C

Appendix C - Consideration of Alternatives Report

Contents

Appendices

Rotokauri Structure Plan – Context for Network Route Protection

Rotokauri is situated in the northwest of Hamilton as shown in **Figure 1** below. Rotokauri is identified as one of four areas of future growth for Hamilton City. Future growth has been earmarked for the Rotokauri area since 1989. Since 2005 the area has been identified as a 'structure plan area', with the Rotokauri Structure Plan (RSP) notation in the Hamilton City District Plan (HCDP). Hamilton's Urban Growth Strategy (2023) identifies the Rotokauri area as one of the future neighbourhood development areas for the City.

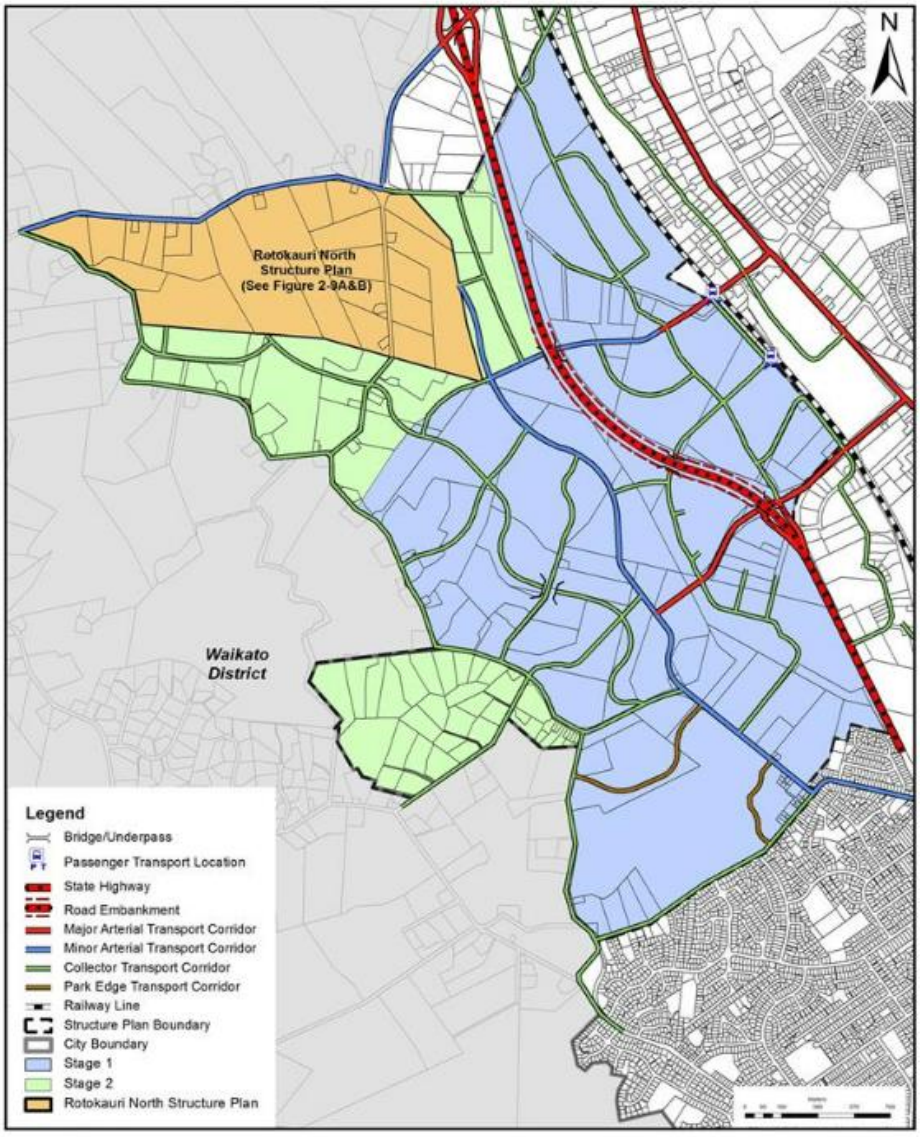


Figure 1: Rotokauri Structure Plan Transportation Network (Source: HCDP)

The RSP is a strategically important planning instrument undertaken via a comprehensive RMA process that is the precursor to this NoR. Structure planning sets out the framework for development suitability having regard to; land use constraints and opportunities; transportation network connection requirements; indicative open space areas; and major infrastructure needed to enable the development of an identified growth area.

The RSP aligns with the growth planning outlined in the Hamilton Urban Growth Strategy and the Waikato Regional Policy Statement and Proposed Change 1 – NPS-UD 2020 and Future Proof Strategy update as discussed in Section 9 – Statutory Assessment.

The RSP provides for the development of Rotokauri in two stages. Stage 1 of Rotokauri was identified for development immediately, while Stage 2 would be developed at a future date. The key timeline in relation to significant aspects is included as **Figure 2** below.

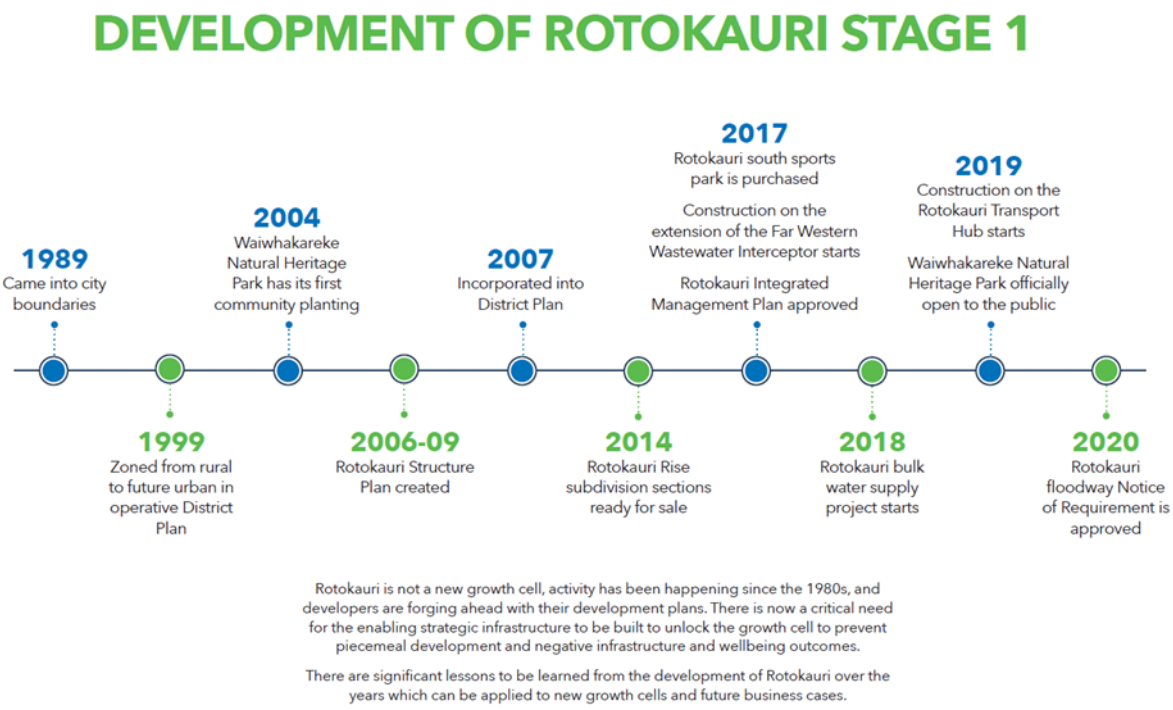


Figure 2: Rotokauri Stage 1 Timeline

The following RSP Road and Transport principles influenced the various transport options considered.

- Serviceability of land within the Structure Plan area;
- Connectivity with the existing road network (internal and external);
- Integrated network (walking, cycling, public transport and infrastructure);
- Segregation of industrial/commercial/residential traffic;
- Permeability and accessibility within and between development and other land uses, especially key community facilities and services (e.g. recreation reserves, retail education, public transport node, Hamilton Zoo) and employment areas within and adjacent to the area;
- Efficiency (hierarchy of routes, direct routing for key links);
- Effective use of land (integrated management e.g., co-ordinating transport corridors with other infrastructure, traffic calming in local areas, implications for development and construction cost);
- Deliverability.

Key transport corridors provide an efficient connection into existing Hamilton City Council (HCC) strategic transport network as illustrated in the Transport Hierarchy Plan in **Figure 3** below.

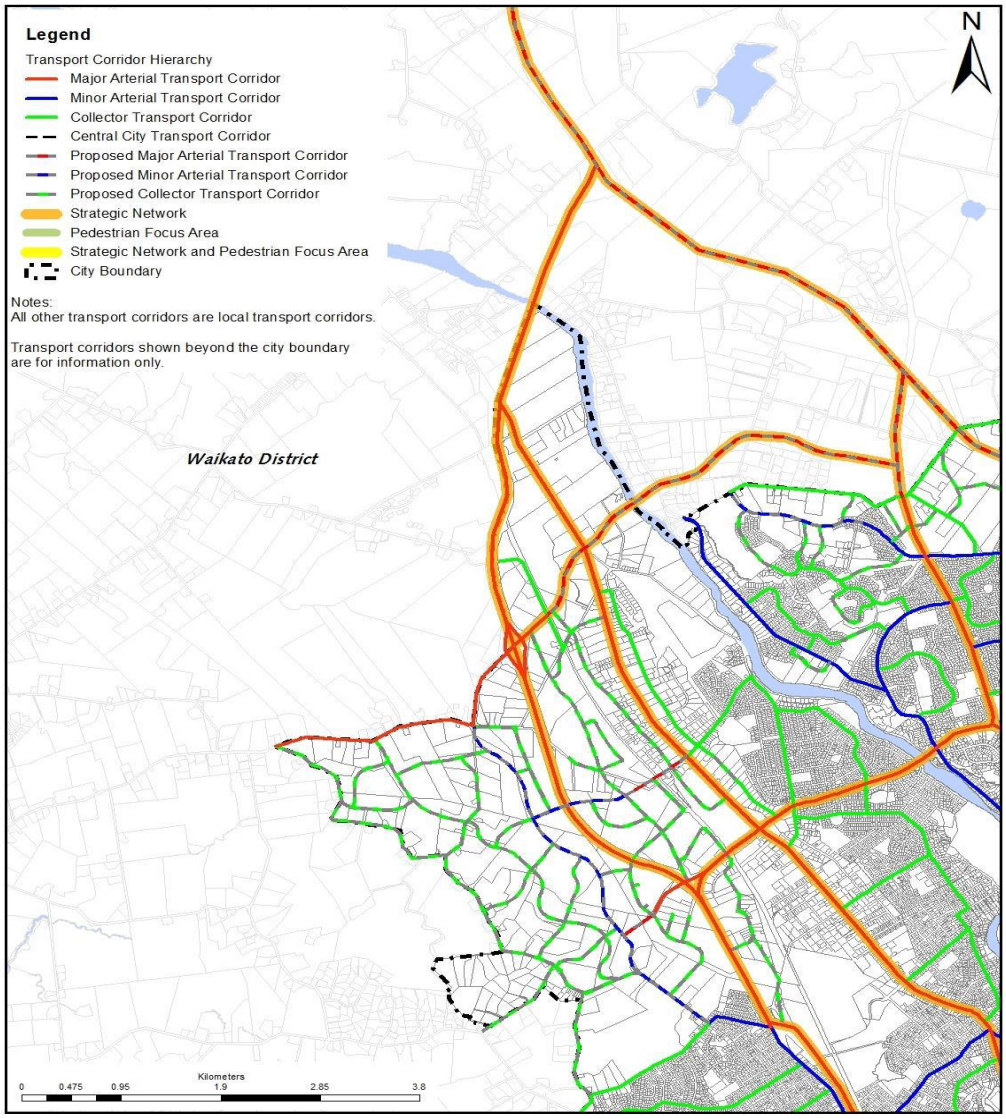


Figure 3: Transport hierarchy plan amended as part of the RSP. (Source: HCDP)

