

Supporting Growth

North West Assessment of Effects on the Environment – Redhills Arterial Transport Network

Volume 2

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Document Status

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The Assessment of Effects on the Environment report and supporting documents are structured as set out in the table below:

Volume	Title	Contents
1	Form 18's	<p>NoR1 Redhills North-South Arterial Transport Corridor</p> <ul style="list-style-type: none"> Attachment A: Designation plans Attachment B: Schedule of Directly Affected Property Attachment C: Proposed NoR Conditions <p>NoR2a Redhills East West Arterial Transport Corridor – Dunlop Road</p> <ul style="list-style-type: none"> Attachment A: Designation plans Attachment B: Schedule of Directly Affected Property Attachment C: Proposed NoR Conditions <p>NoR2b Redhills East West Arterial Transport Corridor – Baker Lane</p> <ul style="list-style-type: none"> Attachment A: Designation plans Attachment B: Schedule of Directly Affected Property Attachment C: Proposed NoR Conditions <p>NoR2c Redhills East West Arterial Transport Corridor – Nixon Road Connection</p> <ul style="list-style-type: none"> Attachment A: Designation plans Attachment B: Schedule of Directly Affected Property Attachment C: Proposed NoR Conditions
2	AEE (this report)	<p>Appendix A: Assessment of Alternatives Report</p> <p>Appendix B: Statutory Assessment</p> <p>Appendix C: Proposed NoR Conditions</p>
3	Drawings	Designation and Indicative Design Drawings
4	Supporting Technical Reports	<p>Appendix A: Assessment of Transport Effects</p> <p>Appendix B: Assessment of Construction Noise and Vibration</p> <p>Appendix C: Assessment of Traffic Noise and Vibration</p> <p>Appendix D: Assessment of Historic Heritage Effects</p> <p>Appendix E: Assessment of Landscape and Visual Effects</p> <p>Appendix F: Assessment of Ecological Effects</p> <p>Appendix G: Assessment of Flooding Effects</p> <p>Appendix H: Urban Design Framework</p>

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Appendices

Appendix A: Assessment of Alternatives Report

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Appendix C: Proposed NoR Conditions

Acronyms

Acronym / Term	Description
AC DBC	Auckland Council Housing Infrastructure Fund Detailed Business Case
ACNV	Assessment of Construction Noise and Vibration
ADR	AUP:OIP Accidental Discovery Protocol
AEP	Annual Exceedance Probability (Stormwater)
AEcE	Assessment of Ecological Effects
AEE	Assessment of Effects on the Environment (this report)
AHHE	Assessment of Historic Heritage Effects
ALVE	Assessment of Landscape and Visual Effects
ATNV	Assessment of Traffic Noise and Vibration
ARI	Average Recurrence Interval (Stormwater)
AT	Auckland Transport
ATE	Assessment of Transport Effects
AUP:OIP	Auckland Unitary Plan: Operative in Part
BPO	Best Practicable Alternative (Noise & Vibration)
CEMP	Construction Environmental Management Plan
CIA	Cultural Impact Assessment
CNVMP	Construction Noise and Vibration Management Plan
CNVMS	Construction Noise and Vibration Management Schedules
CTMP	Construction Traffic Management Plan
DBC	Detailed Business Case
dB LAeq	Decibels equivalent continuous sound level (Noise and Vibration)
EIANZ	Environment Institute of Australia and New Zealand
FULSS	Future Urban Land Supply Strategy (2017)
HIF	Housing Infrastructure Fund
HNZPTA	Heritage New Zealand Pouhere Taonga Act 2014
IBC	Indicative Business Case
LGA	Local Government (Auckland Council) Act 2009
MPD	Maximum Probable Development
MCA	Multi Criteria Assessment
MHS	Residential - Mixed Housing Suburban Zone
MHU	Residential – Mixed Housing Urban Zone
NoR	Notice(s) of Requirement
NPS	National Policy Statement

NZS 6806	New Zealand Standard 6806:2010 'Acoustics - Road-traffic noise - New and altered roads
ONF	Outstanding Natural Feature
ONL	Outstanding Natural Landscape
PBC	Programme Business Case
PPF	Protected Premises and Facilities (Noise & Vibration)
RMA	Resource Management Act 1991
RATN	Redhills Arterial Transport Network
RPS	Regional Policy Statement
SEA	Significant Ecological Area
SG DBC	Supporting Growth Detailed Business Case
SH16	State Highway 16
SH18	State Highway 18
SHZ	Residential - Single House Zone
TDM	Transport Design Manual
THAB	Residential – Terrace Housing and Apartment Zone
The Council	Auckland Council
The Design Framework	Te Tupu Ngātahi Design Framework
The Programme	The Supporting Growth Programme
The Urban Design Framework	Urban Design Framework – Redhills Arterial Transport Network
ULDMP	Urban and Landscape Design Management Plan
Waka Kotahi	Waka Kotahi NZ Transport Agency

1 Introduction

This Assessment of Effects on the Environment (**AEE**) has been prepared for the Redhills Arterial Transport Network (**RATN**) and includes four Notices of Requirement (**NoR**) submitted by Auckland Transport (**AT**) as a requiring authority under the Resource Management Act 1991 (**RMA**).

The RATN forms part of the Supporting Growth Programme (the Programme) to enable the future construction, operation and maintenance of transport infrastructure to support future urban growth in the North West area of Auckland.

The projects in the RATN are listed in Table 1, with an illustration of the RATN context and extent shown in Figure 1.

Table 1: Redhills Arterial Transport Network – Projects and Notice Reference

Notice	Project	Description	Requiring Authority
NoR1	Redhills North-South Arterial Transport Corridor	New urban arterial transport corridor and upgrade of Don Buck and Royal Road intersection.	AT
NoR2a	Redhills East-West Arterial Transport Corridor – Dunlop Road	New urban arterial transport corridor that intersects with Fred Taylor Drive and connects to the remaining East-West connection (NoR2c) at the intersection with the Redhills North-South arterial corridor.	AT
NoR2b	Redhills East-West Arterial Transport Corridor – Baker Lane	New urban arterial transport corridor that intersects with Fred Taylor Drive and connects to the intersection of the remaining East-West connection and Dunlop Road (NoR2a).	AT
NoR2c	Redhills East-West Arterial Transport Corridor – Nixon Road Connection	New urban arterial transport corridor that intersects with the Redhills East West Arterial Corridor – Dunlop Road. This includes the upgrade of the existing Red Hills Road / Nelson Road / Nixon Road intersection, and the existing Nixon Road / Henwood Road intersection.	AT

The purpose of the proposed designations for NoR1 and NoR2(a, b and c) is the “Construction, operation and maintenance of a transport corridor”.

A lapse period of 15 years is proposed for both NoR1 and NoR2(a, b and c).

Appropriate conditions have also been proposed to enable the proposed work and to manage potential adverse effects (provided in 0).

The AEE has been prepared in accordance with section 168A of the RMA in such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

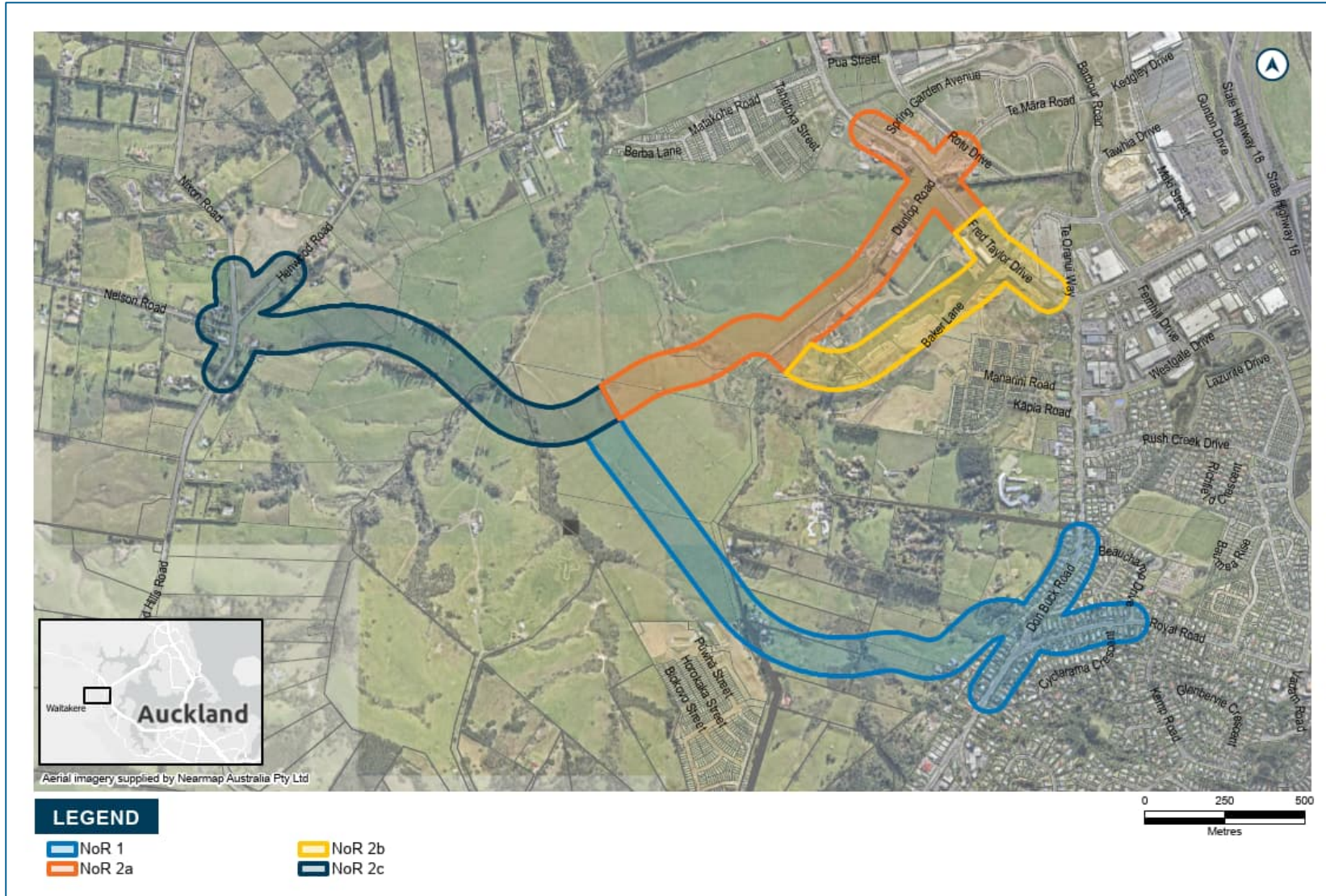


Figure 1: Redhills Arterial Transport Network Context and Extent

1.1 Supporting Growth Programme

The Programme is a collaboration between AT and Waka Kotahi NZ Transport Agency (Waka Kotahi) to identify and plan the transport network in Auckland's identified growth areas over the next 10 to 30 years.

AT and Waka Kotahi have worked in close alignment with Auckland Council (the Council), Mana whenua and KiwiRail Holdings Limited and are working closely with stakeholders and the community to develop the strategic transport network to support Auckland's growth areas.

The key objective of the Programme is to identify and protect land for future implementation of the required strategic transport corridors / infrastructure.

The Programme has identified the North West Preferred Transport Network in the North West Growth Area (Figure 2) which includes the RATN. Route protection for the North West Preferred Transport Network is now being progressed, including the RATN; the subject of this NoR.

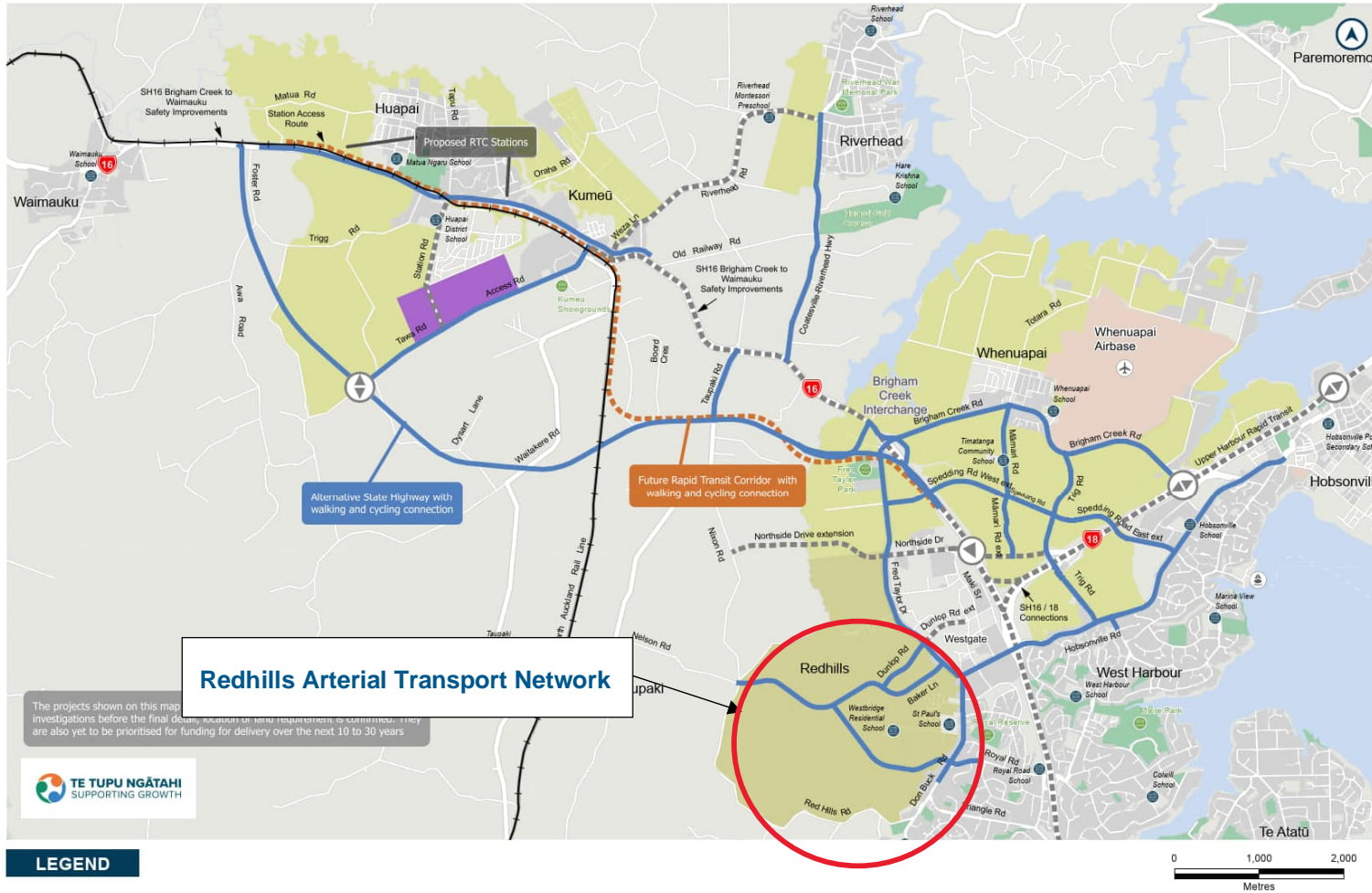


Figure 2: North West Preferred Transport Network

1.2 Housing Infrastructure Fund

The Housing Infrastructure Fund (HIF) was established by the Crown in 2016 to help address the funding constraints of high-growth councils, with the purpose of providing Crown loans to fund bulk infrastructure (water and transport) which enables housing development. The Council made an application for funds from the HIF to accelerate the development of houses in greenfield areas identified in the Future Urban Land Supply Strategy 2017 (FULSS). In July 2017 the Crown announced its recommendation (in principle) to provide a \$300 million loan through the HIF for bulk infrastructure in North West Auckland, estimated at the time to support the early construction of at least 10,500 new homes in North West Auckland.¹

Between 2017 and 2019, two business cases were developed to determine how the HIF could be used for the delivery of bulk infrastructure to support housing development in the North West, including the RATN:

- *Auckland Council Housing Infrastructure Fund Detailed Business Case 2018 (AC DBC)* - considered the extent to which the HIF could be used to fund the investment in all infrastructure required to support accelerated development.
- *Supporting Growth North West Housing Infrastructure Fund Detailed Business Case 2019 (SG DBC)* – further developed the identified transport network.

As Redhills was rezoned for urban land use (mostly residential zoning) through the Auckland Unitary Plan: Operative in Part (AUP:OIP) process, the progressive development of the area is anticipated over the next 10 years, subject to the provision of sufficient bulk infrastructure.

The SG DBC identified that the HIF would not be enough alone to enable the construction of the entire RATN. However, through coordination with developers, the HIF could be used to enable construction of parts of the RATN.

¹ With approval of the HIF in 2017 for bulk infrastructure in the North West, Auckland Council is expected to repay this loan by 2027.

2 Background and Context

2.1 Need for the Supporting Growth Programme

Auckland is New Zealand's largest city, home to approximately 1.65 million people. In 2017, Auckland attracted 36,800 new residents; more than the rest of the country combined. The Auckland Plan 2050 – Development Strategy signals that Auckland could grow by 720,000 people to reach 2.4 million over the next 30 years. This will generate demand for more than 400,000 additional homes and require land for 270,000 more jobs². Most of this growth will go into existing urban areas. However, around a third will go into future urban zoned areas (greenfields) as identified in the AUP:OIP.

In July 2017, the FULSS was updated in line with AUP:OIP zonings, with 15,000 hectares of land allocated for future urbanisation. The FULSS provides for sequenced and accelerated greenfield growth in ten areas of Auckland.

The significant growth anticipated will pose a number of future transport challenges for the region. Given the scale and duration of the growth proposed, the early route protection of critical transport corridors provides the required certainty for AT, Waka Kotahi, stakeholders and the community. The implementation of the strategic transport network required to support the growth will be staged over the next 30 years. A key part of this integrated approach is collaborating with the Council as it develops Structure Plans and works towards progressing subsequent plan changes to rezone land in the future urban areas.

The required transport networks will play a vital role in the success of new neighbourhoods by providing safe, accessible and sustainable travel choices that connect communities and encourage a transformational shift from private vehicles to public transport, walking and cycling. The early protection of these strategic transport corridors will provide for the following outcomes at a Programme-wide level:

- **Supporting and enabling growth:** Protecting improved and new transport corridors will support Council's growth aspirations for the growth areas of Auckland, including intensification or density of growth, resulting in more efficient urban land development.
- **Improved access to economic and social opportunities and resilience of the strategic transport network:** Protecting improved and new transport corridors will improve travel choices and access to the critical economic and social needs of the existing and future communities, reduce an over-reliance on existing strategic transport corridors, and better align the form and function of existing transport corridors with the planned urban form. Key to this is achieving a transformational mode shift from private vehicles to public transport, walking and cycling – which will provide for greater people moving capacity and greater travel choice for all people as the city grows.
- **Land use and transport integration:** Integrating transport solutions with Council's aspirations for land use and urban form can provide for growth in a way that delivers high quality urban outcomes, placemaking and enhanced liveability – including the desire for a quality, connected urban environment

² Draft Auckland Plan 2050 Development Strategy: <https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/auckland-plan/development-strategy/future-auckland/Pages/what-auckland-look-like-future.aspx>

- **Improved safety:** Protecting improved and new transport corridors will help to address existing and increasing safety risks on transport corridors as growth areas urbanise, including:
 - improved safety for all transport modes;
 - provision of dedicated space for cyclists and pedestrians to safely accommodate these modes;
 - specific safety improvement projects, such as improvements to existing road and rail corridors; and
 - a reduction in private vehicle travel as a result of mode shift towards public transport and walking and cycling.
- **Sustainable outcomes:** Protecting improved and new transport corridors will support the Government's policy shift towards more sustainable outcomes. This includes a reduction in greenhouse gas emissions and improved climate change resilience – through effective land use and transport integration and supporting mode shift towards more sustainable travel choices such as public transport and walking and cycling.
- **Infrastructure integration:** Integrating the transport response with the needs and opportunities of network utility providers to provide a better whole of system outcome.

2.2 Reasons for the Projects

Two key transport problems were identified in the AC DBC and SG DBC when considering housing development and the provision of infrastructure in the Redhills area:

- **Problem 1:** Uncertainty in the provision of infrastructure coupled with fragmented land ownership in North West Auckland creates risk aversion and leads to delays in the delivery of houses.
- **Problem 2:** Lack of an appropriate, integrated multi-modal transport system for Whenuapai is limiting travel choice, quality community outcomes and efficient access to jobs, education, and core services for our customers.

Derived from these problems, the following more specific issues have been identified for the RATN area:

- Redhills is within close proximity to the existing strategic transport network (State Highway 18 (**SH18**), State Highway 16 (**SH16**), Fred Taylor Drive and Don Buck Road) however there are limited transport connections available and there is no internal transport network to support development.
- The current mode share for private vehicles in the surrounding North West area is at least 85%, highlighting a lack of viable alternatives.
- The forecast vehicle trip demand is projected to at least double for the North West by 2048, which will significantly increase existing congestion on key linkages if action is not taken.

As noted in Section 1.2, the RATN is needed to support housing development in Redhills enabled by the AUP:OIP. The purpose of the RATN is to provide urban standard transport corridors that will support urbanisation of the surrounding land.

The need for route protection of the RATN is driven by the rate and scale of committed developments, and pressure from developers who have begun developments and / or are beginning to prepare development proposals for the area. If the transport corridors are not identified and protected in the

near future this may result in a combination of more expensive acquisition costs, a lack of certainty around public infrastructure investment, and a loss in ability to influence good urban form. It is therefore critical that the transport system supports and shapes the growth proposed.

To assist with assessing the relative strengths or weaknesses of alternate corridor options for the RATN, investment objectives were developed as part of the AC DBC and further refined in the SG DBC. The investment objectives are an important tool for informing decisions on funding which were developed from the key transport problems identified above.

The RMA Project Objectives for the RATN were then derived from the investment objectives once the required route and method was confirmed. The diagram below (Figure 3) shows how the investment objectives have evolved through the business case options assessment process into the current Project Objectives.

2.3 Project Timeframes

Investigation and reporting of the RATN commenced in 2015 as part of Supporting Growth Programme Business Case 2016 (PBC). This was progressed through to 2020 when the NoRs were first prepared. Due to funding constraints, the RATN was placed on hold, until 2022 when work recommenced.

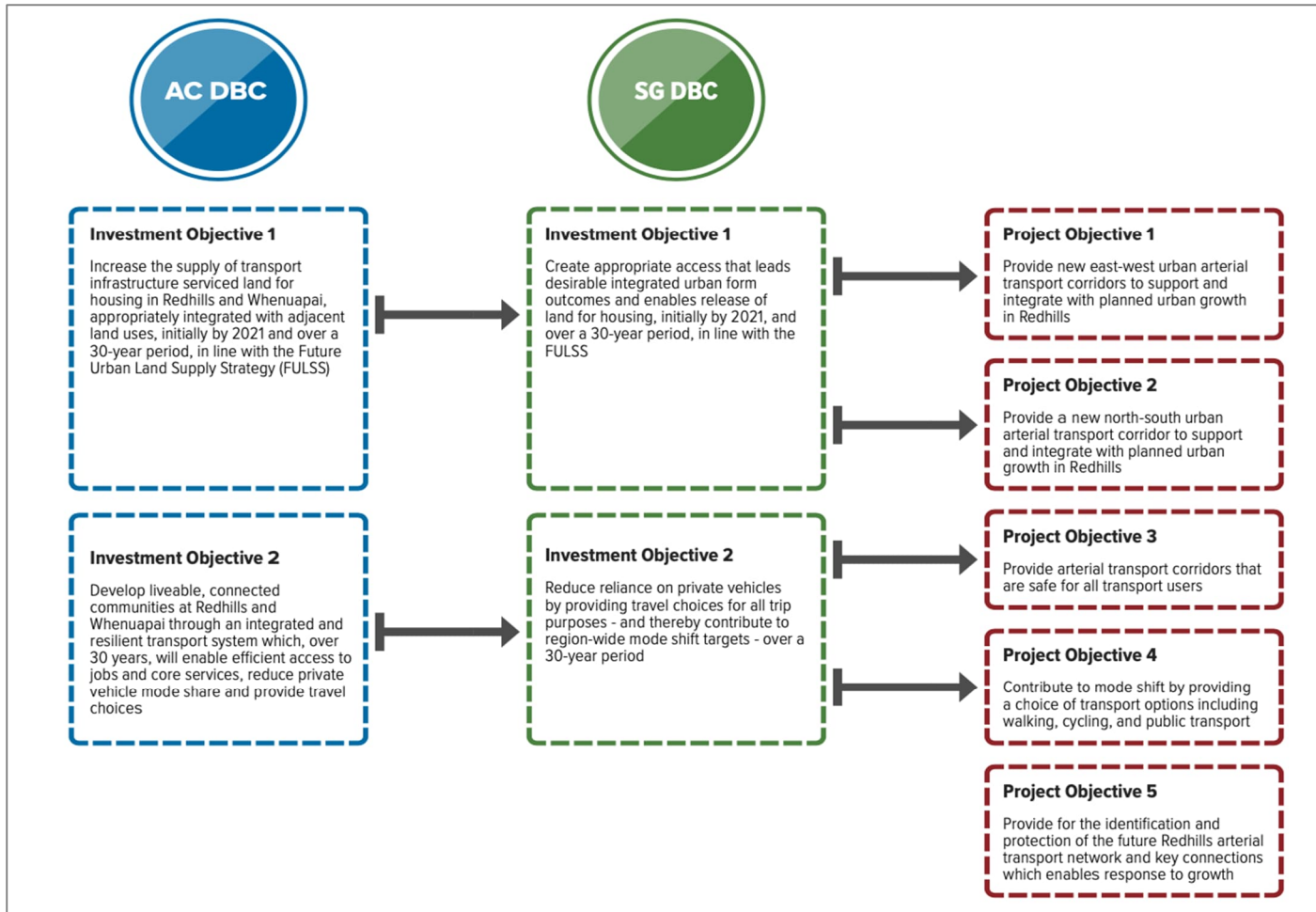


Figure 3: Development Process for Project Objectives

3 The Proposed Network

This section provides a project description for the RATN. The two corridors that make up the RATN comprise:

- Redhills North-South Arterial Transport Corridor (the **N-S Project**); and
- Redhills East-West Arterial Transport Corridor (the **E-W Project**)

3.1 Indicative Design and Drawings

The information provided throughout this report and accompanying documentation (including design drawings), describe the indicative alignment and other ancillary permanent works. Any numbers, areas or dimensions outlined in this section are approximate and may change as a result of detailed design. The final alignment for the RATN (including the design and location of ancillary components, such as stormwater treatment devices and soil disposal sites), will be refined and confirmed at the detailed design stage and confirmed through the Outline Plan of Works and regional resource consent processes. The indicative design was used to identify any actual or potential adverse effects of the RATN and to inform this assessment.

3.2 Redhills North-South Arterial Transport Corridor

The N-S Project provides for a new arterial transport corridor extending from the intersection of Don Buck and Royal Roads intersection in the south and connecting to a new intersection with the proposed Redhills East-West Arterial Transport Corridor (the E-W Project) in the north (Section 3.3 of this report). As well as general traffic, the corridor will also provide for walking, cycling and public transport. The N-S Project includes the signalisation of the existing roundabout at Don Buck and Royal Roads and the formation of a new signalised intersection with the E-W Project.

An overview of the design is provided in Figure 4, with an indicative cross-section of the N-S Project shown in Figure 5. The full set of indicative design drawings for the N-S Project are provided in Volume 3.

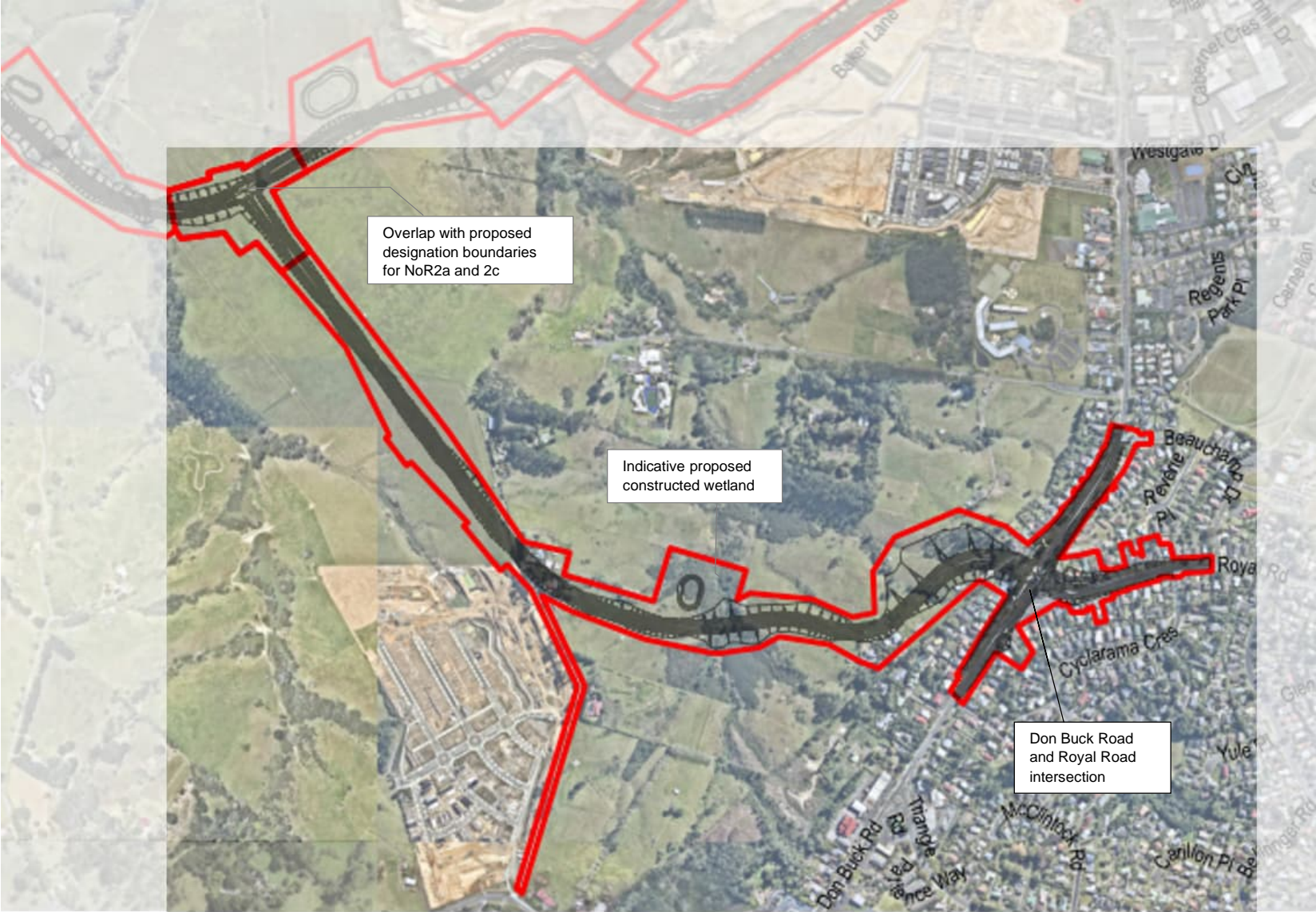


Figure 4: Redhills North-South Arterial Transport Corridor

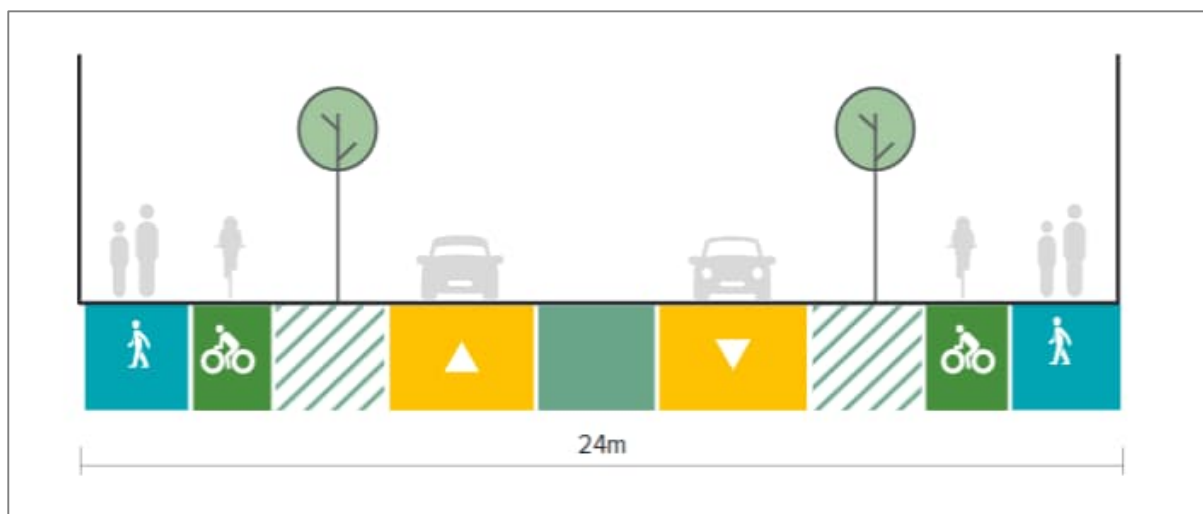


Figure 5: Redhills North-South Arterial Transport Corridor typical cross-section

3.2.1 North-South Arterial Road Layout

The N-S Project will provide for the construction of a two-lane, approximately 24m wide urban arterial transport corridor extending from the Don Buck Road and Royal Road intersection in the south and connecting to a new intersection with the E-W Project (Section 3.3) to the North.

