be considered. A pipeline option eliminates all discharges to local streams by conveying all WTP overflows and off-spec discharges at the full plant flow rate of 160 MLD directly to Little Muddy Creek. A range of pipeline options have previously been developed by MWH³.

³ *Huia WTP Overflow & Off-spec Waters Diversion Pipeline Investigation – Route Optioneering Report. Volume 1 – Multi Criteria Analysis (June 2010) and Volume 2 – Findings and Strategy Revision 2 (August 2010), prepared by MWH*

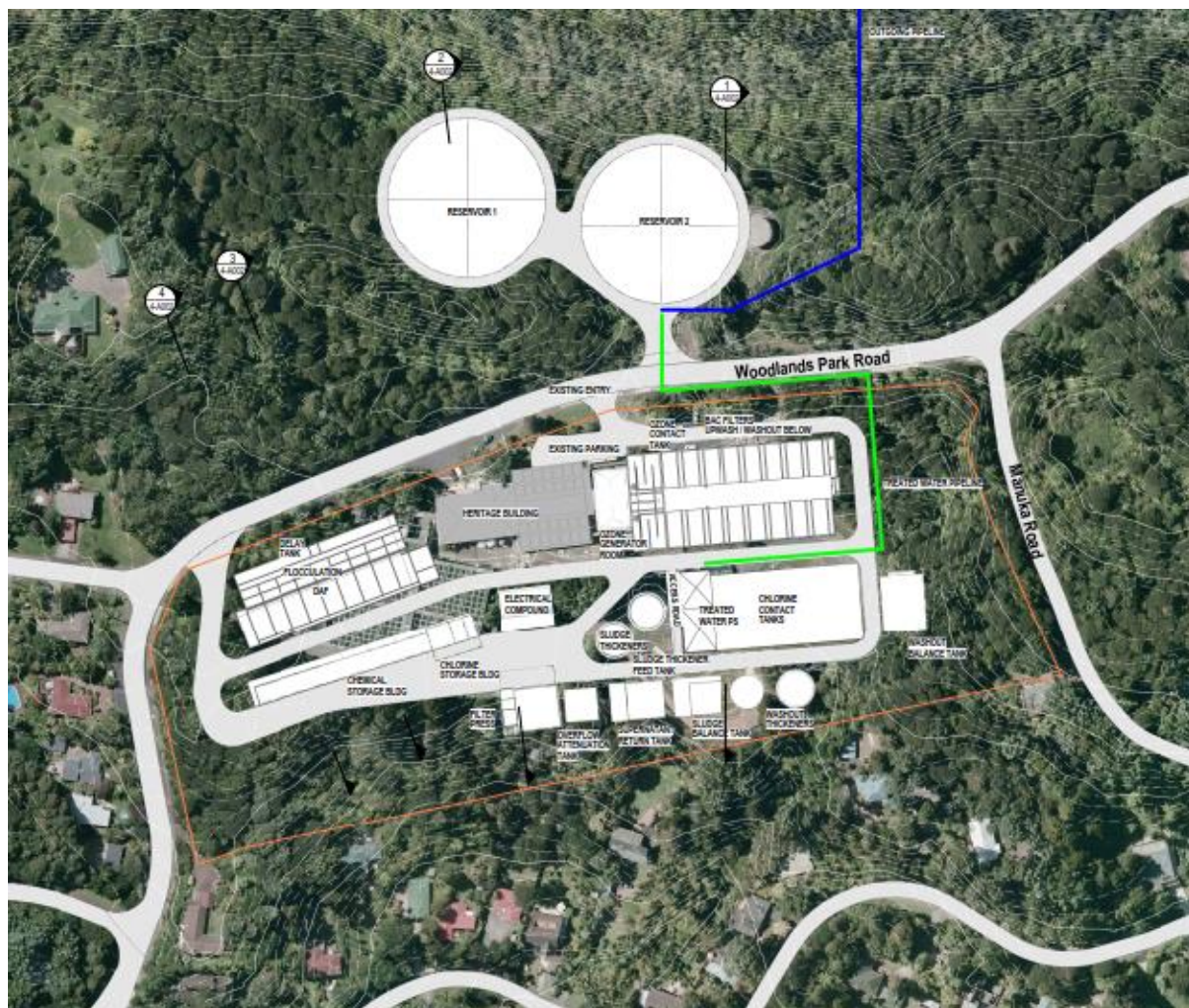


Figure 2.2: Existing Huia WTP site layout, taken from “Existing Site Option: Overall Site Plan”, Drawing Number 51-33575-4-A001 Revision B, drawn by GHD and dated March 2017.

2.4 Woodlands Park Road Scheme: Ancillary structures

Ancillary infrastructure is described in the Shortlist Site Development Report, the Ancillary Structures Summary Report and the Constructability Comparison Report. An overview is provided below for the Woodlands Park Road Scheme which encompasses both the Manuka Road site and existing WTP site options. The connection to the raw and treated water networks for each of the sites is shown in Figure 2.3 and Figure 2.4 below.

2.4.1 Raw water system

The existing WTP site option connects to the end of the existing raw water aqueduct with a gravity supply to the site. The current connection of the Upper Nihotupu Raw Watermain to the raw water aqueduct at Torren’s Taper will be retained.

The Manuka Road site option similarly connects to the end of the existing raw water aqueduct with a new raw water pump station located at the western end of the existing Huia WTP site. For the Manuka Road site there will also be a bypass of the raw water aqueduct via a replacement of the Upper Nihotupu raw watermain along Exhibition Drive which is currently abandoned.

It is anticipated that the raw water system will be controlled at the sources, which is the same as current operational procedures. Significant upgrades and maintenance would be needed to the raw

water aqueduct over the next 20 years due to the age and condition of this asset. Pressurisation of the aqueduct would also be complex given its hydraulic grade. For these reasons, updated costings of the Woodlands Park schemes provide for the replacement of the aqueduct with a tunnel⁴.

2.4.2 Treated water system

Treated water from the Manuka Road site will gravity flow to the treated water reservoirs and from there into a pressurised and lined tunnel passing under the Scenic Drive ridge. 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.

Treated water from the existing WTP site will be pumped to the treated water reservoirs. From this point onwards it is the same as the Manuka Road site i.e. it flows into a tunnel which follows the route of the North Harbour No.2 Watermain.

The replacement and pressurisation of the treated water aqueduct has been shown for the two Woodland Park Road options. This upgrade is required to improve system resilience and maintain the treated water supply directly to the existing Titirangi Reservoirs. However the connection configuration to the aqueduct has not been addressed as part of this project and will need to be considered at later stages of design.

2.4.3 Wastewater Connection

The existing Huia WTP has a connection to the wastewater network and it has been assumed that the Manuka Road site would also maintain this arrangement.

The discharge of filtrates is to the Titirangi Branch Sewer via the Laingholm Branch Sewer. There are current limitations in the capacity of the Titirangi Branch Sewer from Laingholm with surcharging and flooding recorded at a number of locations. However, these issues would need to be addressed independent from any connection from the WTP. The flow from a new WTP would be small compared with the capacity of the branch sewer and would be unlikely to have a measurable effect on the frequency of overflows.

2.4.4 Power Supply

The existing Huia WTP has a connection to the power supply network and it has been assumed that this arrangement would be maintained. Watercare has previously been in discussions with Vector regarding power supply to the Manuka Road site. A variety of options are available with differing levels of redundancy. It has been assumed that 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.

⁴ Huia Site Selection Short-list Cost Estimate. Prepared for Watercare Services Ltd by CH2M Beca Limited, 26 May 2017.



Figure 2.3: Huia WTP Upgrade: Manuka Site Infrastructure Requirements. CH2M Beca drawing no. GIS-6511164-090-01-02D dated March 2017.

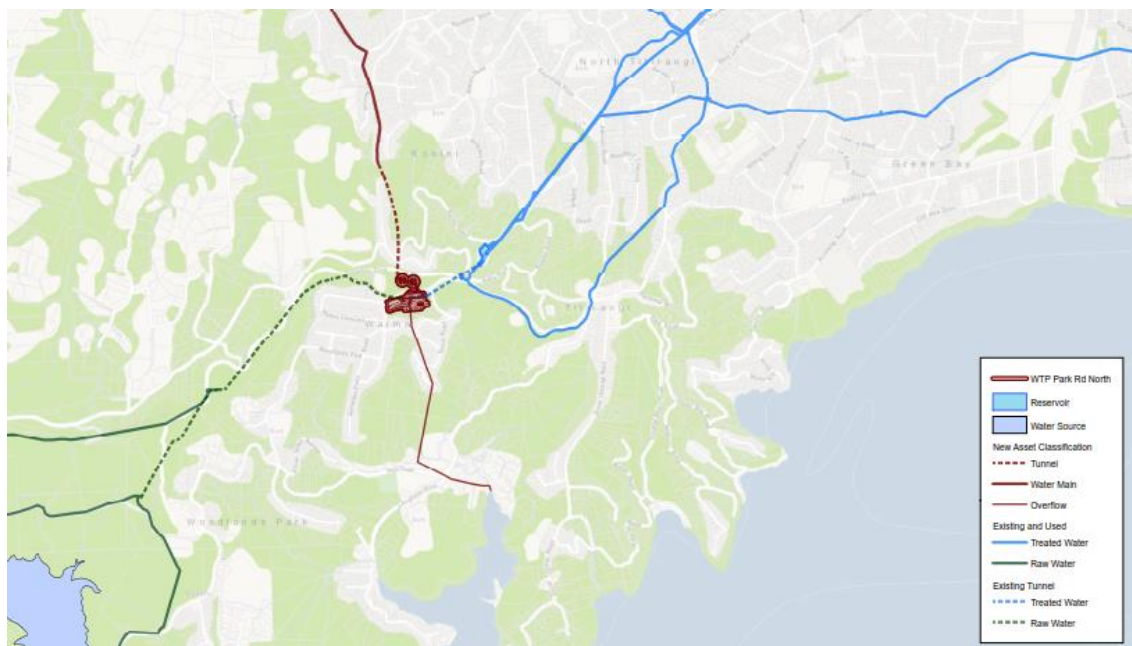


Figure 2.4: Huia WTP Upgrade: Existing Site Infrastructure Requirements. CH2M Beca drawing no. GIS-6511164-090-01-02C dated March 2017.

2.5 Parker North site

The Parker North site is located along Parker Road and accessed in the vicinity of 130 Parker Road. The site is high enough and large enough to accommodate a new WTP and reservoirs on the same site as shown in Figure 2.5 below. The site has a total area of approximately 170,900m² which includes a large extent of densely vegetated area on the eastern part of the site in the vicinity of Allen Swamp.

2.5.1 Site characteristics

The site characteristics are described in detail in the Shortlist Site Development Report. In summary:

- Encompasses 12+ existing property parcels and an additional 7 properties adjoin the site. Watercare owns one of the sites – a large property at 130 Parker Road which was purchased in November 2016.
- Large site which provides a high level of layout flexibility. An unstacked layout can be readily accommodated and alternative reservoir locations are available within the site.
- Moderate access to and from the site via Parker Road although is from one direction only. Good on-site access and circulation.
- Gentle slope towards the north-east with some minor undulations throughout the site and a steep gully, Allen Swamp, located along the eastern boundary. No particular geotechnical constraints have been identified.
- Area where WTP would be located is generally free of vegetation. An overland flow path runs through the site and Allen Swamp is located along the eastern boundary.



Figure 2.5: Parker Road North layout, taken from “Parker Road North Option 2, Overall Site Plan” Drawing Number 51-33575-1-A021 Revision C, drawn by GHD and dated March 2017.

2.5.2 Overflow and off-spec discharges

The Parker North site layout includes an attenuation storage lagoon for overflows and discharges with a volume of approximately 12ML.

The Parker North site is bisected by a small stream (Allen Swamp) on the eastern part of the site which would receive off-spec discharges from the attenuation storage lagoon. Allen Swamp discharges to Cochrane Stream approximately 450m downstream. Cochrane Stream in turn flows into the Oratia Stream some 2.2 km further downstream and then through residential and industrial areas of Henderson to the Henderson Creek, an inlet of the Waitemata Harbour.

Stream flows for the 1% AEP and 10% AEP flood events in both the Allen Swamp and Cochrane Stream are considerably greater than the expected discharge flow of 35 MLD from the attenuation pond. It is expected that a flow of this magnitude, as well as an occasional full plant discharge, could be discharged to these streams.

2.6 Parker South site

The Parker South site is located along Parker Road and accessed from around 152 Parker Road. Similar to the Parker North site, the site is elevated and large enough to accommodate the WTP and the reservoirs on the same site as shown in Figure 2.6 below. The site has a total area of approximately 152,800m².

2.6.1 Site characteristics

The site characteristics are described in detail in the Shortlist Site Development Report. In summary:

- Encompasses 18+ existing property parcels and an additional 8 properties adjoin the site.
- Large site which provides a moderate level of layout flexibility (less than Parker North as a smaller site and additional ecological, elevation and topographical constraints). An unstacked layout can be accommodated.
- Moderate access to and from the site via Parker Road although is from one direction only. Good on-site access and circulation.
- Gentle slope towards the north-east with some minor undulations throughout the site. No particular geotechnical constraints have been identified.
- Located between Allen Swamp which runs along its western boundary and Cochrane Stream along the eastern boundary of the site. Allen Swamp forms a steep gully which drains to the north-east and down to the Cochrane Stream approximately 450m downstream. Overland flow paths also run through the site.

2.6.2 Overflow and off-spec discharges

The Parker South site layout includes an attenuation storage lagoon for overflows and discharges with a volume of approximately 12ML. Options for overflows and off-spec discharges are very similar to the Parker North site, although it is likely that in this case the discharges would be piped directly to the Cochrane Stream.

2.7.2 Treated water system

The Parker Road sites would require a treated water pump station that pumps to the treated water reservoirs.

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. 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.

2.7.3 Wastewater Connection

There is no wastewater network in Parker Road. It has been assumed that a new 150mm diameter gravity pipeline 3km in length will need to connect to the closest wastewater network in Glen Eden (near the intersection of West Coast Road and Shaw Road).

2.7.4 Power Supply

A new 5MVA high voltage supply will be required connecting to the nearest substation with sufficient capacity (likely to be Oratia Sub-station).

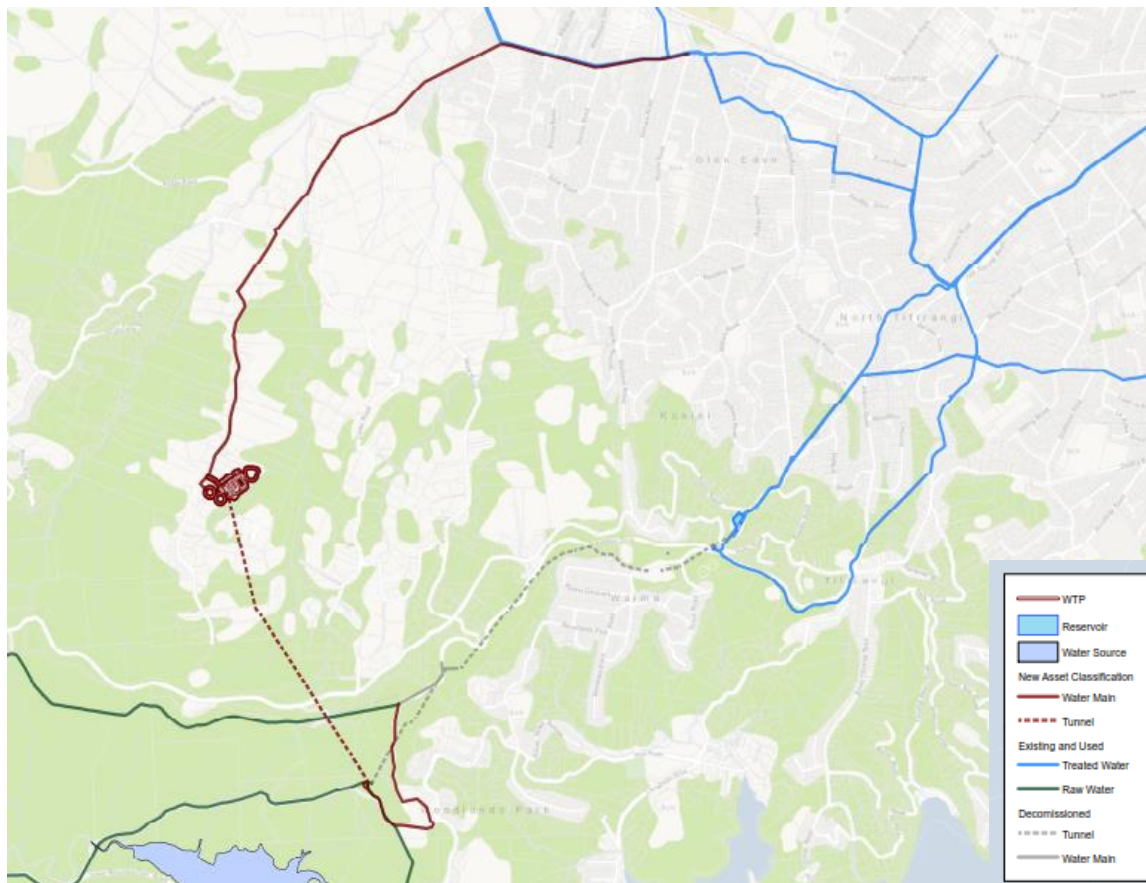


Figure 2.7: Huia WTP Upgrade: Parker North/South Infrastructure Requirements. CH2M Beca drawing no's. GIS-6511164-090-01-02A (North) and -02B (South), dated March 2017.

3 Planning context

3.1 Waitakere Ranges Heritage Area

All four of the shortlisted sites are located within the Waitakere Ranges Heritage Area (WRHA) which was created under the Waitakere Ranges Heritage Area Act 2008 (WRHAA). The purpose of the WRHAA is to recognise the national, regional, and local significance of the Heritage Area, and to promote the protection and enhancement of its heritage features for present and future generations (section 3). Section 7 of the WRHAA identifies the heritage features of the nationally significant heritage area which includes:

- terrestrial and aquatic ecosystems of prominent indigenous vegetation;
- natural landforms and landscapes which give the area its distinctive character;
- streams that rise in the eastern foothills and contribute positively to downstream urban character, stormwater management, and flood protection;
- the quiet and darkness of the Waitakere Ranges;
- the buffer provided by the eastern foothills;
- the subservience of the built environment;
- the identity and character of settlements;
- the historical, traditional, and cultural relationships of people and communities with the area; and
- the public water catchment and supply system, the operation, maintenance, and development of which serves the people of Auckland.

The WRHAA provides high level direction to guide the Auckland Council in its policy, planning and decision-making roles regarding the Heritage Area. Through the RMA it introduces extra considerations that are locally focused to produce planning documents that better reflect the purpose of the WRHAA. Section 25 of the WHRAA provides for Auckland Council to prepare Local Area Plans (LAP) in consultation with local communities to establish goals for the future amenity, character and environment of the local area. An LAP has been completed for Oratia (2009) as well as a Foothills Background Report. When considering an NOR or an application for a resource consent for a discretionary or non-complying activity, the consent authority must have particular regard to the purpose and relevant objectives and policies of the WRHAA.

The Auckland Unitary Plan (AUP) Waitakere Ranges Heritage Area Overlay applies across all of the four sites and gives effect to the purpose and objectives of the WHRAA, as well as to section B4.4 of the regional policy statement (RPS). Objectives and policies seek to protect, restore and enhance the heritage areas and features, maintain significant landscapes, and ensure development is subservient to the natural and rural landscape and character. They also seek to enable infrastructure and related activities provided that the heritage features of the area are protected.

3.2 AUP Natural Heritage and Indigenous Biodiversity provisions

As noted above, all four of the shortlisted sites are located within the WRHA. The natural heritage objectives contained in Section B4.4 Waitakere Ranges Heritage Area are therefore relevant and seek to:

- Protect, restore and enhance the natural resources, heritage features and values of the Waitakere Ranges;
- Ensure development that is sympathetic to the qualities, character and natural features of the Ranges / the character, scale and intensity of development does not adversely affect heritage features;

- Recognise and avoid cumulative effects of activities on the environment, including amenity values and heritage features;
- Enable social, economic, environmental and cultural well-being of people that live and work in the areas; and
- Protect the water supply catchments and their related supply functions.

Relevant policies include the following:

- Policy 3: Where clearing vegetation for infrastructure is necessary, it should be undertaken only where the vegetation is of lower value and there is no practicable alternative option.
- Policy 6: Avoid non-residential activities:
 - a) That are unrelated to the productive use of rural land;
 - b) That require substantial earthworks or vegetation removal; or
 - c) That are industrial and unrelated to rural activities.

All four of the sites also have an SEA overlay - in the case of the Parker Road schemes over at least part of each of the site options, and for the Woodlands Road schemes over most of the two site options other than the footprint of the existing Huia WTP. The indigenous biodiversity objectives contained in Section B7.2 seek to protect areas of significant indigenous biodiversity value from the adverse effects of development. The RPS policy direction is to avoid adverse effects on Significant Ecological Areas (SEA).

The Regional Plan policy framework for SEA set out in Section D9 similarly seeks to protect and enhance areas of significant indigenous biodiversity value. The policies then provide considerable direction to give effect to the overriding objectives. Policy 1 establishes a cascading approach to managing effects in SEA by:

- a) Avoiding adverse effects as far as practicable, and where avoidance is not practicable, minimising adverse effects on the identified values;
- b) Remedying adverse effects on the identified values where they cannot be avoided;
- c) Mitigating adverse effects on the identified values where they cannot be avoided or remediated; and
- d) Considering the appropriateness of offsetting any residual adverse effects that are significant and where they have not been able to be mitigated, through protection, restoration and enhancement measures, having regard to Appendix 8 Biodiversity offsetting.

Policy 8 recognises that it is not always practicable to locate and design infrastructure to avoid significant ecological areas.

3.3 AUP Infrastructure provisions

The infrastructure provisions contained in Section B3.2 of the Auckland Unitary Plan (AUP) RPS recognise the benefits of infrastructure and enable its development and operation while managing adverse effects on the environment. The policy framework explicitly recognises that for functional or operational reasons infrastructure may need to be located in natural resource or heritage overlay areas and provides for this where adverse effects on the values of such areas are avoided where practicable, or otherwise remedied or mitigated.

Infrastructure is also provided for in the Auckland wide provisions of the plan, particularly in chapter E26 – Infrastructure which sets out regional and district plan objectives, policies and rules. The policy framework is typically enabling and recognises the benefits of infrastructure, the particular functional and operational needs, and the importance of security of supply and improved resilience. At the same time adverse effects on the environment are required to be avoided, remedied or

mitigated. This includes effects on the values for which a site has been scheduled or incorporated into an overlay.

Policies 5 and 6 are key policies which set out specific matters for consideration when assessing the effects of infrastructure. Along with the nature and degree of adverse effects, this includes:

- The impact on the network and levels of service if the work is not undertaken;
- The need for the infrastructure in the context of the wider network; and
- The benefits provided by the infrastructure to the communities within Auckland and beyond.

Where the works occur within a natural heritage or natural resource overlay, the following matters are also considered:

- The economic, cultural and social benefits derived from infrastructure and the adverse effects of not providing the infrastructure;
- Whether the infrastructure has a functional or operational need to be located in or traverse the proposed location;
- Whether there are any practicable alternative locations, routes or designs, which would avoid, or reduce adverse effects on the values of those places, while having regard to the above;
- The extent of existing adverse effects and potential cumulative adverse effects;
- How the proposed infrastructure contributes to the strategic form or function, or enables the planned growth and intensification, of Auckland;
- The type, scale and extent of adverse effects on the identified values of the area or feature, taking into account, amongst other things, the extent to which the adverse effects on the values of the area can be avoided, and where these adverse effects cannot practicably be avoided, then the extent to which adverse effects on the values of the area can be appropriately remedied or mitigated.
- Whether adverse effects on the identified values of the area or feature must be avoided pursuant to any national policy statement, national environmental standard, or regional policy statement.

3.4 Woodlands Park Road Schemes

Key planning provisions which apply to the Woodland Park Road schemes are set out in Table 3.1 below.

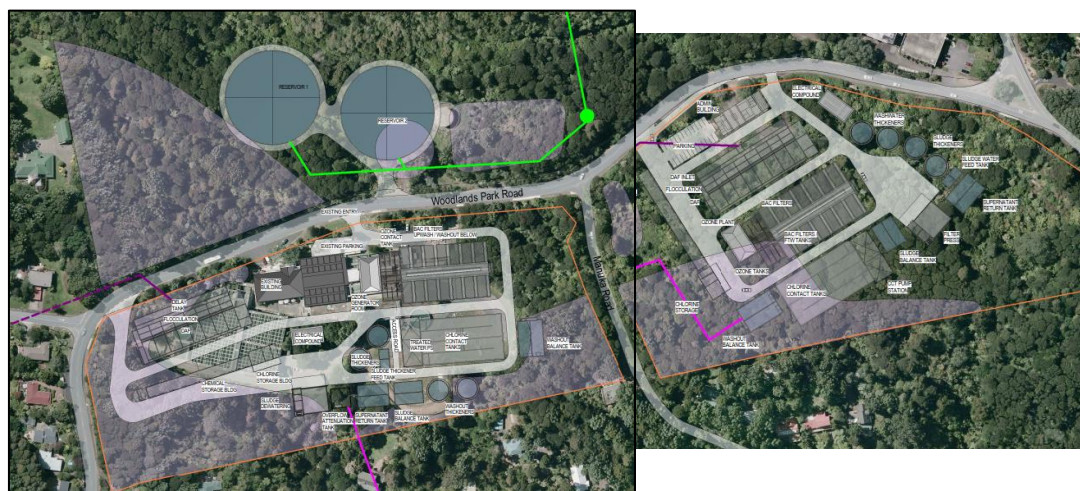
Table 3.1: Woodlands Park Road – zoning and planning overlays

Planning overlays and relevant considerations
<p>Designation 9324 Huia and Nihotupu Water Treatment Plants</p> <p>This designation applies across the existing WTP site, the Manuka Road site and the reservoir location. The land is owned by Watercare and is designated for ‘water supply purposes - water treatment plants’ and associated structures. The designation includes three conditions relating to:</p> <ol style="list-style-type: none"> 1. The requirement to provide an outline plan of works which includes an AEE and policy assessment. 2. Erosion and sediment control measures. 3. Not adversely affecting the identified heritage values of the Huia or Nihotupu Filter Stations (otherwise requires an alteration to the designation). <p>In accordance with Section 176 of the RMA, works which are undertaken by a requiring authority in accordance with a designation do not require a land use consent pursuant to Section 9(3) of the RMA. Instead, an outline plan of works (OPW) will be required within the existing Watercare designation WSL4/9324) at Woodlands Park Road, Titirangi.</p> <p>‘Regional’ consent requirements still apply to designated land. Under the AUP, vegetation removal in an SEA requires a ‘regional’ resource consent as a discretionary activity. Earthworks greater than 2,500m² or 2,500m³ are a restricted discretionary activity provided they are associated with a network utility⁵.</p> <p>There are a range of other ‘regional’ consents which will also be required (including the diversion and discharge of stormwater, groundwater diversion, etc). The regional resource consents necessary for the project are likely to be assessed overall as a discretionary activity. However at this stage the possibility that there may be non-complying elements which could elevate the overall activity status to non-complying cannot be discounted.</p>
<p>Discharge Permit 35534</p> <p>This discharge permit authorises the discharge of off-spec water from the existing Huia WTP to an attenuation lagoon and into the Armstrong Gully and Bishops Creek, which in turn discharge into Little Muddy Creek. Depending on the details of the long-term discharge, Watercare may be able to rely on the existing consent or seek a change to that consent. This is most relevant to the Manuka Road site off-spec discharge options and has little, if any applicability to future off-spec discharges from a new WTP located on the existing WTP site.</p>
<p>Significant Ecological Area – Terrestrial (SEA_T_5539)</p> <p>The SEA overlay covers almost all of the designated area other than the footprint of the existing Huia WTP, a small area in the vicinity of the reservoir location immediately to the north of Woodlands Park Road, and a small area adjacent to Woodlands Park Road in the centre of the Manukau Road site. The relevant AUP map is set out below.</p>

⁵ Earthworks greater than 2,500m² or 2,500m³ are a discretionary activity in an SEA overlay however this is a district plan rule.



The figure below shows the proposed WTP layouts for the Woodlands Park Scheme showing affected areas of high ecological significance highlighted in purple⁶.



Notable tree – Kauri (1836)

This tree is located on the Manuka Road site on the corner of Woodlands Park and Manuka Roads. The site layout plans indicate this tree will be retained.

⁶ From “Existing Site Option: Overall Aerial Site Plan” and “Manuka Road Option: Overall Aerial Site Plan”. Drawing Numbers 51-33575-3-A004 Revision A, drawn by GHD, Sept. 2016.

Waitakere Ranges Heritage Area Overlay

The broad policy provisions of this overlay are set out above. The objectives for Titirangi and surrounds focus on maintaining and enhancing landscape qualities, forested character and natural qualities, low-density residential setting, prominent ridgelines, and native vegetation and fauna habitats.

Policies provide for limited subdivision and development that avoids, where practicable, or otherwise minimises the need for clearance of native vegetation and maintains the dominance of the natural environment; ensures buildings and structures will not be visually prominent, particularly on ridgelines, or through the removal of native vegetation; etc.

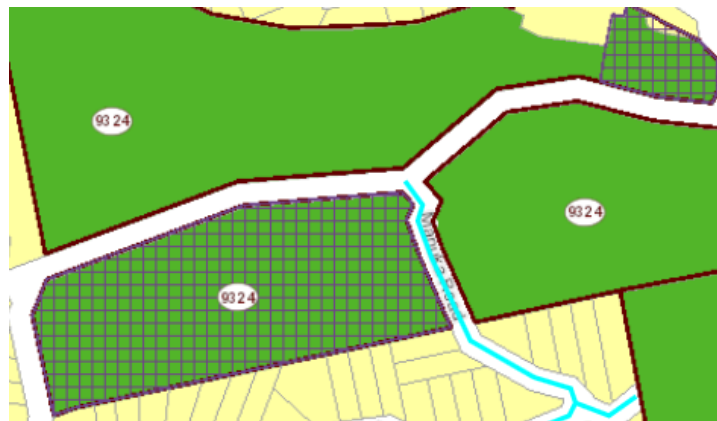
Ridgeline Protection overlay and Outstanding Landscape overlay

Landscape considerations include the Ridgeline Protection Overlay which applies to the reservoir location (shown on the planning overlay map above as the hatched area along the northern boundary of the designated area), and a nearby Outstanding Landscape overlay (subject to appeal) which touches the very south-eastern corner of the Manuka Road site (shown above as the diagonal hatching).

Historic Heritage extent of place overlay – ID 77

The Huia Filter Station was built in 1928 and is a scheduled historic heritage building under the AUP. This will be retained in the proposed scheme layout. The Nihotupu Filter Station which is located back along Woodlands Park Road and outside of the Manuka Road site footprint is also identified as a heritage building.

The historic heritage extent of place covers the entire area of the existing WTP (refer planning map below). In Schedule 14.1 of the AUP it is identified as a Category B historic heritage place with A (historical), F (physical elements), G (aesthetic) heritage values. The interior of the building(s) is identified as an exclusion i.e. does not have historic heritage value. The RPS policy focus for historic heritage is on avoiding destruction/demolition of primary features and avoiding where practicable significant adverse effects on significant historic heritage places, and otherwise remedy or mitigate such effects.



District policies which are relevant in terms of Condition 1 of Designation 9324 specifically address this in the context of network utilities. There must be a functional need or operational constraint which limits available alternatives; there is no reasonable practicable alternative; the infrastructure will provide a significant public benefit that could not otherwise be achieved; and the adverse effects on the heritage values of a place are minimised to the extent practicable.

Open Space Conservation Zone / Large Lot Residential (surrounding land)

The underlying zoning of both the Huia WTP and Manuka Road site options is Open Space Conservation. Considering these options are designated then this underlying zoning has limited relevance.

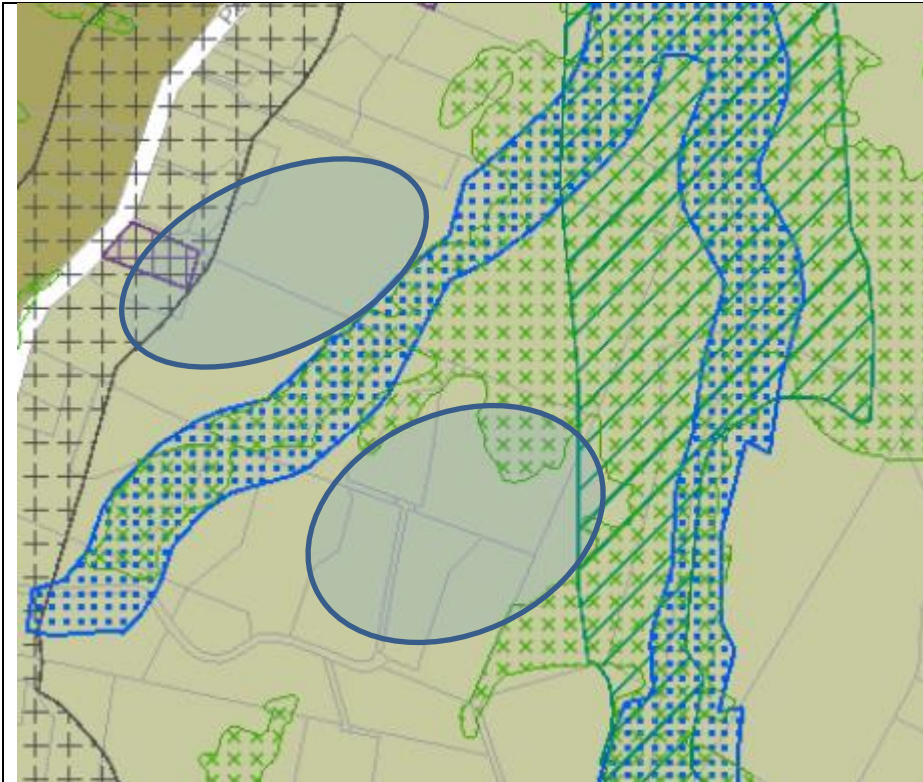
The zoning of the surrounding land is Large Lot Residential which provides for low intensity residential development and is reflective of the current land-use in the area.

3.5 Parker Road Schemes

Key planning provisions which apply to the Parker Road schemes and their implications are set out in Table 3.2 below.

Table 3.2: Parker Road schemes – zoning and planning overlays

Planning overlays and relevant considerations
<p>Waitakere Ranges Heritage Area Overlay – Oratia Foothills</p> <p>The broad policy provisions of this overlay are set out above. Oratia is characterised by low-density settlement with development which is subservient to the natural and rural landscapes. The AUP notes the area's settlement pattern is in transition through the implementation of the former Oratia Structure Plan which enabled the establishment of small rural holdings throughout the settlement area. This is shown in Figure D12.10.1 Overlay Subdivision Plan 1 – Oratia (Foothills). Oratia is identified as a gateway between urban Auckland and the Waitakere Ranges. This is evident in the zoning on the other (western) side of Parker Road which is Rural – Waitakere Ranges Zone and then south of the Parker Road sites which is Open Space – Conservation. Parker Road also delineates the boundary of Subdivision Plan 1.</p> <p>The objectives for the Oratia Foothills focus on retaining and enhancing local rural character and amenity values, and natural landscape qualities, including watercourses and significant native vegetation and fauna habitats. Policies provide for limited subdivision and development that protects where possible significant and outstanding native vegetation and fauna habitat, minimises adverse ecological effects, and retains and enhances rural landscapes.</p>
<p>Rural Foothills Zone</p> <p>The Parker Road schemes are located in the Rural Foothills Zone outside of the Rural Urban Boundary (RUB). This zone aims to retain a rural character with low-density settlement and few urban-scale activities as well as providing a rural and visual buffer between urban Auckland and the forested ranges and coasts. Activities in the zone include a mixture of vineyards, orchards, dwellings and pasture. The zoning focuses on enabling low intensity rural activities, and allows for limited further rural residential development where it does not impact on heritage values.</p> <p>Should Watercare decide to establish the WTP at a new undesignated site on Parker Road, then it could either seek both regional and district consents for the site, or lodge a NOR for a new designation plus seek regional consents. This latter option is typically preferred in that it provides greater security and flexibility to Watercare. The process for this is set out in Part 8 of the RMA. With respect to the consideration of alternatives for an NoR, where the requiring authority does not have an interest in the land sufficient for undertaking the work or it is likely the work will have significant adverse effects on the environment, Section 171(1)(b) of the RMA requires that a territorial authority must have particular regard to whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work.</p> <p>As noted above in relation to Woodlands Park Road, 'regional' consent requirements still apply to designated land. Under the AUP there are a range of 'regional' consents which will be required (including earthworks, the diversion and discharge of stormwater, groundwater diversion, etc). The regional resource consents necessary for the project are likely to be assessed overall as a discretionary activity. However at this stage the possibility that there may be non-complying elements which could elevate the overall activity status to non-complying cannot be discounted.</p>
<p>Significant Ecological Area – Terrestrial (SEA_T_5539) </p> <p>The SEA overlay covers the eastern part of the Parker North site and at the northern edge of the Parker South site, in the vicinity of Allens Swamp. The site layout plans indicate the SEA will not be impacted on by the Parker North site option. However the Parker South site layout plans do encroach into and impact on this SEA. The relevant AUP map is set out below with the SEA shown as the green cross hatched area.</p>



Ridgeline Protection overlay



and Outstanding Landscape overlay



Landscape considerations include the Ridgeline Protection Overlay which applies along and either side of the Parker Road ridge, and the Outstanding Natural Landscapes Overlay - Area 73, Waitakere Ranges and Coastline which applies in the vicinity of Allen Swamp. This overlay is currently subject to appeal.

Natural Stream Management Area Overlay



The objective of this overlay is to identify rivers and streams as natural stream management areas with high natural character and high ecological values and to protect these areas. This overlay relates to the Allen Swamp as well as Cochrane Stream.

4 Site Evaluation

4.1 Methodology

The process for evaluating and ranking the four sites on the short list to assist with determining the preferred site is set out as follows:

4.1.1 Development of further site-specific information

The development of more detailed information relating to each site included indicative site layouts and consideration of pipeline routes and connections. This includes:

- Shortlist information packages incl. site plans, section profiles and axonometric drawings (August 2016, GHD).
- Shortlist Site Development Report (Sept. 2016, GHD)
- Off-spec Discharges Report (July 2016, Tonkin & Taylor Ltd)
- Ancillary Structures Summary Report (20 Sept. 2016, CH2M Beca Limited)
- Huia Site Selection Short-list Cost Estimate (Sept. 2016, CH2M Beca Limited)

The long-list site layouts were conceptual, and were essentially 'generic' layouts laid over site aerials in approximate locations within the site. The shortlist site layouts are site specific and semi-optimised, although are still indicative in terms of what the plant could actually look like. Further work has also been undertaken in relation to how each of the shortlist site options connect to the raw and treated water network.

In preparing the shortlist site layouts, consideration has been given to minimising adverse effects on the environment in terms of the overall footprint and layout of plant within that footprint, while ensuring technical requirements are still met. This includes preliminary consideration of potential setback distances from the site boundary to enable screening and buffer planting, and a site layout which avoids, remedies or mitigates adverse effects on heritage features and values and terrestrial ecology where practicable. The landscape and visual effects, ecological effects and social impacts assessments include a preliminary consideration of potential mitigation measures. Noise and traffic reporting also take into account potential options to manage and mitigate noise effects and traffic effects, respectively.

4.1.2 Engagement of additional subject matter experts (SME)

In the long-list process, the scoring of social and community impacts focused on noise and amenity effects associated with the construction and operation of a WTP and was based on a desk top assessment. This was on the basis that a Social Impact Assessment (SIA) process could have generated potential concern across a number of communities, and Watercare considered an SIA would provide a level of detail more relevant at the shortlisting stage.

Heritage and archaeological effects were scored based on a desk-top assessment in the long-listing phase. This was considered appropriate considering the amount of information readily available through the AUP and archview database as well as previous reporting undertaken in relation to the existing Huia WTP site. Also this criteria was considered unlikely to be a key differentiator / component, notwithstanding the values of the existing Huia WTP which have already been well-documented.

Additional SME were engaged in December 2016 to address the social impacts and the heritage and archaeological effects associated with a new WTP at the four shortlisted sites, and to provide expert scoring of the relevant criteria for the short listed options. Traffic effects and access were scored by a civil engineer in the long-listing phase based on a desk-top assessment and site visits. At the

shortlisting stage a traffic specialist was also engaged to assess site access and the traffic effects associated with the construction and operation of a new WTP.

4.1.3 Site visits

A site visit to Parker Road was held on 7 December 2016, with further site visits held on 12 January 2017 and 1 February 2017 (to Mackie's Rest). Site visits were also undertaken independently by SME to the Woodlands Park Road Scheme sites.

4.1.4 SME assessments

Subject matter experts undertook an assessment of the four sites. The relevant reports are identified in Table 4.1 below. They were also requested to develop assessment measures and a finer-grained template, in particular through the development of sub-criteria, to determine an overall score for their criteria (refer Appendix A).

Consenting risk was included as a criteria at the long-listing stage but not through the short-listing MCA. Instead, the planning context and its application to the four sites is considered in more detail in Section 3 of this report, with the policy direction established through the RMA, WRHAA and AUP also used to inform the weighting analysis in Section 4.4 below.

4.1.5 Design parameters

In March 2017 Watercare confirmed that:

- The design capacity for the new WTP should be increased from 140 MLD to 160 MLD to provide additional capacity to potentially treat raw water from the Waitakere Dam which currently supplies the aging Waitakere WTP.
- Consideration should be given to accommodating a possible additional treatment process block in case of future raw water quality deterioration (or future changes to water quality requirements).
- The top water level for the reservoirs of 120mRL.