The HCDP definitions of the primary RSP corridors are as follows:

- A **'major arterial'** transport corridor's principal function is the movement of significant levels of goods and people between parts of the city and beyond. Inter- and intra-city heavy freight and through traffic should generally be directed to these corridors. This classification includes all corridors managed as Motorway or Expressway by the New Zealand Transport Agency. Property access is either non-existent or heavily controlled. Inter-city passenger transport services are expected to use these routes. Intra-city passenger transport services may traverse these routes.
- A **'minor arterial'** transport corridor's principal function is the movement of high levels of goods and people between parts of the city. Heavy freight distributing goods to parts of the city may use these corridors. Through-traffic moving between parts of the city may use these corridors. Property access is managed. Intra-city passenger transport services are likely to use these routes.
- A **'collector'** transport corridor performs both a movement and property access function. These transport corridors often move goods and people between local destinations or to higher order transport corridors for further travel. Property access is provided with few restrictions. Depending on the land use environment heavy freight and through traffic may be limited on these corridors. Intra-city passenger transport services are likely to use these routes.

Identification of constraints - Reaffirming Network Routes

Land use planning within the area has taken account of the RSP and urbanisation largely reflects this framework. The consideration of alternative 'sites, routes or methods of undertaking the work' commenced in late 2019 and continued until June 2023. As illustrated in **Figure 4**, this process consisted of:

- retesting the appropriateness of the existing RSP layout including an update of potential constraints,
- developing the Urban and Landscape Design Framework,
- the preparation of a draft Detailed Business Case for the Rotokauri Arterial Network assessing a long list of 14 options, culminating in a preferred option,
- developing a concept design for engaging with landowners and key stakeholders, exploring alternative options and refining the design for specific landowners.

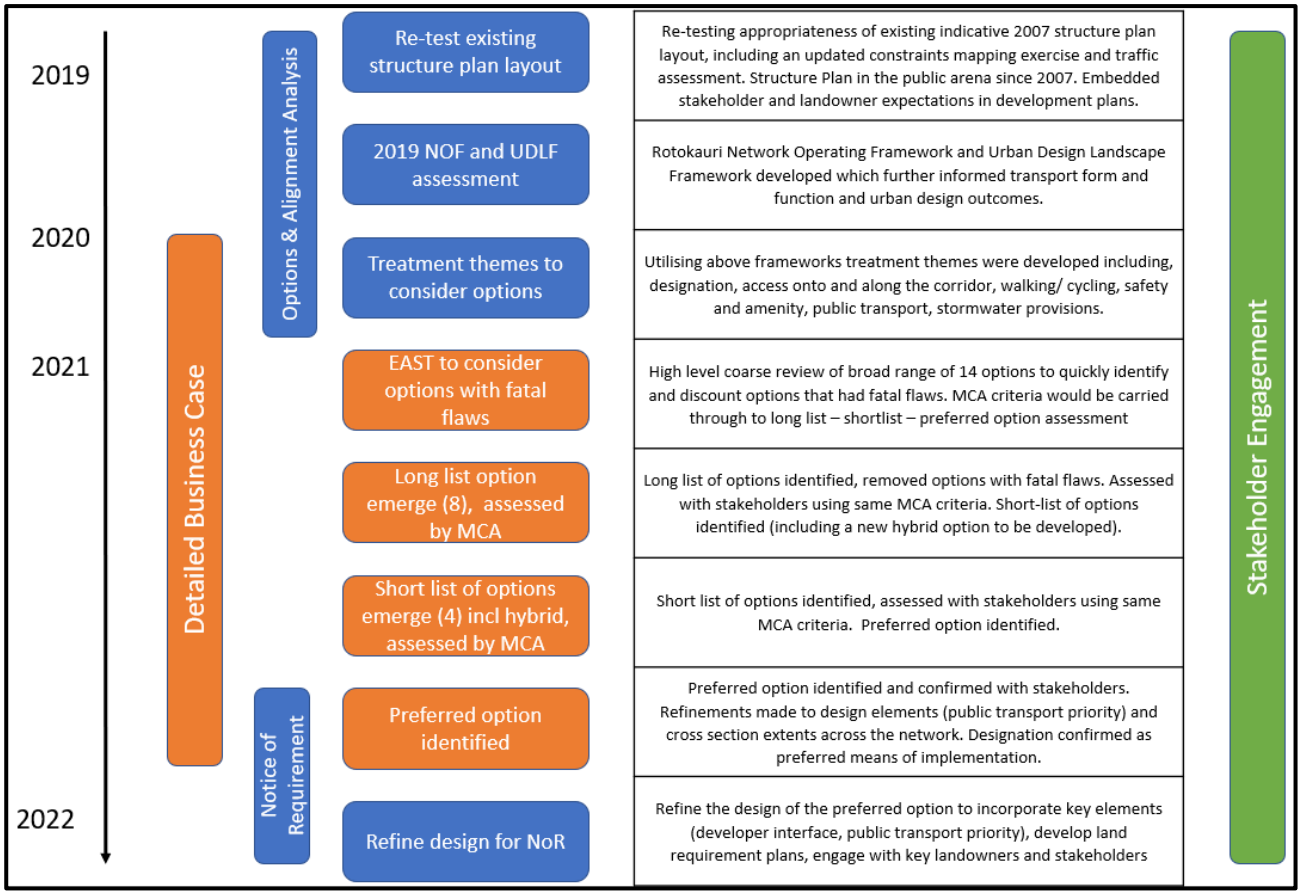


Figure 4: Overview of NoR / Draft DBC process

Considering the arterial network established by the RSP, a series of field investigations, site visits and assessments in relation to Ecology, Wetland assessments, Archaeology, Geotechnical, Environmental (Contaminated Soils), Stormwater Landscape and Noise were undertaken. These assessments confirmed there were no additional or new features/constraints that would warrant a change to the existing RSP transportation network. HCC is satisfied that the transport network indicated in the RSP is not fatally flawed, and no further consideration of alternative alignments was undertaken.

Other constraints identified during this process are described below:

Geotechnical constraints

At the base of the ridgelines the underlying soils change and become limiting closer to the SH1C corridor. These lower lying sections are formally swamp areas which are more heavily influenced by waterlogging and there are deep peats and moderate density waterlogged silts and sands in the lower areas. While localised improvements can be achieved through engineering design, this is a limitation for the networks which often include lineal horizontal infrastructure that is potentially more affected by differential settlements. Consequently, the alignment of the north-south arterial connection follows the area nearer the base of the higher topography (ridgeline fingers) which extend from Exelby Road and Burbush Road. This area is considered advantageous from a construction perspective and whilst pockets of peat may be encountered these are generally less than 1.5m below ground level in these central areas. The RSP network avoids the steeper topography to minimise earthworks.

Lower areas of Rotokauri where pockets of peat are identified are considered more suitable for proposed land uses such as the Rotokauri Greenway and stormwater management and artificial wetland basins.

Transportation network constraints

The extent and capacity of existing transportation connections within the Rotokauri area would not support the level of growth anticipated by the RSP, as such a new network has formed part of the planning for the RSP to accommodate the future traffic volumes.

The RSP vision is *"The sustainable expansion of the City into Rotokauri, through a coherent, integrated and people-focused mixed-use development based on best practice urban design principles".*

Initial traffic modelling for the RSP was undertaken jointly with Transit New Zealand (now Waka Kotahi) and Waikato District Council to provide an integrated approach to traffic issues within the Northern growth corridor. This has helped to determine the capacity of the existing network and the sequence of new and improved roads required to facilitate further development. Modelling of the proposed network on which the RSP was based considered the proposed network to be suitable to support the proposed landuse and future development.

Passenger Transport aspects for the RSP reviewed the suitability of the proposed transport network to support public transport services. The key report to support this assessment is the Parsons Brinckerhoff Report "PT Review of Rotokauri Structure Plan." August 2007. Provision has been made for public transport in the southeastern node with the location of the Rotokauri transportation hub located immediately adjacent to the rail. The key network allows for connection to this facility.

The RSP was developed to consider the distance and time travelled with the intention of reducing the use of private motor vehicles for shorter trips. The topography is well suited to connect walking and cycling networks to other corridors such as the Greenway and Te Rapa Bypass.

The RSP reflects the road hierarchy that was established with Waka Kotahi during the design of the Te Rapa section of the Waikato Expressway. Three fixed east-west corridors underneath the Te Rapa Bypass connect the RSP into the HCC major arterial network. The development of the local transport network was the pre-cursor to Rotokauri Stage 1 industrial development, which is now largely completed or consented.

As the RSP develops, the east-west corridors enable access to deliver the north-south minor arterial over a series of stages to meet demand.

Utilities and Services

The RSP provides for co-location of primary infrastructure networks with the transportation corridors to minimise land required for these publicly controlled network utilities. Three waters infrastructure is currently available at the edges of Rotokauri and will be progressively expanded into Rotokauri as the area urbanises.

A combination of existing strategic infrastructure with additional investment proposed by HCC results in the necessary infrastructure being available by 2030 for the development community to progress Rotokauri Stage 1. HCC has completed the far western interceptor which provides strategic wastewater infrastructure for the RSP and western catchments. This is located in Te Kowhai East Road and Te Wetini Drive extension.

The development of the designated Greenway stormwater management corridor is a necessary pre-cursor service the Rotokauri Arterial network and urbanisation The Greenway corridor generally follows the existing Rotokauri drain and connects to Lake Rotokauri. Stormwater management within the RSP will use best practice design approaches to minimise the effects of urbanisation on the downstream receiving catchments.

Grade Separation

Early consideration was given to the grade separation of transport modes such as roading hierarchies, separation of pedestrians/ cycling functions and grade separation from the North Island Main Trunk Railway (NIMTR). These were also considered as part of the Early Assessment Sifting Tool (EAST) during the Detailed Business Case and were not continued as viable options.

Grade separation for State Highway 1C was achieved as part of the RSP when SH1 was moved west from Te Rapa Road. Waka Kotahi and HCC collaborated to create the RSP local road underpasses. This minimises any potential modal shift barriers and enables the east-west movement of pedestrians, cyclists and passenger transport at ground level. The Project incorporates these as fixed points on the network.

Future traffic modelling indicates the volumes expected on the minor arterial are appropriate for at-grade signalised intersections.

To promote modal shift and provide for safe well designed alternative active modes, the decision was taken to create separated walking and cycling facilities throughout much of the network. Provision for safe crossings at intersections was also considered within the design. Grade separation of these facilities was discounted and not considered necessary in the context of the Project.

