



Ohaiti Site Access Assessment

Option Identification and Evaluation

Prepared for Tauranga City Council

Prepared by Beca Limited

5 October 2021





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Revision History

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Executive Summary

Tauranga City Council (TCC) has engaged Beca Ltd (Beca) to provide planning, transportation and civil engineering services as part of an access investigation for residential zoned land in Ohauti (the site).

The current TCC Long-term Plan (2021-31) stresses the need to find ways to make more housing availability a reality over the next decade and ensure there is balance between increasing housing options in established suburbs, creating more compact housing and providing housing options in new growth areas.

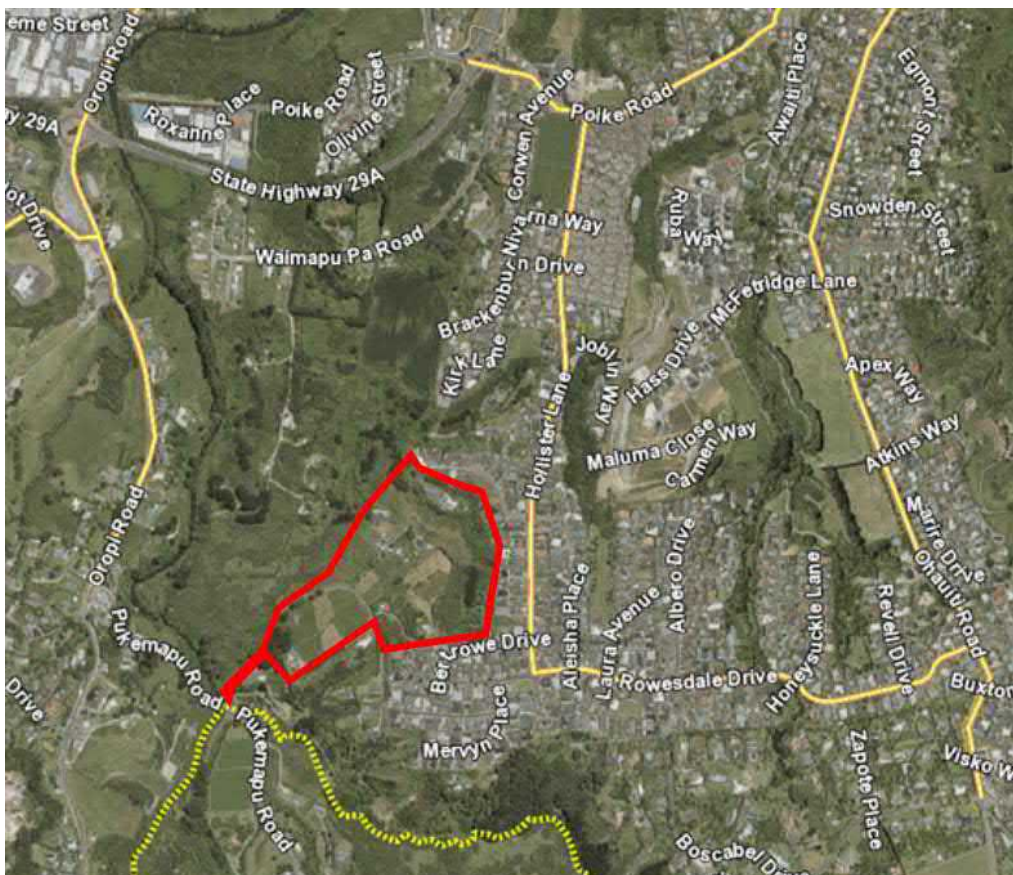
TCC's purpose of this work is to provide a sufficient road access and services route to enable residential development of the approx. 13 ha of underdeveloped residential zoned land.

The purpose of this technical assessment is to:

- identify all reasonably practicable options for access to the residentially zoned land
- assess the advantages and disadvantages of the options including the potential effects on the environment
- recommend a preferential access option for more detailed assessment / consideration
- prepare a concept design and indicative cost estimate for the preferred option to inform further assessment / consideration.

This report will inform the consideration given by TCC to alternative access routes, or other methods for the purposes of the Public Works Act 1981 or Notice of Requirement processes under the Resource Management 1991, if those processes are pursued by the Council.

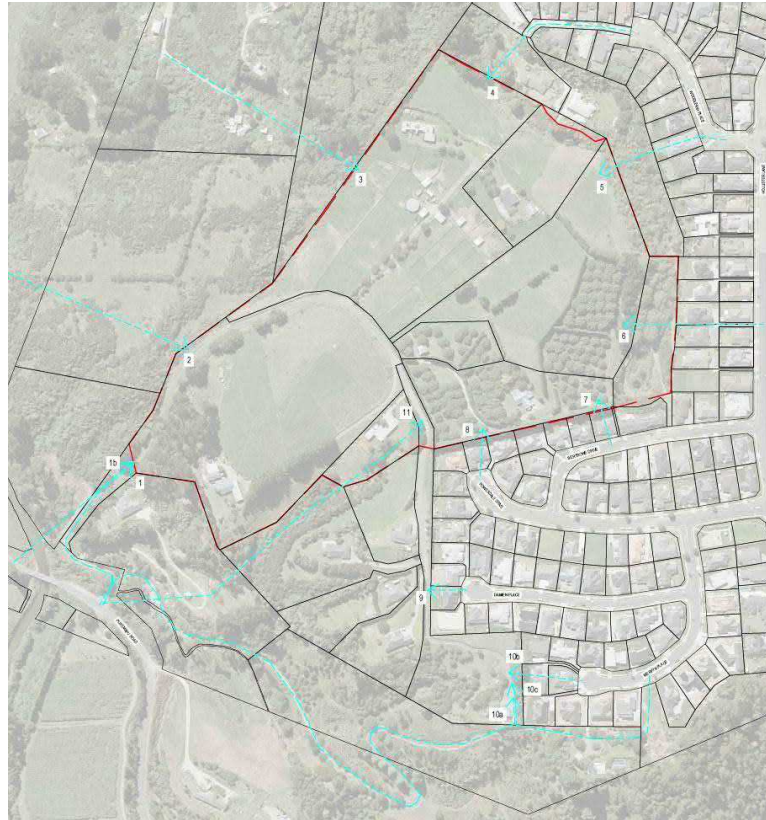
The site is located between Pukemapu Road and Hollister Lane in Ohauti. The site is zoned residential in the TCC City Plan. Existing access to the site is via Pukemapu Road. The approximate site boundary is shown in red within the following figure.



An assessment of the site and surrounding area identified the following matters of particular relevance for the access investigation:

- In general, land and transport facilities are more developed to the east of the site (toward Hollister Lane), for example:
 - Rowsdale Drive and Hollister Lane have footpaths and there is a bus route (Route 55) operating on Hollister Lane that provides travel options. There are limited footpaths and no public bus service operating on Pukemapu Road or Oropi Road.
 - There are small reserve amenities within the Rowsdale area and TCC are working on a plan to zone a small local centre (shops) in Ohauti. There are no equivalent or planned nearby amenities in the Pukemapu / Oropi Road area.
 - There is multiple owned land to the west and north of the site including several titles of 'Maori Freehold Land'. Providing access through these areas would potentially impose adverse effects on Iwi and create additional complexities with the acquisition process under the Public Works Act 1981.
- Road network operation is constrained at both the Poike Road and Oropi Road intersections with State Highway 29. There is no local street connection between Ohauti Road and Oropi Road, therefore requiring local trips to use SH29A.
- Additional development traffic from the site will add to existing traffic congestion. Access routes with greater provision for walking, cycling and public transport will have lower vehicle trip generation / impact on congested routes. As the site is zoned residential it is assumed to be developed in longer term studies such as UFTI and the Transport System Plan. These projects aim to improve the operation of the transport system city-wide.
- There is restricted visibility at the existing site access with Pukemapu Road and a single lane bridge between the access and Oropi Road. The bridge is not a constraint in terms of vehicle capacity, but it does not have any provision for walking or cycling.
- The site has some steep slopes, gullies, relic slips and overland flow paths that have been considered in the option development and evaluation.
- The majority of the reasonably practical access route options would cross records of title which are subject to land covenants prohibiting use of the land for any purpose other than residential use.
- Additionally, in many cases, the parcels of land within the route options are subject to right of way easements. If the Council were required to exercise its compulsory acquisition powers under the PWA to acquire land for those options, it would also likely need to use those powers to acquire the easement rights of those grantees under the affected rights of way, adding additional parties and an additional complexity to any compulsory acquisition process

A long list of 11 reasonably practicable access route options were identified by the project team. The route options within the long list are shown below.



Several concept sketches were developed depicting the various routes to inform assessment of the options. The concept sketches (Appendix A) allowed the project team to consider the potential impacts of the options on surrounding land.

A multi criteria assessment (MCA) of the options was completed by the specialists and reviewed with the TCC team. The following table shows a simplified output of the MCA, the full MCA including commentary on the scoring is provided in Appendix C.

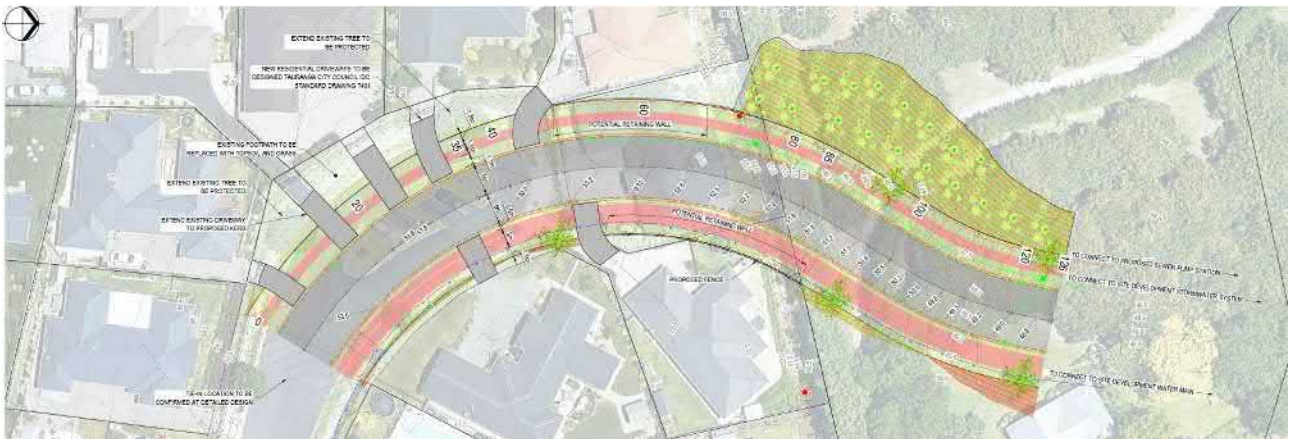
| Criteria | Option Scoring (Average Result from MCA see full MCA in Appendix C for Detailed Scoring) | | | | | | | | | | | | |
|---|--|-----|-----|-----|----|----|----|-----|-----|-----|-----|-----|--|
| | 1 | 1b | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10a | 11 | |
| Transport | - | - | - | -- | + | ++ | ++ | ++ | ++ | + | + | - | |
| Geotechnical and Infrastructure | - | - | - | - | -- | - | - | 0 | ++ | - | 0 | - | |
| Social / Cultural | 0 | 0 | - | - | - | 0 | 0 | + | 0 | 0 | - | 0 | |
| Natural and Physical Environment | 0 | 0 | 0 | -- | -- | -- | -- | 0 | 0 | - | - | - | |
| Site Acquisition | --- | --- | -- | -- | - | - | - | 0 | +++ | - | -- | - | |
| Consentability | -- | --- | -- | -- | - | - | - | + | + | - | - | - | |
| Development outcomes | +++ | +++ | +++ | +++ | - | - | - | +++ | +++ | +++ | +++ | +++ | |

Options 6, 7 and 8 achieved overall positive scores with option 8 (Rowesdale Drive connection) achieving the highest score. Option 7 was second. Both options 8 and 7 scored positively for transport, land ownership, geotechnical and constructability criteria. Other options had higher risks on geotechnical, cultural, site acquisition and other criteria which impacted the outcome. Option 8 requires one full property and impacts on the boundary of one additional property, both of these properties are owned by TCC.

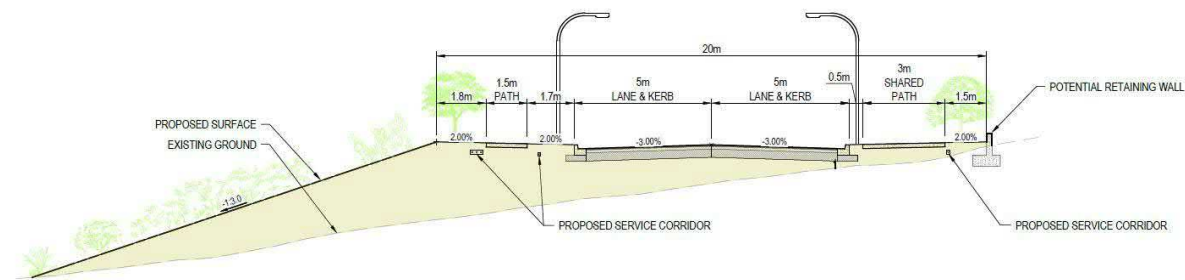
Option 8 is subject to a land covenant prohibiting any uses of land other than residential use. However, the same or similar covenants are registered on most of the potentially affected titles to the eastern side of the site.

The design philosophy for the access following Route 8 is to create a 20m wide accessway in accordance with the TCC Street Design Guide. Within the 20m road corridor a 1.5m footpath is allowed for on one side and a 3m shared path on the other. TCC own two properties at the end of Rowesdale Drive and the design utilises one of these properties fully. At this stage a small area of the second property is required, however the house can potentially remain and could be sold on after construction.

A concept design of the preferred option has been developed as shown below. The cost estimate of the option is approximately \$2.9M excluding TCC project costs (e.g. project management and property costs).



Concept Design - Plan



Concept Design Cross-section

The option will require further design investigation and/or Regional and Territorial Authority resource consents and it is recommended that an Archaeological Authority to modify or destroy unknown archaeological sites is also obtained from Heritage New Zealand.

In conclusion the process followed has been robust and all reasonably practicable options have been considered. The preferred option has more benefit and less associated impacts than the other options when considered against a broad range of criteria.

1 Introduction

1.1 Background

The Tauranga City Council (TCC) has engaged Beca Ltd (Beca) to investigate access options (vehicle and walking / cycling provisions) for an area of residential zoned land in Ohauti which currently has limited access with the surrounding area.

The site is located in the vicinity of Hollister Lane and Pukemapu Road in Ohauti. The approximate location of the site is shown in **Figure 1**.

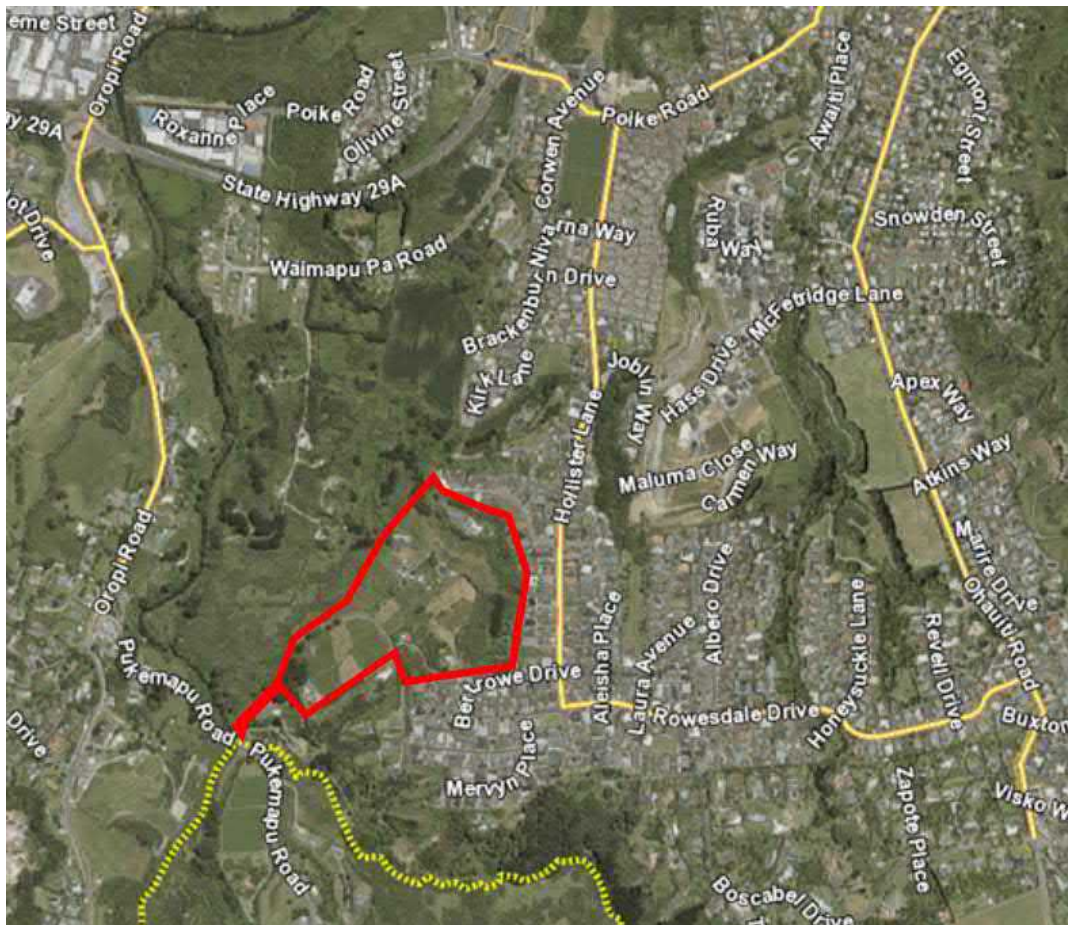


Figure 1: Approximate Location of the Site (within the boundary shown in Red)

The area identified in Figure 1 is zoned Suburban Residential in the operative Tauranga City Plan.

1.2 Urban Growth and Housing Supply Challenges

Tauranga City and the Western Bay of Plenty have seen a rapid and sustained increase in population, with Tauranga City experiencing the bulk of this growth, its population doubling in the past 30 years to over 150,000 residents and 58,000 dwellings. This trend is expected to continue with the sub-region's population expected to increase to 281,960 in the next 30 years.

While this rapid growth continues, Tauranga City remains the fourth smallest territorial authority by land area, with 135km² and the fifth highest city population in New Zealand. In January 2021 areas at Tauriko West, Keenan Road and Tara Road moved from the Western Bay of Plenty District into the Tauranga City local authority area through the Local Government Commission. This recognises the continued rapid growth and

expansion of Tauranga, constrained by geography and the need to preserve significant cultural and natural areas, as well as areas constrained by natural hazard risk.

This presents a challenge in accommodating future population growth in a sustainable way. There is limited greenfield land to accommodate population growth, and constraints exist in the cost and delivery of infrastructure to service that land and meet National Policy Statement requirements, while trying to balance affordable housing opportunities. This introduces a further issue in the finite nature of the land that can be efficiently serviced with infrastructure, and an inherent need to maximise the use of the land resource.

A residential development capacity shortfall is projected across the city. This shortfall will have significant impacts on the housing market in Tauranga. This has been independently confirmed by NZIER in 2020. NZIER assessed the shortage would increase median house prices in the short term by \$40,000 to \$60,000 per annum and over the medium term a loss of construction GDP of over \$100 million (up to \$240 million on high-end shortfall projections).

The current Long-term Plan (2021-31) stresses the need to find ways to make more housing availability a reality over the next decade and ensure there is balance between increasing housing options in established suburbs – creating more compact housing - and providing housing options in new growth areas.

TCC needs to invest over \$2.6 billion over the next 10 years to establish more liveable places and homes within the current footprint of the city, as well as laying the groundwork for additional homes and businesses in new areas.

TCC has already invested in this area as part of the Ohauti structure plan, in particular by delivering the three waters and transport network in Ohauti. Given the city's financial challenges and constraints (as per the LTP) this is a significant driver. This infrastructure has capacity to accommodate development with low or no additional cost as it was designed and built on the basis that land within the site would be developed as per its residential zoning.

1.3 Purpose

TCC has identified the overarching purpose of this work as to provide sufficient road access and services route to enable residential development of the residential zoned land identified.

The purpose of this technical assessment is to:

- identify all reasonably practicable options for access to the residentially zoned land
- assess the advantages and disadvantages of the options including the potential effects on the environment
- recommend a preferential access option for more detailed assessment / consideration
- prepare a concept design and indicative cost estimate for the preferred option to inform further assessment / consideration.

This report does not address consultation or engagement with interested or affected parties, which is undertaken separately by TCC.

This report will inform the consideration given by TCC to alternative access routes, or other methods for the purposes of the Public Works Act 1981 or Notice of Requirement processes under the Resource Management 1991, if those processes are pursued by the Council.

This report is set out over the following chapters:

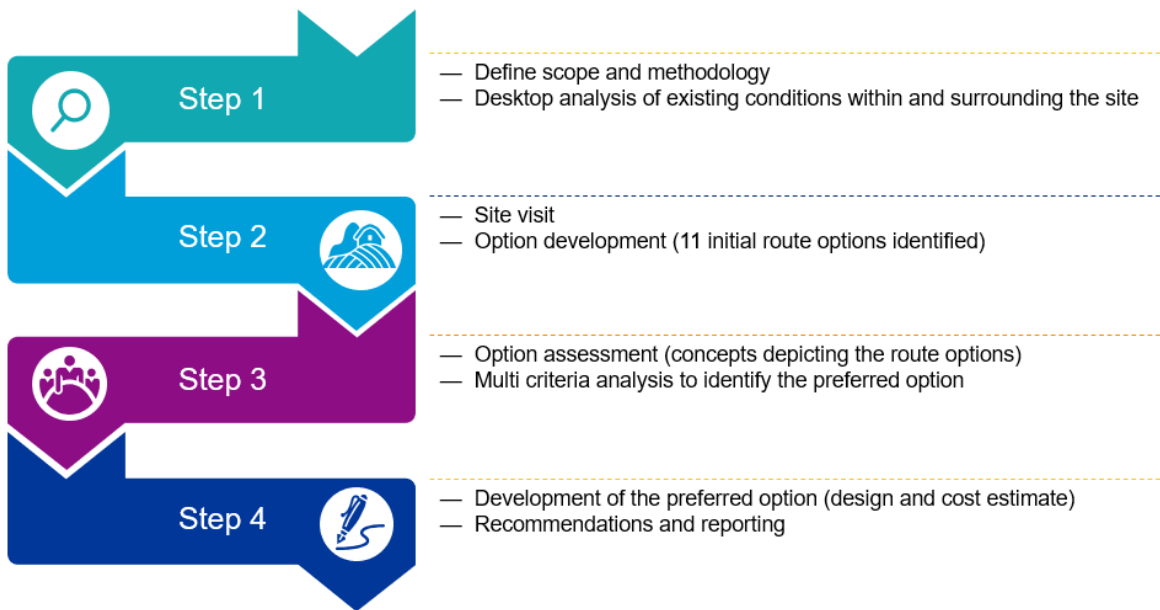
- **Policy context:** key policies influencing the access planning and evaluation at a high level
- **Transport context:** describes the receiving transport environment to inform option identification and evaluation

- **Civil infrastructure context:** describes existing services and topography within the vicinity of the site to inform option identification and evaluation
- **Long list option development:** Describes the route options identified as potentially feasible for providing access to the site
- **Scenario sketches:** describes the necessary cross section and applies this to route options to inform a multicriteria assessment (MCA) of the options
- **Option evaluation:** process and results of the MCA of the options
- **Development of highest ranked option:** concept design and cost information for the preferred option.

1.4 Process

This report has been informed through site visits, technical desktop analysis, evaluation of concept design options and a multi criteria assessment of the options, as depicted below.

Figure 2: Process Diagram



2 Policy Context

The site access and future development will need to adhere to the policy requirements set out in the Tauranga City Plan (TCP), and should support the land use and transport direction given in the Urban Form and Transport Initiative (UFTI) as discussed below.

2.1 Tauranga City Plan

The TCP enables TCC to carry out its functions under the Resource Management Act 1991 (RMA); promoting the sustainable management of natural and physical resources and includes provisions (objectives, policies, rules, anticipated environmental outcomes) to guide the use, development and subdivision of land.

The following objectives and policies from the TCP are relevant when considering the purpose of this work.

4B.1.1 Objective – Promoting an Integrated Transport Network

Subdivision, use and development of land facilitates and encourages the use of alternative modes of transport, in particular walking, cycling and public transport.

4B.1.1.2 Policy – Encouraging Alternative Transport

By ensuring that land-use and subdivision activities that have significant transport implications or present an opportunity to facilitate alternative modes of transport are designed to provide for walking, cycling and public transport facilities that:

- a. *Address any identified need for new facilities or networks;*
- b. *Enhance existing facilities or networks.*

12B.1.1.1 Policy – Subdivision in the Residential Zone

By ensuring that subdivision design and allotment sizes:

- a. *Incorporate good urban design principles by:*
 1. *Providing a safe and efficient transport network that effectively integrates with the surrounding area;*
 2. *Providing for safe and direct movement through and between neighbourhoods for pedestrians, cyclists and vehicles;*
 3. *Providing for efficient public transport layouts;*
 4. *Optimising allotment frontage to public roads and reserves;*
 5. *Providing easy access to open space and reserves;*
 6. *Providing good solar orientation of residential allotments, open space and reserves;*
 7. *Providing a variety of allotment sizes;*
 8. *Retaining and integrating natural features;*
 9. *Generally avoiding cul-de-sacs where these are not associated with topographical constraints.*

2.2 Urban Form and Transport Initiative

UFTI focuses on supporting liveable community outcomes in the areas of housing capacity, intensification, multi-modal transport (such as public transport, walking and cycling), safety and network capacity.

In the context of the intended use of this site, residential development would align with the UFTI in regard to increased housing supply within the existing urban area. It will be necessary, to provide access that supports multi-modal transport and encourages local trip making, i.e. supports direct access to local opportunities, to align with the transport objectives of UFTI.

The Transport System Plan (TSP) identifies transport system modal priorities (bus, cycle, car, freight etc) across the city that also inform the access investigation and are considered further in the following chapter.

3 Transport Context

3.1 Existing Transport Environment

3.1.1 Site Location

The site is located in Ohauti, Tauranga. The site is currently made up of multiple rural-residential properties which are accessed via a formed accessway on to Pukemapu Road (to the South). The site is bordered by the nearby roads of Oropi Road, Pukemapu Road and Rowsdale Drive (**Figure 3**). In the wider area to the site are strategic road connections including State Highway 29, 29A, and 36.