The proposed speed environment is expected to be 50km/h throughout, with no on-street parking and the inclusion of a flush or solid median. The indicative cross-section identifies new 1.8m wide footpaths and 2m wide cycle paths will be provided on both sides of the arterial corridor, with a 2.3m berm provided between these facilities and the road carriageway. This will allow for a flexible design approach that can provide safe walking and cycling facilities with high amenity (during later design stages).

The N-S Project will connect to the E-W Project on the western side of the proposed local centre in the centre of Redhills. This new internal intersection will be signalised as the future local centre environment will result in high numbers of pedestrians, and signals enable pedestrian and cyclist movements to be prioritised and crossing widths reduced.

The alignment geometry of the N-S Project corridor includes the following:

- From the new intersection with the E-W Project, the N-S Project alignment will climb steeply at 8% gradient for approximately 110m, then will traverse across undulating land and stream tributaries before again climbing steeply at 8% for approximately 325m; and then connecting with Don Buck Road at the intersection with Royal Road.
- This alignment will also pass underneath the existing Transpower 110kV and 220kV transmission lines and pylons at one section and run between the pylons for approximately 1km in length.

The N-S Project will require land from both rural and lifestyle block properties as well as land within existing urban residential properties situated adjacent to, or within close proximity to, the Don Buck Road and Royal Road intersection. As the new corridor will provide an important arterial connection it is likely that the corridor will be classified as Limited Access Road under Section 346C of the Local

Government Act 1974. Consequently, while current existing access will be maintained, intensification of access or new access direct to the arterial corridor will generally be discouraged as the area urbanises.

3.2.2 Don Buck Road / Royal Road Intersection Layout

The N-S Project includes a new signalised intersection approximately 50m north of the existing roundabout. The relocation of the intersection will allow Royal Road to be straightened and connect to Don Buck Road at a less acute angle.

Localised widening will be required to accommodate vehicle stacking at the intersection, tie-ins to the existing carriageway at the N-S Project extents, and walking / cycling facilities and crossings around the Don Buck Road and Royal Road intersection. This widening will tie back into the existing road carriageway and footpaths as soon as practicable and safe. Don Buck Road will be lowered by up to approximately 1.2m over a length of 150m to provide adequate sight distances for the intersection.

A signalised intersection is proposed as multiple approach lanes will be required, and a multiple lane roundabout would lead to severance and safety issues associated with crossing for pedestrians and turning cyclists. A roundabout would also require a significant footprint, resulting in adverse urban form impacts. Signalised intersections also provide greater ability to implement bus priority measures

3.2.3 Don Buck Road

Don Buck Road has a relatively wide road reserve width (approximately 32m) on the north side of the intersection and can accommodate widening of the road carriageway. The existing retaining wall on the eastern side of the corridor is to be replaced with a new retaining wall approximately 5m high. A new retaining wall approximately 1.5m high is required on the west side of the corridor to accommodate the difference in level between the trafficked road corridor and low-level service lanes (discussed below).

Vehicle access to existing residential properties along Don Buck Road is largely provided by three low level service lanes, and the N-S Project will maintain these lanes with modifications. Vehicle access to other residential properties along Don Buck Road will generally remain unchanged. Further consideration of the extent of solid and flush medians will be undertaken in the next phase of design to accommodate unrestricted vehicle movements from driveways where possible.

3.2.4 Royal Road

A length of approximately 250m of Royal Road will be realigned for the new intersection with Don Buck Road and the N-S Project. This length of Royal Road will also be widened to accommodate a right turn lane, cycleway and footpath facilities.

Several residential properties on the north side of Royal Road will be required to provide for the new intersection and road layout. Ancillary works such as small retaining walls (less than 1m high) and driveway regrading will be necessary on some properties along Royal Road.

A portion of the existing Royal Road carriageway immediately east of the existing roundabout will be reused for property access.

3.2.5 Public Transport Provisions

The N-S Project proposes the following bus priority measures through the upgraded intersection of Don Buck Road and Royal Road:

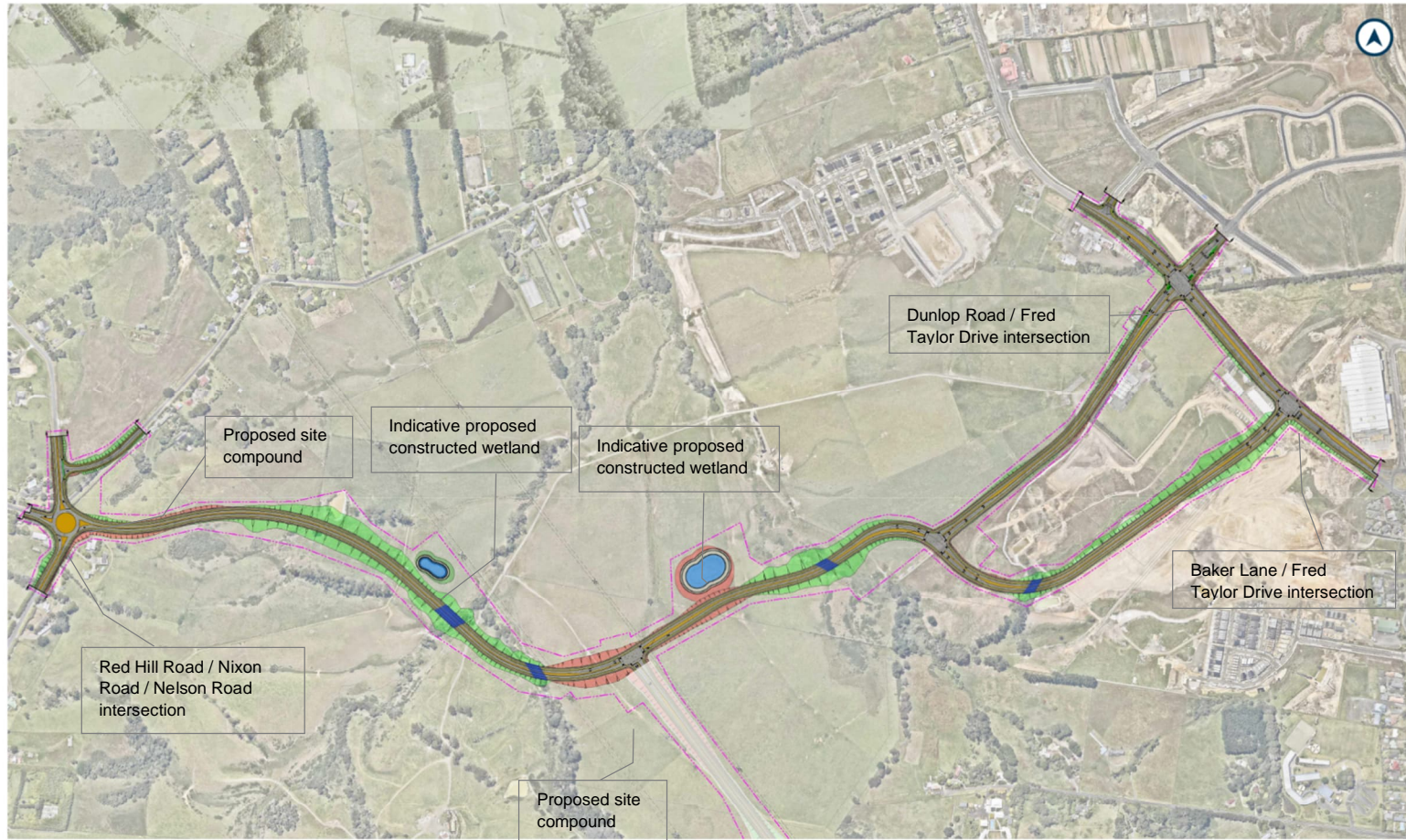
- A dedicated bus approach lane on Royal Road, and
- Providing for 'bus only' through movements in the left-turn lanes.

The exact location of bus stops will be defined later through the detailed design stage, once greater certainty is available on the location of key land use activities and demand for bus stops can be determined (e.g., around centres and schools). The proposed transport corridor cross section widths allow for space that can incorporate a bus stop.

3.3 Redhills East-West Arterial Transport Corridor

The E-W Project provides for a new arterial transport corridor extending across the Redhills area from the intersection of Nixon Road, Nelson Road and Red Hills Road in the west, which splits into two separate two-lane arterial transport corridors which both connect to Fred Taylor Drive in the east. The dual corridors are referred to as 'Dunlop Road' and 'Baker Lane' respectively (these are the names of the existing road and access lane which will be upgraded to form the new corridors).

An overview of the design is provided in Figure 6, with an indicative cross-section of the E-W Project corridors shown in Figure 7. The full set of design drawings for the E-W Project are provided in Volume 3.



LEGEND

- | | | | |
|-------------------------------|------------------------|--|--------------------------|
| Existing property boundary | Proposed road corridor | Proposed berm | Fill batter |
| Proposed designation boundary | Proposed cycleway | Proposed flush, raised median & traffic island | Cut batter |
| Proposed wetland | Proposed footpath | | Proposed stream crossing |

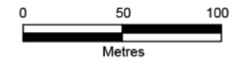


Figure 6: Redhills East West Arterial Transport Corridor

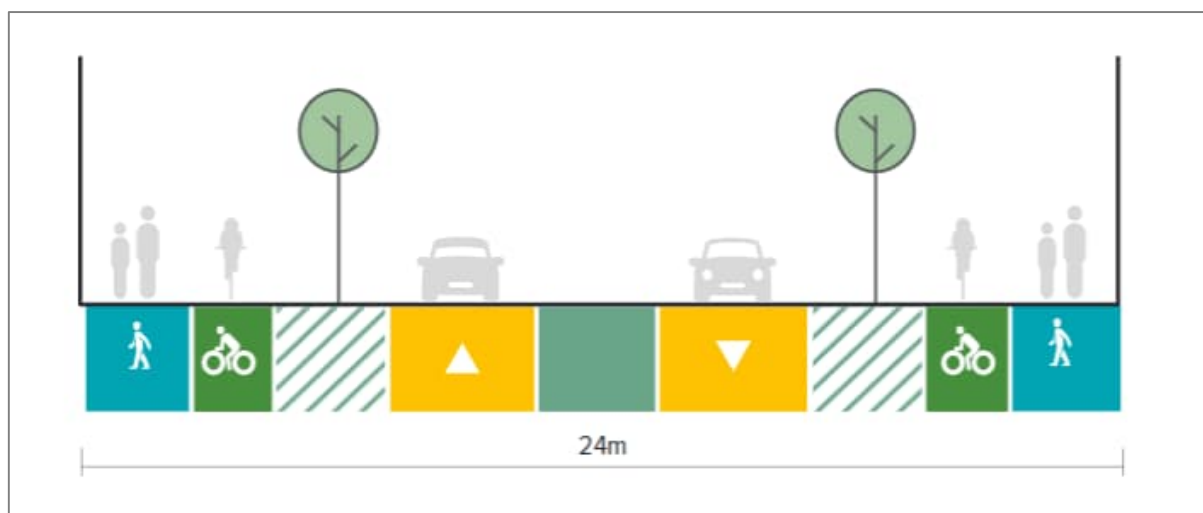


Figure 7: Redhills – East-West Arterial Transport Corridor typical cross-section

3.3.1 East-West Arterial Road Layout

The E-W Project will provide for the construction of a two-lane, 24m wide urban arterial transport corridor extending from the intersection of Nelson Road, Nixon Road and Red Hills Road, splitting into two separate two lane arterial corridors (Dunlop Road and Baker Lane) that connect to two new intersections with Fred Taylor Drive. The new internal intersection with the N-S Project (as discussed previously in Section 3.2) will intersect with the E-W Project to the west of the proposed local centre. This intersection will be signalised due to the anticipated high numbers of pedestrians associated with the future local centre environment. These signals will enable pedestrian movements to be prioritised and crossing widths reduced.

The new speed environment will be 50km/h throughout, with no on-street parking and the inclusion of a flush or solid median. New 1.8m footpaths and 2m wide cycle paths will be provided on both sides of the arterial corridor, with a 2.3m berm provided between these facilities and the road carriageway. This will provide safe walking and cycling facilities with high amenity.

This corridor will provide a strategic connection between Nixon Road and Fred Taylor Drive (via the new Dunlop Road and Baker Lane arterials, described separately in more detail below) and a key transport corridor to the proposed local centre in the centre of Redhills (located midway along this route). This corridor is positioned on the perimeter of the local centre zone, with future collector roads expected to provide direct access into the local centre.

The alignment geometry of this corridor includes the following:

- From the upgraded intersection of Nixon, Nelson and Red Hills Roads in the west, the alignment will extend roughly perpendicular from the intersection then follow a curvilinear geometry to tie into the northern perimeter of the local centre. The vertical alignment will be steep at 8% for 550m as the corridor falls away from the ridge and will follow the existing terrain down to the lower topography in the centre of Redhills.
- The vertical grade will then be generally flat as it passes over numerous existing streams and under the Transpower transmission lines.

As the new corridor will provide an important arterial connection it is assumed that the corridor will be classified as a Limited Access Road under section 346C of the Local Government Act 1974. Consequently, while current existing access will be maintained where practicable, intensification of access will generally be discouraged as the area urbanises.

While stream crossings have been minimised where practicable through the options assessment process (outlined in Section 8.2), four new stream crossings are required within the corridor. The alignments of these crossings have been determined to minimise the skew of the crossings, reducing construction complexity, and potential ecological impacts. The form of these crossings (i.e., bridges or culverts) has not been identified and will be determined at the detailed design phase when regional resource consents will be sought. However, the current designation footprint has been designed to not preclude bridges or culverts from being provided.

3.3.2 Baker Lane

The new Baker Lane will consist of a 24m urban arterial corridor that connects with Fred Taylor Drive in the east. The corridor will initially follow the existing alignment of Baker Lane from Fred Taylor Drive for approximately 100m, then will divert north to align with the proposed development plans adjacent to the corridor.

3.3.3 Dunlop Road

The new Dunlop Road will consist of a 24m urban arterial corridor that connects with Fred Taylor Drive in the east. This corridor will connect the East West arterial transport corridor (and the proposed local centre) with Fred Taylor Drive, which enables a connection to the Westgate Metropolitan Centre and the proposed Public Transit Hub adjacent to SH16. The Dunlop Road corridor will therefore function as the primary public transport route between Redhills and Westgate.

3.3.4 Fred Taylor Drive

Fred Taylor Drive will be widened to accommodate the new Dunlop Road and Baker Lane intersections and additional vehicle lanes (to accommodate four lanes). The widening will extend approximately 200 metres on either side of the Dunlop Road and Baker Lane intersections, for approximately 800m in total, before tying into the existing Fred Taylor Drive.

Fred Taylor Drive has a corridor width of approximately 20m, with an additional 5m either side provided for through ATs existing designation 1468, Road Widening – State Highway 16 (Westgate to Whenuapai) for 'Road widening' purposes. The alignment has been developed working from the existing designation line on the northern side of Fred Taylor Drive to minimise further property impacts on the northern side of Fred Taylor Drive where development is currently progressing (except for property requirements within the existing designation 1468 area).

This section of Fred Taylor Drive will likely undergo full reconstruction; however, the design will maintain the existing road levels where practicable to tie into adjoining developments.

3.3.5 Intersection Layouts

The E-W Project involves one new (Baker Lane / Fred Taylor Drive) and two upgraded intersections (Dunlop Road / Fred Taylor Drive and Red Hills Road / Nixon Road / Nelson Road). Localised widening will be required at all intersections to accommodate a larger intersection footprint, vehicle

stacking, walking and cycling facilities and crossings, and tie-ins to the existing carriageway at the project extents. This widening will require localised property acquisition along the corridor.

The Red Hills Road / Nixon Road / Nelson Road intersection will include the following:

- A new single lane roundabout. The roundabout will provide a threshold treatment between the urbanised and rural areas, with the single lane approach providing for pedestrian and cycle crossings.
- Nixon Road will be lowered by up to 600mm for a length of 150m to provide appropriate sight distance to the roundabout in accordance with the Austroads standards.
- Henwood Road will be realigned for approximately 120m, to connect to Nixon Road 100m north of the new roundabout, providing separation from the roundabout intersection.

The Baker Lane / Fred Taylor Drive and Dunlop Road / Fred Taylor Drive intersections will include the following:

- Signalised intersections have been proposed for the intersections of Dunlop Road and Fred Taylor Drive and Baker Lane and Fred Taylor Drive.
- A signalised intersection is proposed as multiple approach lanes will be required, and a multiple lane roundabout would lead to severance and safety issues associated with crossing for pedestrians and turning cyclists. A roundabout would also require a significant footprint, resulting in adverse urban form impacts. Signalised intersections also provide greater ability to implement bus priority measures for the Dunlop Road intersection and support walking, cycling and bus movements from Redhills to Westgate.
- These intersections will be designed to future proof for extensions of the roads to the north-east (i.e., Baker Lane Extension and Dunlop Road Extension).

3.3.6 Public Transport Provisions

As discussed, the Dunlop Road corridor will provide a connection for frequent bus services from Redhills to Westgate, connecting the proposed local centre in Redhills to Fred Taylor Drive, which enables a connection with the Westgate Metropolitan Centre and the proposed Public Transit Hub adjacent to SH16.

The Dunlop Road corridor will include bus priority measures providing for 'bus only' through movements in the left-turn lanes.

The exact location of bus stops will be defined at later stages as part of the detailed design, once greater certainty is available on the location of key land use activities and demand for bus stops can be determined (e.g., around centres and schools). The proposed transport corridor cross section has sufficient width for bus stops.

3.4 Stormwater

Final design of stormwater wetlands, pond numbers, location and specifications for the RATN will be confirmed at the detailed design stage, in conjunction with regional resource consents sought. However, the designation footprint will provide sufficient space to enable the wetlands based on the principles outlined in Section 5.1.1.2.

3.4.1 Natural Hazards and Flooding

The stormwater design has taken into account the risks associated with the natural hazards caused by flooding and erosion. The RATN will be required to deliver the following outcomes:

- No increase in flood levels for existing authorised habitable floors that are already subject to flooding
- No more than a 10% reduction in freeboard for existing authorised habitable floors
- No increase of more than 50mm in flood level on land zoned for urban or future urban development where there is no existing habitable dwelling
- No new flood prone areas
- No more than a 10% average increase of flood hazard (defined as flow depth times velocity) for main access to authorized habitable dwellings existing at the time the Outline Plan is submitted.

3.5 Utilities

The existing utility infrastructure and other proposed changes to utilities within the RATN area are discussed in Section 6.1.7.

The following changes to utilities are expected as a result of the road works associated with the RATN

N-S Project:

- The N-S Project involves lowering part of Don Buck Road, and this is expected to result in the relocation of Watercare's trunk watermain as part of the construction works. Some of the local watermains may also need to be relocated.
- Watercare local watermains along Royal Road will need to be relocated as part of the realignment of Royal Road.
- The Vector overhead power infrastructure will be relocated and / or undergrounded where necessary as part of the construction works. New power reticulation will be installed in all new arterial corridors in conjunction with Vector.
- Some of the existing communications ducts will need to be relocated and / or protected as part of the works. AT will work with other utility providers to coordinate any potential relocation works during construction where possible.

E-W Project:

- The Watercare trunk watermains along Fred Taylor Drive can be protected during construction works, however some of the local watermains may need to be relocated.
- The Vector overhead power infrastructure may be relocated and / or undergrounded where necessary as part of the construction works and will be determined at the detailed design stage.
- Some of the existing communications ducts will need to be relocated and / or protected as part of the works. AT will work with other utility providers to coordinate any potential relocation works during construction where possible.

4 Overview of NoRs

4.1 Requiring Authority Status

AT is responsible for Auckland's transport projects and services (excluding state highways), including roads, footpaths, cycling, parking and public transport services such as rail. AT is a Council Controlled Organisation under the Local Government (Auckland Council) Act 2009 (LGA), which states that AT's purpose is to "contribute to an effective, efficient and safe Auckland land transport system in the public interest".

AT's functions are identified in section 45 of the LGA and include managing and controlling the AT system in accordance with the LGA, including by performing the statutory functions and exercising the statutory powers set out in section 46 of the LGA as if AT were a local authority or other statutory body, and acting as a requiring authority under section 167 of the RMA.

Under section 47(1) of the LGA, AT is deemed to be approved as a requiring authority, as a network utility operator, under section 167 of the RMA. This is for the purpose of "constructing or operating or proposing to construct or operate roads in relation to the Auckland transport system" and "the carrying out of an activity or a proposed activity ... in relation to the Auckland transport system for which it or the Auckland Council has financial responsibility". Subsequently, AT may designate land under the RMA to construct, operate and maintain roads and to carry out activities which relate to the transport system.

4.2 NoR Summary

The NoRs, if confirmed and subject to any conditions, will designate land in the AUP:OIP for the purpose of the construction, operation and maintenance of the RATN. The designation authorises the works to be undertaken within the footprint, without further consents under the district plan provisions of the AUP:OIP.

Table 2 provides an overview of the key details associated with the NoRs.

Table 2: NoR Overviews

Notice	Project Name	Purpose	Objectives	Extent (succinct description)	Lapse Period (see also section 3.2 below)	Overview of Properties
NoR1	Redhills North-South Arterial Corridor	Construction, operation and maintenance of an arterial transport corridor	<ul style="list-style-type: none"> • Project Objective 1: Provide a new north-south urban arterial transport corridor from Royal Road to the future East-West Arterial Corridor to support and integrate with planned urban growth in Redhills. • Project Objective 2: Provide arterial transport corridors that are safe for all transport users. • Project Objective 3: Contribute to mode shift by providing a choice of transport options including walking, cycling and public transport. • Project Objective 4: Provide for the identification and protection of the future Redhills arterial transport network and key connections which enables growth. 	<p>The NoR submitted proposes a designation footprint that comprises:</p> <ul style="list-style-type: none"> • Approximately 1.8km, generally providing a 24m wide cross section • land for ancillary works including construction, mitigation and ongoing operations and maintenance 	15 years	75 properties directly affected by the NoR
NoR2a	Redhills East-West Arterial Corridor – Dunlop Road Extension	Construction, operation and maintenance of an arterial transport corridor	<ul style="list-style-type: none"> • Project Objective 1: Provide new east-west urban arterial transport corridors from Fred Taylor Drive to Nixon Road to support and integrate with planned urban growth in Redhills. 	<p>The NoR submitted proposes a designation footprint that comprises:</p> <ul style="list-style-type: none"> • Approximately 1.4km, generally providing a 24m wide cross section • land for ancillary works including construction, 	15 years	16 properties directly affected by the NoR

			<ul style="list-style-type: none"> • Project Objective 2: Provide arterial transport corridors that are safe for all transport users. • Project Objective 3: Contribute to mode shift by providing a choice of transport options including walking, cycling and public transport. • Project Objective 4: Provide for the identification and protection of the future Redhills arterial transport network and key connections which enables growth. 	mitigation and ongoing operations and maintenance		
NoR2b	Redhills East-West Arterial Corridor – Baker Lane Extension			<p>The NoR submitted proposes a designation footprint that comprises:</p> <ul style="list-style-type: none"> • Approximately 0.8 km of Baker Lane, generally providing a 24m wide cross section • land for ancillary works including construction, mitigation and ongoing operations and maintenance 		11 properties directly affected by the NoR
NoR2c	Redhills East-West Arterial Corridor – Nixon Road Connection			<p>The NoR proposes a designation footprint that comprises:</p> <ul style="list-style-type: none"> • Approximately 1.2km, generally providing a 24m wide cross section • land for ancillary works including construction, mitigation and ongoing operations and maintenance 		11 properties directly affected by the NoR

4.3 Lapse Period

In accordance with section 184 of the RMA, a designation lapses five years after it is included in the district plan unless:

- a) It has been given effect to; or
- b) Within three months of the designation lapsing, the territorial authority determines that substantial progress or effort has been and continues to be made towards giving effect to the designation, or
- c) The designation specifies a different lapse period

A key objective of the Te Tupu Ngātahi Supporting Growth Programme is to identify and protect land now for future transport networks. It is considered that an extended lapse period of 15 is a method that is reasonably necessary to achieve this key objective as it provides statutory protection of the future transport corridors in a manner that enables a flexible and efficient infrastructure response to landuse.

The RATN is identified in the Auckland Regional Land Transport Plan 2021-2031 as part of the 'Greenfield transport infrastructure – Northwest' project. It is expected that funding for the construction of the RATN will be made available in coordination with residential development within the Redhills area. It is anticipated that the development of Redhills will occur progressively over the coming decade. The delivery of residential development will be led by private developers; therefore, the delivery of the RATN will be largely determined by the pace at which private development occurs.

As the timing of this development is yet to be confirmed, there is a need for flexibility for AT in the timing of delivery of the RATN. As such, AT requires a lapse duration beyond the standard 5-year lapse period for the RATN NoRs. As enabled by section 184(c) of the RMA, lapse periods of 15 years are required for each of the RATN NoRs.

4.4 Notification

Auckland Transport requests that all the notices associated with the RATN (NoR 1, NOR 2a, NoR 2b, NoR 2c) are publicly notified.

5 Design and Assessment Approach

As discussed in Section 1, the RATN is comprised of numerous projects divided into four NoRs. A general approach to design and assessment has been developed to support the delivery of the projects and the wider Programme. The following sub-sections discuss the approach to design, existing and future environment, and managing effects as they apply to the RATN.

5.1 Approach to Design

As noted, the designations proposed by the NoRs, if confirmed, will identify and protect the land in the AUP:OIP and provide approval for the construction, operation and maintenance of the RATN. As discussed in Section 3.1, the design information is indicative for the RATN. It has been prepared to a level sufficient to inform the proposed designation footprints and to assess an envelope of effects that includes operational and maintenance requirements, potential construction areas, and areas required to mitigate any adverse effects.

The key transport elements which will be provided by the RATN are described in Section 3.2 for the North-South arterial transport corridor (NoR 1) and Section 3.3 for the East-West arterial transport corridor (NoR 2 (a, b and c)). The final design details for the RATN will be refined and confirmed before construction as part of the Outline Plan or Plans (as the Outline Plans may be staged to reflect project phases or construction sequencing) which will be submitted to Council as set out in section 176A of the RMA. Resource consents will also need to be applied for in the future.

The indicative alignment drawing sets for each project in the RATN are contained in Volume 3 and includes the following:

- Indicative alignment general arrangement layout plan, including proposed designation footprint; and
- Indicative intersection layout.

These have informed the proposed designation footprint and include ancillary components, such as construction areas and stormwater requirements.

5.1.1 Design Philosophy and Standards

The following section outlines the design philosophy and key design standards that have been adopted for the RATN.

The RATN will provide new arterial transport corridors which will play a vital role within Redhills and as part of a wider regional arterial network. Specifically, there is a need for the RATN to provide for safe and efficient connections between key destinations, integrate with the new or planned communities at Redhills and improve access to the wider transport network and provide choice in mobility.

Overall, the key design outcomes sought are:

- Compatibility with planned urbanisation of the area in the AUP:OIP
- Separated / dedicated off road cycle paths
- Separated footpaths
- Bus priority at intersections

- Enable good urban design and amenity outcomes
- Ensure safety for all road users.

5.1.1.1 Arterial Corridor Design

The RATN has been investigated, designed and assessed in accordance with the Auckland Transport Transport Design Manual (TDM) design guidelines and relevant national standards. The design standards are as follows:

- A design speed of 60km/h has been adopted for all the arterial roads with a posted speed of 50km/h for all the future and interconnecting roading networks.
- A maximum vertical gradient of 8.0% has been adopted for the alignments. Vertical gradients have been set as low as practically possible to mitigate potential problems arising from:
 - Engineering costs related to working on steep gradients, providing an economic balance between cut and fill quantities, and long-term road maintenance costs
 - Vehicle speeds and other road safety concerns attributed to steep gradients
 - Consideration for active modes using the transport corridor
- A generic arterial cross-section has been developed for the transport corridors within the RATN, and generally incorporates the following elements:
 - Berm
 - Footpath
 - Cycleway
 - Traffic lanes
 - Solid or flush median
 - Communications duct for utilities
 - Street lighting on both sides of the transport corridor, providing for cyclist and pedestrian path lighting in accordance with TDM and national lighting standards
 - Appropriate delineation with standard road pavement markings and advance guidance / warning signage in accordance with relevant national standards
 - All batter slopes designed to 3H:1V in accordance with TDM minimum design standards.
- Final cross-sections will be produced at the detailed design stage and will be submitted as part of the Outline Plan(s).
- Active mode mobility is a key desired design outcome, therefore walking and cycling have been prioritised in the RATN design. A nominal 1.8m footpath and 2.0m cycle path are provided with a small buffer between them.
- Public transport has also been prioritised in the design to respond appropriately to forecast demand. Bus stop facilities are expected to be installed along each of the arterials at nominal spacing of 400m.
- The standard arterial road pavement design, and in particular the surfacing details, will be refined during future design phases.

The cross-section provides flexibility to enable the connections with the future collector and local road network through the provision of medium strips and berm space.

5.1.1.2 Stormwater Design and Management

As no regional consents are being sought at this stage, the stormwater design approach has focused on confirming the designation footprint required for appropriate stormwater management. Detail on specific stormwater design and treatment features will be undertaken at the detailed design stage when regional consents will be sought.

Provision has been made for the future mitigation of potential stormwater effects (stormwater quantity, stormwater quality and in-stream structures) by identifying the space required for stormwater management devices (for example ponds) and incorporating land for that purpose into the proposed designation boundaries.

These devices have been designed to attenuate the 100-year ARI event by using 10% of the total roading impervious catchment area (proposed and existing) as the required device size – which is sufficient for a device in accordance with Auckland Council and Waka Kotahi guidance^{3,4}. In identifying the land required for these devices, preliminary sizing and siting has been undertaken and offset allowances made for construction phase works.

Potential stormwater bridge and culvert locations have been assessed based on predicted overland flow paths from flood modelling (refer section 5.1.1.3 below).

5.1.1.3 Flood Hazard Assessment Methodology

The Assessment of Flooding Effects for Redhills, provided in Volume 4, assesses the potential effects of the proposed transport corridors during construction and operational phases on the flood extents and levels in the surrounding area. The summary below should be read in conjunction with this report.

The assessment of flooding effects for the Redhills Arterial Transport Network has involved the following steps:

- Desktop assessment to identify potential flooding locations from Auckland Council Geomaps.
- Modelling of the pre-development terrain with Maximum Probable Development (MPD) and 100-year Average Recurrence Interval (ARI) plus climate change rainfall.
- Two climate scenarios were modelled, one allowing for 2.1°C of temperature increase and one for 3.8°C of temperature increase. The higher climate change scenario has been used to undertake a sensitivity analysis to understand the increased risk of greater climate change impacts.
- Producing flood level maps for the pre-development scenario to show the flood levels and extents (greater than 50 mm) that need to be considered.
- Inspection and review of flood maps at key locations such as proposed bridges and major earthworks to ensure this is allowed for in future design.