The plans were therefore updated in March 2017 to reflect these parameters. These updated plans were provided to the subject matter experts to ensure their reporting took into account the updated plans.

The changes set out above are also documented in the Addendum to the Shortlist Site Development Report (May 2017, GHD).

In addition to the above, the assessment of the Woodlands Park Road schemes was based on retaining the existing Raw Water Aqueduct, albeit recognising that significant upgrades and maintenance would be needed over the next 20 years due to the age and condition of this asset. The aqueduct would also need to be pressurised to minimise discharges to the attenuation lagoon, however this would be complex given the hydraulic grade of the aqueduct. For these reasons, updated costings of the Woodlands Park schemes prepared after the technical / engineering assessments were completed provide for the replacement of the aqueduct with a tunnel (Shortlist Cost Report and Shortlist NPV Report, CH2M Beca Limited, May 2017)

4.1.6 Challenge workshop 1

A challenge workshop was held on 13 April 2017 involving Watercare, legal counsel, project team members and SME in the following fields:

- Engineering
- Planning
- Social Impact Assessment
- Ecology
- Landscape and visual assessment
- Traffic and transport
- Heritage and archaeology

Subject matter experts prepared an initial score for the relevant criteria (i.e. within their field of expertise only) and a rationale for this based on their assessments, with scoring debated and a preliminary score confirmed through this workshop (refer workshop minutes attached in Appendix E).

4.1.7 Challenge workshop 2 (Operability)

Watercare operations staff were unable to attend the shortlist challenge workshop on 13 April and instead a separate workshop to address the operability criteria was held on 29 April 2017 (refer workshop minutes in Appendix E). This was also supported by a memorandum prepared by Watercare Operations Specialists regarding the operability of the four sites and associated ancillary infrastructure.

4.1.8 Challenge workshop 3

The third challenge workshop was held on 16 May 2017 involving Watercare, legal counsel, project team members and SME as identified in Section 0 above, with the exception of the Traffic and Transport Specialist, who was unable to attend and the addition of the Noise Specialist. The scoring for the noise criteria was canvassed and confirmed at this workshop. The scoring of the operations criteria was also canvassed amongst the wider project team and SME within this workshop. This approach enabled the wider project team and SME to take into account the noise and operability assessments and consider whether or not their scores would change taking into account this additional information.

All scores were then individually confirmed by each of the SME through the course of this final challenge workshop. Following the close of the challenge workshop, legal counsel and Watercare also reviewed the draft proposed weightings.

Scores were then entered into the MCA spreadsheet and an overall score was generated for each site to enable a ranking and comparison of sites. Weighting and sensitivity analysis was undertaken to further analyse and test the sensitivity of the process and inform the overall decision making. This is discussed further in Section 4.3 below.

4.1.9 Mana Whenua engagement

Watercare has engaged directly with Mana Whenua on the short listed site options through the Kaitiaki Forum. Four mana whenua have registered an interest in the project. Te Kawerau a Maki has prepared a Cultural Values Assessment (CVA)⁷. The scoring of Mana Whenua values has been

⁷ Cultural Values Assessment for Huia Water Treatment Plant Upgrades, prepared for Watercare Services Ltd, April 2017. Prepared by Scott Lomas, Heritage and Environment Manager, Te Kawerau Iwi Tribal Authority & Settlement Trust.

omitted from the short list MCA in lieu of the CVA and other feedback from interested Mana Whenua groups. The CVA is discussed further in Section 4.5 below.

4.2 Shortlist reporting

Technical reports prepared to inform the assessment of these sites and associated ancillary infrastructure are identified in Table 4.1 below.

Table 4.1: Shortlist reporting

Report	Reference	Content / subject matter
Ancillary Structures Summary Report	<i>Huia Site Selection: Ancillary Structures Summary Report, prepared by CH2M Beca Limited, dated 20 September 2016.</i>	Description of the ancillary infrastructure required for each scheme – specifically raw water and treated water infrastructure and other ancillary infrastructure.
Shortlist Site Development Report	<i>Huia WTP Site Selection Study: Shortlist Site Development Report, prepared by GHD, dated September 2016.</i>	Documents the development of the design concepts of the four shortlisted sites.
Updated site plans	<i>Various drawing references, prepared by GHD, dated September 2016 and updated March 2017.</i>	Revised site plans attached to the Shortlist Site Development Report based on a 160ML plant rather than a 140ML plant.
Addendum Shortlist Site Development Report	<i>Huia WTP Site Selection Study: Addendum to the Shortlist Site Development Report, prepared by GHD, dated May 2017.</i>	Documents the development of the design concepts of the four shortlisted sites.
Shortlist Off-spec Discharges Report	<i>Huia WTP Site Selection Study, Off-Specification Water Discharges', prepared by Tonkin & Taylor Ltd, dated July 2016.</i>	Information on options for the discharge of off-specification (off-spec) water and contingency discharges from each of the four sites).
System Overview Plans	<i>Huia WTP Upgrade: Huia Site Selection System Overview. Drawing numbers GIS-6511164-034-01 to 04, Prepared by CH2MBeca, dated March 2017.</i>	Series of drawings showing system overview for the four sites i.e. ancillary infrastructure connection to raw and treated water network.
Constructability Comparison Report	<i>Draft: Huia Site Options Constructability Comparison. Prepared by CH2MBeca, dated 30 March 2017.</i>	Draft report on the constructability of the four site options with a focus on the ancillary infrastructure.
Operability Draft Report	<i>Huia Water Treatment Plant Replacement – Operations Review of Site Alternatives. Prepared by Watercare Services Ltd, dated 9 May 2017.</i>	Notes on the operability of the four sites from a transmission, headworks and treatment plant perspective jointly prepared by a Watercare's Principal Process Engineer and Transmission Manager.
Traffic Technical Report	<i>Huia Water Treatment Plant Replacement Technical Note. Prepared by CH2M Beca Ltd, dated 2 May 2017.</i>	Overview of the traffic and transport considerations for each of the shortlisted options.

Report	Reference	Content / subject matter
Noise Report	<i>Huia WTP Short-listed Site Noise Contours and Memo. Prepared by Marshall Day Acoustics, dated June 2016.</i>	Preliminary noise contours for the four shortlisted sites.
Landscape and Visual Effects Assessment	<i>Huia Water Treatment Plan Shortlist Options Analysis: Landscape and Visual Effects Evaluation Report. Prepared by Boffa Miskell Ltd, dated 8 May 2017.</i>	Assesses the landscape and visual factors associated with the four shortlisted sites and establishes the rationale for assigning MCA scores.
Ecology Report	<i>Huia Water Treatment Plan Shortlist Options Analysis: Ecological Effects Evaluation Report. Prepared by Boffa Miskell Ltd, dated 8 May 2017.</i>	Addresses the ecological factors associated with the four shortlisted sites and establishes the rationale for assigning MCA scores.
SIA Summary Document – draft	<i>Social Impact Assessment (SIA) Summary Document. Prepared by Beca, dated 9 May 2017.</i>	Provides an overview and summary report on the assessment of social effects of establishing a new WTP at each of the four short-listed sites.
Heritage Report	<i>Huia Water Treatment Plant Replacement Options: Historic Heritage Assessment (DRAFT). Prepared by Clough and Associates, dated April 2017.</i>	Assesses the archaeological and other historic heritage constraints within each of the four shortlisted options.

4.3 Multi-criteria assessment results

4.3.1 Overall scores

The overall MCA baseline scores and the normalised scores for the four shortlisted options from the shortlist challenge workshops are set out in Table 4.2 and Table 4.3 below. Normalising of the scores involved proportionally rating the baseline scores up or down by a normalisation factor so all the criteria were scored out of a maximum possible score of 10. This has been undertaken to ensure that areas with more sub-criteria (i.e. key site characteristics, constructability, operability, traffic and social effects) were not inadvertently outweighing those areas with less sub-criteria (i.e. heritage and archaeology, and property impacts).

Subject matter experts for constructability and social effects provided proportionate weighting for each of the sub-criteria in those areas (refer Appendix B). This enabled more weight to be placed on certain sub-criteria within the engineering and social criteria that the experts deemed of a higher importance than others. For example, within the constructability criteria this represented the approximate scale of works split between the various site and ancillary infrastructure components (i.e. the raw water connection, treated water pipeline, WTP and reservoirs, etc.). For social effects this represented slightly more certainty regarding ‘way of life’ and ‘community cohesion’ impacts when compared to impacts on ‘sustaining one’s self’. It is important to note that these additional sub-criteria weightings do not weight the importance of one criteria over another, only the amount that each sub-criteria should contribute relative to the other sub-criteria to the overall score for that particular criteria.

The proportionate weightings represented the relevant experts’ opinion on how much each of the sub-criteria should contribute to the overall score for the criteria. These proportionate weightings

were therefore incorporated into the baseline score for each of the criteria prior to normalising the scores. Where sub-criteria had not been proportionately weighted by the SME, then all sub-criteria were assessed as contributing equally to the overall score for the criteria.

No weighting has been applied to the scores in Table 4.2 and Table 4.3 below. A high score means the site performed well in relation to the criteria, while a low score indicates poor performance in relation to the criteria. Higher scores and lower scores are highlighted in green and orange respectively.

Table 4.2: Baseline scores

Criteria		Maximum baseline score	Manuka Road	Existing Site	Parker North	Parker South
Technical / Engineering	Key site characteristics	20	15	13	16	15
	Constructability	35	22	14	30.5	26.5
	Operability	15	10	9	12	11
SUB TOTAL TECH. / ENGINEERING BASELINE SCORE (MAXIMUM 70)			47	36	58	52
Environ-mental	Traffic effects	20	16	16	10	10
	Heritage and archaeology	5	4	2	4	5
	Noise effects	10	8	7	10	10
	Ecology	10	5	4	9	2
	Landscape and visual effects	10	4	6	6	5
	Social effects	15	13	14	4	6
SUB TOTAL ENVIRONMENTAL BASELINE SCORE (MAXIMUM 70)			50.2	49.4	42.6	37.4
Property impact (MAXIMUM 5)		5	5	5	1	1
TOTAL (MAXIMUM 145)			102.11	90.4	102.05	89.95

Table 4.3: Normalised baseline scores (no weighting applied)

Criteria		Manuka Road	Existing Site	Parker North	Parker South
Technical / Engineering	Key site characteristics	7.5	6.5	8	7.5
	Constructability	6.26	4	8.7	7.3
	Operability	6.67	6	8	7.33
NORMALISED SCORE (MAXIMUM 30)		20.43	16.5	24.7	22.13

Environmental	Traffic effects	8	8	5	5
	Heritage and archaeology	8	4	8	10
	Noise effects	8	7	10	10
	Ecology	5	4	9	2
	Landscape and visual effects	4	6	6	5
	Social effects	8.8	9.6	2.4	3.6
NORMALISED SCORE (MAXIMUM 60)		41.8	38.6	40.4	35.6
Property impact (MAXIMUM 10)		10	10	2	2
NORMALISED TOTAL (MAXIMUM 100)		72.23	65.1	67.1	59.73

The baseline and normalised scores rank the sites overall as follows:

- 1 Manuka Road
- 2 Parker North
- 3 Existing Huia WTP
- 4 Parker South

Overall rankings are shown in Table 4.4 below.

Table 4.4: Overall rankings

Criteria	Manuka Road	Existing Site	Parker North	Parker South
TECHNICAL / ENGINEERING CRITERIA – RANKING				
BASELINE SCORE	3	4	1	2
NORMALISED SCORE	3	4	1	2
ENVIRONMENTAL CRITERIA – RANKING				
BASELINE SCORE	1	2	3	4
NORMALISED SCORE	1	3	2	4
OVERALL RANKING				
BASELINE TOTAL	1	3	2*	4*
NORMALISED TOTAL	1	3	2	4

* Marginal difference between site and next highest ranked site.

The ranking based on technical and engineering criteria is consistent for both the baseline and normalised score, with the Parker Road sites scoring better than the Manuka Road site and the existing WTP site. This latter site scores notably lower on the basis of engineering criteria.

As can be seen from Table 4.4 above, normalising the scores changes the relative positions of Parker North (from 3rd to 2nd) and the existing WTP site (from 2nd to 3rd) from an environmental perspective. However the overall ranking (taking into account all criteria) does not change once the scores are normalised.

4.3.2 Analysis of sites by criteria

Figure 4.1 shows the contribution of each of the criteria to the overall normalised total score contained in Table 4.2. An analysis of each of the sites by criteria is set out below.

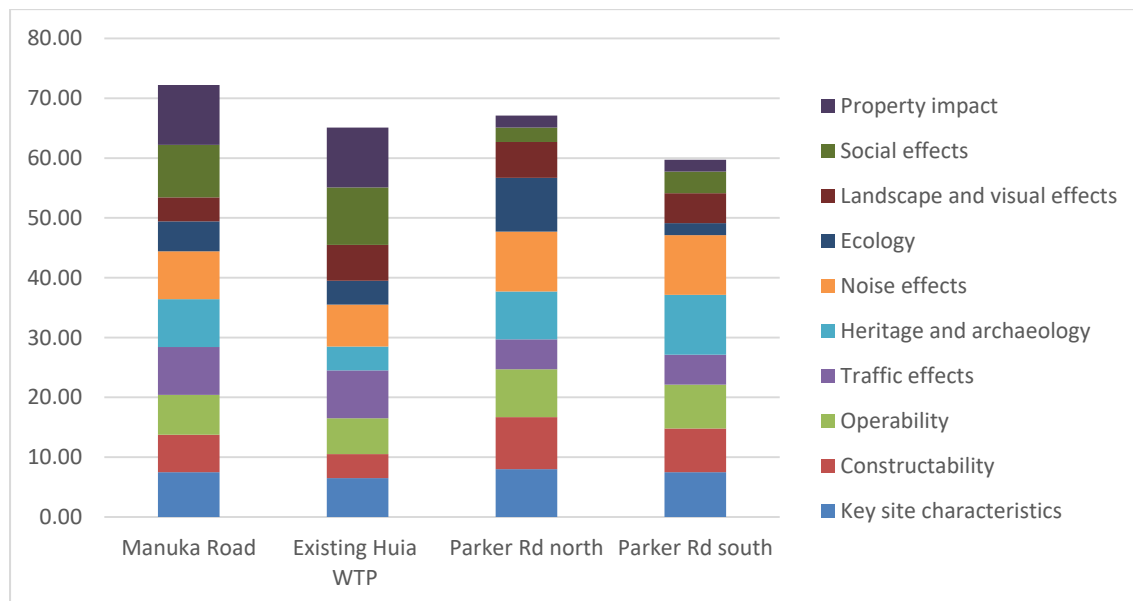


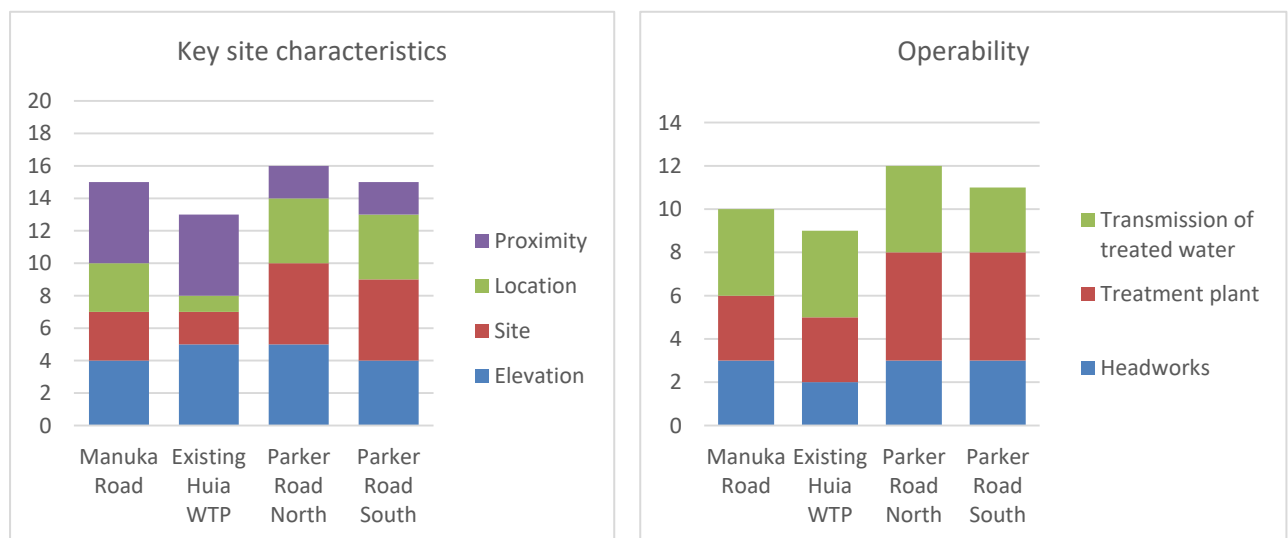
Figure 4.1: Normalised scores by site

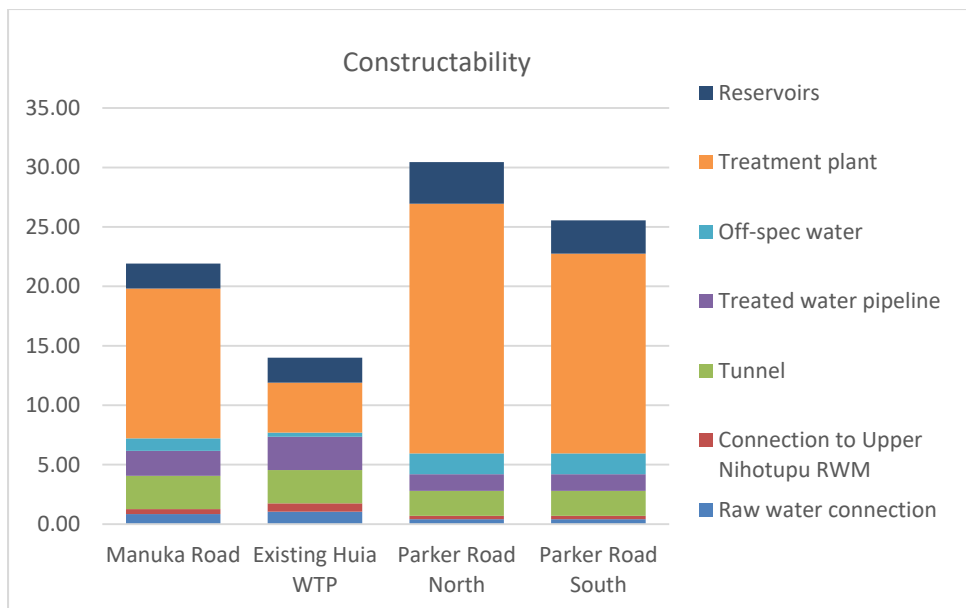
4.3.2.1 Technical and engineering-related criteria

The technical and engineering-related criteria included in the MCA are:

- Key site characteristics
- Constructability
- Operability

The scores for the engineering-related criteria for each of the sites is presented in Figures 4.2 below. For comparative purposes these show the baseline scores attributed by the SME rather than the normalised scores.





Figures 4.2: Engineering scores for the shortlisted WTP and reservoir sites

The Parker Road scheme performs better in terms of the engineering and technical criteria compared to the Woodlands Park Road scheme, with the Parker North site scoring the highest in all three of the criteria. Key reasons for this include the following:

Key site characteristics and site constructability

- Manuka Road and the existing Huia WTP are both at elevations which have minimal pumping requirements. They are also located in close proximity to the existing raw and treated water network. However these sites are constrained in terms of space and an unstacked layout is not feasible on either of these sites.
- The existing Huia WTP is further constrained due to retention of the heritage building (likely for administration purposes) and the presence of the remainder of the facility, i.e. how this is taken out of service and demolished. Construction at this site would also compromise the security of the supply system for the duration of the construction period (the western water sources would not be utilised for a period of up to 3 years). There is also no ability to accommodate a storage lagoon for off-spec discharges on the site. For these reasons the existing Huia WTP scores the lowest on key site characteristics and constructability, the latter by a notable margin.
- The site at Manuka Road is affected by many of the same issues as construction on the existing site. While the site provides more flexibility than the existing Huia WTP, the area for construction is limited due to site area, topography and vegetation. The presence of the existing plant (the Manuka Road site utilises part of the existing Huia WTP site i.e. for the extended attenuation lagoon and new raw water pump station) and the close proximity of houses below also present constraints at this site. The existing attenuation lagoon will also need to be in operation while being extended which presents an operational risk. Overall the Manuka Road site is the second lowest ranked option in terms of site constructability.
- The Parker sites are large and therefore have a greater level of layout flexibility. Parker North scores slightly better than Parker South in this regard. The elevation of the Parker South site presents challenges to locating the reservoirs at the right level. For both of the Parker Road schemes, the distance to the Titirangi Reservoirs means there is less connectivity to the wider network.

Ancillary infrastructure

- The challenges and risks associated with providing ancillary infrastructure to service the existing WTP and Manuka Road sites was assessed as low. Both options have good access to the end of the aqueduct and in the case of the existing WTP site the connection is relatively straight forward. For both options the timing around the construction of the treated water tunnel and the water reservoirs on the same site would need to be carefully managed, but the treated water tunnel is of a short length, is well understood and with good access.
- The challenges and risks associated with ancillary infrastructure to service the Parker Road sites was typically assessed as moderate to high. The construction of the treated watermain from the Parker Road sites is constrained due to road geometry and interactions with other work components (i.e. site construction). This extends the duration of works and means the treated watermain construction is unlikely to be able to proceed in parallel with the treatment plant construction.
- The construction of the raw water connection for the Parker Road schemes at Mackies Rest is also constrained and construction work will need careful programming to minimise disruption and inefficiencies. Access to Mackies Rest is restricted by a narrow access track and steep slopes which will require upgrading. The raw water tunnel to the Parker Road sites is very long and is likely to require an intermediate shaft. Further, the exact geology of the route is unknown.

Operability - Site

- The Parker Road sites scored better in terms of operability than the existing Huia WTP and Manuka Road options largely on the basis of the site characteristics which provide greater flexibility, provision for setbacks / greater distance to neighbours and space for expansion.
- Due to the larger sites, on-site access and circulation is likely to be better at the Parker Road sites than the Manuka Road and existing Huia WTP sites. The larger space available on the Parker Road sites for the treatment plant structures is also an advantage with regard to increasing the potential to avoid confined spaces to gain access to equipment for operation and maintenance.
- Operating and managing a large single site is more efficient than operating over three distinct locations, particularly from a security and Health and Safety perspective.
- In terms of both the existing WTP site and the Manuka Road Site, siting WTP processes on a constrained site reduces flexibility in safety in design and limits the ability to easily incorporate additional water treatment processes if required by future changes in raw water quality or Drinking Water Standards. Slopes at the existing WTP site in particular will also adversely impact vehicle access and movement through this site.

Operability - Raw water

- The raw water aqueduct is a major vulnerability for both the Woodlands Park Road schemes. However for the Manuka Road option, additions to the raw water infrastructure would greatly enhance the resilience of the raw water supply as well as simplifying the engineering required to pressurise the aqueduct⁸ In particular it would both facilitate aqueduct shutdowns for maintenance/upgrades and potentially reduce the level of upgrading required. It would also provide for better management of raw water inflow during an off spec process event.
- By comparison, the existing WTP site relies on the existing raw water aqueduct as the sole supply in an unpressurised configuration. As well as reducing system resilience, this results in

⁸ The extension of the Lower Nihotupu rising main to Exhibition Drive to meet a new falling main from the Upper Nihotupu Dam to form a Combined Nihotupu Raw Water Main.

the inability to rapidly shutdown or reduce flows into the plant if process issues require a flow reduction or diversion. This combined with a lack of space for off spec water attenuation means a full capacity overflow is required, exceeding the capacity of the Armstrong Gully and necessitating a full overflow capacity to the nearest suitable waterway, Manukau Harbour.

- The proposed attenuation lagoons at the Parker Road sites provide a great deal more operational flexibility and environmental mitigation than those proposed for the existing and Manuka Road options. The ability to restrict all of the flow into the plant, through a pressurised raw water supply, and the scope for a large attenuation pond and greater assimilative capacity of the receiving environment is also an advantage for the Parker Road sites.
- For the Parker Road sites, there are benefits of a completely new raw water supply line from Mackies Rest to the Parker Road sites. However there is also complexity associated with maintenance of a new lined tunnel (single point of failure and very limited/no access).

Operability - Transmission

- In terms of transmission, all options include new treated water reservoirs and connections to the North Harbour No.2 pipeline. The transmission system as it stands now has been designed around the Huia WTP being in its current location. A new treatment plant located in this area provides the opportunity for easier connectivity between the existing system and the North Harbour No.2. These sites also have the advantage over the Parker Road sites of the resilience provided by two treated water pipelines on separate routes to different parts of the existing network by upgrading the existing connection to Titirangi Reservoirs.
- The Parker Road sites require an investment in transmission assets to enable the treated water to be distributed with similar operational flexibility as provided by the existing WTP and Manuka Road sites. There is additional short term operational complexity associated with the transmission system, from this site until the completion of the North Harbour No.2 and interconnections.

4.3.2.2 Traffic effects

The MCA scores for the traffic effects criteria for each of the sites is presented in Figure 4.3 below. Traffic associated with the operation of the WTP is very limited and was not considered a key differentiator. It was therefore not included in the MCA scoring.

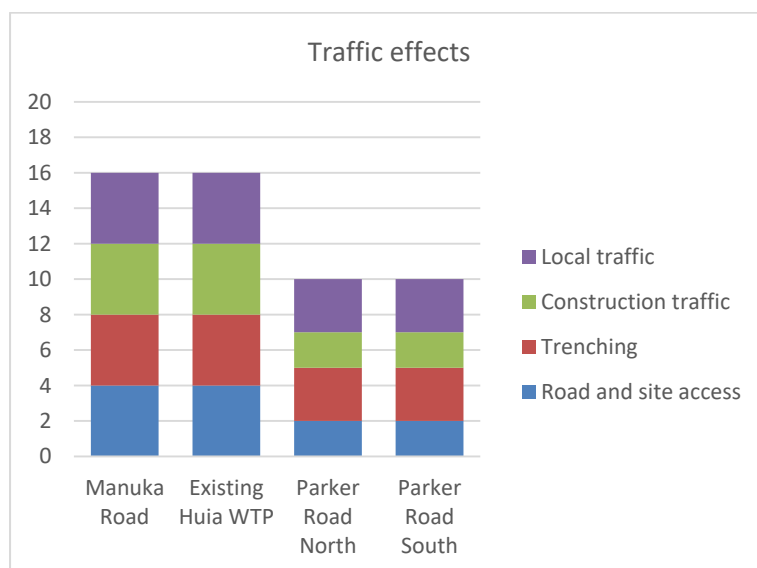


Figure 4.3: Traffic scores for the shortlisted WTP and reservoir sites

The rationale for these scores is contained in the Traffic Technical Report. In summary:

- The Manuka Road site has good road access. While site distances are a concern into the site from Woodlands Park Road, this can be mitigated by an alternative route (Manuka Road). The existing WTP site also has good road and site access with relatively good sight distances and secondary access also available through Manuka Road. Both options were considered to have slight impacts or constraints from an access perspective.
- For the existing WTP site and Manuka Road site, the WTP and reservoir construction and the trenching works occur on different road corridors (Woodlands Park Road / Exhibition Drive with trenching works along Glengarry (or potentially Rosier) Road). Trenching can occur in parallel with construction and reduce the duration of effects for adjacent communities. While there are higher volumes of traffic compared to the Parker Road sites, the traffic effects associated with these options are lower due to alternative routes being available and distributed impact areas. Overall the impact is assessed as low taking into account traffic management and mitigation measures.
- Both Parker Road sites have constrained access due to Parker Road geometry (e.g. narrow road width in places). Site access itself into the Parker North site is acceptable and into the Parker South site is more constrained due to access being via a narrow driveway. No secondary access routes are available. Both options were considered to have high impacts.
- For the Parker Road options, trenching and WTP construction works would utilise Parker Road simultaneously, extending the duration of the works and associated effects. This would require complex traffic management measures along with localised widening of Parker Road and a challenging truck layby area to accommodate construction vehicle movements. Effects overall have been assessed as high and these sites have received a low score in terms of traffic effects.

4.3.2.3 Heritage and archaeology

The score for the heritage and archaeology criteria for each of the sites is presented in Figure 4.4 below.

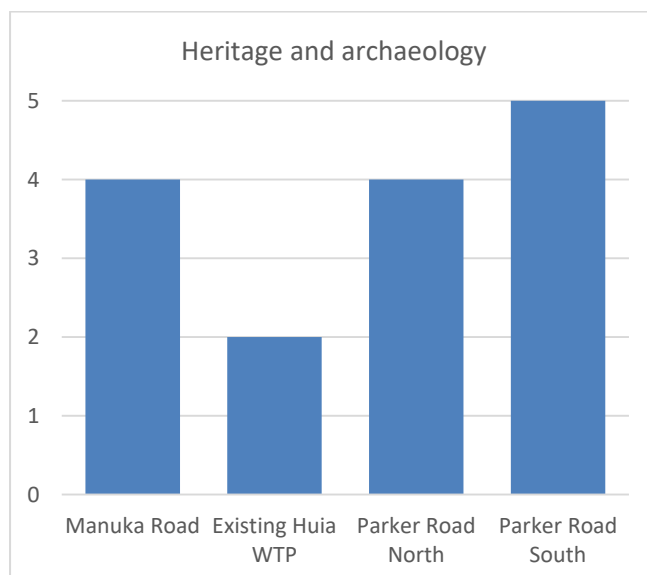


Figure 4.4: Heritage and archaeology scores for the shortlisted WTP and reservoir sites

The rationale for these scores is contained in the Heritage Report. In summary:

- At the Manuka Road site there is low to neutral impacts as there are no direct impacts on the scheduled Huia Filter Station or nearby Nihotupu Filter Station, although there will be some impact on the 'extent of place' overlay shown in the AUP due to the new lagoon.
- Effects at the existing Huia WTP site have been assessed as high. While the existing 1928-43 Huia WTP heritage building would be retained, heritage structures within the 'extent of place' overlay would be demolished. There would also be visual impacts associated with the increase in the scale of building surrounding the existing heritage building.
- The layout for Parker North avoids Theet's Cottage although there will be visual impacts associated with the scale of the buildings in close proximity to the heritage building.
- The Parker South site is not considered to have any impacts on built historic heritage or known archaeological sites. Therefore from a heritage and archaeological perspective, this is the most preferred site.

Note: The future use of the Huia Filter Station and associated structures is yet to be determined if the existing Huia WTP becomes inactive.

4.3.2.4 Noise

The Noise Report is based on the predicted 40dBA noise contour which is the AUP night time limit for the relevant zones, being Rural – Waitakere Foothills, Residential – Large Lot and Open Space – Conservation zones. This therefore represents the most stringent limit that would apply to all four of the short-listed sites, although does not take into account the ambient noise environment and effects relative to this.

The scores for the noise criteria for each of the sites is presented in Figure 4.5 below. In summary:

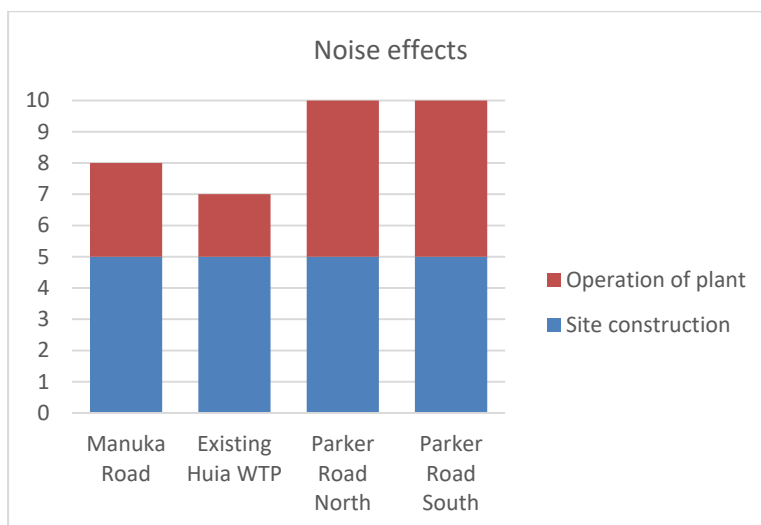


Figure 4.5: Noise scores for the shortlisted WTP and reservoir sites

- Activities at all four sites would be expected to be managed to comply with the relevant construction noise standard NZS6803:1999.
- There are a large number of residential properties located in reasonably close proximity to the Manuka Road site and the existing WTP site. Both options would require significant acoustic treatment and screening, particular for the existing WTP site. These sites have therefore been assessed as being moderate or high, respectively, in terms of the potential impacts of noise associated with the operation of a new WTP and the requirement for extensive mitigation.

- Acoustic mitigation in the form of conventional noise control methods would ensure compliance with the night time limit at both of the Parker Road sites and these sites are therefore assessed as neutral taking into account reasonable onsite mitigation.

4.3.2.5 Ecology

The MCA scores for the ecology criteria for each of the sites is presented in Figure 4.6 below.

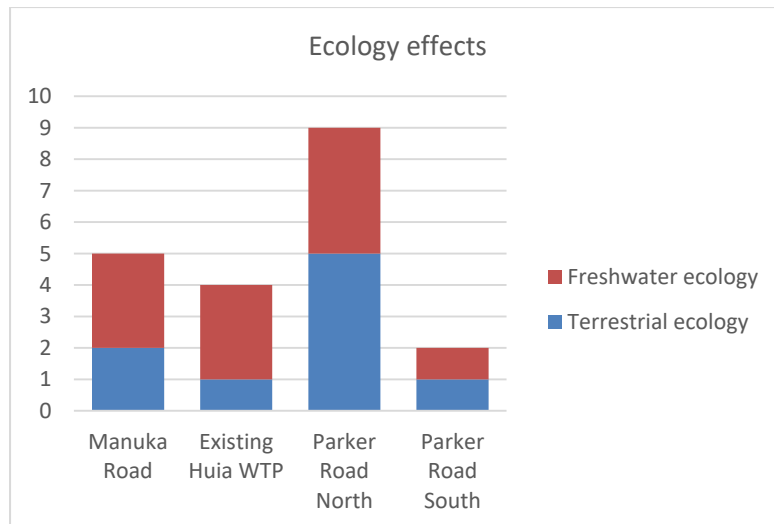


Figure 4.6: Ecology scores for the shortlisted WTP and reservoir sites

The rationale for these scores is contained in the Ecological Effects Report. In summary:

- For the Manuka Road site, both the WTP and reservoirs sites are almost entirely identified as SEA comprising both intact and modified secondary native vegetation, with remnants of old growth forest. Vegetation is contiguous with extensive bush areas in the Waitakere Ranges. The footprint of the operational plant and associated construction zone would encompass approximately 3 ha, most of which is currently vegetated in native forest. More than half of this vegetation has been modified by previous partial clearance and disturbance, but some stands containing large (>50 cm diameter) kauri and podocarp would be lost (approx. 1 ha). Ecological effects have been assessed as moderately high – high in this location.
- Expansion of the existing WTP footprint will impact identified SEA, including clearance of approximately 1.5 - 2 ha of kauri and kahikatea–pukatea forest surrounding the existing WTP site. These are identified as endangered and critically endangered ecosystem types and are anticipated to have high flora and fauna habitat values. Approximately 0.5 ha of mature kanuka forest would also be cleared. This will result in the generation of high adverse effects on terrestrial ecology.
- Construction of the reservoirs associated with the existing WTP site and the Manuka Road site will impact a further estimated ~2ha of identified SEA, most of which is currently vegetated in mature kanuka forest although several large trees are also likely to be lost.
- For both options, the loss of old-growth forest cannot be mitigated in a fully like-for-like replacement and there is minimal scope for undertaking on-site mitigation planting. While offset mitigation could theoretically be derived to compensate for the proposed forest clearance, a substantial multiplier would be required.
- The location of the reservoirs encompasses approximately 100 m of a permanent reach of Armstrong Gully stream headwaters which will require mitigation. The effects on aquatic ecology are assessed as moderate.

- The indicative footprint of the Parker North WTP is accommodated within open areas of the site and does not encroach into native bush. No significant adverse effects are identified for this site and it has been assessed as neutral taking into account onsite mitigation and enhancement.
- The indicative Parker South WTP footprint and accessway encroaches into areas of kahikatea-pukatea forest, a critically endangered ecosystem type. This would result in the loss of areas of high value flora and fauna habitat, as well as about 100m of stream length which is part of a largely unmodified headwater sequence. The loss of old-growth forest cannot be mitigated in a fully like-for-like replacement as time is a key factor in the formation of forest structure and habitat complexity. Furthermore, there are limited opportunities to reinstate wetland forest communities because the substrate and drainage patterns are integral to the character of this ecosystem. As a result, ecological effects were assessed as high for this option.

4.3.2.6 Landscape and visual effects

The MCA scores for the landscape and visual effects criteria for each of the sites is presented in Figure 4.7 below.

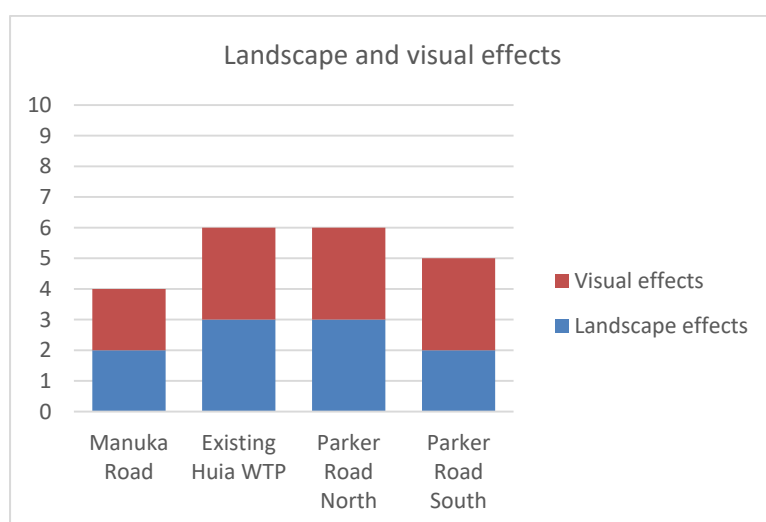


Figure 4.7: Landscape and visual scores for the shortlisted WTP and reservoir sites

All of the sites scored either 2 (high impacts) or 3 (moderate impacts) for the landscape and visual effects criteria. The rationale for these scores is contained in the Landscape and Visual Effects Report. In summary:

- Vegetation clearance and landform modification, along with the introduction of a new industrial scale activity mean that landscape and visual effects have been assessed as high for the Manuka Road option.
- The character of the existing Huia WTP site is strongly influenced by the historically long established WTP. This is relatively well mitigated with a scheduled heritage building addressing Woodlands Park Road which will be retained. Properties both overlook and are orientated away from the WTP. The vegetation removal and earthworks / landform modification required to establish a new WTP at this site means moderate adverse landscape and visual effects will be generated.
- There is some landform modification required at the Parker North site but limited effects on indigenous vegetation. There are also effects associated with changes to the existing large lot residential character and amenity. From a visual effects perspective the catchment is small

and the site is able to be well screened by landform and topography. Overall the effects are assessed as moderate.

- Vegetation clearance and landform modification at the Parker South site, along with impacts on existing large lot residential character and amenity mean the landscape effects have been assessed as moderate to high. Visual effects have been assessed as moderate due to the high impacts but small catchment and potential to mitigate effects.

4.3.2.7 Social effects

The MCA scores for the social effects criteria for each of the sites is presented in Figure 4.8 below. It should be noted that this is a comparative evaluation and does not take into account the social benefits of the WTP which can be attributed to all options. However the SIA notes that there are likely to be high social benefits attributed to quality potable water supply and resilient water supply across the Region.

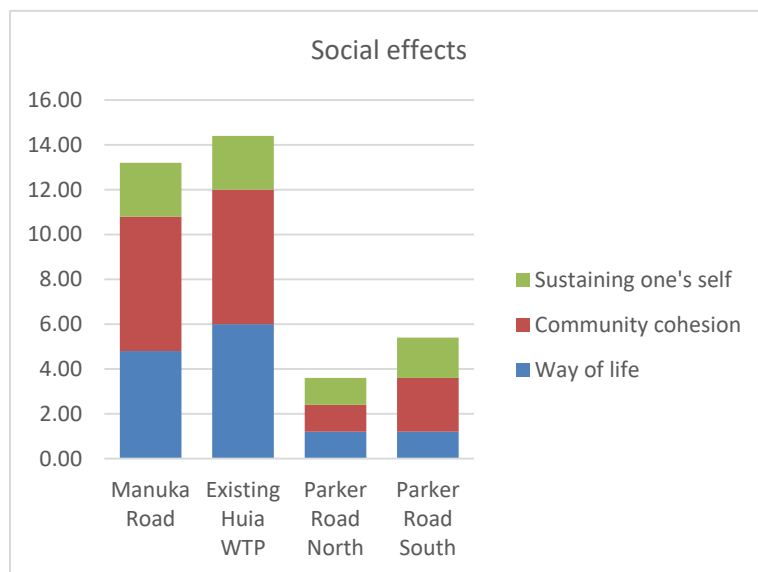


Figure 4.8: Social scores for the shortlisted WTP and reservoir sites

Figure 4.8 shows the Manuka Road and existing Huia WTP score considerably better than the Parker Road sites in terms of social effects. The rationale for these scores is contained in the SIA Summary Document (draft). In summary:

- The potential social effects during both construction and operation for the Parker Road options are likely to be high to very high due to impacts on community cohesion and way of life, the ability for people and communities to sustain themselves and to a lesser extent, the quality of the environment. This includes disruption to people's and the community's way of life as people use Parker Road regularly to go to school, work, into the village etc. It also includes the impacts on people who operate businesses and may be limited in their ability to continue to operate during the construction period.
- For those who have to leave the community and move to another house and for those with family on Parker Road who remain, the impact on way of life post construction / during operation is also assessed as a very high negative impact. Impacts include difficulties in absorbing the displaced community in the programmed timeframe for delivery of project, loss of social interactions and interdependencies, and the high potential loss of business activities noted above.
- Replacing the existing WTP is likely to have lower social impacts during both construction and operation. The construction impacts are negative due to trenching required on local roads

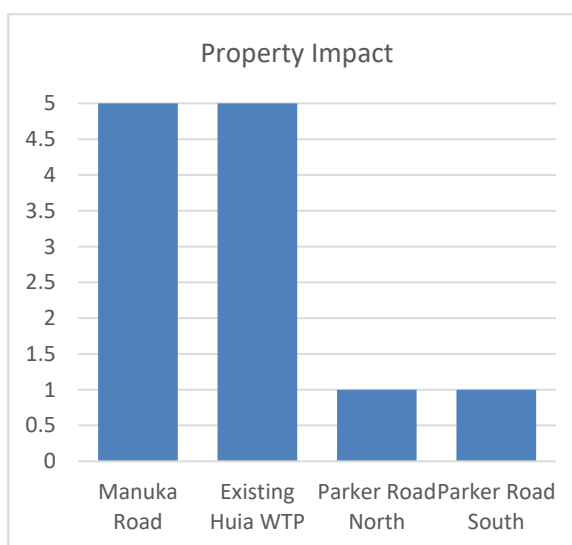
which is likely to cause disruption and impact on the community's way of life and the quality of the environment which they enjoy. However, due to the existing WTP being in the same locality, the effects during operation are generally low to very low.