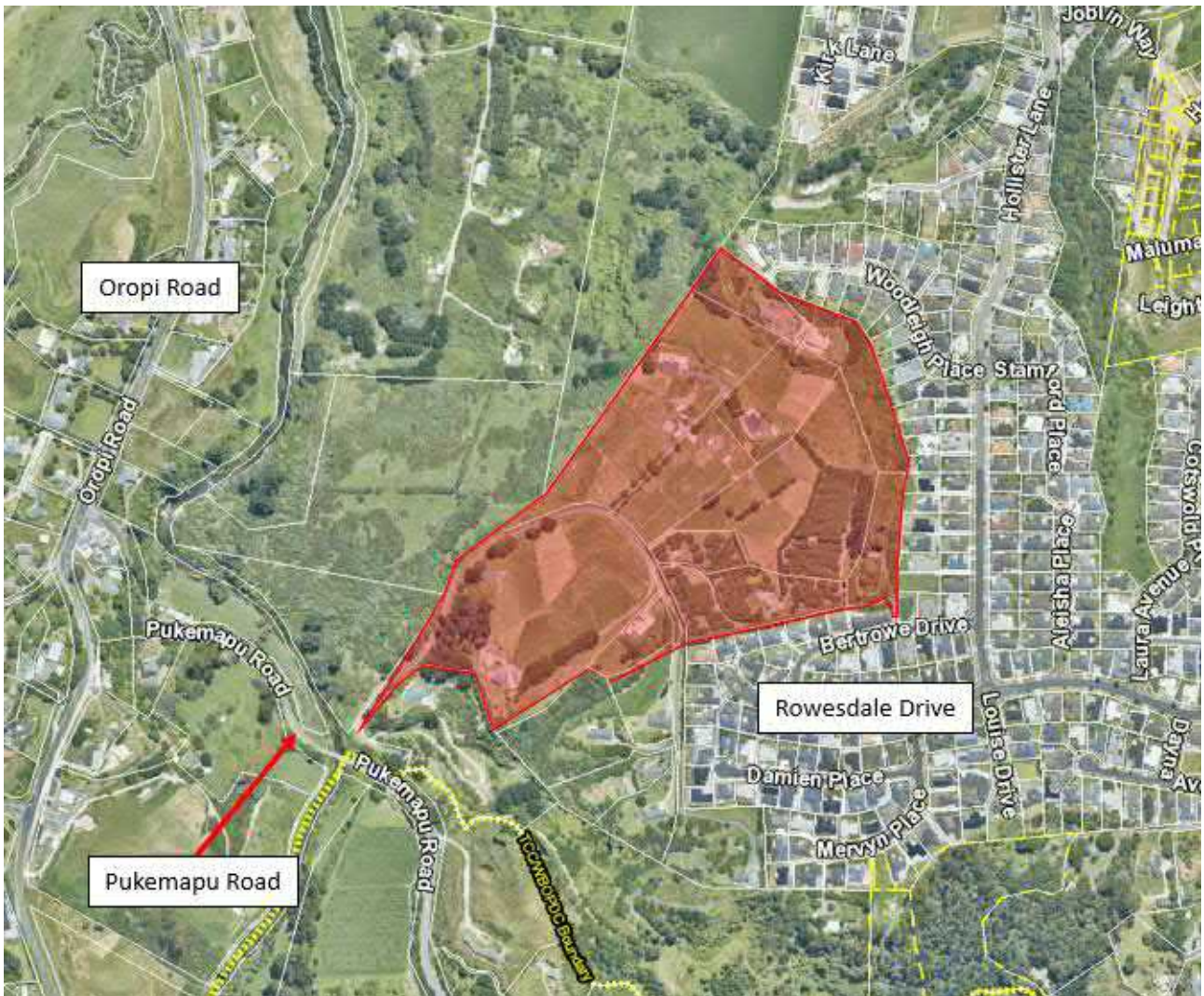


Figure 3: Local Site Area

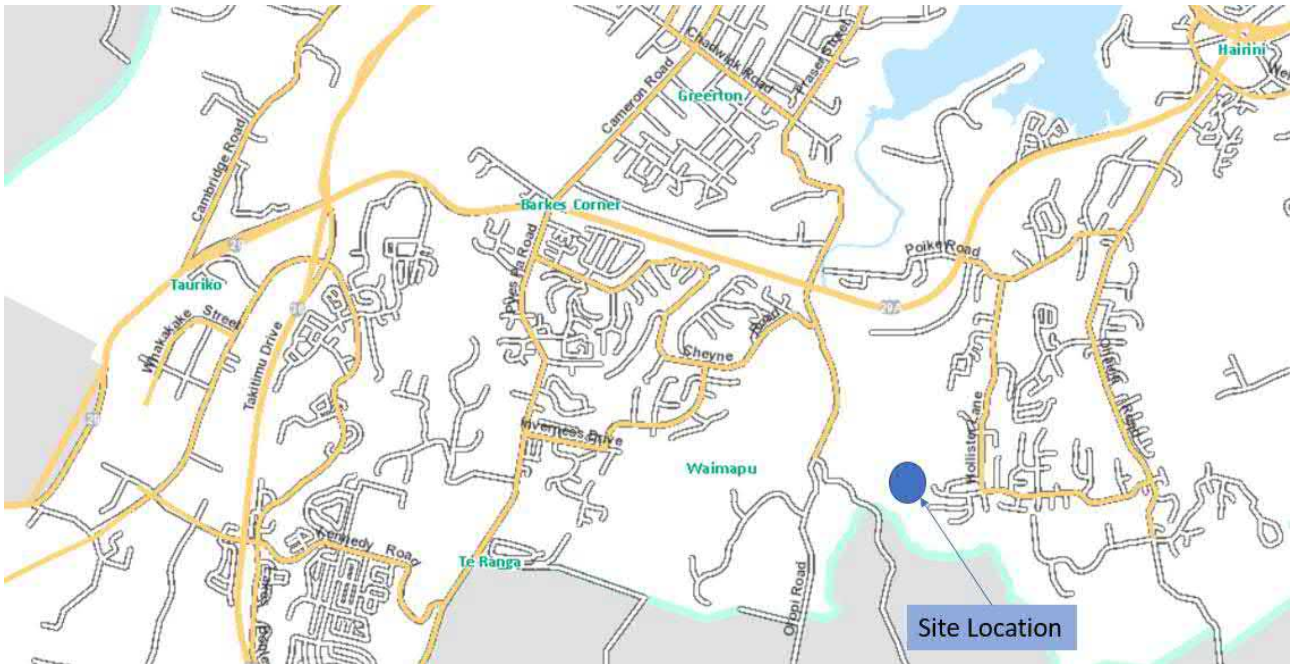


Figure 4: Strategic Site Location Showing Arterial and State Highway Access Routes

3.2 Surrounding Land Use

The site is zoned Suburban Residential in the TCP.

The site is surrounded by:

- Residential properties within the developed subdivision to the east
- Multiple owned rural residential land to the north and west
- Rural land to the south (the site is near the boundary with the Western Bay of Plenty).

Employment

No major businesses or employment centres are located within the immediate area of the site. Several small businesses are located on Oropi Road. These include a petrol station/garage and garden centre.

Education

There are no schools or other education facilities in the immediate areas around the site. The nearest schools to the site are located in Welcome Bay and Pyles Pa. Access to these schools is made via State Highway 29A.

TCC is working with the Ministry of Education on options to locate a primary school in Ohauti. This would improve local accessibility for school trips and reduce the need for children to be driven to schools that are located further away.

Bay of Plenty Polytechnic Toi Ohomai is located to the north of the site in Windermere.

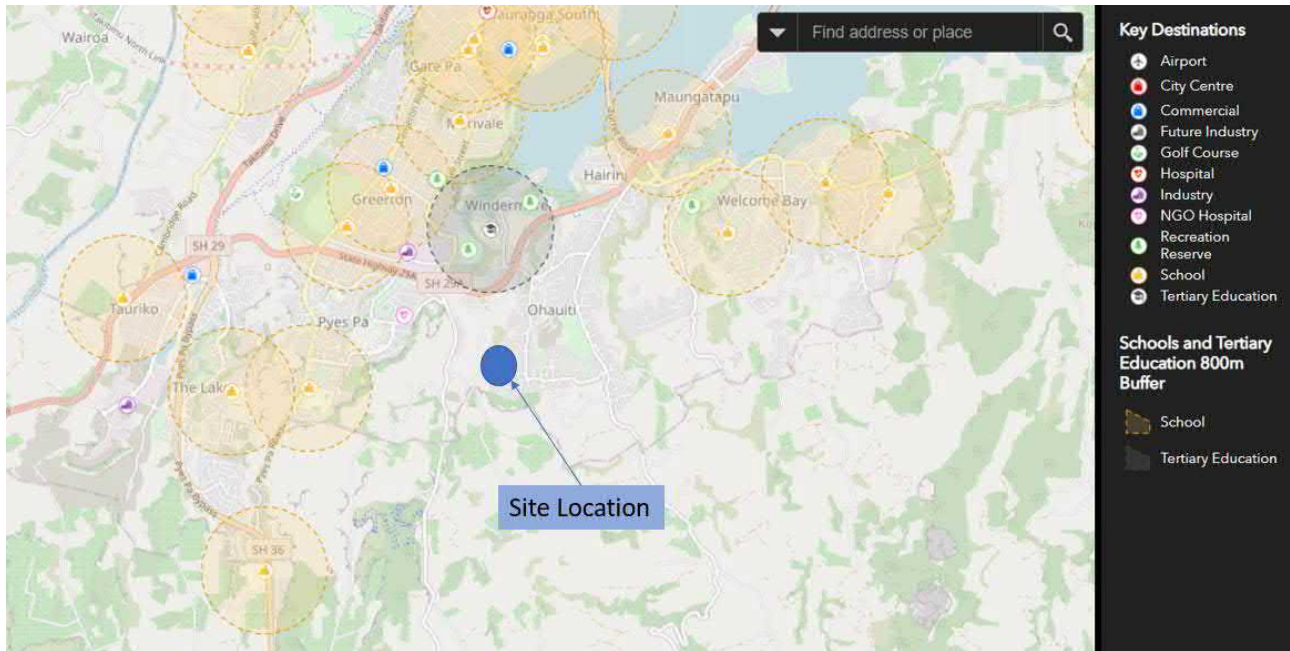


Figure 5: Schools (yellow label with 800m radius buffers) and Tertiary Education (black label and buffer) near the Site

Local Amenities

Several small parks and reserves are located close to the site. These include the Rowsdale Drive Reserve, Laura Avenue Reserve and Ohauti Reserve. The Oropi mountain bike park is located approximately 2.5km north of the Oropi Road / Pukemapu Road intersection.

TCC is working on a Welcome Bay and Ohauti planning study that considers opportunities to increase local amenities, possibly a small local centre, in Ohauti. This would reduce the need to drive for local trips from the site by reducing the distance to these facilities.

3.3 Walking and Cycling

Generally, there are footpaths on all roads within the Rowsdale / Hollister Lane subdivision to the east of the site and limited footpaths or cycle facilities on Pukemapu Road or Oropi Road west of the site.

- Rowsdale Drive has footpaths on both sides and no cycle lanes / facilities
- Hollister Lane has footpaths on both sides and no cycle lanes / facilities
- Pukemapu Road has no footpaths and no cycle lanes / facilities
- Oropi Road has no footpaths and no cycle lanes / facilities.

Hollister Lane is identified as a Primary Cycle Route in the TSP, Rowsdale Drive is a Secondary Cycle Route, Pukemapu Road and Oropi Road are not identified as cycle routes in the TSP.

Primary cycle routes make up the city-wide cycle network and would in time be envisaged to have some form of facility to support safe cycling, e.g., protected cycle lanes, off road paths etc. Secondary cycle routes connect cyclists with primary cycle routes and may or may not have dedicated cycling facilities depending on the safety of the route, i.e., traffic volumes and conflicts.

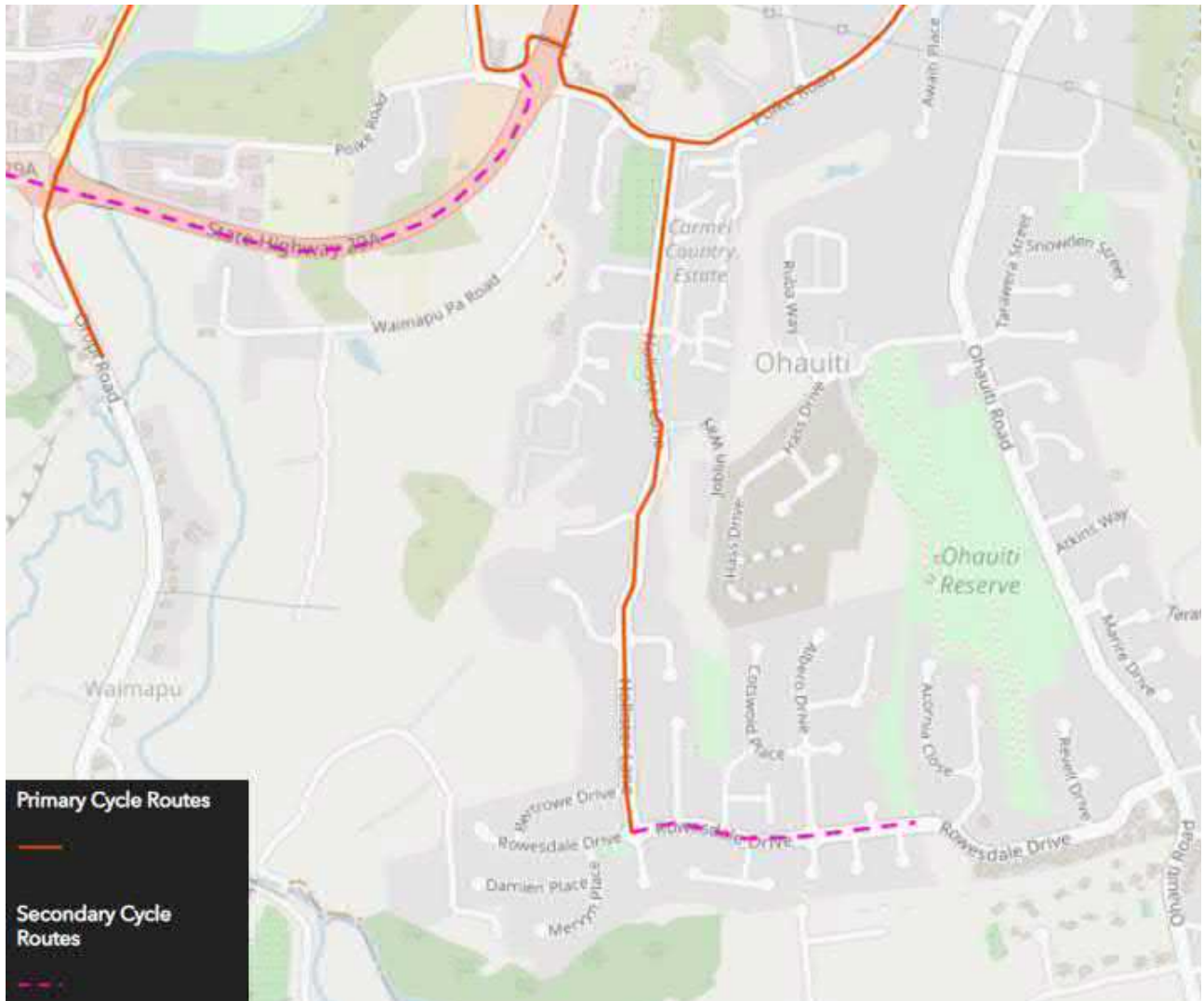


Figure 6: Primary and Secondary Cycle Routes (TSP)

3.4 Public Transport

Public transport services provided within walking distance of the site are as shown below in Figure 7. The only public bus service near the site is route 55. Route 55 operates on Rowsdale Drive and Hollister Lane and provides a connection to Toi Ohomai, Greerton and the Tauranga CBD via Cameron Road.

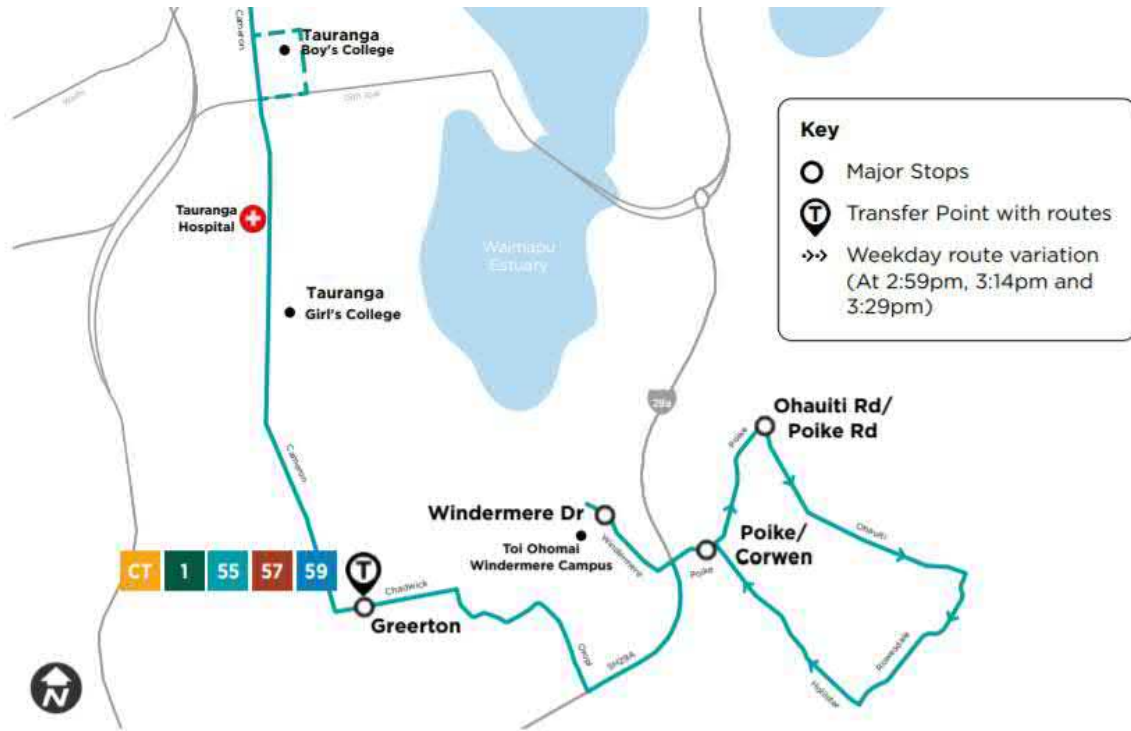


Figure 7: Bay Bus Map Route 55 (baybus.co.nz)



Figure 8: Bus Stops Near the Site

There are bus stops on Oropi Road that are used by students accessing school bus services, but not public bus services.

In the TSP, Primary Bus Routes are routes that connect residential areas with activity centres and major employers served by frequent bus services, e.g., 15-minute headways or less. Secondary bus routes provide public transport network coverage that connects suburbs with the primary public transport routes and with local destinations and services.

Rowesdale Drive is identified as a Secondary Bus Route in the TSP.

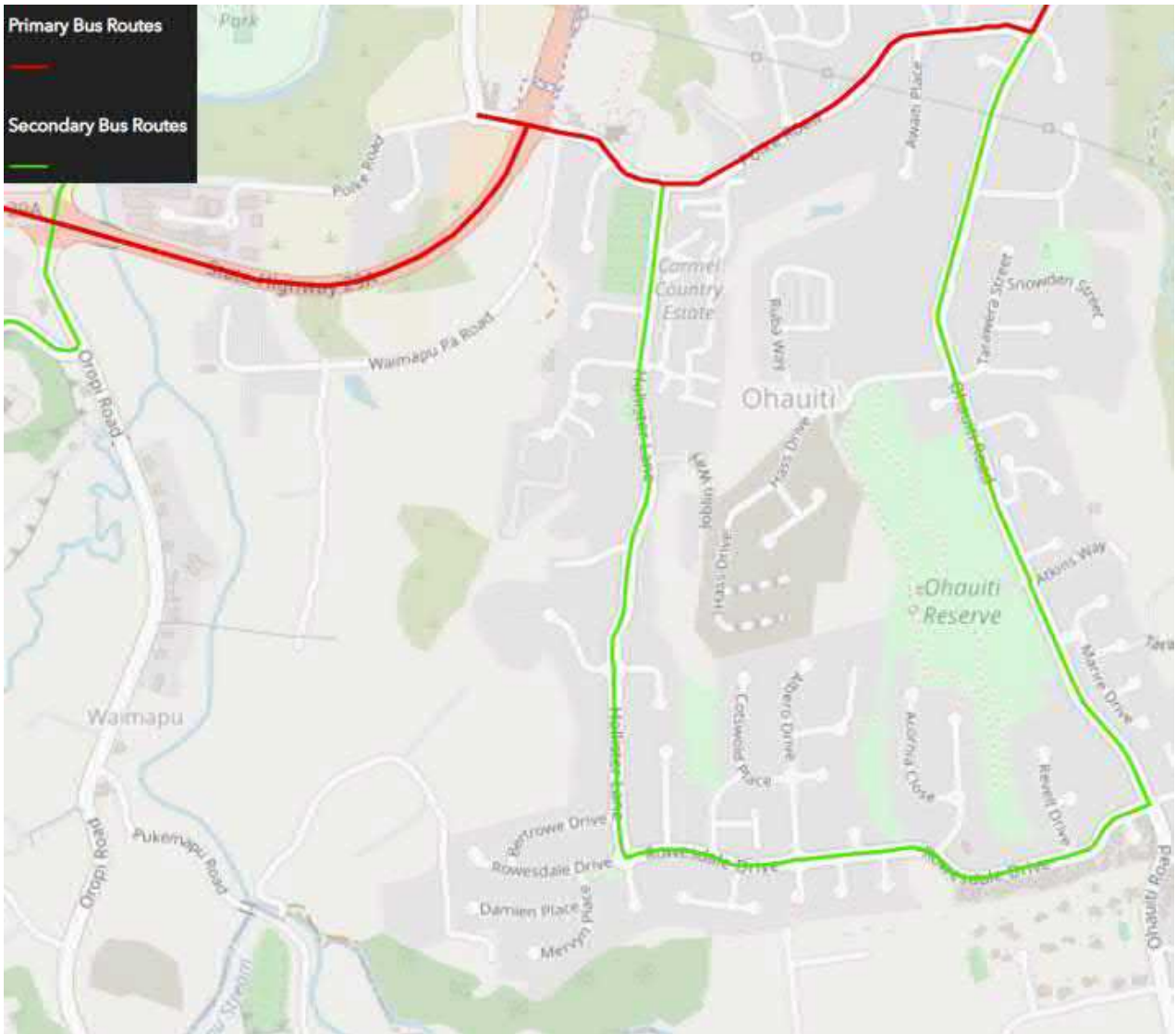


Figure 9: Primary and Secondary Bus Routes (TSP)

3.5 Existing Road Environment

Road Hierarchy

The road hierarchy for the surrounding road network is shown in the following figure. Definitions for these road categories from the TCP are provided below the figure.

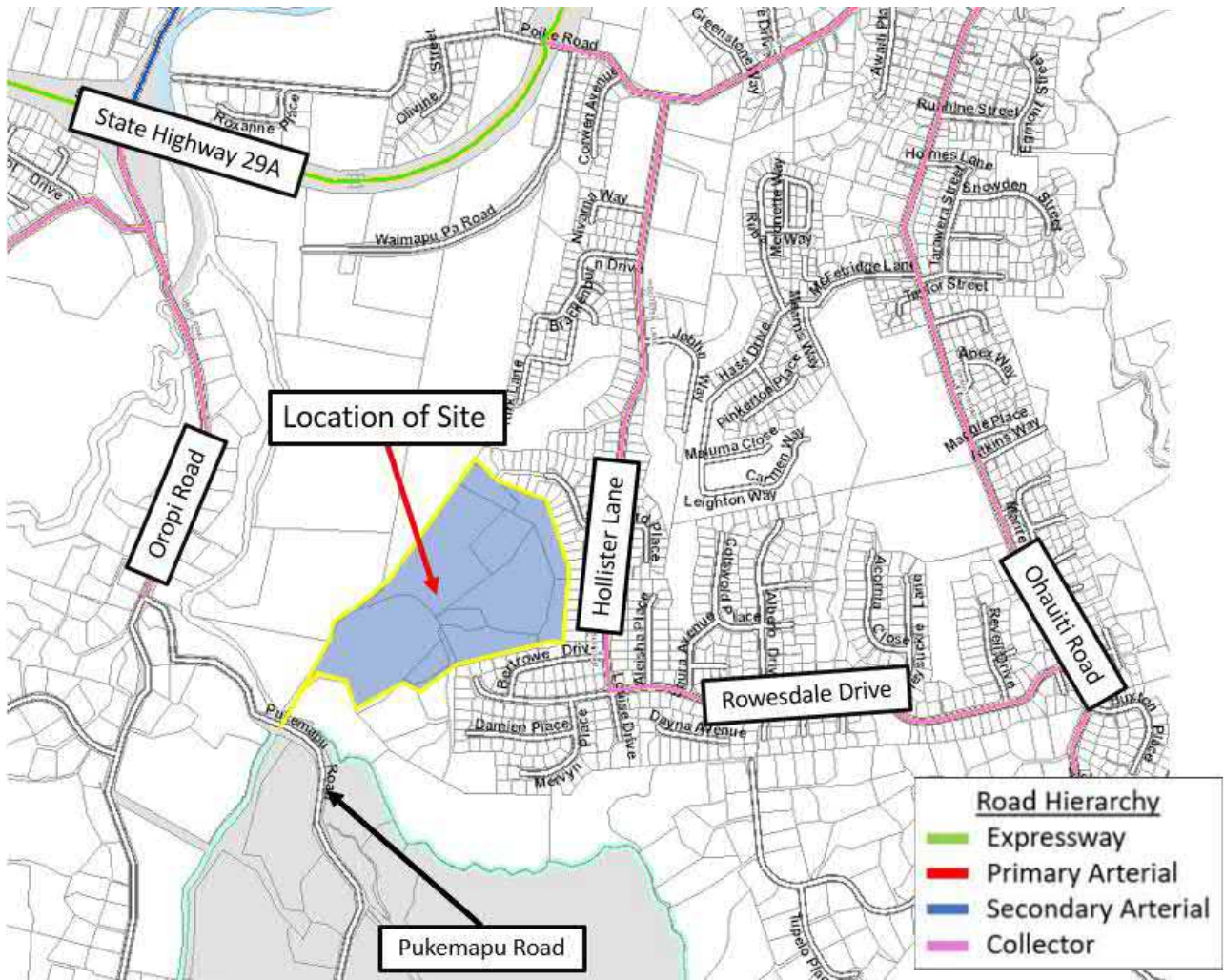


Figure 10: Road Hierarchy

- Expressway: provide for the movement of regional or inter-regional traffic. Access limited to intersecting roads.
- Primary Arterial: Main roads other than motorways and expressways joining significant centres of population and/or providing for regional and inter-regional traffic flow
- Secondary Arterial: Roads joining smaller centres of population and larger centres of population to nearby primary arterials or linking between primary arterials
- Collector: Wider urban roads linking local roads to the arterial network. In rural areas, minor roads linking smaller rural communities to the arterial network. Collector Roads have both a traffic movement function as well as an access role.
- Local: Roads providing direct access for residential and other areas of development in urban areas, with more than one intersection to other local or collector roads. Cul-de-sacs are local roads with intersections to other local roads at one end only.

3.5.1 Rowsdale Drive

Rowsdale Drive is a local road between the cul-de-sac end and Hollister Lane, and a collector road between Hollister Lane and Ohauti Road. Rowsdale Drive provides access for residential properties and connects with Hollister Lane and Ohauti Road.

According to Mobile Road¹ data, Rowsdale Drive carries 1,100 to 1,600 vehicle movements per day between Hollister Lane and Ohauti Road and around 500 vehicle movements per day on the cul-de-sac section west of Hollister Lane.

Rowsdale Drive is lane marked (section dependent) with one traffic lane in each direction, a general two-way lane width of 10m and a 50kph speed limit. On-street parking is provided, which is unmarked.



Figure 11: Rowsdale Drive Ends as a Cul-De-Sac

3.5.2 Hollister Lane

Hollister Lane is a collector road and connects Rowsdale Drive with State Highway 29A via Poike Road. Hollister Lane has a 10m wide carriageway that accommodates one traffic lane in each direction and unmarked car parking on both sides.

3.5.3 Pukemapu Road

Pukemapu Road is identified as a local road in the TCP and provides access to rural / lifestyle properties. The road is a marked two-laned road with a general two-way lane width of 6m and a 70kph temporary posted speed limit. The road is situated across various sloping terrain and has a short one-way bridge.

According to Mobile Road data Pukemapu Road carries less than 500 vehicles per day with approximately 3% heavy vehicles.

¹ Online traffic count information from local authority RAMM database



Figure 12: Pukemapu Road Bridge and Pukemapu Road facing east from the Oropi Road intersection

3.5.4 Oropi Road

Oropi Road is identified as a collector road in the TCP. Oropi Road connects to Pukemapu Road and provides a connection to State Highway 29A. Oropi Road is a marked two-laned road with a general two-way lane width of 6.4m and a posted speed limit of 80kph.

According to Mobile Road data Oropi Road carries 10,500 vehicles per day with approximately 7% heavy vehicles.



Figure 13: Facing south on Oropi Road

The intersection of Oropi Road and Pukemapu Road is being upgraded by TCC at the time of this report to a roundabout.

3.6 Network Operation

The existing road network experiences congestion particularly at Hollister Lane / Poike Road and State Highway 29A during the weekday morning peak period. With no bus priority in this area, buses are delayed in traffic queues. Oropi Road also experiences delay at the SH29A roundabout during the weekday morning peak.