5.1.1.4 Geotechnical

Desktop assessments have been carried out based on published geological and geomorphological conditions to enable the generalised topography and geology of the areas to be identified.

³ Auckland Council's Stormwater Management Devices in the Auckland Region, Guideline Document 2017/001 (December 2017)

⁴ Waka Kotahi NZTA's Stormwater Design Philosophy Statement (May 2010)

As discussed in Section 5.1.1.1 above, 3H:1V cut and fill slopes have been used in all arterial designs, and for determining earthworks quantities and potential impacts on existing features and property boundaries. This is sufficient to determine the footprint of the land required to enable the work. No additional geotechnical or engineering strengthening has been assumed for the cut and / or fill batters, and this will be confirmed during the later design stages.

5.1.1.5 Urban Design Framework

Land use and transport integration, through the placement and interrelationship of movement networks and the areas they pass through, has the potential to contribute to high quality liveable places. The Programme has the potential to have a meaningful, and positive impact on the liveability and quality of future urban areas, including Redhills.

In recognition of this, the Te Tupu Ngātahi Design Framework (the Design Framework) was established for the Programme. The Design Framework provides measurable guidance for outcomes-based decisions throughout each phase of the Programme delivery. The design principles that make up the Design Framework seek to ensure that any transport networks will contribute positively to new and existing communities, the environment and the social and economic vitality of Auckland.

There are twenty design principles that provide high level guidance on the following attributes: responsive, resilient, sustainable, vibrant and high-quality urban environments. Each of the principles describe what 'good looks like' and what to aim for in the design of transport networks. The principles sit within an integrated system across various layers, to be prioritised and applied according to desired outcomes articulated in the strategic policy direction and the unique needs of each context.

The Redhills Arterial Transport Network – Urban Design Evaluation (the Urban Design Evaluation) (Volume 4) provides a project specific overview of the urban design considerations and inputs during option development and refinement of the RATN and the identification of future transport and land use integration opportunities for the RATN.

The Urban Design Evaluation provides urban design focused commentary on the indicative design detail and recommends the framework for how and where any urban design opportunities should be considered in future design stages.

Of particular note, the Urban Design Evaluation states that the North-South transport corridor could potentially preclude vehicular access from adjacent Mixed Housing Suburban zoned land and could also pose a barrier to some users with disabilities or other physical ability limitations on the basis of the gradient required for the North-South transport corridor to approach Don Buck Road. The future establishment of an urban integration strategy that is focused on integration with built form, access, connectivity and character of adjacent development will address and manage this interface to the extent reasonably practicable.

In order to address these effects an Urban and Landscape Design Management Plan (ULDMP) will be prepared (as set out in the conditions in 0). The commentary and recommendations in the Urban Design Evaluation have formed the basis of these urban design specific conditions, and where relevant integrate with recommendations from other interrelated disciplines.

5.2 Approach to Existing and Likely Future Environment

The RATN will support the future urbanisation of the Redhills area. As such, assessing the effects on the environment solely as it exists today (i.e., at the time of this assessment) will not provide an accurate reflection of the environment in which the effects of the construction and operation of the transport corridor will be experienced. Accordingly, when considering the environment within which construction and operation of the transport corridor will occur, this assessment considers the likely future environment (as directed by the current land use zoning and approved resource consents) as well as the existing environment.

The RATN intersects a range of zones under the AUP:OIP which influence the existing and likely future land use patterns for assessment purposes. Areas where the existing land use corresponds with the AUP:OIP zoning are unlikely to experience substantial changes to the existing land use. However, areas that have been recently live zoned or up-zoned under the AUP:OIP and are currently rural or peri-urban are likely to experience material change as a result of urbanisation, enabled or anticipated by planning provisions.

These scenarios are summarised in Table 3.

Table 3: Existing and Likely Future Environment

Land use today	Zoning	Likelihood of Change for the environment	Likely Future Environment
Rural	Residential – Single House	High	Urban
	Residential – Mixed Housing Suburban		
	Residential – Mixed Housing Urban		
	Residential - Terrace Housing and Apartment Building Zone		
	Business - Local Centre Zone		
Residential	Business - Local Centre Zone	Moderate	Urban
	Residential – Mixed Housing Urban	Low	
	Residential - Terrace Housing and Apartment Building Zone		
Business	Business - Local Centre Zone	Low	Urban
	Business - Mixed Use Zone		
	Business – Light Industry		
Special Purpose	Special Purpose - School Zone	Low	Special Purpose

⁵ Based on AUP:OIP zoning/policy direction

⁶ Based on AUP:OIP zoning/policy direction

The likely future environment assessment has also been guided by overlays within the AUP:OIP which identify features considered to be of high natural, cultural or heritage value with associated controls apply on development which may adversely affect those features. The overlays and protective rules provide useful guidance on areas that are likely to remain in the future urban environment.

5.3 Approach to Assessment of Effects

The assessment of effects on the environment has been limited to matters that trigger a district plan consent requirement under the AUP:OP as these are the only activities authorised by the proposed designations and alterations. Where NES or regional plan consent requirements are triggered, these are not authorised and will require future resource consents.

Notwithstanding this, relevant national and regional consent matters have been considered in the alternatives assessment, each corridor design and the resulting designation footprints. Consents will be sought when detailed design for each transport corridor is completed to confirm exact consent requirements, understand the actual or potential effects of activities that require consent and confirm the measures proposed to manage those adverse effects.

6 Existing and Likely Future Environment

6.1 Existing Environment

This section provides an overview of the existing natural, built and social environment in which the RATN will be located.

6.1.1 Site and Context Overview

The RATN is located in Redhills, approximately 13km north-west of the Auckland CBD. Redhills is a transitional landscape on the periphery of the existing urban environment of North West Auckland. The area is generally characterised by a range of rural and urban land uses, including large areas of developing or recently developed urban land use.

The RATN area extends between the intersection of Red Hills Road and Nelson Road, to the east, and Fred Taylor Drive, to the west, for the Redhills East-West arterial transport corridor (NoR 2(a, b and c)). The Redhills North-South arterial transport corridor (NoR 1) extends south to the intersection of Don Buck Road and Royal Road (including the intersection) (Figure 8).

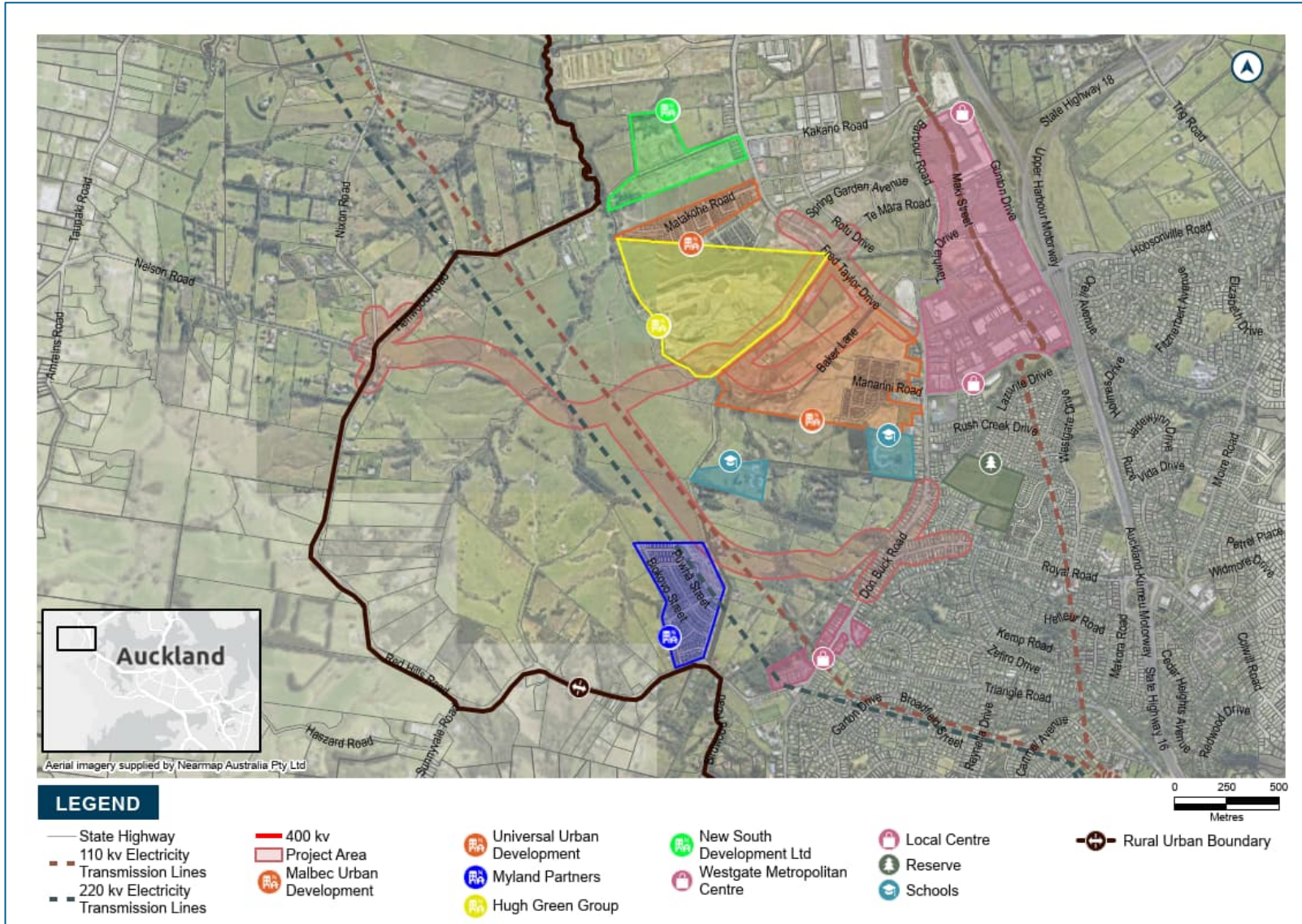


Figure 8: Redhills Arterial Transport Network Surrounding Context

Key features within and surrounding the RATN area include:

- Westgate Metropolitan Centre is approximately 1.3km to the north-east of the RATN area providing a range of commercial and retail land uses (e.g., the NorthWest Mall and Westgate shopping area) as well as community facilities and open space.
- SH16 is accessible from Royal Road approximately 1km to the east, providing a connection to the Auckland CBD. SH18 is accessible from Fred Taylor Drive approximately 1km to the north east of the RATN area.
- Westgate and Massey are immediately east of the RATN area and are characterised by suburban residential land uses in the form of single detached housing.
- A commercial and retail strip is located at the Red Hills Road and Don Buck Road intersection, which includes a takeaway, petrol station, General Practitioner clinic and pet grooming centre.
- Existing Transpower 11kV transmission lines running in a north-west to south-east direction through the centre of Redhills.

The majority of the Redhills area is currently greenfield and rural in character. This land is predominantly in the form of open pasture for farming and grazing and consists of a range of rural residential properties, larger lifestyle blocks and an extensive farming operation owned by a developer. These properties vary in size; however, the vast majority contain rural / semi-rural dwellings and / or farm accessory buildings.

The lower northern portion of the Redhills area bordering Fred Taylor Drive, and an area located on the northern side of Red Hills Road, close to the intersection with Don Buck Road are currently undergoing urban development.

Land use along the eastern extent of the RATN area is generally more urban, characterised by predominantly low-density, single detached residential development along Don Buck Road and Royal Road.

6.1.2 Topography and Hydrology

The Redhills area is an amphitheatre shape, with Red Hills Road traversing the prominent ridgeline along the western and southern perimeter of the RATN area and connecting with Don Buck Road along the eastern fringe to create a bowl-shape that falls in a generally northerly direction.

The landform within the RATN area is dominated by rolling and undulating topography and a network of riparian corridors and overland flow paths. While there are tracts of native and exotic vegetation distributed through the central and southern areas of Redhills, open pasture is the most prevalent landcover. The pastoral landscape is notably modified, including realigned natural watercourses and minimal areas of riparian vegetation.

The Redhills area generally has a low risk for flooding at a 1% AEP (1 in 100) extreme rainfall event. There are however numerous local flood prone areas at low points in the area where the RATN is likely to cross existing streams (Figure 9).

Figure 9 below shows the three named streams within the RATN area: Redhills Stream, Waiteputa Stream and Ngongetepara Stream. Stream classifications for the Redhills catchment indicate five permanent stream branches, four intermittent, two ephemeral, one unclassified and seven described as wetlands within the RATN area.

The landform is compartmentalised by these three streams, and further shaped by the many tributaries of each stream outlined, as well as their associated overland flow paths. The three separate watercourses culminate at the northern edge of the site at Ngongetepara Stream which ultimately drains north into Brigham Creek.

The landform and hydrological corridors within the north and north-eastern sections of the RATN area have been modified to accommodate urban and residential development adjacent to Fred Taylor Drive.

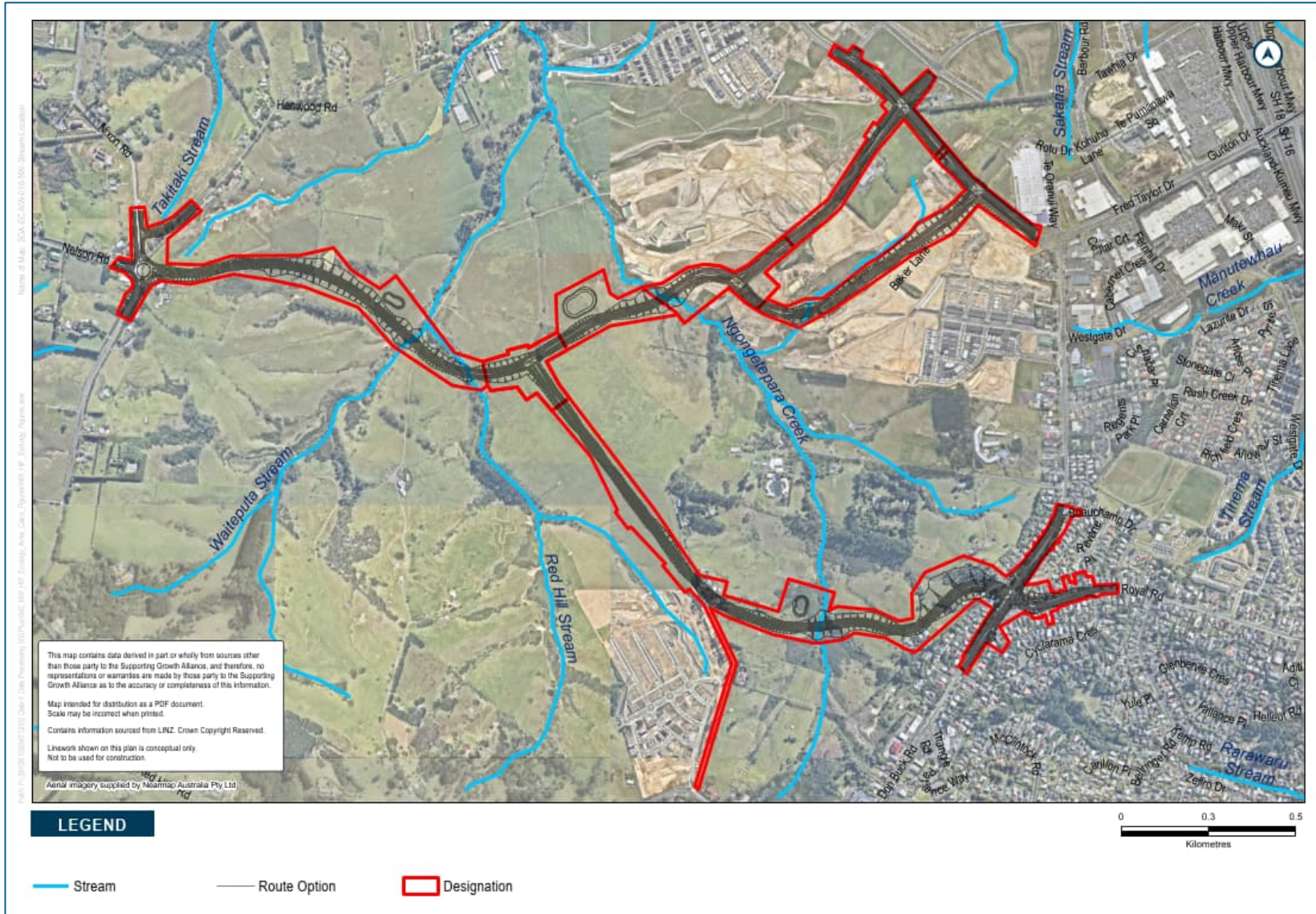


Figure 9: Redhills Arterial Transport Network Topography and Hydrology

The Redhills area is predominantly underlain by residual Waitemata Group Soils; (largely the East Coast Bays Formation, with a small area of the Cornwallis Formation present in the western part of Redhills near Nixon Road) (Figure 10). The East Coast Bays Formation materials consist of “alternating sandstone and mudstone” and the Cornwallis Formation is comprised of “thick bedded, pebbly and gritty volcanic sandstone”.

Additionally, the site is underlain by Puketoka Formation sediments (and Holocene alluvial deposits) in the northern central part of the Redhills area. The Puketoka Formation comprises “pumiceous mud, sand and gravel”, with the Holocene River deposits comprised of “sand, silt, mud and clay with local gravel and peat beds”.

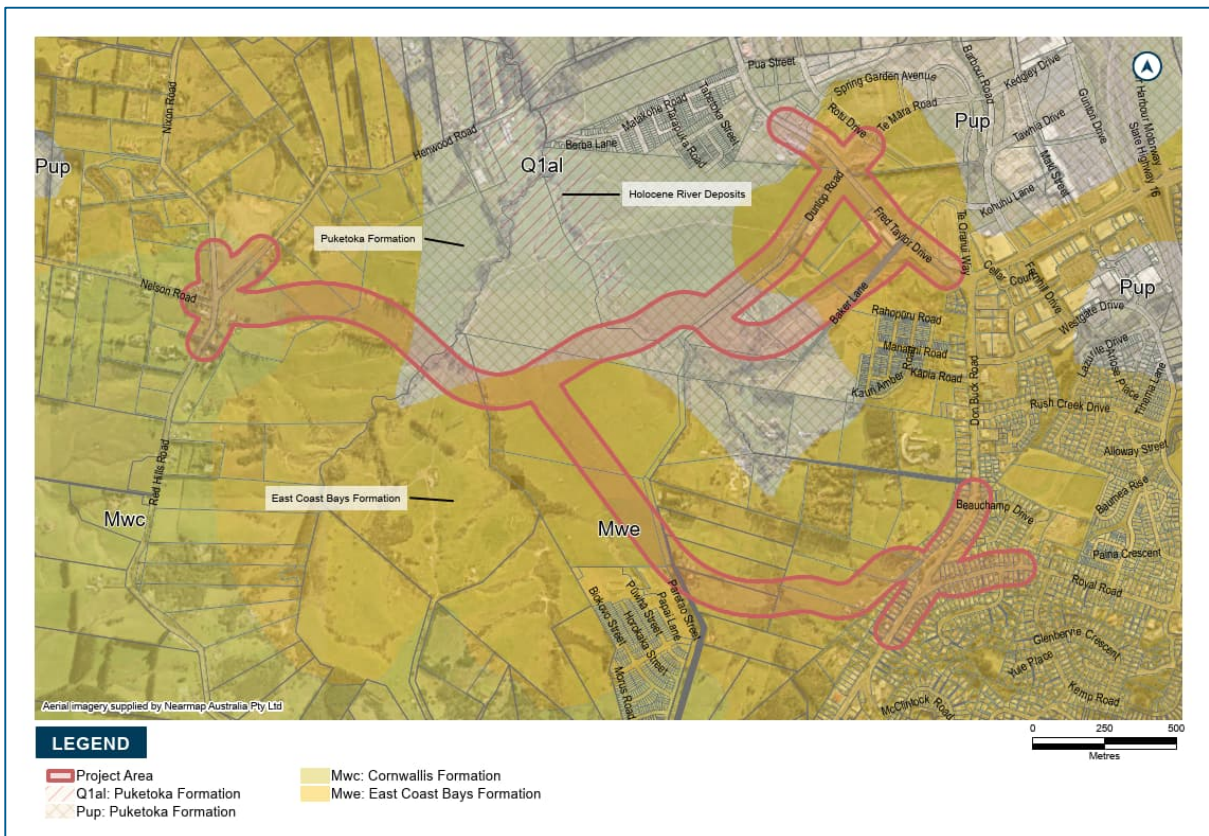


Figure 10: Redhills Area Geology (QMaps, 2019)

6.1.3 Ecological Environment

The following is a summary of the ecological environment and baseline within the RATN project area. Further detail can be found in the Redhills Arterial Transport Network– Assessment of Ecological Effects (AEcE) contained within Volume 4.

The RATN lies within the Tamaki Ecological District, which has a warm humid climate and is characterised by volcanic cones, isthmus, harbours and volcanic terrain (McEwen, 1987). Originally forested, the landscape would have been dominated by northern North Island lowland broadleaved forest with abundant taraire (*Beilschmiedia tarairi*) and pūriri (*Vitex lucens*) (Singers et al., 2017).

6.1.3.1 Terrestrial Ecology (Flora)

The RATN area is currently dominated by exotic grassland with small areas of exotic forest, exotic scrub, regenerating mānuka, kānuka scrub and indigenous/exotic planted vegetation. Regenerating forest fragments are found in the wider Redhills area outside of the RATN. No notable trees (as identified in the AUP:OIP) occur within or adjacent to the Project Area.

There are no Significant Ecological Areas (SEAs) within the RATN area, however there are five within 3 km of the RATN area:

- SEA_T_2031, which is approximately 150m to the south of the RATN area
- SEA_T_2030, which is approximately 600m to the southwest of the RATN area
- SEA_T_6336, which is approximately 800m to the southwest of the RATN area
- SEA_T_6337, which is approximately 1.1km to the southwest of the RATN area
- SEA-M2-57, which is approximately 3km to the east of the RATN in the inner Waitemata harbour.

There is generally limited riparian planting around the existing streams and watercourses (described in Section 6.1.2), with widespread stock access, sediment deposition, bank erosion and stream damage identified.

Table 4 describes the habitats observed within the Project Area and their ecological value in accordance with the EIANZ Guidelines. Kānuka and mānuka species have been listed as 'Threatened – Nationally Vulnerable' because of the spread of myrtle rust within New Zealand. These species are currently common throughout the Tamaki Ecological District, in addition the individuals within the Project Area are predominantly immature or semi-mature. Therefore, the presence of these Threatened species has not altered the valuation of the habitats within which they occur.

Table 4: Ecological values of the vegetation types present within the Project Area

Habitat	Classification (Singers et al., 2017)	Ecological Value
Brown Fields (includes cropland)	BF	Low
Exotic Forest	EF	Moderate
Exotic Grassland	EG	Low
Exotic Scrub	ES	Low
Planted Vegetation – Exotic (amenity)	PL.3	Low
Treeland – Exotic-Dominated	TL.3	Moderate
Mānuka, kānuka scrub	VS3	High

6.1.3.2 Terrestrial Ecology (Fauna)

Bats

Existing records confirm the presence of long-tailed bats (*Chalinolobus tuberculatus*) within 1 km of the Project Area. Seven Automatic Bat Monitors (ABM) were deployed across the RATN area in

November 2019. A low number of bat passes were identified at three of the ABM sites, located along Red Hill Stream which extends into the vegetated foothills of the Waitakere Ranges.

The results indicate that the corridors of low value riparian vegetation and indigenous and exotic forest habitat within the RATN provide suitable foraging and commuting habitat for indigenous bats. Mature trees (*Eucalyptus* sp. and *Pinus* sp.) with suitable roosting features (branch and trunk cavities) were identified within and adjacent to the Project Area (including district plan vegetation located along the northern side of Henwood Road).

The conservation status of long-tailed bats is 'Threatened – Nationally Critical' (O'Donnell et al., 2018), therefore the ecological value of long-tailed bats is Very High.

Birds

New Zealand Bird Atlas database identified 12 indigenous bird species which are listed as 'At Risk' or 'Threatened' (Robertson et al., 2021) within a 2 km radius of the RATN area. These indigenous bird species are associated with coastal and marine habitats located > 1.5 km from the Project Area.

North Island fernbird (At Risk – Declining) is associated with freshwater wetlands. The wetland habitat within SEA_T_2030, located approximately 600 m from the RATN, has the potential to support this species. Therefore, North Island fernbird may commute through the Project Area, between coastal wetlands located to the north and east, through to those within the SEA.

Additionally, North Island kākā (At Risk – Recovering) are recorded to be present in the wider landscape. As they are a highly mobile it is anticipated that this species may utilise the RATN area.

During the site investigation, incidental bird observations were recorded, including 12 indigenous bird species. These species could nest in scrub and trees within the RATN Area, while the exotic wetland and areas of open water could provide nesting habitat for pūkeko, paradise shelduck, pied stilt, spur-winged plover, and white-faced heron. Northern New Zealand dotterel (Threatened – Nationally Increasing) was observed in Brown Field (BF) habitat associated with residential development construction at Baker Lane, Westgate (which is located within the Project Area).

Connective linkages through the RATN area could be of value to some TAR bird species as they migrate through the area. Table 5 presents the ecological value for TAR bird species identified within the RATN area.

Table 5: Ecological value for TAR bird species

Species	Habitat	Conservation Status (Robertson et al., 2021)	Ecological Value
North Island fernbird*	EW, OW	At Risk - Declining	High
North Island kākā*	TL.3, VS3	At Risk - Recovering	High
Northern New Zealand dotterel**	BF	Threatened – Nationally Increasing	Very High

Lizards

A review of the DOC Bioweb database found five indigenous lizard records within a 6 km radius of the Project Area. Four of the five indigenous lizard species identified have a conservation status of 'At Risk' (Hitchmough et al., 2021).

Indigenous lizards were not identified during opportunistic searches completed during the site walkover. Copper skink and ornate skink have been recorded within 500 m of the RATN. Copper skink and ornate skink habitat includes fragmented modified forest edge, scrub and rank grassland habitats ('surrogate habitats') in Auckland. This habitat type is present within the RATN area and is connected to high quality SEA habitat to the south-west.

Forest geckos, elegant geckos, and pacific geckos (identified in the desktop review) require intact or regenerating forest habitat for survival. The forest habitat within the RATN area is small (approximately 0.28 ha), early successional and highly fragmented. It is therefore unlikely that these species would occur within the RATN area, and they have not been considered further in this report.

Table 6 presents the ecological value of lizards identified within the Project Area.

Table 6: Ecological value for TAR lizard species

Species	Habitat	Conservation Status (Hitchmough et al., 2021)	Ecological Value
Ornate skink	<ul style="list-style-type: none"> • EF (with appropriate understorey) • EG • ES • PL.3 • TL.3 (with appropriate understorey) • VS3 (with appropriate understorey) 	At Risk - Declining	High
Copper skink	<ul style="list-style-type: none"> • EF (with appropriate understorey) • EG • ES • PL.3 • TL.3 (with appropriate understorey) • VS3 (with appropriate understorey) 	At Risk - Declining	High

6.1.3.3 Aquatic Ecology

Streams and wetlands

Auckland Geomaps layers indicate that the RATN could cross three named streams: Red Hill Stream, Waiteputa Stream and Ngongetepara Stream. All streams within the RATN area were numbered, classified (permanent, intermittent, or ephemeral) and mapped.

All permanent and intermittent streams accessed during the site investigations were surveyed using the Rapid Habitat Assessment (RHA). The streams measured overall habitat quality scores that ranged from 'Poor' to 'Moderate'. The RHA category was included within the ecological value assessment (refer Table 7 below).

Twenty stream branches associated with wetland complexes were identified during the site investigations within the Project Area. These were assessed against the stream classification criteria developed by Storey and Wadhwa, 2009. The streams are mapped in the AECe contained within Volume 4.

The ecological values of freshwater habitats, informed by ecological baseline information, are presented in Table 7.

Table 7: Summary of aquatic ecological value identified in the RATN area

Stream ID	Ecological Value
RH-S1a, RH-S1b, RH-S2b, RH-S2c, RH-S4, RH-S5b, RH-S5c, RH-S5d, RH-S5e, RH-S7b, RH-S7c, RH-S7d, RH-S8, RH-S10	Low
RH-S2a, RH-S3, RH-S5a, RH-S6, RH-S7a, RH-S9	Moderate

Fish

The New Zealand Freshwater Fish Database (NZFFD) (Stoffels, 2022) did not hold fish records for Red Hill Stream and Waiteputa Stream, which are tributaries of Ngongetepara Stream. However, the database indicates that three fish species, and two freshwater invertebrate species have been recorded in the Ngongetepara Stream. This includes longfin eel which is classified as 'At Risk – Declining' (Dunn et al., 2018). The desktop review results are presented in Table 8 and Table 9.

Table 8: Freshwater fish species recorded in Ngongetepara Stream

Common Name	Conservation Status (Dunn et al., 2018)
Shortfin eel	Not Threatened
Longfin eel	At Risk – Declining
Banded kōkopu	Not Threatened

Table 9: Freshwater invertebrate species recorded in Ngongetepara

Common Name	Conservation Status (Grainger et al., 2018)
Kōura	Not Threatened
Freshwater shrimp	Not Threatened

Fish surveys were not carried out during site investigations, however longfin eel (At Risk – Declining) has been recorded in the wider catchment associated with the Project Area (Table 7 10). The freshwater habitats within the RATN area were assessed for their potential to support native fish during the RHA. No freshwater fish were observed during site investigations.

6.1.4 Transport Environment

The existing transport environment includes several key arterial corridors (Waka Kotahi One Network Road Classification). The RATN area is bordered to the east by Fred Taylor Drive and Don Buck Road, facilitating north-south movements (Figure 8). Fred Taylor Drive provides direct access to SH18, with Don Buck Road providing access to SH16 via Royal Road. The RATN area is bordered to the south and west by Red Hills Road and Nixon Road. The area has no existing internal road network and access to property is by minor local, no-exit roads and private driveways.

6.1.4.1 Transport Corridors

The following transport corridors are relevant to the RATN:

- Fred Taylor Drive is a strategic arterial that is currently a mix of an urban and rural two-lane corridor, with four lanes at signalised intersection approaches. The posted speed limit to the north of the intersection with Don Buck Road is 80kph, with a 50kph speed limit to the east of the intersection with Don Buck Road. It is currently in a state of change with iterative upgrades being provided by developers as the road frontages are upgraded.
- Don Buck Road is a strategic urban arterial two-lane corridor with a 50kph speed limit. It contains footpaths, a mixed of shared paths and on road cycle facilities, a central median and is part of the frequent public transport network.
- Royal Road is a residential urban arterial two-lane corridor with a 50kph speed limit. It contains footpaths and limited cycling facilities, local bus services and provides access to SH16.
- Dunlop Road is a local road that provides internal access to rural properties and a panel beater within Redhills, with no walking and cycling facilities.
- Baker Lane is currently a construction access for development within Redhills, previously operating as a private unsealed driveway providing access to the rear rural properties.
- Red Hills Road, Nixon Road and Nelson Road are rural two-lane roads with an 80kph speed limit and no walking and cycling facilities for the majority of the road.

6.1.4.2 Intersections

The following intersections are relevant to the RATN:

- The intersection of Don Buck Road and Fred Taylor Drive is a roundabout intersection with two approach lanes, and a partial dual lane within the roundabout.
- The intersection of Don Buck Road and Royal Road is a small roundabout intersection, with Royal Road connecting at an acute angle with substandard sight lines along Don Buck Road.
- The intersection of Dunlop Road with Fred Taylor Drive is a priority give-way intersection with a single approach lane in all directions, no flush median and no footpath or cycle facilities.
- The intersection of Red Hills Road, Nixon Road and Nelson Road is a stop-controlled intersection with a single approach lane, no flush median and no footpath or cycling facilities.

The majority of these existing roads provide two traffic lanes with some form of footpath(s). However, pedestrian facilities currently have limited crossing points and are relatively narrow.

Cycling facilities in the area vary in quality and design and generally do not connect well to each other. Aside from bus stops, there are no dedicated public transport facilities.

Existing traffic volumes in the Redhills area have been counted by AT in from October 2020 to March 2022. The results of these surveys are shown in Table 10 below.