Te Kowhai East Road NIMTR crossing is an at-grade two-lane level crossing. A Deed of Grant between HCC and KiwiRail provides for the future upgrading of the level crossing to an at-grade four-laned level crossing. During the RSP Stage 1 industrial land subdivision, HCC secured land along the frontage of Te Kowhai East Road properties to the east of SH1C for this future road widening.

Grade separation of Te Kowhai East Road over the NIMTR was discounted early due to the proximity of Tasman Road and availability of land beyond the existing corridor. Land acquisition would significantly impact access to and use of adjacent land. The extent of land use adjacent to the Te Kowhai East Road makes it difficult to accommodate the change in vertical grade and associated fill embankments required to grade separate Te Kowhai East Road over the NIMTR. An underpass under the NIMTR was discounted early due to geotechnical constraints and a high groundwater table.

Fixed existing network connections

Several fixed connection points/constraints have developed around the Rotokauri Arterial Network since the RSP became operative. These include:

- The construction of the Te Rapa Section of the Waikato Expressway with three grade-separated underpasses located at Chalmers Road, Te Wetini Drive and the westward extension of Te Kowhai East Road,
- The developer-provided commencement of the Taiatea Drive minor arterial corridor as part of the Rotokauri Rise development,
- The developer-provided extension of Te Wetini Drive and the intersection with Taiatea Drive,

- The SH39/Koura Drive roundabout previously designated by Waka Kotahi, and
- The existing alignment of Te Kowhai East Road from the Te Rapa Road roundabout with the existing NIMTR level crossing.

The optioneering process incorporated these fixed points during the assessment of a variety of alternatives to strike a balance between delivering critical transportation and other infrastructure networks to support the urbanisation of Rotokauri, while minimising property impacts.

Urban Design Approach - Process

The spatial requirements of the Project was important, as significant portions of the route are undeveloped. The footprint and integrated design of Project would define the extent of the corridor.

Minimising the extent of the Designation

In determining how the network can best respond to the future land use for Rotokauri and meet the Project objectives, a bottom-up design approach was taken. This results in more detailed considerations of the form and function of each corridor. The land requirement is able to be better defined for the NoR rather than an alternative approach of designating a conservatively wide corridor that gives greater flexibility to accommodate different urban design layouts at a future stage. The approach taken provides greater certainty to the land use development planning underway adjacent to the Project.

An early decision was also taken in the consideration of alternatives that a ‘one size fits all’ approach to the corridor width/ cross section would not be appropriate. Each of the cross sections (or Zones) have differing functions or require a different urban design response.

Development of Preliminary Design for the Corridors

The approach to the preliminary design considered the broad form and function of the identified routes and how they best relate to the future land use as determined by the RSP.

An initial project inception workshop established the vision, goals and functional needs for the network. This resulted in the development of the Project objectives. Transport modelling and sensitivity testing was undertaken to consider the impact of increased housing densities, and to test the multimodal connectivity proposed by the Network Operating Framework. Development of the concepts progressed with multi-disciplinary engineering design to determine the spatial requirements of each Zone.

An Urban and Landscape Design Framework (ULDF) has been developed for the Project. The purpose of which is to provide guidance for outcomes-based urban and landscape design decisions as the Project design develops which responds to the RSP.

An options workshop and initial multi-criteria analysis (MCA) of the key components to be considered for the Project was undertaken. This included input from engineering, design and planning specialists and allowed for a comparison between the various options. The raw scoring output of this process is provided below.

Rotokauri Detailed Business Case

This section summarises the optioneering process undertaken via the Draft Rotokauri Detailed Business Case developed in parallel to and in support of the Notice of Requirement. This process was initiated by HCC to determine the benefits of investing in the corridor. The process re-tested the key form and function options developed for the Rotokauri Arterial Network against a series of KPI's and investment objectives and confirmed a preferred network. This optioneering process carried out through the DBC supports the Notice of Requirement.

The optioneering and assessment undertaken during the parallel DBC process sought to achieve the following:

1. Confirm the strategic case for change and the need for securing a strategic infrastructure corridor to service the growth cell;
2. Assess a wide variety of options (including those considered during the parallel NoR investigations).

   The options reflect different spatial requirements for each corridor (as it is a transportation and infrastructure designation rather than solely roading) which include the roading elements, multi modal provisions, utilities, and the three waters infrastructure for each of the corridors relating to the network, including the intersections. The options include the engineering treatments within each corridor, appropriate form and function, and an effective urban design response to the planned urbanisation. The options demonstrate how the corridor affects the place-making and amenity values through each cross section and illustrate where a combination of approaches may achieve a better outcome.

3. Engage with key project partners in the assessment of options and the ultimate identification of a recommended option (specifically Waka Kotahi NZ Transport Agency (Waka Kotahi), Waikato Regional Council and mana whenua).
4. Confirm a high level of confidence in the recommended option by key project partners.

These steps are broadly described below:

Step	Details
Designation investigations	▪ Options have been based on those developed during the investigation's stages for the proposed designation 2019-2021
Review of Strategic Direction	▪ The strategic case, relevant directions, KPIs and inter-related projects reviewed and considered ▪ Problem Statements, Benefits and Investment Objectives interrogated to understand the key problems and issues to solve on the corridor ▪ This served as a base for treatment development and to help turn treatments into options
Design Framework	▪ A design framework was prepared as part of the designation investigation process. ▪ This Design framework, along with high level Investment Objectives, was used as a base to develop treatment and options.
Do Minimum – Option	▪ Establish a do minimum based on the information above
Problems Benefits and Investment Objectives Workshop	▪ Workshop with key stakeholders to confirm the problem statements, Key performance indicators, consider the likely benefits for the project and confirm the investment objectives.

Long List Treatments Workshop	▪ Treatments were developed and confirmed that allows a broad range of options could be developed. ▪ Workshop held with key stakeholders to consider 7 viable alternatives.
Long List Optioneering Process	▪ Long Listing Options were developed and agreed via a workshop with key members of the project team as well as HCC and Waka Kotahi. ▪ The end result was a list of eight options – including the do-minimum
Early Assessment Sifting Tool (EAST)	▪ EAST assessment tool undertaken against options to help assess the suitability of all options developed ▪ Options with critical concerns or shortcomings identified
Long List Multi-Criteria Analysis (MCA) and identification of a Short List	▪ MCA undertaken on the eight Long List options which includes the reference (do minimum) case ▪ Stakeholders and subject matter experts' assessment inputs ▪ Sensitivity testing completed using MCA criteria weightings ▪ Three Short List options identified and taken forward to the shortlist in addition to the do-minimum – refer to digital copy of MCA assessment
Shortlist development	▪ Designs created for each of the shortlisted options ▪ Includes some options being combined from the previous long list
Short List MCA	▪ MCA workshop was undertaken on the developed shortlist with project stakeholders and mana whenua to review and discuss shortlist options ▪ A recommended option was agreed – refer to digital copy of MCA assessment
Identification of a Recommended Option	▪ A recommended option agreed and the detailed business case is finalised for endorsement by HCC and Waka Kotahi.

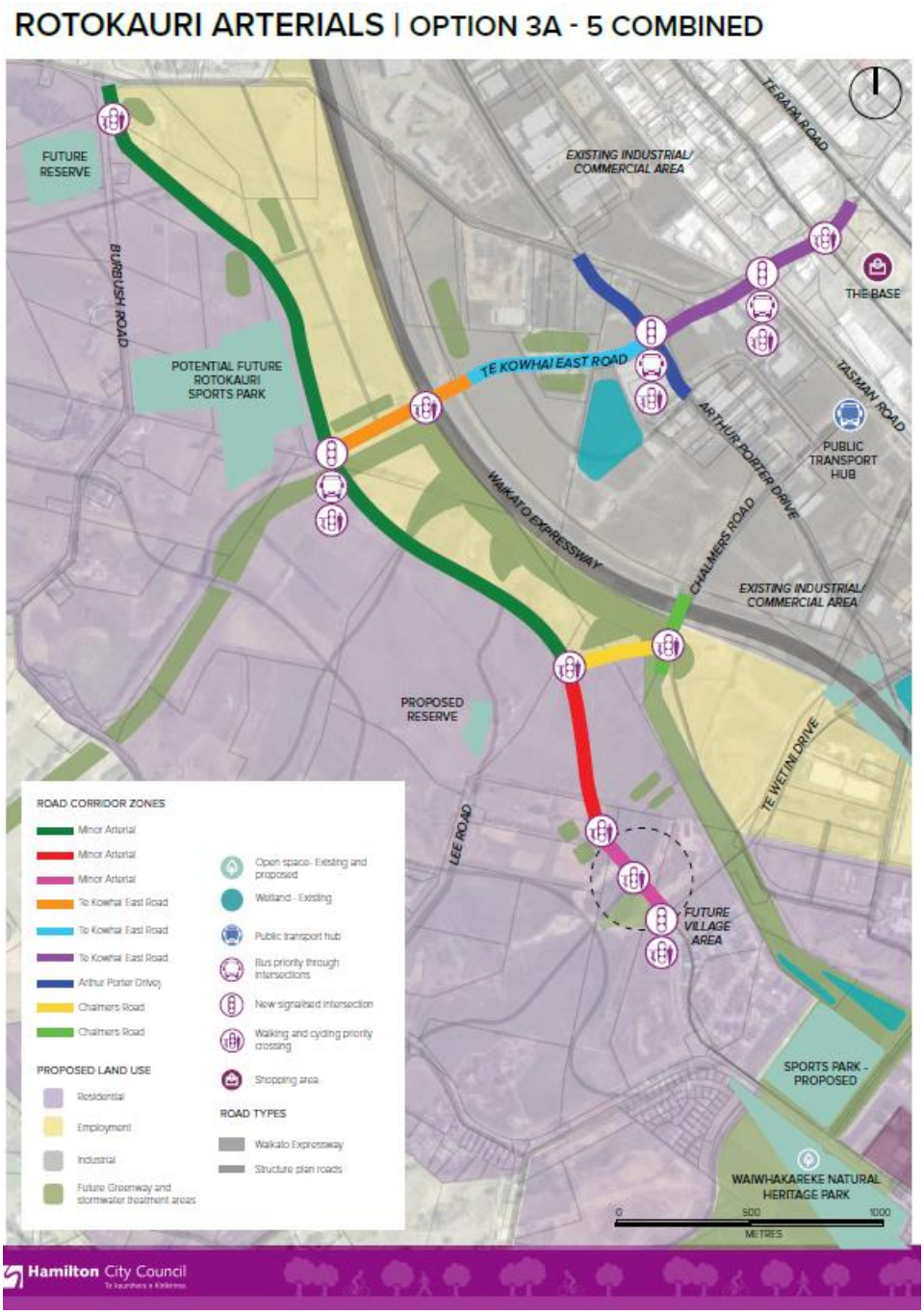


Figure 5 - Option 3A-5: Preferred Option - Draft Detailed Business Case for the Rotokauri Arterial Network

The draft DBC identified a recommended option (3A-5 combined as shown in **Figure 5** above). The draft DBC was submitted to the Waka Kotahi for endorsement by the Board in March 2022. Due to the funding model to be determined at a later date the work undertaken for the draft DBC was supported by Waka Kotahi but did not need formal endorsement for funding at this time.

The option developed by the NoR and retested by the draft DBC process in parallel is shown in **Figure 6** below.