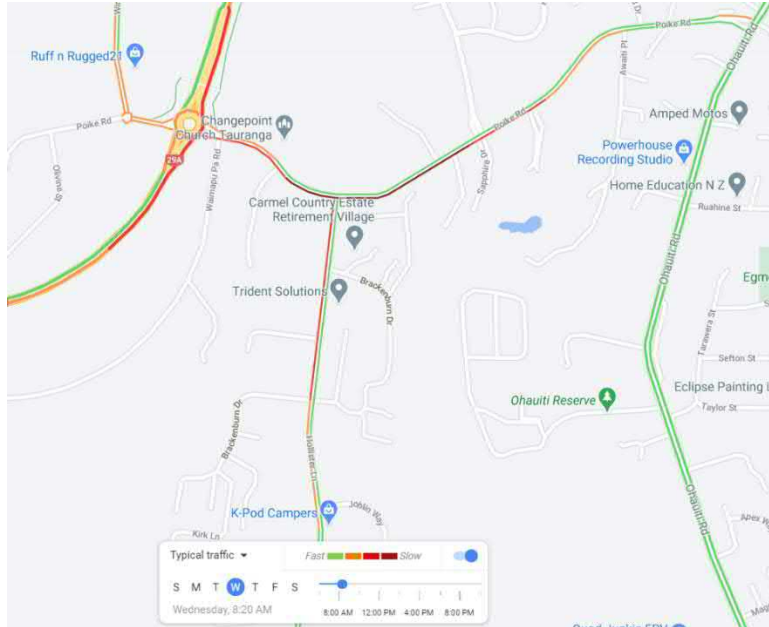


Figure 14: Typical Traffic Speeds During the Weekday Morning Peak at Hollister / Poike / Oropi Road (Google)

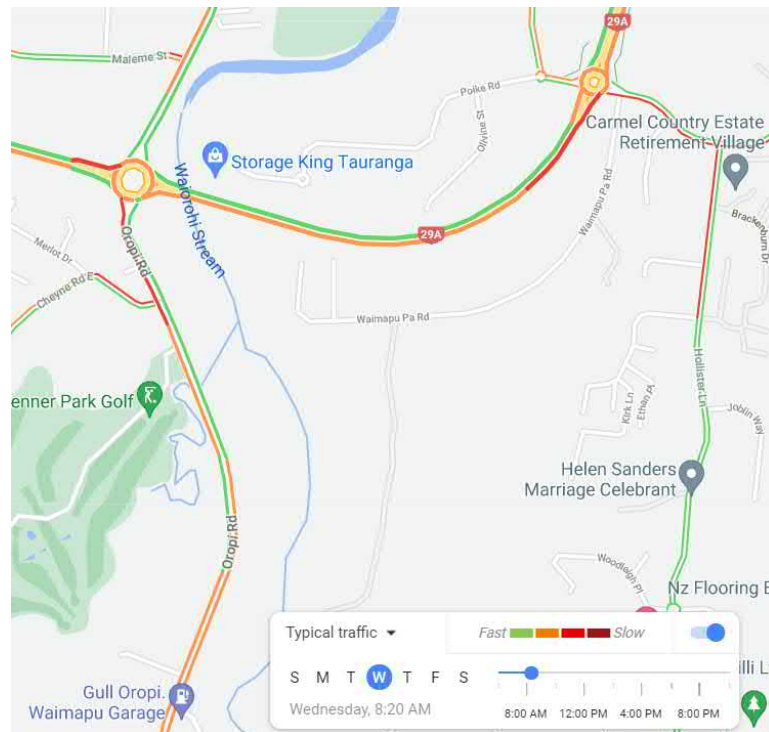


Figure 15: Typical Traffic Speeds During the Weekday Morning Peak at Oropi Road SH29A (Google)

Additional development within the site will generate trips on the road network that, if made by private car during peak periods, will add to existing local traffic congestion. Measures to support local access to opportunities and travel by active modes and public transport will help to mitigate the effect of this. The scale of this effect, and any specific mitigation necessary, would be considered at the resource consent stage. As the site is already zoned residential it is assumed to be developed, and generating trips on the network, within city-wide transport planning studies such as UFTI and the TSP.

3.7 Existing Site Access

3.7.1 Pukemapu Road

The site has a single existing formed accessway via Pukemapu Road as shown in **Figure 16**. The access is shared by the multiple properties within the site. The access is located south of the Pukemapu Road single lane bridge.



Figure 16: Formed Access to Existing Properties within the Site

There is restricted visibility along Pukemapu Road to the south of the existing access. The extent of visibility is approximately 90m as shown in Figure 17. The recommended safe intersection sight distance for a 70km/h speed environment is 150m (Austroads). Actual vehicle speeds approaching the access may be less than 70km/h due to the radius of the corner, but the downhill slope would add to the visibility distance requirement. For a visibility of 90m travel speeds would need to be approximately 50km/h. The existing access is unlikely to achieve Austroads safe sight distance recommendations. Any new or improved access in this location would require the speed limit on Pukemapu Road to be lowered to 50km/h and potentially some earthworks on the opposite side of the road to improve the visibility envelope.



Figure 17: Visibility from the Existing Access Looking South



Figure 18: Visibility Measurement

3.8 Road Safety

Crash data for the past 5 years (2015-2020) has been analysed using the Waka Kotahi (New Zealand Transport Agency) Crash Analysis System (CAS) database for the surrounding road network. The database includes the following crash records within the study area as shown in **Figure 19**.

- 7 crashes in 5 years (2015-2020) which includes:
 - Oropi Road: 1 minor and 5 non-injury crashes
 - Rowsdale Drive: 1 non-injury crash.

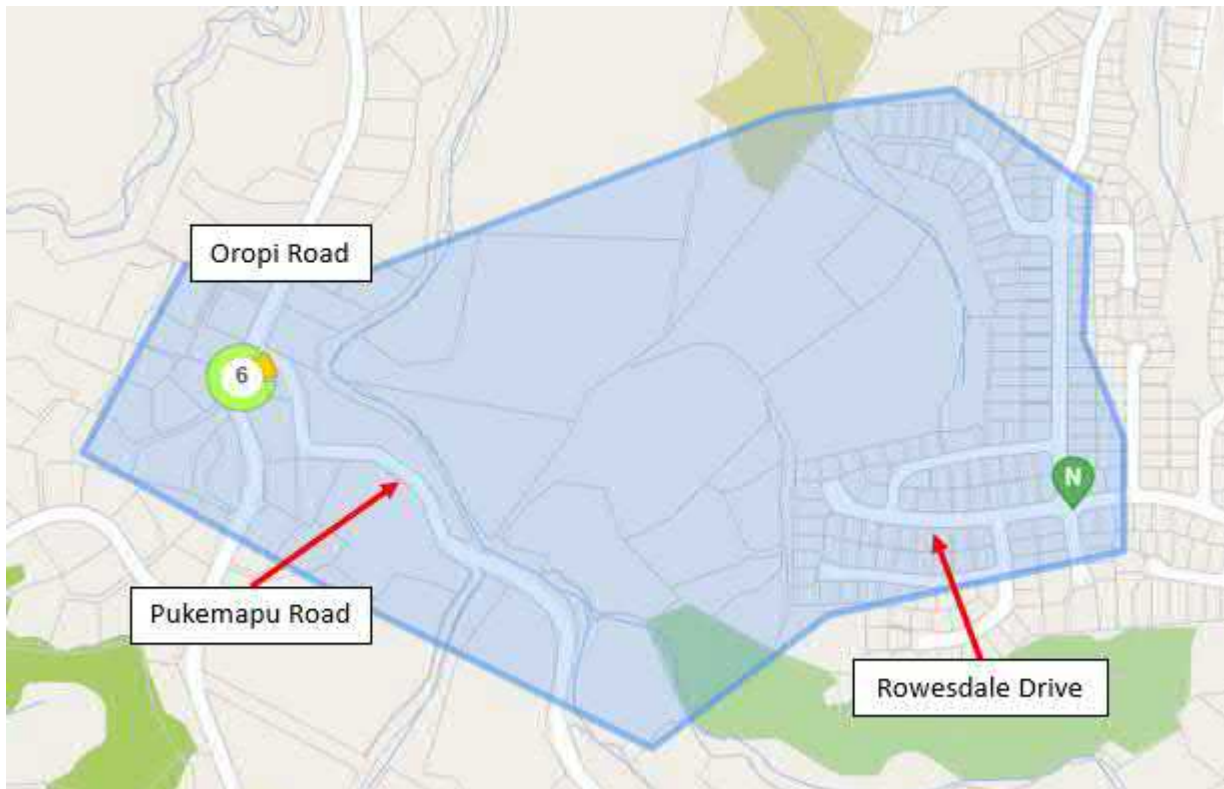


Figure 19: Site Area for Crash Analysis

All six of the crashes on Oropi Road occurred at or near the intersection with Pukemapu Road. The minor-injury crash was the result of a vehicle travelling southbound on Oropi Road colliding with a right turning vehicle from Pukemapu Road on to Oropi Road. Factors involved in the remaining non-injury crashes were generally inappropriate speed or driver behavior which has resulted in collisions with turning vehicles or road features at the intersection. The current upgrade of the Oropi Road / Pukemapu Road intersection to a roundabout may address the crash risk in this location.

The single non-injury crash on Rowsdale Drive occurred from a left-turning vehicle at the Rowsdale Drive / Hollister Lane intersection losing control and striking the median traffic island.

3.9 Trip Generation

At a high level, the Tauranga Transport Model (TTM) applies a vehicle trip generation rate of 7 to 8 vehicle trips per household when predicting vehicle trip generation. This is based on household travel survey, census and traffic count data.

Mode share for non-car modes in Tauranga based on census findings is around 10% walk and cycle and 2% bus. This is a general figure and it will be lower in areas that do not have access to safe and accessible services and facilities for these modes.

Based on this, and as a high-level estimate at this stage, if a development of 200 to 300 dwellings was progressed on the site this would be expected to generate 1,400 to 2,400 vehicle trips per day, around 250-350 walk and cycle trips and around 50-100 bus trips. Typically, around 10% of daily vehicle trips occur during the weekday peak hours (140 to 240 movements).

3.10 Pukemapu Road Bridge

3.10.1 Bridge Capacity

The one lane bridge has a give way arrangement with vehicles travelling southbound (from Oropi Road) giving way to vehicles travelling northbound. The length of the bridge is relatively short (less than 50m). The capacity of the one lane bridge is not considered to present a significant issue with fewer than 500 vehicles per day presently using Pukemapu Road. For comparison, the one lane Pepe Bridge on SH25 in Tairua accommodates around 4,500 vehicles per day (outside peak seasons). The bridge has no facilities (path) for walking or cycling.

3.10.2 Bridge Structural Assessment

An assessment of the structural capacity of the bridge in regard to potentially accommodating additional traffic volumes was undertaken. This assessment concluded that the structure appears to be in good condition overall.

There was nothing observed that would indicate that increased traffic loading on the bridge would compromise its' load carrying capacity.

Based on the existing bridge condition, it is considered unlikely to be feasible to attach a clip-on pedestrian / cycle facility to the bridge deck structure. It may be feasible to span a new footpath structure between the existing piers and abutments with a detailed assessment of the substructure capacity. However, it would likely be more cost effective to build a new independent foot/cycle bridge.

5 Civil Infrastructure Context

A desktop assessment has been undertaken of the existing infrastructure in the surrounding area and a review of the existing landform. Beca has obtained data from TCC Mapi and beforeUdig to inform this assessment.

The existing Rowsdale subdivision is bordered by underground wet services as shown in Figure 19 below. There are dry services present within the existing road corridors.

The site slopes from the existing subdivision down toward Pukemapu Road. Typically, these slopes are steep, ranging between 10%-40%.

The site is bordered by relic slips as well as having some present within the development area, these are shown highlighted in yellow in **Figure 21**.



Figure 20: Existing Services from TCC Mapi



Figure 21: Relic slips from TCC Mapi (highlighted yellow)

Both the existing subdivision and proposed development area have overland flow paths across them. There is a pond and wetland area on the eastern side of the site. Stormwater from the Rowsdale subdivision discharges into the pond, refer to **Figure 22**. Additionally, the stream to the south/west is affected by flooding and harbour inundation (100 year).

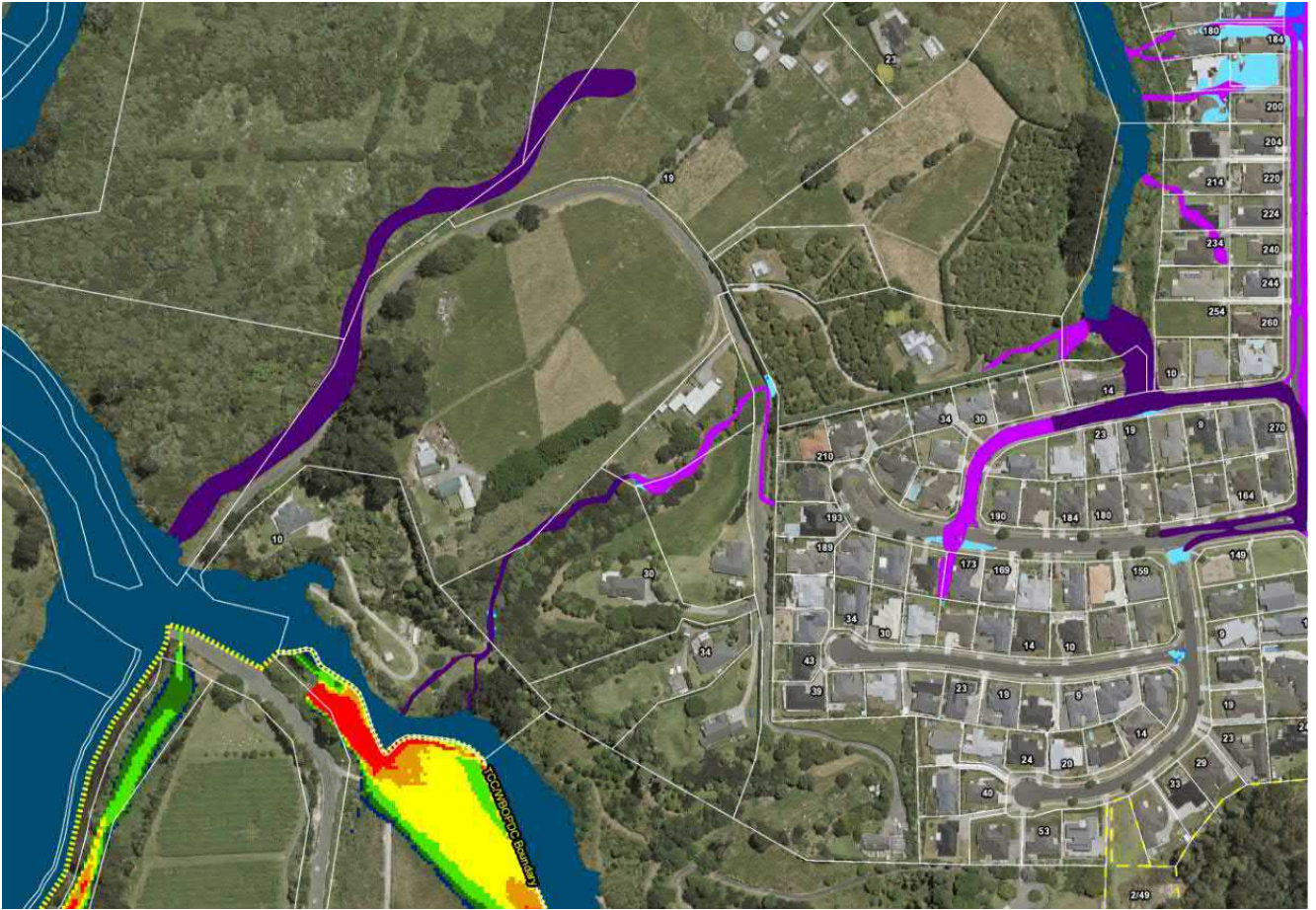


Figure 22: Overland Flow Paths from TCC Mapi

The site access and future land development will need to consider the existing site constraints as part of the development.

6 Long List Option Development

Following a review of the transport and civil environment at and surrounding the site and a site visit, a workshop with Beca and TCC specialists was held to identify all potentially feasible access options.

Figure 23 shows the approximate location of routes considered as potential options for providing access to the site. **Table 1** describes the routes with some initial commentary.

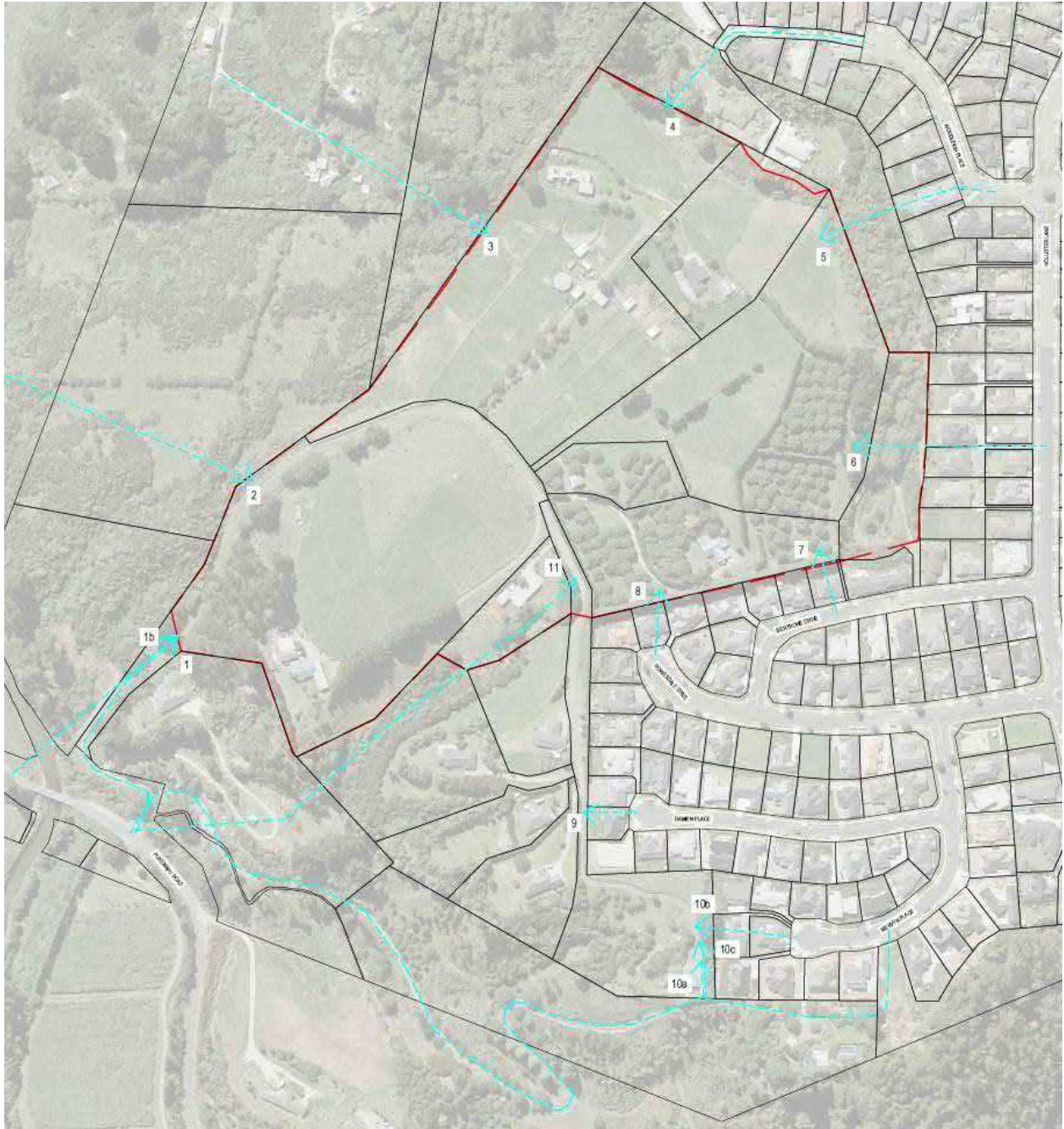


Figure 23: Site Area Plan Showing the Long List of Route Options

Table 1: Long List Routes

| No. | Description | Constraints | Comments |
|-----|--|--|---|
| 1 | Existing access from Pukemapu Road | Widening required May cross Maori land | Sight lines a potential issue that may need to be mitigated. Land ownership to be looked into further during design stage if progressed. |
| 1b | New access from Pukemapu Road | New bridge across Waiorohi Stream required. May cross Maori land | Land ownership to be looked into further. Scarp and access to WBOP road to be investigated. Route appears to cross record of title 470347 registered as Maori Freehold Land. Likely whenua associated with Waimapu Marae. Treaty principles should be considered when dealing with this land. |
| 2 | New access from Oropi Road | Through 1-2 privately owned lots and Maori land | Crosses record of title 470902 which registered as Maori Freehold Land. Likely whenua associated with Waimapu Marae. Treaty principles should be considered when dealing with this land. |
| 3 | Extend existing access from Waimapu Pa Road | Through Maori owned land | This option crosses records of title 444433 and 467755 which are registered as Maori Freehold Land. Likely whenua associated with Waimapu Marae. Treaty principles should be considered when dealing with this land. |
| 4 | Extend existing access from end of Woodleigh Place | Will require widening. Through 1+ privately owned lot | This option crosses record of title 156706 which is subject to Land Covenant comprised in in Easement Instrument 6206153.7. This prevents the land being used for 'other than residential purposes' (1.(m)). Additionally, this record of title is subject to a right of way easement (6206153.4). This means if the Council was required to compulsorily acquire land from the current owners for this option, it would also likely need to use its compulsory acquisition powers to acquire the easement rights of the grantee under that easement, adding additional party/ies and complexity to the process. Steep gradient. Will affect many properties. |

| No. | Description | Constraints | Comments |
|-----|---|-----------------------------------|--|
| 5 | New access from Woodleigh Place Hollister Lane roundabout | Through 1-2 privately owned lots. | <p>This option crosses records of title 156716 and 156707 which are subject to Land Covenant comprised in Easement Instrument 6206153.7. This prevents the land being used for 'other than residential purposes' (1.(m)).</p> <p>Additionally, this record of title is subject to a right of way easement (6206153.4). This means if the Council was required to compulsorily acquire land from the current owners for this option, it would also likely need to use its compulsory acquisition powers to acquire the easement rights of the grantee under that easement, adding additional party/ies and complexity to the process.</p> <p>Steep gradient. Roundabout provides good access at intersection.</p> |
| 6 | New access from Hollister Lane | Through 2-4 privately owned lots. | <p>This option crosses records of title 617067, 566554, 414351 and 414352 which are subject to Land Covenant 8146998.6. This prevents the land being used for 'other than residential purposes' (1.(l)).</p> <p>Additionally, this record of title is subject to a right of way easement (8146998.4). This means if the Council was required to compulsorily acquire land from the current owners for this option, it would also likely need to use its compulsory acquisition powers to acquire the easement rights of the grantee under that easement, adding additional party/ies and complexity to the process.</p> <p>May be restricted by stormwater pond.</p> |
| 7 | New access from Bertrowe Drive | Through 1-2 privately owned lots | This option crosses record of title 639322 which is subject to Land Covenants in Easement Instrument 8666808.3 - prevents the land being used for 'other than residential purposes' (1.(k)). |
| 8 | New access from end of Rowsdale Drive | Through 2 TCC owned properties | Covenant to be investigated. |
| 9 | New access from end of Damien Place | Through 2 privately owned lots | <p>This option crosses record of title 688222 which is subject to Land Covenants in Easement Instrument 9075468.9. This prevents the land being used for 'other than residential purposes' (1.(k))</p> <p>Steep gradient.</p> |

| No. | Description | Constraints | Comments |
|-----|--|----------------------------------|--|
| 10a | New access from end of Mervyn Place | Through 2 privately owned lots | <p>This record of title is subject to two right of way easements (H519282 and 9075468.8). This means if the Council was required to compulsorily acquire land from the current owners for this option, it would also likely need to use its compulsory acquisition powers to acquire the easement rights of the grantee under that easement, adding additional party/ies and complexity to the process.</p> <p>Steep gradient.</p> |
| 10b | Extend existing access from Pukemapu Road (East) | Through 1-2 privately owned lots | <p>This option crosses records of title 676059 and 664147 which are subject to Land Covenants in Easement Instrument 9075468.9. This prevents the land being used 'for other than residential purposes' (1.(k)).</p> <p>Steep and circuitous route</p> |
| 10c | New access from Mervyn Place | Through 2 privately owned lots | <p>This option crosses record of title 596993 which is subject to Land Covenants contained in Easement Instruments 9715243.1 and 9075468.9.</p> <p>Easement Instrument 9075468.9 prevents the land from being used for 'other than residential purposes' (1.(k)).</p> <p>Additionally, this record of title is subject to a right of way easements (B9075468.7 and 5129999.1). This means if the Council was required to compulsorily acquire land from the current owners for this option, it would also likely need to use its compulsory acquisition powers to acquire the easement rights of the grantee under that easement, adding additional party/ies and complexity to the process.</p> <p>Steep and circuitous route</p> |
| 11 | Extend existing access from Pukemapu Road up gully | Through 1 privately owned lot | <p>This record of title is subject to a right of way easements (B388777.12 and 5224533.4). This means if the Council was required to compulsorily acquire land from the current owners for this option, it would also likely need to use its compulsory acquisition powers to acquire the easement rights of the grantee under that easement, adding additional party/ies and complexity to the process.</p> <p>Steep gradients.</p> |

7 Scenario Sketches

To inform a multicriteria assessment (MCA) on the long list options, several scenario sketches were developed to show indicatively what an access option could look like if it was developed in the general area of the long list routes, and to define more information on potential associated impacts. Sketches were not developed for all routes individually, as this is not necessary at this stage of the evaluation.

Scenario sketches were developed for general alignments on the following routes:

- Scenario 1: generally applies to long list Routes 4 to 6
- Scenario 2: generally applies to long list Route 7
- Scenario 3: generally applies to long list Route 8
- Scenario 4: generally applies to long list Route 9
- Scenario 5: generally applies to long list Route 10
- Scenario 6: generally applies to long list Route 1
- Scenario 7: generally applies to long list Route 11.

Alignment sketches are attached as **Appendix A**.

7.1 Identified Scenarios

7.1.1 Basis of Scenario Development

The TCC street design tool was used to define the accessway cross-sections in StreetMix as shown below. This resulted in a general arrangement of one traffic lane in each direction for the access road with footpaths and provision for cycling via a shared path on one side. The total road corridor width is 20m.

The TCC street design tool report is provided as **Appendix B**.

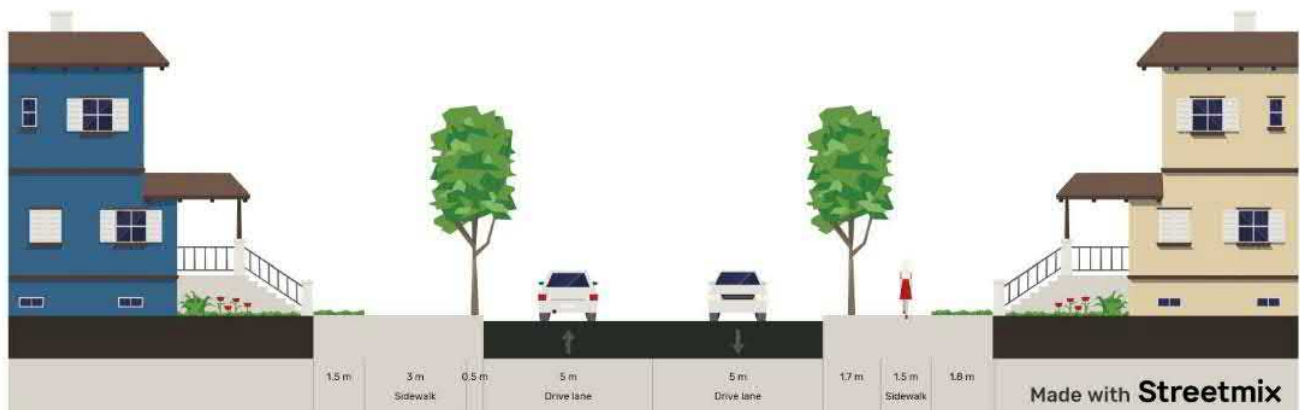


Figure 24: Access Road Typical Cross-Section

7.1.2 Route Scenarios

The seven route scenarios were developed as high-level conceptual designs in Autodesk's InRoads and high level estimations of the landform changes and infrastructure corridors. A summary of these is shown in **Table 2**. **Table 3** provides a general key for the summary table.