- For the Manuka Road option, the potential effects during construction are likely to be moderate due to impacts on people's way of life and quality of the environment. There are some negative impacts during operation, particularly for people's way of life, however given the smaller number of people impacted, the nature of the community and accessibility for that community and the existence of a WTP in a similar location (as well as the fact that residential properties are not directly affected by the site options) these impacts are generally lower than for Parker Road. Negative impacts are associated with the potential loss of Clark Bush, which some anticipated to be a reserve.

4.3.2.8 Property impacts

Property impacts has been scored based on the number of affected titles. This is a conservative assessment which takes into account the footprint of a new WTP as well as surrounding buffer areas. These titles are privately owned, with each title representing at least one residential dwelling (as opposed to vacant land).

This means that the Manuka Road and existing Huia WTP sites score highly as Watercare owns the properties in this location and these options are therefore considered 'straightforward' in terms of the property impacts. By comparison, although Watercare owns 130 Parker Road there are still a number of properties which would be affected by the WTP at either of the site options and may need to be purchased, including those adjoining properties where visual effects may be unable to be mitigated. Both Parker North and South have therefore been identified as having significant property impacts.



4.4 Weighting and sensitivity analysis

4.4.1 Overview

Weighting and sensitivity analysis has been undertaken on the normalised scores in order to further analyse and test the ranking of the sites and inform the overall decision making.

Weightings have been applied as a multiplier on a scale from 1 to 10. A weighting of 1 represents no weighting / the baseline score, up to a maximum possible weighting of 10 where a criteria is deemed to be particularly important in terms of the weighting approach being considered. The series of weightings applied and the rationale for them is set out below along with the outcome of the weightings and sensitivity analysis shown in Tables 4.7 to 4.9. For comparison purposes, the normalised baseline scores (unweighted) are shown in *Table 4.3* above.

4.4.2 Technical and engineering weighting

The technical and engineering weightings were determined by Watercare based on the criteria that it considered the most important from this perspective. Relevant criteria were weighted as set out in Table 4.5 below to gain an understanding of the preferred site(s) from a technical/engineering

perspective. When weighting the technical and engineering criteria, all other criteria have not been weighted (i.e. they remain at the “default” weighting of 1).

Table 4.5: Watercare technical and engineering weighting

Criteria and rationale	Weighting
<p>Key site characteristics</p> <p>Key site characteristics have driven the site selection process from the outset. While the site options score relatively better or worse for this criteria, at the shortlist stage all sites should be reasonable in terms of this criteria. Therefore a low weighting has been assigned to this criteria.</p>	2
<p>Constructability</p> <p>An important consideration but also largely a function of cost. A low to moderate rating is considered appropriate.</p>	4
<p>Operability</p> <p>A fundamental consideration in terms of the long-term operation of the site. Resilience of headworks and the treated water network is a key component of this criteria. Therefore the most important technical / engineering consideration.</p>	10
<p>Traffic effects</p> <p>Construction related therefore low weighting.</p>	2
<p>Noise effects</p> <p>Relates to operation of the WTP. Therefore weighted higher than traffic effects.</p>	4

4.4.3 RMA Section 6 weighting

Criteria which directly relate to matters identified as being of national importance in Section 6 of the RMA were weighted at a multiplier of 10 relative to other non-Section 6 related criteria which have not been weighted (i.e. they remain at the “default” weighting of 1).

These Section 6 matters are as follows:

- **Heritage and archaeology:** The protection of historic heritage from inappropriate subdivision, use and development (Section 6(f)). In addition, Section 6(e) identifies the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga as a matter of national importance. Archaeology is a component of this.
- **Terrestrial and freshwater ecology effects:** the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna (Section 6(c)). In this case the weighting was applied to the terrestrial ecology score in recognition of the SEA overlay.

The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development is also a matter of national importance (Section 6(b)). However landscape and visual effects have not been weighted as the WTP can be located outside of the AUP ONL notations.

The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga is a matter of national importance (Section 6(e)). However Mana Whenua has indicated to Watercare that the effects on Mana Whenua values will be assessed through the preparation of a CVA in the case of Te Kawerau a Maki, and through direct feedback in

the case of other Mana Whenua groups. For this reason Section 6(e) matters have not been assessed in the MCA and therefore cannot be weighted. The management of significant risks from natural hazards is now also a matter of national importance. This is addressed through the site principles and in particular the location principle which required that the site is not located in a hazard prone area. Significant risks have therefore been avoided through the application of this overriding site principle to the site selection process, with risks being otherwise remedied or mitigated through design.

4.4.4 Overall RMA weighting

The overall RMA weightings were determined by a Planner with review and input from Watercare and legal counsel. Criteria were weighted on the basis of their potential relative importance in a resource consent and/or NOR decision making process. While this takes into account Section 6 matters outlined above, the overall RMA weighting is broader than this and takes into consideration Section 5 of the RMA, the AUP policy framework and the effects assessments undertaken by the SME. The rationale for the weightings applied is set out in Table 4.6 below.

Table 4.6: Overall RMA weighting

Criteria and rationale	Weighting
<p>Key site characteristics</p> <p>Key site characteristics (elevation, size, location, proximity) are key drivers for Watercare. These have driven the site selection process from the outset and at the shortlist stage, all sites should be reasonable in terms of this criteria. Therefore a low score has been assigned to this criteria. This was discussed and agreed at the challenge workshop on 16/05/17.</p>	2
<p>Constructability</p> <p>All options present construction challenges which is largely a function of cost. However the AUP RPS and District Plan policy provisions recognise that infrastructure may have a functional or operational reason to be located in a particular location including a natural resource or heritage overlay. Connections to the existing raw water and treated water network are an important component of any justification regarding operational and/or functional need. Hence a low to moderate rating is considered appropriate.</p>	4
<p>Operability</p> <p>Operability is key to the long-term function of the plant. Provides a high level assessment of functional and operational basis for the sites (as per the AUP policy direction). Resilience of headworks and the treated water network is a key component of this criteria. Given a moderately high weighting based on WSL objectives in the AMP and WWSS.</p>	6
<p>Traffic effects</p> <p>Traffic effects are not directly reflected in s6 RMA matters or key AUP provisions. However the traffic assessment identifies some constraints and potentially high adverse effects. This is associated with construction traffic rather than long-term operational traffic, however it is over a long duration of works. A low to moderate rating is therefore considered appropriate for this criteria.</p>	4
<p>Heritage and archaeology</p> <p>Protecting historic heritage features strongly through the statutory policy framework (include RMA s6), and has direct implications for the project due to the scheduled Huia Filter station. However this has been given a moderate rating on the basis that:</p> <ul style="list-style-type: none"> The existing Huia WTP site is designated and Section 9(3) land use consent requirements do not apply. Watercare has confirmed the building will be retained, and remaining effects on the extent of place represent ongoing use of the site consistent with the reason for which it has been 	6

Criteria and rationale	Weighting
<p>scheduled. Appropriate use, development and adaptation of scheduled historic heritage places finds support from AUP policies.</p> <ul style="list-style-type: none"> In terms of archaeology, no particular issues have been raised in the relevant assessment. 	
<p>Noise effects</p> <p>While noise effects are an important consideration, it is not something that is directly reflected in s6 RMA matters or key AUP provisions. Construction noise will be managed to comply with the relevant standard NZS 6803:1999 Acoustics – Construction noise. The expectation too is that through detailed design, a plant at any of the four locations would be designed to comply with noise limits that apply. Noise has therefore been given a low weighting.</p>	2
<p>Ecology</p> <p>Protecting ecological values features strongly through the AUP policy framework and is a section 6 RMA matter of national importance. All four sites have an SEA overlay over at least part of the site and the ecological assessment indicates the potential for significant effects at 3 of the 4 sites. A very high weighting is further supported by reference to the WRHAA. Note: In recognition of the SEA and associated policy provisions, the weighting has been applied to the terrestrial ecology score rather than the combined score for the terrestrial and freshwater ecology criteria.</p>	10
<p>Landscape and visual</p> <p>Protecting landscape values features strongly through the statutory policy framework, including RMA s6. However, while there are outstanding natural landscape and ridge protection overlays over part of all four sites to a greater or lesser degree, these can largely be avoided through plant siting. Landscape and visual effects have therefore been given a moderate to low weighting with the expectation that careful design and the use of buffers and screening will ensure effects are adequately addressed.</p>	4
<p>Social effects</p> <p>Social, economic, environmental and cultural well-being of people that live and work in the Waitakere Ranges is a key consideration in the AUP and is integral to the overall sustainable management purpose of the RMA. The WRHAA and policy provisions which give effect to that also establish a strong framework around maintaining and protecting existing character and rural amenity. Social effects are a relevant consideration at all sites and works and operation will change the existing context, particularly at the Parker Road sites but also at the Manuka Road site.</p>	10
<p>Property impacts</p> <p>While the property acquisition process may present inherent risk, this matter will not feature as being of the same relevance in the RMA decision making process as other matters. Property impacts have therefore been given a low weighting on the basis that this is not an environmental consideration. However this scoring is considered a useful proxy for the presence/absence of an existing designation. It is anticipated that at the Manuka Road and existing Huia WTP sites the presence of an existing and long standing designation for water treatment purposes would be factored into decision making.</p>	2

4.4.5 Results of weighting

The results of weighting the normalised scores with respect to technical and engineering aspects, RMA Section 6 weighting and overall RMA weighting are shown in Tables 4.7 to 4.9. For comparison purposes, the normalised baseline scores (unweighted) are shown in Table 4.3 above.

Table 4.7: Technical and engineering weighting analysis results

Criteria		Manuka Road	Existing Site	Parker North	Parker South
Technical / Engineering	Key site characteristics	15	13	16	15
	Constructability	25.04	16	34.8	29.2
	Operability	66.67	60	80	73.33
Environmental	Traffic effects	16	16	10	10
	Heritage and archaeology	8	4	8	10
	Noise effects	32	28	40	40
	Ecology	5	4	9	2
	Landscape and visual effects	4	6	6	5
	Social effects	8.8	9.6	2.4	3.6
Property impact		10	10	2	2
TOTAL		191	167	208	190

Table 4.8: RMA Section 6 weighting analysis results

Criteria		Manuka Road	Existing Site	Parker North	Parker South
Technical / Engineering	Key site characteristics	7.5	6.5	8	7.5
	Constructability	6.26	4	8.7	7.3
	Operability	6.67	6	8	7.33
Environmental	Traffic effects	8	8	5	5
	Heritage and archaeology	80	40	80	100
	Noise effects	8	7	10	10
	Ecology	80	40	100	40
	Landscape and visual effects	4	6	6	5
	Social effects	8.8	9.6	2.4	3.6
Property impact		10	10	2	2
NORMALISED TOTAL		219	137	230	188

Table 4.9: Overall RMA weighting analysis results (based on normalised scores)

Criteria		Manuka Road	Existing Site	Parker North	Parker South
Technical / Engineering	Key site characteristics	15	13	16	15
	Constructability	25	16	34.8	29.2
	Operability	40	36	48	44
Environmental	Traffic effects	32	32	20	20
	Heritage and archaeology	48	24	48	60
	Noise effects	16	14	20	20
	Ecology	40	20	100	20
	Landscape and visual effects	16	24	24	20
	Social effects	88	96	24	36
Property impact		20	20	4	4
NORMALISED TOTAL		340	295	339	268

The rankings based on the above weightings are set out in Table 10 below.

Table 4.10: Weightings analysis rankings

Criteria	Manuka Road	Existing Site	Parker North	Parker South
BASELINE / NORMALISED SCORE	1	3	2	4
TECHNICAL WEIGHTING	2	4	1	3
RMA WEIGHTING – SECTION 6 MATTERS OF NATIONAL IMPORTANCE	2	4	1	3
OVERALL RMA WEIGHTING – INCLUDING SECTIONS 5 AND 6	1	3	2*	4

* Marginal difference between site and next highest ranked site.

The technical/engineering weighting ranks Parker North first followed by Manuka Road which scored slightly better than Parker South (noting this weighting still includes unweighted broader environmental criteria). However the overall scores in Table 4.4 above show that from a purely engineering/technical basis, the Parker Road sites are both preferred over the Manuka Road and existing WTP sites for site constructability and operability reasons.

When section 6 RMA matters are taken into account and weighted, Parker North is the top ranked site by a notable margin. Manuka Road is the second ranked site followed by Parker South and the existing WTP site.

The overall RMA weighting results rank Manuka Road marginally higher than Parker North. The sensitivity of this ranking in relation to social effects and effects on terrestrial ecology has been examined, given the low score for Parker North and Manuka Road, respectively, for each of these criteria. If a slightly lower weighting is applied to the social effects criteria (i.e. 9 or lower), then the position of Manuka Road and Parker North switches and Parker North becomes the highest ranked option. The ranking in the overall RMA weighting is also sensitive to the weighting applied to the property impacts criteria which directly reflects whether or not the site is designated.

The approach to weighting the ecological effects criteria based on the score for terrestrial ecology also influences the overall RMA weighting results. While this approach is considered valid with reference to the SEA overlay and associated AUP policy provisions, it may understate the effects at the Parker North site which was attributed a lower score (4 versus 5) for freshwater ecology.

There was some discussion and debate in the MCA challenge workshops regarding the low heritage score for the existing Huia WTP. While a new WTP on this location would adversely affect some of the heritage features within the extent of place identified in the AUP the existing heritage building itself would be maintained and would continue to be used in a manner consistent with its designated use. There are also AUP policies which support appropriate use, development and adaptation of scheduled historic heritage places. For these reasons further sensitivity analysis has been undertaken in relation to the Huia WTP site. However, unless the heritage and archaeology criteria is unweighted, there is no change to the overall ranking in the Section 6 analysis. Engineering and technical constraints along with the effects on terrestrial ecology mean that the existing Huia WTP site remains in last place. Similarly reducing the heritage and archaeology criteria weighting makes no difference to the overall RMA weighting results.

Other than this exception, the Parker South site consistently scores relatively poorly for both unweighted and weighted scores. This reflects the fact that it is more constrained from an engineering perspective than the Parker North site, and it also scores poorly in terms of both ecological and social effects.

The existing WTP site typically ranks 3rd or 4th. Notwithstanding that it is currently in operation as a WTP, there are significant resilience and security of supply issues associated with reconstruction at this site which would require the existing WTP to be taken offline for the duration of works. The site is also constrained, there is no space for off-spec discharges to be attenuated on site prior to discharge to a receiving environment, and the site also scores poorly in terms of ecological and heritage effects.

4.4.6 Individual criteria weighting and sensitivity analysis

All criteria were individually weighted progressively from 1-10 to gain an understanding of how the ranking moved when one particular criteria was preferred over all others. Table 4.11 below shows rankings when a weighting of ten is applied to each criteria.

Table 4.11: Sensitivity analysis – Maximum weightings

	Manuka Road	Existing WTP site	Parker North	Parker South
Baseline / Normalised scores	1	3	2	4
Key site characteristics	1	4	2	3
Constructability	2	4	1	3
Operability	2	4	1	3
Traffic effects	1	2	3	4
Heritage and archaeology	2	4	3	1
Noise	3	4	1	2
Ecology	2	3	1	4
Landscape and visual	3	2	1	4
Social	2	1	4	3
Property impact	1	2	3	4

The following observations can be made in relation to the rankings in Table 4.11 above and the full sensitivity analysis results set out in Appendix D:

- In terms of the engineering and technical criteria, the rankings are not particularly sensitive to key site characteristics. Even with a weighting of 10 applied to this criteria the overall rankings of Manuka Road and Parker North remain the same, although the existing WTP site drops to last.
- However the rankings are moderately sensitive to the weightings applied to constructability and operability. When these criteria are weighted at 4 and 6 respectively, the Parker North site becomes the preferred site over Manuka Road.
- If traffic effects are weighted then the existing site quickly moves to the second ranked site and Parker North drops to third. However Manuka Road remains the top ranked site.
- When the heritage and archaeology criteria is weighted the existing site quickly becomes the lowest ranked site, and the Parker South site becomes the favoured site but only once a weighting of 8 or more is applied to the overall score.
- Weightings applied to noise, ecology or landscape favour the Parker North site over Manuka Road and with a moderate rating of 3 or 4 this becomes the preferred site. However even when effects on ecology are weighted heavily Manuka Road remains the second ranked site. This reflects the ecological scores for the existing Huia WTP site and Parker South which are lower than the Manuka Road option.
- If social effects or property impacts are weighted, then the existing Huia WTP quickly becomes the second ranked option behind Manuka Road. With a weighting of 10 for social effects the existing WTP site becomes the preferred overall site which is to be expected considering it is currently in operation as a WTP.

4.5 Assessment of cultural values

The CVA prepared by Te Kawerau a Maki notes that the areas identified for the short-listed sites are of great cultural importance as they sit within the Waitakere Ranges, an area of great significance to the Mana Whenua of Hikurangi (West Auckland). Te Kawerau a Maki has a long and significant history and relationship with Titirangi and Oratia, with strong cultural ties and whakapapa to the area.

The proposed WTP sites are located within a cultural landscape that is highly valued for its cultural sites and places, wahi tapu, cultural values, environment and traditions. The CVA identifies particular concerns with regards to:

- Air (hau) including discharges to air from vehicle emissions, aerial spraying, industrial activities and the risk of chemical spills, and effects on amenity values.
- Land (whenua) including effects on natural and cultural landscapes, heritage sites, wahi tapu and archaeological sites, and effects associated with earthworks, vegetation clearance, and the disturbance of contaminated land.
- Water (wai) including the degradation or destruction of the mauri of natural waterways, the mixing of water from different sources, stormwater discharges and discharges to water, and the public health and safety associated with drinking water.
- Biodiversity including loss of native species, impact of weeds and pests, access to flora and fauna for customary use, and Kauri dieback.
- Wahi tapu and taonga including effects on archaeological materials, wahi tapu and sites of significance, and the cumulative effects of heritage loss through the ad-hoc development of land in Titirangi and Oratia.
- Social, economic and cultural wellbeing including cumulative effects of development on Te Kawerau a Maki and their cultural values, and concerns re ensuring sufficient engagement and participation in the decision making process and the ability to meaningfully exercise kaitiakitanga.

The CVA does not differentiate between the shortlisted sites. Instead, it identifies a comprehensive suite of management and mitigation measures to address these matters which are applicable to all four of the shortlisted sites.

Te Kawerau considers the CVA is a starting point for further engagement and participation to ensure any development is sensitive to the cultural landscape in which the four short-listed sites are located, and to the relationship and values Te Kawerau has with the area. In particular, the CVA emphasises that design input and the exercise of kaitiakitanga is required to achieve a robust cultural outcome for the Huia WTP replacement project.

4.6 Assessment against Watercare objectives

Should Watercare select a new WTP site which is not currently designated, it will need to lodge a NoR for a new designation. When considering an NOR and making its recommendation, pursuant to Section 171(1)(c) a territorial authority must consider the effects on the environment of allowing the requirement having particular regard to whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority.

The broad strategic objectives of the Huia WTP Replacement Project are encapsulated in Watercare's Statement of Intent 2016 – 2019 (SOI), with specific objectives identified in Watercare's Asset Management Plan 2016 – 2036 (AMP) and the Western Water Supply Strategy.

The AMP identifies the following asset management objectives:

- To operate and maintain the water and wastewater systems in an efficient manner
- To ensure there is sufficient infrastructural capacity to meet growth and demand
- To meet regulatory requirements and levels of service; and
- To replace assets when they reach the end of their economic life.

The Western Water Supply Strategy is focused on optimising the future treatment and delivery of water from the western dams to best meet demand as Auckland continues to grow. This strategy has been developed to meet the following business drivers identified in the AMP:

- **Renewals:** A number of existing water assets, in particular the western water treatment plants are at the end of their useful lives and the treatment plant cannot adequately treat water at higher flows due to deteriorating source water quality.
- **Growth:** Significant growth is anticipated in the West and North of Auckland with peak demand increasing from 160MLD today to 215MLD by the 2035 horizon.
- **Resilience:** There is ongoing emphasis for improved system resilience when identifying projects.

In addition to the objectives identified above, at the outset of the Huia WTP Replacement Project a series of key site principles were developed to inform the initial site identification and overall evaluation of sites. These site principles and the objectives which sit behind them encompass growth, resilience, security of supply, sustainability and efficient use of existing infrastructure and align with the AMP and Western Water Supply Strategy, as well as the broader strategic objectives set out in the SOI.

An assessment against relevant Watercare objectives derived from these strategic documents is set out in Table 4.12 below.

Table 4.12: Assessment against Watercare objectives

Objective and source	Project-specific application	Comment
Efficient operations and improved levels of service <ul style="list-style-type: none"> • LGA 2009 s57(1) • SOI Strategic Objectives 1 and 3 relating to exception performance/ efficient business at minimum cost. • AMP Asset Management Objectives: To meet regulatory requirements and levels of service. • To operate and maintain the water and wastewater systems in an efficient manner. 	Project objectives (in Site Principles Report): <ul style="list-style-type: none"> • Maximise the utilisation of the existing water resources in the Waitakere Ranges • Maintain or improve the existing raw water and treated water transmission systems operation Operability MCA criteria and MCA key site characteristics sub-criteria: <ul style="list-style-type: none"> • Elevation: Minimise pumping / pump raw water OR treated water, not both. • Proximity: To ensure the raw water and treated water networks operate as intended and to provide for improved levels of service 	<ul style="list-style-type: none"> • All of the shortlisted sites ensure pumping only occurs once i.e. either raw water or treated water pumping. • The treated and raw water networks are based around the existing Huia WTP. The Woodlands Park Schemes provide convenient access and connectivity to the existing raw and treated water network. • As all the options will involve completely new process units for the entire treatment process, there is the expectation that appropriate design will ensure good levels of service including operability and maintainability (albeit at higher cost for the sites with tighter space constraints i.e. the existing and Manuka Road sites), • For both of the Parker Road schemes, the distance to the Titirangi Reservoirs results in

Objective and source	Project-specific application	Comment
		<p>reduced connectivity to the wider network that may affect levels of service in the short to medium term.</p> <ul style="list-style-type: none"> The lower elevation of the Parker Road scheme reservoirs provides higher levels of system energy efficiency.
<p>1 Provide for growth</p> <ul style="list-style-type: none"> SOI Strategic Objectives 1 – 4 AMP Asset Management Objectives: To ensure there is sufficient infrastructural capacity to meet growth and demand Western Water Supply Strategy 	<p>Project objectives (in Site Principles Report):</p> <ul style="list-style-type: none"> Provide an integrated maximum treated water flow of 140MLD (subsequently increased to 160MLD) <p>Operability MCA criteria and MCA key site characteristics sub-criteria:</p> <ul style="list-style-type: none"> Size. Specifies minimum site area to accommodate new WTP. 	<ul style="list-style-type: none"> All of the options provide for a maximum treated water flow of 160MLD. This provides additional capacity to potentially treat raw water from the Waitakere Dam. The existing Huia WTP site and Manuka Road sites do not provide as much flexibility as the Parker Road sites (e.g. to accommodate an additional treatment process block in case of future raw water quality deterioration, or future changes to water quality requirements).
<p>1 Maintain and improve security of supply</p> <ul style="list-style-type: none"> SOI Strategic Objectives 1 – 4 	<p>Operability MCA criteria and key site characteristics sub-criteria:</p> <ul style="list-style-type: none"> Location: The site must allow the new WTP to be constructed and tested without compromising the supply security to the Auckland metropolitan supply system. Also must not be located on or in close proximity to known hazards. Proximity: Road access from at least two directions preferable. Capable of supplying the Titirangi Reservoirs and the WMNH2. 	<ul style="list-style-type: none"> Construction at the existing Huia WTP site would compromise the security of the supply system for the duration of the construction period. For the Parker Road schemes, the single access road for operators and tanker deliveries and a single pipeline from the WTP plant affects security of supply.
<p>1 Increased resilience</p> <ul style="list-style-type: none"> Western Water Supply Strategy SOI Strategic Objective 2: Business excellence / long term resilience of assets 	<p>Site principles</p> <p>Operability MCA criteria and key site characteristics sub-criteria incl. constructability (ancillary structures).</p>	<ul style="list-style-type: none"> As all the options will involve completely new process units for the entire treatment process, there is the expectation that good design will ensure good operability and maintainability as above, and high levels of redundancy and resilience in all process areas All of the options provide additional capacity to potentially treat raw water from the Waitakere Dam. The raw water aqueduct is a major vulnerability for the existing WTP

Objective and source	Project-specific application	Comment
		<p>site and the Manuka Road site. This will be replaced as part of the project.</p> <ul style="list-style-type: none"> • However for the Manuka Road site, formation of a combined Nihotupu Raw Water Main would greatly enhance the resilience of the raw water supply. • The transmission system as it stands now has been designed around Huia being in its current location. A new treatment plant located in this area provides the opportunity for easier connectivity between the existing systems and the North Harbour No.2. • These sites also have the advantage over the Parker Road by providing two treated water pipelines on separate routes to different parts of the existing network. • If the existing Huia WTP is taken out of service nearly 94% of peak production capacity will be required to come from the south resulting in a loss of resilience. • There are resilience benefits of a completely new raw water supply line from Mackie's Rest to the Parker Road sites. See comments above.
<p>1 Avoid, remedy and mitigate adverse effects on the environment</p> <ul style="list-style-type: none"> • SOI Strategic Objective 3: Fully sustainable / minimise the impact of operations on the environment 	<ul style="list-style-type: none"> • Initial site identification and evaluation exercise to screen out potential new sites with particularly high environmental values. • Application of environmental effects criteria in MCA: noise, traffic, freshwater and terrestrial ecology, heritage and archaeology, and social impacts. • Section 6 and overall RMA weightings approach. 	<p>Refer analysis set out in Sections 4.3 and 4.4 above.</p>

Replacement of the Huia WTP to maintain supply and improve levels of service is identified in the SOI as one of the key initiatives/projects to deliver on Watercare's strategic objectives. The project is expected to contribute to strategic objectives in terms of growth, service level expectations, sustainability and resilience. A new WTP is also identified in the AMP as key infrastructure required

to meet objectives established by Watercare through its AMP to allow for growth while increasing resilience of supply.

The Western Water Supply Strategy identifies the replacement of the Huia WTP and associated water transmission infrastructure as a key component for meeting its objective of ensuring continued supply from the western dams, as well as providing for population growth and maintaining and improving system resilience.

5 Conclusion

The overall ranking and relative merits and constraints of each of the four sites subject to this MCA shortlist assessment are summarised below. It is important to note, however, that this MCA is only a decision support tool and ultimately Watercare will need to balance a number of factors in selecting the preferred site for a new WTP.

Parker South site

The Parker South site scores well in terms of constructability and moderately well for key site characteristics and operability. However compared to the other three sites it consistently ranks poorly overall both with and without weightings applied. While it is a relatively large site which provides some flexibility in terms of site layout (although less than the Parker North site), the elevation of the site potentially presents challenges in terms of locating the reservoirs at an acceptable level. In terms of ancillary infrastructure, the distance from the Titirangi Reservoirs means there is reduced connectivity to the wider network, and the connection to the raw water network at Mackie's Rest is challenging. In terms of the environmental criteria, the ecological assessment has identified the potential for significant adverse effects on ecological values at this site. The SIA has also identified the potential for significant social impacts. There are also significant constraints associated with site access and traffic effects.

Existing Huia WTP site

The existing Huia WTP site scores moderately to poorly across most criteria with some exceptions, being social effects, property and traffic effects where it scores well relative to the Parker Road sites. There are a number of significant challenges associated with redevelopment of the existing site, in particular:

- It is a constrained site which has a number of drawbacks including reduced site flexibility, a restricted working area, the inability to accommodate a storage lagoon for off-spec discharges on the site, and limitations on site manoeuvrability and internal circulation. These matters are reflected in the low scores attributed to the existing Huia WTP for key site characteristics, constructability and operability.
- The demolition of the existing Huia WTP would remove the upper and lower Huia and upper and lower Nihotupu raw water supply sources from Auckland's water supply network for around three years. Construction at this site therefore compromises the security of the supply system for the duration of the construction period and has broader network implications in terms of reduced resilience during this period.
- Expansion of the existing WTP footprint including the reservoir site would impact identified SEA and result in the generation of high adverse effects on terrestrial ecology. These have been assessed as higher than at the adjacent Manuka Road site.

Parker North site

The Parker North site performs well on the basis of technical/engineering criteria, particularly in terms of constructability, and also in terms of key site characteristics and operability. The site is large and therefore has a high level of layout flexibility and all the benefits that entails (refer Section 4.3.2.1). It is also located at a good elevation. However the key constraint at the Parker North site is the social impacts of establishing a new WTP in a locality where there is no expectation of a facility of this nature and scale, and where the policy direction at a local level is focused on retaining and enhancing rural character and amenity values and ensuring the subservience of the built environment. The property impact at Parker North is also significant relative to Manuka Road and the existing WTP site. Additional constraints at the Parker North site include the potential for high

traffic effects and moderate landscape and visual effects, and some challenges associated with the provision of ancillary infrastructure to service the site (refer Section 4.3.2.1).

When a technical weighting is applied to the overall scores Parker Road North becomes the top ranked site. Similarly a Section 6 RMA weighting also ranks Parker North first. Of the options considered this is the only site which scored well in terms of effects on terrestrial ecology. However the Parker North site scores marginally lower than the Manuka Road site and is therefore ranked second on the basis of the overall RMA weighting which takes into account RMA Section 5 matters as well as Section 6 matters, the assessments undertaken by the SME and the policy direction of the AUP. It is also ranked second overall without any weightings applied.

Manuka Road site

Through the MCA process the Manuka Road site is typically ranked either first or second on its weighted and unweighted scores. The properties on which the new WTP would be sited are owned by Watercare and designated for water treatment purposes. The Manuka Road site is also located immediately adjacent to the existing Huia WTP which provides an established baseline in terms of the operation of a WTP at this location from a social and community perspective.

The Manuka Road site is located at a good elevation with minimal pumping requirements and in close proximity to the existing raw and treated water network. However it does not perform as well as either of the Parker Road sites in terms of the engineering criteria, mainly due to it being a smaller and more constrained site. These features make constructability and operability more challenging.

When section 6 RMA matters are taken into account and weighted, Manuka Road is the second ranked site behind Parker North, followed by Parker South and the existing WTP site. Similar to the existing WTP site, a new WTP at the Manuka Road site would impact the identified SEA. While the ecological effects of this have been assessed as lower than expansion at the existing WTP site, the removal of vegetation in an SEA is likely to test the policy framework relating to SEAs (although there is RPS recognition of the benefits associated with the provision of infrastructure and the functional and/or operational need of infrastructure to sometimes locate in natural resource or heritage overlays). The removal of vegetation will require offset mitigation.

The overall RMA weighting results rank Manuka Road marginally higher than Parker North. The overall ranking without any weighting applied also identifies Manuka Road as the preferred site.

Overall conclusion

The MCA process indicates that both the Manuka Road and Parker Road North sites have features and attributes that make them suitable for the location of a new WTP site. These factors counter balance each other to the extent that the two sites are equal in terms of the weighting and sensitivity analysis results. Although equal, it is considered, taking into account all of the technical/engineering, property and environmental matters assessed, that the Manuka Road site emerges from the MCA process as the top ranked site.

6 Applicability

This report has been prepared for the exclusive use of our client Watercare Services Ltd, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

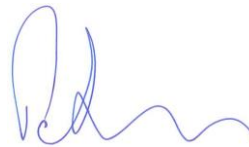
Tonkin & Taylor Ltd

Report prepared by:



Karen Baverstock
Sarah McCarter
Principal/Senior Resource Management Planners

Authorised for Tonkin & Taylor Ltd by:



Peter Roan
Project Director

SCM / KLB

t:\auckland\projects\30848\workingmaterial\4. shortlist\shortlist report\shortlist report 18.06.17 - final.docx

Appendix A: Scoring of MCA criteria

- 1 **Assessment Criteria and Scoring – April 2017**
- 2 **Watercare challenges session presentation – April 2017**

Proposed Assessment Criteria (shortlist)

Approach to scoring / points to note:

- Use consistent order and scheme names throughout
- Develop assessment measures and 'finer-grained' template to determine overall score for criteria (e.g. can use series of sub-criteria to form overall score)
- Scale of 1 – 5 and should align with broad scoring template which is reproduced below i.e. '1' is worst score / very bad and '5' is best score / good.
- Document robust rationale for score in report and include summary/key points which can be used to populate MCA table.
- Freshwater ecological assessment should take into consideration options for off-spec and contingency discharges (refer T+T report June 2016) based on preferred option for each site (GHD, 29/06/16):
 - For Manuka Road option: Expanded lagoon on the existing site rather than Clarke's Bush Gully.
 - For the existing site option, need to allow for the pipeline to Muddy Creek as there will be no real attenuation storage available on site.
 - Parker sites require further investigation but initial options identified in above reports.
- Additional commentary required on works at Mackies Rest from a construction noise, landscape and ecology perspective. However this is not factored into the scoring.

Criteria	Criteria description and approach to scoring	Anticipated detail at short list stage	Basis for scoring	Status
1. Key characteristics	Fit with project objectives and principles. Level of service / efficiency and effectiveness (incl. minimise pumping + distance btw WTP and reservoirs, pipes in public roads, accessibility, etc).	Engineering assessment of key site characteristics based on optimised site layouts and site visits. Undertaken by Beca Engineer.	<p>1 = No alignment with site principles, functionality extremely difficult to achieve</p> <p>2 = Poor alignment with site principles, inconsistencies difficult and/or costly to address</p> <p>3 = Some alignment with site principles, inconsistencies may be addressed at moderate cost</p> <p>4 = Good alignment with site principles, any inconsistencies easily addressed</p> <p>5 = Excellent alignment with site principles, no inconsistencies anticipated.</p>	<p>Largely complete based on existing GHD and Beca reporting but needs reviewing and finalising. Need to ensure based on 160MLD rather than 140MLD.</p> <p>Suggest approach updated to reflect longlist approach. GHD scores the site itself and Beca scores scheme characteristics - ancillary infrastructure (effectively sub-criteria within the overall criteria). Scores already provided to reflect this approach but need to be reviewed and ensure appropriate rationale and no double counting.</p> <p>Complete / scoring provided by Beca.</p>
2. Engineering feasibility and constructability	Physical constraints such as volume/extent of earthworks, slope, access, constructability, ability to locate reservoirs and attenuation ponds on site, potential buffer spaces general degree of difficulty.	Engineering assessment of ability to locate reservoirs and attenuation ponds on site, potential buffer spaces, extent of earthworks, off-spec discharges, etc based on optimised site layouts. Undertaken by GHD + Beca	<p>1 = Significant construction risks</p> <p>2 = High construction risks and downsides may outweigh potential benefits</p> <p>3 = Moderate construction risks which cannot be completely avoided</p> <p>4 = Some identified construction risks but these are localised and minor</p> <p>5 = Relatively straightforward without any unusual risks.</p>	<p>Needs similar level of site design effort / layout for all options (not limited to Parker North).</p> <p>As above regarding site (GHD) and broader ancillary infrastructure (Beca). Note Beca (Jack Brennan) currently looking at constructability of ancillary infrastructure for all four shortlisted sites.</p> <p>Largely complete / just needs input from GHD on Beca spreadsheet.</p>

Criteria	Criteria description and approach to scoring	Anticipated detail at short list stage	Basis for scoring	Status
3. Traffic and Access	Construction and operational traffic effects, access, distance to the arterial or main road, nature of the main access route, whether back-up secondary access is available.	Traffic engineering assessment undertaken by a traffic specialist (Beca).	<p>1 = Significant impacts or risks</p> <p>2 = High impacts or risks</p> <p>3 = Moderate impacts or risks</p> <p>4 = Some identified impacts or risks but these are localised and minor</p> <p>5 = Relatively straightforward without any unusual impacts or risks.</p>	Beca (traffic) has populated template and provided rationale for scoring. However this needs to be expanded on based on site observations, traffic counts etc and incorporated into report on traffic implications (construction and operational) of the four short-listed options.

Criteria	Criteria description and approach to scoring	Anticipated detail at short list stage	Basis for scoring	Status
4. Operability	Degree of difficulty relating to general operability, linkages to existing services and utilities, options for off-spec and contingency discharges, access.	Engineering assessment of operational difficulties associated with each option, based on optimised site layouts and broader scheme assessments. At the scheme assessment stage options for off-spec and contingency discharges will be considered, and in further detail at the shortlist stage. Undertaken by Watercare Operations Specialist.	<p>1 = Significant impacts or risks</p> <p>2 = High impacts or risks</p> <p>3 = Moderate impacts or risks</p> <p>4 = Some identified impacts or risks but these are localised and minor</p> <p>5 = Relatively straightforward without any unusual impacts or risks.</p>	<p>Requires short report on operability for all four shortlisted sites based on existing reports i.e. GHD (site characteristics and layout), Beca (broader connectivity and ancillary infrastructure, and traffic/access) and T+T (off-spec discharges), and taking into account Watercare knowledge of operational requirements of plant and ancillary infrastructure.</p> <p>Watercare to provide at workshop.</p>

Criteria	Criteria description and approach to scoring	Anticipated detail at short list stage	Basis for scoring	Status
5. Historic Heritage and archaeology	<p>Effects on archaeological and historic heritage sites and features:</p> <ul style="list-style-type: none"> - identify and describe sites - assess significance of sites - Identify actual and potential effects <p>Identify possible avoidance or mitigation measures</p> <p>Assess the significance of effects providing mitigation adopted</p>	<p>Heritage/ archaeological assessment including a site visit, initial background archival research, assessment of historic heritage values and significance and appropriate mitigation, and review of optimised site layouts and pipeline routes. Undertaken by Clough and Associates with input from Matthews & Matthews.</p>	<p>1 = Very significant impact, including widespread impacts. On-site mitigation is not achievable</p> <p>2 = High impact. Areas of significance may be affected. Mitigation is not readily available or would be very costly</p> <p>3 = Moderate impact. These effects cannot be completely avoided, but mitigation is achievable at moderate cost</p> <p>4 = Slight impact which is localised and minor, taking into account reasonably (on-site) mitigation</p> <p>5 = Straightforward with positive or neutral impacts, taking into account reasonable (on-site) mitigation.</p>	<p>Clough and Associates has comprehensively reported on the four short listed sites.</p> <p>This report is currently in draft form. It needs to be updated / finalised subject to confirmation from Watercare (or at least a clear indication) of what will happen to some of the key heritage features, and in particular at the Huia WTP. Reasonable mitigation also needs to be factored into their assessment and subsequent scoring.</p> <p>Complete / updated report.</p>
6. Mana Whenua values	<p>Effects on particular sites of significance as well as on customary resources, mauri of waterbodies, wāhi tapu, etc.</p>	<p>Driven by Mana Whenua reps. Potentially a CIA.</p>		<p>Watercare to consult with Mana Whenua, including site visits, with Mana Whenua representatives.</p>

Criteria	Criteria description and approach to scoring	Anticipated detail at short list stage	Basis for scoring	Status
7. Terrestrial Ecology	Adverse impacts on terrestrial ecological values associated with a site, particularly indigenous vegetation which is nationally, regionally or locally significant in terms of habitat values and presence of known species.	Ecologist (Boffa Miskell).	As above.	As per email from Watercare on 03/03/17: Ecological effects at all four sites to be investigated based on updated footprints. Requires report on terrestrial ecology outlining effects and identifying / commenting on potential mitigation (where relevant). Then provides basis for MCA scoring.
8. Freshwater ecology	Adverse impacts on freshwater receiving environments (including from operational discharges and any works within or in proximity to a stream or wetland).	Ecologist (Boffa Miskell).	As above.	As above. Needs to take into account report on off-spec discharge options.