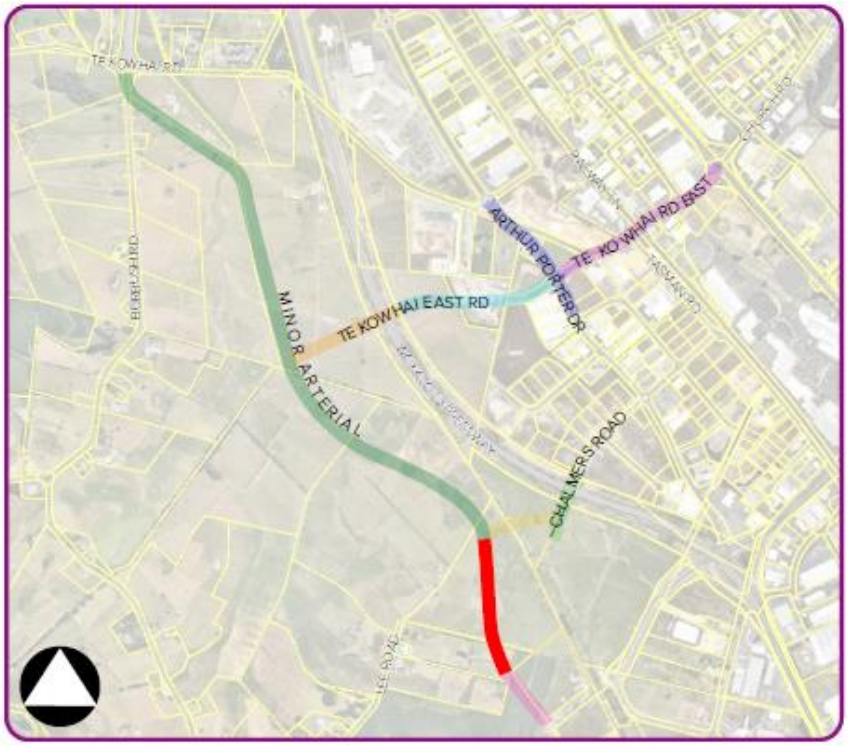


Figure 6: Proposed Rotokauri Arterial Network

Optioneering for localised refinements

Refinements to the design have been undertaken at specific locations as a result of landowner engagement.

Rotokauri North – Plan Change 7

The northern area of the RSP was subject to a private plan change (Plan Change 7 became operative on 15 July 2022). While Plan Change 7 is generally consistent with the Project, some further modifications are likely to be made through the detailed design stage in relation to additional transport connections to the arterial network, and alternate locations for stormwater wetlands. This does not affect the footprint of the Project.

Consolidation of Wetland areas – Minor Arterial south of Te Kowhai East Road

Following engagement with the landowner for Property 9 - Hounsell Holdings Limited (HJV) and Property 14 - Rotokauri Developments Limited (RDL), a review of the catchments and likely residential development was undertaken to consider whether a central stormwater conveyance and treatment device could be accommodated into the design by adjustment of the vertical alignment and associated discharge points. The potential advantage would be the consolidation of two wetlands and removed the requirement for Device 4 immediately to the south of the Chalmers Road connection. This change has been agreed with the affected landowners through early consultation as it allows for an improved land use outcome. This is reflected in the Project and the Land Requirement Plans. Further discussions are expected as developers refine land use plans and consents.

Te Kowhai East Road Section from Expressway to Proposed Intersection with Arthur Porter Drive

The Project includes the westward extension of the existing Te Kowhai East Road to the Minor Arterial under the Expressway embankment. Te Kowhai East Road will be upgraded to a Major Arterial. This east-west connection is one of three corridors to connect the RSP Industrial/employment area to the Rotokauri growth cell to the west.

Options for the Te Kowhai East Road corridor are limited as it needs to connect into fixed locations (the proposed intersection of Arthur Porter Drive and the SH1C underpass). The alignment takes into consideration the location of the existing stormwater wetland to the south which services the industrial subdivision and existing land use near the proposed intersection. This results in an unavoidable severance of two properties, Property 15 - R&C Ratcliffe and Property 16 - Watson Lands Limited.

Following initial discussions with both landowners, HCC further considered the potential property impacts associated with the location of the connection and the need for stormwater treatment in this location to align with the Mangaheka ICMP which requires a stormwater management area to be identified in relation to the northern industrial sub-catchment. **Figure 7** shows the extent of sub-catchment C.

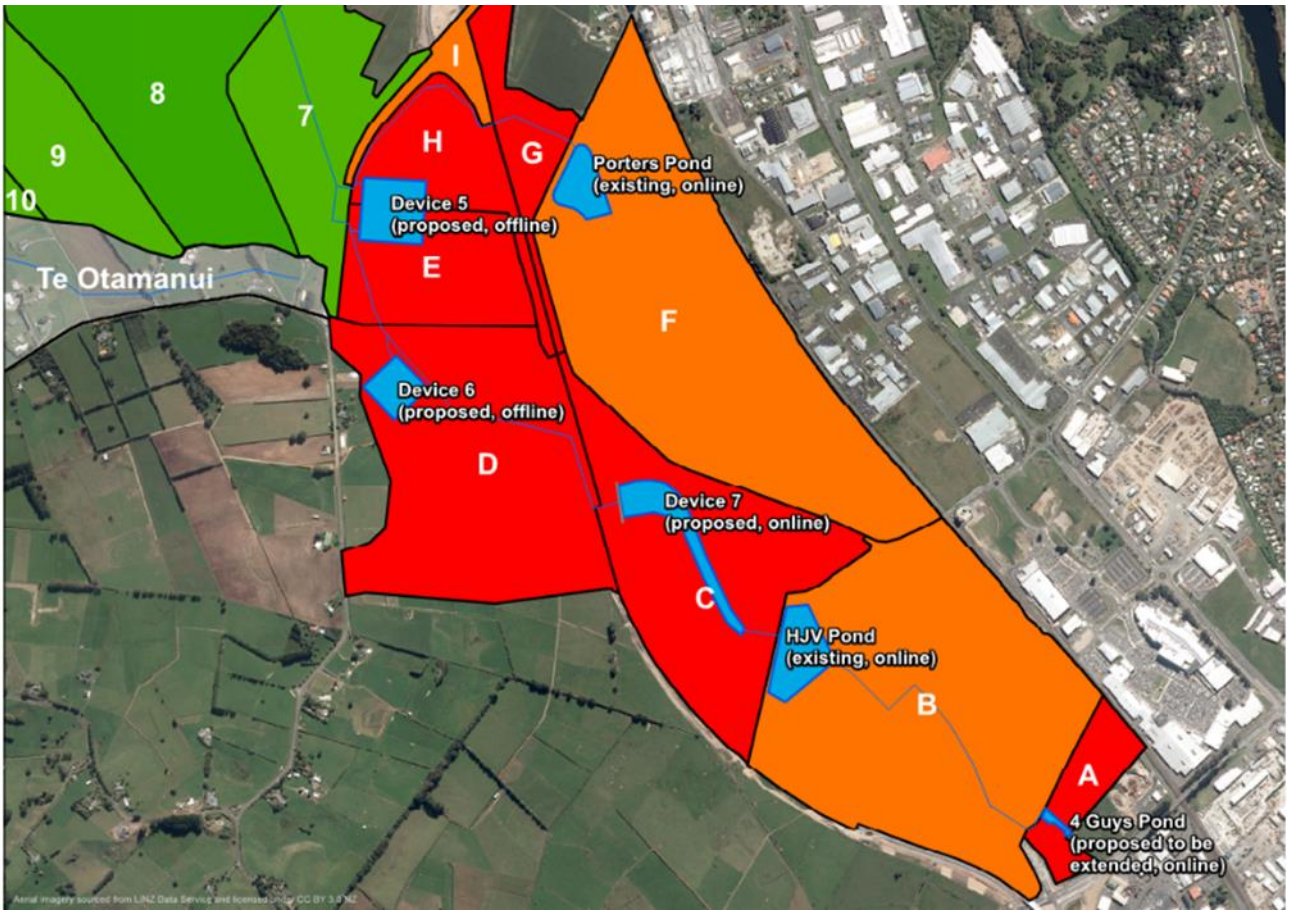


Figure 7: Mangaheka ICMP sub catchments

The ICMP sets the performance requirements for stormwater with this sub-catchment to manage developmental effects on flooding, water quality and stream scour. This is to mitigate flood effects (both cumulative and for individual developments) in the wider catchment as well as localised flood impacts. The location for Device 7 was shown to be online with the existing watercourse. However, the drain has since been diverted by the landowner as part of a previous development. The device can no longer be located in the same area shown in the ICMP.

The Project designates a selection of the centralised stormwater management areas proposed under both the Mangaheka and Rotokauri ICMP's as well as other key stormwater drainage corridors that the new roads will rely on to provide drainage. The approach to designation generally includes those areas that will receive road runoff from the Project. As Device 7 is located downstream of the Project it will receive road runoff as well runoff from the wider development. HCC have determined to include provisions for stormwater management in this vicinity within the designation.

Further stormwater management devices will be necessary as the surrounding land is urbanised. Several options for the location of the SW area have been considered. The Project includes a larger stormwater management area immediately adjacent to the alignment. The resultant severance of Property 15 renders it potentially unusable for industrial development, therefore the designation area has been increased to illustrate a greater level of property acquisition.

Maahanga Drive / Boulevard intersection

An intersection upgrade from the existing roundabout to a signalised intersection is proposed at the intersection of Te Kowhai East Road, Maahanga Drive and The Boulevard. The proposed widening at the intersection will accommodate the additional lanes and pedestrian and cycling facilities.

The intersection is one of three entry/exit points to The Base shopping precinct; a regional shopping centre operated by Kiwi Property in conjunction with Tainui Group Holdings. The land to the south of the current intersection (formally an air force military base) was the subject of historic negotiations with the Crown and was transferred to Waikato Tainui as treaty settlement land. HCC currently holds a 99-year lease for a portion of the property where the current intersection (a roundabout) is located over the Waikato-Tainui land.

The Project results in a 536m^2 increase to the existing lease area. Waikato-Tainui have indicated that a Notice of Requirement to designate the land or purchase the land required for the Project is culturally insensitive. HCC seeks to avoid any perception that land will be taken now or in the future for the works and is negotiating an alternative manner to secure access over the land to upgrade, operate and maintain the intersection. At the time of lodgement of the NoR, HCC was in discussions with Waikato-Tainui regarding the extent of works and the proposed legal mechanism to accommodate the Project.

Arthur Porter Drive Realignment

Several alignment options have been considered for the realignment of the Arthur Porter Drive connection north from Te Kowhai East Road to the intersection with Earthmover Crescent. This signalised intersection will improve the movement of heavy vehicles through the intersection, and provide a safer facility for pedestrians, cyclists and micro-mobility users.

As shown in **Figure 8** below, the proposed alignment of Arthur Porter Drive will impact three properties (Properties 17, 18 and 19 of the Land Requirement Plans). The five alignment options outlined in the "4288564 SK013 ARTHUR PORTER DR OPTIONS" document was assessed at a multi-criteria analysis (MCA) workshop held on 19 August 2021. The MCA raw scoring spreadsheet and options are attached as **Appendix 1**.