Table 2: Summary of High-Level Concepts

| Scenarios | Service Relocation Required. | Earthworks Volumes | Potential Retaining Structure Req. | Properties requiring acquisition for road construction (in whole or in part) | Approximate length of New Road (m) |
|----------------------------|------------------------------|--------------------|------------------------------------|--|------------------------------------|
| Scenario 1 Routes 4,5,6 | Yes | High | Likely | 2 | Medium |
| Scenario 2 Route 7 | Maybe | Low | No | 1 | Short |
| Scenario 3 Route 8 | Maybe | Low + | No | 1 ² | Short |
| Scenario 4 Route 9 | Likely | Medium | Likely | 3 | Medium |
| Scenario 5 Route 10 | Likely | High ++ | Likely | 4 | Long |
| Scenario 6 Route 1 | Likely | High + | Likely | 1 | Long |
| Scenario 7 Route 11 | Unlikely | High ++ | Likely | 1 | Long |

Table 3: Ranges Used for Table 1

| Item | High/Long | Med | Low/Short |
|-----------------------|---------------------|---------------------------|---------------------|
| Earthworks | >5000m ³ | 1000 – 5000m ³ | <1000m ³ |
| Length of access road | >200m | 100-200m | <100m |

Scenario 1 – Shown as connecting Woodleigh Place to the subdivision via a proposed bridge (long list item 5). This scenario is also applicable to longlist routes 4 to 6. The relocation of existing wet and dry services may be required. Acquisition of two properties (minimum) is required for this scenario to be feasible. Bridge abutments and piers are required, additional retaining structures to support these are likely to be required.

Scenario 2 – Shown as connecting Bertrowe Drive to the new subdivision using fill to build a ramp over the existing embankment. This scenario is applicable to long list route 7 and is not limited to the property it is shown in. The access could be through any property on the north stretch of Bertrowe Drive (extent limited by existing stormwater pond). The relocation of services may be able to be avoided by minimising cut within the property area and having fill within the subdivision zone. Acquisition of one property (minimum) is required for this scenario to be feasible. Existing overland flow path may require a culvert under the access road.

Scenario 3 – Shown as connecting Rowsdale Drive to the subdivision over the existing embankment. This scenario is applicable to long list route 8 and is not limited to the property(ies) it is shown in. The relocation of services may be able to be avoided by minimising cut within the property area and having fill within the subdivision zone. Acquisition of one property (minimum) would be required for this scenario to be feasible, however TCC already own two properties on this route so no additional property purchase would be necessary. Existing overland flow path may require a culvert under the access road.

Scenario 4 – Shown as connecting Damien Place to the subdivision over the existing embankment. This scenario is applicable to long list route 9 and is not limited to the properties it is shown in. The relocation of services may be able to be avoided by minimising cut within the property area and having fill within the subdivision zone however it is likely relocation of wet and dry services will be required. Acquisition of one

² Note TCC own two properties on this route, this figure is within the two properties already owned not additional to.

property (minimum) is required for this scenario to be feasible. Existing overland flow path may require a culvert under the access road. Retaining structures are likely to be required to make this scenario feasible.

Scenario 5 – Shown as connecting Mervyn Place to the subdivision over the existing embankment. This scenario is applicable to long list route 10 and is not limited to the property it is shown in. The relocation of services may be able to be avoided by minimising cut within the property area and having fill within the subdivision zone however it is likely location of wet and dry services will be required. Acquisition of two properties (minimum) is required for this scenario to be feasible. Existing overland flow path may require a culvert under the access road. Retaining structures are likely required to make this scenario feasible.

Scenario 6 – Involves widening of the existing accessway from Pukemapu Road. This scenario is applicable to long list route 1. The relocation of services is unlikely to be required, however there may be private house connection or wet and dry services along this existing access. Acquisition of one property (minimum) is required for this scenario to be feasible due to the cut/fill required.

Scenario 7 – Connects Pukemapu Road to the new subdivision via a new accessway up the existing gully. This scenario is applicable to long list route 11. Acquisition of at least part of one property is required. The relocation of services is unlikely to be required. Overland flow path down the gully/road will be required to be catered for. Retaining structures are likely required to make this scenario feasible.

Long list routes 1b, 2, 3, and 10b, 10c were considered similar to other scenarios. For example, Scenario 1b and 2 can be considered similar to Scenario 1 with the addition of requiring bridges, Long list route 3 would include widening of an existing gravel driveway/private road similar to Scenario 1, Long list routes 10b, 10c can be considered similar to either scenario 5 or 7 in terms of required works.

8 Option Evaluation

8.1 Criteria

8.1.1 Scoring Guidance

The options were evaluated by specialists against the following criteria based on desktop and site visit informed analysis. The draft MCA scoring was then reviewed at a workshop with TCC.

The following criteria was used to evaluate the options in the MCA.

Table 4: MCA Criteria

| | |
|---|--|
| Transport | Network integration – how well does the access integrate with the wider transport network, including for cyclists, pedestrians, PT, private cars and service vehicles. Does the option support future opportunities to integrate across the site? |
| | Land use integration – how well does the option integrate with surrounding land use, or conflict. |
| | Safety - how will the access affect the safety of people using the transport network? Does the access promote personal security? |
| | Directness – does the access enable direct travel options to collector roads and near by opportunities (schools, jobs, recreation etc). |
| Geotechnical and Infrastructure | Geotechnical: High level consideration of known ground conditions, stability |
| | Constructability: Is the access in such a location or subject to other constraints as to make construction very difficult? Including impact on services and level of disruption during construction |
| | Three waters: How well does the option support provisions for three waters servicing of the site |
| | Alignment with IDC: How well does the option align with the TCC Infrastructure Development Code (design standards transportation network) |
| Social / Cultural | Cultural: Is the area in the vicinity of the access a site of cultural, spiritual or other significance? |
| | Historic Heritage and Archaeology: Are there known historic heritage or archaeological sites in the vicinity of the access? |
| | Effects on existing community: How will the new access options affect the existing neighbourhood, including character and amenity, and are there other benefits provided to the existing community by forming the access in this location? |
| | Effects on the new community: How will the new access provide for the new community to be established, including the character and amenity of the newly developed area? |
| | Land ownership: How many landowners, other than those within the site to be accessed, are directly affected by the option? Count no. landowners required to obtain land directly affected. Count no. landowners to nearest Collector Road (land not required) as indirectly affected. |
| Natural and Physical Environment | Noise: Will adjacent property owners be affected by increased levels of traffic noise? |
| | Ecology: How will the construction and operation of the access affect animal and plant ecology; loss of habitat, disruption of territorial domains, and interruption of ecological corridors? |

| | |
|-----------------------------|---|
| | Impact of the access: Including the footprint of the access, landscape and visual effects on the surrounding area, carbon and resilience impacts. |
| Site Acquisition | How difficult will land for the access be to acquire. |
| Consentability | How difficult would it be to consent the construction of the proposed access in the chosen location taking into account both Territorial Authority processes (resource consent/designation and contaminated land) and Regional Authority consents (earthworks/ stormwater)? |
| Development outcomes | How well does the option support development outcomes, e.g. maximise or impact development yield |

Options were scored against the criteria using a -3 (large negative impact) to +3 (high positive benefit) scale. A slightly different scoring approach was used for civil criteria (constructability, geotech, three waters and development impacts) to better differentiate between options. As described in Table 5.

The civil criteria varied from the overall scoring as the civil works effects are typically all neutral or negative effects. Using a varied scoring allowed separation between the options more clearly showing the impacts within the MCA.

Table 5: Option Scoring for General Criteria and Civil Criteria

| General Criteria | | Civil Criteria (Constructability, Geotech, 3-waters, Development) | |
|-------------------|--|---|----|
| Large positive | Major positive impacts resulting in substantial and long-term improvements or enhancements of the existing environment. | Minimal negative impact, possibly only lasting over the short term, and definitely able to be managed or mitigated. May be confined to a small area. | 3 |
| Moderate positive | Moderate positive impact, possibly of short-, medium- or long term duration. Positive outcome may be in terms of new opportunities and outcomes of enhancement or improvement. | | 2 |
| Slight positive | Minimal positive impact, possibly only lasting over the short term. May be confined to a limited area | | 1 |
| Neutral | Neutral – no discernible or predicted positive or negative impact. | Moderate negative impact. Impacts may be short, medium or long term and are highly likely to respond to management actions. | 0 |
| Slight negative | Minimal negative impact, possibly only lasting over the short term, and definitely able to be managed or mitigated. May be confined to a small area. | | -1 |
| Moderate negative | Moderate negative impact. Impacts may be short, medium or long term and are highly likely to respond to management actions. | | -2 |
| Large negative | Impacts with serious, long-term and possibly irreversible effect leading to serious damage, degradation or deterioration of the physical, economic, cultural or social environment. Required major rescope of concept, design, location and justification, or requires major commitment to extensive management strategies to mitigate the effect. | Large negative impact i.e poor ground conditions, large footprint of land required, large volume of earthworks. Impacts may be short, medium or long term | -3 |

8.1.2 Sensitivity Test Weighting

Following the MCA assessment, the criteria were weighted to determine whether there are greater benefits to a particular option in relation to social and community values as a sensitivity test.

Sensitivity test weighting differentiates between the short, medium and long-term effects or benefits of the provision of the proposed access. Short and medium term effects are typically less sensitive when considering the overall benefits to the community and social environment. Criteria that have a short term effect such as during construction are weighted at 0.8, criteria that have a long-term effect or benefit such as environmental or amenity effects or the ability to consent the proposed outcome are weighted at 1.5 and criteria that are typically the same across the duration of the development of the area such as the effects on transport or ecology are weighted at 1.0 as the effect is not considered likely to change over time.

In summary social and community weighting considers that scores are multiplied by the following factors:

1.5x = strong effect or benefit on social and community values such as character and amenity over a long period of time

1.0x = no greater effect or benefit over time than represented by the raw value

0.8x = a short term effect on social and community values

For example,

Table 6: Sensitivity Test Weightings

| Effect | Weighting |
|---------------------------------|-----------|
| Transport | 1.0 |
| Geotechnical and infrastructure | 0.8 |
| Social / Cultural | 1.5 |
| Noise | 1.5 |
| Ecology | 1.0 |
| Impact on access | 0.8 |
| Site acquisition | 0.8 |
| Consentability | 1.5 |
| Development outcomes | 1.5 |

8.2 MCA Outcome

The full MCA output spreadsheet is provided in **Appendix C**. The following table summarises the scores for each option against the criteria and the total score.

Routes 10b and 10c shown in Figure 23 were excluded from the analysis prior to the MCA stage as these routes do not connect with the site.

Table 7: Summary MCA Output

| Effects | Weighting | Criteria | Option Scoring | | | | | | | | | | | |
|----------------------------------|-----------|-------------------------------------|----------------|-----|-----|-----|-----|----|----|----|----|----|-----|-----|
| | | | 1 | 1b | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10a | 11 |
| Transport | 1 | Network integration | 0 | 0 | 0 | -1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0 |
| | 1 | Land use integration | -1 | -1 | -1 | -3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | -1 |
| | 1 | Safety | -2 | -1 | -1 | -2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | -2 |
| | 1 | Directness | -1 | -1 | -1 | -3 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | -1 |
| Geotechnical and Infrastructure | 1 | Geotechnical | -1 | -2 | -2 | 0 | -3 | -3 | -3 | 1 | 2 | 0 | -1 | -2 |
| | 1 | Constructability | 0 | -2 | -2 | -1 | -3 | -3 | -3 | 1 | 2 | -1 | -3 | -1 |
| | 1 | Three waters | 1 | 1 | 3 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| | 1 | Alignment with IDC | -2 | -2 | -1 | -2 | -1 | 3 | 3 | -1 | 3 | -1 | 3 | -2 |
| Social / Cultural | 1 | Cultural | -3 | -3 | -3 | -3 | -1 | -1 | -1 | 0 | 0 | 0 | -1 | -1 |
| | 1 | Historic Heritage and Archaeology | -1 | -1 | -3 | 1 | 2 | 2 | 2 | 2 | 0 | -1 | -1 | -1 |
| | 1 | Effects on existing community | 2 | 2 | -1 | -2 | -2 | -1 | 0 | -1 | -2 | -1 | -3 | -1 |
| | 1 | Effects on the new community | 3 | 3 | 0 | -1 | -1 | -1 | -1 | 0 | -1 | 2 | 2 | 2 |
| | 1 | Land ownership | 1 | 1 | 1 | 1 | -1 | 1 | 2 | 2 | 3 | -2 | -2 | 1 |
| Natural and Physical Environment | 1 | Noise | 2 | 2 | 2 | -2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 1 |
| | 1 | Ecology | -1 | -1 | -1 | -1 | -2 | -2 | -2 | -1 | -1 | -1 | -1 | -2 |
| | 1 | Impact of the access | -1 | -2 | -2 | -2 | -2 | -2 | -2 | 1 | 1 | -1 | -2 | -2 |
| Site Acquisition | 1 | Ease | -3 | -3 | -2 | -2 | -1 | -1 | -1 | 0 | 3 | -1 | -2 | -1 |
| Consentability | 1 | RMA | -2 | -3 | -2 | -2 | -1 | -1 | -1 | 1 | 1 | -1 | -1 | -1 |
| Development outcomes | 1 | Land use of access with development | 3 | 3 | 3 | 3 | -1 | -1 | -1 | 3 | 3 | 3 | 3 | 3 |
| TOTAL SCORE | | | -6 | -10 | -13 | -21 | -13 | -2 | 1 | 14 | 20 | 0 | -4 | -10 |

As can be seen in the table above, options 6, 7 and 8 achieved overall positive scores with option 8 (Rowesdale Drive connection) achieving the highest score of 20. Option 7 was second with a score of 14. Both options 8 and 7 scored positively for transport, land ownership, geotechnical and constructability criteria. Other options had higher risk on geotechnical, cultural, site acquisition and other criteria which impacted the outcome.

Detailed comments on all of the scoring is provided in the MCA table in **Appendix C**.

The sensitivity test did not change the outcome of the MCA, the full sensitivity test table is provided in **Appendix D**.

9 Development of the Highest Ranked Option

Route 8, which was represented by Scenario 3 in the concept sketches, is the preferred option that best achieves the project purpose based on the MCA process.

9.1 Access Road Corridor Design Philosophy

The design philosophy for the access road following Route 8 is to create a 20m wide accessway in accordance with the TCC Street Design Guide.

Within the 20m road corridor we have allowed for a 1.5m footpath on one side and a 3m shared path on the other. It is noted that neither Rowsdale Drive nor Hollister Lane currently have a shared path available, but for costing purposes it has been included in this assessment. This is to support Council's cycle initiatives as Hollister Lane is a Primary Cycle Route.

TCC own two properties at the end of Rowsdale Drive and the design utilises one of these properties fully. At this stage a small area of the second property is required, however the house can potentially remain and could be sold on after construction.

9.2 Design Assumption and Limitations

9.2.1 Rooding

The design speed used was 50 km/h. The minimum radius of all horizontal curves is above the absolute minimum required of 49m and is near the desired minimum of 56m for urban roads (Table 7.6 Austroads Guide to Road Design Part 3: Geometric Design).

The maximum vertical slope of the proposed road alignment does not exceed 10% which meets the maximum gradient allowed for in the TCC IDC of 12.5% for local roads. It also meets the standard for roads within 30m of an intersection, not exceeding 10% with a 3% crossfall.

Pavement is assumed to be as per TCC IDC Design Standard DS-4. A departure from the Austroads standards has been identified at a crest vertical curve. The lowest k value of 6.8 meets the minimum value allowed. It does not however meet the appearance criterion minimum value of 33-44. (Tables 8.6 and 8.7 Austroads Guide to Road Design – Part 3: Geometric Design). This is considered acceptable for the expected volume and speed.

9.2.2 Services

It is assumed the eventual developer's design for the stormwater and wastewater systems within the site will accommodate the catchment upstream of the development. No allowance has been made in the concept design for stormwater analysis, including pre and post development assessments or quantity and quality analysis. No dry service providers have been approached and it is assumed there is adequate capacity for new dry service connections in existing systems.

A new water main connection to Ohauti Road is proposed to meet the requirements of Table 7.3 in DS-7 of the TCC IDC for a 200mm watermain connection.

A new wastewater connection to an existing pump station is assumed to be part of the new development. An easement may be required at the northern end of the site, to connect the proposed sanitary sewer pipeline to the existing pump station.

9.3 Concept Design

The concept design is shown below in **Figure 25** and **Figure 26**. Refer **Appendix E** for full concept design drawings.

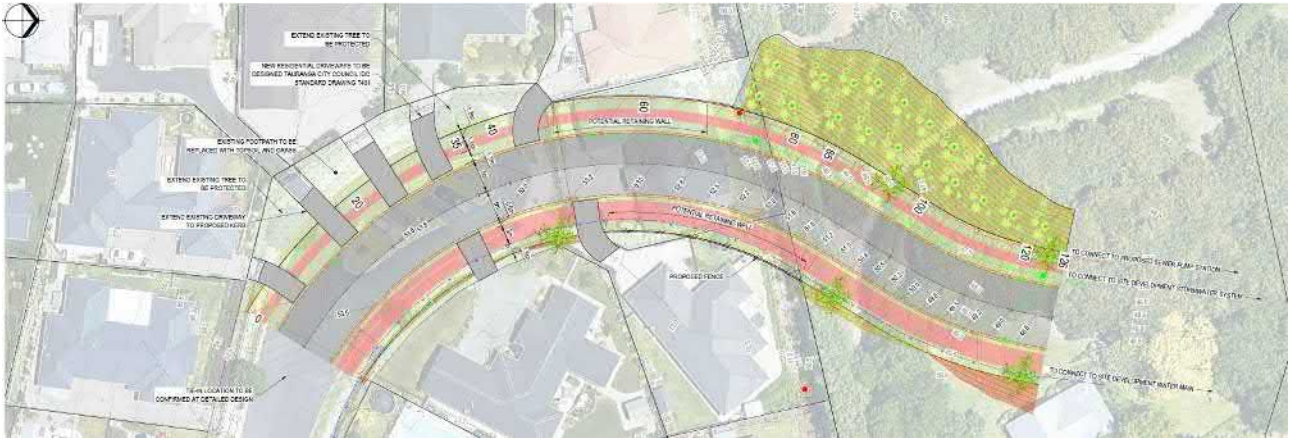


Figure 25: Concept Design - Plan

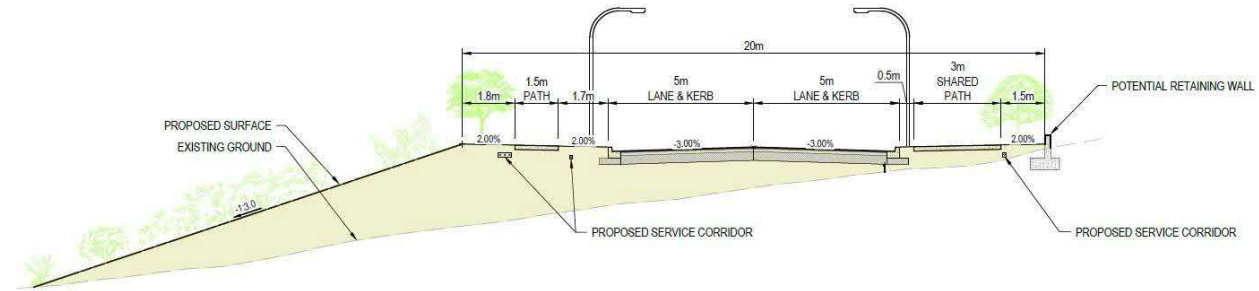


Figure 26: Concept Design Cross-section

9.4 Concept Design Cost Estimate

The purpose of this cost estimate is to provide a Concept Design Cost estimate of quantifiable items (+/-50) for the construction works given the level of detail available. Some provisional, contingency and design development allowances have been included for non-quantifiable items. Further site investigations will need to be undertaken to refine the likelihood and potential impact. Generally, the cost of the projects is comparable for project of similar scale.

Specific reference should be made to the fact that the cost estimate should not be relied upon as absolute/final or be used for funding applications as other costs need to be included for a complete cost estimate, refer to the exclusions and assumption sections for some of these costs.

9.4.1 Summary of Concept Design Cost Estimate

The table below summarizes the cost estimates for the construction of the access route. A breakdown for preliminary and general costs and project related costs can be provided.

Refer 9.4.2 (a) for the methodology used to prepare the cost estimate.

The cost estimate has been derived at a range of -50% to +50%.

Table 8: Cost Estimate Summary Schedule

| Costing Category | Cost Estimate (\$NZD) |
|--|------------------------|
| Preliminary & General | \$ 45,000.00 |
| Environmental Compliance | \$ 21,200.00 |
| Traffic Management and Temporary Works | \$ 21,000.00 |
| Earthworks | \$ 792,762.00 |
| Drainage | \$ 212,900.00 |
| Kerbs & Concrete Work | \$ 152,350.00 |
| Pavement Marking | \$ 5,000.00 |
| Signage | \$ 5,000.00 |
| Street Lighting | \$ 14,000.00 |
| Landscaping | \$ 50,800.00 |
| Fencing | \$ 18,000.00 |
| Utility Services | \$ 508,000.00 |
| Provisional Sums & Dayworks | \$ 133,800.00 |
| Professional Services (15% of Construction Costs) | \$ 296,980.00 |
| Construction Contingency and Design Development (25% of Construction and Professional Services Costs) | \$ 569,200.00 |
| Consenting costs (including Archaeological Authority) | Excluded |
| SUB TOTAL (excl. GST) | \$ 2,846,000.00 |

The estimate excludes TCC costs such as project management and property (cost or sale income)

9.4.2 Scope of Concept Design Estimate

| Item | Description |
|------|---|
| a) | <p>Measurement is generally in accordance with NZS 4224:1983 "Code of Practice for Measurement of Civil Engineering Quantities". The rates have been prepared using a combination of first principle assessments, using our database of previous / current rates / projects for the key scope items identified. The prices and rates entered in this Schedule are generally deemed to have been allowed for all costs involved in supplying, placing and/or fixing and testing each item in its final position or form unless noted otherwise. This estimate has also been priced on local construction industry rates at present-date prices (June 2021). The assessment is for the sole purpose to inform the client of an estimated cost of construction. Reference documents Civil Design Drawings dated 11 June:</p> <ul style="list-style-type: none"> ▪ 4289820-CA-001, Ohauti Site Access Assessment, Existing Services, Layout Plan, Rev A ▪ 4289820-CA-002, Ohauti Site Access Assessment, Proposed Services, Layout Plan, Rev 0 ▪ 4289820-CA-003, Ohauti Site Access Assessment, Proposed Accessway, Plan and Long Section, Rev A ▪ 4289820-CA-004, Ohauti Site Access Assessment, Proposed Accessway, Cross Sections, Rev A <p>Specific reference should be made to the fact that the cost estimate should not be relied upon as absolute/final or be used for funding application as other costs need to be included for a complete cost estimate, refer excludes and assumption sections for some of these costs.</p> |

| | |
|----|--|
| b) | <p>The scope is limited to the cost expected during the design construction contract. This cost estimate is limited to the following site-specific requirements:</p> <ul style="list-style-type: none"> • Contractors Construction including: <ul style="list-style-type: none"> • Preliminary & General • Environmental Compliance • Traffic Management and Temporary Works • Earthworks • Drainage • Kerbs & Concrete Work • Pavement Marking • Signage • Traffic Signals • Street Lighting • Utility Services • Landscaping |
| c) | <p>Main Contractor Preliminary & General Items (P&G), otherwise known as On-Site / Off-site Overhead costs covers items such as:</p> <ul style="list-style-type: none"> • Site supervision / management, site offices, stores, plant, cranes, administrative, financial, executive and plant costs |
| d) | <p>Construction Contingency is a risk contingency to cover the cost of variation claims made by the contractor during the construction phase of the project. We have allowed for 15% contingency.</p> <p>The Design Development Allowance is a general allowance for residual cost risk including design development, omissions, sundry unmeasured items and considerations made for construction details omitted from the current project scope. We have allowed for 10%.</p> |
| e) | <p>This cost estimate is based on the design information provided and is currently subject to an accuracy range of -50% to +50%, as the estimation is highly sensitive to the survey information available, the existing service, and traffic management requirements.</p> |

9.4.3 Assumptions

The level of accuracy in the cost estimate has been derived at a range of -50% to +50%.

| Item | Description |
|------|--|
| a) | <p>Key assumptions used in this cost-estimate are outlined below:</p> <ul style="list-style-type: none"> • Indications of boundaries, areas and volumes used in the cost estimate are dependent on the quality information and aerial photography available of Tauranga City Council Mapi system and LINZ. Greater accuracy may be achieved from a topographical survey of site in proceeding design or construction stages. • That the existing on-site material is suitable for compacted cut to fill earthworks. Additional imported material will also be required to bring the site to formation level. Portion of the stripped topsoil will be used for grassed and landscaping areas, with the remainder being carted offsite. • A nominal allowance for ground improvement is included • Provisional sum included for upgrade/renew of adjoining public service networks (water connection and wastewater pump station). It is assumed that there is adequate capacity in the existing infrastructure for the new connections. • The contract will be procured by TCC in accordance with NZS3910 • Construction Period is 100 Working Days, will commence 2022 and coincide with the development work. |

| | |
|----|--|
| b) | <p>General assumptions used in this cost-estimate are outlined below:</p> <ul style="list-style-type: none"> • There is unrestricted access to undertake the works • Works will be carried out by a single main contractor. No allowance has been made for multiple contractors. The works will coincide the development of the subdivision by the same contractor. • All roads to remain open during construction. • Allowance for inclement weather will need to be included in the construction programme within the construction plan • Material from local quarry is suitable as import fill and pavement material. |
| c) | <p>Site-specific risks that impact the level of accuracy include the following items:</p> <ul style="list-style-type: none"> • Disposal of contaminated land or building materials • Archaeological discoveries may halt or slow project works • Disruption to allow connections to existing council services may incur unforeseen delays and cost • Unidentified underground services • Assumes that the Contractor is a qualified competent Contractor (minimum Level C Waka Kotahi Pre-qualification level) • Contaminated land and removal of such soils to a managed landfill • Further input from geotechnical investigation will direct earthworks levels in future design stages. |

9.4.4 Exclusions

There are general and site-specific risks to the cost estimate that will need to be evaluated in preparing the overall cost estimate. These could have a significant impact on the out-turn cost.

Exclusions for the Estimate:

- Cost of consents and Archaeological Authority
- Public Consultation
- Accidental discovery of artefacts
- Disposal of contaminated soil or asbestos off-site
- Betterment of existing services
- Renewals of services and roading infrastructure
- Excavation of rock
- Carbon credits
- Significant ground improvements i.e. piles, deep soil mixing
- Land acquisition and easement costs (if required)
- Other professional services, such as cost to prepare and attend hearings if required
- Future maintenance and operational costs
- Project funding costs
- Client management costs
- Escalation
- Legal and finance costs
- Goods & Services Tax (GST)
- A nominal allowance has been included for the design works and construction monitoring, but does not include stand-down or standby allowance
- Covid-19 related costs
- Cost allowance to relocate unidentified services
- Cost allowance for liaising with existing service providers of dry services. Provisional item included for relocating only. Services connections for new development not included.
- Vibration damage
- Full road closures and diversions for long duration traffic management.

9.4.5 Limitations

These clauses have been written in conjunction with and are intended to be reviewed alongside the Engineers Estimates.

Description

© Beca 2021 (unless Beca has expressly agreed otherwise with the Client in writing).

This report has been prepared by Beca on the specific instructions of our Client. It is solely for our Client's use for the purpose for which it is intended in accordance with the agreed scope of work. Any use or reliance by any person contrary to the above, to which Beca has not given its prior written consent, is at that person's own risk.

Where another party has supplied information for use in this report, it is assumed to be reliable. Beca reserves the right, but not the obligation, to review all calculations included or referred to in this report and, if considered necessary, to revise its opinion in the light of any new or existing information.

This cost estimate has been developed solely for the purpose of a Concept Design cost estimate of physical works. They cannot be used for budget-setting purposes as the design is not detailed enough and required items may have been omitted and/or the works not fully scoped.

10 Consenting

Route 8 is likely to require further investigation and/or the following Regional and Territorial Authority resource consents, and it is recommended that an Archaeological Authority to modify or destroy unknown archaeological sites is also obtained from Heritage New Zealand.