Table 10: Existing Traffic Volumes on Surrounding Road Network

	Survey Date	5 Day ADT ⁷	7-day ADT	AM Peak Volumes	PM Peak Volumes
Fred Taylor Drive: between Bakers Lane and Don Buck Road roundabout	February 2022	14,030	13,140	870	1,260
Royal Road: between Kemp Road and Lawson Creek Street	October 2020	7,042	7,970	760	810
Don Buck Road: between Beauchamp Road and Rush Creek Drive	August 2021	21,940	21,220	2,070	1,880
Red Hills Road: between Don Buck Road and Birdwood Road	March 2022	9,350	8,830	970	1,060

6.1.5 Cultural and Heritage Environment

There are no archaeological sites recorded within the RATN area, with the nearest known sites over 400m away (including a plane crash site during World War II, a gum diggers' camp and hut site, a 1930's Post Office and a historic dwelling). The nearest recorded archaeological site related to Māori settlement is some 2km to the east of the RATN area.

Similarly, there are no identified Sites of Significance to Manawhenua identified under the AUP:OIP within or in close proximity to the RATN area.

6.1.6 Community and Recreational Facilities

Community and recreational facilities within or in proximity to the RATN area include:

- St. Pauls Primary School (498 Don Buck Road) accessed down local access ways; and
- Westbridge Residential School (488E Don Buck Road) located approximately 1km off Don Buck Road down a long access way, providing co-educational schooling and 24-hour care.

6.1.7 Utilities

The existing utilities within the RATN area are summarised in Table 11 below.

Table 11: Existing utilities in the RATN area

Utility Type	Details
Watercare Watermains	<ul style="list-style-type: none"> • Don Buck Road: contains trunk watermains and local watermains • Royal Road: contains various local watermains • There is no water infrastructure along Red Hills Road or other local roads within the Redhills area

⁷ Average Daily Traffic

	<ul style="list-style-type: none"> • Fred Taylor Drive: contains trunk watermains, local watermains on both sides of the road (sizes and type vary) and local watermains connections to dwellings
Watercare Wastewater	<ul style="list-style-type: none"> • A wastewater transmission line runs along the eastern side of the Ngongetepara Stream, from Dunlop Road in the south to the property at 134 Fred Taylor Drive in the north, and then east along Northside Drive. • Fred Taylor Drive, Don Buck Road and Red Hills Road (or the properties adjacent to) contain local wastewater lines.
Power Network	<ul style="list-style-type: none"> • Transpower operate two high voltage power transmission lines (1 x 110kV, 1 x 220kV) in the form of overhead power cables with pylons that run north-west to south-east through the centre of Redhills. The following restrictions exist: <ul style="list-style-type: none"> ○ Construction must be outside a 12m (horizontal) buffer from all existing pylons (without specific approval) ○ Minimum clearance of 4.5m for construction related vehicles (i.e., cranes, diggers, oversized haulage vehicles etc) as well as future road infrastructure (e.g., power poles and streetlights) • Vector overhead power infrastructure on existing roads
Communications	<ul style="list-style-type: none"> • All existing road corridors will contain communication ducts, chambers and cables (copper and fibre)
Stormwater	<ul style="list-style-type: none"> • Existing stormwater infrastructure is largely located where the RATN ties-in with the existing surrounding roads and includes the following: <ul style="list-style-type: none"> ○ Stormwater along Red Hills Road, Nixon Road and Henwood Road is currently conveyed via roadside swales, with no underground stormwater infrastructure. ○ The majority of the stormwater along the section of Fred Taylor Drive adjacent to the RATN is conveyed via roadside swales. A small stretch of Fred Taylor Drive ($\pm 100\text{m}$ north west and $\pm 100\text{m}$ south east of the existing Dunlop Road intersection) is conveyed via kerb, channel and catchpits and into underground stormwater pipes of unknown size, which eventually discharges back into the roadside swales. ○ Stormwater along Don Buck Road / Royal Road is conveyed via kerb, channel and catchpits and into the underground stormwater pipes

6.2 Planning context

Table 12 details the relevant planning context as specified by the AUP:OIP and Auckland Council GeoMaps, with the current AUP:OIP land use zoning shown in Figure 11. The key elements of the planning context for the RATN area are as follows:

- The RATN runs through greenfield land which is predominantly zoned under the AUP:OIP for urban residential land use.
- Local centre land is zoned 'Business – Local Centre' Zone near the centre of the RATN area.
- The North-South arterial transport corridor is proposed to run along the western edge of the 'Business – Local Centre' Zone, with the East-West arterial transport corridor proposed to run along the northern edge of the 'Business – Local Centre' Zone.

- The proposed North-South arterial transport corridor will be in close proximity to existing Transpower transmission lines that extends across Redhills from the north-west to the south-east.
- AT is the requiring authority for existing designations along Fred Taylor Drive that provide for road widening. These enable a 30m wide corridor between the Don Buck Road and Brigham Creek Road intersections (Des. Ref: 1468).
- There are numerous private land developers who are currently active around the RATN area. It is anticipated that two of these developers (Hugh Green Group and Universal Homes) will play an active role in the delivery of components of the RATN.

Table 12: AUP:OIP Planning Context for the RATN Area

Planning Context: RATN area	
Zones	Residential – Terrace Housing and Apartment Building Zone Residential – Mixed Housing Urban Zone Residential – Mixed Housing Suburban Zone Residential – Single House Zone Business – Mixed Use Zone Business – Local Centre Zone Business – Light Industry Zone Special Purpose – School Zone Road Zone
Modifications	Proposed Plan Change 78 – Intensification (refer section 6.2.3 below)
Precincts	I610 Redhills Precinct Westgate sub-precinct C
Overlays	High-Use Aquifer Management Areas Overlay [rp] – Kumeu Waitemata Aquifer National Grid Corridor Overlay – National Grid Yard Uncompromised National Grid Corridor Overlay – National Grid Subdivision Corridor Stormwater Management Area Control - MASSEY, Flow 2 Significant Ecological Areas Overlay - SEA_T_2031, Terrestrial Natural Resources: Significant Ecological Areas Overlay - SEA_T_2030, Terrestrial Natural Resources: Significant Ecological Areas Overlay - SEA_T_6336, Terrestrial
Controls	Macroinvertebrate Community Index – Rural Macroinvertebrate Community Index – Urban Macroinvertebrate Community Index – Exotic
Transport Designations	1433, Road – Fred Taylor Drive Transport Corridor, AT 1468, Road Widening – State Highway 16 (Westgate to Whenuapai), AT
Other Designations	4311 (Air Space Restriction Designation), Defence purposes – protection of approach and departure paths (Whenuapai Air Base), Minister of Defence 4646, Educational purposes - special school years 0-13 (Westbridge Residential School), Designations, Minister of Education
Non-Statutory Features	Ngongetepara Stream (River Number: 78850) Ngongetepara Stream Tributary (River Number: 78883) Red Hill Stream (River Number: 78871)

	Waiteputa Stream (River Number: 78870) Overland Flow Paths Flood Prone Areas Flood Plains
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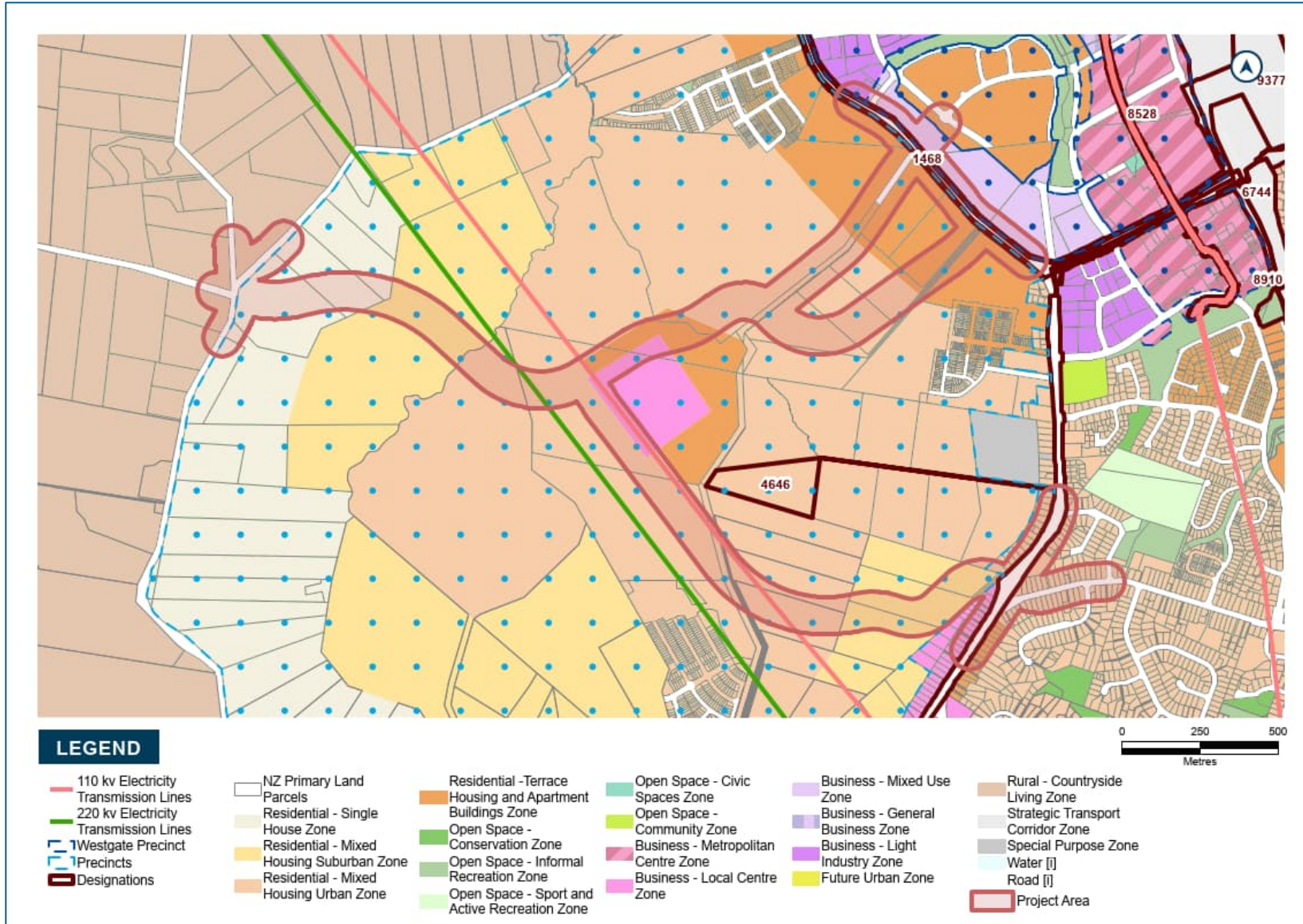


Figure 11: AUP:OIP Zoning for RATN area

6.2.1 Redhills Precinct Plan

The AUP:OIP contains the Redhills Precinct Plan (I610 Redhills Precinct), which provides an indicative proposed roading network and specific policies, objectives and rules for Redhills.

The purpose of the Redhills precinct is to implement the Redhills Precinct: Precinct Plan 1 (Figure 12) to “ensure the precinct has a high quality residential development with a local centre established centrally within the precinct to provide a heart and focal point to the Redhills community”.

Arterial road connections are indicated throughout the precinct to provide future connectivity east-west between Fred Taylor Drive and Nelson Road, and north-south between Royal Road and Henwood Road. These connections are identified to provide direct strategic transport connections between SH16 and the rural communities and future urban areas to the north and west of Redhills. Furthermore, these indicative arterial connections have fixed intersection points where they meet the existing surrounding transport network (Figure 12).

The Redhills Precinct Plan also proposes a “green” road circuit to provide for walking and cycling facilities and high amenity recreational spaces, including indicative open spaces and riparian stream corridor recreational spaces.

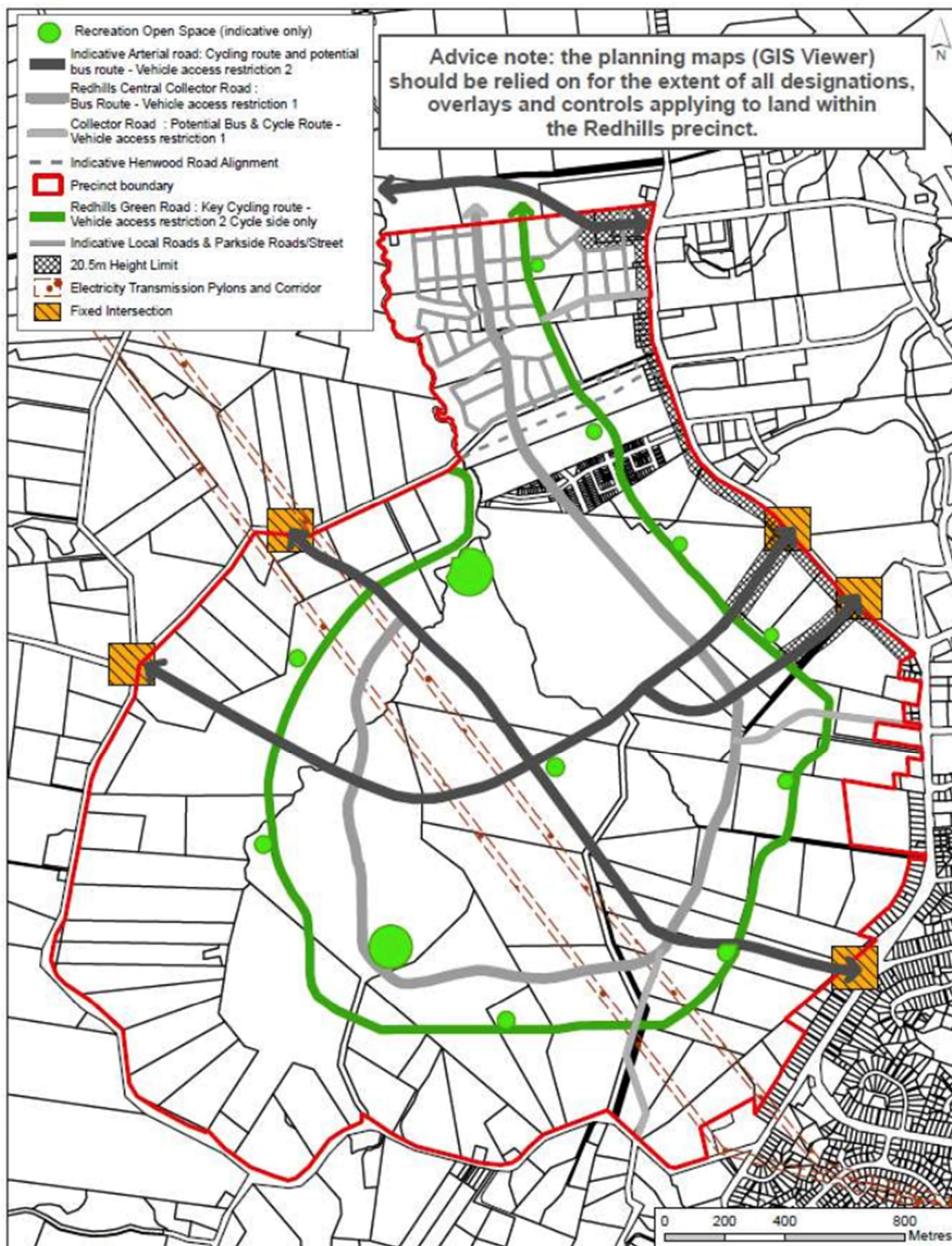


Figure 12: I616.10.1. Redhills Precinct: Precinct Plan 1

6.2.2 Westgate Precinct Plan

The Westgate Precinct (I616. Westgate Precinct) consists of seven sub-precincts (Figure 13). This precinct has the purpose to “develop a new metropolitan centre in Sub-precinct A, integrated with the existing Westgate Centre in Sub-precinct E”. The precinct seeks to provide “an integrated

employment and business area, comprising a retail core in Sub-precincts A and E, surrounded by a mix of large format retail, compact mixed use, residential and open space activities in the adjoining sub-precincts”.

Sub-precinct C is located adjacent to the RATN along the north-eastern boundary of Fred Taylor Drive and is zoned under the AUP:OIP as ‘Business – Mixed Use Zone’. Specific activity thresholds for this sub-precinct include limiting a supermarket to the south-eastern block adjoining Fred Taylor Drive, providing a maximum gross floor area for large format retail and trade suppliers and limiting residential activities on the ground floor.

Furthermore, the Westgate Precinct includes a conceptual road network (Figure 14) to provide further detail on the transport links including strategic access points. The components of this anticipated network relevant to the RATN are as follows:

- A ‘left in left out’ vehicle access on Fred Taylor Drive at the existing intersection with Baker Lane; and
- A ‘strategic access’ signalised intersection at the existing intersection of Dunlop Road with Fred Taylor Drive.

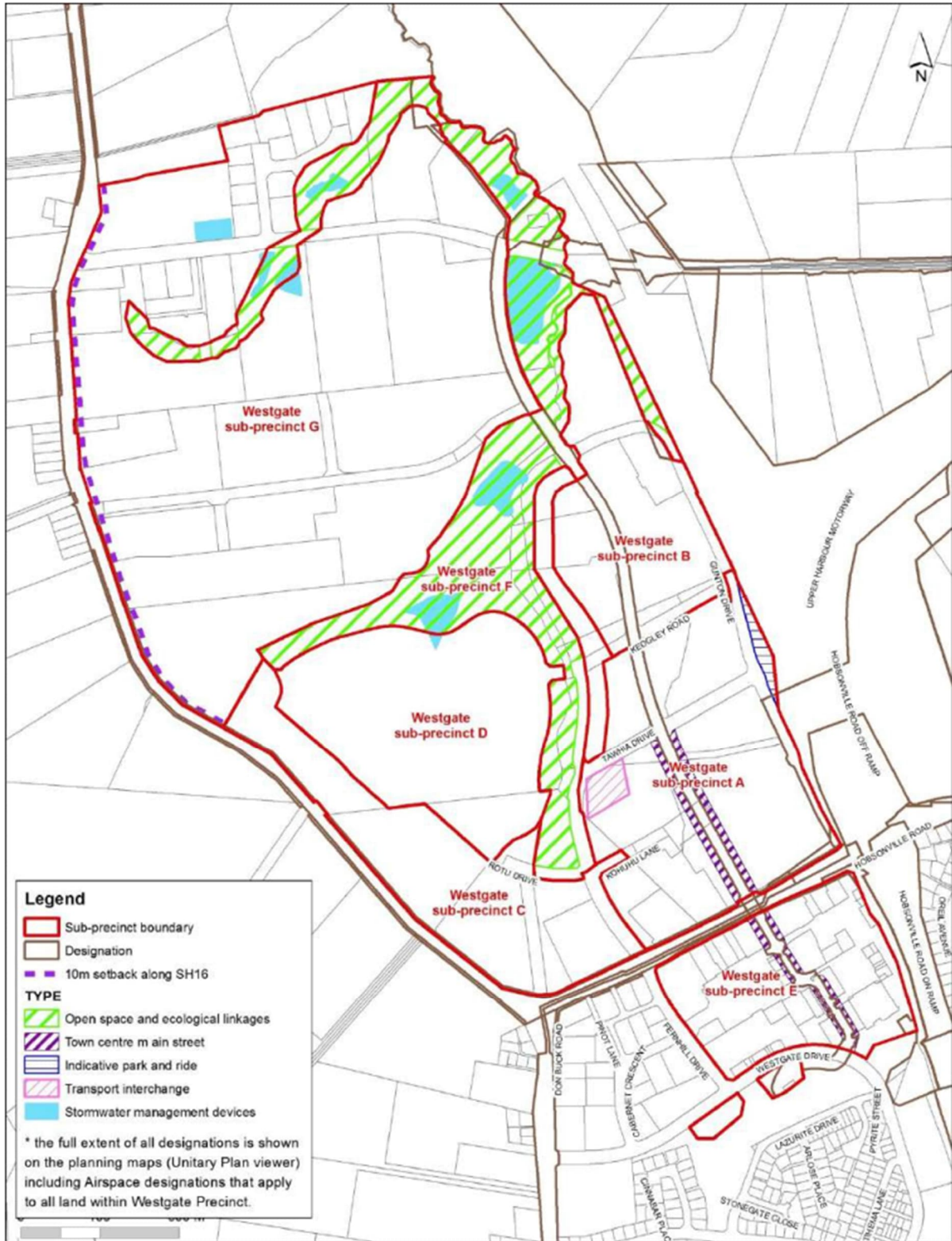


Figure 13: I615.10.1 Westgate Precinct Plan 1

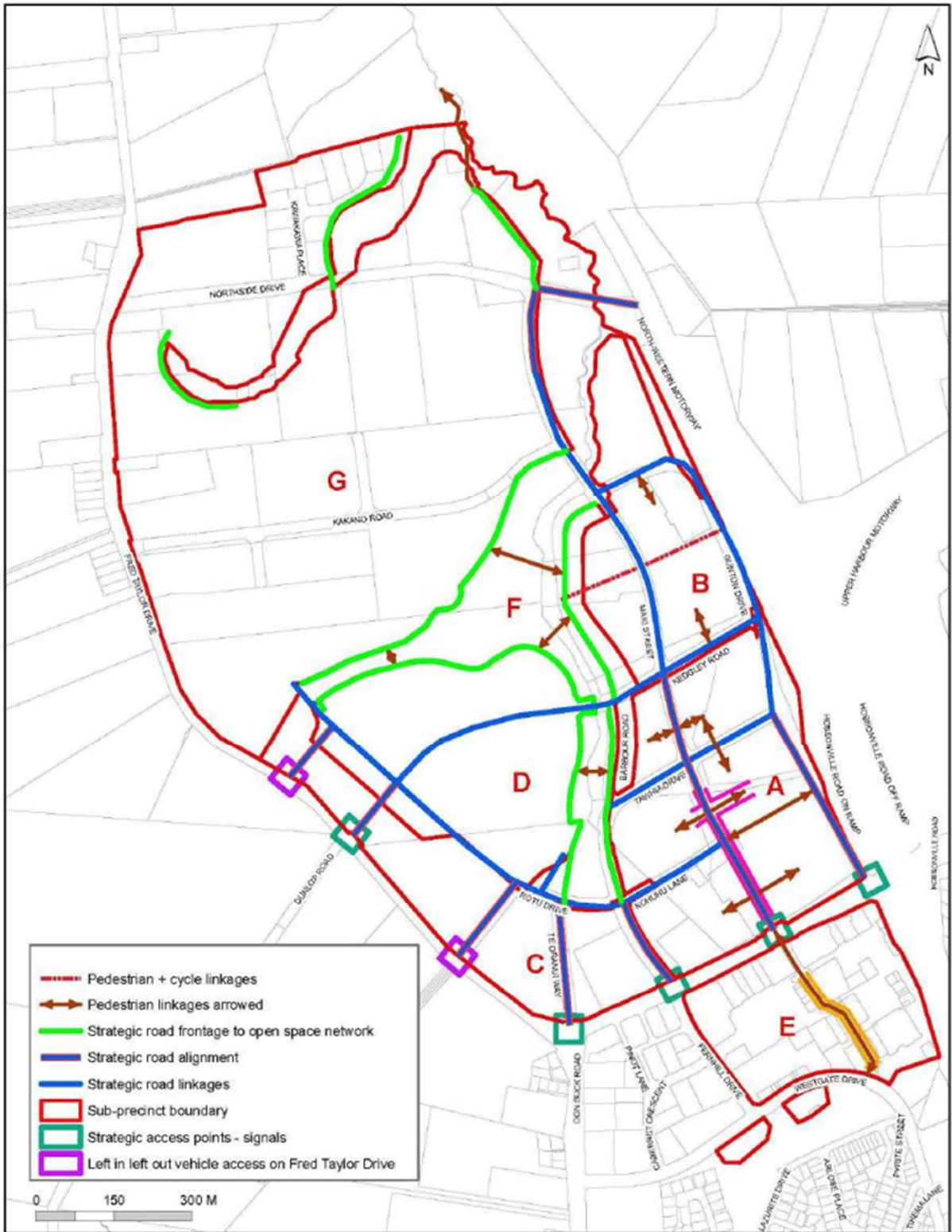


Figure 14: I615.10.2 Westgate Precinct Plan 2 – Conceptual Road Network

6.2.3 Plan Changes

Proposed Plan Change 78 (Intensification) in response to the NPS-UD and requirements of the RMA to enable more intensive development in and around neighbourhood, local, town and city

centres and rapid transit stops and incorporate Medium Density Residential Standards into the AUP:OP.

Tracts of residentially zoned land within the RATN area are proposed to be up-zoned from Single House Zone and Mixed Housing Suburban to Mixed Housing Urban Zoned, and Mixed Housing Urban Zone to Terrace Housing and Apartment Building Zone.

6.3 Likely Future Environment

As discussed previously in Section 5.2, the largely greenfield and rural existing environment of the RATN, the current range of residential and business zonings under the AUP:OIP, and the provisions of the Redhills Precinct Plan (outlined in Section 6.2.1) indicate a high likelihood of land use change. It is anticipated that the RATN will be constructed within a transitional environment and will be operated within an urban or rapidly urbanising environment. Accordingly, when considering the environmental context of the RATN, it is important to consider the likely future environment as well as the existing environment. The following sub-sections outline the key land use features that will comprise the likely future environment.

6.3.1 Future Residential Areas

As illustrated in Figure 11, most of the current AUP:OIP zoning within the Redhills Precinct and surrounding the RATN area is for the following residential land uses:

- 'Residential - Single House' Zone (**SHZ**);
- 'Residential - Mixed Housing Suburban' Zone (**MHS**);
- 'Residential - Mixed Housing Urban' Zone (**MHU**); and
- 'Residential - Terrace Housing and Apartment Buildings' Zone (**THAB**).

Overall, the residential zone density graduates from the centre of Redhills outwards, with the greatest density and intensive land uses situated near the Redhills centre and along the existing transport corridors, and the lower density zones largely situated out to the rural fringe.

THAB zoning within the RATN area is in the following locations (see Figure 11):

- Adjacent / surrounding the proposed local centre to the north, east and south;
- Along the south-western boundary of Fred Taylor Drive and the western boundary of the northern portion of Don Buck Road.

This development of up to seven storeys (including supporting non-residential activities) in the THAB zone is anticipated in the RATN area due to its location adjacent to the proposed local centre, with the benefits of proximity to local businesses and services, and the access to the Dunlop Road public transport corridor and eventual Westgate Transit Hub. This development is also expected in the THAB zone adjacent to Fred Taylor Drive due to its close proximity to the arterial network, SH16 and SH18, and the Westgate Metropolitan Centre (a 10-minute walk away) and its associated future Public Transport Hub.

6.3.1.1 Transitioning Residential Areas

As the current land use in these residential zones throughout the Redhills Precinct area is predominately rural greenfield with very few residential dwellings, it is expected to be gradually urbanised in general accordance with the Redhills Precinct Plan.

However, there are some areas of the Redhills Precinct area that are currently experiencing this urban development, which will provide a range of medium-high density housing, jobs, services, and facilities. This includes the north-eastern portion of the Precinct containing the Universal Homes 'West Hills' development, part of the northern section of the Precinct containing the Malbec development, and the Myland 'Cardinal West' development in the southern part of the precinct.

The expected urban form outcomes within each AUP:OIP zone are summarised in Table 13.

Table 13: AUP:OIP Zoning Potential Urban Form

Zone	Anticipated Outcomes
Single House Zone	Development is low density, typically one dwelling per site, up to two storeys in height.
Mixed Housing Suburban	Development is typically two storey detached and attached housing in a variety of types and sizes.
Mixed Housing Urban	Development typically up to three storeys in a variety of sizes and forms, including detached dwellings, terrace housing and low-rise apartments.
Terraced Housing and Apartment Building	Provides for urban residential living in the form of terrace housing and apartments. Buildings are enabled up to five, six or seven storeys.

6.3.2 Existing Residential Areas

The existing residential area surrounding the Don Buck Road and Royal Road intersection is zoned MHU. However, the current development is still largely characterised as low-density, single detached dwellings. While there is evidence of some subdivision and subsequent infill housing the majority of these dwellings are still single or double storey and detached. The MHU zone allows greater intensity for the residential area surrounding the Don Buck Road and Royal Road intersection, enabling development of detached, terraced and low-rise apartment housing up to three storeys. However, the MHU zone does not significantly change the potential development yields which could be achieved from these properties, consequently it is anticipated that any intensification of this area will occur more slowly than the adjacent greenfield land in the Redhills Precinct area.

6.3.3 Business Zoned Areas

As shown in Figure 11, 'Business – Local Centre' zones are provided under the AUP:OIP in the following locations:

- The centre of the Redhills Precinct;
- On the eastern boundary of the Redhills Precinct area, adjacent to Don Buck Road and immediately to the south of the Don Buck Road and Royal Road intersection.

The Local Centre zone primarily provides for "local convenience needs of surrounding residential areas, including local retail, commercial services, offices, food and beverage, and appropriately scaled supermarkets" (AUP:OIP H11.1). The built form provisions typically enable buildings up to four storeys high, allowing residential use on the upper floors.

- Additionally, the Redhills Precinct seeks to ensure the following for the local centre in the centre of Redhills:
 - It is “established centrally within the precinct to provide a heart and focal point for the Redhills community” (AUP:OIP I610.1).
 - The two arterial roads in the Redhills Precinct (i.e., the North-South arterial transport corridor and East-West arterial transport corridor) “will intersect with each other at the local centre, to support the centre and enhance its use by passing traffic and public transport, walking and cycling” (AUP:OIP I610.1).
 - Subdivision and development promote more intensive development around the local centre.
 - Subdivision and development create a safe and accessible environment for pedestrians, cyclists and public transport.
 - Subdivision and development create a low speed, main street environment with active frontages to key public interfaces.

The local centre zoned land adjacent to Don Buck Road is predominantly occupied by low-density residential housing, similar to the surrounding land use. However, in the future this is expected to be developed in accordance with the built form provisions of the ‘Business – Local Centre’ zone due to its location along an arterial corridor and its close proximity to SH16, SH18 and the Westgate Metropolitan Centre.

Furthermore, whilst not within the Redhills Precinct, there is a ‘Business - Mixed Use’ Zone adjacent to Fred Taylor Drive on the north-west side of the corridor.

The Mixed Use zone provides for ‘residential activity and predominantly smaller scale commercial activity...and is typically located around centres and along corridors served by public transport’, acting as a transition area in terms of scale and activity between residential areas and business centre zones (AUP:OIP H13.1). Building heights can vary, with provisions typically enabling four storeys. However, as this area is in very close proximity to the Westgate Metropolitan Centre, greater height is enabled and anticipated.

6.3.4 Transport Network

The indicative roading network provided in the Redhills Precinct Plan (discussed in Section 6.2.1) was informed by the AC DBC through an Environment Court appeal, and subsequent mediation process. This resulted in the Redhills Precinct Plan identifying the following transport elements:

- The future intersection locations with the existing road network – including the use of Baker Lane to intersect with Fred Taylor Drive rather than a connection at the Don Buck Road / Fred Taylor Drive roundabout.
- An indicative alignment of the future arterial road network within Redhills, in particular the relationship of the roading network and the future Redhills town centre.
- A key public transport corridor on Dunlop Road to provide greater benefits for walking and cycling and public transport between the future Redhills town centre, Westgate Metropolitan Centre, the future Westgate Rapid Transit Station and the Rapid Transit Network and beyond.

The resulting indicative Precinct Plan transport network (specified in ‘I610.10.1. Redhills Precinct: Precinct plan 1’) is shown below in Figure 15.