Criteria	Criteria description and approach to scoring	Anticipated detail at short list stage	Basis for scoring	Status
9. Landscape 9a. Landscape effects 9b. Visual effects	Adverse construction and operational impacts on visual effects and effects on existing landscape character (including degree of modification), any outstanding landscape and important landscape / natural features; visual and residential amenity.	Assessment by Landscape Architect (Boffa Miskell).	As above.	As per email from Watercare on 03/03/17: Landscape and visual effects at all four sites to be investigated and reported on based on updated footprints and plans being prepared by GHD. Report and scoring received.
10. Social and community impacts - construction	Construction effects including disruption, dislocation, noise and vibration, traffic, visual amenity, other matters including any particular H&S considerations.	Assessment by social impact specialist (Beca). Rationale to be provided for scoring.	1 = Very significant impact or risk. Mitigation is not achievable 2 = High impact or risk, with more than local effects. Downsides may outweigh potential benefits. Mitigation is not readily available or would be very costly 3 = Moderate impact, with effects that are slightly more than localised. These effects cannot be completely avoided, but mitigation is achievable at moderate cost 4 = Slight impact which is localised and minor, taking into account reasonable mitigation 5 = Straightforward with positive or neutral impacts, taking into account reasonable mitigation.	Assessment being undertaken by Beca. For the purpose of the shortlist MCA all four sites need to be reported on and scored. To be reported on by Beca at workshop

Criteria	Criteria description and approach to scoring	Anticipated detail at short list stage	Basis for scoring	Status
11. Social and community impacts - operation	Operational effects including noise and vibration, traffic, visual amenity, other matters including any particular H&S considerations.	Assessment by social impact specialist (Beca). Rationale to be provided for scoring.	As above.	As above.
12. Property risk/impacts	Number of properties, any particular challenges in terms of property acquisition/degree of difficulty	Based on further detail incl. optimised layouts and pipeline route. Scored by Watercare property specialist	1 = Significant property risk 2 = High property risk 3 = Moderate property risk 4 = Slight property risk 5 = Straightforward	WSL to report on this. Needs to include: <ul style="list-style-type: none"> No of properties affected. Development potential of properties based on area (with input from T+T on what the relevant zoning provides for). Review of CTs and any particular limitations attached to these.
13. Cost		Assessed separately. BECA.	NA – not scored.	Complete (though may need to be updated based on further developed design). Beca (Jack Brennan) to advise.
14. Planning assessment		Assessed separately. T+T	NA – not scored at shortlist stage. Instead will form part of shortlist report.	Desk-top assessment based on existing plan provisions and taking into consideration outcome of subject matter expert assessments. Identify zoning, plan objectives and policies, major impediments. Based on optimised site layouts and likely pipeline routes and site visit. Consideration of consent requirements will be included.



Huia WTP Replacement

Shortlist Challenges Session



Exceptional thinking together

www.tonkintaylor.co.nz

Process to date

1. Develop and confirm site principles: elevation, site size, location, proximity
2. Apply principles through series of GIS screening layers to id potential sites
3. Eliminate sites with fatal flaws
4. Confirm potential sites
5. Group into 8 schemes with similar characteristics
6. Undertake high level MCA on each of the 8 schemes
7. Preferred schemes shortlisted: Woodlands Park Road and Parker Road
8. Shortlist MCA of four sites (two in each scheme)

Purpose of challenge workshop

- To discuss and confirm shortlist MCA scores based on further design and assessment
- All criteria scored on a 1-5 scale
- Scores supported by a clear and robust rationale



Technical criteria

OVERARCHING CRITERIA	ASSESSMENT AND SCORING BASED ON:	DERIVED FROM:	SCORED BY:
Key site characteristics	Fit with project objectives and principles. Level of service / efficiency and effectiveness (incl. minimise pumping + distance btw WTP and reservoirs, pipes in public roads, accessibility, etc)	RMA S5, S7(b), S171 LGA S57(1) WSL Strategic Obj 2: Business excellence (resilience of assets)	Engineering specialist (GHD)
Engineering feasibility and constructability	Physical constraints such as volume/extent of earthworks, slope, access, constructability, general degree of difficulty, electricity supply	RMA S5 WSL Strategic Obj 2: Business excellence (resilience of assets)	Engineering specialist (Beca)
Operability	Degree of difficulty relating to general operability, linkages to existing services and utilities, options for off-spec and contingency discharges.	RMA S5 LGA S57(1) WSL Strategic Obj 2: Business excellence (resilience of assets)	Operations Specialist (Watercare)



Environmental, social and cultural criteria

OVERARCHING CRITERIA	ASSESSMENT AND SCORING BASED ON:	DERIVED FROM:	SCORED BY:
Traffic and Access	Effects if construction and operational traffic. Access incl. distance to the arterial or main road, nature of the main access route, whether back-up secondary access is available	RMA S5 WSL Strategic Obj 2: Business excellence (resilience of assets)	Traffic expert (Beca)
Archaeology / Heritage	Effects on archaeological and heritage sites and features	RMA S5 and S6(f) WSL Strategic Obj 4	Heritage specialist (Clough and Associates)
Social impacts	Social impacts of construction and operation	RMA S5 LGA	SIA specialist (Beca)
Mana Whenua values	Adverse impacts on particular sites of significance as well as on customary resources, mauri of waterbodies, wāhi tapu, etc.	RMA S5, S6(e), S7(a) and (aa), S8	Based on Mana Whenua consultation (including through Watercare's Kaitiaki Forum)



Environmental, social and cultural criteria

OVER-ARCHING CRITERIA	ASSESSMENT AND SCORING BASED ON:	DERIVED FROM:	SCORED BY:
Ecology: Terrestrial and Freshwater	<ol style="list-style-type: none"> 1. Adverse impacts on terrestrial ecological values associated with a site, particularly indigenous vegetation which is nationally, regionally or locally significant in terms of habitat values and presence of known species. 2. Adverse impacts on freshwater receiving environments (including from operational discharges and any works within or in proximity to a stream or wetland) 	<p>RMA S5, S6(a) and (c), S7(d)</p> <p>WSL Strategic Obj 4</p>	Ecologist (Boffa Miskell)
Landscape / visual impacts	<p>Adverse construction and operational impacts on:</p> <ol style="list-style-type: none"> 1. Visual effects and effects on existing landscape character (including degree of modification), any outstanding landscape and important landscape / natural features; 2. Visual and residential amenity. 	<p>RMA S5, S6(b) and S7(c)</p> <p>WSL Strategic Obj 4: Fully sustainable</p>	Land-scape specialist (Boffa Miskell)



Other criteria and cost

OVERARCHING CRITERIA	ASSESSMENT AND SCORING BASED ON:	DERIVED FROM:	SCORED BY:
Property impacts and challenges	Number of properties, any particular challenges in terms of property acquisition / degree of difficulty	RMA S5, S171	Property specialist (Watercare)
Consistency with planning documents / consentability	Zoning, plan objectives and policies, major impediments	RMA S5, S104, S171	NA (not scored). Reported on in shortlist report.
Cost	Land acquisition. Construction costs and operational costs	RMA S5, S7(b) LGA S57(1) WSL Strategic Obj 1 and 3 re minimum cost provider	NA (not scored)

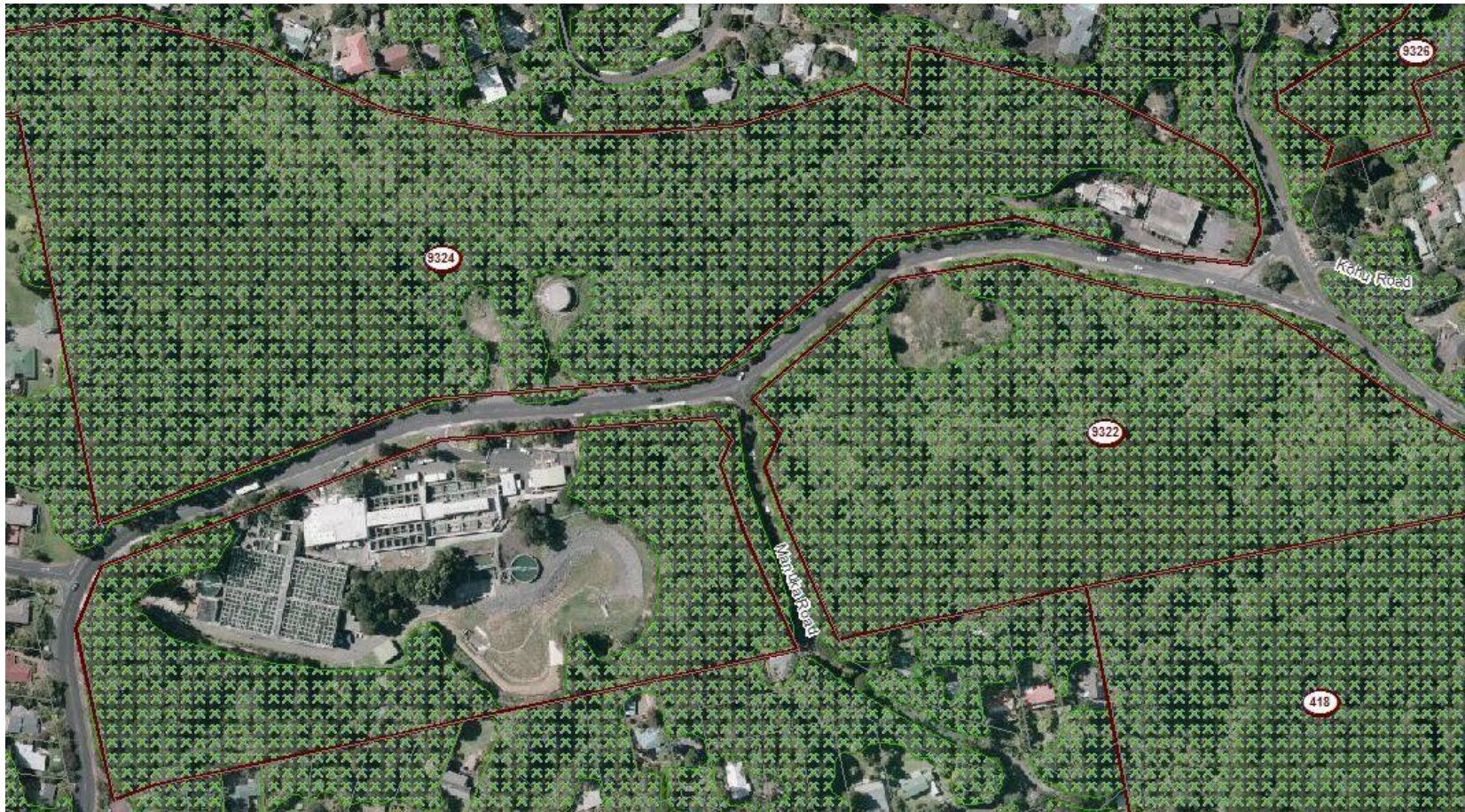


Scoring of criteria

Level of effect (guidance descriptors for 1 – 5 scale)	Score
Straightforward with positive or neutral impacts, taking into account reasonable (on-site) mitigation.	5
Slight impact which is localised and minor, taking into account reasonable (on-site) mitigation.	4
Moderate impact, with effects that are slightly more than localised. These effects cannot be completely avoided, but mitigation is achievable at moderate cost.	3
High impact, with more than local effects. Areas of significance may be affected, and the downsides may outweigh potential benefits. Mitigation is not readily available or would be very costly.	2
Very significant impact, including widespread impacts on sensitive environments (e.g. Significant Ecological Areas, areas with high significance to Mana Whenua). On-site mitigation is not achievable.	1



Questions?



Appendix B: MCA scoring results by site

MCA scoring spreadsheets;

- 1 Baseline and normalised scores**
- 2 Technical weightings**
- 3 RMA Section 6 weightings**
- 4 Overall RMA weightings**

Baseline and normalised baseline scores

		Scheme				Woodlands Park Road					Woodlands Park Road					Parker Road					Parker Road				
		Site				Manuka Road site					Existing Huia WTP site					Parker North					Parker South				
Criteria	Sub-criteria	SME sub-criteria proportional amount	Corrected SME sub-criteria proportional amount	Criteria Weighting (weighting memo)	Normalisation factor	Gross score	Baseline score (corrected based on SME proportional amount for sub-criteria)	Normalised baseline (out of 10)	Normalised score with criteria weighting	Site notes and reasons for score - opportunities/benefits, particular	Gross score	Baseline score (corrected based on SME proportional weighting for sub-criteria)	Normalised baseline (out of 10)	Normalised score with criteria weighting	Site notes and reasons for score - opportunities/benefits, particular	Gross score	Baseline score (corrected based on SME proportional weighting for sub-criteria)	Normalised baseline (out of 10)	Normalised score with criteria weighting	Site notes and reasons for score - opportunities/benefits, particular	Gross score	Baseline score (corrected based on SME proportional weighting for sub-criteria)	Normalised baseline (out of 10)	Normalised score with criteria weighting	Site notes and reasons for score - opportunities/benefits, particular
Key site characteristics	Elevation	0.25	1		0.5	4.00	4.00	2.00		Minor additional raw	5.00	5.00	2.50		Ideal elevation,	5.00	5.00	2.50		Ideal elevation,	4.00	4.00	2.00		Elevation of site presents
	Size	0.25	1		0.5	3.00	3.00	1.50		Restricted site for treatment	2.00	2.00	1.00		Restricted site for treatment	5.00	5.00	2.50		Large site suitable for all	5.00	5.00	2.50		Large site suitable for all
	Location	0.25	1		0.5	3.00	3.00	1.50		Some slope issues, a short	1.00	1.00	0.50		Sloping site, off-spec	4.00	4.00	2.00		A long tunnel not in road	4.00	4.00	2.00		A long tunnel not in road
	Proximity	0.25	1		0.5	5.00	5.00	2.50		Close proximity to	5.00	5.00	2.50		Close proximity to	2.00	2.00	1.00		The distance from Titirangi	2.00	2.00	1.00		The distance from Titirangi
	Overall score	1	4	1		15.00	15.00	7.50	7.50		13.00	13.00	6.50	6.50		16.00	16.00	8.00	8.00		15.00	15.00	7.50	7.5	
Engineering feasibility and constructability - ancillary infrastructure	Raw Water connection	0.03	0.21		0.29	4.00	0.84	0.24		Good access but restricted	5.00	1.05	0.30		Good access to the end of the	2.00	0.42	0.12		Some access challenges at	2.00	0.42	0.12		As per Parker North
	Connection to Upper Tunnel	0.02	0.14		0.29	3.00	0.42	0.12		Pipeline along Exhibition Dr-	5.00	0.70	0.20		No modification	2.00	0.28	0.08		Pipeline along Exhibition	2.00	0.28	0.08		As per Parker North
	Treated water pipeline	0.1	0.7		0.29	4.00	2.80	0.80		Short length, well	4.00	2.80	0.80		Short length, well	3.00	2.10	0.60		Long length and	3.00	2.10	0.60		As per Parker North
		0.1	0.7		0.29	3.00	2.10	0.60		Narrow roads affecting	4.00	2.80	0.80		Narrow roads affecting	2.00	1.40	0.40		Parker Road is constrained	2.00	1.40	0.40		As per Parker North but
Engineering feasibility and constructability - site	Off-spec water	0.05	0.35		0.29	3.00	1.05	0.30		Overflow/off spec storage	1.00	0.35	0.10		No overflow/off	5.00	1.75	0.50		No significant issues- space	5.00	1.75	0.50		No significant issues
	Treatment Plant	0.6	4.2		0.29	3.00	12.60	3.60		Restricted working area,	1.00	4.20	1.20		Restricted working area-	5.00	21.00	6.00		No significant issues, High	4.00	16.80	4.80		No significant issues,
	Reservoirs	0.1	0.7		0.29	3.00	2.10	0.60		Restricted site, conflict with	3.00	2.10	0.60		Restricted site, conflict with	5.00	3.50	1.00		No significant issues	4.00	2.80	0.80		Greater difficulty
	Overall score	1	7.00	1		23.00	21.91	6.26	6.26	0.00	23.00	14.00	4.00	4.00		24.00	30.45	8.70	8.70		22.00	25.55	7.30	7.30	
Operability	Headworks	0.33333	0.99999		0.67	3.00	3.00	2.00		Issue with aqueduct as	2.00	2.00	1.33		High impacts or risks. Key	3.00	3.00	2.00		Considered 4 but single	3.00	3.00	2.00		As per Parker North.
	Treatment Plant	0.33333	0.99999		0.67	3.00	3.00	2.00		Moderate. Better layout	3.00	3.00	2.00		Moderate Semi-loop	5.00	5.00	3.33		Key characteristics	5.00	5.00	3.33		While not quite the same
	Transmission of treated	0.33334	1.00002		0.67	4.00	4.00	2.67		Supply to Titirangi	4.00	4.00	2.67		Supply to Titirangi	4.00	4.00	2.67		Additional pumping	3.00	3.00	2.00		As per Parker North but
	Overall score	1	3	1		10.00	10.00	6.67	6.67		9.00	9.00	6.00	6.00		12.00	12.00	8.00	8.00		11.00	11.00	7.33	7.33332	
	SUB-TOTAL: engineering					48.00	46.91	20.43	20.43		45.00	36.00	16.50	16.50		52.00	58.45	24.70	24.70		48.00	51.55	22.13	22.13	
	Road and site access	0.25	1		0.5	4.00	4.00	2.00		Existing site and Manuka	4.00	4.00	2.00		Existing site and Manuka	2.00	2.00	1.00		Constrained in terms of width	2.00	2.00	1.00		As per Parker North.
Traffic effects	Trenching	0.25	1		0.5	4.00	4.00	2.00			4.00	4.00	2.00			3.00	3.00	1.50		Significant issue.	3.00	3.00	1.50		
	Construction Traffic	0.25	1		0.5	4.00	4.00	2.00		Have done a high level	4.00	4.00	2.00			2.00	2.00	1.00		Construction without	2.00	2.00	1.00		
	Local traffic	0.25	1		0.5	4.00	4.00	2.00			4.00	4.00	2.00			3.00	3.00	1.50			3.00	3.00	1.50		
	Overall score	1	4	1	2	16	16	8	8.00		16	16	8	8.00		10	10	5	5.00		10	10	5	5	
Heritage and archaeology	Heritage and archaeology	1	1		2	4.00	4.00	8.00		Moderate effects on	2.00	2.00	4.00		High impact on known historic	4.00	4.00	8.00		Slight impact.	5.00	5.00	10.00		No to slight effects.
	Overall score	1	1	1	2	4.00	4.00	8.00	8.00		2.00	2.00	4.00	4.00		4.00	4.00	8.00	8.00		5.00	5.00	10.00	10	
Noise effects	Noise effects - site	0.5	1		1	5.00	5.00	5.00		To comply with NZS6803:1999	5.00	5.00	5.00		To comply with NZS6803:1999	5.00	5.00	5.00		To comply with NZS6803:1999	5.00	5.00	5.00		To comply with NZS6803:1999
	Noise effects - operation of	0.5	1		1	3.00	3.00	3.00		3rd: Required acoustic	2.00	2.00	2.00		4th: Highest level of	5.00	5.00	5.00		1st: Lowest (with Parker	5.00	5.00	5.00		2nd: Second lowest level of
	Overall score	1	2	1	2	8.00	8.00	8.00	8.00		7.00	7.00	7.00	7.00		10.00	10.00	10.00	10.00		10.00	10.00	10.00	10	
Ecology	Terrestrial Ecology	0.5	1		1	2.00	2.00	2.00		Both main WTP and	1.00	1.00	1.00		Clearance of approximately	5.00	5.00	5.00		No significant vegetation or	1.00	1.00	1.00		This option (as envisaged)
	Freshwater ecology	0.5	1		1	3.00	3.00	3.00		No mitigation for the loss of	3.00	3.00	3.00		Armstrong Gully stream is	4.00	4.00	4.00		No significant adverse	1.00	1.00	1.00		Indicative layout shows
	Overall score	1	2	1	2	5.00	5.00	5.00	5.00		4.00	4.00	4.00	4.00		9.00	9.00	9.00	9.00		2.00	2.00	2.00	2	
Visual	Landscape effects	0.5	1		1	2.00	2.00	2.00		Moderate high / high adverse	3.00	3.00	3.00		Moderate adverse	3.00	3.00	3.00		Some landform	2.00	2.00	2.00		Some impact on identified

Landscape and effects	Visual effects	0.5	1		1	2.00	2.00	2.00		Initially high potentially adverse effects	3.00	3.00	3.00		Moderate adverse visual effects	3.00	3.00	3.00		Small catchment but potentially adverse effects	3.00	3.00	3.00		Small catchment but potentially adverse effects
	Overall score	1	2	1	2	4.00	4.00	4.00	4.00		6.00	6.00	6.00	6.00		6.00	6.00	6.00	6.00		5.00	5.00	5.00	5	
Overall social effects	Way of Life	0.4	1.2		0.67	4.00	4.80	3.20		Impact on those who live on Manuka	5.00	6.00	4.00		No change to the existing way of life as	1.00	1.20	0.80		Large number of people and significant	1.00	1.20	0.80		Large number of people and significant
	Community cohesion	0.4	1.2		0.67	5.00	6.00	4.00		Due the existing plant being nearby	5.00	6.00	4.00		Community expects a plant to be there so	1.00	1.20	0.80		Significant impact which is widespread	2.00	2.40	1.60		Significant impact on a moderate
	Sustaining one's self	0.2	0.6		0.67	4.00	2.40	1.60		Negligible long term	4.00	2.40	1.60		Negligible long term	2.00	1.20	0.80		Significant impact that	3.00	1.80	1.20		Significant impact that
	Overall score	1	3	1	2.00	13.00	13.20	8.80	8.80		14.00	14.40	9.60	9.60		4.00	3.60	2.40	2.40		6.00	5.40	3.60	3.6	
	SUB-TOTAL: environmental	6	14	6	12	50.00	50.20	41.80	41.80		49.00	49.40	38.60	38.60		43.00	42.60	40.40	40.40		38.00	37.40	35.60	35.60	
Property impact	Property Impacts	1	1		2	5.00	5.00	10.00		Watercare owns the site.	5.00	5.00	10.00		Watercare owns the site	1.00	1.00	2.00		As at December	1.00	1.00	2.00		In excess of a dozen
	Overall score	1	1	1	2	5.00	5.00	10.00	10.00		5.00	5.00	10.00	10.00		1.00	1.00	2.00	2.00		1.00	1.00	2.00	2	
	SUB-TOTAL: property	1	1	1	2	5.00	5.00	10.00	10.00		5.00	5.00	10.00	10.00		1.00	1.00	2.00	2.00		1.00	1.00	2.00	2	
TOTAL (NON-COST ATTRIBUTES)						103.00	102.11	72.23	72.23		99.00	90.40	65.10	65.10		96.00	102.05	67.10	67.10		87.00	89.95	59.73	59.73	

Technical weightings

Document:		Scheme				Woodlands Park Road				Woodlands Park Road				Parker Road				Parker Road			
		Site				Manuka Road site				Existing Huia WTP site				Parker North				Parker South			
Criteria	Sub-criteria	SME sub-criteria proportional amount	Corrected SME sub-criteria	Criteria Weighting	Normalisation factor	Gross score	Baseline score (corrected based on SME)	Normalised baseline (out of 10)	Normalised score with criteria weighting	Gross score	Baseline score (corrected based on SME)	Normalised baseline (out of 10)	Normalised score with criteria weighting	Gross score	Baseline score (corrected based on SME)	Normalised baseline (out of 10)	Normalised score with criteria weighting	Gross score	Baseline score (corrected based on SME)	Normalised baseline (out of 10)	Normalised score with criteria weighting
Key site characteristics	Elevation	0.25	1		0.5	4.00	4.00	2.00		5.00	5.00	2.50		5.00	5.00	2.50		4.00	4.00	2.00	
	Size	0.25	1		0.5	3.00	3.00	1.50		2.00	2.00	1.00		5.00	5.00	2.50		5.00	5.00	2.50	
	Location	0.25	1		0.5	3.00	3.00	1.50		1.00	1.00	0.50		4.00	4.00	2.00		4.00	4.00	2.00	
	Proximity	0.25	1		0.5	5.00	5.00	2.50		5.00	5.00	2.50		2.00	2.00	1.00		2.00	2.00	1.00	
	Overall score	1	4	2		15.00	15.00	7.50	15.00	13.00	13.00	6.50	13.00	16.00	16.00	8.00	16.00	15.00	15.00	7.50	15
Engineering feasibility and constructability - ancillary infrastructure	Raw Water	0.03	0.21		0.29	4.00	0.84	0.24		5.00	1.05	0.30		2.00	0.42	0.12		2.00	0.42	0.12	
	Connection to	0.02	0.14		0.29	3.00	0.42	0.12		5.00	0.70	0.20		2.00	0.28	0.08		2.00	0.28	0.08	
	Tunnel	0.1	0.7		0.29	4.00	2.80	0.80		4.00	2.80	0.80		3.00	2.10	0.60		3.00	2.10	0.60	
	Treated water	0.1	0.7		0.29	3.00	2.10	0.60		4.00	2.80	0.80		2.00	1.40	0.40		2.00	1.40	0.40	
Engineering feasibility and constructability - site	Off-spec	0.05	0.35		0.29	3.00	1.05	0.30		1.00	0.35	0.10		5.00	1.75	0.50		5.00	1.75	0.50	
	Treatment	0.6	4.2		0.29	3.00	12.60	3.60		1.00	4.20	1.20		5.00	21.00	6.00		4.00	16.80	4.80	
	Reservoirs	0.1	0.7		0.29	3.00	2.10	0.60		3.00	2.10	0.60		5.00	3.50	1.00		4.00	2.80	0.80	
	Overall score	1	7.00	4		23.00	21.91	6.26	25.04	23.00	14.00	4.00	16.00	24.00	30.45	8.70	34.80	22.00	25.55	7.30	29.20
Operability	Headworks	0.333	1		0.67	3.00	3.00	2.00		2.00	2.00	1.33		3.00	3.00	2.00		3.00	3.00	2.00	
	Treatment	0.333	1		0.67	3.00	3.00	2.00		3.00	3.00	2.00		5.00	5.00	3.33		5.00	5.00	3.33	
	Transmission	0.333	1		0.67	4.00	4.00	2.67		4.00	4.00	2.67		4.00	4.00	2.67		3.00	3.00	2.00	
	Overall score	1	3	10		10.00	10.00	6.67	66.67	9.00	9.00	6.00	60.00	12.00	12.00	8.00	80.00	11.00	11.00	7.33	73.3332
	SUB-TOTAL					48.00	46.91	20.43	106.71	45.00	36.00	16.50	89.00	52.00	58.45	24.70	130.80	48.00	51.55	22.13	117.53
	Road and site	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		2.00	2.00	1.00		2.00	2.00	1.00	
Traffic effects	Trenching	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		3.00	3.00	1.50		3.00	3.00	1.50	
	Construction	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		2.00	2.00	1.00		2.00	2.00	1.00	
	Local traffic	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		3.00	3.00	1.50		3.00	3.00	1.50	
	Overall score	1	4	2	2	16	16	8	16.00	16	16	8	16.00	10	10	5	10.00	10	10	5	10
Heritage and archaeology	Heritage and	1	1		2	4.00	4.00	8.00		2.00	2.00	4.00		4.00	4.00	8.00		5.00	5.00	10.00	
	Overall score	1	1	1	2	4.00	4.00	8.00	8.00	2.00	2.00	4.00	4.00	4.00	4.00	8.00	8.00	5.00	5.00	10.00	10
Noise effects	Noise effects - site	0.5	1		1	5.00	5.00	5.00		5.00	5.00	5.00		5.00	5.00	5.00		5.00	5.00	5.00	
	Noise effects - adjacent	0.5	1		1	3.00	3.00	3.00		2.00	2.00	2.00		5.00	5.00	5.00		5.00	5.00	5.00	
	Overall score	1	2	4	2	8.00	8.00	8.00	32.00	7.00	7.00	7.00	28.00	10.00	10.00	10.00	40.00	10.00	10.00	10.00	40
Ecology	Terrestrial Ecology	0.5	1		1	2.00	2.00	2.00		1.00	1.00	1.00		5.00	5.00	5.00		1.00	1.00	1.00	
	Freshwater	0.5	1		1	3.00	3.00	3.00		3.00	3.00	3.00		4.00	4.00	4.00		1.00	1.00	1.00	
	Overall score	1	2	1	2	5.00	5.00	5.00	5.00	4.00	4.00	4.00	4.00	9.00	9.00	9.00	9.00	2.00	2.00	2.00	2
Landscape and visual effects	Landscape effects	0.5	1		1	2.00	2.00	2.00		3.00	3.00	3.00		3.00	3.00	3.00		2.00	2.00	2.00	
	Visual effects	0.5	1		1	2.00	2.00	2.00		3.00	3.00	3.00		3.00	3.00	3.00		3.00	3.00	3.00	
	Overall score	1	2	1	2	4.00	4.00	4.00	4.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.00	5.00	5.00	5
Overall social effects	Way of Life	0.4	1.2		0.67	4.00	4.80	3.20		5.00	6.00	4.00		1.00	1.20	0.80		1.00	1.20	0.80	
	Community cohesion	0.4	1.2		0.67	5.00	6.00	4.00		5.00	6.00	4.00		1.00	1.20	0.80		2.00	2.40	1.60	
	Sustaining	0.2	0.6		0.67	4.00	2.40	1.60		4.00	2.40	1.60		2.00	1.20	0.80		3.00	1.80	1.20	
	Overall score	1	3	1	2.00	13.00	13.20	8.80	8.80	14.00	14.40	9.60	9.60	4.00	3.60	2.40	2.40	6.00	5.40	3.60	3.6

Property impact	Property	1	1		2	5.00	5.00	10.00		5.00	5.00	10.00		1.00	1.00	2.00		1.00	1.00	2.00	
	Overall score	1	1	1	2	5.00	5.00	10.00	10.00	5.00	5.00	10.00	10.00	1.00	1.00	2.00	2.00	1.00	1.00	2.00	2
	SUB-TOTA	1	1	1	2	5.00	5.00	10.00	10.00	5.00	5.00	10.00	10.00	1.00	1.00	2.00	2.00	1.00	1.00	2.00	2
TOTAL (NON-COST ATTRIBUTES)						103	102	72	191	99	90	65	167	96	102	67	208	87	90	60	190

RMA Section 6 weightings

Main structures		Scheme				Woodlands Park Road				Woodlands Park Road				Parker Road				Parker Road			
		Site				Manuka Road site				Existing Huia WTP site				Parker North				Parker South			
Criteria	Sub-criteria	SME sub-criteria proportional amount	Corrected SME sub-criteria proportional amount	Criteria Weighting (weighting memo)	Normalisation factor	Gross score	Baseline score (corrected based on SME proportional amount for sub criteria)	Normalised baseline (out of 10)	Normalised score with criteria weighting	Gross score	Baseline score (corrected based on SME proportional weighting for sub criteria)	Normalised baseline (out of 10)	Normalised score with criteria weighting	Gross score	Baseline score (corrected based on SME proportional weighting for sub criteria)	Normalised baseline (out of 10)	Normalised score with criteria weighting	Gross score	Baseline score (corrected based on SME proportional weighting for sub criteria)	Normalised baseline (out of 10)	Normalised score with criteria weighting
Key site characteristics	Elevation	0.25	1		0.5	4.00	4.00	2.00		5.00	5.00	2.50		5.00	5.00	2.50		4.00	4.00	2.00	
	Size	0.25	1		0.5	3.00	3.00	1.50		2.00	2.00	1.00		5.00	5.00	2.50		5.00	5.00	2.50	
	Location	0.25	1		0.5	3.00	3.00	1.50		1.00	1.00	0.50		4.00	4.00	2.00		4.00	4.00	2.00	
	Proximity	0.25	1		0.5	5.00	5.00	2.50		5.00	5.00	2.50		2.00	2.00	1.00		2.00	2.00	1.00	
	Overall score	1	4	1		15.00	15.00	7.50	7.50	13.00	13.00	6.50	6.50	16.00	16.00	8.00	8.00	15.00	15.00	7.50	7.5
Engineering feasibility and constructability - ancillary infrastructure	Raw Water connection	0.03	0.21		0.29	4.00	0.84	0.24		5.00	1.05	0.30		2.00	0.42	0.12		2.00	0.42	0.12	
	Connection to Upper	0.02	0.14		0.29	3.00	0.42	0.12		5.00	0.70	0.20		2.00	0.28	0.08		2.00	0.28	0.08	
	Tunnel	0.1	0.7		0.29	4.00	2.80	0.80		4.00	2.80	0.80		3.00	2.10	0.60		3.00	2.10	0.60	
	Treated water pipeline	0.1	0.7		0.29	3.00	2.10	0.60		4.00	2.80	0.80		2.00	1.40	0.40		2.00	1.40	0.40	
Engineering feasibility and constructability - site	Off-spec water	0.05	0.35		0.29	3.00	1.05	0.30		1.00	0.35	0.10		5.00	1.75	0.50		5.00	1.75	0.50	
	Treatment Plant	0.6	4.2		0.29	3.00	12.60	3.60		1.00	4.20	1.20		5.00	21.00	6.00		4.00	16.80	4.80	
	Reservoirs	0.1	0.7		0.29	3.00	2.10	0.60		3.00	2.10	0.60		5.00	3.50	1.00		4.00	2.80	0.80	
	Overall score	1	7.00	1		23.00	21.91	6.26	6.26	23.00	14.00	4.00	4.00	24.00	30.45	8.70	8.70	22.00	25.55	7.30	7.30
Operability	Headworks	0.33333	0.99999		0.67	3.00	3.00	2.00		2.00	2.00	1.33		3.00	3.00	2.00		3.00	3.00	2.00	
	Treatment Plant	0.33333	0.99999		0.67	3.00	3.00	2.00		3.00	3.00	2.00		5.00	5.00	3.33		5.00	5.00	3.33	
	Transmission of treated	0.33334	1.00002		0.67	4.00	4.00	2.67		4.00	4.00	2.67		4.00	4.00	2.67		3.00	3.00	2.00	
	Overall score	1	3	1		10.00	10.00	6.67	6.67	9.00	9.00	6.00	6.00	12.00	12.00	8.00	8.00	11.00	11.00	7.33	7.33332
	SUB-TOTAL: engineering					48.00	46.91	20.43	20.43	45.00	36.00	16.50	16.50	52.00	58.45	24.70	24.70	48.00	51.55	22.13	22.13
	Road and site access	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		2.00	2.00	1.00		2.00	2.00	1.00	
Traffic effects	Trenching	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		3.00	3.00	1.50		3.00	3.00	1.50	
	Construction Traffic	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		2.00	2.00	1.00		2.00	2.00	1.00	
	Local traffic	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		3.00	3.00	1.50		3.00	3.00	1.50	
	Overall score	1	4	1	2	16	16	8	8.00	16	16	8	8.00	10	10	5	5.00	10	10	5	5
Heritage and archaeology	Heritage and archaeology	1	1		2	4.00	4.00	8.00		2.00	2.00	4.00		4.00	4.00	8.00		5.00	5.00	10.00	
	Overall score	1	1	10	2	4.00	4.00	8.00	80.00	2.00	2.00	4.00	40.00	4.00	4.00	8.00	80.00	5.00	5.00	10.00	100
Effects	Noise effects - site construction	0.5	1		1	5.00	5.00	5.00		5.00	5.00	5.00		5.00	5.00	5.00		5.00	5.00	5.00	

Noise effects	Noise effects - operation of plant	0.5	1		1	3.00	3.00	3.00		2.00	2.00	2.00		5.00	5.00	5.00		5.00	5.00	5.00	
	Overall score	1	2	1	2	8.00	8.00	8.00	8.00	7.00	7.00	7.00	7.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10
Ecology	Terrestrial Ecology	1	2		2	2.00	4.00	8.00		1.00	2.00	4.00		5.00	10.00	20.00		1.00	2.00	4.00	
	Freshwater ecology	0	0		0	3.00	0.00	0.00		3.00	0.00	0.00		4.00	0.00	0.00		1.00	0.00	0.00	
	Overall score	1	2	10	2	5.00	4.00	8.00	80.00	4.00	2.00	4.00	40.00	9.00	10.00	20.00	100.00	2.00	2.00	4.00	40
Landscape and visual effects	Landscape effects	0.5	1		1	2.00	2.00	2.00		3.00	3.00	3.00		3.00	3.00	3.00		2.00	2.00	2.00	
	Visual effects	0.5	1		1	2.00	2.00	2.00		3.00	3.00	3.00		3.00	3.00	3.00		3.00	3.00	3.00	
	Overall score	1	2	1	2	4.00	4.00	4.00	4.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.00	5.00	5.00	5
Overall social effects	Way of Life	0.4	1.2		0.67	4.00	4.80	3.20		5.00	6.00	4.00		1.00	1.20	0.80		1.00	1.20	0.80	
	Community cohesion	0.4	1.2		0.67	5.00	6.00	4.00		5.00	6.00	4.00		1.00	1.20	0.80		2.00	2.40	1.60	
	Sustaining one's self	0.2	0.6		0.67	4.00	2.40	1.60		4.00	2.40	1.60		2.00	1.20	0.80		3.00	1.80	1.20	
	Overall score	1	3	1	2.00	13.00	13.20	8.80	8.80	14.00	14.40	9.60	9.60	4.00	3.60	2.40	2.40	6.00	5.40	3.60	3.6
	SUB-TOTAL: environmental	6	14	24	12	50.00	49.20	44.80	188.80	49.00	47.40	38.60	110.60	43.00	43.60	51.40	203.40	38.00	37.40	37.60	163.60
Property impact	Property Impacts	1	1		2	5.00	5.00	10.00		5.00	5.00	10.00		1.00	1.00	2.00		1.00	1.00	2.00	
	Overall score	1	1	1	2	5.00	5.00	10.00	10.00	5.00	5.00	10.00	10.00	1.00	1.00	2.00	2.00	1.00	1.00	2.00	2
	SUB-TOTAL: property	1	1	1	2	5.00	5.00	10.00	10.00	5.00	5.00	10.00	10.00	1.00	1.00	2.00	2.00	1.00	1.00	2.00	2
TOTAL (NON-COST ATTRIBUTES)						103	101	75	219	99	88	65	137	96	103	78	230	87	90	62	188

Overall RMA weightings

ment:		Scheme				Woodlands Park Road				Woodlands Park Road				Parker Road				Parker Road			
		Site				Manuka Road site				Existing Huia WTP site				Parker North				Parker South			
Criteria	Sub-criteria	SME sub-criteria proportional amount	Corrected SME sub-criteria proportional	Criteria Weighting	Normalisation factor	Gross score	Baseline score (corrected based on SME)	Normalised baseline (out of 10)	Normalised score with criteria weight	Gross score	Baseline score (corrected based on SME)	Normalised baseline (out of 10)	Normalised score with criteria weight	Gross score	Baseline score (corrected based on SME)	Normalised baseline (out of 10)	Normalised score with criteria weight	Gross score	Baseline score (corrected based on SME)	Normalised baseline (out of 10)	Normalised score with criteria weight
Key site characteristics	Elevation	0.25	1		0.5	4.00	4.00	2.00		5.00	5.00	2.50		5.00	5.00	2.50		4.00	4.00	2.00	
	Size	0.25	1		0.5	3.00	3.00	1.50		2.00	2.00	1.00		5.00	5.00	2.50		5.00	5.00	2.50	
	Location	0.25	1		0.5	3.00	3.00	1.50		1.00	1.00	0.50		4.00	4.00	2.00		4.00	4.00	2.00	
	Proximity	0.25	1		0.5	5.00	5.00	2.50		5.00	5.00	2.50		2.00	2.00	1.00		2.00	2.00	1.00	
	Overall score	1	4	2		15.00	15.00	7.50	15.00	13.00	13.00	6.50	13.00	16.00	16.00	8.00	16.00	15.00	15.00	7.50	15.00
Engineering feasibility and constructability - ancillary infrastructure	Raw Water	0.03	0.21		0.29	4.00	0.84	0.24		5.00	1.05	0.30		2.00	0.42	0.12		2.00	0.42	0.12	
	Connection to	0.02	0.14		0.29	3.00	0.42	0.12		5.00	0.70	0.20		2.00	0.28	0.08		2.00	0.28	0.08	
	Tunnel	0.1	0.7		0.29	4.00	2.80	0.80		4.00	2.80	0.80		3.00	2.10	0.60		3.00	2.10	0.60	
	Treated water	0.1	0.7		0.29	3.00	2.10	0.60		4.00	2.80	0.80		2.00	1.40	0.40		2.00	1.40	0.40	
Engineering feasibility and constructability - site	Off-spec	0.05	0.35		0.29	3.00	1.05	0.30		1.00	0.35	0.10		5.00	1.75	0.50		5.00	1.75	0.50	
	Treatment	0.6	4.2		0.29	3.00	12.60	3.60		1.00	4.20	1.20		5.00	21.00	6.00		4.00	16.80	4.80	
	Reservoirs	0.1	0.7		0.29	3.00	2.10	0.60		3.00	2.10	0.60		5.00	3.50	1.00		4.00	2.80	0.80	
	Overall score	1	7.00	4		23.00	21.91	6.26	25.04	23.00	14.00	4.00	16.00	24.00	30.45	8.70	34.80	22.00	25.55	7.30	29.20
Operability	Headworks	0.33333	0.99999		0.67	3.00	3.00	2.00		2.00	2.00	1.33		3.00	3.00	2.00		3.00	3.00	2.00	
	Treatment Plant	0.33333	0.99999		0.67	3.00	3.00	2.00		3.00	3.00	2.00		5.00	5.00	3.33		5.00	5.00	3.33	
	Transmission of	0.33334	1.00002		0.67	4.00	4.00	2.67		4.00	4.00	2.67		4.00	4.00	2.67		3.00	3.00	2.00	
	Overall score	1	3	6		10.00	10.00	6.67	40.00	9.00	9.00	6.00	36.00	12.00	12.00	8.00	48.00	11.00	11.00	7.33	44.00
	SUB-TOTAL					48.00	46.91	20.43	80.04	45.00	36.00	16.50	65.00	52.00	58.45	24.70	98.80	48.00	51.55	22.13	88.20
	Road and site	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		2.00	2.00	1.00		2.00	2.00	1.00	
Traffic effects	Trenching	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		3.00	3.00	1.50		3.00	3.00	1.50	
	Construction	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		2.00	2.00	1.00		2.00	2.00	1.00	
	Local traffic	0.25	1		0.5	4.00	4.00	2.00		4.00	4.00	2.00		3.00	3.00	1.50		3.00	3.00	1.50	
	Overall score	1	4	4	2	16	16	8	32.00	16	16	8	32.00	10	10	5	20.00	10	10	5	20.00
Heritage and archaeology	Heritage and archaeology	1	1		2	4.00	4.00	8.00		2.00	2.00	4.00		4.00	4.00	8.00		5.00	5.00	10.00	
	Overall score	1	1	6	2	4.00	4.00	8.00	48.00	2.00	2.00	4.00	24.00	4.00	4.00	8.00	48.00	5.00	5.00	10.00	60.00
Noise effects	Noise effects - site	0.5	1		1	5.00	5.00	5.00		5.00	5.00	5.00		5.00	5.00	5.00		5.00	5.00	5.00	
	Noise effects - operation	0.5	1		1	3.00	3.00	3.00		2.00	2.00	2.00		5.00	5.00	5.00		5.00	5.00	5.00	
	Overall score	1	2	2	2	8.00	8.00	8.00	16.00	7.00	7.00	7.00	14.00	10.00	10.00	10.00	20.00	10.00	10.00	10.00	20.00
Ecology	Terrestrial Ecology	1	1		1	2.00	2.00	2.00		1.00	1.00	1.00		5.00	5.00	5.00		1.00	1.00	1.00	
	Freshwater	0	1		1	3.00	3.00	3.00		3.00	3.00	3.00		4.00	4.00	4.00		1.00	1.00	1.00	
	Overall score	1	2	10	2	5.00	5.00	5.00	40.00	4.00	4.00	4.00	20.00	9.00	9.00	9.00	100.00	2.00	2.00	2.00	20.00
Landscape and visual effects	Landscape effects	0.5	1		1	2.00	2.00	2.00		3.00	3.00	3.00		3.00	3.00	3.00		2.00	2.00	2.00	
	Visual effects	0.5	1		1	2.00	2.00	2.00		3.00	3.00	3.00		3.00	3.00	3.00		3.00	3.00	3.00	
	Overall score	1	2	4	2	4.00	4.00	4.00	16.00	6.00	6.00	6.00	24.00	6.00	6.00	6.00	24.00	5.00	5.00	5.00	20.00
Social effects	Way of Life	0.4	1.2		0.67	4.00	4.80	3.20		5.00	6.00	4.00		1.00	1.20	0.80		1.00	1.20	0.80	
	Community cohesion	0.4	1.2		0.67	5.00	6.00	4.00		5.00	6.00	4.00		1.00	1.20	0.80		2.00	2.40	1.60	

Overall social	Sustaini ng	0.2	0.6		0.67	4.00	2.40	1.60		4.00	2.40	1.60		2.00	1.20	0.80		3.00	1.80	1.20	
	Overall score	1	3	10	2.00	13.00	13.20	8.80	88.00	14.00	14.40	9.60	96.00	4.00	3.60	2.40	24.00	6.00	5.40	3.60	36.00
	SUB- TOTAL	6	14	36	12	50.00	50.20	41.80	240.00	49.00	49.40	38.60	210.00	43.00	42.60	40.40	236.00	38.00	37.40	35.60	176.00
Property impact	Propert y	1	1		2	5.00	5.00	10.00		5.00	5.00	10.00		1.00	1.00	2.00		1.00	1.00	2.00	
	Overall score	1	1	2	2	5.00	5.00	10.00	20.00	5.00	5.00	10.00	20.00	1.00	1.00	2.00	4.00	1.00	1.00	2.00	4.00
	SUB- TOTAL	1	1	2	2	5.00	5.00	10.00	20.00	5.00	5.00	10.00	20.00	1.00	1.00	2.00	4.00	1.00	1.00	2.00	4.00
TOTAL (NON- COST ATTRIB UTES)						103	102	72	340	99	90	65	295	96	102	67	339	87	90	60	268

Appendix C: Technical reports

- 1 **Shortlist Site Development Report**
Huia WTP Site Selection Study: Shortlist Site Development Report, prepared by GHD, dated September 2016.
- 2 **DRAFT Addendum to the Shortlist Site Development Report**
Huia WTP Site Selection Study: DRAFT Addendum to the Shortlist Site Development Report, prepared by GHD, dated May 2017.
- 3 **Ancillary Structures Summary Report**
Huia Site Selection: Ancillary Structures Summary Report, prepared by CH2M Beca Limited, dated 20 September 2016.
- 4 **Constructability Comparison Report**
Draft: Huia Site Options Constructability Comparison. Prepared by CH2MBeca, dated 30 March 2017.
- 5 **Operability Draft Report**
Huia Water Treatment Plant Replacement – Operations Review of Site Alternatives. Prepared by Watercare Services Ltd, dated 9 May 2017.
- 6 **Traffic Technical Report**
Huia Water Treatment Plant Replacement Technical Note. Prepared by CH2M Beca Ltd, dated 2 May 2017.
- 7 **Noise Report**
Huia WTP Short-listed Site Noise Contours and Memo. Prepared by Marshall Day Acoustics, dated June 2016.
- 8 **Landscape and Visual Effects Assessment**
Huia Water Treatment Plan Shortlist Options Analysis: Landscape and Visual Effects Evaluation Report. Prepared by Boffa Miskell Ltd, dated 8 May 2017.
- 9 **Ecology Report**
Huia Water Treatment Plan Shortlist Options Analysis: Ecological Effects Evaluation Report. Prepared by Boffa Miskell Ltd, dated 8 May 2017.
- 10 **SIA Summary Document**
Social Impact Assessment (SIA) Summary Document. Prepared by Beca, dated 11 August 2017 (and DRAFT dated 9 May 2017).
- 11 **Heritage Report**
Huia Water Treatment Plant Replacement Options: Historic Heritage Assessment. Prepared by Clough and Associates, dated April 2017.