- Tauranga City Plan: “*The construction and vesting of infrastructure in the Council that complies with the relevant performance standards in Appendix 12A, B, C, D and E is a Controlled activity*”, (Table 12G.1, TCP)
- National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS). Further investigation required. As this area is, or has been, used for horticulture then a Preliminary Site Investigation would need to be carried out to determine whether a Detailed Site Investigation is needed, which will then determine whether further resource consents under the NESCS or the Bay of Plenty Regional Natural Resources Plan (RNRP) are required.

It is noted that the expected earthworks volumes for construction of this scenario do not trigger the need for consent under the RNRP.

11 Conclusion

TCC's purpose of this work is to provide a sufficient road access and services route to enable residential development of the underdeveloped residential zoned land.

This technical assessment has:

- identified all reasonably practicable options
- assessed the advantages and disadvantages of the options
- recommend a preferential option for more detailed assessment / consideration
- provided a concept design and indicative cost estimate for the preferred option to inform further assessment / consideration.

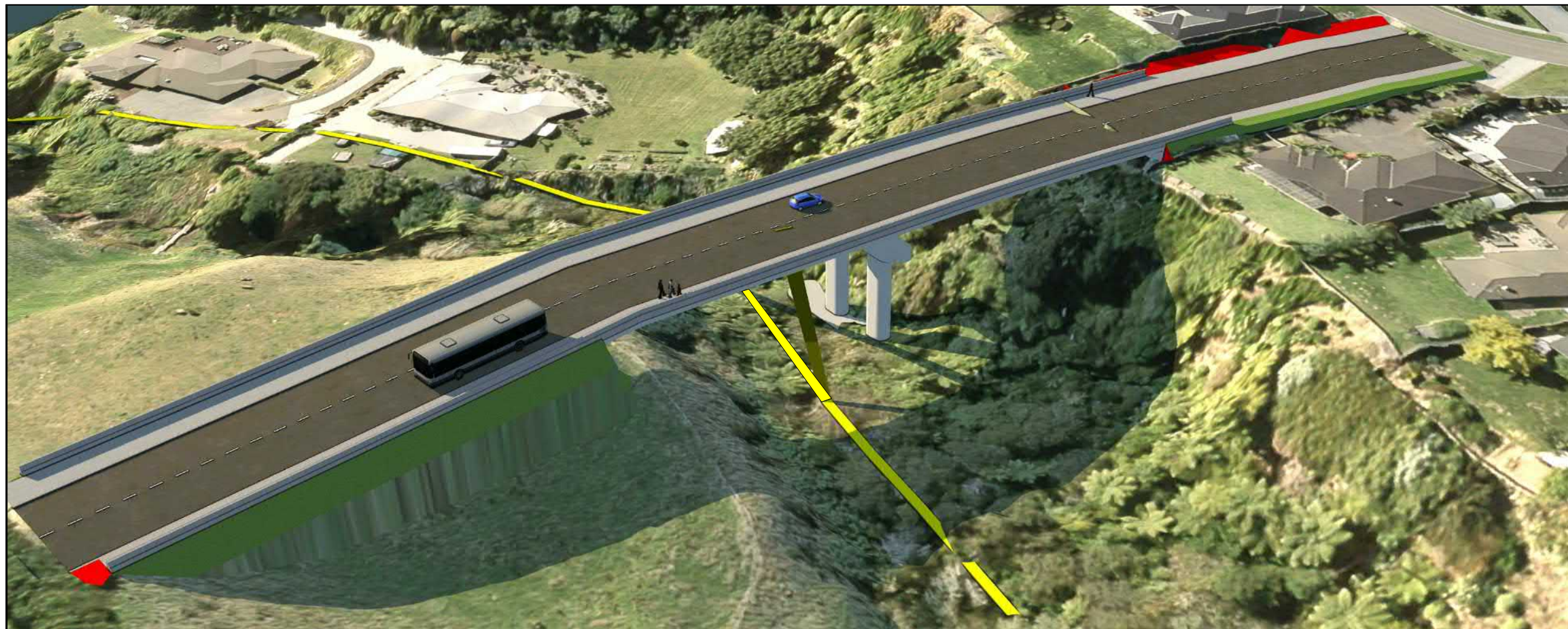
The assessment has considered a wide range of options and criteria and the preferential option clearly demonstrates greater benefit and lower impacts than the alternative options.

Detailed design, consultation and consenting will need to be completed as next steps if TCC decide to advance with the preferred option as the way forward.



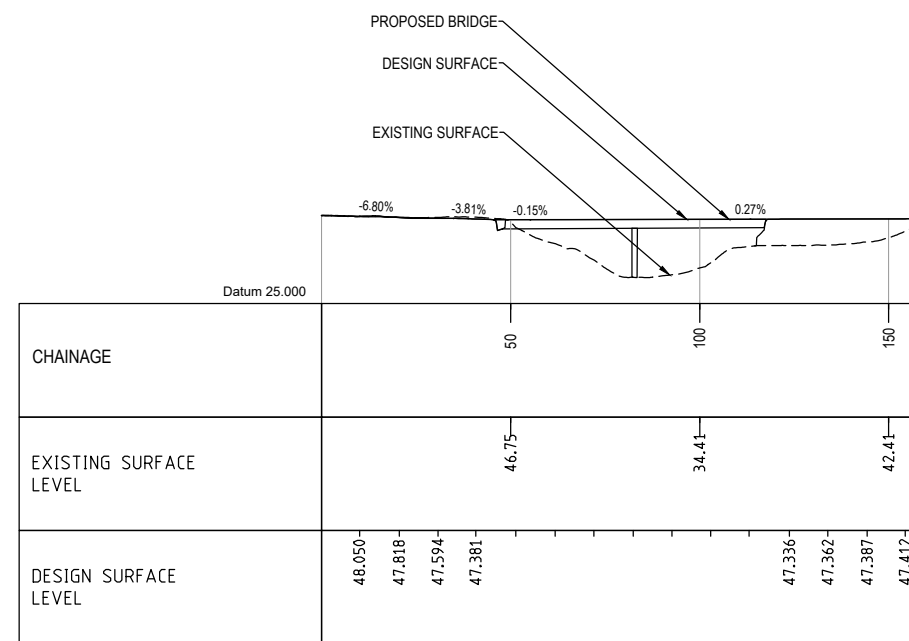
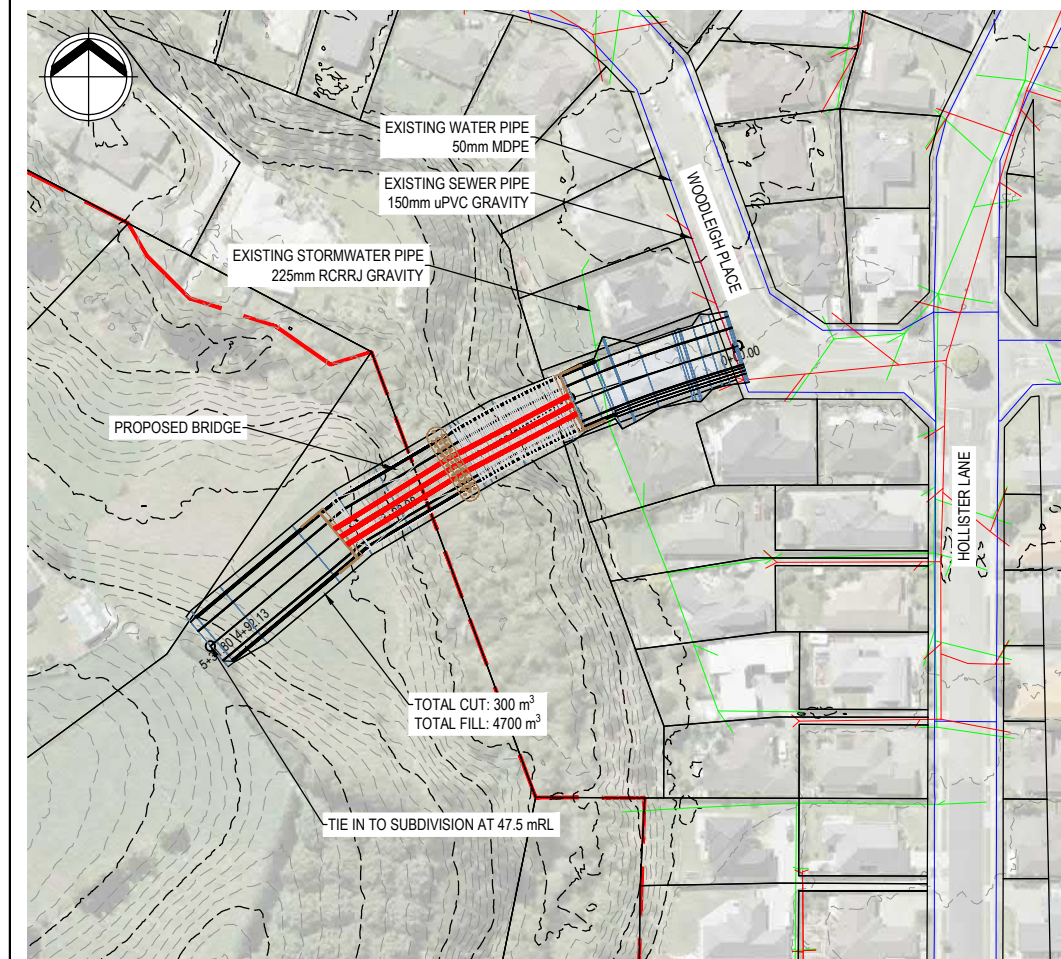
Appendix A – Scenario Alignment Sketches





LEGEND

- CUT AREA
- FILL AREA
- BOUNDARY



- NOTES:**
- SERVICES SHOWN ARE INDICATIVE ONLY. DATA HAS BEEN OBTAINED FROM BEFOREUDIG AND TCC MAP1. BECA HOLDS NO RESPONSIBILITY FOR ACCURACY OF SERVICE TYPES OR LOCATIONS.
 - PROPOSED SHORT-LISTED LOCATIONS ARE INDICATIVE ONLY AND PREPARED FOR THE SOLE PURPOSE OF A MULTI-CRITERIA ANALYSIS.
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Routes 4-6

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| Original Scale (A1) | Design Drawn | Approved For Construction* |
| Reduced Scale (A3) | Design Verifier | Date |
| | Design Check | |

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Project: **OHAUTI SITE ACCESS ASSESSMENT**

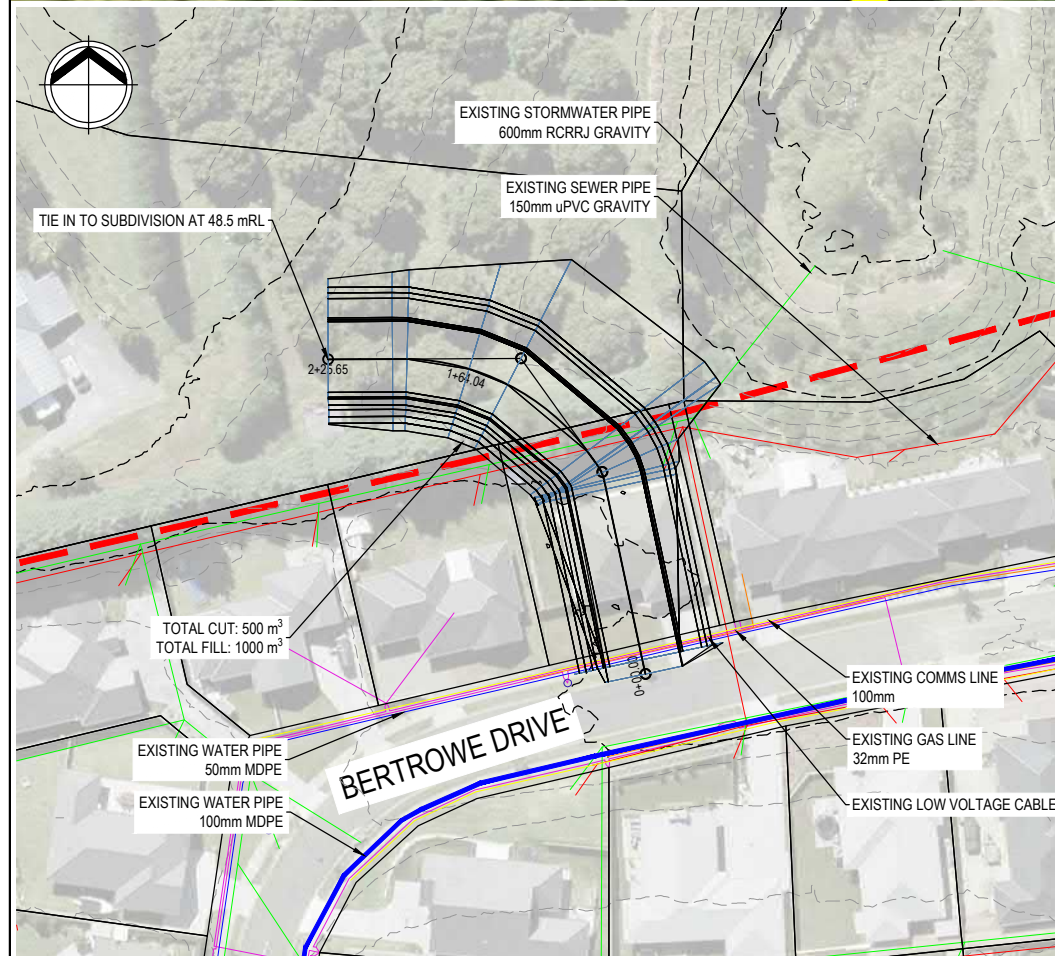
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SCENARIO 1
SHEET 1 OF 7**

| | |
|-------------|--------------------------|
| Discipline | CIVIL ENGINEERING |
| Drawing No. | 4289820-CE-K001 |
| Rev. | 0 |



LEGEND

- CUT AREA
- FILL AREA
- BOUNDARY



| | -9.64% | -5.20% | -1.84% |
|------------------------|--------------|--------|--------|
| DESIGN SURFACE | Datum 40.000 | | |
| EXISTING SURFACE | 50 | | |
| CHAINAGE | 47.48 | | |
| EXISTING SURFACE LEVEL | 49.550 | 49.382 | 49.232 |
| DESIGN SURFACE LEVEL | 49.012 | 48.823 | 48.636 |

- NOTES:**
- SERVICES SHOWN ARE INDICATIVE ONLY. DATA HAS BEEN OBTAINED FROM BEFOREUDIG AND TCC MAP1. BECA HOLDS NO RESPONSIBILITY FOR ACCURACY OF SERVICE TYPES OR LOCATIONS.
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Route 7

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| Reduced Scale (A3) | Dwg Verifier | Date |
| | Dwg Check | |

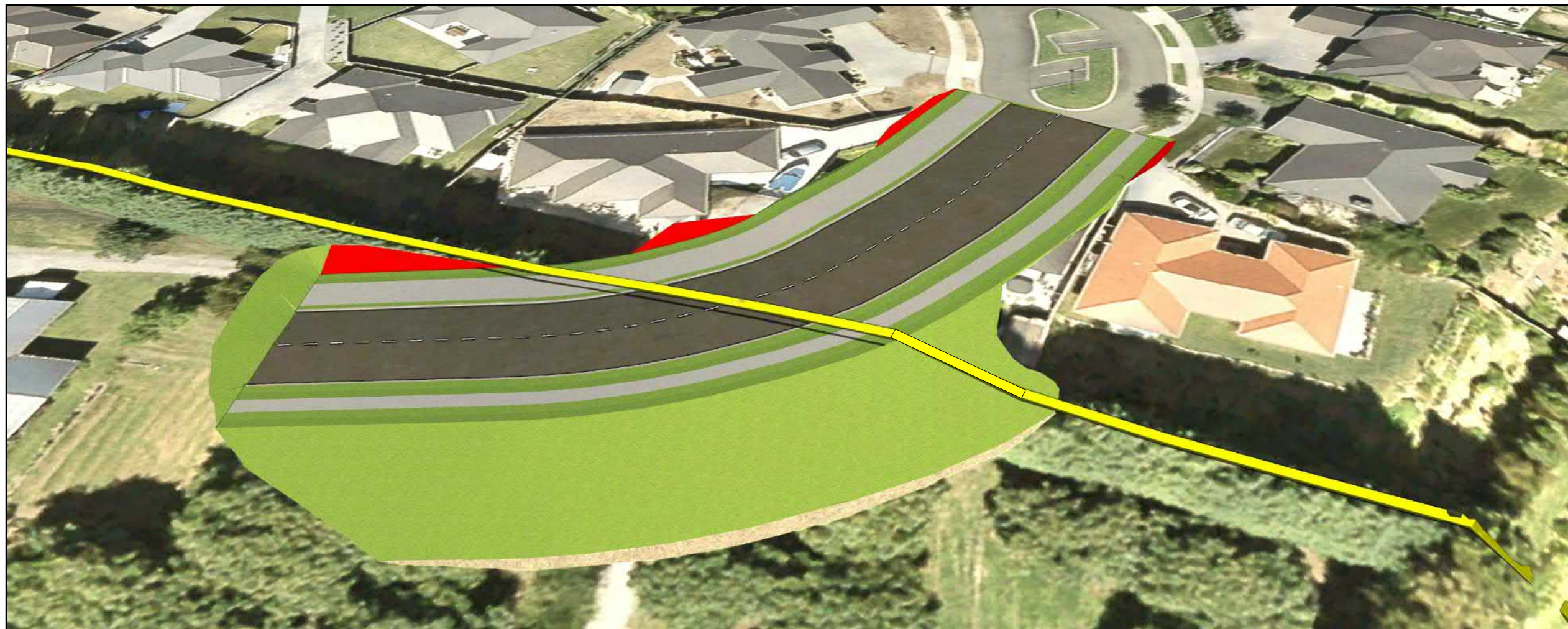
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Project: OHAUITI SITE ACCESS ASSESSMENT

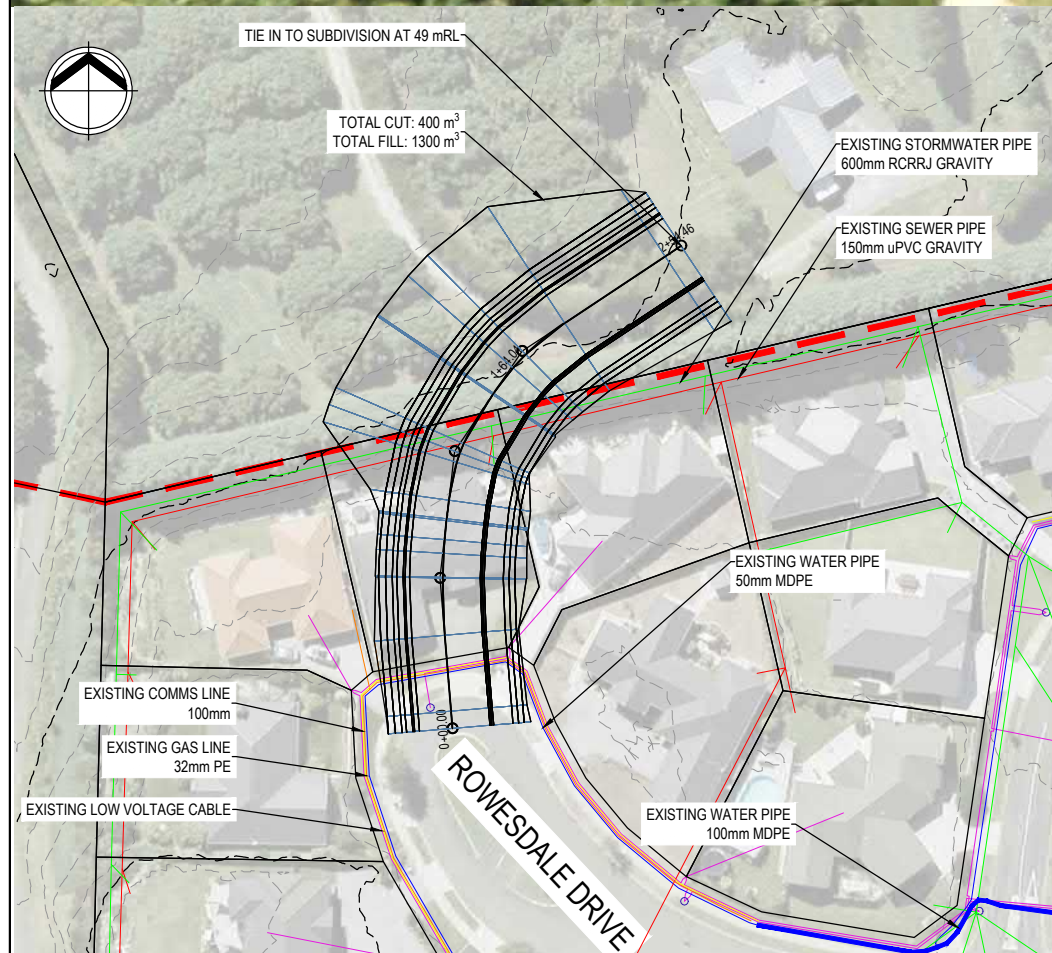
SHORT LIST ROUTE SCENARIOS
SCENARIO 2
SHEET 2 OF 7

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| Discipline | CIVIL ENGINEERING |
| Drawing No. | 4289820-CE-K001 |
| Rev. | 0 |



LEGEND

- CUT AREA
- FILL AREA
- BOUNDARY



| Datum 40.000 | |
|------------------------|---|
| CHAINAGE | 50 |
| EXISTING SURFACE LEVEL | 47.48 |
| DESIGN SURFACE LEVEL | 49.550 - 49.382 - 49.232 - 49.012 - 48.823 - 48.636 |

Grades: -9.64%, -5.20%, -1.84%

NOTES:

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Route 8

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| Reduced Scale (A3) | Design Verifier | Date |
| | Dwg Check | |

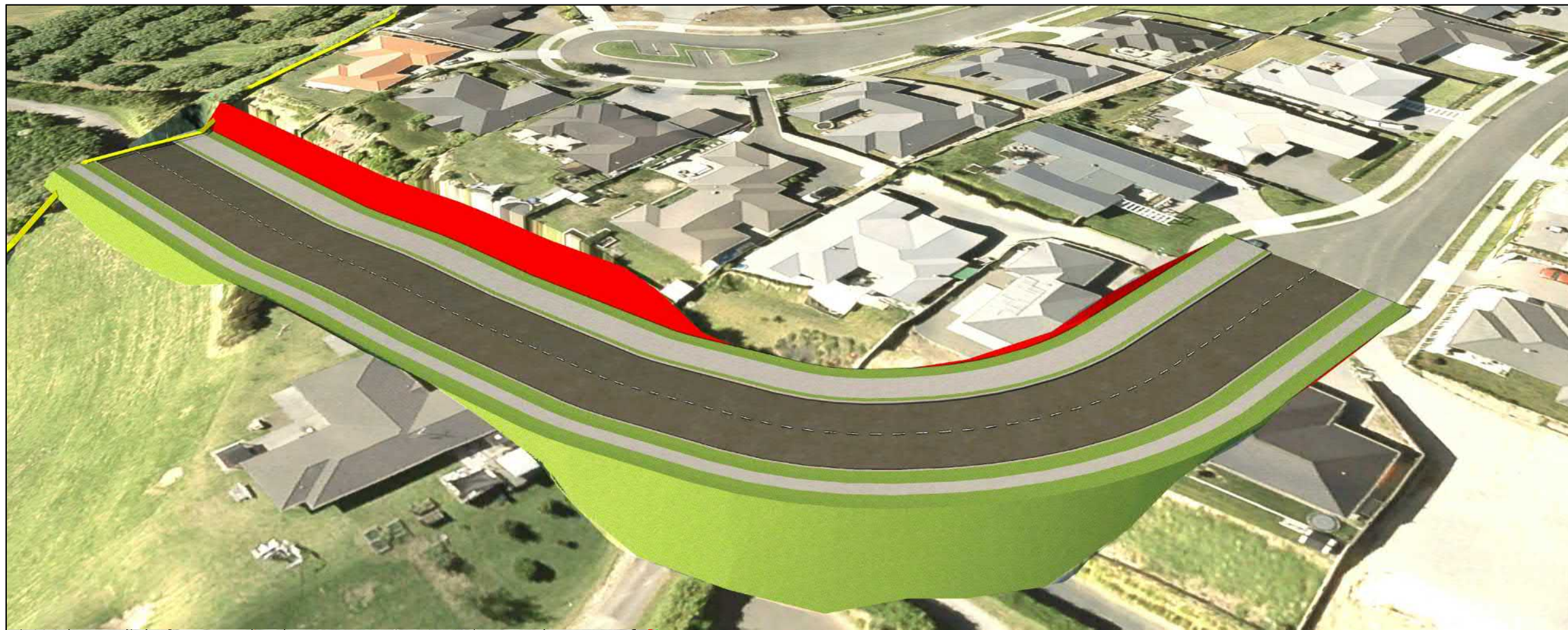
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Project: **OHAUITI SITE ACCESS ASSESSMENT**

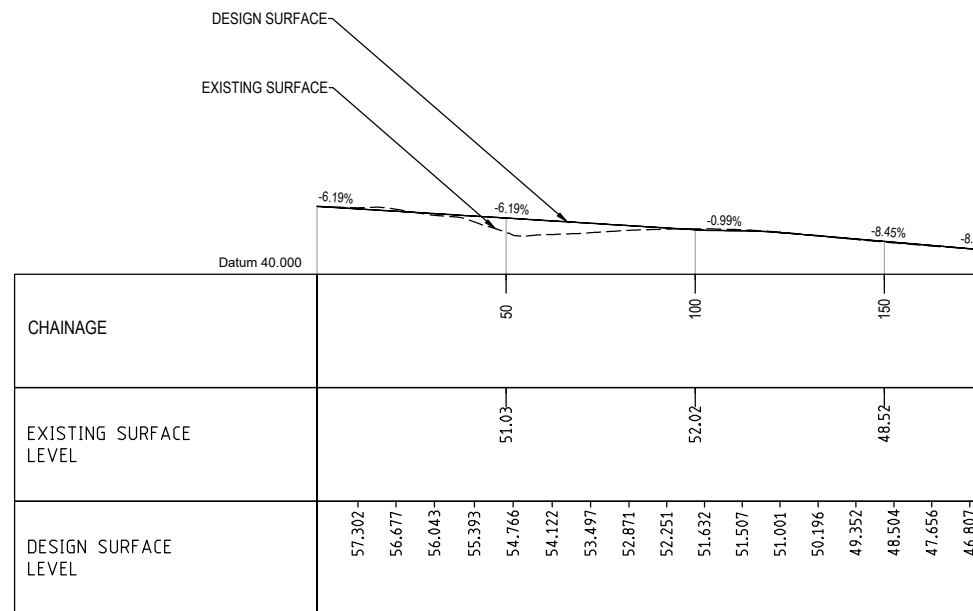
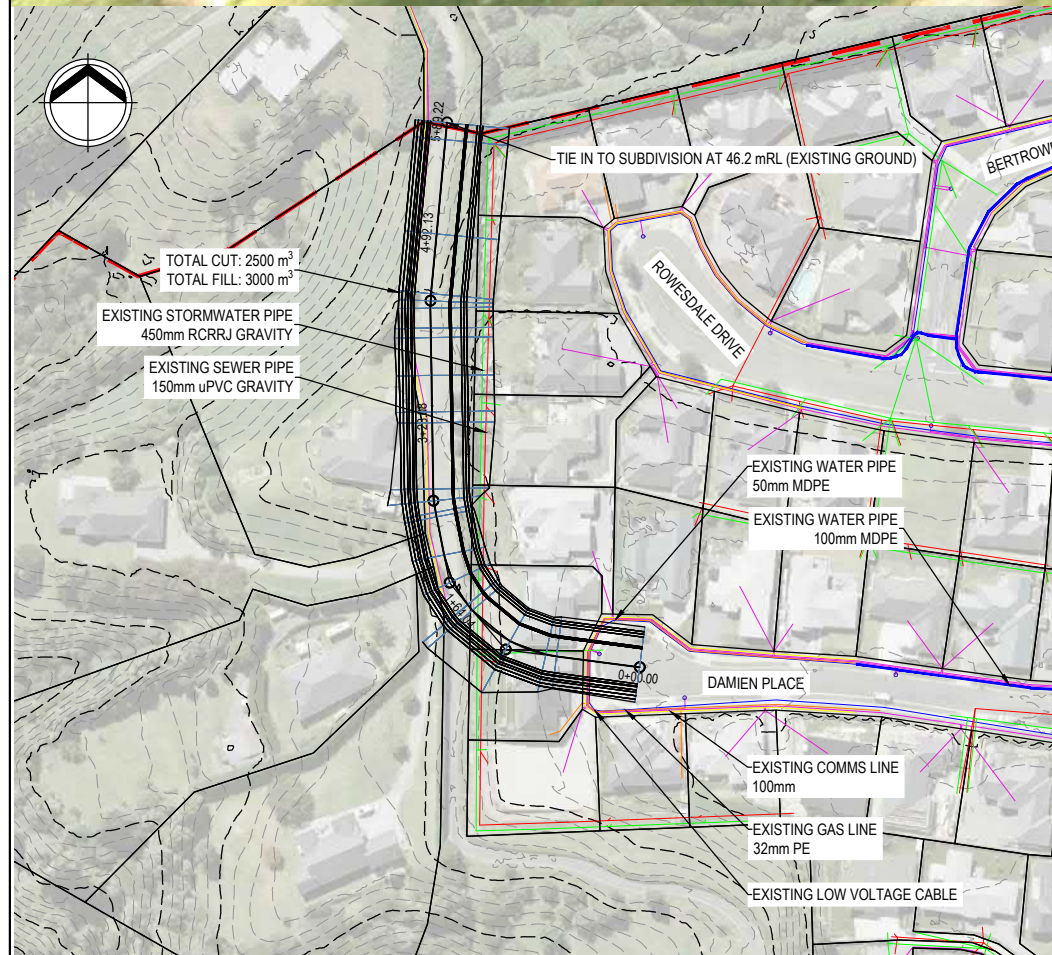
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SCENARIO 3
SHEET 3 OF 7**

| | |
|-------------|--------------------------|
| Discipline | CIVIL ENGINEERING |
| Drawing No. | 4289820-CE-K001 |
| Rev. | 0 |