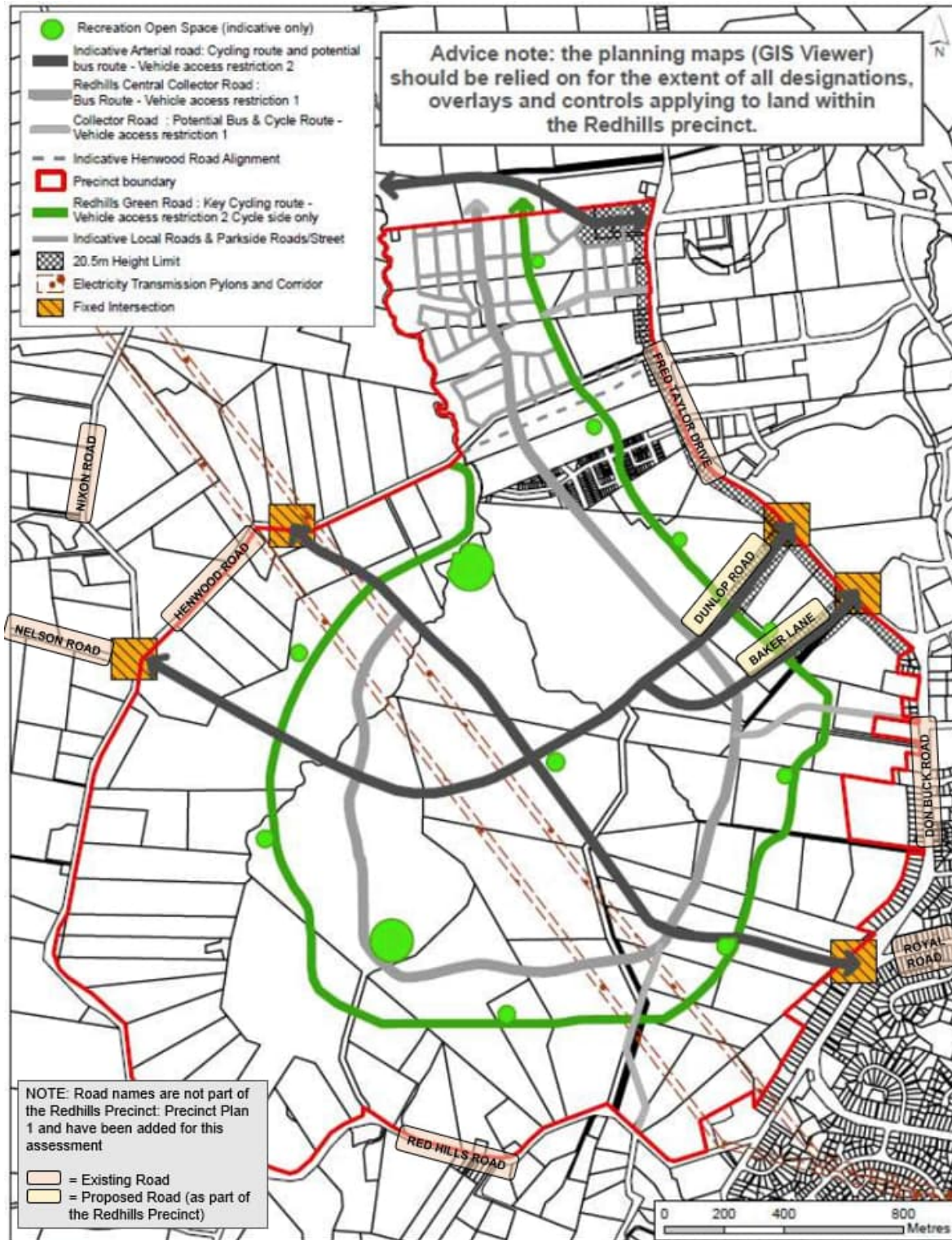


Figure 15: Redhills Precinct: Precinct Plan 1

AT noted that it would subsequently follow up these indicative alignments with confirmed alignments via typical planning processes (e.g., a NoR) through the Programme. The RATN and associated NoRs seek to formally protect the arterial corridors which will form the basis of the future transport environment.

Additionally, numerous indicative collector roads and local roads are proposed in the Redhills Precinct: Precinct Plan 1 (Figure 15), including:

- A central collector road that forms a 'loop' inside the Green Road;
- Multiple collector roads that link Red Hills Road, Don Buck Road and Fred Taylor Drive with the central collector road; and
- Various internal local roads / streets in a grid pattern in the northern section of the Precinct.

Once the Redhills area is developed, these transport corridors will serve a variety of movement needs and purposes, including:

- Access to the surrounding residential land;
- Access to the east to the strategic roading network via Don Buck Road, Fred Taylor Drive, and onward to SH16 and SH18;
- Access to the Westgate Metropolitan Centre and transport links in that area;
- Access to the proposed Rapid Transit station at Royal Road; and
- Access through to the ferry terminals at West Harbour and Hobsonville.

The RATN will serve a range of local and strategic uses across a range of modes and will therefore need to facilitate all modes of travel, including walking, cycling, public transport and private vehicles.

The North West Preferred Transport Network which has been identified through the Programme (Figure 2) also includes a range of other future projects on the periphery of the Redhills area which will have a direct interface with the RATN. These include:

- Fred Taylor Drive Upgrade
- Don Buck Road Upgrade

6.3.5 Open Space and Waterways

The objectives of the Redhills Precinct Plan in relation to open space include (AUP:OIP I610.2. Objectives):

- (9) The intrinsic character of the precinct and its location in proximity to the Northwest Wildlink is recognised and stream ecology and remnant vegetation is restored, with opportunities created for natural wildlife corridors.
- (10) Parks and open space corridors achieve an integrated, attractive and safe open space network across the precinct that integrates stormwater management, and ecological and recreational functions, while enhancing the amenity of cyclists and pedestrians who will have access through these open space areas.

To achieve this, the Redhills Precinct Plan includes provision for a "Green Road" circuit that will provide a high amenity cycle and pedestrian route, connecting recreational spaces such as parks and stream corridors, and connections to commuter cycling routes.

Furthermore, there is a strong emphasis on achieving an integrated and attractive open space network across the precinct that integrates stormwater management, and ecological and recreational functions. The Recreation Open Space network is indicated on the Redhills Precinct: Precinct Plan 1 (Figure 15).

Riparian margins as identified within the Redhills Precinct: Precinct Plan 1 (Figure 15) must also be planted with native vegetation. Stream edge routes for pedestrians and cycle paths along both sides of permanent and intermittent streams are also encouraged, with pedestrian and cycle paths required to be located adjacent to, and not within the 10m planted strip.

7 Redhills North-South Arterial Transport Corridor (NoR1)

This section provides the following for the Redhills North-South Arterial Transport Corridor (the N-S Project):

- A description of construction works
- Assessment of alternatives, and
- Assessment of effects on the environment.

Refer to Section 3 for a description of the permanent works associated with the N-S Project.

7.1 Construction Works

7.1.1 General approach

While it is anticipated that construction may not occur for some time (and therefore the construction techniques may change), an indicative construction methodology has been developed based on the level of design undertaken to date and the current land use / land form in which the corridors are located and with the knowledge that a contractor is yet to be confirmed. As such, there is a preference to retain some flexibility in construction methodologies, and the construction will be guided through the management plan process. The conditions for the proposed designation and future resource consents will be in place to manage the effects of the construction activities.

Should the contractors wish to undertake construction activities in a manner which is not within the scope of the proposed designations, additional authorisations will need to be obtained at that time

Management Plans form an integral part of the construction methodology for the Project setting out how specific matters will be managed. A suite of Management Plans are proposed for the Project. These are discussed in Section 9 of this AEE and include the following:

- Construction Environmental Management Plan (**CEMP**);
- Stakeholder and Communication Engagement Management Plan (**SCEMP**);
- Cultural Monitoring Plan (**CMP**);
- Construction Traffic Management Plan (**CTMP**);
- Ecological Management Plan (**EMP**);
- Tree Management Plan (**TMP**); and
- Construction Noise and Vibration Management Plan (CNVMP);

The management of any potential or actual effects arising from construction activities that relate to regional resource consenting matters will be provided for when these consents are sought, in the future.

The Management Plans and future Outline Plan(s) required for the proposed designations will be submitted to Auckland Council prior to the commencement of construction.

Following the Completion of Construction, the designation boundary will be reviewed and any land that is not required for the permanent work or for the on-going operation, maintenance or mitigation of the RATN will be reinstated in coordination with directly affected landowners or occupiers.

Typical offsets for construction areas of various construction work have been adopted to inform the proposed designation boundaries. These offsets and typical construction areas have been based on similar transport infrastructure projects of this size and nature. These are intended to allow sufficient

working areas to facilitate the construction of the Project and are indicative only. Final areas will be determined during detailed design and informed through the Outline Plan process.

7.1.2 Indicative Construction Zones and Programme

It is anticipated that the works for the entire RATN will be broken down into separate construction stages as follows:

- **Stage 1:** Baker Lane from Fred Taylor Drive to the Dunlop Road intersection
- **Stage 2:** Dunlop Road from Fred Taylor Drive to the E-W Project junction
- **Stage 3:** E-W Project from Dunlop Road junction to Red Hills Road
- **Stage 4:** N-S Project from Don Buck Road to E-W Project

The expected duration for each stage ranges from 1.5 years to 3 years.

Table 14 provides an overview and summary of the typical construction activities associated specifically with the N-S Project, being Stage 4 identified above.

Table 14: N-S Project Construction Activities Summary

Stage	Construction Activities
Stage 4	<p>Don Buck Road / Royal Road</p> <ul style="list-style-type: none"> • Vegetation clearing and demolition / modification of existing properties • Protect or relocate existing services • Lane widening along the east side of Don Buck Road • Earthworks cut and fill (approximately 24,000m³ of cut and 3,800m³ of fill mostly on the embankment to Royal Road) • Realignment of existing road • New intersection with N-S Project • Alignment change from Royal Road to Don Buck Road • Construct new berm, footpath and cycleway on both sides of the road • New road surface and median • Line marking • Lighting and road furniture <p>N-S Project</p> <ul style="list-style-type: none"> • Install environmental controls, silt fences, and temporary sediment retention ponds • Vegetation clearing and demolition / modification of existing properties • Construct three new culverts • Construct one stormwater wetland • Bulk earthworks cut and fill (approximately 30,000m³ of cut and 310,000m³ of fill) • Construct retaining walls to the south near the Don Buck Road intersection • Construct new berm, footpath and cycleway on both sides of the transport corridor • New road construction and median • Line marking • Lighting and road furniture

7.1.3 Construction Laydowns and Work Areas

As the N-S Project will be predominantly constructed though greenfield land that will likely be undergoing urban development at the same time as the N-S Project is constructed, indicative construction laydowns and work area locations have been identified and assessed for the purpose of

providing for the works within the proposed designation footprint. These are shown in the indicative design drawings provided in Volume 3.

7.1.4 Construction Activities

7.1.4.1 Site Establishment and Clearance

In preparation for the works, the N-S Project area will need to be cleared of all impediments to construction such as buildings, structures and vegetation.

The existing vegetation within the N-S Project area will require removal to enable the construction and operation of the corridor. This is mostly comprised of localised shelterbelt vegetation scattered throughout the Redhills area.

Regional resource consents will likely be required before construction commences and will include details on measures to manage erosion and sediment arising from construction. All environmental / management controls related to watercourses will be set up prior to the removal of any riparian vegetation and considered as part of the regional resource consent process.

7.1.4.2 Earthworks

The N-S Project will require bulk earthworks for the construction of the new arterial corridor. Regional resource consents for earthworks will be sought at the detailed design stage.

Environmental controls will be installed prior to commencing bulk earthworks and all unsuitable soils will be removed from the site before placing fill material or constructing structures. Regional resource consents for earthworks will be sought at the detailed design stage.

The N-S Project alignment passes beneath the Transpower transmission lines however this should not affect construction as there is only a 2.5m cut at this location. Works in this section will be conducted in accordance with the 'working around live cables' guidance from Transpower.

The AUP:OIP's Accidental Discovery Protocol (ADR) will be adopted to address any unexpected heritage items during construction, unless an archaeological authority for the N-S Project has been obtained from Heritage New Zealand.

7.1.4.3 Drainage and Stormwater

As discussed in Section 5.1.1.2 a number of indicative constructed wetlands are shown along the N-S Project to provide stormwater treatment and flood attenuation to the various catchments along the route. However, the specific stormwater network and infrastructure elements associated with the N-S Project, including the finalised location of the wetlands, will be determined at a later detailed design stage in conjunction with regional resource consents sought.

Subject to any regional resource consents required it is anticipated that these construction works activities are likely to involve typical shallow drain laying, involving excavations with simple batters or trench shields to provide ground support. Where road crossings are required, construction will be through excavation in stages with single lane closure traffic management. These works will likely be constructed upon the completion of the bulk earthworks.

The N-S Project provides sufficient space within the designation footprint to provide for these works.

7.1.4.4 Watercourse Crossings

Construction works for the N-S Project will include several watercourse crossings and other associated activities within the existing watercourses (Redhills Stream, Waiteputa Stream and Ngongetepara Stream). The form of the stream crossings (i.e., bridges or culverts) and the construction works / structures within the watercourses will be confirmed and assessed at a later detailed design stage as part of future applications for regional resource consents. The N-S Project provides sufficient space within the designation footprint to enable these works.

7.1.4.5 Retaining Structures

Retaining structures are proposed to support the minor cuts and fill along the Don Buck Road / Royal Road intersection. The exact scope, design, and construction methodology of the retaining structure will be determined as the design develops, however will likely involve small to medium size construction equipment (typically up to 20T excavators).

7.1.4.6 Pavement and Surfacing

Pavement and surfacing will commence once earthworks, drainage and utilities works are complete. Due to gradient changes and the new cross-section design, it is likely that most of the existing surface will be removed for the new pavement. This will likely be staged to maintain traffic flow along the corridor, with the intersections requiring further staging. New street lighting will be installed once the bulk earthworks and drainage are complete.

7.1.4.7 Construction Reinstatement

N-S Project construction will have temporary impacts to private properties along the N-S Project corridor. This may include temporary changes to property access, private outdoor space (including fences, gardens and vegetation and lawns) and, in localised instances, impacts to dwellings and other private structures. Reinstatement is to be addressed on a case-by-case basis through discussion with individual landowners and will follow the provisions under the Public Works Act 1981, which is a process separate from the requirements of the RMA.

7.1.5 Typical Plant and Equipment

To help inform the assessment, a list of typical plant and equipment which may be required for construction has been developed (Table 15).

Table 15: Typical Plant and Equipment Summary

Construction Type	Construction Activity
Typical across all works	<ul style="list-style-type: none"> Site facility Light vehicles Hiab truck
Bulk Earthworks	<ul style="list-style-type: none"> 30T excavator 20T excavator Compactor / sheepsfoot roller Water cart Tippers / ADT's
Drainage	<ul style="list-style-type: none"> 20T excavator

	<ul style="list-style-type: none"> • Trench shields • Tandem tipper • Loader • Plate compactor
Pavement Construction	<ul style="list-style-type: none"> • Grader • Smooth drum roller • Tandem tippers • Kerbing machine • Plate compactor • Paver

7.2 Assessment of Alternatives

When considering a NoR by a requiring authority, a territorial authority is required under section 171(1)(b) of the RMA to have particular regard to whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if either:

- i) The requiring authority does not have an interest in the land sufficient for undertaking the work; or
- ii) It is likely the work will have a significant adverse effect on the environment.

In this instance, AT does not currently have an interest in all of the land through which the RATN will be constructed and operated.

The development of alternatives for the RATN was completed through a sequential options development process in the Supporting Growth Programme Business Case 2016 (PBC), AC DBC, SG DBC and development of this NoR application and the N-S Project as described in Section 3.2.

Figure 16 provides a summary of the options development process in relation to each of the steps. In summary, once problems, issues and objectives had been established, a list of corridor options were developed to achieve the outcomes. These were refined into a range of alignment options with the preferred options further refined to develop the N-S Project as it is described in Section 3.2.

A comprehensive assessment of alternatives was undertaken and is provided in 0. This includes the key decisions made during the assessment of corridor options, alignment options, design refinement and statutory methods. It also outlines the further review of AC DBC and SG DBC options that was subsequently undertaken due to the introduction of the National Policy Statement for Freshwater Management 2020 (NPS-FM), which affords additional protection to natural wetlands. Please refer to 0 for these assessments.

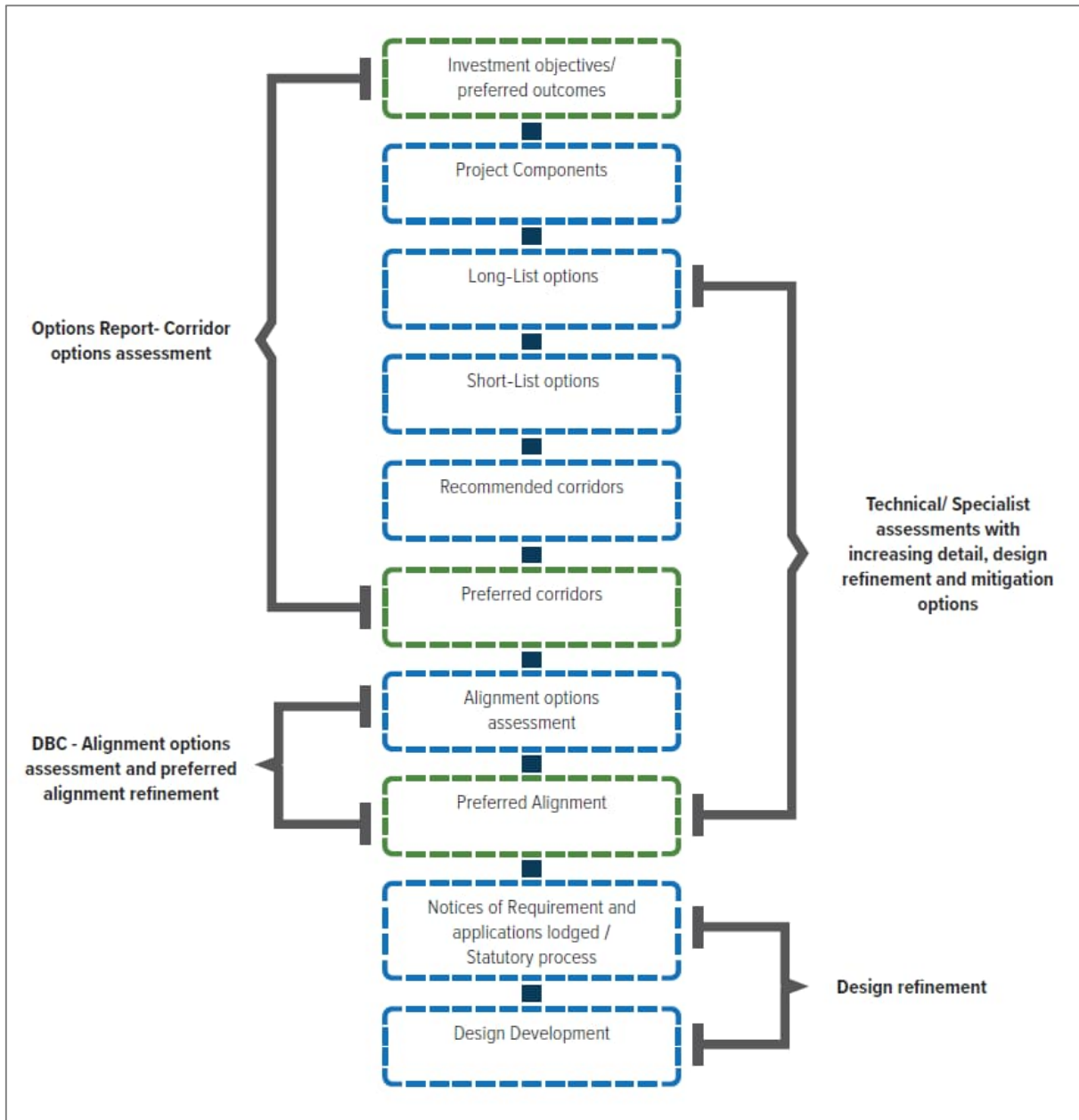


Figure 16: Summary of Options Development Process

A wide range of alternatives have been investigated for addressing the transport needs for the N-S Project area. A key driver for the assessment of alternatives was to avoid adverse effects where practicable. That evaluation confirmed that the N-S Project (connecting from the upgraded and signalised Don Buck Road / Royal Road intersection in the south and connecting to the E-W Project) would provide a balance of strong transport and urban outcomes while minimising potential adverse effects.

A further review of AC DBC and SG DBC options was undertaken in response to introduction of the National Policy Statement for Freshwater Management 2020 (NPS-FM). It concluded that that the strategic connections and relationship to the future local centre largely determine the form of the RATN. Impacts on wetlands could not be entirely avoided given the need for arterial transport

corridors to traverse the Redhills area, to enable its development, however, the preferred North-South corridor has been refined to reduce wetland impacts where possible.

The N-S Project supports the development of land in Redhills which is planned for under the AUP:OIP and Redhills Precinct Plan, thereby supporting the objectives and policies of the AUP:OIP. Its location and design represent the most appropriate approach to the changing local environment, providing a high-quality urban corridor for the urbanisation and development of the surrounding area and connecting to the future and existing transport network.

An assessment of the various alternative methods for achieving the N-S Project was undertaken, and it was concluded that a designation is considered the most appropriate mechanism to provide for the Project.

The conclusion reached in the assessment of alternatives has been based on a comprehensive, robust and replicable optioneering process. As such it is concluded that adequate consideration has been given to alternative sites, routes, or methods for undertaking the work, satisfying the requirements of section 171(1)(b) of the RMA.

7.3 Assessment of Effects on the Environment

Section 171 of the RMA requires that when considering a NoR, a territorial authority must consider the effects on the environment of allowing the requirement.

This section provides a summary of the actual and potential effects of the construction, operation and maintenance of the N-S Project, including whether these effects are positive or adverse and the scale, duration and locality of effects.

As set out in Section 7.2, the consideration of adverse effects has been a key driver for the assessment of alternatives, identification of the proposed designation corridor and the subsequent refinement of the corridor. Where effects cannot be avoided, measures to remedy or mitigate significant adverse effects have been proposed. Details of these are included in Section 9 and are reflected in the proposed designation conditions.

Positive effects are summarised in Section 7.3.1, and adverse effects on the environment are described in Sections 7.3.2 to 6.4.9.

7.3.1 Positive Effects

The Project Objectives (Section 4.1) have been developed to address the key problems and issues identified in Section 2.2. In achieving these objectives, the N-S Project will deliver a range of positive effects for the Redhills area.

Significant growth is anticipated and provided for under the AUP:OIP in Redhills. A range of infrastructure, including transport infrastructure, is required to achieve the growth figures sought under the Auckland Plan. The N-S Project supports the ongoing and proposed urbanisation of the area, by providing an internal arterial transport network that connects to the existing surrounding strategic transport network through new and upgraded intersections. The N-S Project will include pedestrian, cycle and public transport facilities along all transport corridors which will enable greater choice of mode and provide improved safety outcomes for transport users.

Overall, the N-S Project will provide significant benefits to the local community and wider North West area, supporting the Council's growth strategy. In providing an urban transport corridor which responds to the growth demand in the area, the N-S Project will improve transport network functions and contribute to a high-quality urban environment for local residents, businesses and road users.

7.3.1.1 Walking and Cycling

There are currently limited footpaths and limited and / or no cycle facilities on the existing Don Buck Road and Royal Road. The proposed walking and cycling facilities for the N-S Project and sections of Don Buck Road and Royal Road within the N-S Project extents (as described in Section 3.2) have been designed to provide separated and protected walking and cycling facilities on both sides of the corridors. All intersections within the N-S Project have been provided with pedestrian / cycle crossing facilities. This will provide a significant improvement to the existing walking and cycling network and is a positive effect of the N-S Project.

Overall, the N-S Project will create an improved and safer walking and cycling network that encourages and promotes alternative modes of transport. The proposed walking and cycling improvements will integrate with existing networks (where these exist) and the likely future environment.

7.3.1.2 Public Transport Network

As described in Section 3.2.5, the N-S Project will enable public transport services to operate within the Redhills area. Dedicated bus priority measures will be provided at the intersection of Don Buck Road and Royal Road to enhance bus travel times and reliability, including:

- A dedicated bus approach lane on Royal Road; and
- Providing for 'bus only' through movements in the left-turn lanes.

These upgrades will allow buses travelling on the proposed N-S Project and Royal Road to avoid potential queuing delays at intersections and improve travel time reliability. Prioritising bus services at this intersection is consistent with the future RTN intentions for the North West, enabling connectivity to a new planned Rapid Transit Network station on SH16 at Westgate and at Royal Road.

Overall, the N-S Project will enable an efficient public transport network in Redhills and provide a quicker and more reliable public transport network within the surrounding transport corridors, which will support the existing and the likely future environment in Redhills and its surroundings.

7.3.1.3 Road Safety

The design of the N-S Project has been undertaken to reflect AT's commitment to Vision Zero which aims for no deaths or serious injuries on Auckland's transport system by 2050. The N-S Project supports this approach by:

- Providing for safe walking and cycling facilities on all corridors.
- Safe intersection design based on AT standards and provision of crossing facilities for vulnerable users.

Overall, the N-S Project is well aligned with the principles of AT's Vision Zero. It will provide new, and improve existing, transport corridors to provide high levels of road safety in the N-S Project area. Detailed design investigations will be completed at a later stage to further support safety outcomes.

7.3.2 Transportation Effects

This section provides an assessment of the actual and potential adverse transportation effects that will result from the construction, operation and maintenance of the N-S Project. The assessment is informed by the Redhills Arterial Transport Network: Assessment of Transport Effects (ATE) contained within Volume 4.

7.3.2.1 Construction Traffic Effects

The assessment of expected construction traffic has been developed based on the indicative construction methodology (outlined in Section 7.1). It is anticipated that the larger part of works required for this package of projects will likely be delivered offline. However, this will be confirmed at detailed design stage, and regardless there is still likely to be some works in the live carriageway, which means that temporary traffic management will be required.

The scale of temporary traffic management to delineate live traffic away from the construction zones is largely dependent on the various stages and requirements of the construction activities. It is expected that short term temporary road closure for nights or weekends may be required for some specific activities, such as road surfacing, traffic switches and gas relocation. Other activities may require stop/go or contraflow traffic management, such as drainage, utility relocation, survey and investigation work.

The construction of the N-S Project will require significant earthworks. Final cut and fill volumes will be confirmed following detailed design prior to construction. The construction traffic movements to accommodate the earthworks will likely result in the increase of traffic volume on construction routes used during the construction period of the Project.

Given the construction timing and staging of the package has yet to be determined, there is a degree of uncertainty associated with any predicted construction methodology and associated traffic routes. This means:

- The routes that will be used by construction vehicles will depend on the location of quarries and disposal sites which are not yet certain
- The exact location and extent of compound sites/lay down areas has yet to be determined
- The timing of construction of other projects could impact on likely construction vehicle routes

Notwithstanding this, it is considered that with available connectivity to the strategic network and available capacity in the network, construction traffic will be able to be readily accommodated.

It is noted that construction access for the N-S Project will be required from a private driveway (currently servicing five properties) accessed off Red Hills Road. This access has been included within the designation extent and no specific mitigation is considered necessary in addition to that already identified through a Construction Traffic Management Plan (CTMP) (refer section 7.3.2.1.1 below).

Overall, the ATE does not identify any significant adverse impacts on the wider transport network as a result of the construction traffic; however, it does identify the potential for localised changes to traffic movement and property access. Measures to mitigate these potential effects will be secured through a designation condition requiring preparation and implementation of a CTMP, such that the adverse effects are no more than minor. These measures are summarised below.

7.3.2.1.1 Construction Traffic Management

As discussed above, the potential adverse effects of construction traffic will be managed through a CTMP. The purpose of the CTMP is to ensure the construction of each Project is managed in such a way that enables safe and efficient movement of local traffic throughout the construction period and to minimise disruption to road users, particularly the adjacent residential properties and local activities.

Localised transport effects will be managed through appropriate construction management protocols, including:

- Measures to provide for the safety of all road users is maintained throughout construction; for instance, temporary speed limits.
- Identification of detour routes and other methods to provide for the safe management and maintenance of traffic flows, including pedestrians and cyclists, on existing roads;
- Methods to provide ongoing vehicle and pedestrian access to private and adjacent properties; and
- Methods for communicating and timing construction activities to minimise the effects of temporary traffic and access restrictions.

7.3.2.2 Operational Transport Effects

The assessment of operational effects provided in the ATE was completed using a mix of quantitative transport modelling and qualitative assessment measures relating to the following transport functions:

- Walking and cycling
- Public transport
- Road user safety
- Property access
- General traffic

The positive transport effects as a result of the N-S Project have been described previously in Section 7.3.1. The following sub-sections provide a summary of the adverse operational effects with respect to each of these transport functions.

7.3.2.2.1 Walking and Cycling

The proposed walking and cycling facilities are described in Section 3.2. There are no adverse operational effects anticipated on walking and cycling, as the effects are expected to be positive (as described in Section 7.3.1).

All proposed berm widths will significantly exceed the 0.6m buffer requirement of the AT TDM, which is considered more than sufficient to provide for walking and cycling facilities.

7.3.2.2.2 Access

Driveways

As the proposed N-S Project, Don Buck Road and Royal Road are expected to be classified as 'arterial' corridors, any new direct property access will be limited by the AUP:OIP.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land other than where necessary.

There are 10 existing properties where it has been identified that a driveway (compliant with the AUP:OP) may not be possible to implement, primarily due to changes to road levels and the incursion of the corridor into the front of the properties. These properties have been included within the designation boundary. They include the following properties:

- 13, 15A, 17A, 18, 19, 20, 22, 24, 26, 28 Royal Road.

Access Lanes

There are currently three existing low-level access lanes provided along Don Buck Road, with all three provided at a lower level than the existing road. The provision of these vehicle accesses in these locations will be retained, and these access lanes will be reformed. Access lanes are proposed to be a minimum of 3m wide, allowing for vehicle travel one-way at a time, with passing enabled by the provision of driveways if two vehicles should meet on the access lane. Walking and cycling facilities will be located adjacent to the carriageway, at the higher level.

This is generally an improvement to the existing access lane configuration providing for safer vehicle access to private properties.

In terms of the lower-level access on Don Buck Road to the south of Royal Road on the eastern side, the low-level access is proposed to be reformed to deliver an access with appropriate grades, resulting in a northward shift. This access rearrangement, in addition to the road realignment in this location has resulted in access and property impacts on 1 Royal Road, 443 and 445 Don Buck Road. These three properties have accordingly been included within the proposed designation boundary.

Additionally, as part of the design of the signalised intersection at Royal Road a raised traffic island has been proposed to separate traffic at the intersection approaches. The provision of this barrier has been provided as a safety measure, however some properties accessing the road network from the low-level access nearest the intersection will no longer be able to turn right, with the access arrangement operating as a left-in left-out at this location. Vehicles will however be able to access the roading network from the low level access point further from the intersection and complete all movements at this location and be able to pass each other in the low-level access if necessary, therefore these effects are considered to be minor.

7.3.2.2.3 General Traffic

Table 16 provides a summary of the expected traffic volumes for the arterial corridors within the N-S Project area and those adjacent to the Redhills Precinct.

A two-lane corridor can efficiently accommodate vehicles volumes as shown below and therefore the proposed corridor design is expected to meet forecasted needs, with the additional lane provision at intersections to accommodate greater bus priority.

Table 16: Predicted Annual Average Daily Traffic (AADT) Volumes for 2048 Scenario

Count Location	2048 predicted AADT
Don Buck Road north of Royal Road	21,800
N-S Project between E-W Project and Royal Road	8,500

The ATE has assessed the performance of the proposed Don Buck Road and Royal Road intersection, with the intersection predicted to perform at a satisfactory level during the peak periods under a 2048 scenario.

The intersection was identified as having capacity restraints by 2048, with approaches reaching practical capacity or experiencing queues. However, this is not uncommon in peak periods in urban environments and is not considered a significant delay. Furthermore, with the significant growth expected in Redhills and the wider North West area, travel by vehicle will continue to be subject to congestion in the weekday peak periods. Moreover, bus reliability will improve, operational performance in other periods should improve, and facilities for pedestrians and cyclists will provide enhanced alternatives for travel.

7.3.2.2.4 Surrounding Network Connections

The collector road network as identified in the Redhills Precinct Plan (see Section 6.3.4 for further detail) has not been specifically provided for within the N-S Project. Given there is a degree of uncertainty about the timing and form of adjacent subdivision and development, the N-S Project includes a flush median along the length of the N-S Project corridor, which will provide additional width to accommodate potential intersections for collector connections when these are confirmed. The median will also facilitate the opportunity for future pedestrian / cycle crossing points along the N-S Project corridor, as urbanisation occurs on both sides of the corridor.

The location of these collector intersections will also need to be integrated with bus stop locations and pedestrian crossing facilities. The N-S Project does not preclude these facilities being provided at a later stage of design.