Appendix D: Sensitivity analysis

- 1 **Sensitivity analysis worksheet**
- 2 **Sensitivity analysis worksheet 2**

Sensitivity Analysis Worksheet - Weightings from 1 to 10

Key Site Characteristics

		Normalised base	1	2	3	4	5	6	7	8	9	10
Manuka Road Existing site Parker Road North Parker Road South	Manuka Rd remains as the preferred option and Parker Rd North as second option	72	72	80	87	95	102	110	117	125	132	140
		65	65	72	78	85	91	98	104	111	117	124
		67	67	75	83	91	99	107	115	123	131	139
		60	60	67	75	82	90	97	105	112	120	127

Constructability

		Normalised base	1	2	3	4	5	6	7	8	9	10
Manuka Road Existing site Parker Road North Parker Road South	Parker north becomes preferred site. Manuka Rd becomes the second option	72	72	78	85	91	97	104	110	116	122	129
		65	65	69	73	77	81	85	89	93	97	101
		67	67	76	85	93	102	111	119	128	137	145
		60	70	67	74	82	89	96	104	111	118	125

Operability

		Normalised base	1	2	3	4	5	6	7	8	9	10
Manuka Road Existing site Parker Road North Parker Road South	Parker north becomes preferred site. Manuka Rd becomes the second option	72	72	79	86	92	99	106	112	119	126	132
		65	65	71	77	83	89	95	101	107	113	119
		67	67	75	83	91	99	107	115	123	131	139
		60	60	67	74	82	89	96	104	111	118	126

Traffic effects

		Normalised base	1	2	3	4	5	6	7	8	9	10
Manuka Road Existing site Parker Road North Parker Road South	The existing site becomes the second preferred option	72	72	80	88	96	104	112	120	128	136	144
		65	65	73	81	89	97	105	113	121	129	137
		67	67	72	77	82	87	92	97	102	107	112
		60	60	65	70	75	80	85	90	95	100	105

Heritage and Archaeology

		Normalised base	1	2	3	4	5	6	7	8	9	10
Manuka Road Existing site Parker Road North Parker Road South	Parker south becomes preferred site. Manuka road remains as second option. The existing site quickly becomes the lowest ranked site.	72	72	80	88	96	104	112	120	128	136	144
		65	65	69	73	77	81	85	89	93	97	101
		67	67	75	83	91	99	107	115	123	131	139
		60	60	70	80	90	100	110	120	130	140	150

Noise

		Normalised base	1	2	3	4	5	6	7	8	9	10
Manuka Road Existing site Parker Road North Parker Road South	After weighting noise, Parker north quickly becomes the preferred site and Parker South becomes the second option	72	72	80	88	96	104	112	120	128	136	144
		65	65	72	79	86	93	100	107	114	121	128
		67	67	77	87	97	107	117	127	137	147	157
		60	60	70	80	90	100	110	120	130	140	150

Ecology

		Normalised base	1	2	3	4	5	6	7	8	9	10
Manuka Road Existing site Parker Road North Parker Road South	Parker north quickly becomes the preferred site when ecology is weighted. Manuka Rd stays as second option	72	72	77	82	87	92	97	102	107	112	117
		65	65	69	73	77	81	85	89	93	97	101
		67	67	76	85	94	103	112	121	130	139	148
		60	60	62	64	66	68	70	72	74	76	78

Landscape and visual

		Normalised base	1	2	3	4	5	6	7	8	9	10
Manuka Road Existing site Parker Road North Parker Road South	When landscape and visual is weighted, Parker Road North becomes the preferred option over Manuka Road and the existing site is the second option	72	72	76	80	84	88	92	96	100	104	108
		65	65	71	77	83	89	95	101	107	113	119
		67	67	73	79	85	91	97	103	109	115	121
		60	60	65	70	75	80	85	90	95	100	105

Social

		Normalised base	1	2	3	4	5	6	7	8	9	10
Manuka Road Existing site Parker Road North Parker Road South	The existing site becomes the preferred site when weighted very highly and Parker North falls to last place	72	72	81	90	99	107	116	125	134	143	151
		65	65	75	84	94	104	113	123	132	142	152
		67	67	70	72	74	77	79	82	84	86	89
		60	60	63	67	71	74	78	81	85	89	92

Property Impact

		Normalised base	1	2	3	4	5	6	7	8	9	10
Manuka Road Existing site Parker Road North Parker Road South	No sensitivity	72	72	82	92	102	112	122	132	142	152	162
		65	65	75	85	95	105	115	125	135	145	155
		67	67	69	71	73	75	77	79	81	83	85
		60	60	62	64	66	68	70	72	74	76	78

Sensitivity Analysis Worksheet 2 - RMA Section 6 and terrestrial ecology increasingly weighted from 1 to 10

Section 6 matters (terrestrial ecology and heritage and archaeology)

Section 6 matters (terrestrial ecology and heritage and archaeology)		Normalised baseline score (0)	1	2	3	4	5	6	7	8	9	10
Manuka Road	Options sensitive to S6 weighting. Parker Road North becomes preferred option with weighting of 2 applied. Manuka Road moves to second ranked site and existing site moves to lowest ranked site.	75	75	91	107	123	139	155	171	187	203	219
Existing site		65	65	73	81	89	97	105	113	121	129	137
Parker Road North		67	67	106	134	162	190	218	246	274	302	330
Parker Road South		62	62	76	90	104	118	132	146	160	174	188

Terrestrial ecology

<u>Terrestrial ecology</u>		(0)	1	2	3	4	5	6	7	8	9	10
Manuka Road	Manuka Road and Parker North remain the 1st and 2nd ranked sites, respectively.	75	75	83	91	99	107	115	123	131	139	147
Existing site		65	69	73	77	81	85	89	93	97	101	
Parker Road North	However the gap between these two sites increases considerable. The existing site and Parker Road South remain the 3rd and 4th ranked sites, respectively.	78	78	98	118	138	158	178	198	218	238	258
Parker Road South		62	62	66	70	74	78	82	86	90	94	98

Appendix E: Workshop minutes

- 1 **Watercare challenges session April 2017**
- 2 **Shortlist workshop 1 minutes 13 April 2017**
- 3 **Shortlist workshop 2 draft minutes 29 April 2017**
- 4 **Shortlist workshop 3 draft minutes 16 May 2017**



Huia WTP Replacement

Shortlist Challenges Session



Process to date



1. Develop and confirm site principles: elevation, site size, location, proximity
2. Apply principles through series of GIS screening layers to id potential sites
3. Eliminate sites with fatal flaws
4. Confirm potential sites
5. Group into 8 schemes with similar characteristics
6. Undertake high level MCA on each of the 8 schemes
7. Preferred schemes shortlisted: Woodlands Park Road and Parker Road
8. Shortlist MCA of four sites (two in each scheme)

Purpose of challenge workshop

- To discuss and confirm shortlist MCA scores based on further design and assessment
- All criteria scored on a 1-5 scale
- Scores supported by a clear and robust rationale

Technical criteria

OVERARCHING CRITERIA	ASSESSMENT AND SCORING BASED ON:	DERIVED FROM:	SCORED BY:
Key site characteristics	Fit with project objectives and principles. Level of service / efficiency and effectiveness (incl. minimise pumping + distance btw WTP and reservoirs, pipes in public roads, accessibility, etc)	RMA S5, S7(b), S171 LGA S57(1) WSL Strategic Obj 2: Business excellence (resilience of assets)	Engineering specialist (GHD)
Engineering feasibility and constructability	Physical constraints such as volume/extent of earthworks, slope, access, constructability, general degree of difficulty, electricity supply	RMA S5 WSL Strategic Obj 2: Business excellence (resilience of assets)	Engineering specialist (Beca)
Operability	Degree of difficulty relating to general operability, linkages to existing services and utilities, options for off-spec and contingency discharges.	RMA S5 LGA S57(1) WSL Strategic Obj 2: Business excellence (resilience of assets)	Operations Specialist (Watercare)

Environmental, social and cultural criteria



OVERARCHING CRITERIA	ASSESSMENT AND SCORING BASED ON:	DERIVED FROM:	SCORED BY:
Traffic and Access	Effects of construction and operational traffic. Access incl. distance to the arterial or main road, nature of the main access route, whether back-up secondary access is available	RMA S5 WSL Strategic Obj 2: Business excellence (resilience of assets)	Traffic expert (Beca)
Archaeology / Heritage	Effects on archaeological and heritage sites and features	RMA S5 and S6(f) WSL Strategic Obj 4	Heritage specialist (Clough and Associates)
Social impacts	Social impacts of construction and operation	RMA S5 LGA	SIA specialist (Beca)
Mana Whenua values	Adverse impacts on particular sites of significance as well as on customary resources, mauri of waterbodies, wāhi tapu, etc.	RMA S5, S6(e), S7(a) and (aa), S8	Based on Mana Whenua consultation (including through Watercare's Kaitiaki Forum)

Environmental, social and cultural criteria



OVER-ARCHING CRITERIA	ASSESSMENT AND SCORING BASED ON:	DERIVED FROM:	SCORED BY:
Ecology: Terrestrial and Freshwater	<ol style="list-style-type: none"> Adverse impacts on terrestrial ecological values associated with a site, particularly indigenous vegetation which is nationally, regionally or locally significant in terms of habitat values and presence of known species. Adverse impacts on freshwater receiving environments (including from operational discharges and any works within or in proximity to a stream or wetland) 	RMA S5, S6(a) and (c), S7(d) WSL Strategic Obj 4	Ecologist (Boffa Miskell)
Landscape / visual impacts	Adverse construction and operational impacts on: <ol style="list-style-type: none"> Visual effects and effects on existing landscape character (including degree of modification), any outstanding landscape and important landscape / natural features; Visual and residential amenity. 	RMA S5, S6(b) and S7(c) WSL Strategic Obj 4: Fully sustainable	Land-scape specialist (Boffa Miskell)

Other criteria and cost

OVERARCHING CRITERIA	ASSESSMENT AND SCORING BASED ON:	DERIVED FROM:	SCORED BY:
Property impacts and challenges	Number of properties, any particular challenges in terms of property acquisition / degree of difficulty	RMA S5, S171	Property specialist (Watercare)
Consistency with planning documents / consentability	Zoning, plan objectives and policies, major impediments	RMA S5, S104, S171	NA (not scored). Reported on in shortlist report.
Cost	Land acquisition. Construction costs and operational costs	RMA S5, S7(b) LGA S57(1) WSL Strategic Obj 1 and 3 re minimum cost provider	NA (not scored)

Scoring of criteria

Level of effect (guidance descriptors for 1 – 5 scale)	Score
Straightforward with positive or neutral impacts, taking into account reasonable (on-site) mitigation.	5
Slight impact which is localised and minor, taking into account reasonable (on-site) mitigation.	4
Moderate impact, with effects that are slightly more than localised. These effects cannot be completely avoided, but mitigation is achievable at moderate cost.	3
High impact, with more than local effects. Areas of significance may be affected, and the downsides may outweigh potential benefits. Mitigation is not readily available or would be very costly.	2
Very significant impact, including widespread impacts on sensitive environments (e.g. Significant Ecological Areas, areas with high significance to Mana Whenua). On-site mitigation is not achievable.	1

Questions?



Minutes

Meeting: Huia WTP Replacement - Shortlist Challenge Workshop

Venue: Tonkin + Taylor Ltd Date: 13 April 2017

Job No: 30848.100 Time: 1pm - 4:30pm

Present: Paul Jones, Taun Hawke, Tim xxx, Suzie Clark, Richard O'Connor, Geoff Stewart, Simon Greening and Mark Bourne - Watercare; Christian Gamst - GHD; Karen Baverstock and Sarah McCarter – T+T; Sarah McCready – Clough & Associates; Rachel de Lambert and Sarah Flynn - Boffa Miskell; Tim Fischer – Simpson Grierson; Amelia Linzey, Scheepers Fourie, Corinne Marti and Jack Brennan – Beca.

Apologies: WSL Operations (Priyan Perera and Tom Surrey)

Paul Jones, Taun Hawke, Tim xxx, Suzie Clark, Richard O'Connor, Geoff Stewart, Simon Greening and Mark Bourne - Watercare; Christian Gamst - GHD; Karen Baverstock and Sarah McCarter – T+T; Sarah McCready – Clough & Associates; Rachel de Lambert and Sarah Flynn - Boffa Miskell; Tim Fischer – Simpson Grierson; Amelia Linzey, Scheepers Fourie, Corinne Marti and Jack Brennan – Beca.

Item	Minutes	Actions	Owner
1	Brief round table introductions		
2	Overview of challenge workshop / purpose		
3	CG ran through updated site layout plans with a particular focus on any key changes associated with the design change from 140 MLD to 160 MLD.	The rationale for changing design from 140 MLD to 160 MLD needs to be documented.	WSL
4	<p>Canvassed possible revision of RL for reservoirs from 120m RL to 115m RL at the Parker Road options. The interrelationship between these site options, NH1 and NH2 is causing an issue. To feed NH2 would need an RL of 115m. This provides operability advantages.</p> <p>At Parker North would be able to accommodate this change. The site this would have the most implications at is Parker South. A reduction in the reservoir RL from 120 to 115m RL at this site would make it very</p>		

	challenging to locate the reservoirs on the site. RdL queried whether this would mean the reservoirs were buried/partially buried at this site. CG noted this would be unlikely. Instead, from an engineering (elevation) perspective would consider moving the reservoirs to the Parker North site. AL noted additional social impacts that may occur from this option.		
5	<p>Site Principles: The four site principles determined at the commencement of the project were scored individually as sub-criteria by JB. These scores were then averaged to provide an overall 'site principles' score.</p> <p>However the breakdown of the site principles by sub-criteria was considered more useful at this stage, and provides a more detailed level of information. KB indicated this would be used in the shortlist assessment.</p>		
6	<p>Elevation and proximity are key principles that cannot be changed i.e. the site options meet the principles or they would no longer be valid/current options. Discussion followed over whether these should in fact be criteria if it was a pass/fail assessment? JB elaborated that while there was a pass/fail component (and those sites that 'failed' had already been eliminated), taking into account the components of each of these site principles some sites scored 'better' or 'worse' in these categories.</p> <p>The proximity score for Manuka Road was revised upwards from a 4 to a 5 in the workshop. This was on the basis that it is more-or-less the same as the existing Huia WTP site in terms of proximity, and importantly both options provide two points of supply to two locations (city and North Harbour).</p> <p>The Parker Road sites do not provide the same connectivity to the wider network and only supply North Harbour. They therefore scored low on this criteria. A score of 2 was attributed at the workshop, however following the workshop and on further review of the site principles JB and CG advised this should be revised downwards to a score of 1 on the basis that the distance from Titirangi Reservoirs results in reduced connectivity to the wider network and therefore may affect levels of service. In addition, the single access road for operators and tanker deliveries, and the single treated water pipeline from the plant negatively affect security of supply.</p>		
7	In terms of the 'site size' sub-criteria, discussion centred around whether there was potential for double counting e.g. particularly in terms of engineering feasibility and constructability, operability and off-spec discharges, etc. JB referred back to the site principles and noted that there was a distinction between having a large enough site to comfortably locate everything (treatment plant, attenuation storage,		

	<p>reservoirs) without stacking / compressing the design, and being able to provide adequate buffers and laydown areas etc.</p> <p>Both Parker Road options scored well in this criteria (5). The two Woodlands Park Road schemes do not score as well in this criteria due to the sites being restricted for the treatment plant and reservoirs. The Manuka Road site scored a 3 and the existing Huia WTP site a 2 due to there also being no allowance for flow attenuation at this site.</p>		
8	<p>Location: GS considered resilience to be a key assessment criteria. This is supported by recent storm events which have significantly impacted on water supply to the region. There was some discussion regarding the risk associated with construction on the existing site with the plant out of service. The general consensus at the workshop was that security of supply should be split out as a separate criteria from location and scored. KB noted this is also a matter that can be addressed through weighting and sensitivity analysis. Based on this discussion, at the workshop the existing WTP site score for the location criteria was revised upwards from 1 to 2. Following workshop, JB advised that security of supply during construction is specifically captured in the location criteria of the site principles (principle L1). Therefore retained within the location criteria, but revised the score for the existing Huia WTP site post-workshop down from a 2 (which JB advised would be appropriate if security of supply was considered separately / not included in the location principle) to the original score of 1. JB and CG also considered a 1 appropriate as the site is located within an area of geotechnical risk.</p> <p>Following the workshop, GM and JB advised that the location score for the Manuka option should be revised downwards from 4 to 3 on the basis that while there is a shorter length of tunnel for treated water, the raw water aquaduct is outside the road corridor. Also the site is located within an area of geotechnical risk.</p> <p>At the workshop there was some further discussion regarding bringing forward the Waikato take. WSL noted the cost associated with this was a key factor, as was loss of system resilience for a period (i.e. taking out the water supply from the Waitakere dams), and the environmental and engineering/infrastructure effects of not using the dams for a period of 3+ years and letting the water spill from the dams.</p>	To document constraints and challenges associated with bringing forward the additional Waikato River take.	WSL
9	<p>The location scores for the two Parker Road site options were also revised downwards through the workshop from a 4 to a 3. This reflects the long raw water tunnel, not within a road – therefore cannot be accessed readily / largely inaccessible which poses risks for ongoing operations and maintenance.</p> <p>Post workshop CG and JB advised that while the Parker Road site options should be marked down for the raw water tunnel, the sites</p>		

	align well with the other components of the location principle and an overall score of 4 is appropriate for this criteria.		
10	<p>Engineering feasibility and constructability:</p> <p>The sub-criteria for the overarching engineering feasibility and constructability criteria were debated and confirmed through the workshop as set out below. The sub-criteria were scored individually, with an overall score provided using a pro-rata weighting based on the approximate scale of works split. This was retained following the workshop although revised so that two overall scores were provided, one which captured the site works (incl. treatment plant, reservoirs and off-spec discharges) and the other which captured connecting 'ancillary' infrastructure.</p> <p>In terms of the raw water connection, the tight working area at Mackies Rest was noted for the Parker Road options. Both scored low, i.e. 2, in this category. By comparison, the existing WTP site and Manuka Road site scored well in this category (5 and 4 respectively).</p> <p>In terms of the connection to the Upper Nihotupu raw watermain, the pipeline required along Exhibition Drive, a narrow track used by the public, means the Manuka Road option scores a 3 on this criteria relative to the 5 attributed to the existing WTP site. The interactions with other tunnelling work required to support a new WTP at the Parker Road site options means both these options score poorly on this criteria (i.e. 2).</p> <p>In terms of the treated water pipeline, engineering feasibility and constructability is very constrained along Parker Road and both of these site options score a 2. The existing WTP site is less constrained / considered relatively straight forward (4) while the Manuka Road site Woodlands Park Road section adds a degree of difficulty compared to the existing WTP site. Hence this scored a 3.</p> <p>In terms of off-spec water, the option for the existing WTP site is to pipe this discharge directly to the Manukau Harbour. This is therefore the worst site in terms of off-spec discharges and scores a 1. By comparison, the Parker Road sites have space for a full-size lagoon and scored a 5 for this sub-criteria. The Manukau Road site relies on the existing site, with augmentation of the current attenuation lagoon. There are also some risks with this option around building retaining structures to contain the lagoon upstream of private property. This has therefore scored moderately (3).</p> <p>In terms of engineering feasibility and constructability of the treatment plant itself, the existing site is significantly constrained and scored the lowest in this category (1). The scores for this site and the other 3 sites</p>		

	<p>were confirmed though the workshop on the basis of the rationale provided.</p> <p>Similarly, the provisional scores for the engineering feasibility and constructability of the reservoirs were confirmed through the workshop with the scores ranging from 3 at the existing WTP site and the Manuka Road site, to 4 and 5 at the Parker South and Parker North sites, respectively.</p>		
11	<p>Operability</p> <p>TBC following input from WSL – Operations. Note workshop was adjourned so it could be reconvened at a later time(s) to enable input by Watercare operations specialists, and to enable scores to be reconfirmed (if/where necessary) through continuation of workshop.</p>		
12	<p>Traffic and access</p> <p>SCF ran through the sub-criteria developed to score traffic and access for each of the four sites: Road and site access; trenching; construction traffic; local traffic. The two Woodlands Park Road Schemes are essentially the same from a traffic and access perspective, as are the two Parker Road Schemes.</p> <p>The Woodlands Park Road schemes scored better than the Parker Road Schemes across the full suite of traffic and access sub-criteria (4 across all sub-criteria). This is principally because trenching activities take place separately / on a different road corridor to construction of the treatment plant itself.</p> <p>By comparison, for the Parker Road sites, treatment plant construction and the treated water pipeline all effect the one road. A high level capacity analysis has been undertaken for Parker Road. Construction traffic would be restricted by the pipeline construction and the need to maintain local access. Traffic management constraints would mean a notably longer construction timeframe for Parker Road e.g. additional 12+ months. These sites therefore scored a 2 or 3 across all sub-categories.</p> <p>Some discussion in the workshop regarding traffic and access sub-criteria and overlap with social effects i.e. effects on cars versus effects on people. AL considered while this is not necessarily double counting as they are two different issues, need to acknowledge that the outcome of one may impact on the other.</p> <p>It is relevant to note that operational traffic was not considered a differentiator considering the limited amount of traffic this would generate (i.e. site operators and approx. 1-6 truck movements/week). All sites would effectively score a 5 if this sub-criteria was applied.</p>		

13	<p data-bbox="284 271 568 300">Heritage and archaeology</p> <p data-bbox="284 333 1054 589">The score of 1 for the existing site was attributed on the basis that the Huia Filter Station would be demolished and the site reused. However CG indicated that the plans showed that the filter station would be retained for either of the Manuka Road scheme options. This was confirmed by MB who indicated WSL is committed to retaining the filter station regardless of the option ultimately selected, but the process units will very likely be demolished.</p> <p data-bbox="284 622 1070 725">The score was revised upwards to a 2 in the workshop as SMC considers there is still the potential for significant impacts on heritage items including the extent of place.</p> <p data-bbox="284 759 1067 938">Discussion in the workshop then focused on whether this score was too low considering it was ongoing use of a heritage structure for the use for which it was originally constructed. Agreement on this was not reached. However the score remained 2 on the basis of the SME opinion.</p> <p data-bbox="284 972 1062 1189">The score for the Manuka Road option was revised upwards in the workshop from a 3 to a 4. This was based on confirmation provided in the workshop that the scheduled Kauri tree near the corner of Woodlands Park and Manuka Roads would be retained. It did not score a 5 due to the possibility of previously unrecorded archaeological or other historic heritage sites in the area.</p> <p data-bbox="284 1223 1070 1588">The Parker Road North site contains Theet's Cottage however the plans show that direct impacts on this building will be avoided. There was some discussion regarding what is considered a heritage structure. SCM confirmed that an archaeological site is pre-1900s, however Auckland Council approach to heritage encompasses sites and structures into the early 1900s. AL noted that on the Viscovich and Gash property there were old buildings including agricultural buildings / sheds that had a long association with the area. While this is not formally recognised or scheduled heritage, people still consider these to have heritage value and to contribute to the character of the area.</p> <p data-bbox="284 1621 1067 1800">SCM considered revising the score for Parker North down to 3 on this basis, but ultimately retained the score of 4 through the workshop on the basis that effects on Theet's cottage were avoided and there are no other identified heritage sites / there is unlikely to be any undetected archaeological sites.</p> <p data-bbox="284 1834 1070 1980">No archaeological or other historic heritage sites are located within or in the vicinity of the Parker Road South WTP option. It is also considered unlikely that any undetected archaeological or other historic heritage sites are present on the Parker Road South WTP option</p>		
----	---	--	--

	as this area have been previously surveyed. For these reasons a score of 5 was retained for the Parker Road South option.		
14	<p>Terrestrial Ecology</p> <p>Both the existing WTP site and the Manuka Road site options are identified as an SEA. This comprises a mix of vegetation – both intact and modified and modified secondary native vegetation. The existing site was scored a 1 due to the loss of mature podocarp and kahikatea forest that cannot be fully mitigated in a like-for-like manner.</p> <p>The Manuka Road site was scored slightly higher at 2 due to the loss of less high value (mature / old-growth) vegetation, therefore it is a slightly better option from an ecological perspective. SF noted the presence of a coherent patch of forest / old growth in the south west corner of the site which did not appear to be impacted by the site layout. However CG noted that it may be impacted by the overflow. At this point in time this has not been factored into the scoring.</p> <p>The Parker North site was scored a 5 due to the ability to largely avoid effects on significant vegetation or fauna habitat. The Parker South site scored a 1 due to impacts on Kahikatea swamp forest and high value habitat for fauna such as bats.</p> <p>Through the workshop there was some discussion regarding ecological effects, versus the extent of the SEA i.e. was it appropriate to differentiate for areas that were identified as an SEA or should it all be attributed a low score because of the SEA overlay and associated consent requirements. Agreed that the focus was on ecological effects per se and not consenting and that the sites should be scored on this basis.</p> <p>The scores for terrestrial ecology were discussed and confirmed through the workshop.</p>		
15	<p>Freshwater Ecology: Both the Woodlands Park Road schemes scored a 3 for 'moderate' freshwater ecology effects. In both instances off-site mitigation for the loss of the permanent Armstrong Gully stream reach would be required at a high ECR given the relatively high instream and riparian values. SF noted she had considered a score of 2 for the Manuka Road option due to the loss of ephemeral stream reach. However no mitigation is required in relation to this in the AUP / it is a permitted activity so effects are considered to be no more than minor. Therefore retained the scoring of 3.</p> <p>The Parker North site scored a 5 for this criteria on the basis that no significant aquatic effects are likely to be generated and the option would be neutral taking into account reasonable mitigation. The Parker</p>		

	<p>South site scored poorly (1) in relation to this criteria due to the loss of approximately 100m of stream and disruption to riparian connectivity.</p> <p>The scores for freshwater ecology were discussed and confirmed through the workshop.</p>		
16	<p>Landscape and visual effects:</p> <p>The existing WTP facility has the advantage of having an existing character that is already strongly influenced by the industrial scale and character of a long established water treatment plant. Also includes a scheduled heritage building fronting Woodlands Park Road. The site is not included in an identified Outstanding Natural Landscape (ONL) or Feature (ONF) nor is it covered by a significant ridgeline notation. Landscape effects and visual effects were both assessed as moderate (3) for the existing WTP site.</p> <p>The Manuka Road site has the appearance of highly unmodified 'natural' landscape covered in vegetation (recognising past modification has occurred – former WTP related staff housing). This option therefore scored a 2 for landscape effects due to the moderate high to high landscape effects associated with landform and vegetation modification. Due to the dramatic scale of vegetation clearance and new industrial scale activity which will be apparent, the site has scored a 2 for visual effects also.</p> <p>The Parker South site has a large lot residential character and amenity framed by vegetation and within a Waitakere Ranges environment. There will be some impact on identified SEA along with landform modification. There is a limited surrounding visual catchment at distance and a small concentration of elevated residential properties on west side of Parker Road. This site option was attributed a score of 2 for landscape effects and a 3 for visual effects.</p> <p>The Parker Road North site has a large lot (and some smaller lot) residential character with some productive horticultural land use – eg feijoa orchard. The wider context has a Waitakere Ranges bush character / amenity. The site has a level of existing modification. Some further landform modification will be required but earthworks required can be set down into the valley. This site scored a 3 for 'moderate' landscape effects. In terms of visual effects, there is a limited surrounding catchment and the site is well screened by landform and topography and can be separated / screened from road. The site scored a '3' for visual effects.</p> <p>The scores for landscape and visual effects were discussed and confirmed through the workshop.</p>		
17	<p>Social Effects: Social effects were assessed based on the following 3 sub criteria: Way of Life; Community cohesion; and sustaining one's self.</p>		

	<p>It was noted that the assessment was only a comparative evaluation of the options and as such had been considered at the local community effects scale (not regional social impacts).</p> <p>For the existing site, there is no change to the existing way of life as the plant is already there and has been for a significant period of time (5). For the Manuka Road option, it entails an impact on those who live on Manuka Road, who use the site and/or who anticipated the site would stay as 'Open Space' (4).</p> <p>The community expects a plant to be there so both options are neutral in terms of community cohesion (5). In terms of sustaining one's self, both options score a 4 on the basis that there are little or negligible long terms impact or change, but acknowledging the duration of the construction period and the disruption impacts of this work, particularly to the highly trafficked Scenic Drive and commuter routes through this area (including crossing of school catchments/zones).</p> <p>In terms of way of life, both of the Parker Road options score poorly i.e. 1, due to the large number of people (relative to the size of that community being the Oratia community area) and significance of the impact for these residents. In particular, AL noted the number of people that would be displaced by both options and the assessed inability to relocate within Oratia (as property turnover is very low) in the timeframes being proposed (e.g. anticipated that property acquisition would be undertaken over 12 to 24 months, not a longer term staged acquisition process).</p> <p>The Parker South option scored slightly better than the Parker North option for community cohesion and sustaining one's self i.e. 2 for community cohesion compared to 1 at Parker North, and scores of 3 and 2 respectively for sustaining one's self. While both options had a high degree of people impacted for businesses operating from the site, the difference acknowledged the longer term (permanent) loss of business opportunities with the Parker North option which were impacted.</p>		
18	<p>Property impacts: Property impacts at the Manuka Road site were initially scored a 4, but through the workshop this was revised to 5 on the basis that WSL owns the site. The existing Huia site was similarly scored a 5 for the same reason.</p> <p>The Parker North site was originally scored a 2 for property impacts on the basis of approximately half a dozen properties to be acquired within the footprint. However this was subsequently changed to a 1 at the workshop to take into account the additional properties acquired around the plant as a buffer. The Parker South site also scored a 1 for property impacts.</p>		

	<p>There was some discussion regarding the social effects of property acquisition, and the tension between obtaining properties to ensure an adequate buffer but increasing the social effects (displacement/relocation) at the same time. AL indicated that displacement of people is the key issue, more so than the presence of the plant itself. Mitigation would involve reducing the number of properties acquired. Also, the acquisition of properties for a buffer rather than just those directly required for the footprint could be difficult to justify or defend.</p>		
19	<p>Workshop adjourned at 4:30pm to enable:</p> <ul style="list-style-type: none"> • Input from Watercare Operations Specialists at a reconvening of the challenge workshop. • Challenge and confirmation of MCA scores in a reconvened workshop where agreement has not been reached above and/or further work has been identified as being required. 		