Based on the outcome of the MCA scoring, the three options considered are indicated below. All options have a notable property impact on Properties 17, 18 and 19 resulting in bisected residual areas, while the balance areas for Property 17 will support industrial development in the future, the residual area of Property 19 may limit opportunities and require acquisition of the remaining area. The existing Arthur Porter Drive will become an access cul-de-sac. The connection into the new Arthur Porter Drive alignment will also require an alteration to the existing access for Property 18.

Option C: Green – Central Alignment MCA raw score -3

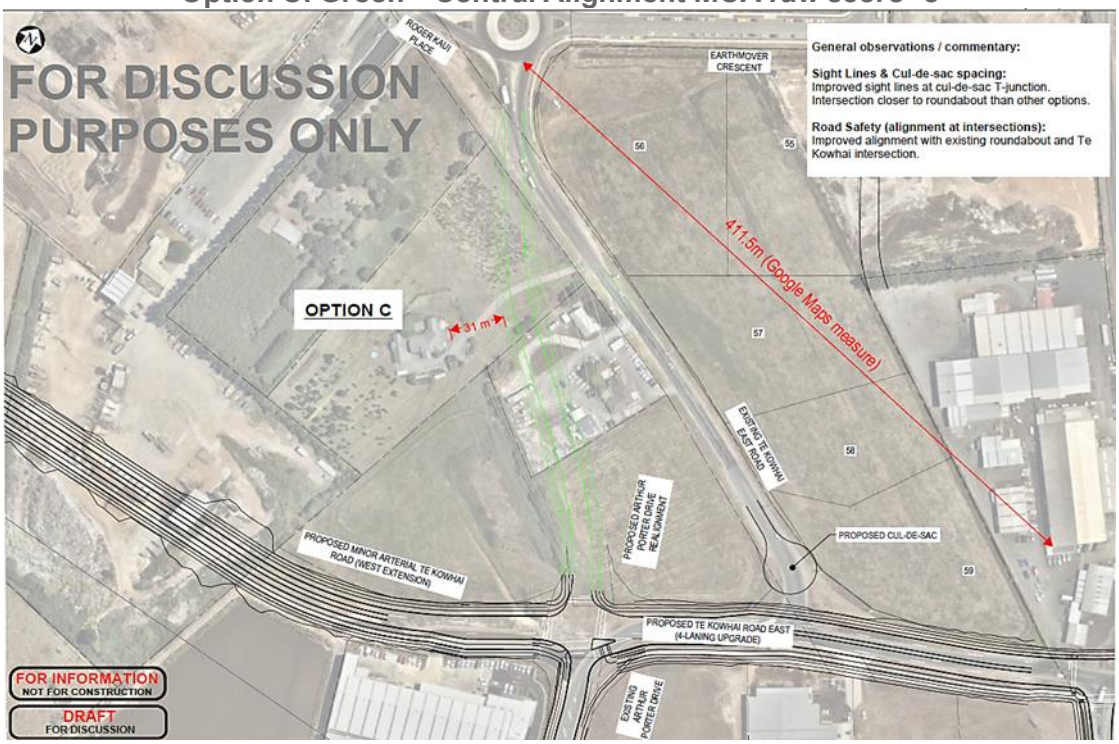


Figure 8: Arthur Porter Drive Option C

Option D: Purple – Centre-East Alignment (preferred) - MCA raw score +1

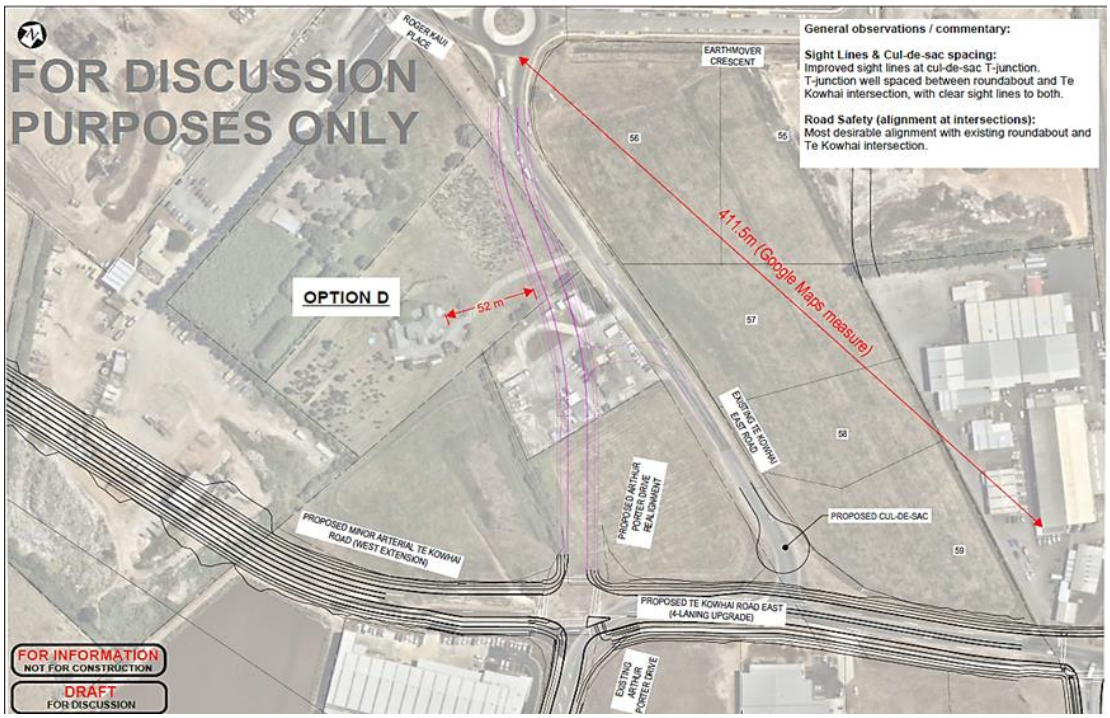


Figure 9: Arthur Porter Drive Option D

Option E: Blue – Eastern most Alignment - MCA raw score 0

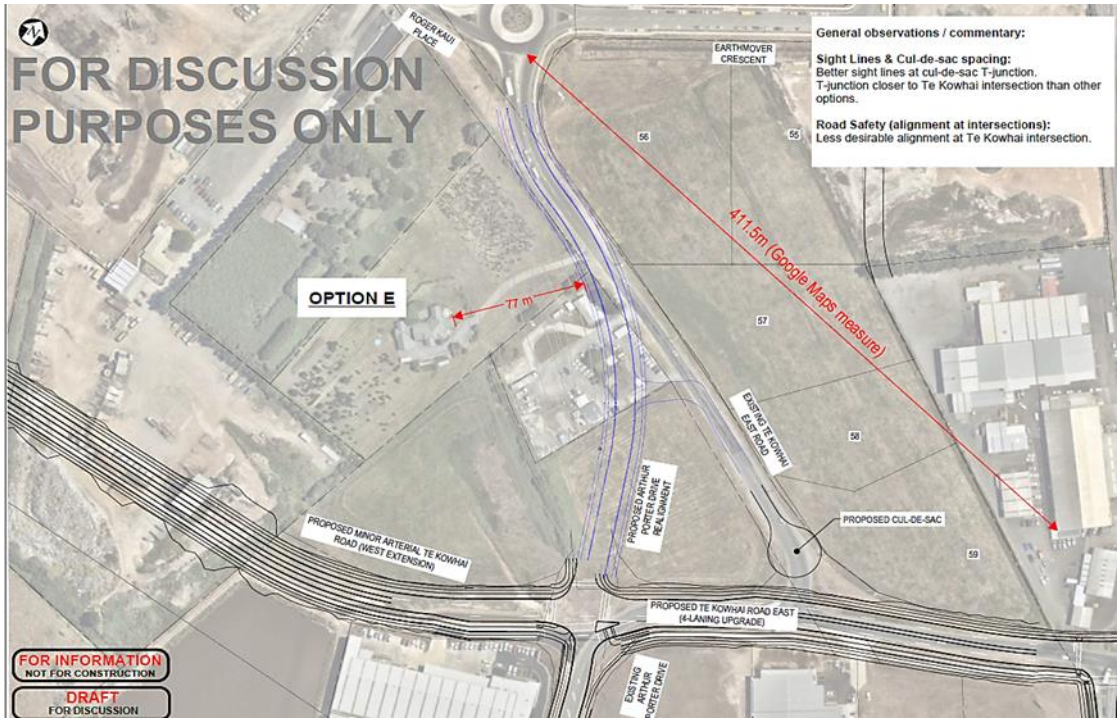


Figure 10: Arthur Porter Drive Option E

Based on the outcome of the MCA scoring **the preferred option taken forward in the Project is Option D - Central east alignment.**

Sapphire Group Property Access Alternatives

The Project requires widening of Te Kowhai East Road, and the signalisation of the intersection of Te Kowhai East Road with Tasman Drive affects the current access arrangement to the Sapphire Group Property on Te Kowhai East Road (the Property). There are several engineering considerations in this highly constrained area that make it challenging to achieve a safe intersection and NIMTR crossing while maintaining the Property's existing access to Te Kowhai East Road.

The Project results in a change to the current access to the Property from Te Kowhai East Road. Alternative access options consider improved safety and functionality, which result in access from an alternative road e.g. either Arthur Porter Drive or Earthmover Crescent.

Ten options were assessed and outlined in the "Te Kowhai Access Options – July 2021_v4" during a multi-criteria analysis (MCA) workshop held on 19 August 2022. In summary the assessment concludes:

- Provision of full movement access to/from the Property as part of the intersection upgrade were generally considered less desirable from an engineering perspective. These options scored low for safety which would be considered a fatal flaw due the concerns in relation to the right turn bay and stacking lengths.
- Options II and III would require an extra lane on the eastern side of the level crossing. Since the workshop, a more detailed look at the available width has resulted in an adjustment of the impact to property scores to -2, as these may not be feasible and would also affect the current KiwiRail Deed of Grant and safety of the level crossing.
- Reconsideration of the scoring criteria included a 'weighted' score to the MCA analysis (alongside the raw scores), to place an emphasis on safety, property impacts and financial considerations, and provide a sensitivity test to the scoring.
- Options I, IV-X1 (inclusive) require alternative access across third party land which is reflected in the scoring. These have been assigned a -2 as all would require further landowner investigations with property owners who have had limited involvement in the process to date. These aspects are not considered fatal flaws; however, property negotiations may influence the viability of the options.
- All of these options would require internal reconfiguration of the Sapphire Group Property as the access arrangement differs from the current configuration. Additional discussions with property owners would be required.

A further refinement of alternative options was undertaken with all access options from Arthur Porter Drive as shown in **Figure 11** below. The MCA outputs are attached in **Appendix 2.**

Figure 11: Arthur Porter Drive and Property Access Options

The relative scoring of each is identified below.

			SCORE	RANK	SCORE	RANK
Option I (Brown)			-5	5.5	-43	9
Option II (Lime Green)			-11	11	-89	11
Option III (Mid Green)			-7	9.5	-57	10
Option IV (Mid Blue)			-4	3.5	-19	6.5
Option V (Yellow)			-4	3.5	-15	5
Option VI (Burgundy)			-7	9.5	-31	8
Option VII(Red)			-6	7.5	-7	4
Option VIII (Purple)			-5	5.5	-6	3
Option IX (Orange)			-6	7.5	-19	6.5
Option X (Dark Blue)			0	2	16	2
Option XI (Magenta)			2	1	27	1

Options X (Dark Blue) and XI Magenta were considered the favourable options for access, with the Option X being selected as the preferred due to an improved geometric connection to Arthur Porter Drive. Further investigation has determined that proposed development on adjacent Lot 17 would preclude access via Earthmover Crescent which is an influencing factor in relation to the designation and property negotiations. Option XI is also considered least favourable in relation to the Sapphire Group property as it would connect to the very rear of the site.