Overall, while the future collector and local transport network is yet to be determined, the N-S Project design provides sufficient flexibility to enable these connections to be formed as the surrounding land is developed. As such, the N-S Project will have no adverse effects on the future network connectivity.

7.3.2.3 Summary of Transport Effects

Considering both the positive transport effects in Section 7.3.1 and the actual and potential transport effects described above, overall, the N-S Project will provide an improved transport environment which includes:

- Improved walking and cycling facilities with increased safety, which will provide for the urbanisation of the local walking and cycling catchment, and improve the connectivity for all travel modes between Redhills and Massey;
- Improved public transport efficiency and reliability through the provision of bus priority and sufficient space to accommodate the development of the future public transport network;
- A high standard of road safety through transport design and improvements in road safety to existing transport corridors in the N-S Project area; and
- Improved network performance through upgraded intersection designs and traffic signalling.

To provide these benefits, the construction of the N-S Project will require some temporary and localised disruption to traffic movements and property access. These construction effects can be appropriately managed through the implementation of a CTMP.

Additionally, multiple existing properties may require changes to their current vehicle access (outlined in Section 7.3.2.2.2). A detailed access assessment will be completed by a suitably qualified traffic engineer and / or transport planner as part of the Outline Plan of Works to identify appropriate means to mitigate these effects.

Overall, the N-S Project will have positive effects for the local and wider transport network. Any adverse effects will be temporary and localised, and any permanent effects mitigated such that they will be no more than minor.

7.3.3 Noise and Vibration Effects

This section identifies and assesses the actual and potential effects of noise and vibration associated with the construction, operation and maintenance of the N-S Project. The assessment is informed by the Redhills Arterial Transport Network: Assessment of Construction Noise and Vibration (ACNV) and the Redhills Arterial Transport Network: Assessment of Traffic Noise and Vibration (ATNV) contained within Volume 4.

7.3.3.1 Construction Noise and Vibration Effects

The indicative construction methodology (Section 7.1) has been assessed for construction noise and vibration against the relevant standards. The proposed designation boundary has been assumed as the construction boundary, and noise predictions were based on reasonable worst-case assumptions which included:

- The majority of noisy works will be carried out between 7am-6pm on weekdays with limited night-time and weekend works for the pavement and surfacing stage when required.
- Equipment and construction activity sound power levels for dominant noise sources for the N-S Project were identified.
- Minimum set back distances from receivers were calculated to comply with day-time noise criterion of 70 decibels equivalent continuous sound level (**dB L_{Aeq}**) without mitigation.

The vibration effects associated with construction of the N-S Project have been assessed in relation to potential building damage. The effect of vibration on amenity has not been assessed and has only been discussed to the extent that it is relevant to mitigation.

Indicative vibration emission radii distances have been predicted for the most vibratory equipment. Actual vibration levels are highly dependent on local conditions and the selection of machinery, which is currently unknown. To account for inaccuracies, the likely worst-case vibration has been calculated based on the equipment and hard ground geology to provide offset distances.

The predicted results were then assessed against the relevant criteria to determine if there would be any potential construction noise and vibration exceedances for any of the existing receivers along the N-S Project.

7.3.3.1.1 Construction Noise Effects

The ACNV identifies that the closest properties outside the designation boundary and adjacent to the N-S Project area could experience worst-case noise levels up to 90 decibels equivalent continuous sound level (dB L_{Aeq}) with mitigation, which does not comply with the AUP:OIP day-time noise criterion. This has the potential to result in noise disturbance effects (e.g., loss of concentration,

annoyance, a reduction in speech intelligibility and reduced productivity) without appropriate mitigation.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 90 dB LAeq at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. Mitigated noise levels are expected to comply with the 70 dB LAeq daytime noise criterion for most of the construction works.

The ACNV sets out a hierarchy of mitigation measures which will be adopted through a Construction Noise and Vibration Management Plan (CNVMP) and any Schedules produced for the works (refer to section 7.3.3.1.3 for details). The preparation and implementation of CNVMP and Schedules will be secured through a designation condition.

The ACNV concludes that by following this hierarchy the BPO for mitigation will be implemented, whilst avoiding undue disruption to the community.

Overall, construction noise will be temporary and construction noise levels can be significantly reduced through the implementation of the hierarchy of mitigation measures. Accordingly, by providing appropriate mitigation and construction management the potential construction noise effects will be no more than minor.

7.3.3.1.2 Construction Vibration Effects

The ACNV identifies that, in worst case circumstances (without mitigation), 73 residential dwellings adjacent to the N-S Project area may experience vibration levels of 5 mm/s or above, exceeding the criteria for residential properties. 5mm/s is the threshold above which cosmetic building damage may occur, such as cracking.

The vibration amenity criteria (vibration levels of 0.3mm/s for night time and 2 mm/s during the day) could be exceeded in existing or future buildings if they are occupied during the works and within 21m of the roller compactor (high vibratory equipment) or within the emission radii identified for the other vibration generating equipment (refer to Volume 4 for details).

In addition to cosmetic building damage, the potential adverse effects associated with excessive vibration may range from annoyance to loss of amenity or inability to carry out work. It is noted the structural damage is not expected. These vibration effects will reduce with distance from the source and the level of vibration transmission into a building will depend on a number of factors, such as the foundation type and building construction. Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

The ACNV sets out a hierarchy of mitigation measures which will be adopted through a Construction Noise and Vibration Management Plan (CNVMP) and any Schedules produced for the works (refer to section 7.3.3.1.3 for details). The preparation and implementation of CNVMP and Schedules will be secured through a designation condition.

Additionally, to manage the potential for cosmetic damage to buildings, a building condition survey will be offered to be carried out before and after construction works at properties where predictions

indicate the relevant building damage criteria may be exceeded, to determine if any damage has been caused. Any damage confirmed to be caused by the N-S Project will then be repaired.

Overall, construction vibration will be temporary and through the implementation of the hierarchy of mitigation measures, the risk of significant adverse effects associated with excessive construction vibration levels can be avoided. Accordingly, by providing appropriate mitigation and construction management, the potential construction vibration effects will be no more than minor.

7.3.3.1.3 Construction Noise and Vibration Management Plan

A Construction Noise and Vibration Management Plan (**CNVMP**) is proposed as the most effective way to control noise and vibration impacts. The objective of the CNVMP is to provide a framework for the development and implementation of the Best Practicable Option for the management of construction noise and vibration effects to achieve the construction noise and vibration standards set out in the conditions to the extent possible. The CNVMP will include a comprehensive suite of measures, which are set out in detail in the ACNV in Volume 4 and the proposed designation conditions in 0.

Where noise and/or vibration limits are predicted to be exceeded for a more sustained period or by a large margin, a Site Specific or Activity Specific Construction Noise and Vibration Management Schedules (“Schedule”) will be produced. Any Schedule will include details such as:

- (i) Construction activity location, start and finish dates;
- (ii) The nearest neighbours to the construction activity;
- (iii) The predicted noise and/or vibration level for all receivers where the levels are predicted or measured to exceed the applicable standards and predicted duration of the exceedance;
- (iv) The proposed mitigation options that have been selected, and the options that have been discounted as being impracticable and the reasons why;
- (v) The consultation undertaken with owners and occupiers of sites subject to the Schedule, and how consultation has and has not been taken into account; and
- (vi) Location, times and types of monitoring.

Where measured or predicted vibration from construction exceeds Category A, then there is also a requirement to undertake building condition surveys.

Night works may potentially be required during pavement construction stages. Where there is no practicable alternative, night works can be managed through increasing the frequency of communication with stakeholders, carrying out regular monitoring to ensure criteria are being met and, as a last resort, offering alternative accommodation.

As set out above, where necessary, pre-condition surveys by a suitably qualified engineer will be offered to be undertaken at all buildings where the N-S Project building damage criteria is identified as likely be exceeded. A post-construction condition survey of the same buildings will be conducted when construction is completed, and any damage shown to have been caused by the Project construction rectified by AT.

7.3.3.2 Traffic Noise and Vibration Effects

This section identifies and assesses the actual and potential effects of traffic noise and vibration associated with the N-S Project.

The Assessment of Traffic Noise and Vibration Effects report for Redhills, in Volume 4, contains predictions of road traffic noise carried out using the method recommended in NZS 6806: Acoustics – Road traffic noise – New and altered roads (NZS 6806) in accordance with the AUP:OP.

The assessment of effects undertaken in the report is two-fold: in accordance with NZS 6806 and in relation to the predicted noise level changes comparing the future traffic noise levels with and without the extended and / or upgraded transport corridors. The summary below should be read in conjunction with this report.

7.3.3.2.1 Assessment Methodology

As required by NZS 6806, the assessment methodology included the prediction of existing and future traffic noise levels, both without (Existing and Do Nothing scenarios) and with the proposed transport corridors (Do Minimum scenario). The scenarios are explained below:

- The Existing scenario represents the current road network with current traffic volumes, i.e., the existing environment as it is experienced now
- The Do Nothing scenario represents the current road network with future traffic volumes, assuming a full build out of the area
- The Do Minimum scenario represents the proposed future road network, incorporating the proposed or upgraded transport corridors and other planned transport projects in the area. This scenario assumes a full build out of the area, and the transport infrastructure to enable the development. This is a realistic scenario at a point in time when all proposed designations are operational. In this instance the Do Minimum scenario includes use of AC-14 or equivalent low noise road surface, with the exception of Red Hills Road which is chip seal.

Noise effects of road traffic on existing noise sensitive locations, referred to as Protected Premises and Facilities (PPFs) within NZS 6806, have been assessed. PPFs within a 100m radius of the urban transport corridors have been included.

Where transport corridors are considered 'Altered Roads', these have been assessed by comparing the predicted noise levels in the design year without the projects (Do Nothing) with the predicted noise levels in the design year with the projects (Do Minimum).

Transport corridors considered to be 'New Roads' have been assessed by comparing the predicted existing noise levels with the Do Minimum predictions.

7.3.3.2.2 Potential Traffic Noise and Vibration Effects

Adverse noise effects as a result of high levels of traffic noise may include sleep disturbance, loss of concentration, annoyance, a reduction in speech intelligibility and reduced productivity. The effects are not restricted to PPFs but also future residential and other noise-sensitive developments. The effects on future residential and other noise-sensitive developments are not included in the NZS 6806 definition of PPF. Where new noise sensitive developments are established in the vicinity of a road, their design should take account of the potential noise effects and care should be taken to avoid or minimise the effects.

The magnitude of effects will largely depend on noise levels received in noise-sensitive spaces within buildings, although there are also potential annoyance effects associated with a loss of amenity when high noise levels are received in outdoor living or recreation spaces.

Traffic from new or upgraded roading projects is not generally expected to create any vibration issues. The smooth and even surface typical of new urban roads would likely generate no more than negligible traffic vibration impacts. Therefore, traffic vibration has not been assessed for the transport corridors.

7.3.3.2.3 Assessment of Traffic Noise Effects

Following implementation of recommended mitigation measures outlined in Section 7.3.3.2.4, noise levels associated with the new N-S arterial and associated alterations to Don Buck Road are predicted to decrease or remain unchanged at over half of PPFs, resulting in positive noise effects. This is due to the intended redistribution of traffic across the wider network, resulting in a reduction in traffic volumes along sub-arterial roads such as Red Hills Road.

Of the PPFs that are not predicted to receive a reduction or experience no change in noise levels, the predicted increase is assessed as negligible (between 0 dB and 2 dB) for most. In total 22 PPFs are predicted to experience a 3 dB to 4 dB increase in noise level, resulting in slight adverse noise effects. 7 PPFs are predicted to experience a 5 dB to 8dB increase in noise level, resulting in moderate noise effects. These PPFs remain in the lowest noise category (Category A) under NZS 6806, and in accordance with the standard do not require mitigation.

There is one PPF located in the N-S Project area that was assessed against new road criteria (27 Redhills Road). A noise level of 47 dB LAeq(24h) is predicted at this PPF; an increase of 12 dB, resulting in significant adverse effects. This increase is due to the introduction of the new noise source near the PPF. However, this PPF remains in the lowest noise category (Category A) under NZS 6806, and in accordance with the standard does not require mitigation.

Further, ambient noise levels in the area will likely increase as the area urbanises and therefore the change in noise level due to the Project will likely not be as noticeable at the time. A noise barrier was investigated but not considered practical due to the gap that would be required to maintain access to the property compromising the performance of the barrier.

All predictions are based on traffic flow along 'New Roads' and 'Altered Roads' at the design year (2048). These traffic volumes are predicated based on the anticipated urbanisation of the area and implementation of surrounding infrastructure projects. Development of the surrounding areas will likely increase activity and associated noise levels. Therefore, any changes predicted for the traffic noise effects related to these projects are not likely to represent such a significant change at the time of construction due to the change in environment.

The results of the noise assessment will be confirmed at detailed design stage including confirmation of the road traffic noise at current PPFs. The review, confirmation and refinement of the BPO shall aim to achieve the same noise criteria categories as determined with the current BPO.

Nevertheless, the predictions show that all PPFs across the N-S Project area will receive levels within the lowest design noise levels. Therefore, resulting noise levels will be reasonable in a residential context at the majority of PPFs assessed and no further noise mitigation is deemed necessary at this stage.

7.3.3.2.4 Recommended measures to avoid, remedy or mitigate potential adverse effects

There are broadly three mitigation options that can be applied to manage road traffic noise, and are discussed in NZS6806:

- The choice of road surface material, a mitigation option that reduces noise at the source. Road surface material has the largest influence on the generation of road traffic noise.
- The installation of noise barriers either on the roadside or on the property boundary.
- Building Modification measures (e.g., mechanical ventilation to enable windows and doors to remain closed, or upgrade or replacement of windows, wall linings, floors and ceiling linings).

NZS 6806 states:

The noise criteria are intended to address the adverse effects of road-traffic noise on people. Land-use planning is the preferred method of avoiding these effects. Where this is impracticable, the Standard sets out procedures and methods of the prediction, measurement and assessment, and guidelines for mitigation of road-traffic noise in accordance with the duty to adopt the best practicable option.⁸

This indicates that NZS6806 deals with the residual noise effects after land-use planning has been implemented (or where it has been omitted in the planning stage).

Generally, mitigation is implemented from source to receiver. This means that the road surface is the first choice of mitigation measure as it protects the largest extent of receivers. Second are barriers placed either on the road edge or the property boundary. Barriers protect the area behind them, so are not suitable to shield upper floors of multi storey buildings, however, they are suitable to protect ground floors and outdoor living areas where these are facing a road. Barriers may also not be appropriate in suburban and urban environments for urban design reasons – this would be considered when the BPO is confirmed. Lastly, building modification can be implemented to existing PPFs where these are not sufficiently designed to reduce internal noise levels. Building modification is the last choice as it only protects individual living areas and has no benefit to the wider community.

Where future developments are not yet implemented, the road controlling authorities and developers have a shared responsibility to implement reasonable and appropriate mitigation.

Application of AC-14 or equivalent low noise road surface has been recommended for the new N-S arterial road and will be retained along Don Buck Road. Red Hills Road is currently finished in chip seal and the results indicate that this can remain unchanged. No additional mitigation measures are required.

7.3.3.2.5 Summary of Traffic Noise and Vibration Effects

Predicted traffic noise levels during operation of the N-S Project are generally expected to reduce or increase negligibly with recommended mitigation implemented when compared to the Do Nothing scenario for 'Altered Roads'.

One PPF is predicted to experience a noise level increase of 12 dB when comparing the Existing and Do Minimum scenarios (for 'New Roads'), potentially resulting in significant adverse effects. However, ambient noise levels in the area will likely increase as the area urbanises and therefore the

⁸ NZS6806, Section 1.1.1

change in noise level due to the Project will likely not be as noticeable at the time. A noise barrier was investigated but not considered practical due to the gap that would be required to maintain access to the property compromising the performance of the barrier.

7.3.4 Archaeology and Heritage Effects

This section provides an assessment of the actual and potential effects on archaeology and heritage that will result from the construction, operation and maintenance of the RATN (both the N-S Project and the E-W Project). The assessment is informed by the Redhills Arterial Transport Network: Assessment of Historic Heritage Effects (AHHE) contained within Volume 4.

The AHHE has been prepared based on review of the following sources to determine whether any archaeological or other historic heritage sites have been recorded on or in the immediate vicinity of the RATN area within Redhills:

- The New Zealand Archaeological Association's site record database (ArchSite);
- Auckland Council's Cultural Heritage Inventory;
- AUP:OIP schedules;
- The Heritage New Zealand Pouhere Taonga New Zealand Heritage List / Rārangī Kōrero; and
- Literature and archaeological reports relevant to the RATN area.

This was supplemented with a visual inspection of the RATN area.

The AHHE concludes that there are no archaeological sites recorded within or in close proximity to the RATN area. The nearest sites are more than 400m away (including a plane crash site during World War II, a gum diggers' camp and hut site, a 1930's Post Office and historic dwelling). The nearest recorded archaeological site related to Māori settlement is some 2km to the east of the RATN area. As such, the construction and operation of the RATN will have no effects on any known archaeological or other historic heritage values.

In any area where archaeological sites have been recorded in the general vicinity it is possible that unrecorded subsurface remains may be exposed during development. However, it is considered unlikely in this situation as the Redhills area is located some distance from the coast and navigable waterways, where Māori and early European archaeological sites tend to be concentrated. Furthermore, the area has been farmland throughout the period of European ownership.

To mitigate the very limited potential for unidentified archaeological remains to be exposed during construction, the conditions include an advice note referring to the AUP:OIP Accidental Discovery Rule (ADR) (E12.6.1).

Overall, the RATN is unlikely to have effects on any known archaeological or other historic heritage values and the very limited risk that unidentified archaeological remains are exposed will be managed through the ADR.

7.3.5 Cultural Effects

This section addresses the potential cultural effects associated with the construction, operation and maintenance of the RATN (both the N-S Project and the E-W Project).

Manawhenua have been partners throughout the development of the Programme, with Ngāti Whātua o Kaipara and Te Kawerau ā Maki the predominant iwi groups with an interest in the Redhills area.

Manawhenua involvement in the Programme has included options assessment, design refinement and effects assessment for the RATN. Engagement with these iwi groups has included regular hui as part of the Manawhenua Forum (refer Section 10.2.3) and site walkovers to identify and address any culturally significant effects.

Ngāti Whātua o Kaipara and Te Kawerau ā Maki have also produced Cultural Impact Assessments (CIA) for the RATN.

7.3.5.1 Manawhenua Treaty areas and site of significance

The RATN does not directly affect any identified properties or land currently being negotiated under Treaty settlements, land returned under a Treaty settlement, marae, Māori freehold lands, Tupuna Maunga Affected Areas, Tangata Whenua Management Areas, or Sites of Significance under the AUP:OP. The sites are also not within the coastal environment under the Marine and Coastal Area (Takutai Moana) Act 2011, therefore there are no customary marine title areas/groups or protected customary rights that need to be considered in relation to these corridors.

The N-S Project falls partially within, and the remainder of the RATN is proximate to, Te Kawerau ā Maki's statutory acknowledgement area (recorded in Appendix 21.7 of the AUP:OP). As such, the relevant consent authorities must have regard to the statutory acknowledgement relating to the area.

7.3.5.2 Ngāti Whātua o Kaipara

In the CIA, Ngāti Whātua o Kaipara raised matters including:

- Road design
- Vegetation removal
- Potential to enhance ecology and environment
- Effects of site works
- Potential to uncover archaeological or heritage items

7.3.5.3 Te Kawerau ā Maki

Te Kawerau ā Maki are associated with the area within which the North West Preferred Transport Network (refer Figure 2) is located. The CIA prepared by Te Kawerau ā Maki addresses the entirety of the North West Preferred Transport Network. This includes the RATN.

The following is a summary of the key matters raised by Te Kawerau ā Maki, in respect to the RATN:

The future transport network

- Te Kawerau ā Maki do not oppose the RATN.
- The CIA notes the potential positive operational benefits of the RATN through walking and cycling provision and opportunity for cultural design and place making.

Impacts on streams and ecology

- The CIA identifies impacts on Waiteputa (a tributary of Ngongetepara Stream), including effects arising from earthworks in proximity to the awa, permanent fill batter slopes adjacent to the awa, and formation of a new section of road and net increase in impervious surface.
- Impacts on Wai Māori (fresh water) are identified, including effects arising from earthworks within proximity to watercourses and vegetation clearance along watercourse embankments.
- Te Kawerau ā Maki identified in the CIA that the stormwater management approach proposed as having minor beneficial effect.

Impacts on whenua (soils)

- The CIA raises the impact of bulk earthworks associated with the Project.

7.3.5.4 Recommended measures to avoid, remedy or mitigate potential adverse effects

A suite of measures is proposed to avoid, remedy and mitigate cultural effects arising from the RATN, and will be secured through designation conditions. These are summarised below.

General

- Te Tupu Ngātahi will continue to engage with manawhenua to seek to further understanding of the cultural effects that may result from the construction and operation of the RATN.
- Manawhenua will be invited to prepare a Cultural Advisory Report in advance of the detailed design. The purpose of the report is to assist in understanding and identifying treasures affected by the project and inform their management and protection.

Cultural design and expression

- Manawhenua will be invited to participate in the development of the ULDMP to input into relevant cultural landscape and design matters on each corridor. This includes the management of potential effects on cultural sites, landscapes and values.

Risk of archaeological discovery

- A Cultural Monitoring Plan will be prepared prior to the start of construction works or enabling works. These plans will be prepared in collaboration with manawhenua to ensure that effects are managed appropriately, including features discovered by accident.
- Accidental discovery protocols set out under the AUP:OIP Accidental Discovery Rule (E12.6.1) will be adhered to. An advice note is proposed to this effect.

Construction environmental controls

- Concerns relating to construction works and potential impacts of sediment on streams and wetlands will be considered through the CEMP, and future regional consents. Detailed design will provide the opportunity to reduce earthwork extents, where practicable.

Ecological mitigation

- Potential construction and operational impacts on fish, lizards, birds and bats have been considered through the Assessment of Ecological Effects (Volume 4) and Section 7.3.7, and

mitigation measures recommended. Ecological mitigation will be secured through designation conditions requiring pre-construction ecological surveys, and preparation and implementation of an Ecological Management Plan (EMP).

Riparian vegetation

- Effects and mitigation for impacts on riparian vegetation will be considered at detailed design, for those corridors that have impacts on streams. Where there is a known impact on riparian vegetation due to a crossing or culvert design, suitable space for future mitigation planting has been included in the designation footprint, however mitigation will be confirmed under future regional consents.

7.3.5.5 Summary of Cultural Effects

Manawhenua have been partners through the development of the RATN and their values have been reflected through the decision-making process and implementation of key mitigation protocols. While the RATN will not affect any identified Sites of Significance to Manawhenua under the AUP:OIP, there is the potential for impacts on cultural values to the natural environment and cultural landscape context, identified through direct engagement with manawhenua.

Provision for cultural input and engagement will be enabled through the ULDMP and monitoring plans to manage adverse effects on cultural heritage and the potential for new archaeological discovery. The ULDMP will also consider how corridor features integrate with the corridor as a whole, including any proposed mitigation, and how the transport corridors can contribute to or reduce effects on the relevant cultural landscape.

7.3.6 Landscape and Visual Effects

This section provides an assessment of the actual and potential landscape and visual effects that will result from the construction, operation and maintenance of the N-S Project. This assessment is informed by the Redhills Arterial Transport Network – Assessment of Landscape and Visual Effects (ALVE) contained within (Volume 4).

It is noted that the ALVE was finalised in 2020 prior to the NORs being placed on hold. The general premise of this assessment is still correct, with only very minor changes made to the alignment since 2020 (notably a slight amendment to the alignment of the N-S corridor immediately west of the Don Buck / Royal Road intersection).

7.3.6.1 Construction Landscape and Visual Effects

As outlined in Section 5.2, construction of the N-S Project is likely to take place in the existing (mostly rural) environment or while this landscape is transitioning into an urban environment. Within this context, the following changes need to be considered when considering construction related landscape and visual effects:

- Physical changes to the landscape during construction as a result of construction activities, such as earthworks, vegetation removal, and site clearance; and
- Temporary changes to visual amenity as a result of construction activities, such as construction laydown areas and machinery.

These changes to the landscape environment have the potential to result in temporary adverse landscape and visual effects during construction, particularly when viewed from properties that are immediately adjacent to the N-S Project. However, through the implementation of appropriate mitigation and design considerations, the potential adverse effects can be minimised, and the level of effect will diminish over time following completion of the N-S Project. These mitigation and design considerations include:

- Cut and fill slopes are proposed be shaped to a natural profile to integrate into the surrounding natural landform.
- Vegetation removal is proposed to retain noteworthy and high value trees and vegetation identified within the N-S Project area where possible.
- Existing fences and garden plantings (removed through the N-S Project works) are proposed to be reinstated (in consultation with the landowner).
- Reinstatement of the N-S Project area following the completion of construction, including the removal of any leftover fill from site compound areas, the reshaping of ground to integrate with the surrounding landform and the reinstatement of site compound areas with grass and landscaping.
- Remnant land that is maintained in the road corridor (where existing dwellings are removed) will be grassed to mitigate adverse visual amenity effects potentially arising from residual land.

Overall, there may be minor adverse effects on visual amenity during construction. However, these effects will be temporary and largely confined to the period of construction. These temporary effects are typical for the construction of new transport corridors and upgraded intersections, and when considered within the context of a landscape which is likely to be changing at the time of the construction of the N-S Project, are further mitigated.

7.3.6.2 Operational Landscape and Visual Effects

As outlined in Section 5.2, operation of the N-S Project is likely to take place in an urban landscape. By the time the N-S Project is operational it can reasonably be assumed that further sections of the Redhills Precinct will have urbanised, alongside (if not as part) of the implementation of the NoR section. As such, operational related landscape and visual effects need to be considered within this context.

The N-S Project will result in longer-term changes to the landscape context of the N-S Project area, which have the potential to result in adverse effects to the landscape character, natural character and visual amenity of the area. These changes include:

- For private properties adjacent to the N-S Project (specifically along Royal Road and Don Buck Road), proposed earthworks will permanently impact private properties in the following ways:
 - Encroachment into some private yards, impacting on residential amenity and existing entrance way design;
 - Surface level changes between private property boundaries and the upgraded road corridor, requiring some existing driveways and private access ways to be regraded;
 - Greater proximity of the carriageway and footpath/cycleway to property boundaries and increased traffic volumes;
 - Introduction of noise mitigation walls or other mitigation features and retaining walls;

- Potential effects on natural character through clearance and/or disturbance of vegetation (although limited) associated with stream crossings within the margins of Waiteputa Stream, Red Hill Stream and Ngongetepara Stream, heightening the impression of further human modification.
- Adverse visual effects for a number of properties located directly west of the existing Don Buck Road / Royal Road roundabout. These properties currently enjoy views over the Redhills Precinct, however have the potential to be disrupted by the elevated section of the N-S Project and associated fill slopes. However, as discussed adverse visual effects are considered within the context of the urbanisation of the Redhills area, and such effects are considered to be moderated by the land use for this localised setting of 'Business – Local Centre' surrounded by 'Residential - Mixed Housing Suburban' under the AUP:OIP, with future development expected to respond to the N-S Project accordingly.

These localised, permanent effects from the N-S Project area can be managed through the preparation of an ULDMP which will include the following matters:

- All cut and fill slopes will be shaped to a natural profile to integrate into the surrounding natural landform. Where there are large-scale fill slopes (that are retained within the road reserve) it is recommended these are reinstated with grass, where practicable, if they are not able to be integrated with adjacent land use through site specific landscape design.
- Retaining walls and noise mitigation walls will be designed to integrate with private boundary fencing and where practicable incorporate existing and reinstatement planting.
- The consideration of any proposed bridge design (if applicable) to be designed to contribute to the local sense of place and urban amenity of the future urban landscape
- The consideration to investigate walking and cycling connectivity opportunities to integrate with existing and future open space (as indicated by the Precinct Plan)
- The retaining wall (Don Buck / Royal Road intersection) will be reinstated to be designed to contribute to the local sense of place and urban amenity of the future urban landscape.

Furthermore, the ALVE recommends the following opportunities to be considered at the detailed design phase and implemented through the ULDMP (if practicable):

- The planting of any constructed stormwater wetlands with appropriate (low maintenance) native species and the integration of wetlands into the surrounding urban landscape context
- Expand reinstatement planting areas around stream crossings to include a greater extent of wetland and riparian margin

On the basis of the above, the magnitude and nature of landscape character, natural character and visual change within the N-S Project area are considered to accord with that which will occur throughout the adjacent development of the Redhills areas. While the N-S Project will result in some temporary adverse effects to the landscape and visual amenity in the N-S Project area, the landscape mitigation measures proposed through the implementation of an ULDMP can adequately remedy adverse effects arising from the N-S Project.

Anticipated development within Redhills on adjacent land will, over time, substantially change the scale and character of the adjacent landscape and absorb the landscape and visual changes proposed within the N-S Project area. As such, the N-S Project will contribute to an improvement of the landscape values for the future urban context of the area.

7.3.7 Ecological Effects

This section provides an assessment of the actual and potential ecological effects that will result from the construction, operation and maintenance of the RATN (both the N-S Project and the E-W Project). The assessment is informed by the Redhills Arterial Transport Network– Assessment of Ecological Effects (AEcE) contained within Volume 4.

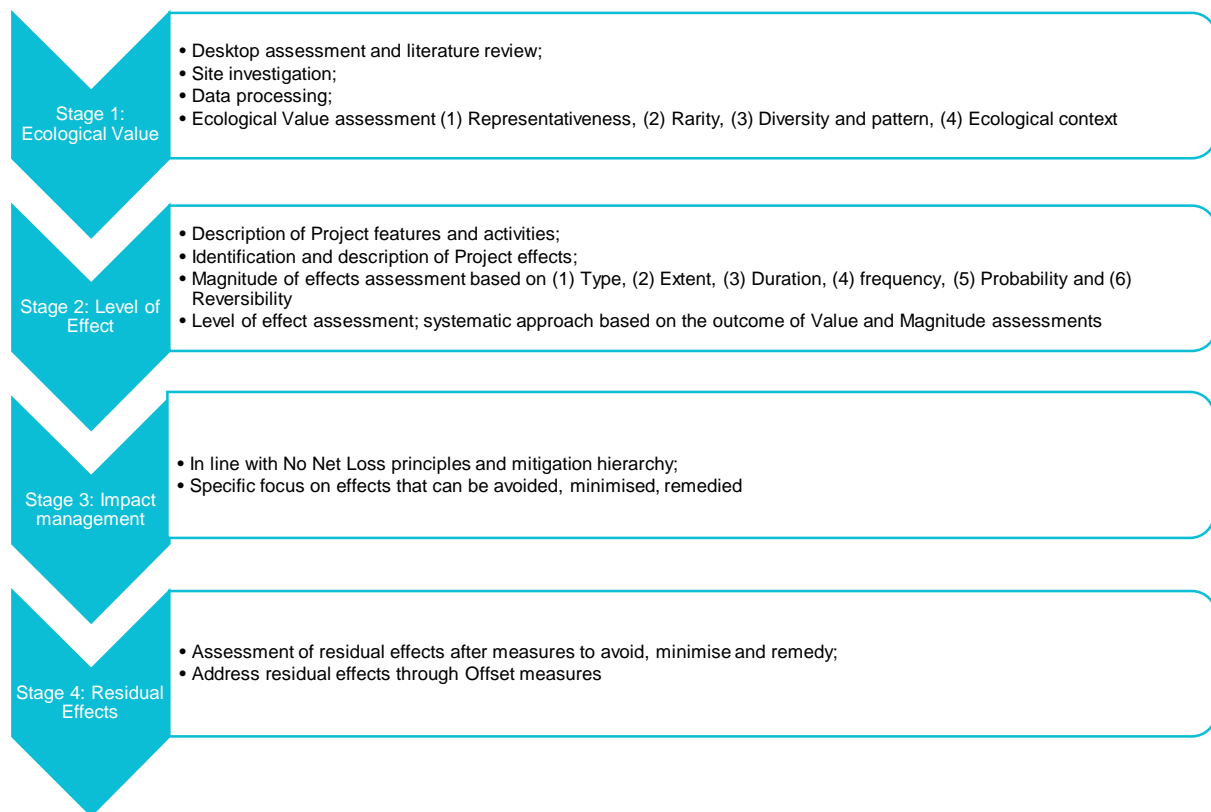
Although regional consents are not being sought at this time, ecological effects arising in respect of activities that require regional consents have been considered to inform design, options assessment and the proposed designation footprint. This includes the identification of any ecological features of value for the purposes of design and alignment decisions. In summary, these regional consenting matters relate to:

- Effects of vegetation removal on terrestrial habitats;
- Effects of vegetation removal on fauna (bats, birds, lizards) behaviour and their roosts/nests;
- Effects on streams and wetlands; and
- Earthworks effects – weed dispersal and sediment discharge.