LEGEND

- CUT AREA
- FILL AREA
- BOUNDARY



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Route 9

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| Reduced Scale (A3) | Design Verifier | Date |
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Project: **OHAUTI SITE ACCESS ASSESSMENT**

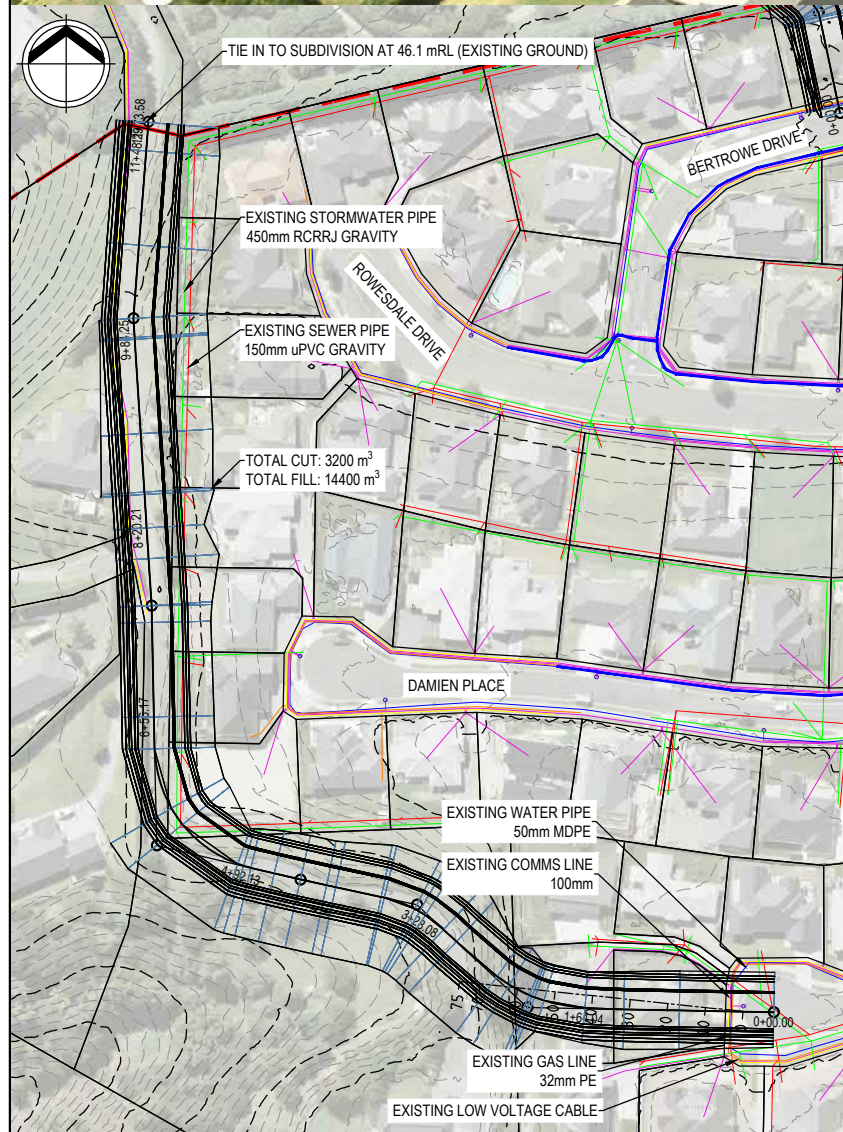
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SCENARIO 4
SHEET 4 OF 7

| | |
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| Discipline | CIVIL ENGINEERING |
| Drawing No. | 4289820-CE-K001 |
| Rev. | 0 |



LEGEND

- CUT AREA
- FILL AREA
- BOUNDARY



| CHAINAGE | EXISTING SURFACE LEVEL | DESIGN SURFACE LEVEL |
|--------------|------------------------|----------------------|
| Datum 40.000 | | |
| 50 | 62.50 | 63.048 |
| 100 | 52.45 | 62.841 |
| 150 | 51.04 | 62.633 |
| 200 | 50.70 | 62.426 |
| 250 | 50.95 | 62.219 |
| 300 | 51.12 | 62.009 |
| 350 | 46.73 | 61.447 |
| | | 60.463 |
| | | 59.471 |
| | | 58.433 |
| | | 57.393 |
| | | 56.326 |
| | | 55.279 |
| | | 54.180 |
| | | 53.260 |
| | | 53.215 |
| | | 53.171 |
| | | 53.126 |
| | | 53.081 |
| | | 53.037 |
| | | 52.993 |
| | | 52.949 |
| | | 52.930 |
| | | 52.944 |
| | | 52.959 |
| | | 52.947 |
| | | 52.748 |
| | | 52.333 |
| | | 51.703 |
| | | 50.868 |
| | | 49.986 |
| | | 49.104 |
| | | 48.221 |
| | | 47.339 |
| | | 46.457 |

- NOTES:**
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Route 10

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| Original Scale (A1) | Design Drawn | Approved For Construction* |
| Reduced Scale (A3) | Design Verifier | Date |
| | Dwg Check | |

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Project: OHAUTI SITE ACCESS ASSESSMENT

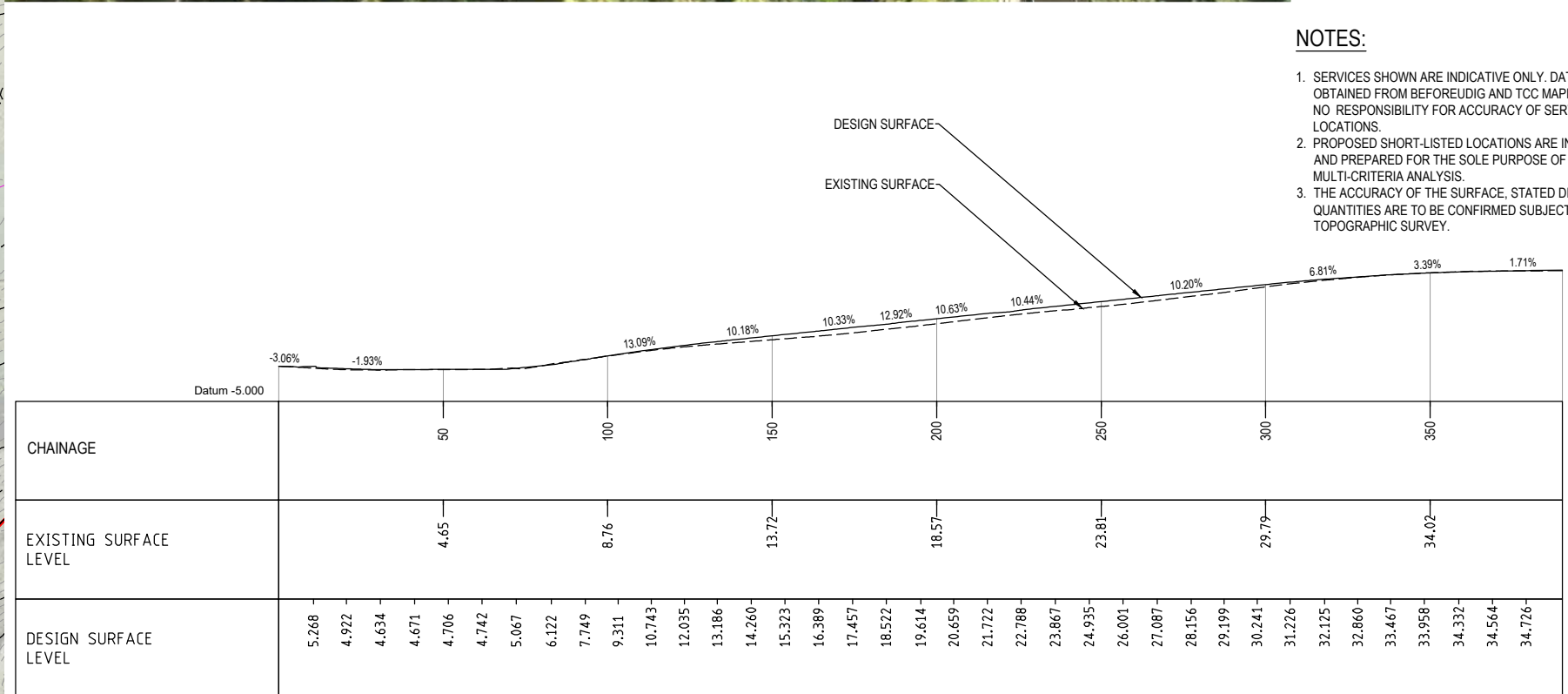
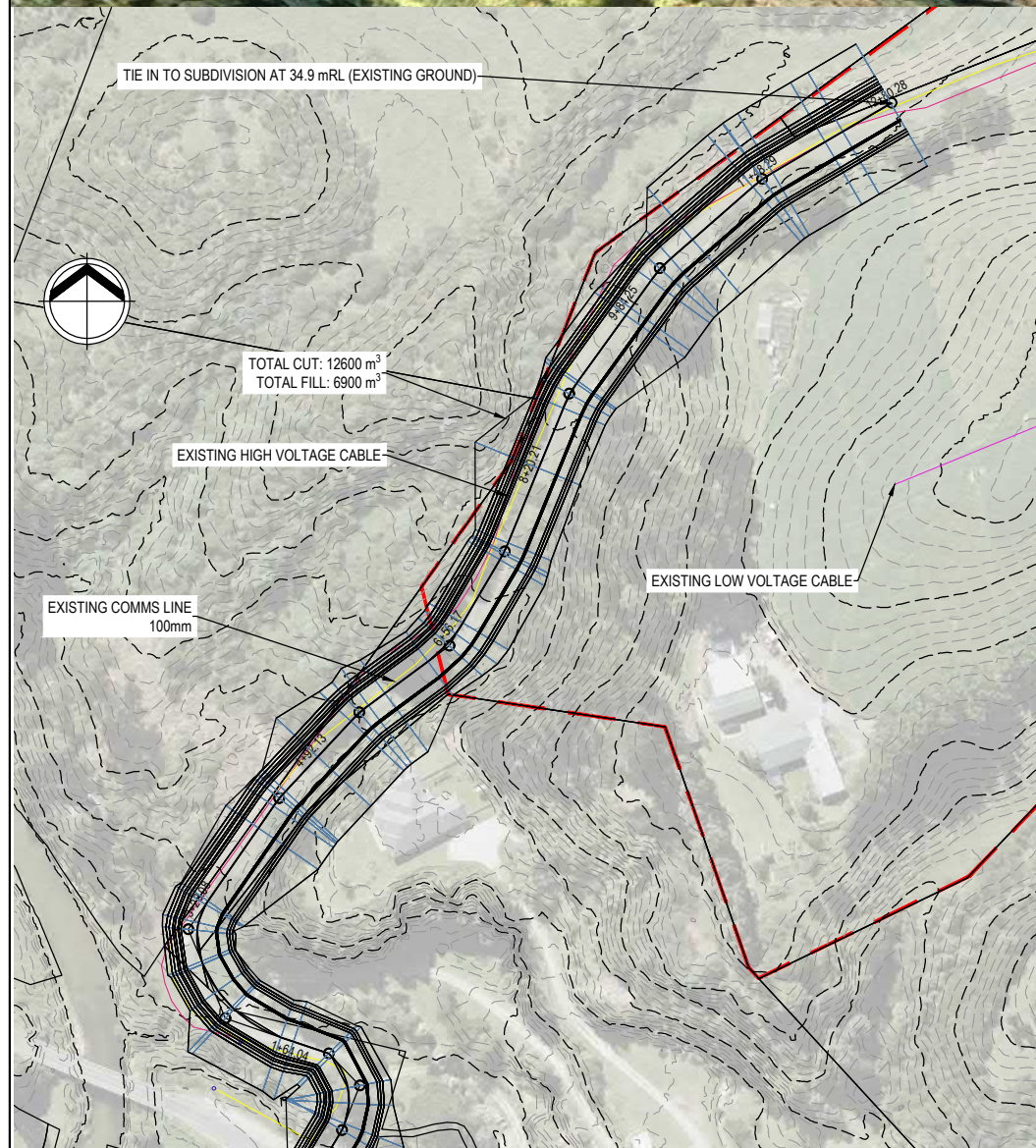
SHORT LIST ROUTE SCENARIOS
SCENARIO 5
SHEET 5 OF 7

| | |
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| Discipline | CIVIL ENGINEERING |
| Drawing No. | 4289820-CE-K001 |
| Rev. | 0 |



LEGEND

- CUT AREA
- FILL AREA
- BOUNDARY



- NOTES:**
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Route 1

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| Reduced Scale (A3) | Design Verifier | Date |
| | Dwg Check | |

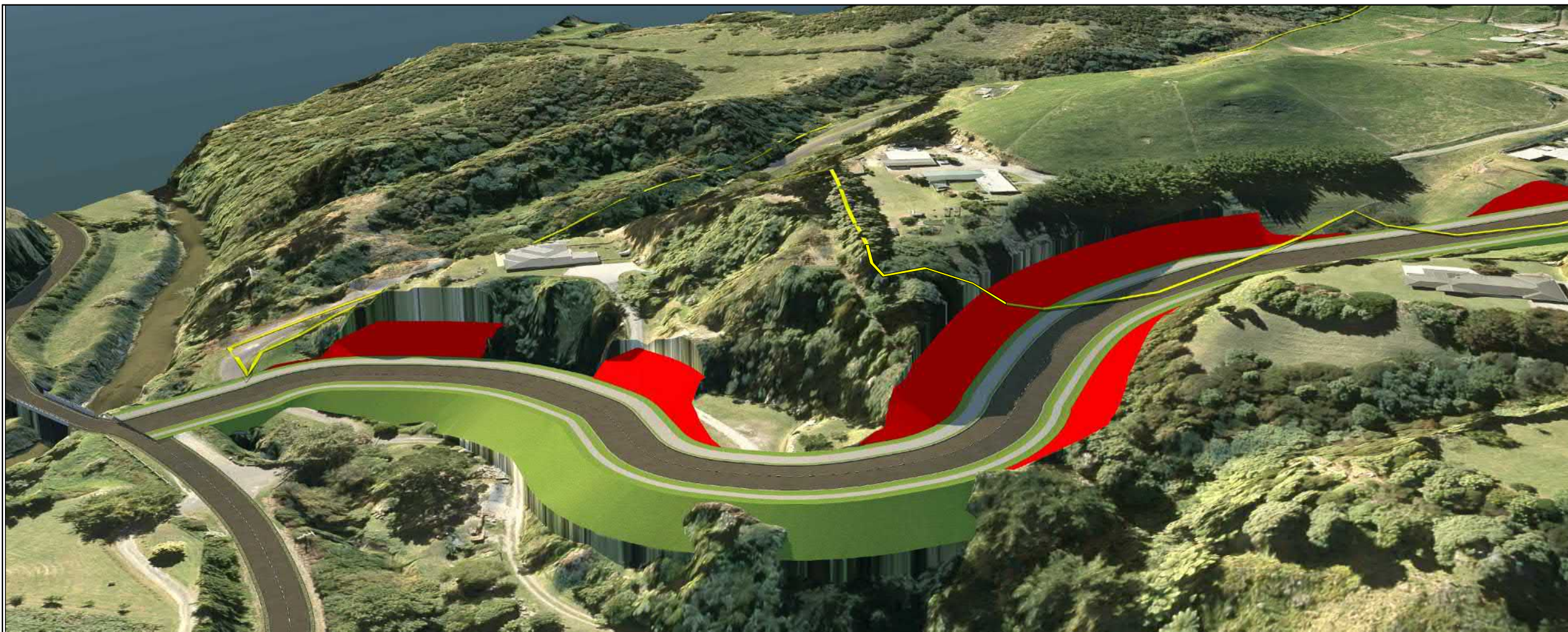
* Refer to Revision 1 for Original Signature



Project: OHAUITI SITE ACCESS ASSESSMENT

Title: SHORT LIST ROUTE SCENARIOS
 SCENARIO 6
 SHEET 6 OF 7

| | |
|-------------|-------------------|
| Discipline | CIVIL ENGINEERING |
| Drawing No. | 4289820-CE-K001 |
| Rev. | 0 |

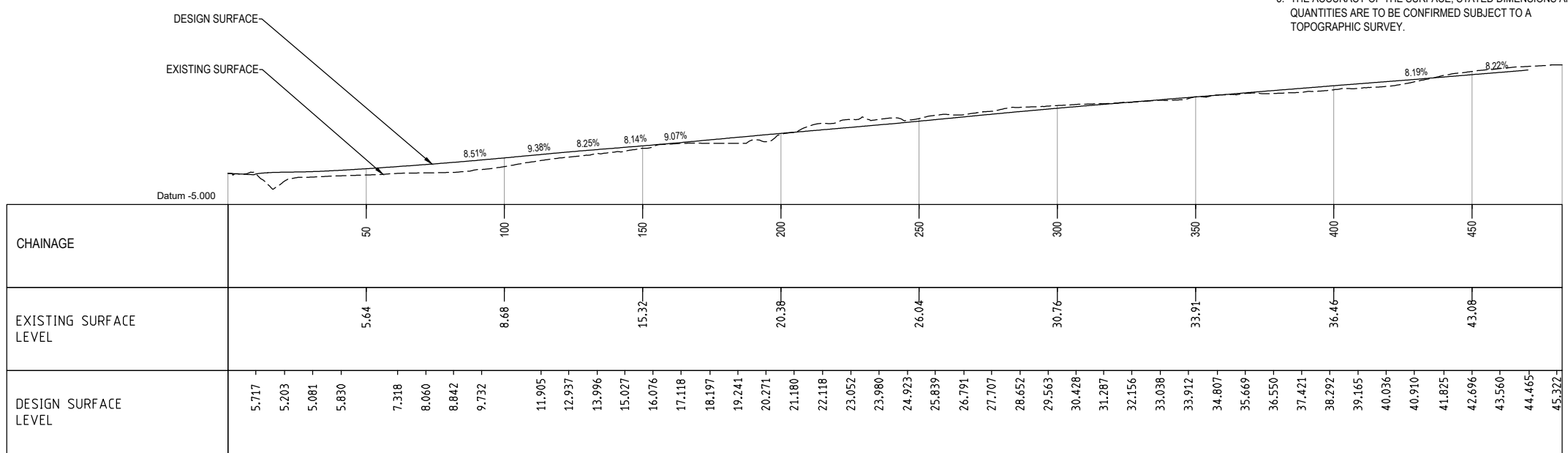
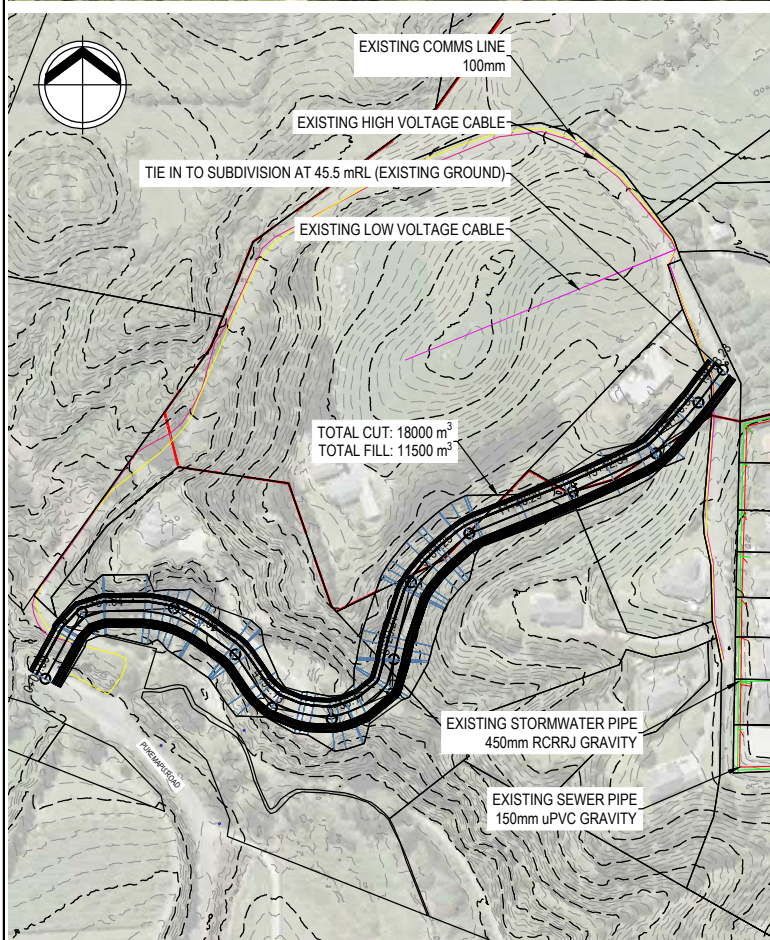


LEGEND

- CUT AREA
- FILL AREA
- BOUNDARY

NOTES:

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2. PROPOSED SHORT-LISTED LOCATIONS ARE INDICATIVE ONLY AND PREPARED FOR THE SOLE PURPOSE OF A MULTI-CRITERIA ANALYSIS.
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| 0 | FOR CLIENT REVIEW | TCV | KNW | JVZ | 07.05.21 |
| No. | Revision | By | Chk | Appd | Date |



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| Original Scale (A1) | Design Drawn | Approved For Construction* |
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Project: OHAUTI SITE ACCESS ASSESSMENT

SHORT LIST ROUTE SCENARIOS
SCENARIO 7
SHEET 7 OF 7

| | |
|-------------|-------------------|
| Discipline | CIVIL ENGINEERING |
| Drawing No. | 4289820-CE-K001 |
| Rev. | 0 |

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Route 11

B

Appendix B – TCC Street Design Report



Street design tool report

Project details

| | |
|-----------------------------|----------------------------|
| Project name | Ohauiti Access |
| Street reference | Rowesdale Drive |
| Designer | T. van der Leden |
| Company | Beca |
| Contact phone number | 027 252 9915 |
| Email address | taima.vanderleden@beca.com |
| Revision number | |
| Revision date | |
| Additional comments | |

Link and place status

Link status

| Indicator/user selection | Map derived options | Justification |
|---|---------------------|-----------------|
| Road classification: Local road (through route) | | |
| "Anticipated" traffic volumes (per day): 1000-5000 | | |
| Requirement for vehicle access to properties: High importance for access to properties | | |
| Buses per hour: 1-6 | 0 | New subdivision |
| Freight: Neither | Neither | |
| On cycle plan or planned key cycle route: Yes | | |
| LINK STATUS | LOCAL | |

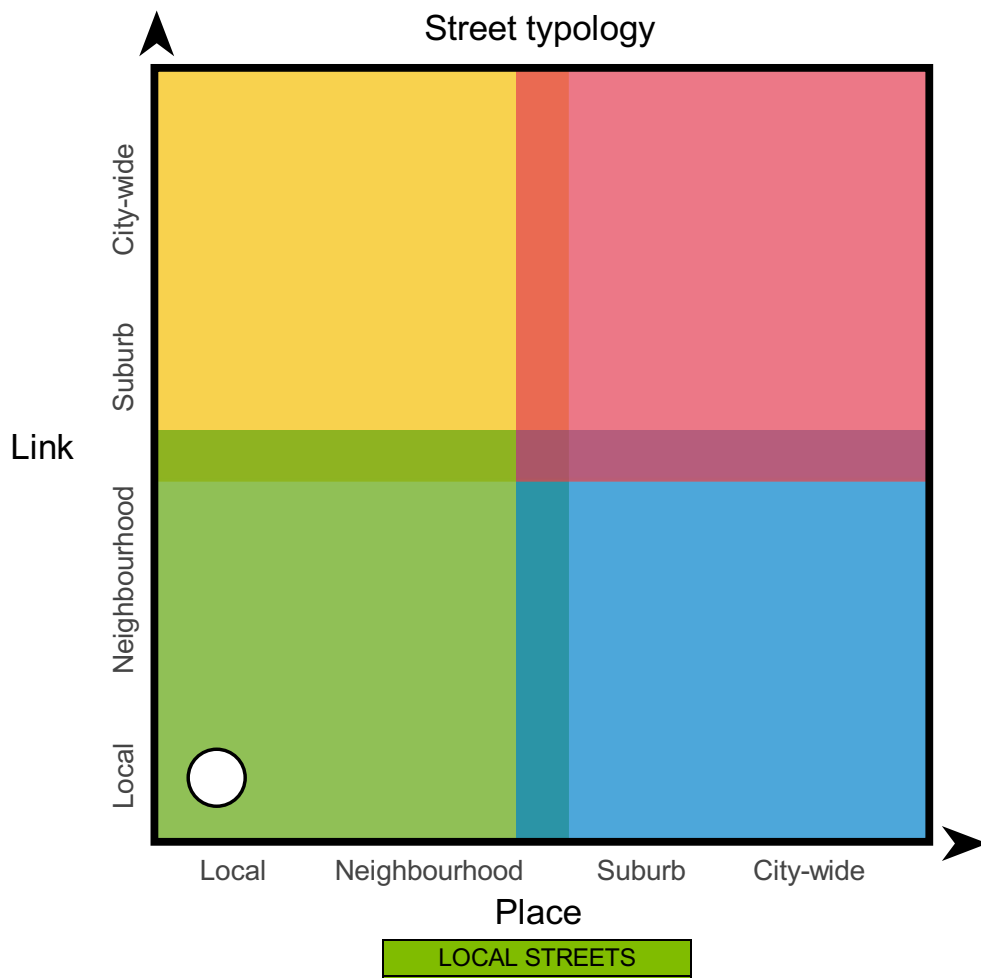
Place status

| Indicator/user selection | Map derived options | Justification |
|--|----------------------------------|-----------------|
| Residential: Medium density character/retirement (15-25dph) | Lower density character (<15dph) | New subdivision |
| Retail: None | None | |
| Commercial: None | None | |
| Industrial: None | None | |
| Education: None | None | |
| Recreation: None | None | |
| Civic, community or medical: None | None | |
| What is the catchment of people who come to spend time in this street?: Just residents and their visitors | | |
| PLACE STATUS | LOCAL | |

Overlays

| Indicator/user selection | Map derived options | Justification |
|---|---------------------|---------------|
| Located within the commercial business sub-zone: No | No | |
| Located within the city centre waterfront sub-zone: No | No | |
| Located within 500m of the coastline: No | No | |
| Located within 200m of a river/estuary/wetland/lake: No | No | |
| Located within 500m of a marae: No | No | |
| Located within 500m of a school or hospital: No | No | |
| Located within 500m of an outstanding natural features and landscapes plan area: No | No | |
| Located within or adjacent to a significant māori area: No | No | |
| Located within or adjacent to a significant archaeological area: No | No | |
| Located within or adjacent to an important amenity landscape area: No | No | |
| Located adjacent to a commercial plan area: No | No | |
| Located adjacent to a high rise plan area: No | No | |
| Location adjacent to a medium rise plan area: No | No | |
| Located within or adjacent to a special ecological area: No | No | |
| Overland flow path: Minor | Minor | |
| Located within or adjacent to stormwater soakage decommissioning zone: No | No | |