In September 2023 Council purchased Lot 57, enabling the Project to proceed with Option X as the preferred option for access to Arthur Porter Drive.

KiwiRail NIMTR Crossing

A summary of the assessment of options for crossing the NIMTR and associated engagement with KiwiRail is provided in **Appendix O**.

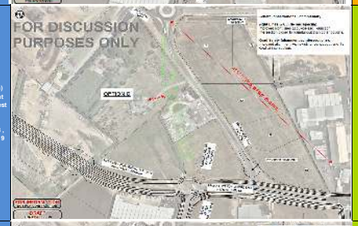
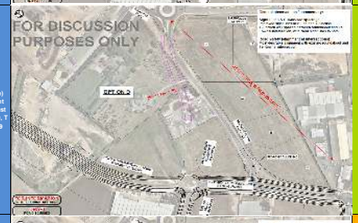
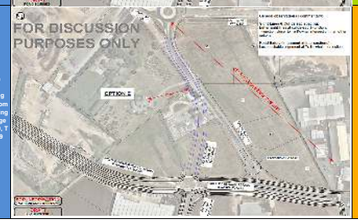
Conclusion

Consideration has been given to alternative routes, cross sections and methods to achieving the vision of the RSP and to protect a route for the future transportation and infrastructure corridor for Rotokauri. The process included re-examining original routes shown in the RSP for appropriateness, identification of constraints and integration of existing and proposed infrastructure to support the urbanisation of the Rotokauri growth cell. Ultimately the optioneering process has resulted in the identification of a network of transport and infrastructure corridors that meets the RSP vision, Project objectives and reduces to the extent where possible actual and potential effects on the environment.

1

Appendix 1 – MCA Arthur Porter Drive

Sensitivity: General

		Effects								Implementability							Comments applying to all options
	Multi - Criteria Assessment	Safety	Impacts on Infrastructure - Existing and Proposed (sw, services etc)	Integration with multimodal network (existing and proposed), Connections, intersection form and function	Social Cohesion/ good design outcome responding to future landuse	Property Impacts	Environment effects	Archaeological/ Heritage	Impacts on Te Ao Maori	Constructability	Staging Complexity	Consentability	Operational/ maintenace (whole of life)	Financial	Public/ Stakeholder acceptance	Total Score	CI - No known archaeological / te ao maori constraints against any of the alignment options
Options		SF	IS	SF/BF/KMc	TA/KMc	CS/CI	CI	CI	CI	BS/SF/NT	NT/BS	CI	BS	RA	CS/CI		Comments
Option A (orange) Western curve impacting dwelling property 8 T intersection on 8 , avoids property 9		-2	-2	-2	-1	-2	-1	0	0	-1	-1	-1	0	-1	0	-14	fills in existing flood area so will need offsetting 
Option B (red) Western curve 3m offset to dwelling on property 8, T intersection on 8, cutting rear corner of property 9		-1	-2	-1	-1	2	-1	0	0	0	0	-1	0	-1	0	-6	fills in existing flood area so will need offsetting 
Option C (Green) central alignment slight curve to west triangle from property 8 T intersection on 8 , bisects property 9		1	-1	1	-1	-2	0	0	0	-1	-1	0	0	1	0	-3	fills in smaller area of flooding so less offsetting needed
Option D (purple) Central alignment slight curve to east bisects property 9, T intersection on 9		1	0	1	1	-1	0	0	0	-1	-1	0	0	1	0	1	fill in least area of flooding
Option E (Blue) curve to east following existing road alignment from roundabout clipping property 8 frontage bisects property 9, T intersection on 9 and 7		-1	0	1	1	-1	0	0	0	-1	-1	0	0	2	0	0	fill in least area of flooding

Score	Description
-3	Significant Negative (Fatal Flaw)
-2	Moderate Negative
-1	Minor Negative
0	Neutral
1	Minor Positive
2	Moderate Positive
3	Significant Positive

Drawing Plotted: 20 May 2021 11:44 am

FOR DISCUSSION PURPOSES ONLY

General observations / commentary:

Sight Lines & Cul-de-sac spacing:
Worst sight lines at cul-de-sac T-junction.
Intersection closer to roundabout than other options.

Road Safety (alignment at intersections):
Least desirable alignment with existing roundabout and Te Kowhai intersection.

ROGER KAUI PLACE

EARTHMOVER CRESCENT

56

55

411.5m (Google Maps measure)

OPTION A

Proposed alignment option overlaps with existing house

57

58

59

EXISTING TE KOWHAI EAST ROAD

PROPOSED ARTHUR PORTER DRIVE REALIGNMENT

PROPOSED CUL-DE-SAC

PROPOSED MINOR ARTERIAL TE KOWHAI ROAD (WEST EXTENSION)

PROPOSED TE KOWHAI ROAD EAST (4-LANING UPGRADE)

EXISTING ARTHUR PORTER DRIVE

FOR INFORMATION
NOT FOR CONSTRUCTION

DRAFT
FOR DISCUSSION

No.	Revision	By	Chk	Appd	Date

Drawing Originator: Beca

Original Scale (A1) AS SHOWN
Reduced Scale (A3) HALF SHOWN

Design			Approved For Construction*
Drawn			
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: Hamilton City Council Te kaunihera o Kirikiriroa

Project: ROTOKAURI ARTERIALS DESIGNATION

Title: TE KOWHAI ROAD PROPOSED OPTIONS

Discipline: CIVIL ENGINEERING

Drawing No.: 4288564-SK-013

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Document No. 4288564-SK-013 POSSIBLE ALIGNMENT FOR PRESENTATION

Drawing Plotted: 20 May 2021 11:44 am

FOR DISCUSSION PURPOSES ONLY

General observations / commentary:

Sight Lines & Cul-de-sac spacing:
Poor sight lines at cul-de-sac T-junction.
Intersection closer to roundabout than other options.

Road Safety (alignment at intersections):
Better alignment with existing roundabout than Option A, still less than desirable at Te Kowhai intersection.

ROGER KAUI PLACE

EARTHMOVER CRESCENT

56

55

57

58

59

411.5m (Google Maps measure)

OPTION B

9 m

EXISTING TE KOWHAI EAST ROAD

PROPOSED ARTHUR PORTER DRIVE REALIGNMENT

PROPOSED CUL-DE-SAC

PROPOSED MINOR ARTERIAL TE KOWHAI ROAD (WEST EXTENSION)

PROPOSED TE KOWHAI ROAD EAST (4-LANING UPGRADE)

EXISTING ARTHUR PORTER DRIVE

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Title: TE KOWHAI ROAD PROPOSED OPTIONS

Discipline: CIVIL ENGINEERING

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Drawing Plotted: 20 May 2021 11:44 am

FOR DISCUSSION PURPOSES ONLY

General observations / commentary:

Sight Lines & Cul-de-sac spacing:
Improved sight lines at cul-de-sac T-junction.
Intersection closer to roundabout than other options.

Road Safety (alignment at intersections):
Improved alignment with existing roundabout and Te Kowhai intersection.

ROGER KAUI PLACE

EARTHMOVER CRESCENT

56

55

57

58

59

411.5m (Google Maps measure)

OPTION C

31 m

EXISTING TE KOWHAI EAST ROAD

PROPOSED ARTHUR PORTER DRIVE REALIGNMENT

PROPOSED CUL-DE-SAC

PROPOSED MINOR ARTERIAL TE KOWHAI ROAD (WEST EXTENSION)

PROPOSED TE KOWHAI ROAD EAST (4-LANING UPGRADE)

EXISTING ARTHUR PORTER DRIVE

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NOT FOR CONSTRUCTION

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Approved For Construction* Date

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Client: Hamilton City Council Te kaunihera o Kirikiriroa

Project: ROTOKAURI ARTERIALS DESIGNATION

Title: TE KOWHAI ROAD PROPOSED OPTIONS

Discipline: CIVIL ENGINEERING

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General observations / commentary:

Sight Lines & Cul-de-sac spacing:
Improved sight lines at cul-de-sac T-junction.
T-junction well spaced between roundabout and Te Kowhai intersection, with clear sight lines to both.

Road Safety (alignment at intersections):
Most desirable alignment with existing roundabout and Te Kowhai intersection.

ROGER KAUI PLACE

EARTHMOVER CRESCENT

56

55

57

58

59

411.5m (Google Maps measure)

52 m

OPTION D

EXISTING TE KOWHAI EAST ROAD

PROPOSED ARTHUR PORTER DRIVE REALIGNMENT

PROPOSED CUL-DE-SAC

PROPOSED MINOR ARTERIAL TE KOWHAI ROAD (WEST EXTENSION)

PROPOSED TE KOWHAI ROAD EAST (4-LANING UPGRADE)

EXISTING ARTHUR PORTER DRIVE

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Approved For Construction* Date
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Client: Hamilton City Council, Te kaunihera o Kirikiriroa

Project: ROTOKAURI ARTERIALS DESIGNATION

Title: TE KOWHAI ROAD PROPOSED OPTIONS

Discipline: CIVIL ENGINEERING

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General observations / commentary:

Sight Lines & Cul-de-sac spacing:
Better sight lines at cul-de-sac T-junction.
T-junction closer to Te Kowhai intersection than other options.

Road Safety (alignment at intersections):
Less desirable alignment at Te Kowhai intersection.