Minutes

Meeting:	Huia WTP Replacement - Shortlist Challenge Workshop: Operability		
Venue:	Tonkin + Taylor Ltd	Date:	29 April 2017
Job No:	30848.100	Time:	2pm - 3:30pm
Present:	Tom Surrey, Joe Chaloner-Warman, Paul Jones, Mark Bourne, Shannon Palmer, Sharon Danks, Priyan Pereira - Watercare; Karen Baverstock - Tonkin + Taylor; Christian Gamst - GHD; Tim Fischer - Simpson Grierson		

Item	DRAFT Minutes	Actions	Owner
1	Brief round table introductions and overview of challenge workshop / purpose		
2	CG ran through updated site layout plans with a particular focus on any key changes associated with the design change from 140 MLD to 160 MLD. Outlined key characteristics of plant and connecting infrastructure.		
3	TS and PP confirmed sub-criteria for scoring operability: <ul style="list-style-type: none"> 1. Headworks 2. Treatment plant from RW system to treated water reservoirs. Includes access (circulation within site), parking, deliveries, H&S, deliveries and transmission. 3. Transmission of treated water 		
4	<u>Headworks: Existing site</u> Discussion centred on raw water aqueduct which will be retained. This option is therefore neutral in terms of effects but PP noted there is a risk associated with retaining the existing raw water aqueduct as it is old infrastructure. TS noted that during construction the plant would be out of commission so could replace aqueduct or place pipe through aqueduct at that time. CG confirmed that upgrades to the aqueduct were not included in project scope / assessed in terms of constructability. PP indicated a low score required due to complexity in relation to aqueduct.		
5	<u>Headworks: Manuka Road</u> As above, discussion centred on the raw water aqueduct. PP queried whether could assume that there would be upgrades to this infrastructure e.g. pipe in tunnel. CG noted that unlike the existing site option, the plant would not be shut		

	<p>down for a period of time. PP noted while this would be more challenging, could still make it work (i.e. undertake some maintenance activity)</p> <p>PP queried whether a new pipeline along Exhibition Drive should be assumed as part of this option. CG confirmed no, not addressing raw water aqueduct as part of project.</p> <p>Split raw water flows into the treatment plant i.e. from the aqueduct and from the Upper Nihotupu raw watermain, would increase system resilience. Agreed this was a significant positive and meant Manuka Road scored a 4 in terms of headworks.</p>		
6	<p><u>Headworks: Parker North and Parker South</u></p> <p>Both scored a 3 in relation to headworks. Pressurised raw water tunnel that does not follow roads and at depth. MB noted that once constructed very limited – no opportunity for access. Very unlikely to have a problem but if there is one, then very challenging / impossible to access. PP queried whether drills pits / receiving pits could be retained for future. CG indicated this was possible. Also noted deep tunnel, unlikely to be affected by slips.</p> <p>PP considered that a pipe in the tunnel would be the right thing to do re future proofing. SD noted this is something that should be looked at further in a detailed design stage.</p>		
7	<p><u>Treatment Plant: Existing site</u></p> <p>No off-spec discharge attenuation pond. Straight to Little Muddy Creek. Potentially very challenging / major issue or constraint. However removal of lagoon / dam is positive from a H&S perspective due to downstream effects / dam failure (low probability but high risk).</p> <p>TS noted the topography i.e. location on side of hill makes the layout very constrained. SP noted there may be issues with land instability.</p> <p>Existing heritage building likely to be used as admin building. TS noted that this takes up a lot of space in the site plans. CG confirmed retention makes layout awkward. Sub-optimal layout.</p> <p>Access: Limited parking (same as existing), constrained manoeuvring. PP queried driveway grade. CG indicated as flat as possible but requires retaining. At eastern end will be steep as land drops away.</p>		
8	<p><u>Treatment Plant: Manuka Road</u></p> <p>Nice plateau in the middle of the piece of land. SP queried whether many of the same issues as those identified above. MB noted that at this location will end up with a flat site that has been completely reshaped / reengineered. Cannot do this at existing site due to heritage structures.</p>		

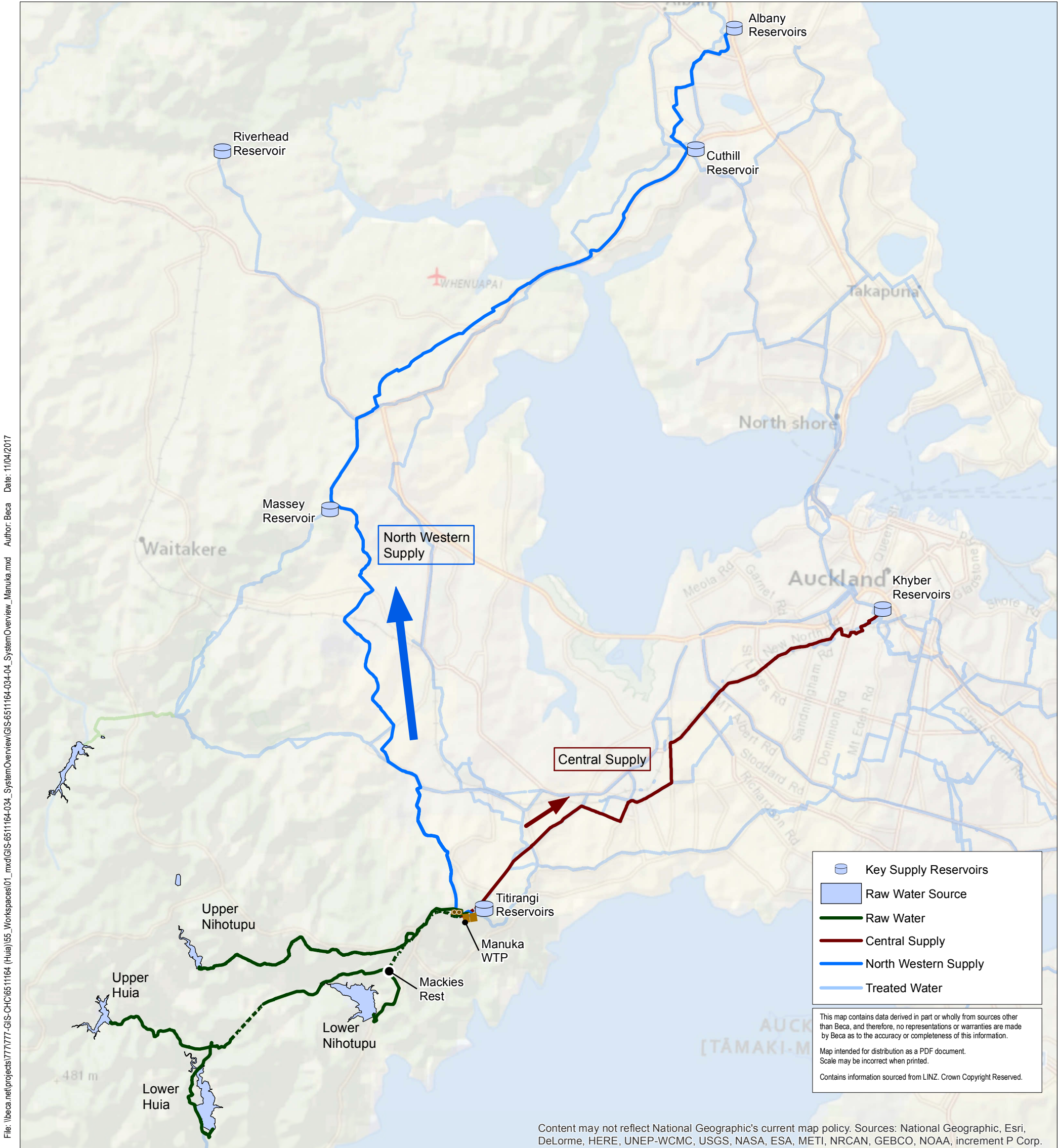
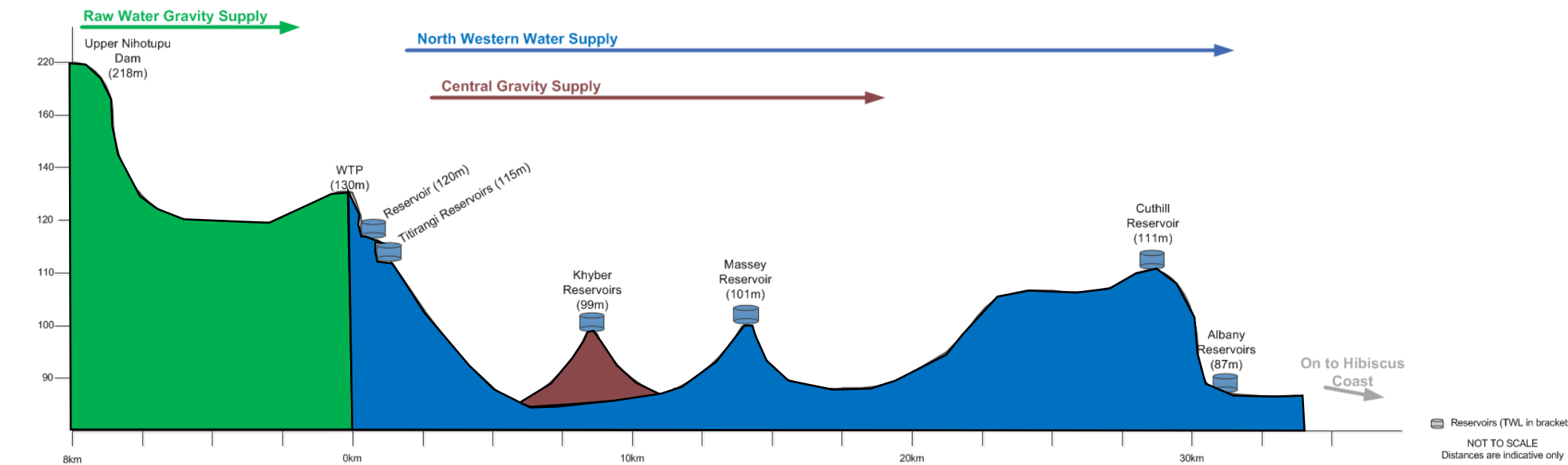
	<p>TS noted that access was better for this option compared to the existing site. PP noted that the treatment plant would be spread across three sites – plant itself, reservoirs and storage lagoon which made the option operationally more challenging than a single site option. Would also be 12 ML storage ‘water retaining structure’ above peoples’ houses. TS queried the option of having a tank rather than a lagoon.</p> <p>On the basis of the above, the Manuka Road site was considered moderate (3) in terms of the treatment plant operability.</p> <p>Queried what would happen with existing site? TS suggested would look to retain it for future development.</p>		
9	<p><u>Treatment Plant: Parker North</u></p> <p>Key characteristics discussed included flexibility, multiple layouts, provision for setbacks, neighbours further away and space for expansion – a function of terrain and land area. For these reasons scored a 5.</p>		
10	<p><u>Treatment Plant: Parker South</u></p> <p>Similar although not quite as good as Parker North in that there is not the same layout flexibility. Is further setback off the road. Agreed that overall should also score a 5.</p>		
11	<p><u>Treated water: Existing site and Manuka Road</u></p> <p>Treated water pumping up to reservoirs then gravity supply. This option includes replacing the treated water aqueduct to the Titirangi Reservoirs as well as connecting to NH i.e. flexibility to send water two ways. SD noted this is a key positive in terms of resilience.</p>		
12	<p><u>Treated water: Parker Road North and South</u></p> <p>Connects to NH2 assuming construction of this is brought forward. Not connected to Titirangi Reservoirs. While water could be pumped back to Titirangi Reservoirs would need a new pump station and additional pumping requirement would be wasting energy.</p> <p>Discussion also focused on complexity of treated water pipeline – long single pipeline. Together with the fact this option is not connected to Titirangi, means less resilience at least in the short-medium term. Parker Road South had the additional constraint of piping treated water under private property which raises issues from a property and operational perspective. For these reasons the Parker Road schemes did not score as well as the Woodlands Park schemes, with Parker North considered moderate (3) and Parker South moderate – high risk (2).</p>		
19	Workshop adjourned at 3:30pm		

DRAFT MCA SCORES

Operability – sub criteria	Existing	Manuka	Parker North	Parker South
Headworks	2 High impacts or risks. Key issue is complexity in relation to retention and ongoing reliance on aqueduct.	4 Issue with aqueduct as per existing site but increased resilience due to two raw water pipelines.	3 Considered 4 but single point of failure and very limited/no access to enable maintenance.	3 As per Parker North.
Treatment plant From RW system to treated water reservoirs Access – circulation within site (driveability, walkability) Parking Deliveries H&S Security	3 Moderate Semi-loop around site. Layout of site sub-optimal as working around heritage building. Security an issue	3 Moderate. Better layout and access than existing but spread across 3 different sites.	5 Key characteristics included flexibility, multiple layouts, provision for setbacks, neighbours further away and space for expansion	5 While not quite the same flexibility as Parker North, is still a very good site from an operational perspective.
Transmission of treated water	4 Supply to Titirangi reservoirs and NH	4 Supply to Titirangi reservoirs and NH	3 Additional pumping compared to Manuka / existing. Long single pipeline.	2 As per Parker North but treated water under private property

Appendix F: Site Plans

- 1 System Overview Figures**
- 2 Site Layout Plans**



File: \\beca.net\projects\7777777-GIS-CHC651164 (Huia)\55_Workspaces\01_mxd\GIS-651164-034_SystemOverview_Manuka.mxd Author: Beca Date: 11/04/2017

Map Scale @ A3: 1:100,000

Revision	Author	Verified	Approved	Date
2	CP8	BP	JB	27/03/2017
1	CP8	DRAFT	DRAFT	21/03/2017

Title:

Huia Site Selection

System Overview

Manuka

Client:

Watercare Services Ltd

Project:

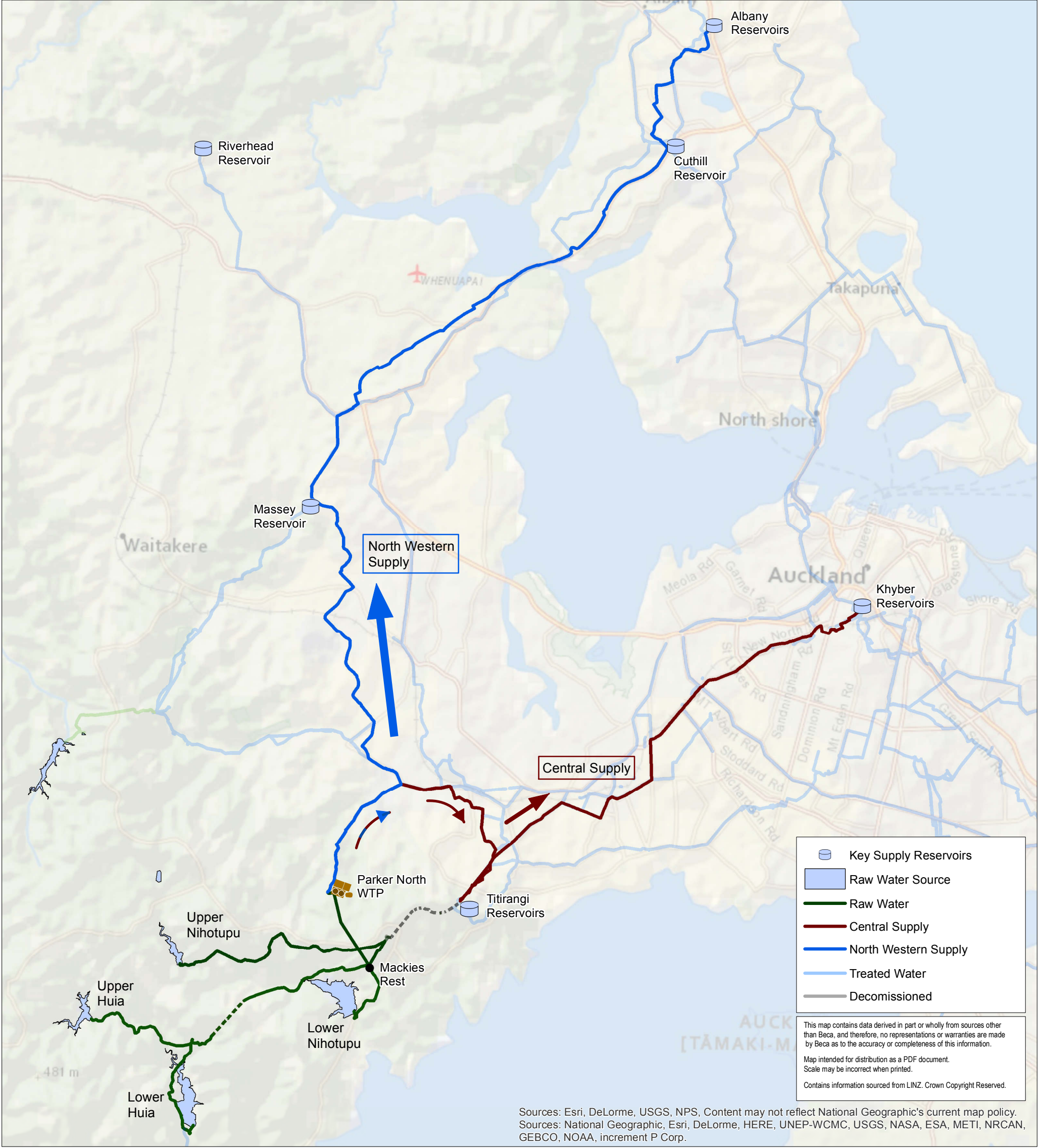
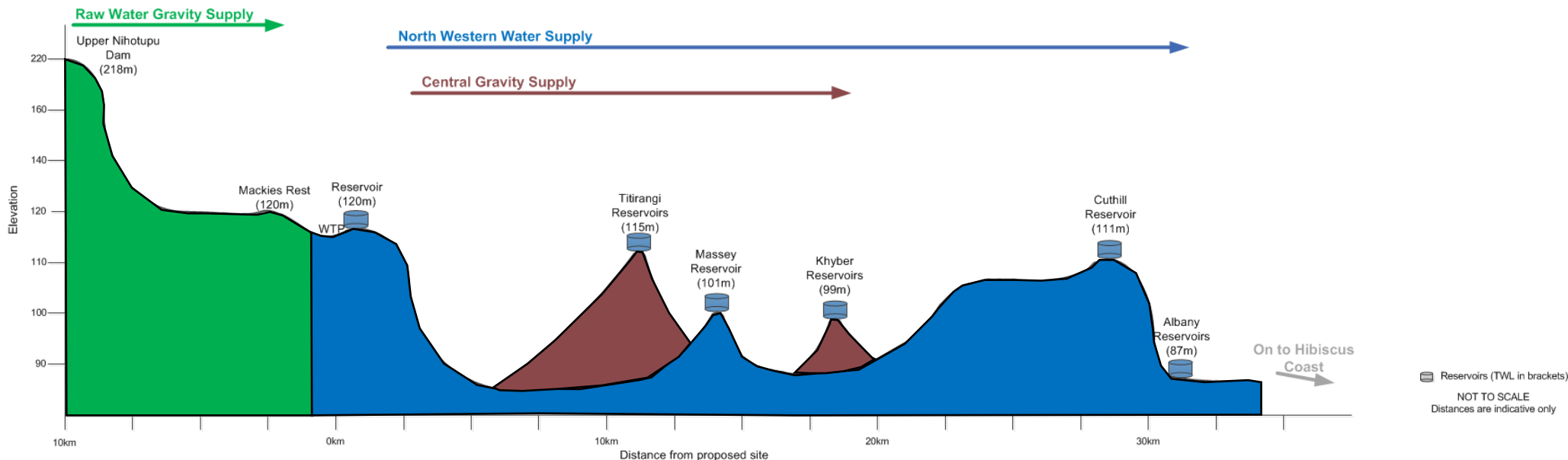
Huia WTP Upgrade

Discipline:

GIS

Drawing No:

GIS-651164-034-04



File: \\beca.net\projects\77777777-GIS-CHC651164 (Huia)\55_Workspaces\01_mxd\GIS-651164-034-01_SystemOverview.mxd Author: Beca Date: 5/04/2017

Map Scale @ A3: 1:100,000



Revision	Author	Verified	Approved	Date	Title:
2	CP8	BP	JB	27/03/2017	Huia Site Selection System Overview
1	CP8	DRAFT	DRAFT	21/03/2017	

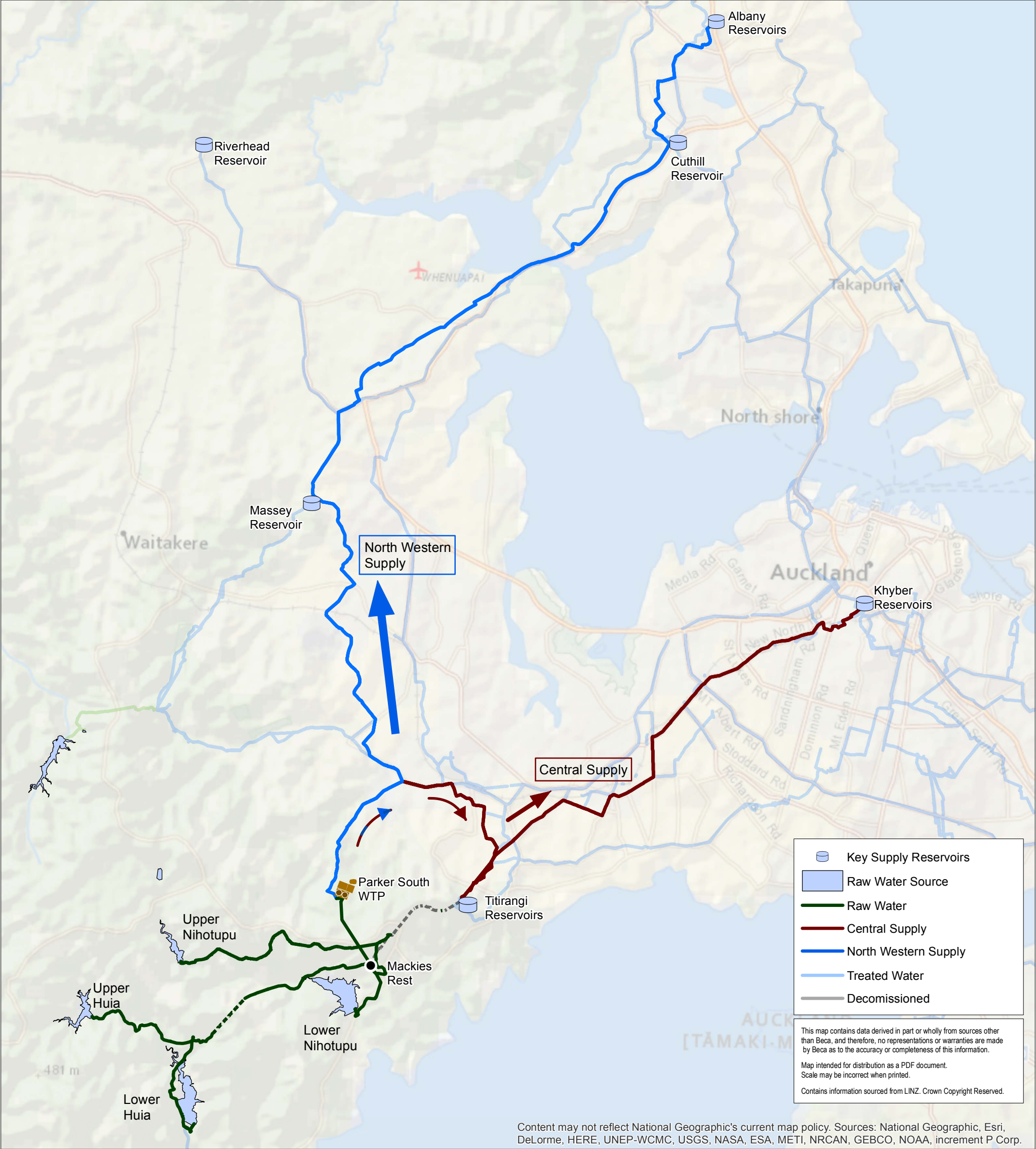
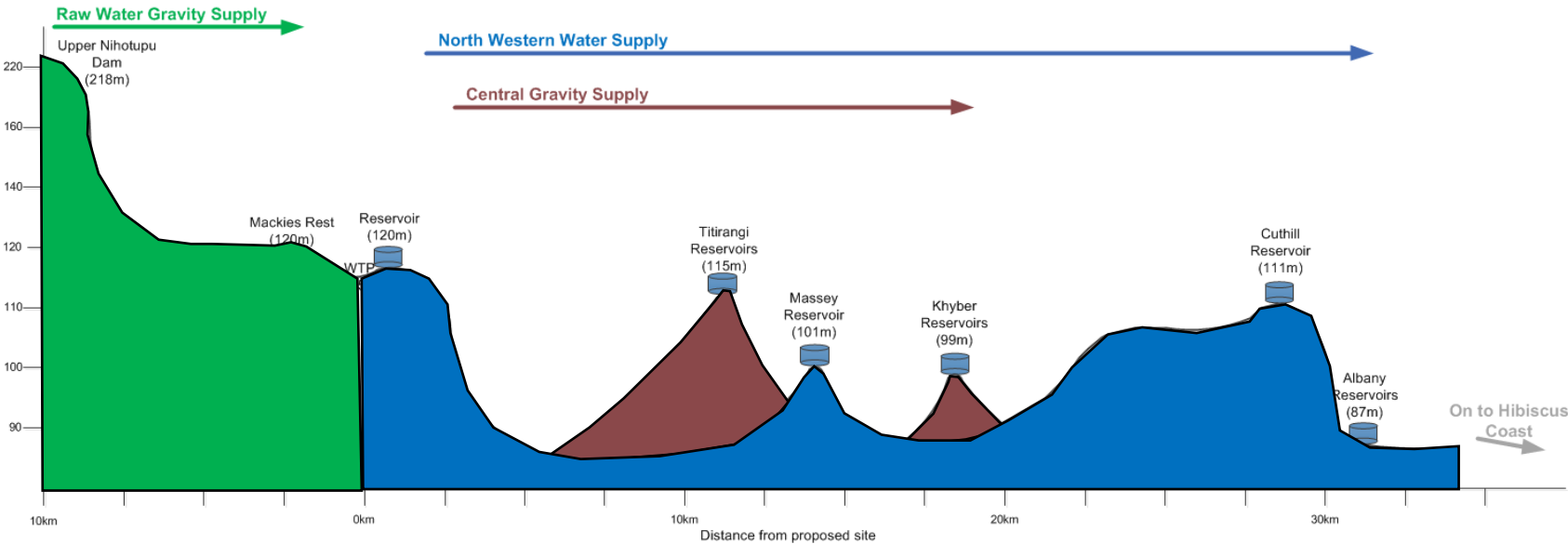
Client:
Watercare Services Ltd

Project:
Huia WTP Upgrade



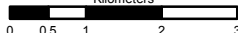

Discipline:
GIS

Drawing No:
GIS-651164-034-01



File: \\beca.net\projects\77777777-GIS-CHC651164 (Huia)\55_Workspaces\01_mxd\GIS-651164-034_SystemOverview_ParkerS.mxd Author: Beca Date: 11/04/2017


Map Scale @ A3: 1:100,000



Revision	Author	Verified	Approved	Date	Title: Huia Site Selection System Overview Parker South
2	CP8	BP	JB	27/03/2017	
1	CP8	DRAFT	DRAFT	21/03/2017	

Client:
Watercare Services Ltd

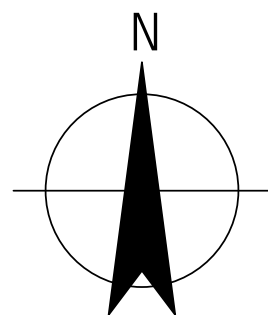
Project:
Huia WTP Upgrade



Discipline:
GIS

Drawing No:
GIS-651164-034-02

Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



Site Plan
SCALE 1:1000

DRAFT

B	REVISED TO 160L	RW	CG	MM	03/17	
A	SITE SELECTION STUDY	AC	CG	MM	09/16	
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date



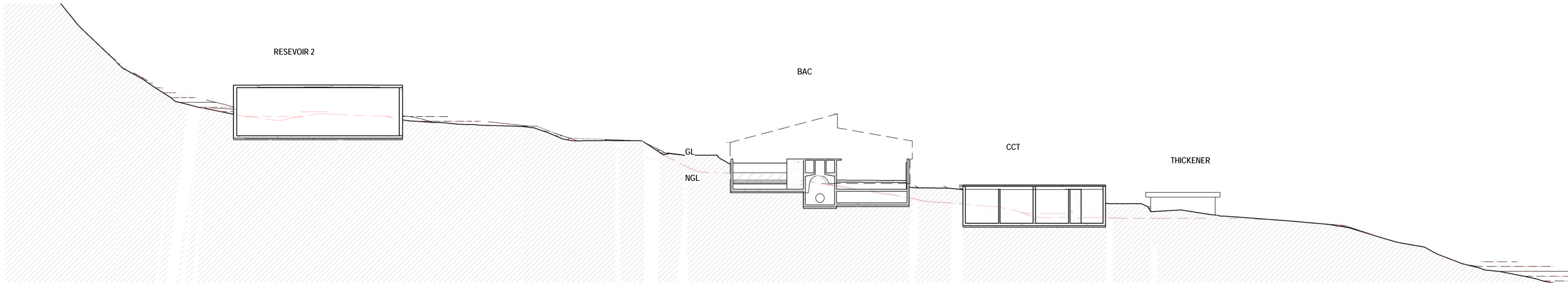
GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akimail@ghd.com W www.ghd.com

DO NOT SCALE

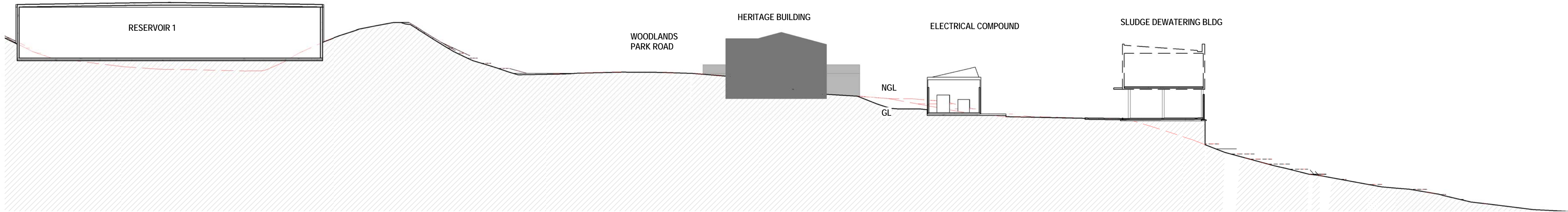
Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	AC	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)	MM		
Date	SEP 16		
Scale	1 : 1000	This Drawing must not be used for Construction unless signed as Approved	

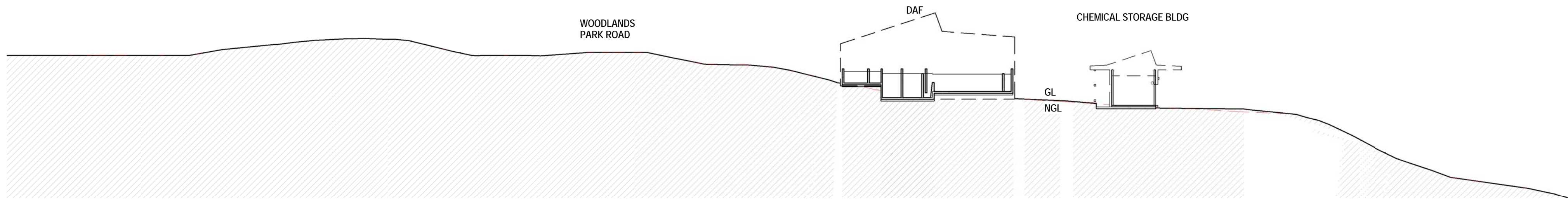
Client	Watercare Services LTD		
Project	HUIA Water Treatment Plant		
Title	Existing Site Option Overall Site Plan		
Original Size	A1	Drawing No:	51-3357501-4-A001
Rev:	B		



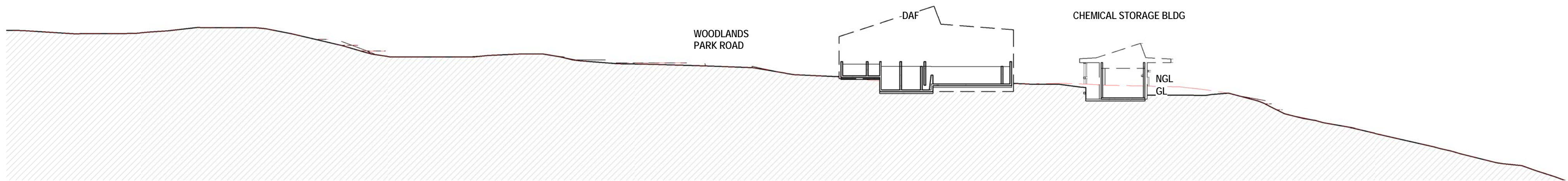
1 SECTION
4-A001 SCALE 1 : 500



2 SECTION
4-A001 SCALE 1 : 500



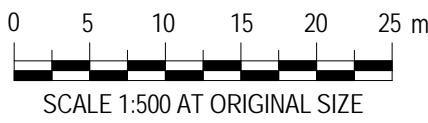
3 SECTION
4-A001 SCALE 1 : 500



4 SECTION
4-A001 SCALE 1 : 500

DRAFT

B	REVISED TO 160L	RW	CG	MM	03/17		
A	SITE SELECTION STUDY	AC	CG	MM	09/16		
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing		Drawn	Job Manager	Project Director	Date



GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E ak@mail@ghd.com W www.ghd.com

DO NOT SCALE

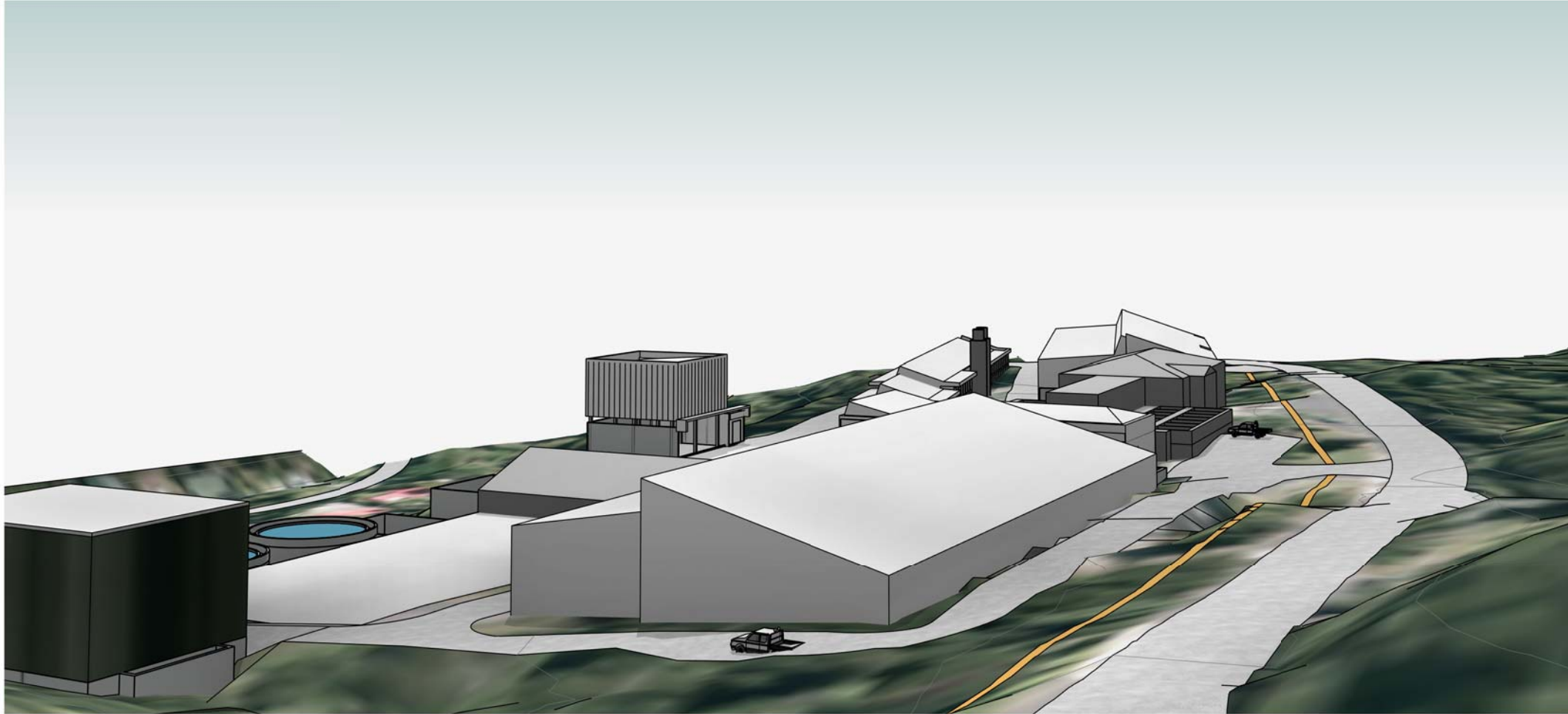
Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	AC	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)	MM		
Date	SEP 16		
Scale	1 : 500	This Drawing must not be used for Construction unless signed as Approved	

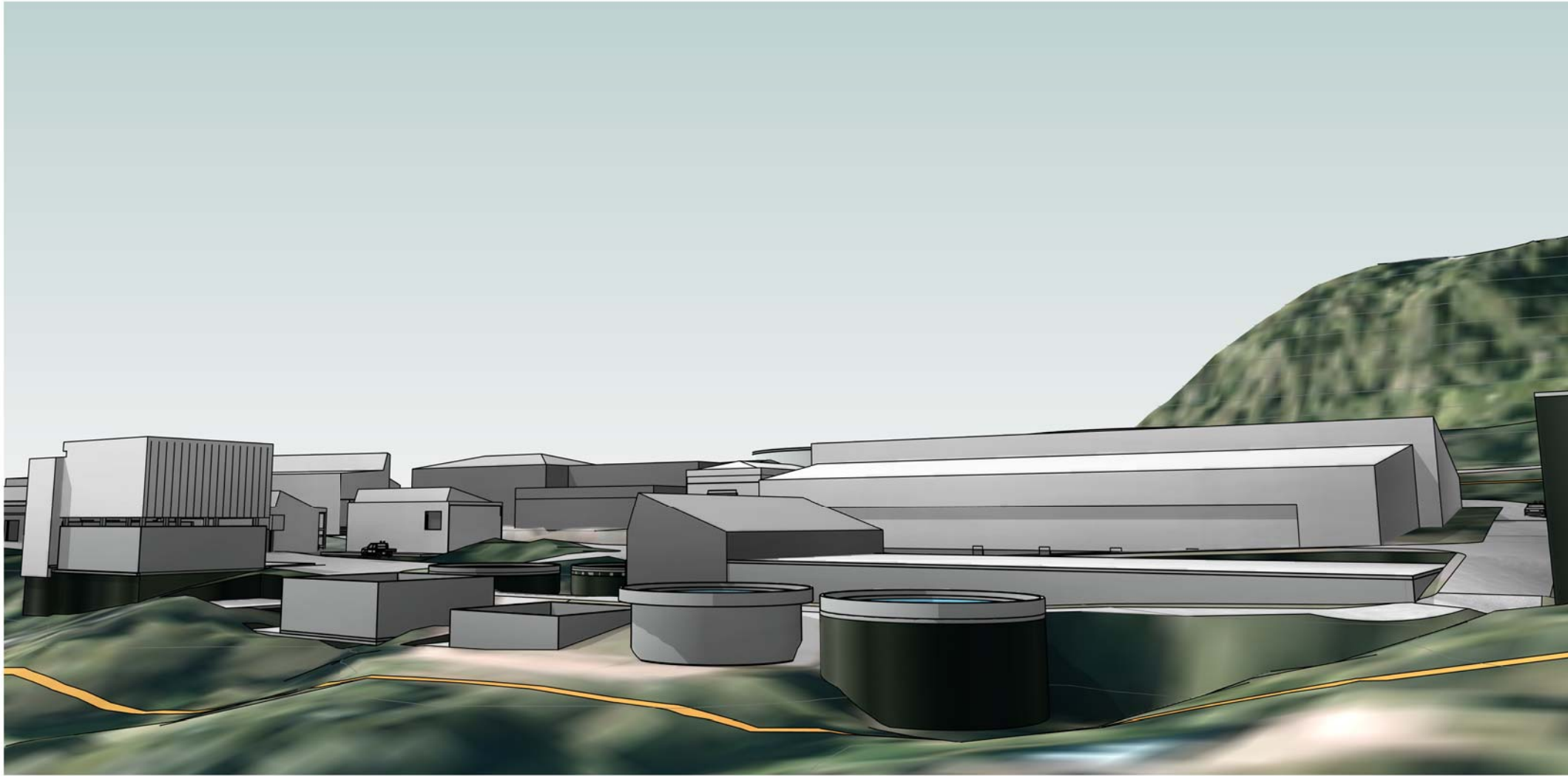
Client	Watercare Services LTD
Project	HUIA Water Treatment Plant
Title	Existing Site Option Overall Site Sections
Original Size	A1
Drawing No:	51-3357501-4-A002
Rev:	B



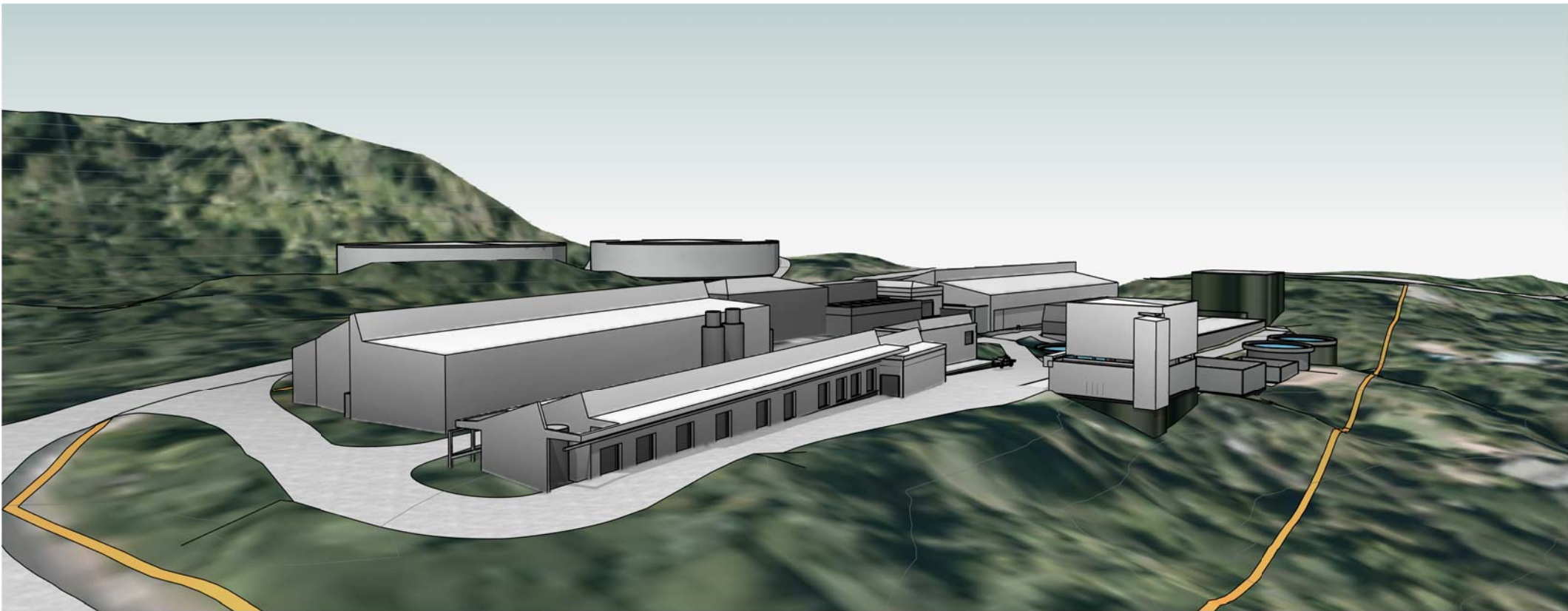
Site Axi
NOT TO SCALE



North East Perspective
NOT TO SCALE



South East Perspective
NOT TO SCALE



South West Perspective
NOT TO SCALE

DRAFT

B	REVISED TO 160L	RW	CG	MM	03/17
A	SITE SELECTION STUDY	AC	CG	MM	09/16
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director
					Date



GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akimail@ghd.com W www.ghd.com

DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn AC

Drafting Check CG

Approved (Project Director)