Typology



Link element selection

Movement lane elements

| | x | ✓ | x | x | x | x | x |
|--|---|---|--|---|--------------------------------|--------------------------------|--------------------------------|
| Indicators | Dual carriageway (two lanes in each direction) | One lane in each direction, with centreline | Two-way street, with no centreline marking | Single lane street, two-way with passing bays | Single lane street, one-way | Shared lane | Shared plaza |
| Road classification: Local road (through route) | Prohibited | Mandatory unless criteria met | Acceptable and preferred | Prohibited unless criteria met | Prohibited unless criteria met | Acceptable and preferred | Acceptable and preferred |
| "Anticipated" traffic volumes (per day): 1000-5000 | Acceptable but not preferred | Mandatory unless criteria met | Acceptable but not preferred | Prohibited | Prohibited | Prohibited unless criteria met | Prohibited unless criteria met |
| Buses per hour: 1-6 | Prohibited unless criteria met | Mandatory unless criteria met | Prohibited unless criteria met | Prohibited unless criteria met | Prohibited unless criteria met | Prohibited unless criteria met | Acceptable but not preferred |
| On cycle plan or planned key cycle route: Yes | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Overland flow path: Minor | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Located within or adjacent to stormwater soakage decommissioning zone: No | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |

Driving elements

| Indicators | x | x | ✓ | x | x |
|---|---------------------------------|------------------------------|--|--|------------------------------|
| | Solid or planted central median | Access restriction | Wider lane for truck or bus (overwidth lane) | Bus/ High occupancy vehicle (HOV) lane | Central flush median |
| Road classification: Local road (through route) | Acceptable but not preferred | Acceptable but not preferred | Not Applicable | Not Applicable | Acceptable but not preferred |
| "Anticipated" traffic volumes (per day): 1000-5000 | Acceptable but not preferred | Acceptable and preferred | Acceptable and preferred | Not Applicable | Acceptable and preferred |
| Buses per hour: 1-6 | Not Applicable | Acceptable and preferred | Mandatory | Acceptable and preferred | Acceptable and preferred |
| On cycle plan or planned key cycle route: Yes | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Overland flow path: Minor | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Located within or adjacent to stormwater soakage decommissioning zone: No | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |

Walking elements

| | x | x | ✓ |
|--|----------------------------------|------------------------------------|--------------------------------------|
| Indicators | Footpath shared with carriageway | Footpath on one side of the street | Footpath on both sides of the street |
| Road classification: Local road (through route) | Not Applicable | Prohibited unless criteria met | Mandatory unless criteria met |
| "Anticipated" traffic volumes (per day): 1000-5000 | Not Applicable | Prohibited unless criteria met | Mandatory unless criteria met |
| Buses per hour: 1-6 | Not Applicable | Prohibited unless criteria met | Mandatory unless criteria met |
| On cycle plan or planned key cycle route: Yes | Not Applicable | Not Applicable | Not Applicable |
| Overland flow path: Minor | Not Applicable | Not Applicable | Not Applicable |
| Located within or adjacent to stormwater soakage decommissioning zone: No | Not Applicable | Not Applicable | Not Applicable |



Cycling elements

| Indicators | ✓ | x | x | x | x |
|--|------------------------------------|----------------------------------|--------------------------|----------------------------------|--|
| Indicators | Combined pedestrian and cycle path | Cyclists sharing the carriageway | Marked cycle lane | Protected or buffered cycle lane | Cycle path provided outside of the street corridor |
| Road classification: Local road (through route) | Not Applicable | Mandatory unless criteria met | Acceptable and preferred | Acceptable and preferred | Acceptable and preferred |
| "Anticipated" traffic volumes (per day): 1000-5000 | Not Applicable | Acceptable but not preferred | Acceptable and preferred | Mandatory unless criteria met | Not Applicable |
| Buses per hour: 1-6 | Not Applicable | Prohibited unless criteria met | Acceptable and preferred | Mandatory unless criteria met | Not Applicable |
| On cycle plan or planned key cycle route: Yes | Prohibited unless criteria met | Not Applicable | Acceptable and preferred | Mandatory unless criteria met | Acceptable and preferred |
| Overland flow path: Minor | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Located within or adjacent to stormwater soakage decommissioning zone: No | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |

Cycling elements justification

| Element selected/not selected | Indicator | Justification |
|------------------------------------|---|---|
| Combined pedestrian and cycle path | On cycle plan or planned key cycle route: Yes | <ul style="list-style-type: none"> • Where it is the safest option for cyclists and pedestrian movement to occur due to physical limitations or conflicts in the width of a street, and where faster cyclist speeds (above 15kph) can be discouraged through signposting or calming measures. • Where the path would be used by recreational or inexperienced cyclists only and at a slow speed (for example near schools and childcare centres). |
| Cyclists sharing the carriageway | Road classification: Local road (through route) | <ul style="list-style-type: none"> • Where a cycle lane is provided instead. |
| Protected or buffered cycle lane | Buses per hour: 1-6 | <ul style="list-style-type: none"> • A marked or off-road cycle lane is provided instead. |
| Protected or buffered cycle lane | On cycle plan or planned key cycle route: Yes | <ul style="list-style-type: none"> • A marked or off-road cycle lane is provided instead. |
| Protected or buffered cycle lane | "Anticipated" traffic volumes (per day): 1000-5000 | <ul style="list-style-type: none"> • A marked or off-road cycle lane is provided instead. |

Bus elements

| Indicators |  Bus stop with shelter |  Simple bus stop |
|--|---|---|
| Road classification: Local road (through route) | Not Applicable | Not Applicable |
| "Anticipated" traffic volumes (per day): 1000-5000 | Not Applicable | Not Applicable |
| Buses per hour: 1-6 | Mandatory unless criteria met | Acceptable and preferred |
| On cycle plan or planned key cycle route: Yes | Not Applicable | Not Applicable |
| Overland flow path: Minor | Not Applicable | Not Applicable |
| Located within or adjacent to stormwater soakage decommissioning zone: No | Not Applicable | Not Applicable |

Traffic calming elements

| Indicators | Traffic calming ✓ |
|--|--|
| Road classification: Local road (through route) | Mandatory unless criteria met |
| "Anticipated" traffic volumes (per day): 1000-5000 | Acceptable and preferred |
| Buses per hour: 1-6 | Acceptable but not preferred |
| On cycle plan or planned key cycle route: Yes | Mandatory unless criteria met |
| Overland flow path: Minor | Not Applicable |
| Located within or adjacent to stormwater soakage decommissioning zone: No | Not Applicable |

Vehicle design speed

| | x | x | x | x | ✓ | x |
|--|-------------------------------|------------------------------|-------------------------------|--------------------------|------------------------------|------------------------------|
| Indicators | ≤20km/h | 20km/h | 30km/h | 40km/h | 50km/h | ≥60km/h |
| Road classification: Local road (through route) | Mandatory unless criteria met | Acceptable but not preferred | Mandatory unless criteria met | Acceptable and preferred | Acceptable but not preferred | Prohibited |
| "Anticipated" traffic volumes (per day): 1000-5000 | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Buses per hour: 1-6 | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| On cycle plan or planned key cycle route: Yes | Acceptable and preferred | Acceptable and preferred | Acceptable and preferred | Acceptable and preferred | Acceptable but not preferred | Acceptable but not preferred |
| Overland flow path: Minor | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Located within or adjacent to stormwater soakage decommissioning zone: No | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |

Vehicle design speed justification

| Element selected/not selected | Indicator | Justification |
|-------------------------------|--|---|
| ≤20km/h | Road classification: Local road (through route) | <ul style="list-style-type: none"> A shared lane or plaza is NOT proposed. |
| 30km/h | Road classification: Local road (through route) | <ul style="list-style-type: none"> The existing speed limit is 50km/h |

Stormwater elements

| | x | ✓ | x | x |
|--|--------------------------|---|-------------------------------------|-------------------------------|
| Indicators | Stormwater treatment | Overland flow path along kerb and channel | Additional overland flow management | Stormwater soakage |
| Road classification: Local road (through route) | Not Applicable | Not Applicable | Not Applicable | Mandatory unless criteria met |
| "Anticipated" traffic volumes (per day): 1000-5000 | Acceptable and preferred | Not Applicable | Not Applicable | Not Applicable |
| Buses per hour: 1-6 | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| On cycle plan or planned key cycle route: Yes | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Overland flow path: Minor | Not Applicable | Mandatory unless criteria met | Acceptable and preferred | Not Applicable |
| Located within or adjacent to stormwater soakage decommissioning zone: No | Not Applicable | Not Applicable | Not Applicable | Mandatory unless criteria met |

Stormwater elements justification

| Element selected/not selected | Indicator | Justification |
|-------------------------------|--|--|
| Stormwater soakage | Located within or adjacent to stormwater soakage decommissioning zone: No | <ul style="list-style-type: none"> • Within 150m of a relic slip, 2:1, 3:1 slope AND sufficient reticulation capacity confirmed by Council. |
| Stormwater soakage | Road classification: Local road (through route) | <ul style="list-style-type: none"> • Within 150m of a relic slip, 2:1, 3:1 slope AND sufficient reticulation capacity confirmed by Council. |

Place element selection

Parking and loading elements

| Indicators | x | ✓ | x | x | x | x | ✓ |
|--|-------------------------------|--------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------|-----------------------------|
| | Formal car parks | Informal car parks | Accessible parking | Bicycle parking facility | Charging for electric vehicles | Formal loading space | Layout of vehicle crossings |
| Residential: Medium density character/retirement (15-25dph) | Mandatory unless criteria met | Prohibited unless criteria met | Mandatory unless criteria met | Mandatory unless criteria met | Acceptable and preferred | Acceptable and preferred | Mandatory |

Parking and loading elements justification

| Element selected/not selected | Indicator | Justification |
|-------------------------------|--|--|
| Formal car parks | Residential: Medium density character/retirement (15-25dph) | <ul style="list-style-type: none"> Where no car parking is provided due to all public parking needs being met on private property. |
| Informal car parks | Residential: Medium density character/retirement (15-25dph) | <ul style="list-style-type: none"> Where an existing street corridor does not have enough space or an incompatible layout for formalised car parking bays. AND; Where expected parking demand is very low (less than 5 vehicles parked during peak hours). AND; Where providing informal parking opportunities would not likely result in vehicles parked on berms, footpaths or other areas due to physical constraints. |
| Accessible parking | Residential: Medium density character/retirement (15-25dph) | <ul style="list-style-type: none"> If the street is on a very steep gradient (steeper than 1:10). |
| Bicycle parking facility | Residential: Medium density character/retirement (15-25dph) | <ul style="list-style-type: none"> Where bicycle parking is provided within private property or other reserve (for example a garage or apartment complex or park). |

Walking elements

| Indicators | x | x | x |
|--|------------------------------|-------------------------------|--------------------------------|
| | Special footpath surfaces | Pedestrian crossing | Shelter for pedestrians |
| Residential: Medium density character/retirement (15-25dph) | Acceptable but not preferred | Mandatory unless criteria met | Prohibited unless criteria met |

Walking elements justification

| Element selected/not selected | Indicator | Justification |
|-------------------------------|--|--|
| Pedestrian crossing | Residential: Medium density character/retirement (15-25dph) | <ul style="list-style-type: none"> Local road |

Soft landscape elements

| Indicators | ✓ | x | x | x | x |
|--|-------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| | Street trees | Planting at intersections | Planting in berms | Planting within roundabouts | Planting within central medians |
| Road classification: Local road (through route) | Not Applicable | Prohibited unless criteria met | Prohibited unless criteria met | Prohibited unless criteria met | Prohibited unless criteria met |
| Residential: Medium density character/retirement (15-25dph) | Mandatory unless criteria met | Not Applicable | Not Applicable | Not Applicable | Not Applicable |

Hard landscape elements

| | | | | | |
|--|----------------------------------|--------------------------|-------------------------------|--|---|
| | ✗ | ✗ | ✓ | ✗ | ✗ |
| Indicators | Public drinking fountains | Public seating | Street furniture zone | High spec light poles and banners | Space for public artworks or sculptures or other cultural installation |
| Road classification: Local road (through route) | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Residential: Medium density character/retirement (15-25dph) | Prohibited unless criteria met | Acceptable and preferred | Mandatory unless criteria met | Prohibited unless criteria met | Acceptable but not preferred |

Resource recovery and waste elements

| | | |
|--|---------------------------------|------------------------------|
| | ✓ | ✗ |
| Indicators | Refuse collection points | Public rubbish bins |
| Residential: Medium density character/retirement (15-25dph) | Mandatory unless criteria met | Acceptable but not preferred |

Legibility elements

| | | |
|--|--|--|
| | ✓ | ✗ |
| Indicators | Street naming to reflect cultural context | Special signage and wayfinding elements |
| Residential: Medium density character/retirement (15-25dph) | Acceptable and preferred | Acceptable but not preferred |

Utility selection

Utility owned power

| Location | Selected | Desirability | Use restrictions |
|--|----------|----------------------------|---|
| Grass berm with other linear utilities. | ✓ | Acceptable and preferred | None |
| Planted berm with other linear utilities. | ✗ | Allowed with justification | In discussion and with written approval from TCC Parks and Recreation team and utility provider (including plant type). Planting not allowed that will impede access to and opening of the transformers and switch units. Will not impact on operating the equipment and will allow for safe egress in a fault situation e.g. switch failure/flashover. |
| Hard surfaced berm (including footpath or off-road cycle path). | ✗ | Allowed with justification | In discussion and with written approval from utility provider. Restrictions on surface type – only plain concrete (with frequent expansion joints), bitumen or pavers unless overlay triggers “special footpath surfaces”. |
| Indented car parking. | ✗ | Allowed with justification | In discussion and with written approval from utility provider. For high density developments consider future connections and maintenance requirements. Provide details/locations to utility provider for consideration during design. Utility may require ducting and spare ducts may be required. |
| Grass/planted berm, central median and roundabouts without linear utilities. | ✗ | Not applicable | None |
| Carriageway (including carriageway parking, cycle lanes and shared zones). | ✗ | Prohibited | None |
| Raingarden. | ✗ | Prohibited | None |
| Swale. | ✗ | Allowed with justification | In discussion and with written approval from utility provider. Depends on the location of the swale, not allowed in a central median swale. |
| Turning area in shared zone. | ✗ | Not applicable | None |
| On one side of the road only. | ✗ | Allowed with justification | In discussion and with written approval from utility provider. May be allowed where no more than two road crossings are required and the development cannot be extended in the future. |
| Public Parks and Reserves. | ✗ | Allowed with justification | In discussion and with written approval from TCC's Spaces and Places team even though this is the preferred option by the utility. An easement will be required. |
| Private property. | ✗ | Prohibited | None |

| Location | Selected | Desirability | Use restrictions |
|--|----------|----------------------------|--|
| Within zone of influence of retaining walls as defined in T1012 (under development). | X | Allowed with justification | In discussion and with written approval from utility provider. |

Utility owned communication

| Location | Selected | Desirability | Use restrictions |
|--|----------|----------------------------|---|
| Grass berm with other linear utilities. | ✓ | Acceptable and preferred | None |
| Planted berm with other linear utilities. | ✗ | Allowed with justification | In discussion and with written approval from TCC Parks and Recreation team. |
| Hard surfaced berm (including footpath or off-road cycle path). | ✗ | Allowed with justification | In discussion and with written approval from utility provider. Restrictions on surface type – only plain concrete (with frequent expansion joints), bitumen or pavers unless overlay triggers “special footpath surfaces”. |
| Indented car parking. | ✗ | Allowed with justification | No parking at customer connection points. Intermittent 2x2m grass spaces available. For high density developments consider future connections and maintenance requirements. In discussion and with written approval from the utility provider for low density developments. |
| Grass/planted berm, central median and roundabouts without linear utilities. | ✗ | Not Applicable | None |
| Carriageway (including carriageway parking, cycle lanes and shared zones). | ✗ | Prohibited | None |
| Raingarden. | ✗ | Prohibited | None |
| Swale. | ✗ | Prohibited | None |
| Turning area in shared zone. | ✗ | Not Applicable | None |
| On one side of the road only. | ✗ | Allowed with justification | Network deployment down one side of the road requires frequent road crossings to reach every lot/unit, this deployment is only appropriate when the total length of network (including road crossings) is significantly less than total length of network if it was deployed down both sides of the road. |
| Public Parks and Reserves. | ✗ | Allowed with justification | In discussion and with written approval from TCC's Spaces and Places team. An easement will be required. |
| Private property. | ✗ | Prohibited | None |
| Within zone of influence of retaining walls as defined in T1012 (under development). | ✗ | Allowed with justification | In discussion and with written approval from utility provider. |

Utility owned gas

| Location | Selected | Desirability | Use restrictions |
|--|----------|----------------------------|--|
| Grass berm with other linear utilities. | ✓ | Acceptable and preferred | None |
| Planted berm with other linear utilities. | ✗ | Allowed with justification | In discussion and with written approval from TCC Parks and Recreation and utility provider. |
| Hard surfaced berm (including footpath or off-road cycle path). | ✗ | Allowed with justification | In discussion and with written approval from utility provider. Restrictions on surface type – only plain concrete (with frequent expansion joints), bitumen or pavers unless overlay triggers “special footpath surfaces”. |
| Indented car parking. | ✗ | Allowed with justification | In discussion and with written approval from utility provider. For high density developments consider future connections and maintenance requirements. |
| Grass/planted berm, central median and roundabouts without linear utilities. | ✗ | Not Applicable | None |
| Carriageway (including carriageway parking, cycle lanes and shared zones). | ✗ | Prohibited | None |
| Raingarden. | ✗ | Prohibited | None |
| Swale. | ✗ | Prohibited | None |
| Turning area in shared zone. | ✗ | Not Applicable | None |
| On one side of the road only. | ✗ | Allowed with justification | In discussion and with written approval from utility provider. May be allowed where no more than two road crossings are required and the development cannot be extended in the future. |
| Public Parks and Reserves. | ✗ | Allowed with justification | In discussion and with written approval from TCC's Spaces and Places team. An easement will be required. |
| Private property. | ✗ | Prohibited | None |
| Within zone of influence of retaining walls as defined in T1012 (under development). | ✗ | Allowed with justification | In discussion and with written approval from utility provider. |

Utility owned water reticulation

| Location | Selected | Desirability | Use restrictions |
|--|----------|----------------------------|--|
| Grass berm with other linear utilities. | ✓ | Acceptable and preferred | None |
| Planted berm with other linear utilities. | ✗ | Allowed with justification | In discussion and with written approval from TCC Parks and Recreation team. |
| Hard surfaced berm (including footpath or off-road cycle path). | ✗ | Allowed with justification | In discussion and with written approval from utility provider. Restrictions on surface type – only plain concrete (with frequent expansion joints), bitumen or pavers unless overlay triggers “special footpath surfaces”. |
| Indented car parking. | ✗ | Prohibited | None |
| Grass/planted berm, central median and roundabouts without linear utilities. | ✗ | Not Applicable | None |
| Carriageway (including carriageway parking, cycle lanes and shared zones). | ✗ | Prohibited | None |
| Raingarden. | ✗ | Prohibited | None |
| Swale. | ✗ | Prohibited | None |
| Turning area in shared zone. | ✗ | Not Applicable | None |
| On one side of the road only. | ✗ | Prohibited | None |
| Public Parks and Reserves. | ✗ | Allowed with justification | In discussion and with written approval from TCC's Spaces and Places team. An easement will be required. |
| Private property. | ✗ | Prohibited | None |
| Within zone of influence of retaining walls as defined in T1012 (under development). | ✗ | Allowed with justification | Specific engineering design required to enable ongoing maintenance and renewal and to protect wall against pipe burst. |

No bulk water utility

Subdivision fed off of rider main

Utility owned streetlights

| Location | Selected | Desirability | Use restrictions |
|--|----------|----------------------------|---|
| Grass berm with other linear utilities. | X | Allowed with justification | Circumstance where this may be allowed: Adequate separation distances provided. |
| Planted berm with other linear utilities. | X | Allowed with justification | In discussion and with written approval from TCC Parks and Recreation team. Circumstance where this may be allowed: Adequate separation distances provided between streetlight and utility. |
| Hard surfaced berm (including footpath or off-road cycle path). | X | Allowed with justification | Circumstance where this may be allowed: Adequate footpath width around streetlight. |
| Indented car parking. | X | Allowed with justification | Circumstance where this may be allowed: A vehicle manoeuvring assessment will be provided. The clearance envelope between vehicle body and light columns are a minimum of 600mm. |
| Grass/planted berm, central median and roundabouts without linear utilities. | X | Acceptable and preferred | None |
| Carriageway (including carriageway parking, cycle lanes and shared zones). | X | Prohibited | None |
| Raingarden. | X | Allowed with justification | Circumstance where this may be allowed : Special corrosion protection and foundation design required. |
| Swale. | X | Allowed with justification | Circumstance where this may be allowed : Special corrosion protection and foundation design required. |
| Turning area in shared zone. | X | Not Applicable | None |
| On one side of the road only. | ✓ | Acceptable and preferred | None |
| Public Parks and Reserves. | X | Not Applicable | None |
| Private property. | X | Prohibited | None |
| Within zone of influence of retaining walls as defined in T1012 (under development). | X | Allowed with justification | In discussion and with written approval from Power utility provider. |

Utility owned stormwater

| Location | Selected | Desirability | Use restrictions |
|--|----------|------------------------------|--|
| Grass berm with other linear utilities. | X | Acceptable and preferred | None |
| Planted berm with other linear utilities. | X | Allowed with justification | In discussion and with written approval from TCC Parks and Recreation team. |
| Hard surfaced berm (including footpath or off-road cycle path). | X | Acceptable and preferred | None |
| Indented car parking. | X | Allowed with justification | Circumstance where this may be allowed: There are no trees in this corridor. |
| Grass/planted berm, central median and roundabouts without linear utilities. | X | Not Applicable | None |
| Carriageway (including carriageway parking, cycle lanes and shared zones). | ✓ | Acceptable and preferred | None |
| Raingarden. | X | Acceptable but not preferred | None |
| Swale. | X | Acceptable but not preferred | None |
| Turning area in shared zone. | X | Not Applicable | None |
| On one side of the road only. | X | Acceptable and preferred | None |
| Public Parks and Reserves. | X | Allowed with justification | In discussion and with written approval from TCC's Spaces and Places team even though this is the preferred option by the utility. An easement will be required. |
| Private property. | X | Allowed with justification | Circumstance where this may be allowed: Access will be provided. Easements required. |
| Within zone of influence of retaining walls as defined in T1012 (under development). | X | Prohibited | None |

Utility owned wastewater reticulation

| Location | Selected | Desirability | Use restrictions |
|--|----------|----------------------------|--|
| Grass berm with other linear utilities. | ✓ | Acceptable and preferred | None |
| Planted berm with other linear utilities. | ✗ | Allowed with justification | In discussion and with written approval from TCC Parks and Recreation team. |
| Hard surfaced berm (including footpath or off-road cycle path). | ✗ | Acceptable and preferred | None |
| Indented car parking. | ✗ | Allowed with justification | Circumstance where this may be allowed: There are no trees in this corridor. |
| Grass/planted berm, central median and roundabouts without linear utilities. | ✗ | Not Applicable | None |
| Carriageway (including carriageway parking, cycle lanes and shared zones). | ✗ | Acceptable and preferred | None |
| Raingarden. | ✗ | Prohibited | None |
| Swale. | ✗ | Prohibited | None |
| Turning area in shared zone. | ✗ | Not Applicable | None |
| On one side of the road only. | ✗ | Acceptable and preferred | None |
| Public Parks and Reserves. | ✗ | Allowed with justification | In discussion and with written approval from TCC's Spaces and Places team even though this is the preferred option by the utility. An easement will be required. |
| Private property. | ✗ | Allowed with justification | Circumstance where this may be allowed: Access will be provided. Easements required. |
| Within zone of influence of retaining walls as defined in T1012 (under development). | ✗ | Prohibited | None |

Council owned street trees

| Location | Selected | Desirability | Use restrictions |
|--|----------|------------------------------|--|
| Grass berm with other linear utilities. | X | Prohibited | None |
| Planted berm with other linear utilities. | X | Prohibited | None |
| Hard surfaced berm (including footpath or off-road cycle path). | X | Allowed with justification | Circumstance where this may be allowed: Adequate footpath width around tree. |
| Indented car parking. | X | Allowed with justification | Circumstance where this may be allowed : Adequate berm width available and adequate clearance from car parking. Appropriate tree species will be selected. |
| Grass/planted berm, central median and roundabouts without linear utilities. | ✓ | Acceptable and preferred | None |
| Carriageway (including carriageway parking, cycle lanes and shared zones). | X | Allowed with justification | Circumstance where this may be allowed: Tree pits provided in parking lane. |
| Raingarden. | X | Prohibited | None |
| Swale. | X | Allowed with justification | Circumstance where this may be allowed: Adequate capacity in swale remains. |
| Turning area in shared zone. | X | Not Applicable | None |
| On one side of the road only. | X | Acceptable but not preferred | None |
| Public Parks and Reserves. | X | Not Applicable | None |
| Private property. | X | Not Applicable | None |
| Within zone of influence of retaining walls as defined in T1012 (under development). | X | Allowed with justification | The tree is located below the wall only and specific design required to ensure the tree will not affect the retaining wall. |

Element/utility selection summary

Link elements

Movement lane elements

- One lane in each direction, with centreline

Driving elements

- Wider lane for truck or bus (overwidth lane)

Walking elements

- Footpath on both sides of the street

Cycling elements

- Combined pedestrian and cycle path

Bus elements

- Bus stop with shelter

Traffic calming elements

- Traffic calming

Vehicle design speed

- 50km/h

Stormwater elements

- Overland flow path along kerb and channel

Place elements

Parking and loading elements

- Informal car parks
- Layout of vehicle crossings

Walking elements (no selected elements)

Soft landscape elements

- Street trees

Hard landscape elements

- Street furniture zone

Resource recovery and waste elements

- Refuse collection points

Legibility elements

- Street naming to reflect cultural context

Utilities


- Utility owned power
- Utility owned communication
- Utility owned gas
- Utility owned water reticulation
- No bulk water utility
- Utility owned streetlights
- Utility owned stormwater
- Utility owned wastewater reticulation
- Council owned street trees

C

Appendix C – MCA Full Output

D

Appendix D – MCA Sensitivity Test

A large, white, stylized letter 'E' is centered on a teal background. The letter is composed of thick, solid lines and has a modern, sans-serif appearance.

Appendix E – Concept Design Drawings

Ohauti Access Assessment

Civil

Prepared for Tauranga City Council
 Prepared by Beca Limited (Beca Ltd)
 At: Beca Tauranga

Project No.: 4289820
 11 June 2021
 For Concept

DRAWING LIST

| DRAWING No. | DRAWING TITLE |
|----------------|--|
| 4289820-CA-001 | EXISTING SERVICES – LAYOUT PLAN |
| 4289820-CA-002 | PROPOSED SERVICES – LAYOUT PLAN |
| 4289820-CA-003 | PROPOSED ACCESSWAY – PLAN AND LONG SECTION |
| 4289820-CA-004 | PROPOSED ACCESSWAY – CROSS SECTIONS |



**make
 everyday
 better.**



LEGEND

| EXISTING SERVICES: | |
|--------------------|-------------------------------|
| — W — W | WATER |
| — SS — SS | SANITARY SEWER |
| — SW — SW | STORMWATER |
| — T — T | COMMUNICATIONS |
| — E — E | POWER |
| — G — G | GAS |
| —> —> | OVERLAND FLOW PATH |
| - - - - - | PROPOSED DEVELOPMENT BOUNDARY |

NOTES:

1. NOT ALL SERVICES ARE SHOWN. DATA HAS BEEN OBTAINED FROM BEFOREUDIG AND TAURANGA CITY COUNCIL MAPI IN MARCH/APRIL 2021.
2. THE PROPOSED HIGH-LEVEL CONCEPT IS INDICATIVE ONLY AND IS FOR THE PURPOSE OF REPORTING ON THE SELECTED OPTION FROM THE MCA. THE EXACT LOCATION AND EXTENT IS SUBJECT TO CHANGE DURING DEVELOPED DESIGN.
3. THE ACCURACY OF THE BOUNDARIES, SURFACE, STATED DIMENSIONS AND QUANTITIES ARE TO BE CONFIRMED SUBJECT TO TOPOGRAPHIC AND CADASTRAL SURVEYS.
4. AS FAR AS PRACTICAL THE DESIGN STANDARDS ADOPTED ARE IN ACCORDANCE WITH THE TAURANGA CITY COUNCIL IDC, AUSTRROADS AND NEW ZEALAND STANDARDS. THE DEPARTURES TO THE STANDARDS HAVE BEEN LISTED IN THE REPORT.
5. ALL SERVICES AND ROAD TIE LOCATIONS ARE CURRENTLY SHOWN AS INDICATIVE ONLY. THE EXACT LOCATIONS ARE TO BE CONFIRMED IN SUBSEQUENT DESIGN STAGES.
6. FURTHER SITE INVESTIGATIONS WILL BE REQUIRED TO:
 - 6.1. IDENTIFY PHYSICAL LOCATION OF EXISTING SERVICES
 - 6.2. GEOTECHNICAL TESTING
7. ALL LANDSCAPED/PLANTED AREAS ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. LANDSCAPING DESIGN TO BE UNDERTAKEN AT SUBSEQUENT DESIGN STAGES.