ROGER KAUI PLACE

EARTHMOVER CRESCENT

56

55

57

58

59

411.5m (Google Maps measure)

77 m

OPTION E

EXISTING TE KOWHAI EAST ROAD

PROPOSED ARTHUR PORTER DRIVE REALIGNMENT

PROPOSED CUL-DE-SAC

PROPOSED MINOR ARTERIAL TE KOWHAI ROAD (WEST EXTENSION)

PROPOSED TE KOWHAI ROAD EAST (4-LANING UPGRADE)

EXISTING ARTHUR PORTER DRIVE

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Appendix 2 – MCA Access to Sapphire Group Property

		Effects								Implementability							Comments applying to all options
	Multi - Criteria Assessment	Safety	Impacts on Infrastructure- Exisiting and Proposed (sw services etc)	Integration with multimodal/ transport network (existing and proposed Connections, intersection form and function)	Social Cohesion/ good design outcome responding to future landuse.	Property Impacts	Environment effects	Archaeological/ Heritage	Impacts on Te Ao Maori	Constructability (spatial and complexity constraints)	Staging Completixty	Consentability	Operational/ maintenace (whole of life)	Financial	Public/ Stakeholder acceptance	Total Score	CI - No known archaeological / te ao maori constraints againest any of the access options KMc - These scores are neutral based on no improvement of social cohesion. No consideration for impact of buisness. Assumes this will be property impacts.
Options	Person to score criteria	SF	IS/ CI	SF/BF/KMc	TA/KMc	CS	CI	CI	CI	BS/SF/NT	NT/BS	CI	BS	RA	CS/CI		Comments
Option A Full movement entrance mid frontage with pocket right turn bay, closure of western		-3	0	-2	0	-1	0	0	0	0	-2	-2	0	-2	-2	-14	Entrance location with RTB would be considered unsafe
Option A1 Full movement entrance mid frontage with right turn bay east of rail		-2	0	-2	0	-2	0	0	0	0	-1	-1	0	-2	-1	-11	
Option A2 Full movement eastern (with rail consesssion) with Right turn bay east of rail		-1	0	-2	0	-2	0	0	0	0	-1	-1	0	-2	1	-8	
Option B1 Left in Left out at western end of frontage closure of 2nd entrance		2	-1	-2	0	-1	0	0	0	0	0	1	0	0	1	0	potential clash with culvert outlet
Option B2 Left in Left out at western entrance & full movement near rail		-1	-1	-2	0	-2	0	0	0	0	-1	-1	0	-2	1	-9	potential clash with headwall and incrementally more carbon etc with multiple entrances to construct
Option C Retain full movement from western entrance with pocket Right hand turn bay		-3	-1	-3	0	-1	0	0	0	0	-2	-2	0	-2	-2	-16	Entrance location with RTB would be considered unsafe
Option D1 Alternate Left in Left out all exisiting closed		2	-2	1	0	-1	-1	0	0	-1	0	1	0	-1	-1	-3	new culvert of open channel needed
Option D2 Alternate Left in Left out & entrance near Rail all movement		-1	-2	-2	0	-2	-1	0	0	-1	-1	-1	0	-1	1	-11	new culvert
Option E Alternative Access via Cul de sac		3	-1	1	0	-2	-1	0	0	-1	-1	1	0	-2	-1	-4	new culvert and carbon etc expended on works for long access. Longer route will be difficult to drain and may need open channels due to lack of fall increasing likely land requirement
Option F Alternative Access via Earthmovor Cres		3	-1	1	0	-2	0	0	0	0	-2	1	0	-2	-1	-3	access road will need drainage and longer route increases construction impacts

Scoring guide	
-3	Significant Negative (Fatal Flaw)
-2	Moderate Negative
-1	Minor Negative
0	Neutral
1	Minor Positive
2	Moderate Positive
3	Significant Positive

		Effects														
	Multi - Criteria Assessment	**Traffic Safety, Turning Movements and Intersections**	**Implications to Overall Future Rotokauri Arterials Network**	**Integration with multimodal transport network (existing and proposed Connections, form and function)**	**Technical Design /Geometric alignment**	**Property Access Outcomes**	**Property Impacts**	**Environmental Effects /Consentability**	**Archaeological/ Heritage**	**Impacts on Te Ao Māori**	**Financial**	**Public /Stakeholder Acceptance**	**Operational/ maintenance (whole of life)**		**Raw Score**	**Weighted Score**
	Weighting	**10**	**8**	**6**	**6**	**5**	**8**	**3**	**2**	**2**	**8**	**2**	**3**	**0**		
Options	Key aspects of note	SF	SF/BM	SF/BF/KMc	BM/GC	BM/GC	CF	CI/S	CI	CI	RA	CS	RA			
Option I (Brown) **Left in Left out entrance at existing west frontage, closure of mid frontage entrance.**	No integration with signals Left turn out difficult to phase with level crossing barrier Requires internal site reconfiguration property 13	-1	-2	-2	-1	1	-1	2	0	0	0	-1	0	0	-5	-43
Score Comments		LILO a preferred arrangement with interaction to signals. However the proximity to the signals would impeded vehicles exiting to have sufficient gap.	Direct conflict with islands, allocated vehicle lanes, and queue, but limited to two movements	The option favours vehicle access and reduces provision for pedestrians/amenity on the north side of the road. Option increases complexity for road users with close proximity to Tasman Road intersection and railway. Option does not impact cyclists as the two-way cycleway is on the south side of the road.	Tracking paths/length of kerb let downs may be significant (Design Vehicle) due to no shoulder	Direct access, limited movements, tracking/turning around onsite	Owner currently enjoys two access points to Te Kowhai Rd with separate access for Defence, which is important to owner	No real interference with stormwater features. Minimal increase in impervious area. Care needs to be taken not to drain road down onto property which will likely impact on the extent of the accessway grading.	No differentiating factor	No differentiating factor	Lowest cost of options , some minor treatments required	Kiwi/Rail are the key stakeholder seeking to manage their North Island Main Trunk Railway line crossing. Slightly negative scoring to reflect that KiwiRail would prefer a greater separation between property access and crossing.	no additional asset			
Option II (Lime Green) **Full movement entrance at existing west frontage, becomes part of signalised intersection with Tasman Road/Te Kowhai east with pocket right turn bay , closure of mid frontage entrance.**	Requires integration into intersection signals Removes one westbound through lane to accommodate right turn bay Left turn out difficult to phase with level crossing barrier Requires internal site reconfiguration property 13	-3	-3	-2	-3	2	-1	2	0	0	-1	-1	-1	0	-11	-89
Score Comments		Full movement will have serious conflict with Signals, queueing and gaps will impede movements not to mention queueing for right turn might spill back onto level crossing	Direct conflict with signals, layouts and dedicated lanes, queuing etc…	The option favours vehicle access and reduces provision for pedestrians/amenity on the north side of the road. Option increases complexity for road users with close proximity to Tasman Road intersection and railway. Option does not impact cyclists as the two-way cycleway is on the south side of the road.	Tracking paths/length of kerb let downs may be significant (Design Vehicle) due to no shoulder. Insufficient width to construct right turn bay without impact on intersection layout/berms	Full access, tracking/turning onsite, may be limitations due to traffic om main road	Owner currently enjoys two access points to Te Kowhai Rd with separate access for Defence, which is important to owner. Superior to option I but scored the same due to limited range of scoring options	No real interference with stormwater features. Minimal increase in impervious area. Care needs to be taken not to drain road down onto property which will likely impact on the extent of the accessway grading.	No differentiating factor	No differentiating factor	Integration of 4th leg into intersection signals	Kiwi/Rail are the key stakeholder seeking to manage their North Island Main Trunk Railway line crossing. Slightly negative scoring to reflect that KiwiRail would prefer a greater separation between property access and crossing.	Elevated maintenance cost for intersection			
Option III (Mid Green) **Full movement entrance at existing mid frontage, becomes part of signalised intersection with Tasman Road/Te Kowhai east with right turn bay held at level crossing approach , closure of west frontage entrance.**	Requires integration into intersection signals Removes one westbound through lane to accommodate right turn bay Left turn out difficult to phase with level crossing barrier Requires internal site reconfiguration property 13	-2	-1	-2	-2	2	-1	2	0	0	-1	-1	-1	0	-7	-57
Score Comment		Full movements could act as fourth leg to signals, better integration than I and II, however there might be unintended queueing if right turners don't make it through a phase with potential spillback onto level crossing. Adding fourth leg will also reduce intersection operation with loss of green time to fourth leg.	assuming a fourth signalised leg, and geometrics components are possible, minor issue for traffic elements, full movements	The option favours vehicle access and reduces provision for pedestrians/amenity on the north side of the road. Option increases complexity for road users with close proximity to Tasman Road intersection and railway. Option does not impact cyclists as the two-way cycleway is on the south side of the road.	Proximity of building limits kerb returns, footpaths, berm and sightlines	assuming fourth leg geometric works, full access, controlled movements by signals, delay by signal cycle time	Owner currently enjoys two access points to Te Kowhai Rd with separate access for Defence, which is important to owner.	No real interference with stormwater features. Minimal increase in impervious area. Care needs to be taken not to drain road down onto property which will likely impact on the extent of the accessway grading.	No differentiating factor	No differentiating factor		Kiwi/Rail are the key stakeholder seeking to manage their North Island Main Trunk Railway line crossing. Slightly negative scoring to reflect that KiwiRail would prefer a greater separation between property access and crossing.	Ongoing Maintenance of culvert			
Option IV (Mid Blue) **New Left in Left out access further west on Te Kowhai East Road**	Entrance location conflicts with stacking length on eastbound approach to Tasman Rd/ Te Kowhai East Intersection Requires culvert crossing for new access	0	1	-1	-1	2	-1	-1	0	-1	-1	1	-2	0	-4	-19
Score Comment		Best option for access along Te Kowhai, LILO and distance to signals are improved from I,II and III. Still only limited movement	assuming a fourth signalised leg, and geometrics components are possible, minor issue for traffic elements, full movements	Option has less impact on Tasman Road intersection than options I, II and III. Option does not impact cyclists as the two-way cycleway is on the south side of the road.	Assuming slip lane, extensive kerb return length can be minimised, but has an associated impact to pedestrian and berm width	Limited access, away from intersection, limiting possible delay due to traffic	Loss of land and exposure to Te Kowhai Road. Risk that limited falls force elevated road levels relative to surrounding land with implications on secondary flow over private land or needing fill the property further or use open channels along the road to avoid the first two with consequential impacts on land take	Slightly more impervious area than options 1 through 3. Will need some minor drainage (catchpits and pipes). Needs a driveway culvert but relatively minor and could allow for the driveway to be graded down so high flows can over top if required in the existing drainage corridor	No differentiating factor	requires additional culvert crossing of currently open SW channel - Additional impact to the wai	Cost of land acquisition with higher profile and frontage to Te Kowhai East	No strong differentiating factor for 'public/stakeholder' attribute for Options IV to XI. Have scored Options IV to VII slightly more positively to reflect that Roger Giles will slighlty favour being the 'public' as not the directly affected landowner so not captured by 'property impact' attribute.	Ongoing maintenance of new road and drainage network			
Option V (yellow) **Alternative access via Arthur Porter Drive closest to turning head affects Lot 59**	Alignment would greatly affect planned development at Lot 59 Requires culvert crossing for access , turning head shown at edge of channel	1	2	0	1	1	-2	-2	0	-1	-3	1	-2	0	-4	-15
Score Comment		Options V-IX are mostly the same. Provides full access to Property 13. There are concerns on right turning movements with increased heavy vehicles (200 pd) to Prop 13. This could spillback and impede operation at Te Kowhai and Arthur Porter Intersection. Option V-IX all require two movements from Arthur Porter which is different from Option X only requiring one. This will affect manoeuvrability especially if HCV are involved.	Assuming RTB or wide median is available (currently not designed, not justified from Austroads movement numbers, but may be justified from a safety component). No direct impact to signals, but may have impact on queue lengths based on extent of RTB or similar.	Option removes any vehicle conflict with Te Kowhai Road although increases vehicle movement on Arthur Porter Drive. This increased vehicle movement will have an impact on the cyclists using the corridor as there is no provision for separated cycle lanes on Arthur Porter Drive however the pedestrian and cyclist activity on the corridor is assumed to be much less than on Te Kowhai Road East.	Assuming removal of first turning head, road alignment can be achieved for slow speed environment, parking opportunity will be limited.	Limited access, away from intersection to limit possible delay due to traffic	Possible total purchase due to effect on balance of property. Risk that limited falls force elevated road levels relative to surrounding land with implications on secondary flow over private land or needing fill the property further or use open channels along the road to avoid the first two with consequential impacts on land take	Significant additional impervious area. Long pipe drainage runs will be needed and risk of impacting road levels. Need a driveway culvert and limited space to grade an overflow point.	No differentiating factor	requires additional culvert crossing of currently open SW channel	High land acquisition cost, cost of new road access	No strong differentiating factor for 'public/stakeholder' attribute for Options IV to XI. Have scored Options IV to VII slightly more positively to reflect that Roger Giles will slighlty favour being the 'public' as not the directly affected landowner so not captured by 'property impact' attribute.	Ongoing maintenance of new road and drainage network			
Option VI (Burgundy) **Alternative access via Arthur Porter Drive splits affects between Lot 58 and Lot 59**	Would necessitate a redesign of Lot 58 and Lot 59 access and carparking configurations Requires culvert crossing for access , turning head shown at edge of channel	1	2	0	-3	1	-2	-2	0	-1	-2	1	-2	0	-7	-31