The assessment of ecological effects contained in this section is limited to those effects arising from matters that would trigger a district plan requirement.

7.3.7.1 Assessment Methodology

The ecological assessment of effects follows the Ecological Impact Assessment (EclA) Guidelines (EIANZ, 2018). These guidelines were used to assess the ecological value of identified ecological features (refer to Section 6.1.3 above) and evaluate the magnitude and level of potential effects that the RATN could have on these features, as summarised in Figure 17 below. Note that that for Stage 2 (Level of Effect) and Stage 3 (Impact Management) additional consideration was given to the permitted baseline and the likely future ecological environment under the AUP:OP.

Figure 17: Ecological Impact Assessment Guideline Process

Site visits

The ecological assessment has been informed by site visits to key ecological features (identified from a desktop screening exercise), where features were accessible. Additional bat surveys were carried out which confirmed the presence of bat activity⁹ (but low frequency) in the broader landscape.

7.3.7.2 Construction Effects

The potential construction effects (direct and indirect) to the terrestrial habitat and species within and adjacent to the RATN area (as they relate to district matters) have been identified:

- Vegetation removal subject to district controls.
- Disturbance and displacement to roosts/nests and individual (existing) bats, birds and lizards due to construction activities (noise, light, dust etc.). It is assumed that this effect will occur after vegetation clearance (subject to regional consent controls) has been implemented and is therefore likely to happen in habitats adjacent to the project footprint/designation or underneath structures such as bridges¹⁰.

⁹ Bat monitors were placed along streams and vegetated linear features within the RATN area. Monitors were deployed between 1 – 26 November 2019 for 19 suitable nights.

¹⁰ Herpetofauna have been considered but excluded in the assessment of ecological effects as construction effects are considered **Very Low**.

A description of these potential construction effects and a summary of the subsequent level of ecological effects (prior to mitigation) based on the ecological value and magnitude of the effect presented in Table 17.

Table 17: Summary of Ecological Effects During Construction

Effects type		Description	Subsequent level of Effect
Habitat	Terrestrial	<ul style="list-style-type: none"> A total area of 2246m² terrestrial vegetation within in the RATN area will be removed. Permanent loss of habitat/ecosystem due to vegetation removal, but unlikely probability that fragmentation and edge effects will occur. 	Very Low
Species	Bats	<p>Bats may utilise habitats (EF, TL.3, VS3 (refer Table 4)) associated with the RATN Area for roosting or foraging. Potential disturbance and displacement to roosts and individual bats adjacent to construction activities, including:</p> <p><u>Light</u></p> <ul style="list-style-type: none"> Night works may be required, and site compounds are likely to be lit. Lighting at night has the potential to modify the behaviour of bats if foraging within this area or roosting in nearby isolated stands of mature trees. <p><u>Noise and Vibration</u></p> <ul style="list-style-type: none"> Noise and vibration can be an issue if bats are roosting in the immediate vicinity of the construction works. Bat surveys indicated the RATN area provides suitable foraging and commuting habitat for bats. It can be assumed that bats will utilise roost sites within the RATN area as mature trees with suitable roosting features were identified. 	Moderate
		<p>Potential effects due to removal of district plan vegetation:</p> <ul style="list-style-type: none"> Bats may be impacted by the removal of district plan vegetation through loss of foraging habitat, roost loss¹¹, or mortality or injury. 	Low
	Birds	<p>Potential disturbance and displacement to roosts and individual bats adjacent to construction activities, including:</p> <ul style="list-style-type: none"> Noise, vibration and lighting disturbance caused by construction activities, which could displace native birds from suitable nesting and foraging habitat within and adjacent to the RATN area. The Northern New Zealand dotterel was observed at the Universal Homes residential development construction site. It is expected that the road will be constructed once the residential development is already constructed, therefore dotterel are unlikely to be present, and therefore would not be impacted by 	<p>Non-Threatened or At-Risk (TAR) Birds</p> <p>Low</p> <p>Terrestrial TAR birds (Northern New Zealand dotterel)</p> <p>Low</p>

¹¹ Roost loss has been considered but excluded as an effect as the consequence of roost loss (if it does occur at all) is considered Negligible in the context of this Project.

		disturbance effects during construction. Additionally Northern New Zealand dotterel are increasingly breeding in modified habitats including construction sites (Waka Kotahi, 2012), suggesting that they can become acclimatised to construction disturbance.	
		Potential effects due to removal of district plan vegetation: <ul style="list-style-type: none"> • Loss of foraging habitat • Mortality or injury to birds 	Non-TAR Birds Very Low
			Terrestrial TAR birds (North Island kākā) Very Low

In accordance with the Environment Institute of Australia and New Zealand (EIANZ) guidelines, impact management measures (i.e., mitigation) are only proposed for those effects that have been assessed as moderate and above, therefore mitigation is only required for the construction effects of the RATN on bats.

To protect bats during the construction of the RATN, an Ecological Management Plan (EMP) will be prepared and implemented. This EMP will be prepared in line with the current best practice and include the following:

- Surveys prior to construction to confirm presence/likely absence. Surveys to confirm bat roost locations if activity is confirmed.
- Confirmation of maternity roosts may require a seasonal restriction on construction activity (no or restricted construction during December to March).
- Siting of compounds and laydown areas to avoid particular habitat.
- Lighting design to reduce light levels and spill from construction areas.
- Restriction of nightworks around particular habitat.
- Bat management should be incorporated with any regional consent conditions that may be required for regional compliance.

Assuming bat presence is confirmed, with the implementation of the EMP detailed above, it is considered that the magnitude of the construction effects from the RATN on bats could be reduced to Very Low.

7.3.7.3 Operational Effects

The potential operational effects from the RATN (as they relate to district matters) have been identified:

- Loss in connectivity to indigenous fauna (e.g., bats, birds, herpetofauna) due to light, noise and vibration effects from the operation of the road, leading to fragmentation of habitat; and
- Disturbance and displacement of indigenous fauna and their nests/roosts (e.g., bats, birds, herpetofauna) due to light, noise and vibration effects from the operation of the road¹².

¹² Herpetofauna have been considered but excluded in the assessment of ecological effects as operational effects are considered **Very Low**.

A description of these potential operational effects and a summary of the potential level of ecological effects (prior to mitigation) based on the ecological value and magnitude of the effect presented in Table 18.

Table 18: Summary of Ecological Operational Effects

Effects type		Description	Subsequent Level of Effect
Species	Bats	Disturbance and displacement of new and existing roosts (including maternity roost) and individuals due to noise/vibration and lighting (including disturbance of commuting and foraging bats at night and adverse effects on insect prey populations).	High
		Loss in connectivity due to permanent habitat loss, light, and noise effects from the road can lead to fragmentation of terrestrial habitat and influence bat movement in the broader landscape.	Very High
	Birds	Noise, vibration, dust and lighting disturbance caused by the presence of the road could potentially displace native birds (existing) from suitable nesting and foraging habitat within and adjacent to the RATN area.	Non-TAR birds Low
			Terrestrial TAR birds (Northern New Zealand dotterel) Low
			Terrestrial TAR birds (North Island kākā) Low
			Wetland TAR birds (North Island fernbird) Low
		Loss in connectivity due to permanent habitat loss, light and noise effects from the road, may lead to fragmentation of terrestrial, wetland and riparian habitat due to the presence of the road. The Northern New Zealand dotterel was observed at the Universal Homes residential development construction site. It is expected that the road will be constructed once the residential development is already constructed, therefore Northern New Zealand dotterel are unlikely to be present, and therefore would not be impacted by loss in connectivity.	Non-TAR birds Low
			Terrestrial TAR birds (Northern New Zealand dotterel) Low
			Terrestrial TAR birds (North Island kākā) Low
			Wetland TAR birds (North Island fernbird) Low

In accordance with the EIANZ guidelines, impact management measures (i.e., mitigation) are only proposed for those effects moderate and above, therefore mitigation is only required for the operational effects of the RATN on bats.

To address the operational project effects (disturbance and loss in connectivity) on long-tailed bats, an Ecological Management Plan (EMP) for the Project will be prepared and implemented, and will include consideration for:

- Buffer planting (including hop-over/under late-stage/mature planting), retention of existing mature trees between the road alignment and features with potential for bat roost.
- Light and noise management through design. For example, this could include:
 - maintaining stream corridors / hop-over vegetation as dark corridors as far as practicable (while maintaining pedestrian safety).
 - Measures to reduce light spill into adjacent habitat used by bats such as using reflector lenses to direct light onto the road.

Overall, with implementation of the impact management measures detailed above it is considered that the magnitude of the operational effects from the RATN on bats could be reduced to very low.

7.3.7.4 Summary of Ecological Effects

Following the implementation of the identified mitigation measures the residual level of construction effect associated with the construction of the RATN is considered very low. Potential effects are therefore able to be appropriately managed.

Following the implementation of the identified mitigation measures the residual level of operational effect associated with the operations of the RATN is considered very low. Potential effects are therefore able to be appropriately managed.

7.3.8 Natural Hazards

7.3.8.1 Flooding Effects

This section provides an assessment of the actual and potential flooding effects that may result from the construction, operation and maintenance of the RATN (both the N-S Project and the E-W Project). The assessment is informed by the Redhills Arterial Transport Network – Assessment of Flooding Effects (AFE) contained within Volume 4.

Construction effects

There may be some temporary construction phase flooding risk associated with temporary works required for the construction of culverts and stormwater management infrastructure. However, it is expected that construction works can be carried out in a way that will appropriately manage the risk. Flood risk mitigation measures will be captured in the Construction Environmental Management Plan (CEMP) and it is recommended this be included as a condition of the proposed designation. The management and mitigation measures for construction effects are set out in Section 6.1 of the AFE contained within Volume 4.

Operational effects

The RATN is near the top of the Redhills catchment therefore flood flows and stormwater effects will be minimised. There is a minor risk of flooding at locations of bridges, particularly on the main stream reach. Existing overland flow paths can be accommodated although these may be impacted by the future development within the area, with some of the flow reduced by piping.

Potential flooding effects will be appropriately managed and are expected to result in negligible up to minor effects subject to the following recommended design outcomes, which will be secured by a designation condition:

- No increase in flood levels for existing authorised habitable floors that are already subject to flooding
- No more than a 10% reduction in freeboard for existing authorised habitable floors
- No increase of more than 50mm in flood level on land zoned for urban or future urban development where there is no existing habitable dwelling
- No new flood prone areas
- No more than a 10% average increase of flood hazard (defined as flow depth times velocity) for main access to authorised habitable dwellings existing at the time the Outline Plan is submitted.

Further, sensitivity analysis for the potential increased rainfall due to climate change was undertaken. This found there was a slight change to the identified flood effects at key locations under a more severe climate change scenario (3.8° temperature change). However, no additional mitigation is required as it is anticipated these effects can be mitigated utilising appropriate design.

In summary, the RATN is considered to have no more than minor effects in relation to flood hazards in the Redhills area. While further regional resource consents will be required for any proposed stream crossings, the proposed designation footprint has sufficient area to enable these crossings to be designed to avoid any new or exacerbated flooding effects either upstream or downstream of these future crossings.

7.3.8.2 Geotechnical

A desktop geotechnical assessment has been completed for the Redhills area. This was used to identify initial construction related constraints related to:

- Slope stability for excavations and embankment fills;
- Liquefaction potential;
- The presence of springs and high groundwater tables; and
- The settlement potential of soft compressible soils.

As discussed in Section 6.1.2 and shown in Figure 10, the Redhills area is predominantly underlain by residual Waitemata Group soils and Tauranga Group soils.

Whilst the desktop assessment has not indicated any significant geotechnical issues, discrete locations have been highlighted as areas of possible instability. Slope instability has been identified as most likely around steep slopes, slopes on sidling streams and the more significantly incised ephemeral watercourses where stream crossings are proposed.

These do not suggest significant constraints, and the adoption of a conservative approach of unsupported slopes cut at no steeper than 3H:1V will meet target stability factors for safety.

In conclusion, any slope stability geotechnical issues can be addressed within the proposed designation boundary such that effects on adjacent properties and the wider environment will be less than minor.

7.3.9 Property, Land Use and Business Effects

The N-S Project design philosophy has been to avoid and minimise potential adverse effects on private properties and businesses through alignment and project design, where this is practicable. This has included specific consideration of the potential property and business impacts in the assessment of alternatives as discussed in Section 7.2 and detailed in Appendix A0.

Where impacts on property, land use and businesses cannot be avoided, the potential effects are categorised into two broad groups:

- Directly affected properties/landowners; and
- Properties and businesses affected by proximity to the N-S Project.

An assessment of these potential property, land use and business disruption effects is provided in the following sub-sections.

7.3.9.1 Directly Affected Properties

The proposed designation requires land to provide a sufficient footprint to enable the construction and operation of the N-S Project (Designation Drawings are provided in Volume 3). Based on the proposed designation footprint, 75 private properties will be directly affected.

A description of existing land uses of the directly affected properties is provided in Section 6.1. In summary:

- A significant portion of the N-S Project area within Redhills is currently private farmland. The land is primarily used for grazing and contains minimal farming-related structures;
- The land use surrounding the Don Buck Road and Royal Road intersection is predominantly comprised of low-density residential properties; and
- The properties along the western road frontage of Don Buck Road (south of the roundabout) are zoned Business - Local Centre Zone providing for a range of business activities although the current land use is predominantly residential.

The potential pre-construction, construction and post construction effects on directly affected properties is discussed in the following sub-sections.

7.3.9.2 Pre-Construction

The proposed designation has a lapse duration of 15 years to provide a sufficient timeframe which enables construction of the N-S Project in response to the progressive urbanisation of Redhills. While the length of the lapse date reflects the need to provide long term certainty regarding the alignment of the N-S Project.

The proposed designation will not preclude the continued (unchanged) use of any directly affected properties prior to construction. However, in accordance with section 176 of the RMA, written consent would be required from AT for any works that would “prevent or hinder” the N-S Project, including:

- undertaking any use of the land;
- subdividing the land; and
- changing the character, intensity, or scale of the use of the land.

The purpose of the N-S Project is to support urban growth in Redhills. As outlined in Section 5.2, the majority of the N-S Project is located within Redhills, a greenfield area which is likely to experience a

high level of change as the area transitions from rural to urban land use. As outlined in Section 6.3, the N-S Project is likely to be constructed within a transitional environment and will be operated within an urban or rapidly urbanising environment. As such, the N-S Project is unlikely to affect the current land use of Redhills until such a time that the area starts to develop which would be concurrent with the construction of the N-S Project. At this point potential land development issues would be addressed through the construction and operation of the N-S Project (further discussed in Sections 7.3.9.3 and 7.3.9.4).

The areas of the N-S Project along Don Buck Road and Royal Road are expected to have a lesser scale of development change as this area is an existing residential environment - albeit that the area is generally zoned MHU under the AUP:OIP which allows for higher density development than that existing. As discussed, development is not precluded within the designation area, however any development within the designation area will require approval pursuant to section 176 of the RMA. As outlined in Section 10.2.6, AT has actively sought to engage with developers through the N-S Project development process to address development plans and adapt where practicable to enable development in and around the N-S Project corridor. AT will continue this process once the designation is confirmed, using section 176 of the RMA as the mechanism for approval with particular regard to the compatibility and viability of construction, flexibility of the N-S Project design and where possible avoiding effects on reasonable future changes to land use which do not prevent or hinder the N-S Project.

Considering these effects, the pre-construction of the N-S Project will have no more than minor effects on property, land use and business.

7.3.9.3 Construction

During construction the N-S Project will temporarily require land to enable construction activities (detailed in Section 7.1). Within Redhills, the identified land is predominantly pastoral, while along Don Buck Road and Royal Road the land is predominantly residential. Potential effects from temporary land acquisition include temporary loss of grazing pasture, stock-proof fencing, disruption to farm activities, disruption to access, changes to driveway gradient, loss of vegetation and temporarily affected amenity.

It is proposed that the designation will be drawn back to the operational boundary once construction is complete. Effects from temporary land acquisition can be mitigated through site specific arrangements which will be developed with the individual landowners through the Public Works Act processes.

Potential adverse effects from construction activities are addressed throughout Section 7.3 with appropriate mitigation identified to avoid or minimise effects on properties in proximity to the works. Particular mitigation measures for residential property and business disruption during construction include:

- Implementation of a CTMP to manage construction traffic and disruption to the local transport network (Section 7.3.2.1.1), including methods to:
 - Maintain vehicle access to property and/or private roads where practicable, or to provide alternative access arrangements when it will not be; and
 - Communicate traffic management measures to affected parties.
- Implementation of a CNVMP and any Schedules produced to manage construction noise and vibration effects on sensitive receivers (Section 7.3.3.1.3), including methods to:

- Communicate and engage with nearby residents and stakeholders; and
 - Minimise construction disruption for affected properties during construction.
- Implementation of a Stakeholder and Communication Management Plan to identify how the public and stakeholders will be communicated with throughout construction, including methods to:
 - Determine adequate notice periods for the commencement of construction activities and works that affect access to properties;
 - Inform parties of the expected timing, duration and staging of works and regular updating of progress; and
 - Provide feedback, inquires and complaints during the construction process.

These measures will appropriately minimise disruption to affected properties and allow the continued use of properties where possible. Potential effects will be temporary and therefore it is considered that they will be less than minor.

7.3.9.4 Post Construction

The N-S Project will permanently require land which is required for the finished N-S Project (permanent transport corridor). The primary effect is loss of productive and residential land which will be mitigated through the Public Works Act process.

Any residual land (land not permanently required) will be reinstated in coordination with landowners through the temporary land acquisition process. The finished form of the corridor and viability of land adjacent to the road corridor will be evaluated based on the principles of the ULDMP. The purpose of this document is to:

“Enable integration of the Project's permanent works into the surrounding landscape and urban context; and

Ensure that the completed Project mitigates potential adverse landscape and visual effects as far as practicable and contributes to a quality urban environment.”

The ULDMP requires the consideration of the future land use context as this relates to the N-S Project corridor and seeks to ensure a suitable urban outcome for the area. Key considerations include:

- Design to integrate with the adjacent urban (or proposed urban) landscape context, including the surrounding existing or proposed topography, urban environment and landscape character.
- Integration of batters and cut/fill slopes in the landscape, measures may include:
 - Grading cut and fill slopes to integrate with the surrounding landform.
 - Minimising encroachment into water bodies and indigenous vegetation.
 - Planting batters that coincide with wetland and stream courses.

The ULDMP is anticipated to be further developed in coordination with adjacent development where this is practical. In this way the ULDMP will ensure that the N-S Project appropriately integrates with future land uses which are directly adjacent to the corridor and avoids, where possible, the potential to create residual land as a result of the N-S Project. It is therefore considered that the effects of land acquisition will be no more than minor on these landowners.

7.3.9.5 Properties Impacted by Proximity

Aside from the properties which will be directly affected by the designation, there is the potential that other properties outside the designation footprint could be affected by the N-S Project as a result of their proximity to the construction activities.

Potential adverse effects from construction activities are addressed throughout Section 7.3 with appropriate mitigation identified to avoid or minimise effects on properties in proximity to the works. The particular mitigation measures for directly affected properties during construction, which are described in Section 6.4.9.3, are also applicable to properties impacted by proximity.

The potential adverse effects to properties and businesses in proximity to the N-S Project area would be temporary and through the implementation of appropriate construction management, can be avoided or minimised, such that they are no more than minor.

8 Redhills East-West Arterial Transport Corridor (NoR2a, NoR2b and NoR2c)

This section refers to the following projects (outlined in Table 1), collectively referred to and assessed as the 'Redhills East-West Arterial Transport Corridor' (defined above as the E-W Project):

- Redhills East-West Arterial Transport Corridor – Dunlop Road Extension;
- Redhills East-West Arterial Transport Corridor – Baker Lane Extension; and
- Redhills East-West Arterial Transport Corridor – Nixon Road Connection.

This section provides the following for the E-W Project:

- A description of construction works
- Assessment of alternatives; and
- Assessment of effects on the environment.

Refer to Section 3 for a description of the permanent works associated with the E-W Project.

8.1 Construction Works

8.1.1 General approach

As noted in Section 3.1, an indicative construction methodology has been developed based on the level of design undertaken to date and the current land use / land form in which the corridor is located to allow an assessment of likely construction effects.

The key components of this construction methodology for the E-W Project are outlined in the following sub-sections.

8.1.2 Indicative Construction Zones and Programme

As identified at section 7.1.2 of this report, it is anticipated that the works for the entire RATN will be broken down into four separate construction stages. Stages 1, 2 and 3 relate to the E-W Project as follows:

- **Stage 1:** Baker Lane from Fred Taylor Drive to the Dunlop Road intersection
- **Stage 2:** Dunlop Road from Fred Taylor Drive to the E-W Project junction
- **Stage 3:** The E-W Project from Dunlop Road junction to Red Hills Road

Table 19 provides an overview and summary of the typical construction activities associated specifically with the E-W Project.

Table 19: E-W Project Construction Activities Summary

Stage	Construction Activities
Stage 1	<ul style="list-style-type: none"> • Baker Lane <ul style="list-style-type: none"> ○ Site establishment ○ Vegetation clearing and demolition / modification of existing properties ○ Install environmental controls, silt fences, and temporary sediment retention ponds ○ Construct three new culverts ○ Construct stormwater wetland

	<ul style="list-style-type: none"> ○ Bulk earthworks cut and fill to formation level (approximately 4000m³ of cut and 97,000m³ of fill) ○ Install network drainage ○ Pavement construction ○ Construct new berm, footpath and cycleway on both sides of the road ○ Intersection tie-in to Fred Taylor Drive ○ Line marking ○ Lighting and road furniture ● Fred Taylor Drive <ul style="list-style-type: none"> ○ Lane widening west side of road, mainly south of Baker Lane to create turning lane ○ Diversion of overhead services on west side of road ○ Earthworks cut and fill (approximately 10,000m³ of cut and 10,000m³ of fill) ○ Remarking of existing road ○ New intersection to accommodate Dunlop Road and Baker Lane upgrades ○ Construct new berm, footpath and cycleway on both sides of the road ○ New road surface and median ○ Line marking ○ Lighting and road furniture
Stage 2	<ul style="list-style-type: none"> ● Dunlop Road <ul style="list-style-type: none"> ○ Vegetation clearing and demolition / modification of existing properties ○ Install environmental controls, silt fences, and temporary sediment retention ponds ○ Earthworks cut and fill (approximately 15,000m³ of cut and 3,000m³ of fill) ○ Install network drainage ○ Pavement construction ○ Construct new berm, footpath and cycleway on both sides of the road ○ New intersection with E-W Project and Baker Lane ○ Intersection tie-in to Fred Taylor Drive ○ Line marking ○ Lighting and road furniture ● Fred Taylor Drive <ul style="list-style-type: none"> ○ Lane widening west side of road, mainly south of Baker Lane to create turning lane ○ Diversion of overhead services on west side of road ○ Earthworks cut and fill ○ Remarking of existing road ○ New intersection to accommodate Dunlop Road and Baker Lane upgrades ○ Construct new berm, footpath and cycleway on both sides of the road ○ New road surface and median ○ Line marking ○ Lighting and road furniture

Stage 3	<ul style="list-style-type: none"> • E-W Project – Nixon Road Connection <ul style="list-style-type: none"> ○ Install environmental controls, silt fences, and temporary sediment retention ponds ○ Vegetation clearing ○ Construct culvert(s) and / or bridge structure(s), including piling and retaining structures ○ Bulk earthworks cut and fill to formation level (approximately 75,500m³ of cut and 170,000m³ of fill) ○ Construct stormwater wetland ○ Install network drainage ○ Pavement construction ○ Construct new berm, footpath and cycleway on both sides of the transport corridor ○ Line marking ○ Lighting and road furniture ○ Construct intersection with N-S Project ○ Road widening, realignment, and roundabout construction along Nixon Road, Henwood Road, and Nelson Road ○ Line marking
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8.1.3 Construction Laydowns and Work Areas

As the E-W Project will be predominantly constructed through greenfield land that will likely be undergoing urban development at the same time as the E-W Project is constructed, indicative construction laydowns and work area locations have been identified and assessed for the purpose of providing for the works within the proposed designation footprint. These are shown in the indicative design drawings provided in Volume 3.

8.1.4 Construction Activities

8.1.4.1 Site Establishment and Clearance

In preparation for the works, the E-W Project area will need to be cleared of all impediments to construction such as buildings, structures and vegetation.

The existing vegetation within the E-W Project area will require removal to enable the construction and operation of the corridor. This is mostly comprised of localised shelterbelt vegetation scattered throughout the Redhills area.

Regional resource consents will likely be required before construction commences and will include details on measures to manage erosion and sediment arising from construction. All environmental / management controls related to watercourses will be set up prior to the removal of any riparian vegetation.

8.1.4.2 Earthworks

The E-W Project will require bulk earthworks for the construction of the new arterial corridor and the widening of Fred Taylor Drive, and minor earthworks for the Dunlop Road corridor. Regional resource consents for earthworks will be sought at the detailed design stage.

Environmental controls will be installed prior to commencing bulk earthworks and all unsuitable soils will be removed from the site before placing fill material or constructing structures. Regional resource consents for earthworks will be sought at the detailed design stage.

Like the N-S Project, the alignment passes beneath the Transpower transmission lines. All works near Transpower transmission lines will be undertaken in accordance with best practice guidance from Transpower regarding 'working around live cables'.

The AUP:OIP's ADR will be adopted to address any unexpected heritage items during construction, unless an archaeological authority for the E-W Project has been obtained from Heritage New Zealand.

8.1.4.3 Drainage and Stormwater

As discussed in Section 3.4, a number of constructed wetlands are proposed along the E-W Project to provide stormwater treatment and flood attenuation to the catchments along the route. However, the specific stormwater network and infrastructure elements associated with the E-W Project, including the finalised location of the wetlands, will be determined at a later detailed design stage in conjunction with regional resource consents sought.

Construction activities are anticipated to include shallow drain laying, involving excavations with simple batters or trench shields to provide ground support. Where existing road crossings are required, construction will be through excavation in stages with single lane closure traffic management. These works will be constructed upon the completion of the bulk earthworks.

The E-W Project provides sufficient space within the designation footprint to enable these works.

8.1.4.4 Watercourse Crossings

The E-W Project requires several watercourse crossings and associated construction activities within watercourses (Redhills Stream, Waiteputa Stream and Ngongetepara Stream). The form of the stream crossings (i.e., bridges or culverts) and the construction works / structures within the watercourses will be confirmed at detailed design as part of regional resource consents.

The E-W Project provides sufficient space within the designation footprint to enable these works.

8.1.4.5 Pavement and Surfacing

Pavement and surfacing will commence once earthworks, drainage and utilities works are complete. For the existing Fred Taylor Drive and Dunlop Road, this will likely be staged in two halves to maintain traffic flow in the adjacent lane, with the intersections requiring further staging.

Street lighting will be installed once the bulk earthworks and drainage are complete.

8.1.4.6 Construction Reinstatement

E-W Project construction will have temporary impacts to private properties along the E-W Project corridor. This may include temporary changes to property access, private outdoor space (including fences, gardens and vegetation and lawns) and in localised instances impacts to dwellings and other private structures.

Reinstatement is to be addressed on a case-by-case basis through discussion with individual landowners and will follow the provisions under the Public Works Act 1981, which is a process separate from the requirements of the RMA.

8.1.5 Typical Plant and Equipment

A list of typical plant and equipment which may be required has been developed to inform the assessment, (Table 20).

Table 20: Typical Plant and Equipment Summary

Construction Type	Construction Activity
Typical across all works	<ul style="list-style-type: none"> • Site facility • Light vehicles • Hiab truck
Bulk Earthworks	<ul style="list-style-type: none"> • 30T excavator • 20T excavator • Compactor / sheepsfoot roller • Water cart • Tippers / ADT's
Drainage	<ul style="list-style-type: none"> • 20T excavator • Trench shields • Tandem tipper • Loader • Plate compactor
Pavement Construction	<ul style="list-style-type: none"> • Grader • Smooth drum roller • Tandem tippers • Kerbing machine • Plate compactor • Paver

8.2 Assessment of Alternatives

When considering a NoR by a requiring authority, a territorial authority is required under section 171(1)(b) of the RMA to have particular regard to whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if either:

- i) The requiring authority does not have an interest in the land sufficient for undertaking the work; or
- ii) It is likely the work will have a significant adverse effect on the environment.

In this instance, AT does not currently have an interest in all of the land through which the RATN will be constructed and operated.

The development of alternatives for the RATN was completed through a sequential options development process in the PBC, AC DBC, SG DBC and development of this NoR application and the E-W Project as described in Section 3.3.

Figure 18 provides a summary of the options development process in relation to each of the steps. In summary, once problems, issues and objectives had been established, a list of corridor options were developed to achieve the outcomes. These were refined into a range of alignment options with the preferred options further refined to develop the E-W Project as it is described in Section 3.3.

A comprehensive assessment of alternatives was undertaken and is provided in Appendix A. This includes the key decisions made during the assessment of corridor options, alignment options, design refinement and statutory methods. It also outlines the further review of AC DBC and SG DBC options that was subsequently undertaken due to the introduction of the National Policy Statement for Freshwater Management 2020 (NPS-FM), which affords additional protection to natural wetlands. Please refer to 0 for these assessments.

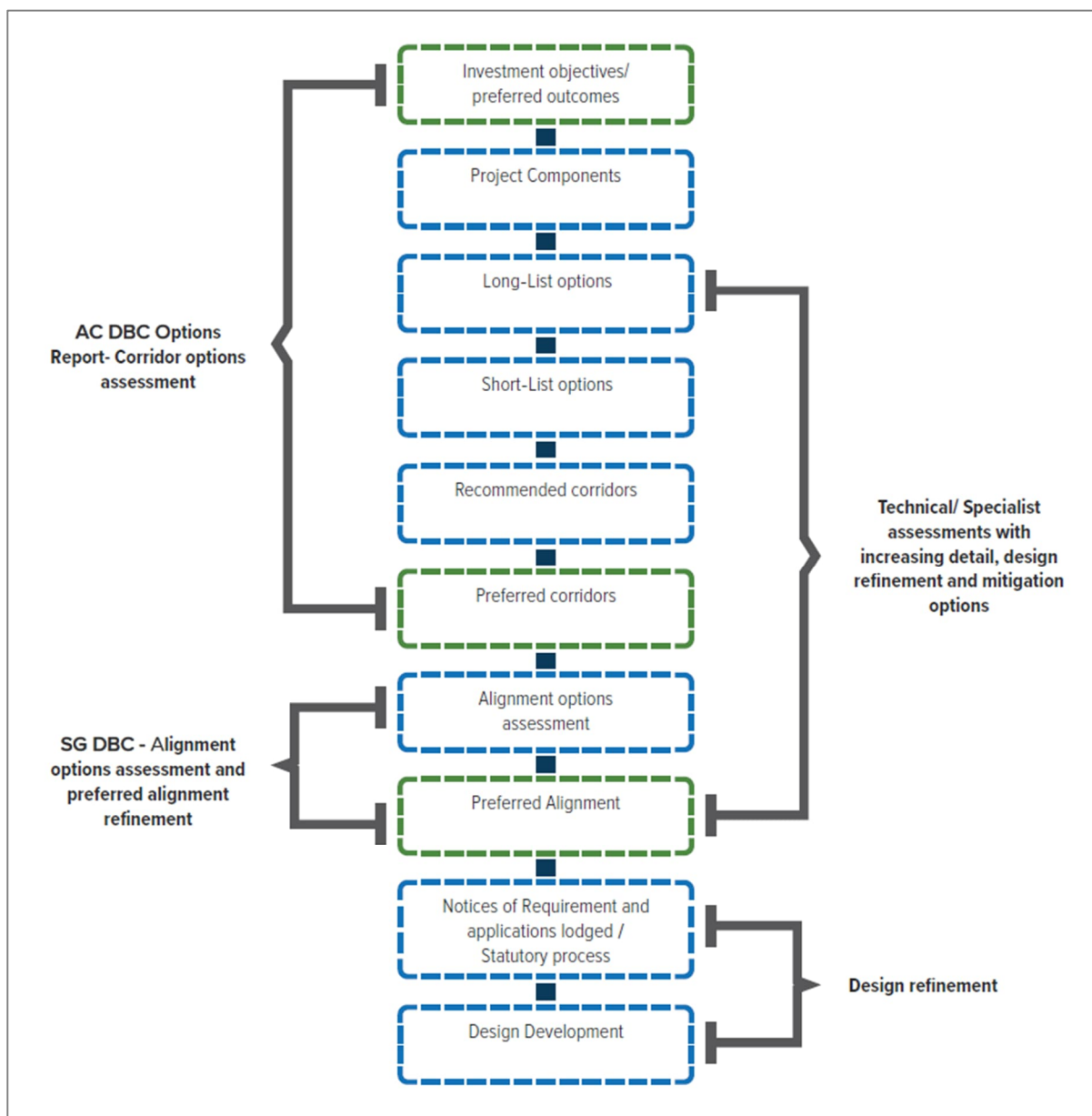


Figure 18: Summary of Options Development Process

A wide range of alternatives have been investigated for addressing the transport needs for the E-W Project area. A key driver for the assessment of alternatives was to avoid adverse effects where practicable. That evaluation confirmed that the East-West arterial transport corridor connecting from the upgraded Red Hills Road / Nixon Road / Nelson Road intersection (roundabout) to the west and connecting to Fred Taylor Drive to the east, including the dual arterial corridors of Baker Lane and Dunlop Road) would provide a balance of strong transport and urban outcomes while minimising potential adverse effects.