Date

Designer CG

Design Check MM

MM

SEP 16

Scale NOT TO SCALE

This Drawing must not be
used for Construction unless
signed as Approved

Client Watercare Services LTD

Project HUIA Water Treatment Plant

Title Existing Site Option

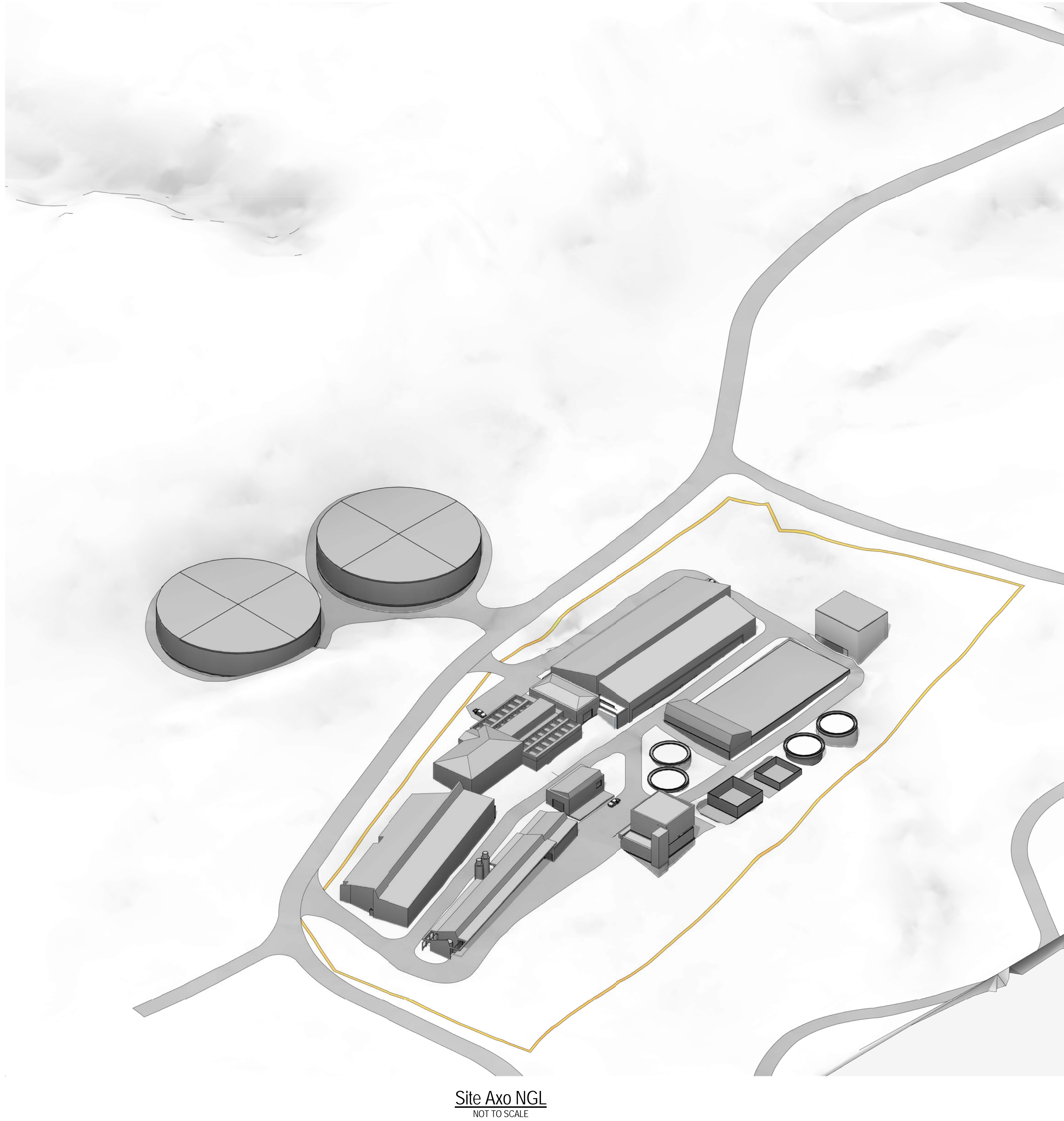
Site Works Perspectives

Original Size

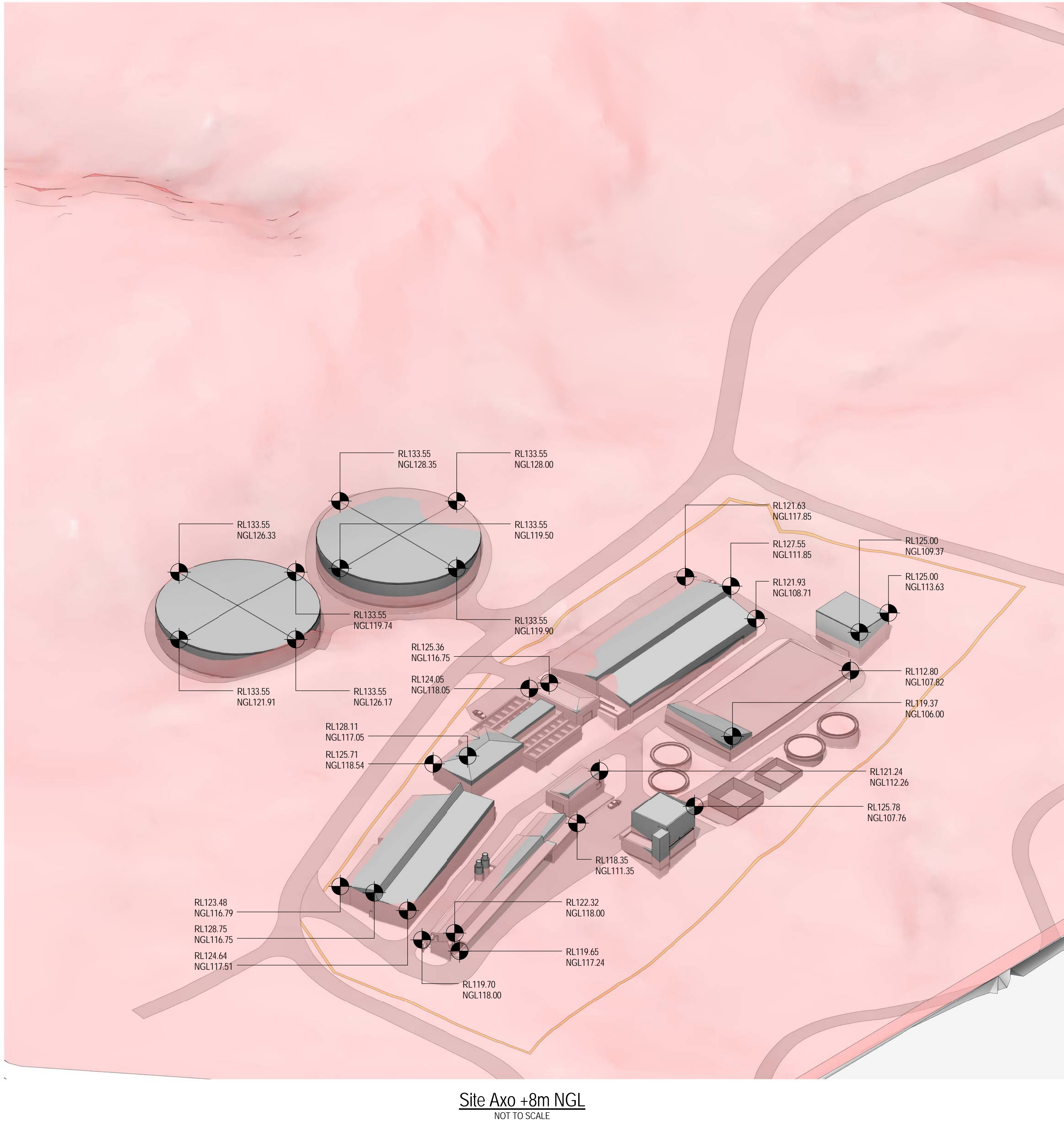
A1

Drawing No: 51-3357501-4-A003

Rev: B



Site Axo NGL
NOT TO SCALE



Site Axo +8m NGL
NOT TO SCALE

DRAFT

A	REVISED TO 160L		RW	CG	MM
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director
					Date



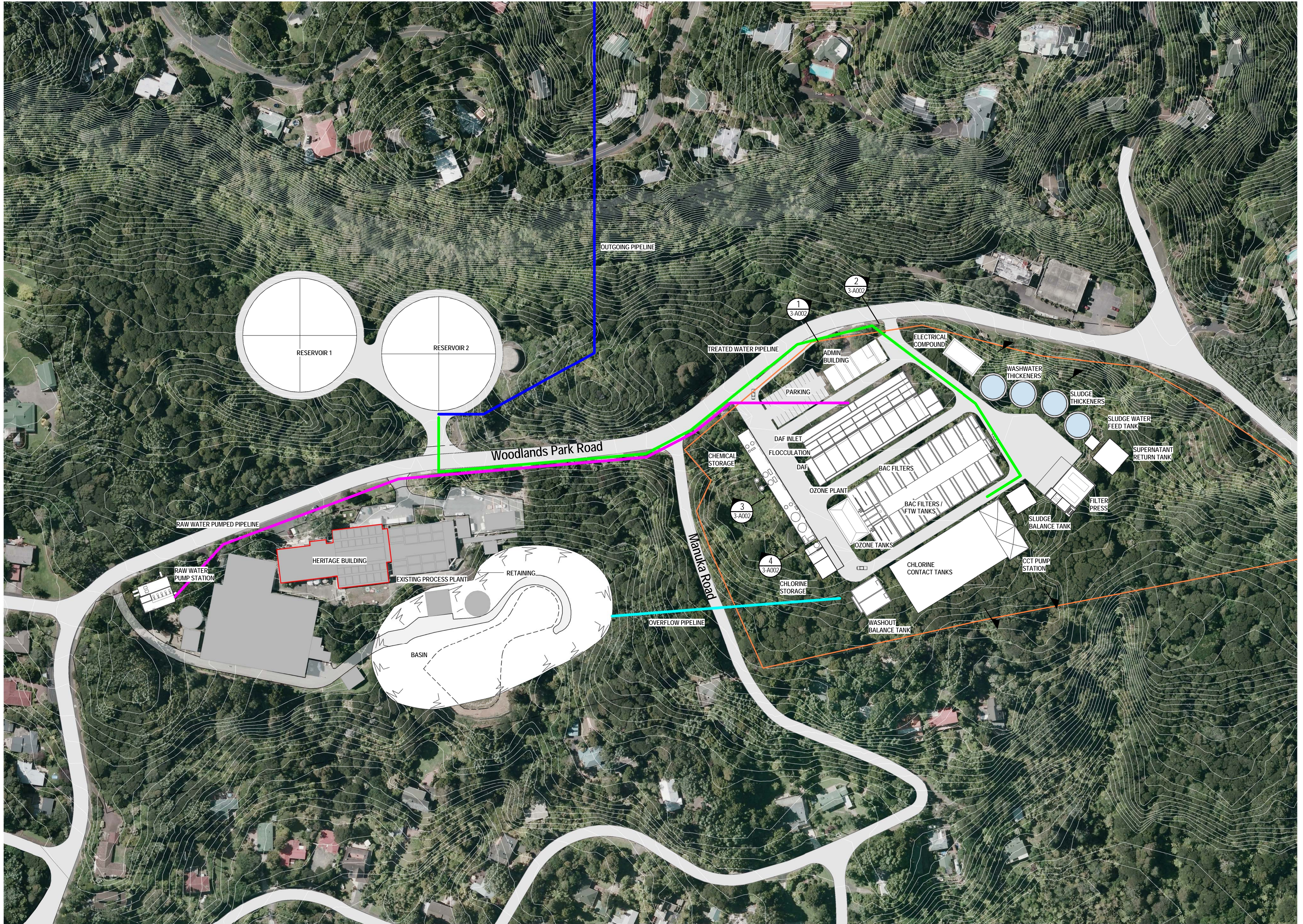
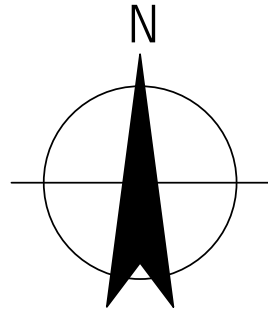
GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akimail@ghd.com W www.ghd.com

DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	RW	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)			
Date			
Scale		This Drawing must not be used for Construction unless signed as Approved	

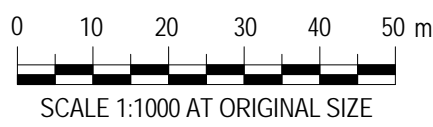
Client	Watercare Services LTD		
Project	HUIA Water Treatment Plant		
Title	Existing Site Option Site Works - Height Analysis		
Original Size	A1	Drawing No:	51-3357501-4-A004
		Rev:	A



Site Plan
SCALE 1:1000

DRAFT

B	REVISED TO 160L		RW	CG	MM	03/17
A	SITE SELECTION STUDY		AC	CG	MM	09/16
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date



GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akimail@ghd.com W www.ghd.com

DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn AC

Designer CG

Drafting Check CG

Design Check MM

Approved (Project Director)

MM

Date

SEP 16

Scale 1:1000

This Drawing must not be
used for Construction unless
signed as Approved

Client Watercare Services LTD

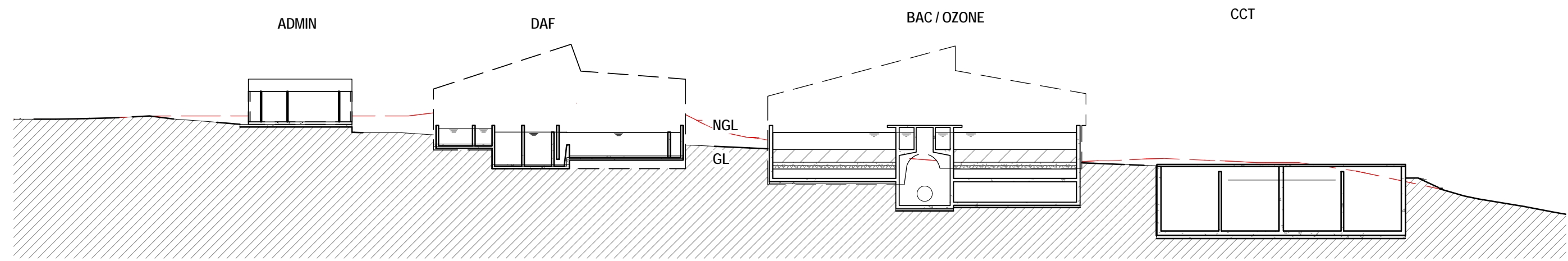
Project HUIA Water Treatment Plant

Title Manuka Road Option
Overall Site Plan

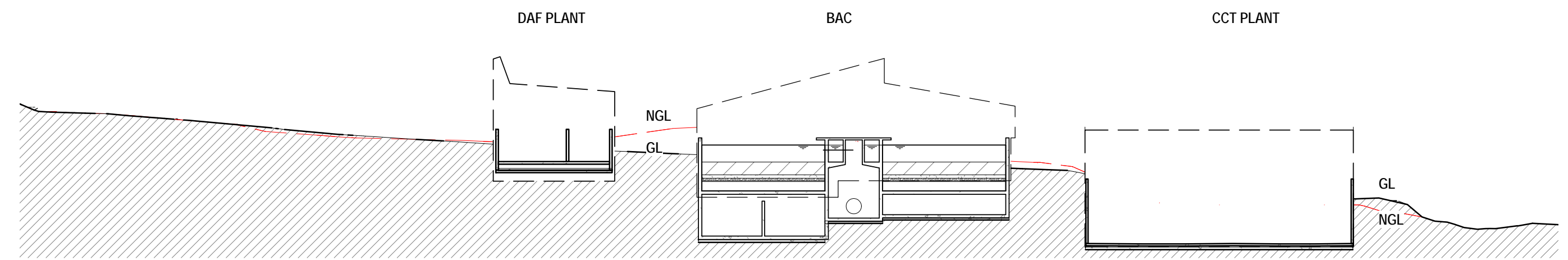
Original Size

A1 Drawing No: 51-3357501-3-A001

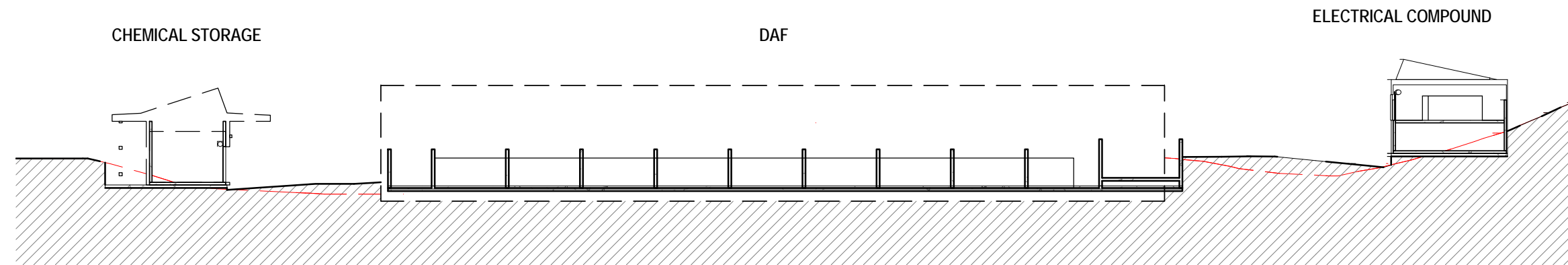
Rev: B



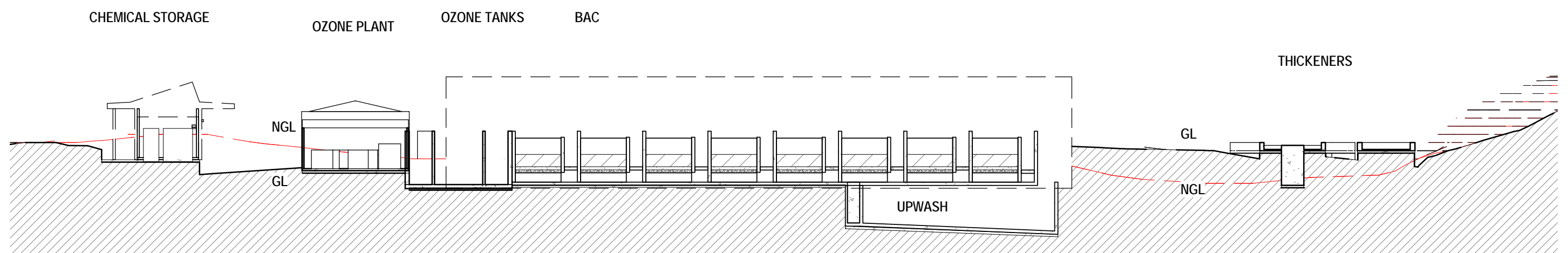
1 SECTION
3-A001 SCALE 1 : 500



2 SECTION
3-A001 SCALE 1 : 500



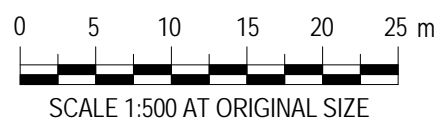
3 SECTION
3-A001 SCALE 1 : 500



4 SECTION
3-A001 SCALE 1 : 500

DRAFT

B	REVISED TO 160L	RW	CG	MM	03/17
A	SITE SELECTION STUDY	AC	CG	MM	09/16
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director
					Date



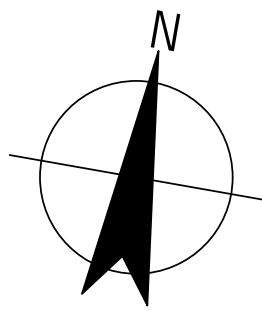
GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akimail@ghd.com W www.ghd.com

DO NOT SCALE

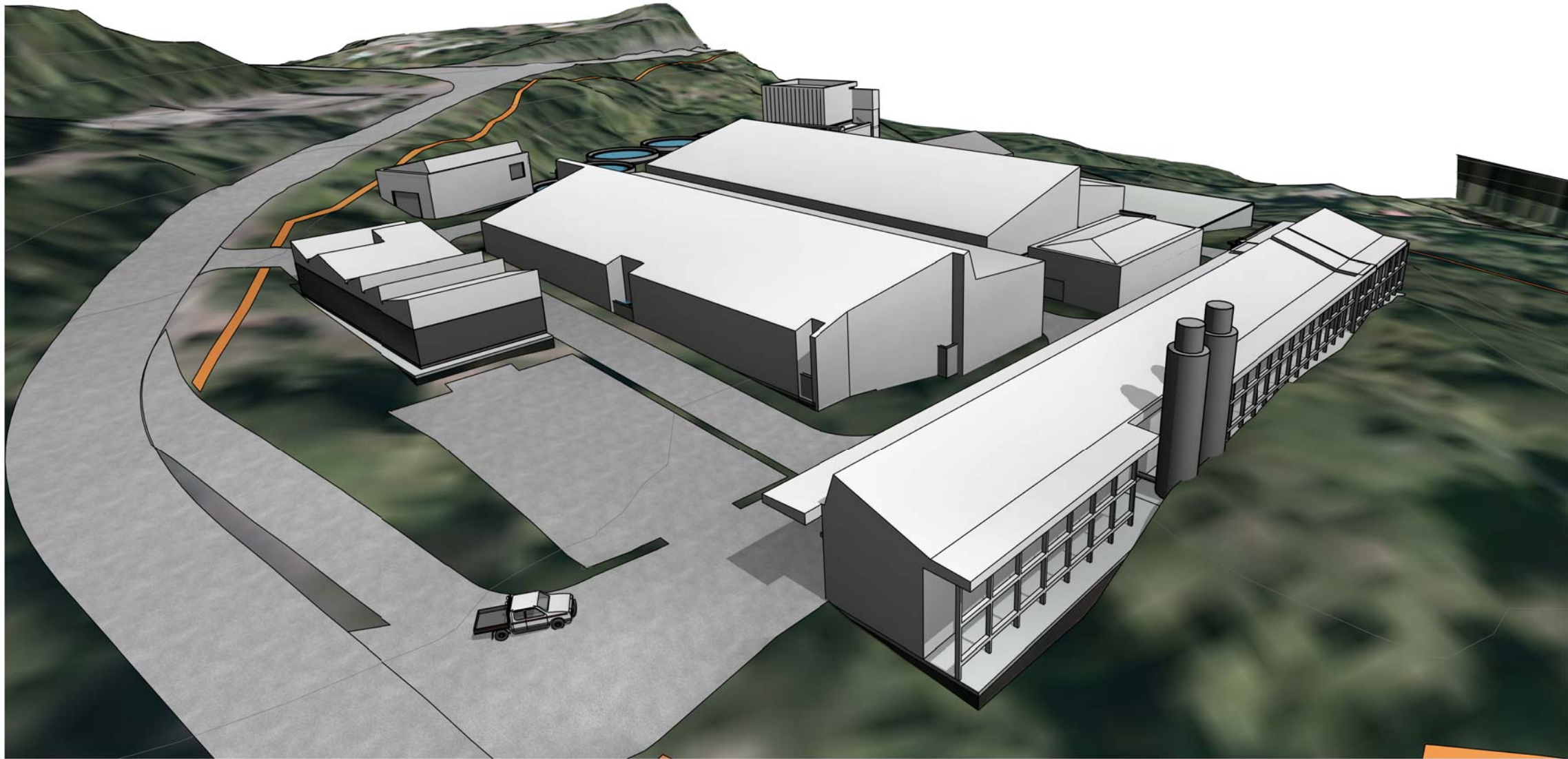
Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	AC	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)	MM		
Date	SEP 16		
Scale	1 : 500	This Drawing must not be used for Construction unless signed as Approved	

Client	Watercare Services LTD		
Project	HU1A Water Treatment Plant		
Title	Manuka Road Option		
	Overall Site Sections		
Original Size	A1	Drawing No:	51-3357501-3-A002
		Rev:	B



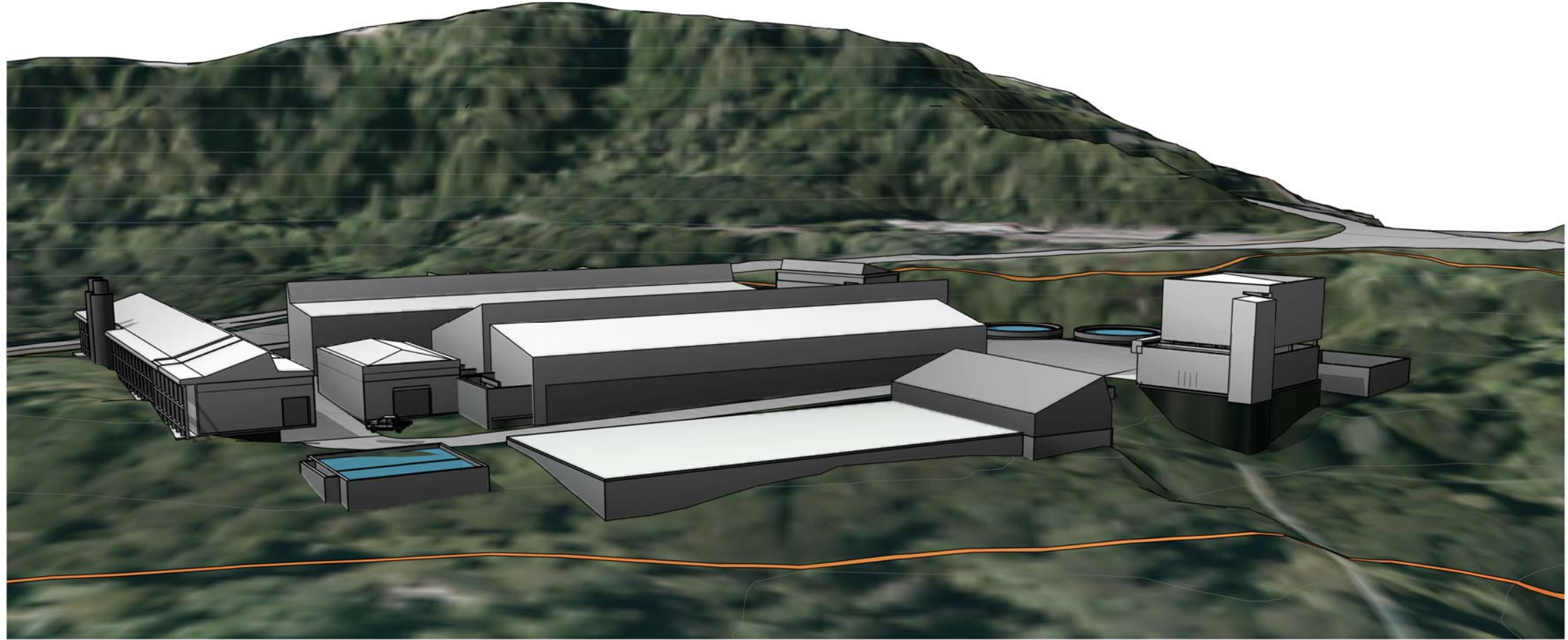
Site Axo
NOT TO SCALE



South-East Perspective
NOT TO SCALE



North-East Perspective
NOT TO SCALE



South-West Perspective
NOT TO SCALE

DRAFT

B	REVISED TO 160L	RW	CG	MM	03/17
A	SITE SELECTION STUDY	AC	CG	MM	09/16
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director
					Date



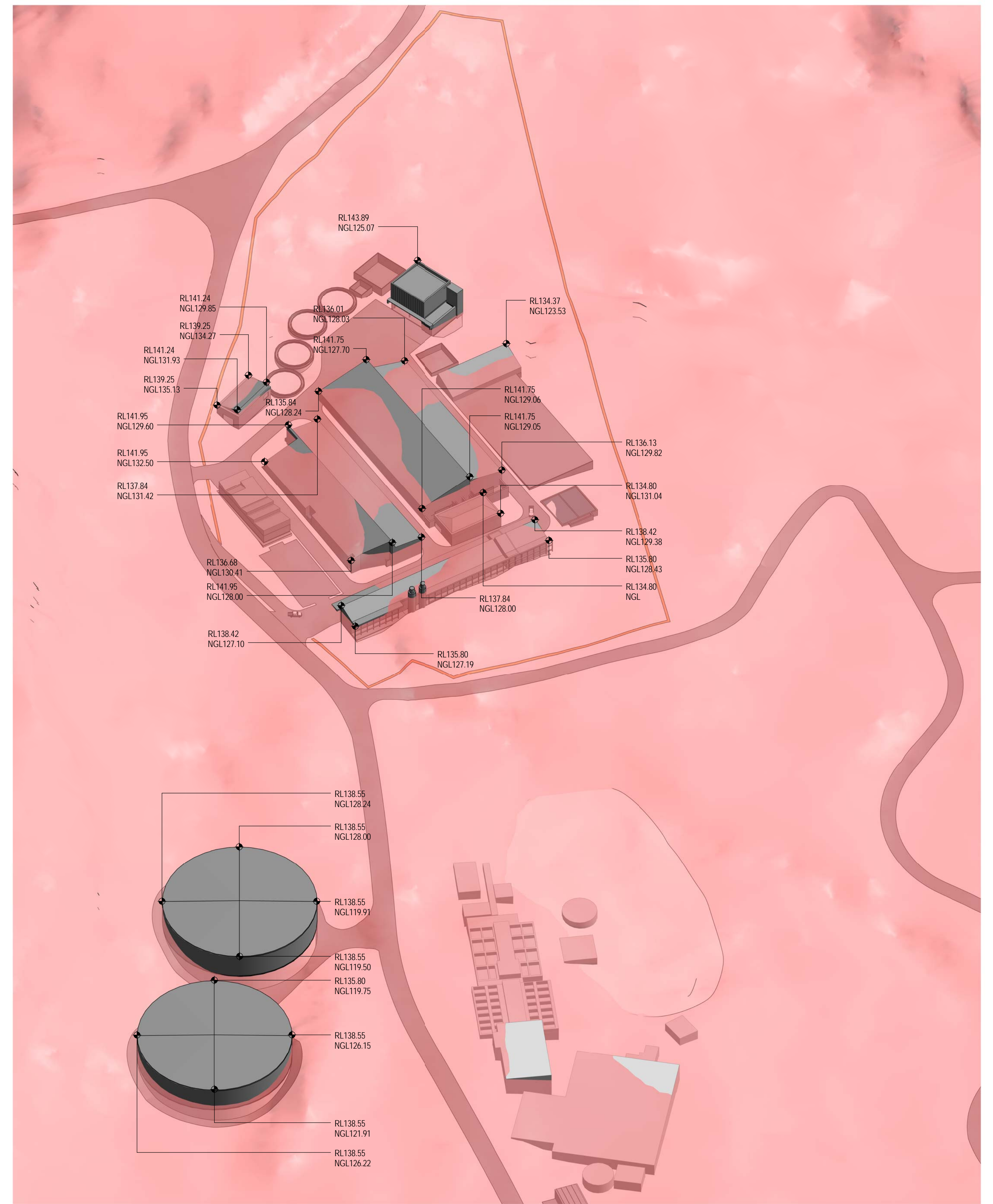
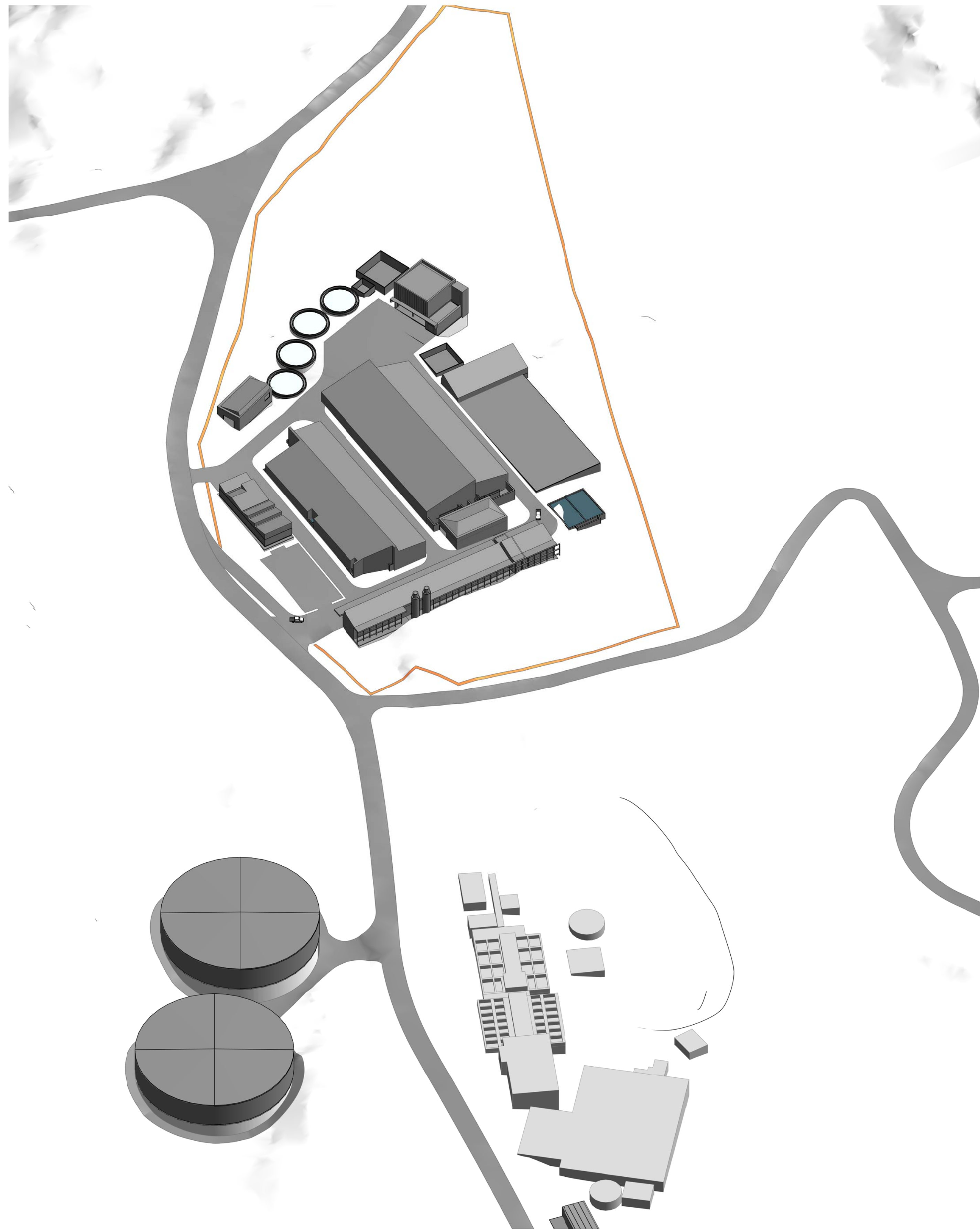
GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akimail@ghd.com W www.ghd.com

DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	AC	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)	MM		
Date	SEP 16		
Scale	NOT TO SCALE	This Drawing must not be used for Construction unless signed as Approved	

Client	Watercare Services LTD		
Project	HUIA Water Treatment Plant		
Title	Manuka Road Option Site Works Axonometric		
Original Size	A1	Drawing No:	51-3357501-3-A003
		Rev:	B



DRAFT

A	REVISED TO 160L	RW	CG	MM 03/17
No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director Date



GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E aklmail@ghd.com W www.ghd.com

DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	RW
-------	----

Drafting	CG
Check	
Approved	
(Project Director)	
Date	

Scale

Designer	CG
----------	----

	Design Check	MM
--	--------------	----

This Drawing must not be
used for Construction unless
signed as Approved

Client	Watercare Services LTD
Project	HUIA Water Treatment Plant
Title	Manuka Road Option Site Works - Height Analysis

Original Size **A1** Drawing No: **51-3357501-3-A004**

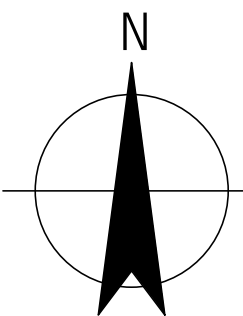
Rev: **A**



Site Plan
SCALE 1:1000

DRAFT

C	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	02/17	
B	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	02/17	
A	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	01/17	
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date



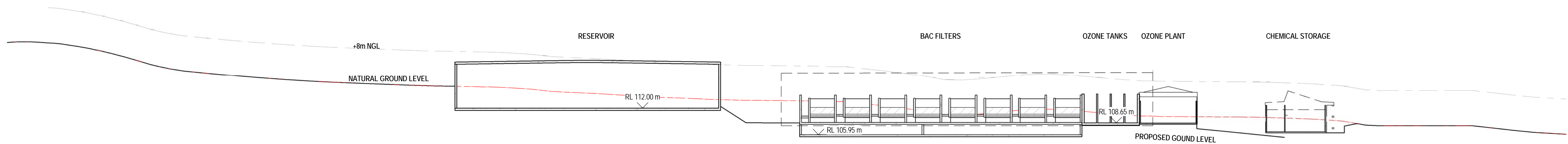
GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akmail@ghd.com W www.ghd.com

DO NOT SCALE

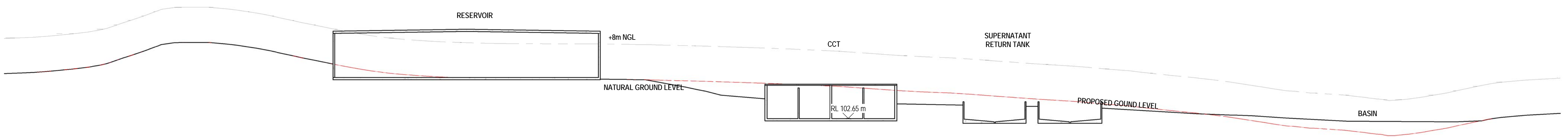
Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	AC	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)	MM	Date	JAN 17
Scale	1 : 1000	This Drawing must not be used for Construction unless signed as Approved	

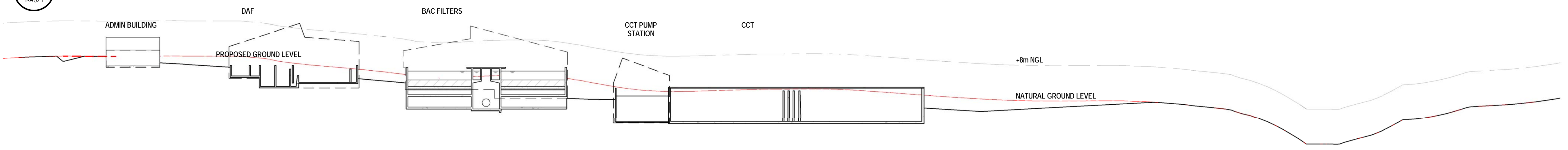
Client	Watercare Services LTD		
Project	HUIA Water Treatment Plant		
Title	Parker Road North Option 2 Overall Site Plan		
Original Size	A1	Drawing No:	51-33575-1-A021
		Rev:	C



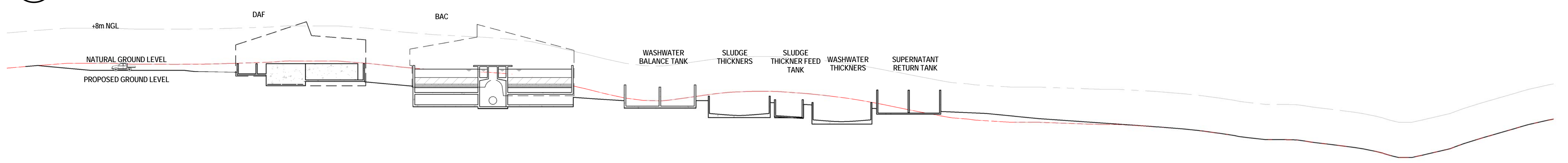
1 SECTION
1-A021 SCALE 1:500



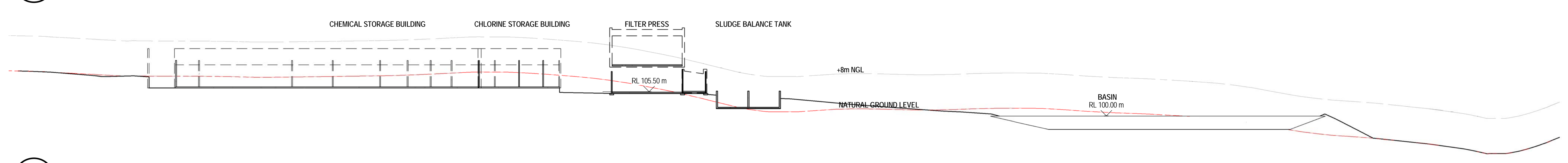
2 SECTION
1-A021 SCALE 1:500



3 SECTION
1-A021 SCALE 1:500



4 SECTION
1-A021 SCALE 1:500



5 SECTION
1-A021 SCALE 1:500

DRAFT

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C		PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	02/17
B		PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	02/17
A		PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	01/17



GHD

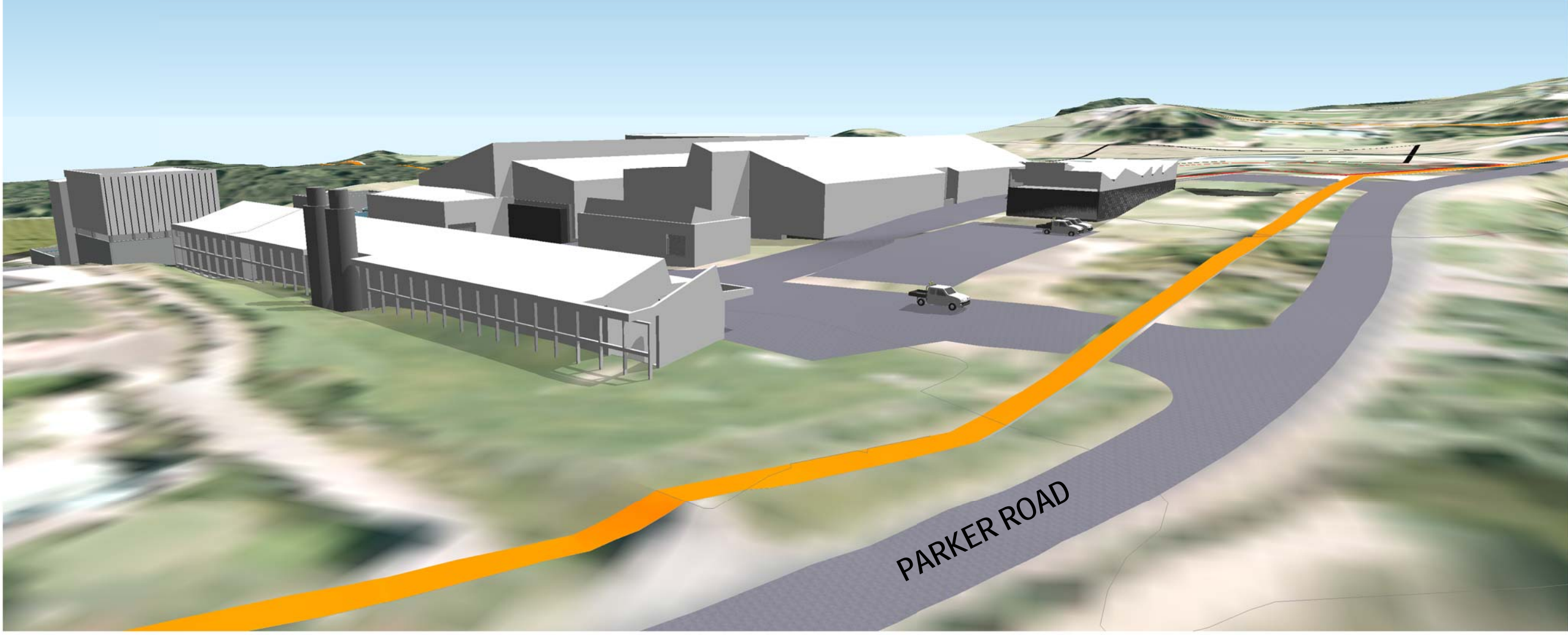
GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akmail@ghd.com W www.ghd.com

DO NOT SCALE	Drawn AC	Designer CG
Conditions of Use. This document may only be used by GHD's client (and any other person who GHD has agreed can use this document) for the purpose for which it was prepared and must not be used by any other person or for any other purpose.	Drafting Check CG	Design Check MM
	Approved (Project Director) MM	
	Date JAN 17	
Scale 1 : 500	This Drawing must not be used for Construction unless signed as Approved	

Client	Watercare Services LTD
Project	HUIA Water Treatment Plant
Title	Parker Road North Option 2 Overall Site Sections
Original Size	Drawing No: 51-33575-1-A022
Rev: C	