Scoring guide

-3	**Significant Negative (Fatal Flaw)**
-2	**Moderate Negative**
-1	**Minor Negative**
0	**Neutral**

Score Comment		see comment of V above	Assuming RTB or wide median is available (currently not designed, not justified from Austroads movement numbers, but may be justified from a safety component). No direct impact to signals, but may have impact on queue lengths based on extent of RTB or similar.	Option is neutral in terms of integration with multimodal transport as it reduces and removes vehicle movement on Te Kowhai Road East.	close proximity of service lane to turning head results in poor geometric design, turning head over drain, will require shifting with narrow access for improved drainage opportunities.	Full access at turning head end, some limitation by right turning from Arthur Porter Drive.	Will require redesign/reconfiguration of proposed plans for both Lots 58 and 59. Risk that limited falls force elevated road levels relative to surrounding land with implications on secondary flow over private land or needing fill the property further or use open channels along the road to avoid the first two with consequential impacts on land take	Significant additional impervious area. Long pipe drainage runs will be needed and risk of impacting road levels. Need a driveway culvert and limited space to grade an overflow point.	No differentiating factor	requires additional culvert crossing of currently open SW channel - Additional impact to the wai	Moderate land acquisition cost, cost of new road access	No strong differentiating factor for 'public/stakeholder' attribute for Options IV to XI. Have scored Options IV to VII slightly more positively to reflect that Roger Giles will slightly favour being the 'public' as not the directly affected landowner so not captured by 'property impact' attribute.	Ongoing maintenance of new road and drainage network			
Option VII (Red) **Alternative access via Arthur Porter Drive splits affects between Lot 58 and Lot 59 bringing turning head closer to Arthur Porter**	Would necessitate a redesign of Lot 58 and Lot 59 access and carparking configurations Requires culvert crossing for access , turning head shown at edge of channel	1	2	0	-2	1	-2	-2	0	-1	-2	1	-2	0	-6	-7
Score Comment		see comment of V above	Assuming RTB or wide median is available (currently not designed, not justified from Austroads movement numbers, but may be justified from a safety component). No direct impact to signals, but may have impact on queue lengths based on extent of RTB or similar.	Option is neutral in terms of integration with multimodal transport as it reduces and removes vehicle movement on Te Kowhai Road East.	close proximity of service lane to turning head results in poor geometric design, Jug head is positioned over drain.	Full access at turning head end, some limitation by right turning from Arthur Porter Drive.	Will require redesign/reconfiguration of proposed plans for both Lots 58 and 59, marginal as to whether there is sufficient land available to accommodate on Lot 58 given current development aspirations	Significant additional impervious area. Long pipe drainage runs will be needed and risk of impacting road levels. Need a driveway culvert and limited space to grade an overflow point.	No differentiating factor	requires additional culvert crossing of currently open SW channel - Additional impact to the wai	Moderate land acquisition cost, cost of new road access	No real differentiating factor for 'public/stakeholder' attribute for Options VIII to XI. All reasonable options from a broad public traffic safety/public acceptance viewpoint, and no other stakeholder particularly expressing an interest relevant to these options. Have scored as neutral.	Ongoing maintenance of new road and drainage network			
Option VIII (Purple) **Alternative access via Arthur Porter Drive affects Lot 58**	Alignment would greatly affect planned development at Lot 58 Requires culvert crossing for access , turning head shown at edge of channel	1	2	0	1	1	-2	-2	0	-1	-3	0	-2	0	-5	-6
Score Comment		see comment of V above	Assuming RTB or wide median is available (currently not designed, not justified from Austroads movement numbers, but may be justified from a safety component). No direct impact to signals, but may have impact on queue lengths based on extent of RTB or similar.	Option is neutral in terms of integration with multimodal transport as it reduces and removes vehicle movement on Te Kowhai Road East.	Suitable mid length positioning of access (between turn head and curve). End turn head to be shifted & access for more appropriate drain profiles	Full access at turning head end, some limitation by right turning from Arthur Porter Drive.	Probable total purchase due to effect on balance of property. Risk that limited falls force elevated road levels relative to surrounding land with implications on secondary flow over private land or needing fill the property further or use open channels along the road to avoid the first two with consequential impacts on land take	Significant additional impervious area. Long pipe drainage runs will be needed and risk of impacting road levels. Need a driveway culvert and limited space to grade an overflow point.	No differentiating factor	requires additional culvert crossing of currently open SW channel - Additional impact to the wai	High land acquisition cost, cost of new road access	No real differentiating factor for 'public/stakeholder' attribute for Options VIII to XI. All reasonable options from a broad public traffic safety/public acceptance viewpoint, and no other stakeholder particularly expressing an interest relevant to these options. Have scored as neutral.	Ongoing maintenance of new road and drainage network			
Option IX (Orange) **Alternative Access via Connection to Realigned Arthur Porter Drive splits affect between Lot 58 and 57**	Would necessitate a redesign of Lot 58 access and carparking configurations, lesser impact to rear yard. Impacts Lot 57 - Site Development aspirations unknown Requires culvert crossing for access , turning head shown at edge of channel	1	2	0	-2	1	-1	-2	0	-1	-2	0	-2	0	-6	-19
Score Comment		see comment of V above	Assuming RTB or wide median is available (currently not designed, not justified from Austroads movement numbers, but may be justified from a safety component). No direct impact to signals, but may have impact on queue lengths based on extent of RTB or similar.	Option is neutral in terms of integration with multimodal transport as it reduces and removes vehicle movement on Te Kowhai Road East.	Proximity of access too close to bend, will cause tracking path issues. Turning head to be moved & access required for appropriate drainage profiles. Proximity of building to road exasperates issue, sightline/vertical geometric constraints	Limited access, away from intersection to limit possible delay due to traffic	Will require redesign/reconfiguration of proposed plans for Lots 57 and 58. Risk that limited falls force elevated road levels relative to surrounding land with implications on secondary flow over private land or needing fill the property further or use open channels along the road to avoid the first two with consequential impacts on land take	Significant additional impervious area. Long pipe drainage runs will be needed and risk of impacting road levels. Need a driveway culvert and limited space to grade an overflow point.	No differentiating factor	requires additional culvert crossing of currently open SW channel - Additional impact to the wai	Moderate land acquisition cost, cost of new road access	No real differentiating factor for 'public/stakeholder' attribute for Options VIII to XI. All reasonable options from a broad public traffic safety/public acceptance viewpoint, and no other stakeholder particularly expressing an interest relevant to these options. Have scored as neutral.	Ongoing maintenance of new road and drainage network			
Option X (Dark Blue) **Alternative Access via Realigned Arthur Porter Drive , Affects Lot 57 creates T intersection**	Affects Lot 57 - Development Aspirations Unknown Requires culvert crossing for access , turning head shown at edge of channel	2	2	1	2	1	-2	-1	0	-1	-2	0	-2	0	0	16
Score Comment		see comment of V above. Best option for V-X. Less movements from and to Arthur Porter improved alignment. Same issues with large quantity of HCVs accessing Prop 13 and others.	Assuming RTB or wide median is available (currently not designed, not justified from Austroads movement numbers, but may be justified from a safety component). No direct impact to signals, but may have impact on queue lengths based on extent of RTB or similar.	Option would achieve good level of integration with multimodal transport as it reduces and removes vehicle movement on Te Kowhai Road East.	Good intersection layout, clear tracking path to lot 13. Jug head can be moved to improve stormwater works over existing drain.	Full access at turning head end, some limitation by right turning from Arthur Porter Drive.	Will interrupt development aspirations for Lot 57 but as owner intending to subdivide and provide access to the rear site, there may be some mutual benefits. Risk that limited falls force elevated road levels relative to surrounding land with implications on secondary flow over private land or needing fill the property further or use open channels along the road to avoid the first two with consequential impacts on land take	Significant additional impervious area. Long pipe drainage runs will be needed and risk of impacting road levels. Need a driveway culvert and limited space to grade an overflow point.	No differentiating factor	requires additional culvert crossing of currently open SW channel - Additional impact to the wai	Unknown property implication at this time however less advanced development therefore moderate land acquisition cost assumed due to greater ability to negotiate industrial rates, cost of new road access	No real differentiating factor for 'public/stakeholder' attribute for Options VIII to XI. All reasonable options from a broad public traffic safety/public acceptance viewpoint, and no other stakeholder particularly expressing an interest relevant to these options. Have scored as neutral.	Ongoing maintenance of new road and drainage network			
Option XI (Magenta) **Alternative Access via Earthmover Crescent**	Affects Lot 17 development intentions unknown However access aligns with subdivision easements in favour of HCC	3	2	1	2	-2	-1	1	0	0	-2	0	-2	0	2	27
Score Comment		By far the best option for traffic safety and turning movements, virtually no impact on intersections and the existing roundabout allows for good control in all directions. This option is the most preferred from a traffic point of view. All available directions are covered and minimal impact across the network. There is no implication on the t-junction along Arthur Porter as with V-X right turns.	No impact to signal operation	The option allows for the existing roundabout to help control the increased traffic volumes along Arthur Porter. The option takes the main access off Arthur Porter Drive and Te Kowhai Road East which is favourable in reducing conflicts for any pedestrians or cyclists using the corridor.	Good intersection layout, clear tracking path to Lot 17 and Property 13	Rear access for Property 13 would require significant reconfiguration of the site	May interrupt development aspirations for Lot 17 but there may be some mutual benefits if the owner will benefit from frontage to a road	No culvert needed nor interrupting a secondary flow path but has significant new impervious area. Physically seperated from remaining corridor therefore lacks some continuity.	No differentiating factor	No differentiating factor	Moderate land acquisition cost, cost of new road access	No real differentiating factor for 'public/stakeholder' attribute for Options VIII to XI. All reasonable options from a broad public traffic safety/public acceptance viewpoint, and no other stakeholder particularly expressing an interest relevant to these options. Have scored as neutral.	Ongoing maintenance of new road and drainage network			

1	Minor Positive
2	Moderate Positive
3	Significant Positive

					WEIGHTED	
			SCORE	RANK	SCORE	RANK
Option I (Brown)			-5	5.5	-43	9
Option II (Lime Green)			-11	11	-89	11
Option III (Mid Green)			-7	9.5	-57	10
Option IV (Mid Blue)			-4	3.5	-19	6.5
Option V (Yellow)			-4	3.5	-15	5
Option VI (Burgundy)			-7	9.5	-31	8
Option VII(Red)			-6	7.5	-7	4
Option VIII (Purple)			-5	5.5	-6	3
Option IX (Orange)			-6	7.5	-19	6.5
Option X (Dark Blue)			0	2	16	2
Option XI (Magenta)			2	1	27	1