**CONCEPT DESIGN
NOT FOR CONSTRUCTION**

| No. | Revision | By | Chk | Appd | Date |
|-----|-------------|-----|-----|------|----------|
| A | FOR CONCEPT | TCV | KNW | JVZ | 11.06.21 |

| Original Scale (A1) | Design | TCV | 12.05.21 | Approved For Construction* |
|---------------------|--------------|-----|----------|----------------------------|
| 1:1000 | Drawn | TCV | 11.06.21 | |
| Reduced Scale (A3) | Dwg Verifier | JVZ | 11.06.21 | |
| 1:2000 | Dwg Check | JVZ | 11.06.21 | |

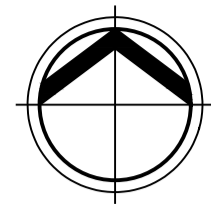
* Refer to Revision 1 for Original Signature



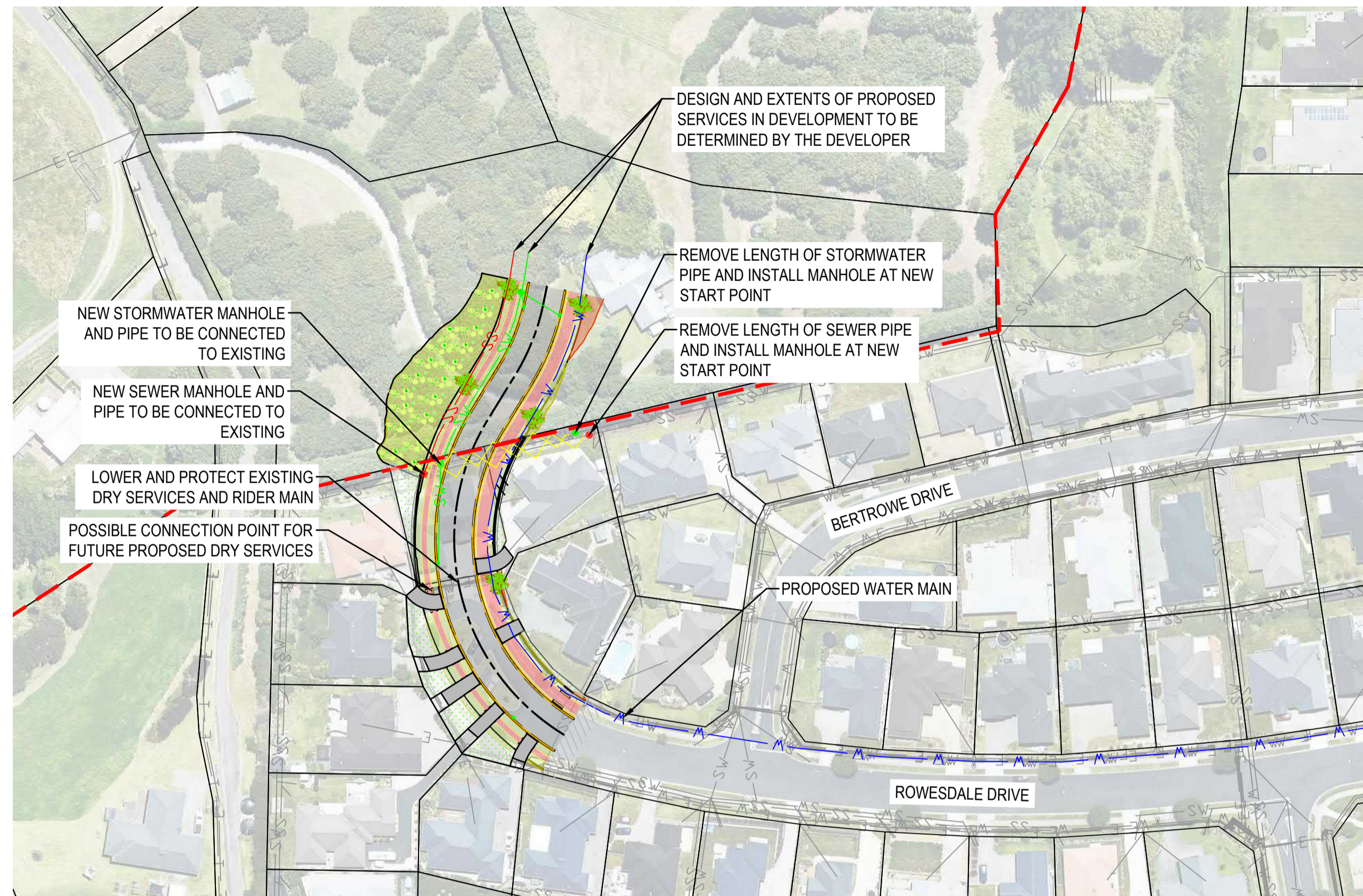
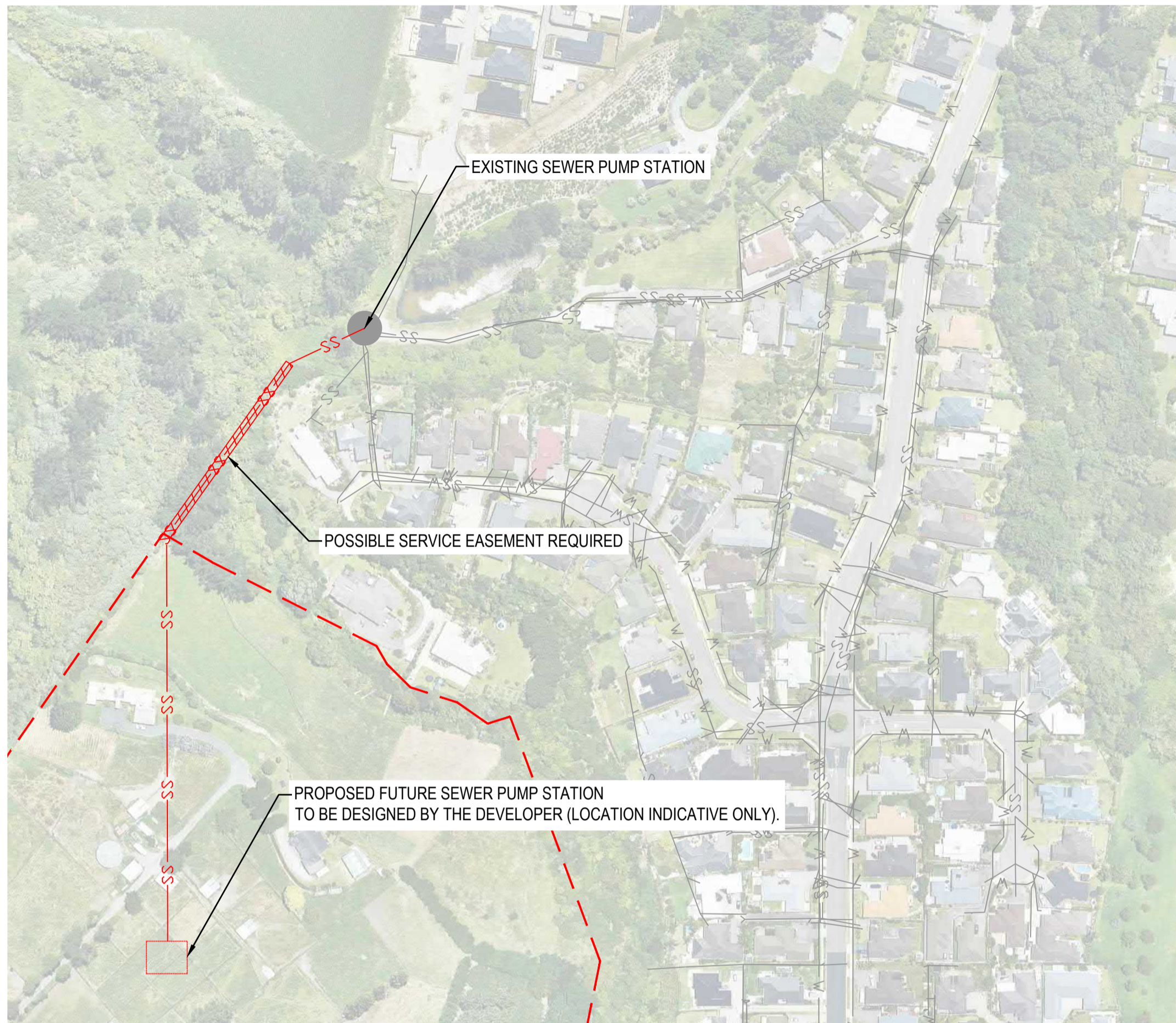
Client: **OHAUITI SITE ACCESS ASSESSMENT**

Title: **EXISTING SERVICES LAYOUT PLAN**

| | |
|-------------|-----------------------|
| Discipline | CIVIL |
| Drawing No. | 4289820-CA-001 |
| Rev. | A |



| LEGEND | | |
|---------------------------|---------------------|--|
| EXISTING SERVICES: | | |
| — W — W — | WATER | |
| — SS — | SANITARY SEWER | |
| — SW — | STORMWATER | |
| — T — T — | COMMUNICATIONS | |
| — E — E — | LOW-VOLTAGE POWER | |
| — G — G — | GAS | |
| PROPOSED SERVICES: | | |
| — W — W — | WATER | |
| — SS — | SANITARY SEWER | |
| — SW — | STORMWATER | |
| ● | SEWER MANHOLE | |
| ● | STORMWATER MANHOLE | |
| ● | STORMWATER CATCHPIT | |



NOTES:
1. REFER DRAWING CA-001

CONCEPT DESIGN
NOT FOR CONSTRUCTION

| No. | Revision | By | Chk | Appd | Date |
|-----|-------------|-----|-----|------|----------|
| 0 | FOR CONCEPT | TCV | KNW | JVZ | 11.06.21 |

| Original Scale (A1) | Design Drawn | TCV | 12.05.21 | Approved For Construction* |
|---------------------|--------------|--------------------------------------|------------------------|----------------------------|
| Reduced Scale (A3) | Dwg Verifier | JVZ <td>11.06.21 <td>Date</td> </td> | 11.06.21 <td>Date</td> | Date |



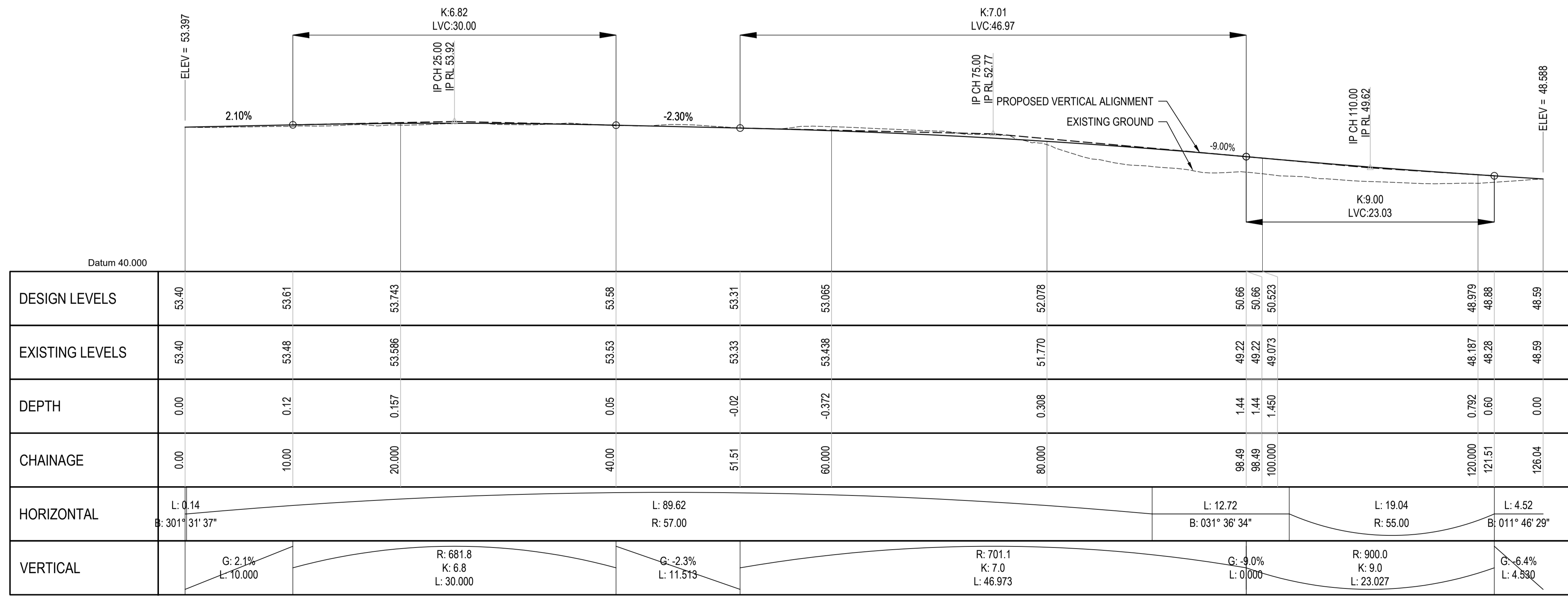
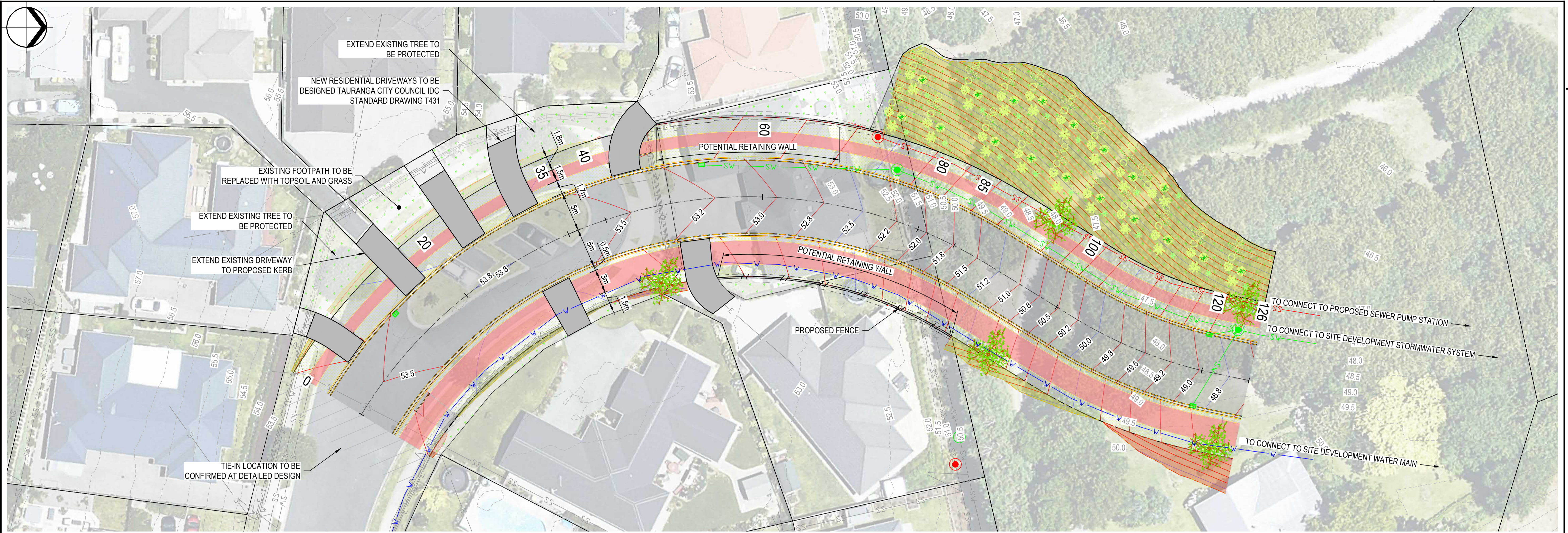
Client:



Project: **OHAUITI SITE ACCESS ASSESSMENT**

Title: **PROPOSED SERVICES LAYOUT PLAN**

| | |
|-------------|--------------------------|
| Discipline | CIVIL ENGINEERING |
| Drawing No. | 4289820-CE-002 |
| Rev. | 0 |



LEGEND:

- CUT
- FILL
- GRASS / VEGETATION
- DRIVEWAY
- FOOTPATH

NOTES:
1. REFER DRAWING CA-001

CONCEPT DESIGN
NOT FOR CONSTRUCTION

| No. | Revision | By | Chk | Appd | Date |
|-----|-------------|-----|-----|------|----------|
| A | FOR CONCEPT | JSD | KNW | JVZ | 11.06.21 |

| Original Scale (A1) | Design | Drawn | Date | Approved For Construction* |
|--|--------|-------|----------|----------------------------|
| 1:250 | JSD | JSD | 12.05.21 | 04.06.21 |
| Reduced Scale (A3) <td>JVZ</td> <td>JVZ</td> <td>11.06.21</td> <td>11.06.21</td> | JVZ | JVZ | 11.06.21 | 11.06.21 |
| 1:500 | JVZ | JVZ | 11.06.21 | 11.06.21 |

* Refer to Revision 1 for Original Signature



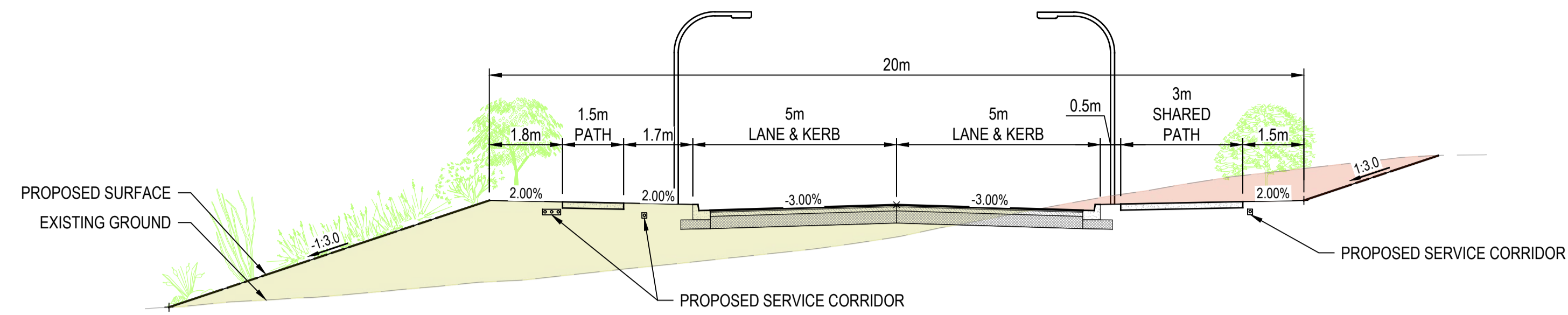
Client: **OHAUITI SITE ACCESS ASSESSMENT**

Title: **PROPOSED ACCESSWAY PLAN AND LONG SECTION**

| Discipline | CIVIL |
|-------------|----------------|
| Drawing No. | 4289820-CA-003 |
| Rev. | A |

LEGEND:

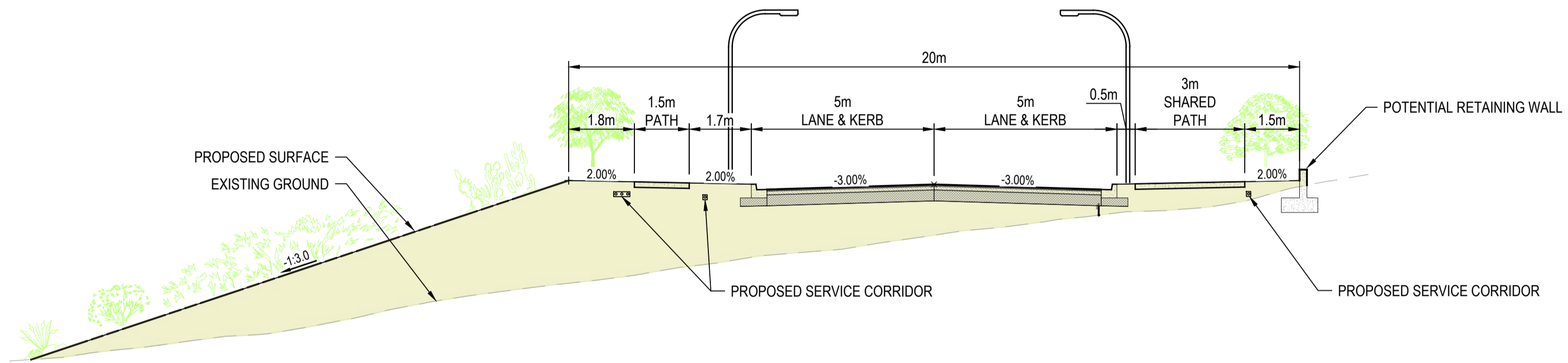
| | |
|--|------|
| | CUT |
| | FILL |



Datum: 45.000

| | | | | | | | | | | | | | | | | | | |
|------------------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| OFFSETS | -17.874 | -14.000 | -10.005 | -5.178 | -0.205 | 7.513 | 6.705 | -5.922 | -4.575 | 0.000 | 4.575 | 5.240 | 6.886 | 8.506 | 9.205 | 10.005 | 11.479 | 13.300 |
| PROPOSED LEVELS | 46.46 | 47.74 | 49.09 | 49.07 | 49.05 | 48.04 | 48.02 | 49.00 | 48.84 | 48.98 | 48.84 | 48.99 | 49.02 | 49.06 | 49.07 | 49.09 | 49.58 | 50.18 |
| EXISTING LEVELS | 46.664 | 46.727 | 47.089 | 47.131 | 47.236 | 47.312 | 47.400 | 47.479 | 47.621 | 47.981 | 48.188 | 48.331 | 48.454 | 48.597 | 48.777 | 48.988 | 50.033 | 50.190 |
| LEVEL DIFFERENCE | -0.001 | 1.009 | 1.997 | 1.939 | 1.814 | 1.725 | 1.620 | 1.525 | 1.220 | 0.791 | 0.791 | 0.225 | 0.225 | 0.431 | 0.301 | 0.112 | 0.446 | 0.006 |

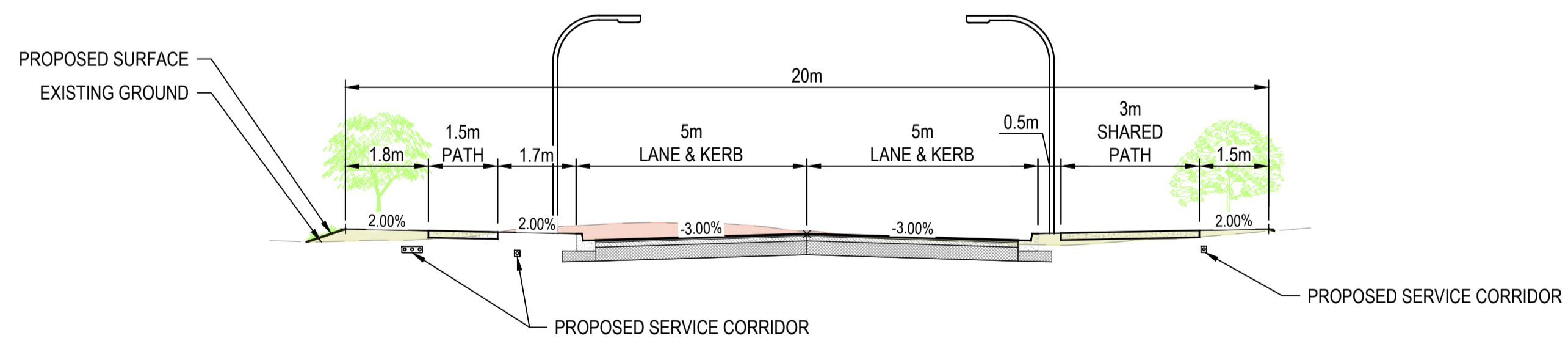
CH: 120.00



Datum: 45.000

| | | | | | | | | | | | | | | | |
|------------------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| OFFSETS | -24.719 | -14.909 | -10.004 | -3.204 | -7.625 | -6.704 | -6.047 | -4.575 | 0.000 | 4.575 | 5.319 | 7.419 | 8.596 | 9.453 | 10.006 |
| PROPOSED LEVELS | 46.84 | 50.21 | 51.85 | 51.81 | 51.80 | 51.78 | 51.77 | 51.80 | 51.74 | 51.80 | 51.76 | 51.80 | 51.82 | 51.84 | 52.15 |
| EXISTING LEVELS | 46.845 | 48.309 | 49.006 | 49.254 | 49.355 | 49.498 | 49.578 | 49.800 | 50.352 | 50.909 | 50.996 | 51.111 | 51.235 | 51.549 | 51.683 |
| LEVEL DIFFERENCE | -0.001 | 1.902 | 2.815 | 2.726 | 2.447 | 2.285 | 2.192 | 1.984 | 1.390 | 0.891 | 0.769 | 0.689 | 0.587 | 0.295 | 0.472 |

CH: 85.00



Datum: 50.000

| | | | | | | | | | | | | | | | | |
|------------------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| OFFSETS | -10.841 | -10.004 | -9.263 | -8.204 | -7.598 | -6.704 | -6.044 | -4.575 | 0.000 | 4.575 | 5.209 | 6.759 | 8.596 | 9.122 | 10.006 | 10.121 |
| PROPOSED LEVELS | 53.50 | 53.78 | 53.77 | 53.74 | 53.73 | 53.71 | 53.70 | 53.74 | 53.67 | 53.54 | 53.68 | 53.72 | 53.75 | 53.76 | 53.78 | 53.74 |
| EXISTING LEVELS | 53.501 | 53.518 | 53.541 | 53.563 | 53.595 | 53.711 | 53.734 | 53.794 | 53.738 | 53.504 | 53.526 | 53.594 | 53.606 | 53.660 | 53.734 | 53.742 |
| LEVEL DIFFERENCE | 0.001 | 0.283 | 0.225 | 0.181 | 0.137 | 0.044 | -0.034 | -0.337 | -0.065 | 0.080 | 0.249 | 0.212 | 0.144 | 0.102 | 0.046 | 0.001 |

CH: 35.00

- NOTES:**
1. THE EXISTING ROAD RESERVE WIDTH ALONG ROWESDALE DRIVE RANGES BETWEEN 21 - 26 METRES.

**CONCEPT DESIGN
NOT FOR CONSTRUCTION**

| | | | | | |
|-----|-------------|----|-----|------|----------|
| No. | Revision | By | Chk | Appd | Date |
| A | FOR CONCEPT | BH | KNW | JVZ | 11.06.21 |

| | | | | |
|---------------------|-----------------|-----|----------|----------------------------|
| Original Scale (A1) | Design | JSD | 12.05.21 | Approved For Construction* |
| 1:100 | Drawn | BH | 01.06.21 | |
| Reduced Scale (A3) | Design Verifier | JVZ | 11.06.21 | |
| 1:200 | Design Check | JVZ | 11.06.21 | |

* Refer to Revision 1 for Original Signature



Client: **OHAUTI SITE ACCESS ASSESSMENT**

Title: **PROPOSED ACCESSWAY CROSS SECTIONS**

| | |
|-------------|----------------|
| Discipline | CIVIL |
| Drawing No. | 4289820-CA-004 |
| Rev. | A |