Overall Site
SCALE



North-West Perspective
NOT TO SCALE



South-West Perspective
NOT TO SCALE



South-East Perspective
NOT TO SCALE

DRAFT

C	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	02/17
B	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	02/17
A	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	01/17
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director



GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akmail@ghd.com W www.ghd.com

DO NOT SCALE

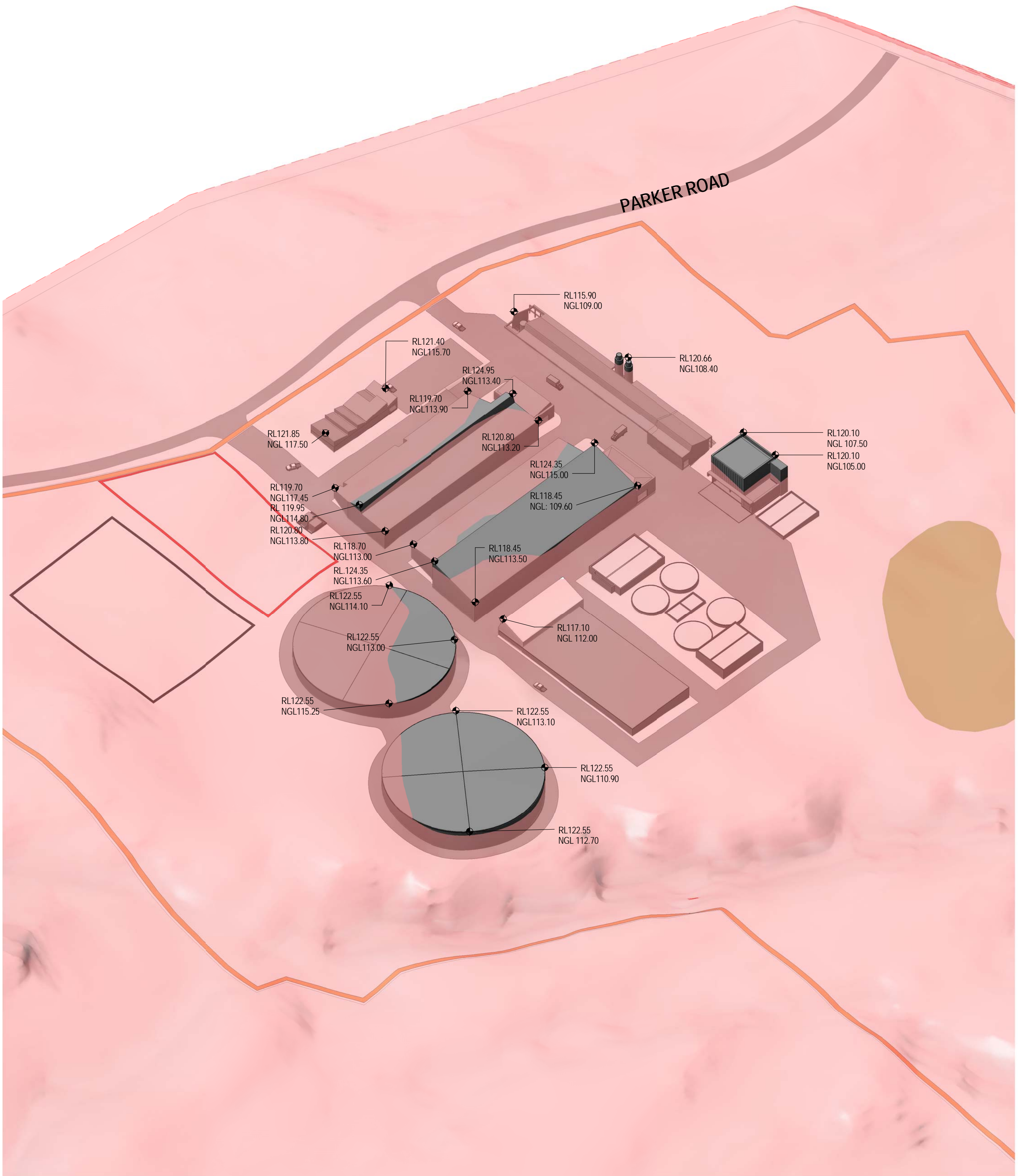
Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	AC	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)	MM	Date	JAN 17
Scale		This Drawing must not be used for Construction unless signed as Approved	

Client	Watercare Services LTD		
Project	HUIA Water Treatment Plant		
Title	Parker Road North Option 2 Site Works Perspectives		
Original Size	A1	Drawing No:	51-33575-1-A023
		Rev:	C



Site Axo NGL
NOT TO SCALE



Site Axo +8m NGL
NOT TO SCALE

DRAFT

C	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	02/17
B	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	02/17
A	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	01/17
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director



GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akmail@ghd.com W www.ghd.com

DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn AC

Designer CG

Drafting Check CG

Design Check MM

Approved (Project Director)

MM

Date

JAN 17

Scale

This Drawing must not be
used for Construction unless
signed as Approved

Client

Watercare Services LTD

Project

HUIA Water Treatment Plant

Title

Parker Road North Option 2

Site Works Height Analysis

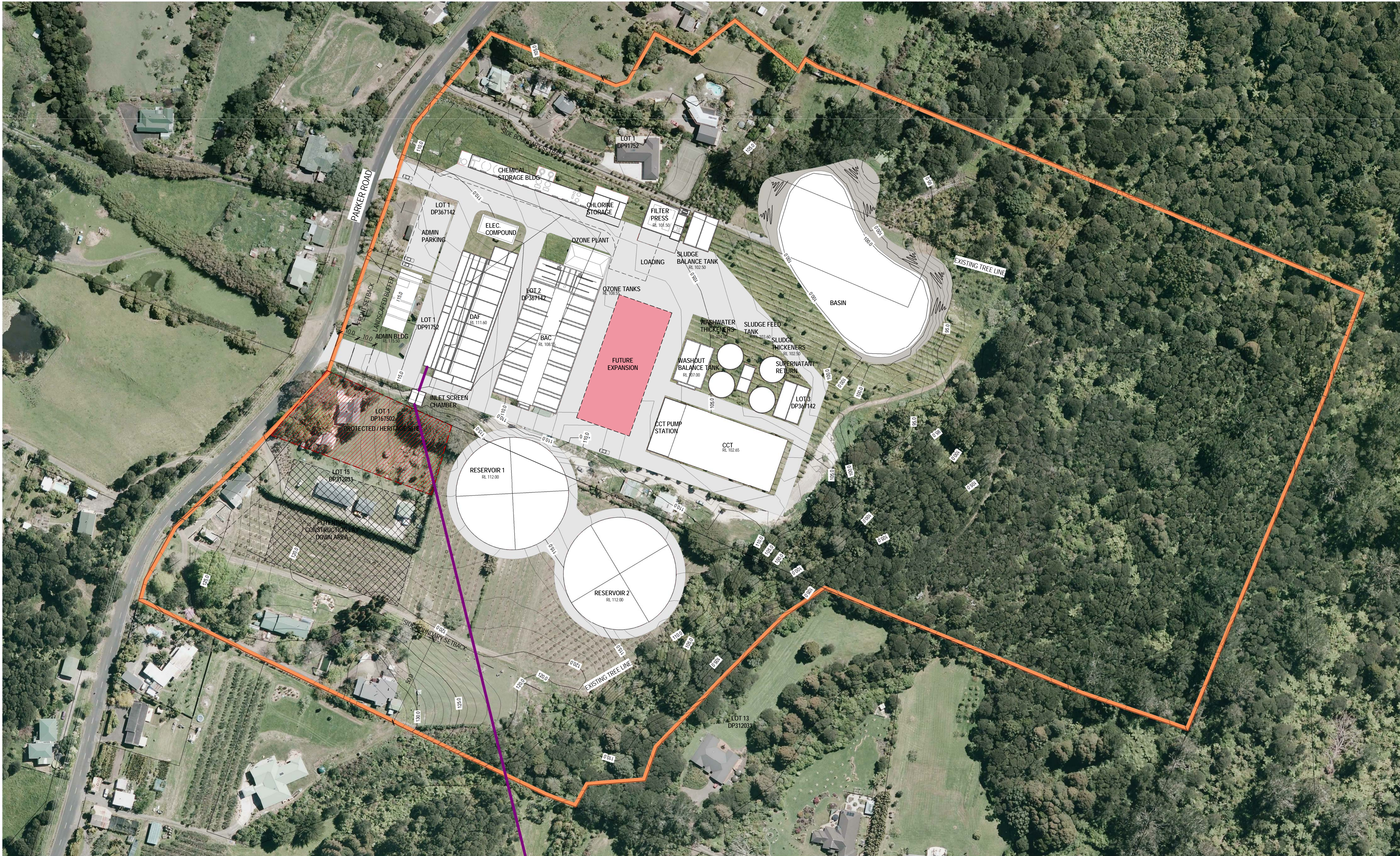
Original Size

A1

Drawing No:

51-33575-1-A024

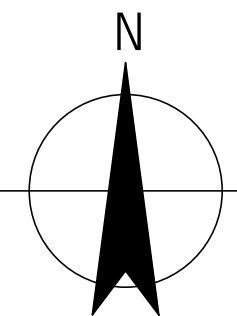
Rev: C



Site Plan
SCALE 1:1000

DRAFT

B	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	02/17
A	PARKER NORTH SITE LAYOUT STUDY	AC	CG	MM	02/17
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director
					Date



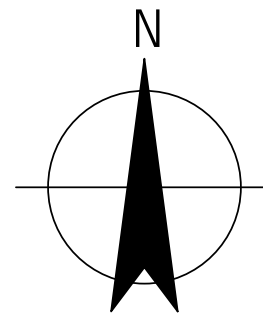
GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akmail@ghd.com W www.ghd.com

DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	AC	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)	MM	Date	JAN 17
Scale	1 : 1000	This Drawing must not be used for Construction unless signed as Approved	

Client	Watercare Services LTD		
Project	HUIA Water Treatment Plant		
Title	Parker Road North Option 2		
	Overall Site Plan - Expanded layout		
Original Size	Drawing No:	51-33575-1-A025	Rev: B



Site Plan
SCALE 1:1000

DRAFT

B	REVISED TO 160L	RW	CG	MM	03/17
A	SITE SELECTION STUDY	AC	CG	MM	09/16
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director



GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E aklmail@ghd.com W www.ghd.com

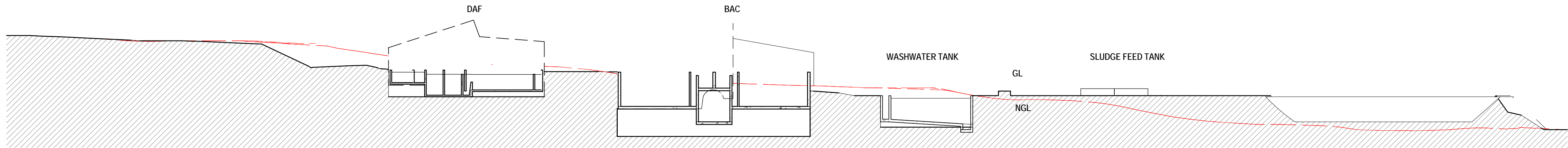
DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

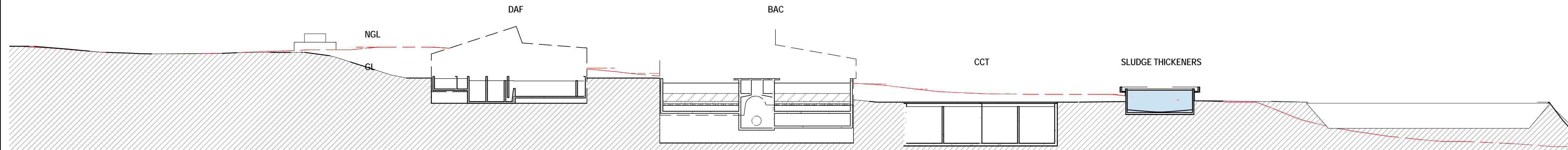
Drawn	AC	Designer	CG
Drafting	CG	Design	MM
Check		Check	
Approved	MM		
(Project Director)			
Date	SEP 16		
Scale	1 : 1000		

This Drawing must not be
used for Construction unless
signed as Approved

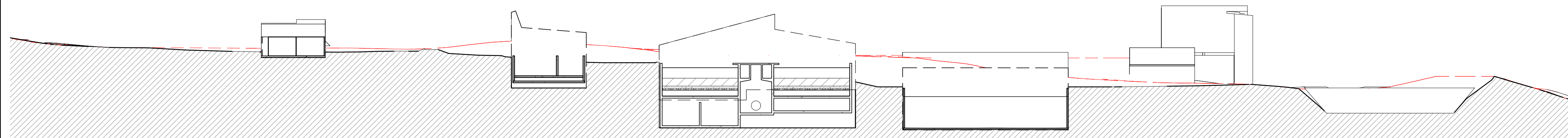
Client	Watercare Services LTD
Project	HUIA Water Treatment Plant
Title	Parker Road South Option Overall Site Plan
Original Size	A1
Drawing No:	51-3357501-2-A001
Rev:	B



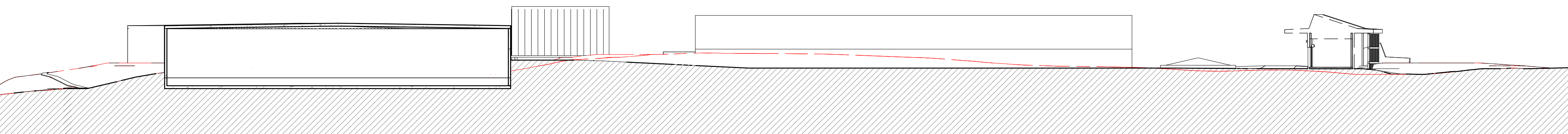
1 SECTION
2-A001 SCALE 1:500



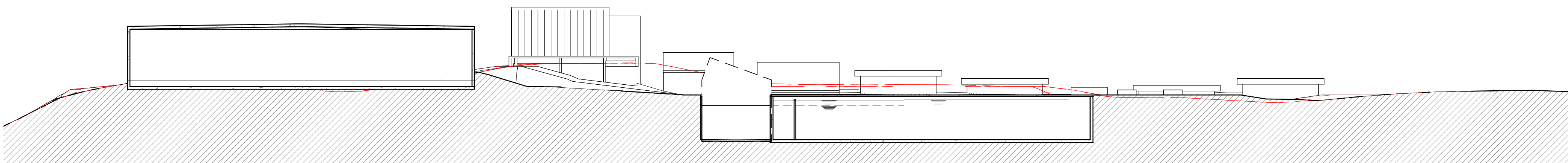
2 SECTION
2-A001 SCALE 1:500



3 SECTION
2-A001 SCALE 1:500



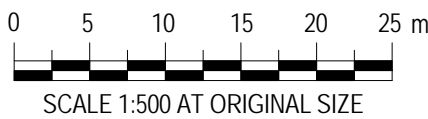
4 SECTION
2-A001 SCALE 1:500



5 SECTION
2-A001 SCALE 1:500

DRAFT

B	REVISED TO 160L	RW	CG	MM	03/17	
A	SITE SELECTION STUDY	AC	CG	MM	09/16	
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date



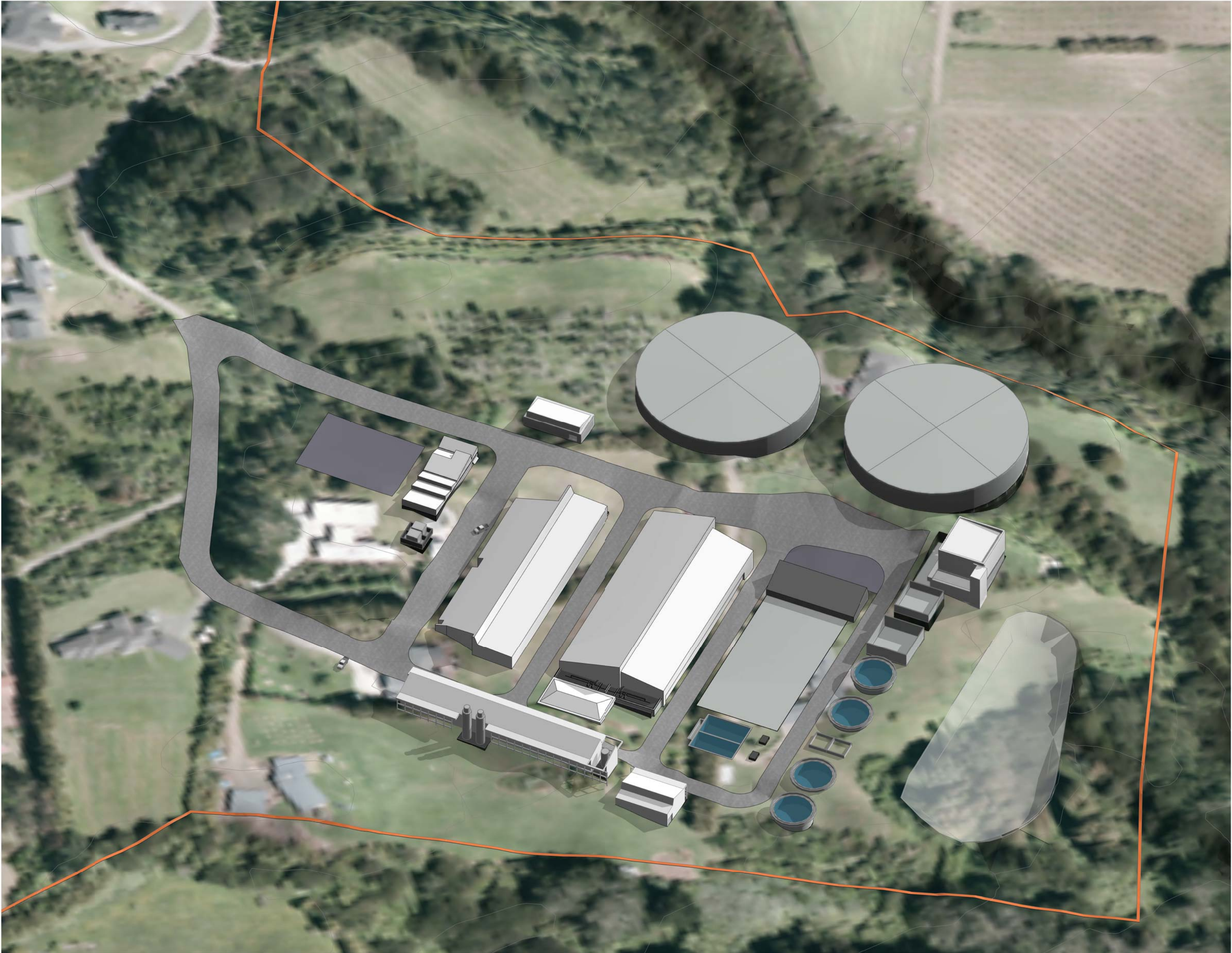
GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akimail@ghd.com W www.ghd.com

DO NOT SCALE

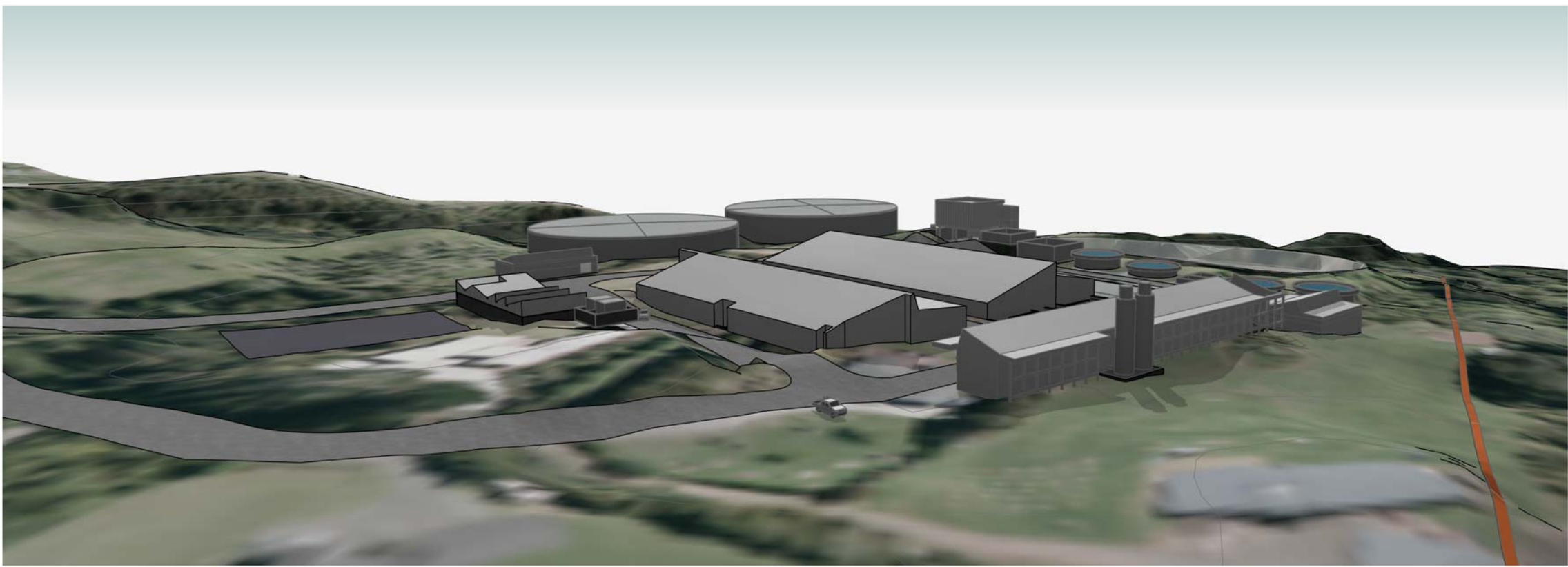
Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	AC	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)	MM	Date	SEP 16
Scale	1 : 500	This Drawing must not be used for Construction unless signed as Approved	

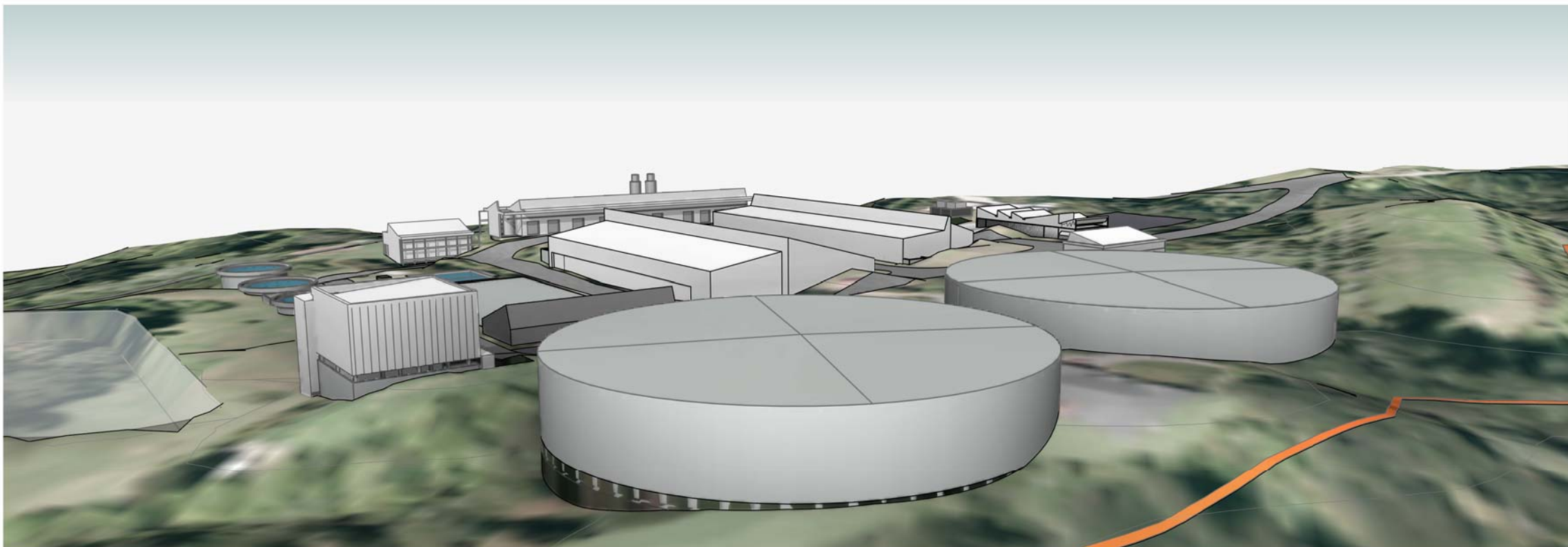
Client	Watercare Services LTD
Project	HUIA Water Treatment Plant
Title	Parker Road South Option
Original Size	Drawing No: 51-3357501-2-A002
Rev: B	



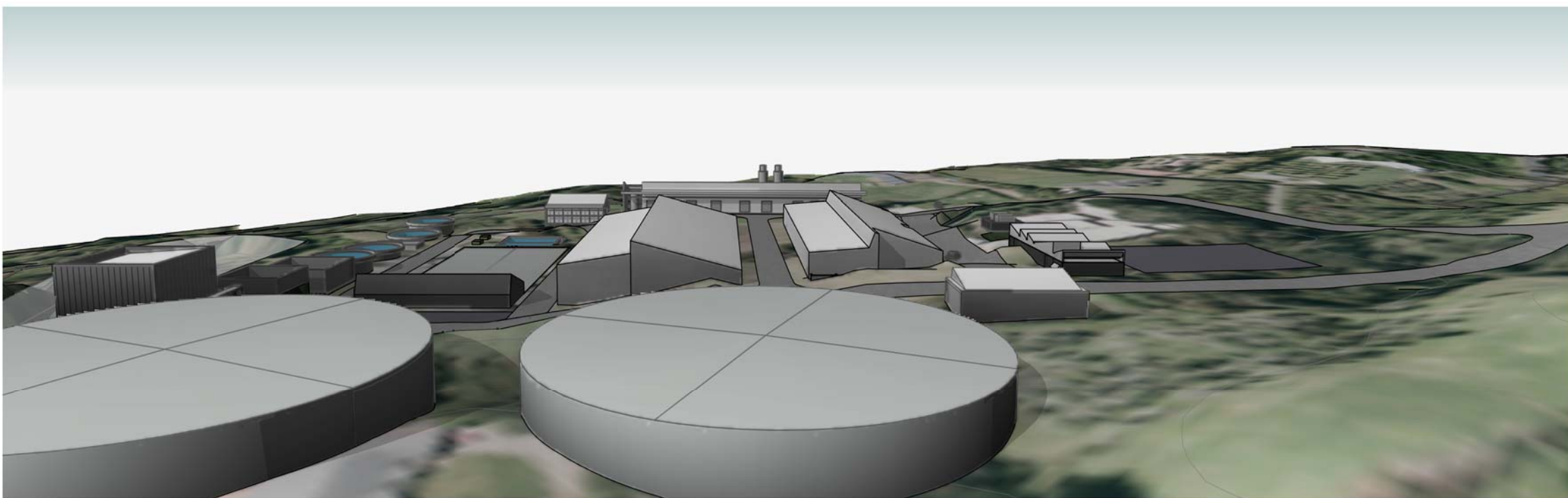
Site Axo
NOT TO SCALE



South-East Perspective
NOT TO SCALE



North-West Perspective
NOT TO SCALE



North-East Perspective
NOT TO SCALE

DRAFT

B	REVISED TO 160L		RW	CG	MM 03/17
A	SITE SELECTION STUDY		AC	CG	MM 09/16
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director Date



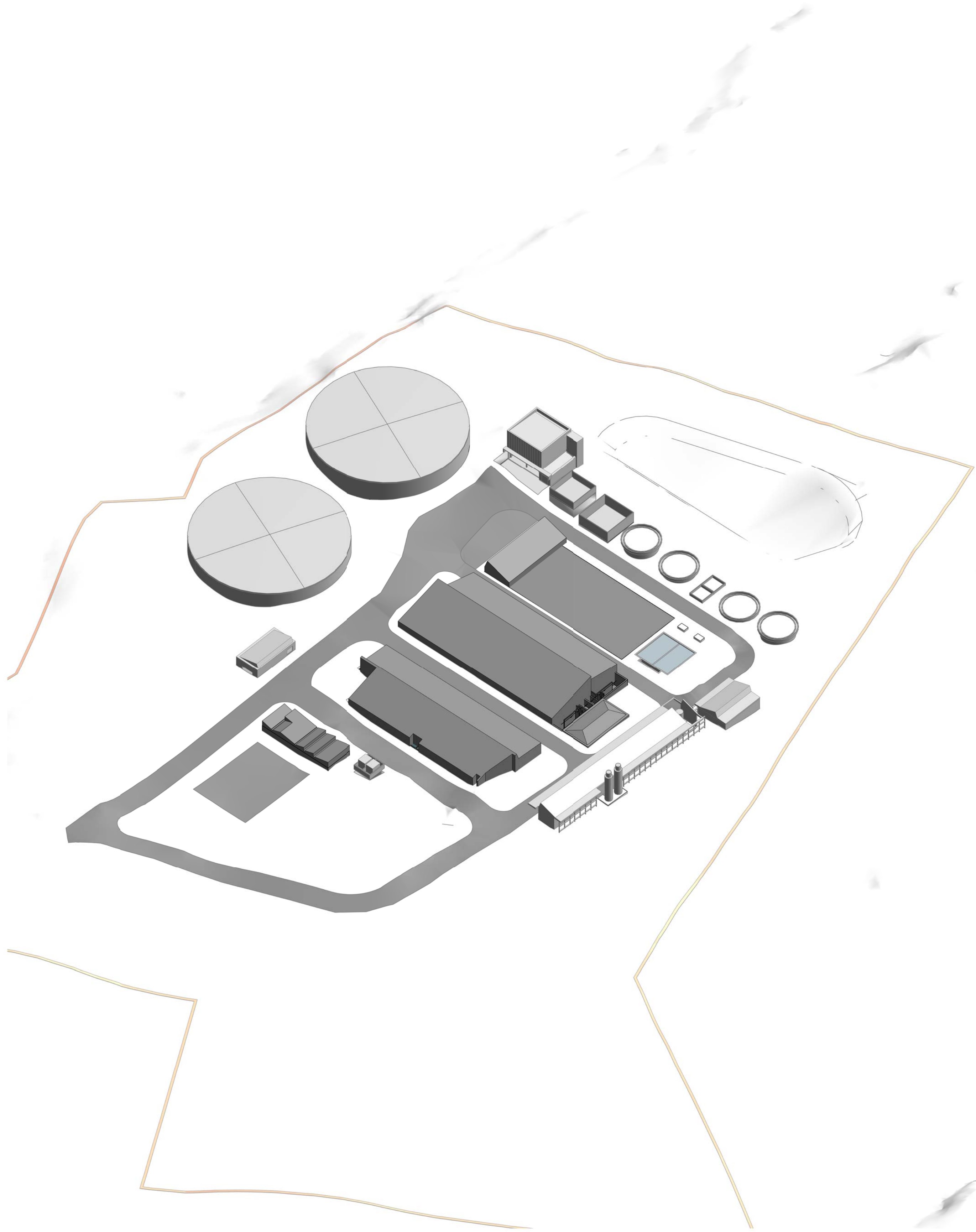
GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akimail@ghd.com W www.ghd.com

DO NOT SCALE

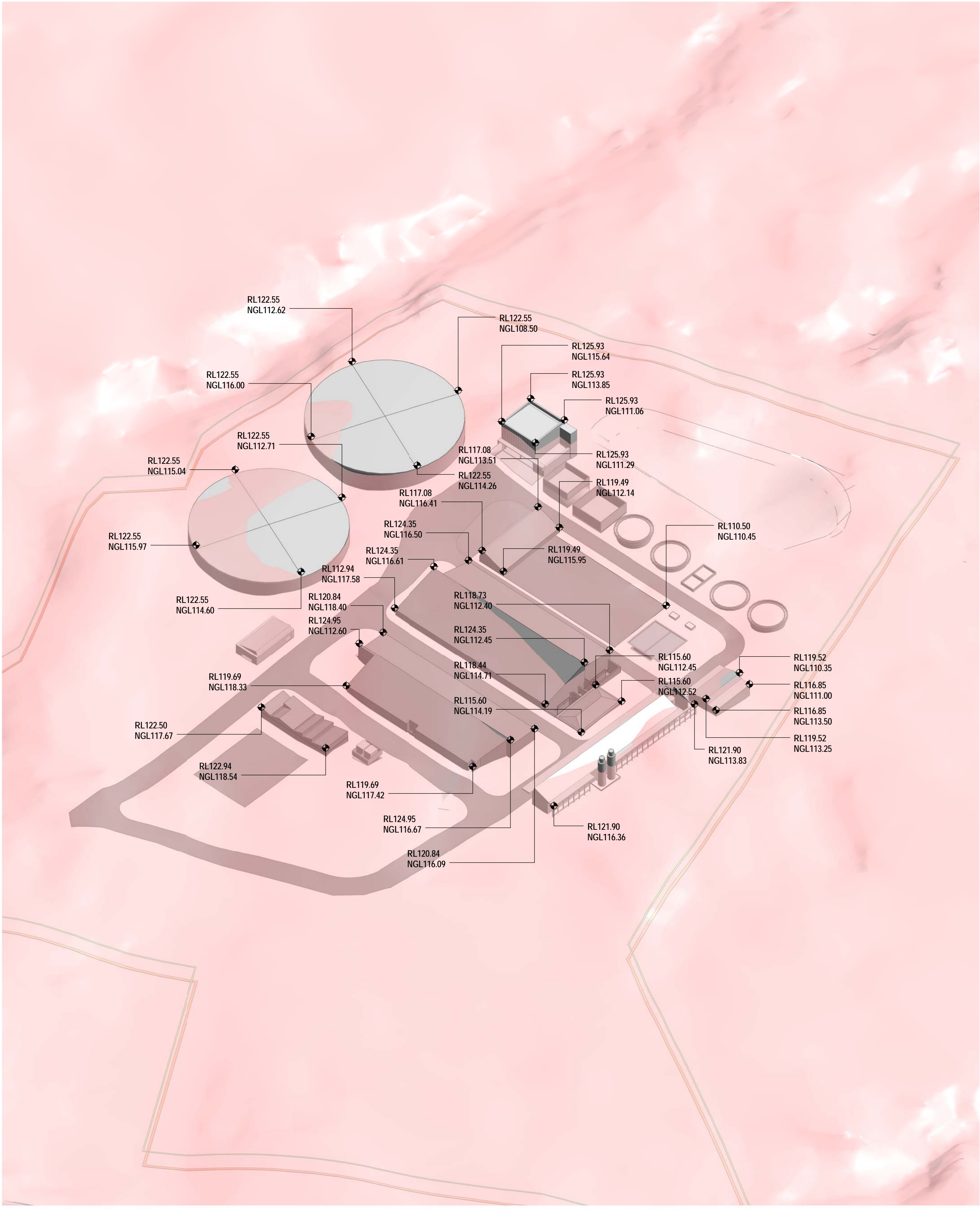
Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	AC	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)	MM	Date	SEP 16
Scale		This Drawing must not be used for Construction unless signed as Approved	

Client	Watercare Services LTD		
Project	HUIA Water Treatment Plant		
Title	Parker Road South Option Site Works Perspectives		
Original Size	A1	Drawing No:	51-3357501-2-A003
		Rev:	B



Site Axo NGL
NOT TO SCALE



Site Axo +8m NGL
NOT TO SCALE

DRAFT

A	REVISED TO 160L		RW	CG	MM 03/17
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director Date



GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E akimail@ghd.com W www.ghd.com

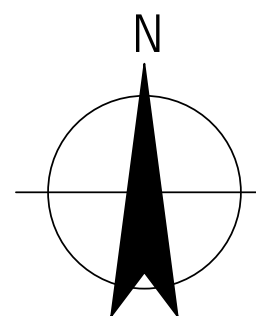
DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	RW	Designer	Designer
Drafting		Design	Checker
Check		Check	
Approved	Approver		
(Project Director)			
Date			
Scale			

This Drawing must not be
used for Construction unless
signed as Approved

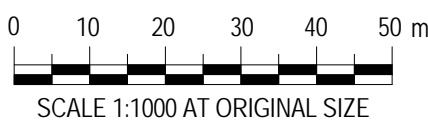
Client	Watercare Services LTD
Project	HUIA Water Treatment Plant
Title	Parker Road South Option Site Works Height Analysis
Original Size	A1
Drawing No:	51-3357501-2-A004
Rev:	B



Site Plan - Expanded Layout
SCALE 1:1000

DRAFT

B	REVISED TO 160L	RW	CG	MM	03/17	
A	SITE SELECTION STUDY	AC	CG	MM	09/16	
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date



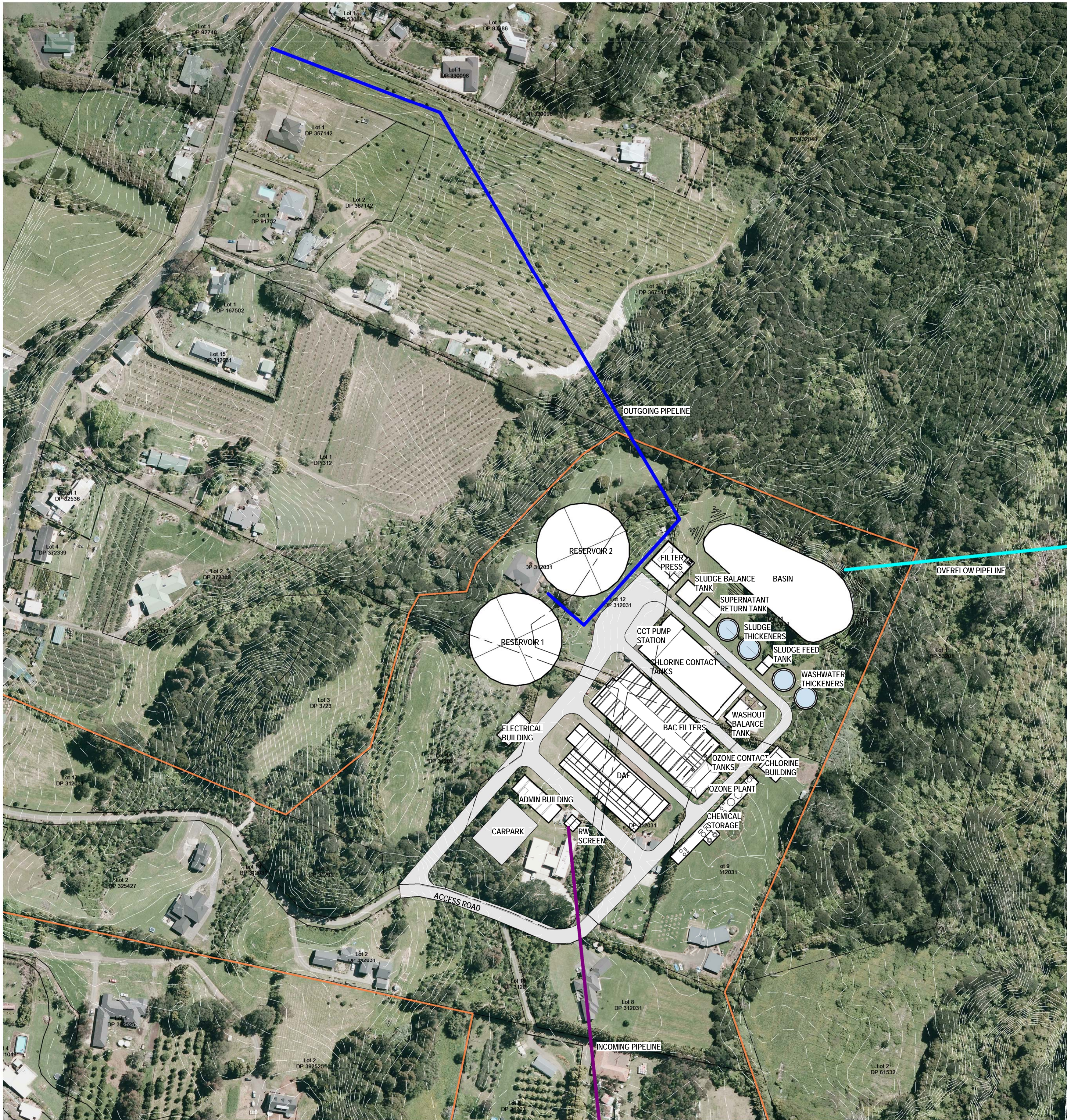
GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E aklmail@ghd.com W www.ghd.com

DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn	AC	Designer	CG
Drafting Check	CG	Design Check	MM
Approved (Project Director)	MM		
Date	SEP 16		
Scale	1 : 1000	This Drawing must not be used for Construction unless signed as Approved	

Client	Watercare Services LTD		
Project	HUIA Water Treatment Plant		
Title	Parker Road South Option		
	Overall Site Plan - Expanded		
Original Size	A1	Drawing No:	51-3357501-2-A005
Rev:	B		



LOCATION PLAN
SCALE 1 : 1500

DRAFT

A	REVISED TO 160L		RW	CG	MM
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director
					Date



GHD Centre Level 3 27 Napier Street Freemans Bay Auckland 1011
PO Box 6543 Wellesley Street Auckland 1141 New Zealand
T 64 9 370 8000 F 64 9 370 8001
E aklmail@ghd.com W www.ghd.com

DO NOT SCALE

Conditions of Use.
This document may only be used by
GHD's client (and any other person who
GHD has agreed can use this document)
for the purpose for which it was prepared
and must not be used by any other
person or for any other purpose.

Drawn RW

Designer CG

Drafting CG

Design Check MM

Approved
(Project Director)
Date

Scale 1 : 1500

This Drawing must not be
used for Construction unless
signed as Approved

Client **Watercare Services LTD**
Project **HUIA Water Treatment Plant**
Title **Parker Road South Option**
Overall Location Plan

Original Size
A1 Drawing No: **51-3357501-2-A006**

Rev: A