A further review of AC DBC and SG DBC options was undertaken in response to introduction of the National Policy Statement for Freshwater Management 2020 (NPS-FM). It concluded that that the strategic connections and relationship to the future local centre largely determine the form of the RATN. Impacts on wetlands could not be entirely avoided given the need for arterial transport corridors to traverse the Redhills area, to enable its development, however, the preferred East-West corridor had been refined to reduce wetland impacts where possible.

The E-W Project supports the development of land in Redhills which is planned for under the AUP: OIP and Redhills Precinct Plan, thereby supporting the objectives and policies of the AUP:OIP. Its indicative location and design represent the most appropriate approach to the changing local environment, providing a high-quality urban corridor for the urbanisation and development of the surrounding area and connecting to the future and existing transport network.

An assessment of the various alternative methods for achieving the E-W Project was undertaken, and it was concluded that a designation is considered the most appropriate mechanism to provide for the Project.

The conclusion reached in the assessment of alternatives has been based on a comprehensive, robust and replicable optioneering process. As such it is concluded that adequate consideration has been given to alternative sites, routes, or methods for undertaking the work, satisfying the requirements of section 171(1)(b) of the RMA.

8.3 Assessment of Effects on the Environment

Section 171 of the RMA requires that when considering a NoR, a territorial authority must consider the effects on the environment of allowing the requirement.

This section provides a summary of the actual and potential effects of the construction, operation and maintenance of the E-W Project, including whether these effects are positive or adverse and the scale, duration and locality of effects.

As set out in Section 8.2, the consideration of adverse effects has been a key driver for the assessment of alternatives, identification of the proposed designation corridor and the subsequent refinement of the corridor. Where effects cannot be avoided, measures to remedy or mitigate significant adverse effects have been proposed. Details of these are included in Section 9 and reflected in the proposed designation conditions.

Positive effects are summarised in Section 8.3.1, and adverse effects on the environment are described in Sections 8.3.2 to 7.4.9.

8.3.1 Positive Effects

The Project Objectives (Section 4.1) have been developed to address the key problems and issues identified in Section 2.2. In achieving these objectives, the E-W Project will deliver a range of positive effects for the Redhills area.

Significant growth is anticipated and provided for under the AUP:OIP in Redhills. A range of infrastructure, including transport infrastructure, is required to support the growth figures sought under the Auckland Plan. The E-W Project supports the ongoing urbanisation of the area, by providing an internal arterial transport network that provides connections to the existing strategic transport network through new and upgraded intersections. The E-W Project provides pedestrian, cycle and public

transport facilities along all transport corridors. This enables greater choice of mode and provides improved safety outcomes for transport users on existing corridors and safe transport corridors for transport users on new roads. Public transport will be provided through bus priority measures along Dunlop Road to provide a connection between the future Redhills local centre to Fred Taylor Drive, which then enables a connection to the Westgate Metropolitan Centre and future Public Transit Hub.

Overall, the E-W Project will provide significant benefits to the local community and wider Auckland Region, supporting the Council's growth strategy. In providing urban transport corridors which respond to the growth demand in the area, the E-W Project will improve transport network functions and contribute to a high-quality urban environment for local residents, businesses and road users.

8.3.1.1 Walking and Cycling

There are currently limited footpaths and limited and / or no cycle facilities on the existing Fred Taylor Drive and Dunlop Road, with no walking and cycling facilities within the Redhills interior. The proposed walking and cycling facilities for the E-W Project (including Dunlop Road and Baker Lane) and the section of Fred Taylor Drive within the E-W Project extents have been designed to provide separated and protected walking and cycling facilities on both sides of the corridors. All intersections within the E-W Project have been provided with pedestrian / cycle crossing facilities. This will provide a significant improvement to the existing walking and cycling network and is a positive effect of the E-W Project.

Additionally, the dedicated walking and cycling facilities will provide enhanced alternatives for travel, further contributing to effective network performance.

Overall, the E-W Project will create an improved and safer walking and cycling network that encourages and promotes alternative modes of transport. The proposed walking and cycling improvements will integrate with existing networks and the likely future environment.

8.3.1.2 Public Transport Network

As described in Section 3.3.6, the E-W Project will enable public transport services to operate within the Redhills area. The existing Dunlop Road corridor will provide a connection between the proposed Redhills local centre and Fred Taylor Drive for frequent public transport services, which enables a further connection with the Westgate Metropolitan Centre. Dedicated bus priority measures including providing for 'bus only' through movements in the left-turn lanes at the intersection of the upgraded Dunlop Road and Fred Taylor Drive will enhance bus travel time and reliability. Furthermore, the proposed intersection improvements will also enable efficient public transport as bus services will be less restricted due to the bus advance lanes.

These upgrades on the Dunlop Road corridor will allow buses using the route to avoid intersection queuing, avoid potential delays at intersections and improve travel time reliability.

Overall, the E-W Project will provide for the future public transport network in Redhills and provide a quicker and more reliable public transport network within the surrounding transport corridors.

8.3.1.3 Road Safety

The design of the E-W Project has been undertaken to reflect AT's commitments to Vision Zero, which aims for no deaths or serious injuries on Auckland's transport system by 2050. The E-W Project supports this approach by:

- Providing for safe walking and cycling facilities on all corridors.
- Safe intersection design based on AT standards and provision of crossing facilities for vulnerable users.

Overall, the E-W Project is well aligned with the principles of AT's Vision Zero. It will provide new, and improve existing, transport corridors to provide high levels of road safety in the E-W Project area. Detailed design investigations will be completed at a later stage to further support safety outcomes.

8.3.2 Transportation Effects

This section provides an assessment of the actual and potential transportation effects that result from the construction, operation and maintenance of the E-W Project. The assessment is informed by the ATE contained within Volume 4.

8.3.2.1 Construction Traffic Effects

The assessment of expected construction traffic has been developed based on the indicative construction methodology (outlined in Section 8.1). It is anticipated that the larger part of works required for this package of projects will likely be delivered offline. However, this will be confirmed at detailed design stage, and regardless there is still likely to be some works in the live carriageway, which means that temporary traffic management will be required.

The scale of temporary traffic management to delineate live traffic away from the construction zones is largely dependent on the various stages and requirements of the construction activities. It is expected that short term temporary road closure for nights or weekends may be required for some specific activities, such as road surfacing, traffic switches and gas relocation. Other activities may require stop/go or contraflow traffic management, such as drainage, utility relocation, survey and investigation work.

The construction of the E-W Project will require significant earthworks. Final cut and fill volumes will be confirmed following detailed design prior to construction. The construction traffic movements to accommodate the earthworks will likely result in the increase of traffic volume on construction routes used during the construction period of the Project.

Given the construction timing and staging of the package has yet to be determined, there is a degree of uncertainty associated with any predicted construction methodology and associated traffic routes. This means:

- The routes that will be used by construction vehicles will depend on the location of quarries and disposal sites which are not yet certain
- The exact location and extent of compound sites/lay down areas has yet to be determined
- The timing of construction of other projects could impact on likely construction vehicle routes

Notwithstanding this, it is considered that with available connectivity to the strategic network and available capacity in the network, construction traffic will be able to be readily accommodated.

Overall, the ATE does not identify any significant adverse impacts on the wider transport network as a result of construction traffic; however it does identify the potential for localised effects to traffic movement and property access. Measures to mitigate these effects will be secured through a designation condition requiring preparation and implementation of a CTMP, such that the adverse effects are no more than minor. These measures are summarised below.

8.3.2.1.1 Construction Traffic Management

As discussed above, the potential adverse effects of construction traffic will be managed through a CTMP. The purpose of the CTMP is to ensure the construction of each Project is managed in such a way that enables safe and efficient movement of local traffic throughout the construction period and to minimise disruption to road users, particularly the adjacent residential properties and local activities.

Localised transport effects will be managed through appropriate construction management protocols, including:

- Measures to provide for the safety of all road users is maintained throughout construction; for instance, temporary speed limits.
- Identification of detour routes and other methods to provide for the safe management and maintenance of traffic flows, including pedestrians and cyclists, on existing roads;
- Methods to provide ongoing vehicle and pedestrian access to private and adjacent properties; and
- Methods for communicating and timing construction activities to minimise the effects of temporary traffic and access restrictions.

8.3.2.2 Operational Transport Effects

The assessment of operational effects provided in the ATE was completed using a mix of quantitative transport modelling and qualitative assessment measures relating to the following transport functions:

- Walking and cycling
- Public transport
- Road user safety
- Property access
- General traffic

The positive transport effects as a result of the E-W Project have been described previously in Section 8.3.1. The following sub-sections provide a summary of the adverse operational effects with respect to each of these transport functions.

8.3.2.2.1 Walking and Cycling

The proposed walking and cycling facilities are described in Section 3.3. There are no adverse operational effects anticipated on walking and cycling, as the effects are expected to be positive (as described in Section 8.3.1).

Some of the proposed footpath widths in the E-W Project area do not meet the minimum recommended width of facilities within the Redhills Precinct Plan. However, they are consistent with AT TDM standards and therefore will provide adequately for capacity and safety of users in the future urban environment. All proposed berm widths significantly exceed the 0.6m buffer requirement of the AT TDM, which is considered more than sufficient to provide for walking and cycling facilities.

8.3.2.2.2 Access

Driveways

As the proposed E-W Project (including Dunlop Road and Baker Lane) and Fred Taylor Drive are currently or expected to be classified as 'arterial' corridors, new direct property access will be limited by the AUP:OIP.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land other than where necessary.

The ATE has determined that driveways (compliant with the AUP:OP) can be maintained to all properties along the E-W corridor.

8.3.2.2.3 General Traffic

Table 21 provides a summary of the expected traffic volumes for the arterial corridors within the E-W Project area.

A two-lane corridor can efficiently accommodate vehicles volumes as shown below and therefore the proposed corridor design is expected to meet forecasted needs, with the additional lane provision at intersections to accommodate greater bus priority.

Table 21: Predicted Annual Average Daily Traffic Volumes for 2048 Scenario

Count Location	2048 predicted AADT
Dunlop Road	8,300
Baker Lane	14,400
E-W Project between Baker Lane and N-S Project	16,800
E-W Project between N-S Project and Nixon Road	11,400

The ATE has assessed the performance of the proposed intersections within the E-W Project, with all the intersections predicted to perform at satisfactory levels during the peak periods under a 2048 scenario. Vehicles travelling along Fred Taylor Drive were considered to experience increased travel delays due to the introduction of two intersections. This delay is not considered to be significant within an urbanising context, and in light of increased outcomes for pedestrians and cyclists this is considered to be an acceptable effect.

8.3.2.2.4 Surrounding Network Connections

The collector road network as identified in the Redhills Precinct Plan (see Section 6.3.4 for further detail) has not been specifically provided for within the E-W Project corridors. Given there is a degree of uncertainty about the timing and form of adjacent subdivision and development, the E-W Project includes a flush median along the lengths of the E-W Project, which provides additional width to accommodate potential intersections for collector connections when these are confirmed. The median will also facilitate the opportunity for future pedestrian / cycle crossing points along the E-W Project, as the urbanisation occurs on both sides of the corridor.

The location of these collector intersections will also need to be integrated with the bus stop locations and pedestrian crossing facilities. The E-W Project does not preclude these facilities being provided at a later stage of design.

Overall, while the future collector and local transport network is yet to be determined, the E-W Project design provides sufficient flexibility to enable these connections to be formed as the surrounding land is developed. As such, the E-W Project will have no adverse effects on the future network connectivity.

8.3.2.3 Summary of Transport Effects

Considering both the positive transport effects in Section 8.3.1 and the actual and potential transport effects described above, overall, the E-W Project will provide an improved transport environment which includes:

- Improved walking and cycling facilities with increased safety which provides for the urbanisation of the local walking and cycle catchment, and improves the connectivity for all travel modes between Redhills and Westgate.
- Improved public transport efficiency and reliability through the provision of bus priority and sufficient space to accommodate the development of future public transport network.
- A high quality of road safety through transport design and improvements in road safety to existing transport corridors in the E-W Project area.
- Improved network performance through upgraded intersection design and traffic signalling.

To provide these benefits, the construction of the E-W Project will require some temporary and localised disruption to traffic movements and property access. These construction effects can be appropriately managed through the implementation of a CTMP.

Additionally, a small number of properties will require changes to their existing vehicle access. A detailed access assessment will be completed by a suitably qualified traffic engineer and / or transport planner as part of the Outline Plan of Works to identify appropriate means to mitigate these effects.

Overall, the E-W Project will have positive effects for the local and wider transport network. Any adverse effects will be temporary and localised, such that they will be no more than minor.

8.3.3 Noise and Vibration Effects

This section identifies and assesses the actual and potential effects of noise and vibration associated with the construction, operation and maintenance of the E-W Project. The assessment is informed by the ACNV and the ATNV contained within Volume 4.

8.3.3.1 Construction Noise and Vibration Effects

The indicative construction methodology (Section 8.1) has been assessed for construction noise and vibration against the relevant standards. The proposed designation boundary has been assumed as the construction boundary, and noise predictions were based on reasonable worst-case assumptions which included:

- The majority of noisy works will be carried out between 7am-6pm on weekdays with probable night-time and weekend works for the pavement and surfacing stage when required.

- Equipment and construction activity sound power levels for dominant noise sources for the E-W Project were identified.
- Minimum set back distances from receivers were calculated to comply with day-time noise criterion of 70 dB L_{Aeq} without mitigation.

The vibration effects associated with construction of the E-W Project have been assessed in relation to potential building damage. The effect of vibration on amenity has not been assessed and has only been discussed to the extent that it is relevant to mitigation.

Indicative vibration emission radii distances have been predicted for the most vibratory equipment. Actual vibration levels are highly dependent on local conditions and the selection of machinery, which is currently unknown. To account for inaccuracies, the likely worst-case vibration has been calculated based on the equipment and hard ground geology to provide offset distances.

The predicted results were then assessed against the relevant criteria to determine if there would be any potential construction noise and vibration exceedances for any of the existing receivers along the E-W Project.

8.3.3.1.1 Construction Noise Effects

The ACNV identified that the closest properties outside the designation boundary and adjacent to the E-W Project area are predicted to experience worst-case noise levels up to 90 dB L_{Aeq} with mitigation, which does not comply with the AUP:OIP day-time noise criterion. This has the potential to result in noise disturbance effects (e.g. loss of concentration, annoyance, a reduction in speech intelligibility and reduced productivity) without appropriate mitigation.

Operation of construction equipment will be intermittent in nature. Construction will be linear so as the equipment moves away from the receiver noise levels will reduce. The worst-case situations, where mitigated noise levels could reach 90 dB L_{Aeq} at the closest receivers, are not expected to be frequent, due to the setback distances to the majority of the proposed works and the use of equipment with lower source noise levels for large portions of the works. Mitigated noise levels are expected to comply with the 70 dB L_{Aeq} daytime noise criterion for most of the construction works.

The ACNV sets out a hierarchy of mitigation measures which will be adopted through a Construction Noise and Vibration Management Plan (CNVMP) and any Schedules produced for the works (refer to section 8.3.3.1.3 for details). The preparation and implementation of CNVMP and Schedules will be secured through a designation condition.

The ACNV concludes that by following this hierarchy the BPO for mitigation will be implemented, whilst avoiding undue disruption to the community.

Overall, construction noise will be temporary and construction noise levels can be significantly reduced through the implementation of the hierarchy of mitigation measures. Accordingly, by providing appropriate mitigation and construction management the potential construction noise effects will be no more than minor.

8.3.3.1.2 Construction Vibration Effects

The ACNV identifies that in worst case circumstances (without mitigation) two residential dwellings adjacent to the E-W Project area may experience vibration levels of 5 mm/s or above, exceeding the criteria for residential properties. 5mm/s is the threshold above which cosmetic building damage may occur, such as cracking.

The vibration amenity criteria (vibration levels of 0.3mm/s for night time and 2 mm/s during the day) could be exceeded in existing or future buildings if they are occupied during the works and within 21m of the roller compactor (high vibratory equipment) or within the emission radii identified for the other vibration generating equipment (refer to Volume 4 for details).

In addition to cosmetic damage, the potential adverse effects associated with excessive vibration may range from annoyance to loss of amenity or inability to carry out work. These vibration effects will reduce with distance from the source and the level of vibration transmission into a building will depend on a number of factors, such as the foundation type and building construction. Vibration can typically be tolerated inside buildings if it occurs intermittently during the day, is of limited duration and where there is effective prior engagement.

The ACNV sets out a hierarchy of mitigation measures which will be adopted through a Construction Noise and Vibration Management Plan (CNVMP) and any Schedules produced for the works (refer to section 8.3.3.1.3 for details). The preparation and implementation of CNVMP and Schedules will be secured through a designation condition.

Additionally, to manage the potential for cosmetic damage to buildings, a building condition survey will be offered to be carried out before and after construction works at properties where predictions indicate the relevant building damage criteria may be exceeded, to determine if any damage has been caused. Any damage confirmed to be caused by the E-W Project will then be repaired.

Overall, construction vibration will be temporary and through the implementation of the hierarchy of mitigation measures, the risk of significant adverse effects associated with excessive construction vibration levels can be avoided. Accordingly, by providing appropriate mitigation and construction management the potential construction noise effects will be no more than minor.

8.3.3.1.3 Construction Noise and Vibration Management Plan

A CNVMP is proposed as the most effective way to control noise and vibration impacts. The objective of the CNVMP is to provide a framework for the development and implementation of the Best Practicable Option for the management of construction noise and vibration effects. The CNVMP will include a comprehensive suite of measures, which are set out in detail in the ACNV in Volume 4 and the proposed designation conditions in 0.

Where noise and/or vibration limits are predicted to be exceeded for a more sustained period or by a large margin, a Site Specific or Activity Specific Construction Noise and Vibration Management Schedules ("Schedule") will be produced. Any Schedule will include details such as:

- Construction activity location, start and finish dates;
- The nearest neighbours to the construction activity;
- The predicted noise and/or vibration level for all receivers where the levels are predicted or measured to exceed the applicable standards and predicted duration of the exceedance;
- The proposed mitigation options that have been selected, and the options that have been discounted as being impracticable and the reasons why;
- The consultation undertaken with owners and occupiers of sites subject to the Schedule, and how consultation has and has not been taken into account; and
- Location, times and types of monitoring;

Where measured or predicted vibration from construction exceeds Category A, then there is also a requirement to undertake building condition surveys.

Night works may potentially be required during pavement construction stages. Where there is no practicable alternative, night works can be managed through increasing the frequency of communication with stakeholders, carrying out regular monitoring to ensure criteria are being met and, as a last resort, offering alternative accommodation.

As set above, where necessary pre-condition surveys by a suitably qualified engineer will be offered to be undertaken at all buildings where the E-W Project building damage criteria is identified as likely to be exceeded. A post-construction condition survey of the same buildings will be conducted when construction is completed, and any damage shown to have been caused by the Project construction rectified by the AT.

8.3.3.2 Operational Noise and Vibration Effects

This section identifies and assesses the actual and potential effects of traffic noise and vibration associated with the E-W Project.

The Assessment of Traffic Noise and Vibration Effects report for Redhills, in Volume 4, contains predictions of road traffic noise carried out using the method recommended in NZS 6806: Acoustics – Road traffic noise – New and altered roads (NZS 6806) in accordance with the AUP:OP.

The assessment of effects undertaken in the report is two-fold: in accordance with NZS 6806 and in relation to the predicted noise level changes comparing the future traffic noise levels with and without the extended and / or upgraded transport corridors. The summary below should be read in conjunction with this report.

8.3.3.2.1 Assessment Methodology

As required by NZS 6806, the assessment methodology included the prediction of existing and future traffic noise levels, both without (Existing and Do Nothing scenarios) and with the proposed transport corridors (Do Minimum scenario). The scenarios are explained below:

- The Existing scenario represents the current road network with current traffic volumes, i.e. the existing environment as it is experienced now
- The Do Nothing scenario represents the current road network with future traffic volumes, assuming a full build out of the area
- The Do Minimum scenario represents the proposed future road network, incorporating the proposed or upgraded transport corridors and other planned transport projects in the area. This scenario assumes a full build out of the area, and the transport infrastructure to enable the development. This is a realistic scenario at a point in time when all proposed designations are operational. In this instance the Do Minimum scenario includes use of AC-14 or equivalent low noise road surface.

Noise effects of road traffic on existing noise sensitive locations, referred to as Protected Premises and Facilities (PPFs) within NZS 6806, have been assessed. PPFs within a 100m radius of the urban transport corridors have been included.

Where transport corridors are considered 'Altered Roads', these have been assessed by comparing the predicted noise levels in the design year without the projects (Do Nothing) with the predicted noise levels in the design year with the projects (Do Minimum).

Transport corridors considered to be 'New Roads' have been assessed by comparing the predicted existing noise levels with the Do Minimum predictions.

8.3.3.2.2 Potential Traffic Noise and Vibration Effects

Adverse noise effects as a result of high levels of traffic noise may include sleep disturbance, loss of concentration, annoyance, a reduction in speech intelligibility and reduced productivity. The effects are not restricted to PPFs but also future residential and other noise-sensitive developments. The effects on future residential and other noise-sensitive developments are not included in the NZS 6806 definition of PPF. Where new noise sensitive developments are established in the vicinity of a road, their design should take account of the potential noise effects and care should be taken to avoid or minimise the effects.

The magnitude of effects will largely depend on noise levels received in noise-sensitive spaces within buildings, although there are also potential annoyance effects associated with a loss of amenity when high noise levels are received in outdoor living or recreation spaces.

Traffic from new or upgraded roading projects is not generally expected to create any vibration issues. The smooth and even surface typical of new urban roads would likely generate no more than negligible traffic vibration impacts. Therefore, traffic vibration has not been assessed for the transport corridors.

8.3.3.2.3 Assessment of Traffic Noise Effects

Following the implementation of recommended mitigation measures outlined in Section 8.3.3.2.4, noise levels associated with the new E-W arterial and associated alterations to existing roads are predicted to decrease or remain unchanged at the vast majority of PPFs, resulting in positive noise effects. This is due to the intended redistribution of traffic across the wider network and subsequent reduction in traffic volumes.

Of the PPFs that are not predicted to receive a reduction or experience no change in noise levels, the predicted increase is assessed as negligible (between 0 dB and 2 dB) for all PPFs.

All predictions are based on traffic flow along 'New Roads' and 'Altered Roads' at the design year (2048). These traffic volumes are predicated based on the anticipated urbanisation of the area and implementation of surrounding infrastructure projects. Development of the surrounding areas will likely increase activity and associated noise levels. Therefore, any changes predicted for the traffic noise effects related to these projects are not likely to represent such a significant change at the time of construction due to the change in environment.

The results of the noise assessment will be confirmed at detailed design stage including confirmation of the road traffic noise at current PPFs. The review, confirmation and refinement of the BPO shall aim to achieve the same noise criteria categories as determined with the current BPO.

Nevertheless, the predictions show that all PPFs across the E-W Project area will receive levels within the lowest design noise levels. Therefore, resulting noise levels will be reasonable in a residential context all PPFs assessed, and no further noise mitigation is deemed necessary at this stage.

8.3.3.2.4 Recommended measures to avoid, remedy or mitigate potential adverse effects

There are broadly three mitigation options that can be applied to manage road traffic noise. These are outlined in Section 7.3.3.2.4 above.

Application of AC-14 or equivalent low noise road surface has been recommended for the new E-W arterial road and will be retained along Fred Taylor Drive. No additional mitigation measures are required.

8.3.3.2.5 Summary of Traffic Noise and Vibration Effects

Predicted traffic noise levels during operation of the E-W Project are generally expected to reduce or increase negligibly with recommended mitigation implemented when compared to the Do Nothing scenario for 'Altered Roads'.

8.3.4 Archaeology and Heritage Effects

As discussed at Section 7.3.4 of this report, an assessment of the actual and potential effects on archaeology and heritage that will result from the construction, operation and maintenance of the RATN has been undertaken. The assessment is informed by the AHHE contained within Volume 4.

To mitigate the very limited potential for unidentified archaeological remains to be exposed during construction, the conditions include an advice note referring to the AUP:OIP Accidental Discovery Rule (ADR) (E12.6.1).

Overall, the RATN is unlikely to have effects on any known archaeological or other historic heritage values and the very limited risk that unidentified archaeological remains are exposed will be managed through the ADR.

8.3.5 Cultural Effects

Refer to Section 7.3.5 of this report for discussion in respect to the potential cultural effects associated with the construction, operation and maintenance of the RATN, including the E-W Project.

8.3.6 Landscape and Visual Effects

This section provides an assessment of the actual and potential landscape and visual effects that will result from the construction, operation and maintenance of the E-W Project. This assessment is informed by the ALVE contained within (Volume 4).

8.3.6.1 Construction Landscape and Visual Effects

As outlined in Section 5.2, construction of the E-W Project is likely to take place in the existing (mostly rural) environment or while this landscape is transitioning into an urban environment. Within this context, the following changes need to be considered with regard to potential construction related landscape and visual effects:

- Physical changes to the landscape during construction as a result of construction activities, such as earthworks and fill slopes, vegetation removal, and site clearance; and
- Temporary changes to visual amenity as a result of construction activities, such as construction laydown areas and machinery.

These changes to the landscape environment have the potential to result in temporary adverse landscape and visual effects during construction, particularly when viewed from properties that are immediately adjacent to the E-W Project. However, through the implementation of appropriate mitigation and design considerations, the potential adverse effects can be minimised, and the level of

effect will diminish over time following completion of the E-W Project. These mitigation and design considerations include:

- Cut and fill slopes are proposed be shaped to a natural profile to integrate into the surrounding natural landform.
- Vegetation removal is proposed to retain noteworthy and high value trees and vegetation identified within the E-W Project area where possible.
- Existing fences and garden plantings (removed through the E-W Project works) are proposed to be reinstated (in consultation with the landowner).
- Reinstatement of the E-W Project area following the completion of construction, including the removal of any leftover fill from site compound areas, the reshaping of ground to integrate with the surrounding landform and the reinstatement of site compound areas with grass and landscaping.
- Remnant land that is maintained in the road corridor (where existing dwellings are removed) will be grassed to mitigate adverse visual amenity effects potentially arising from residual land.

Overall, there may be minor adverse effects on visual amenity during construction. However, these effects will be temporary and largely confined to the period of construction. These temporary effects are typical for the construction of new transport corridors and upgraded intersections, and when considered within the context of a landscape which is likely to be changing at the time of the construction of the E-W Project, are further mitigated.

8.3.6.2 Operational Landscape and Visual Effects

As outlined in Section 5.2, operation of the E-W Project is likely to take place in an urban landscape. By the time the E-W Project is operational it can reasonably be assumed that further sections of the Redhills Precinct will have urbanised alongside (if not as part) of the implementation of the NoRs. As such, operational related landscape and visual effects need to be considered within this context.

The E-W Project will result in longer-term changes to the landscape context of the E-W Project area, which have the potential to result in adverse effects to the landscape character, natural character and visual amenity of the area. These changes include:

- Potential effects on natural character through clearance and/or disturbance of vegetation (although limited) associated with stream crossings within the margins of Waiteputa Stream, Red Hill Stream and Ngongetepara Stream, heightening the impression of further human modification.
- Potential for moderate to large-scale fill slopes (in some locations) that are not able to be actively integrated back into the adjacent urban development parcel (i.e. remain within the road reserve) to be viewed as left-over spaces, and adversely impact the amenity of the road corridor and adjacent urban neighbourhood.

These localised, permanent effects from the E-W Project area can be managed through the preparation of an ULDM which will include the following matters:

- All cut and fill slopes will be shaped to a natural profile to integrate into the surrounding natural landform. Where there are large-scale fill slopes (that are retained within the road reserve) it is recommended these are reinstated with grass, where practicable, if they are not able to be integrated with adjacent land use through site specific landscape design.

- Retaining walls will be designed to integrate with private boundary fencing and where practicable incorporate existing and reinstatement planting.
- The consideration of any proposed bridge design (if applicable) to be designed to contribute to the local sense of place and urban amenity of the future urban landscape
- The consideration to investigate walking and cycling connectivity opportunities to integrate with existing and future open space (as indicated by the Precinct Plan)
- A Planting Plan will be prepared for the E-W Project, including:
 - New street tree planting along the entire length of the E-W Project corridors to mitigate the loss of individual or small groupings of existing native trees and shrubs (where practicable and not in conflict with the Transpower transmission lines) ;
 - Treatment of fill slopes to integrate them with adjacent land use; and
 - An ecological analysis to determine appropriate street tree species selection.

Furthermore, the ALVE recommends the following opportunities to be considered at the detailed design phase and implemented through the ULDMP (if practicable):

- The planting of any constructed stormwater wetlands with appropriate (low maintenance) native species and the integration of wetlands into the surrounding urban landscape context
- Expand reinstatement planting areas around stream crossings to include a greater extent of wetland and riparian margin

On the basis of the above, the magnitude and nature of landscape character, natural character and visual change within the E-W Project area are considered to accord with that which will occur throughout the adjacent development of the Redhills areas. While the E-W Project will result in some temporary adverse effects to the landscape and visual amenity in the E-W Project area, the landscape mitigation measures proposed through the implementation of an ULDMP can adequately remedy adverse effects arising from the E-W Project.

Anticipated development within Redhills on adjacent land will, over time, substantially change the scale and character of the adjacent landscape and absorb the landscape and visual changes proposed within the E-W Project area. As such, the E-W Project will contribute to an improvement of the landscape values for the future urban context of the area.

8.3.7 Ecological Effects

Refer to Section 7.3.7 of this report for an assessment of the actual and potential ecological effects that will result from the construction, operation and maintenance of the RATN, including the E-W Project.

8.3.8 Natural Hazards

8.3.8.1 Flooding Effects

Refer to Section 7.3.8.1 of this report for an assessment of the actual and potential flooding effects that may result from the construction, operation and maintenance of the RATN, including the E-W Project.

8.3.8.2 Geotechnical

A desktop geotechnical assessment has been completed for the Redhills area. This was used to identify initial construction related constraints related to:

- Slope stability for excavations and embankment fills;
- Liquefaction potential;
- The presence of springs and high groundwater tables; and
- The settlement potential of soft compressible soils.

As discussed in Section 6.1.2 and shown in Figure 10 below, the Redhills area is predominantly underlain by residual Waitemata Group soils and Tauranga Group soils.

Whilst the desktop assessment has not indicated any significant geotechnical issues, discrete locations have been highlighted as areas of possible instability. Slope instability has been identified as most likely around steep slopes, slopes on sidling streams and the more significantly incised ephemeral watercourses where stream crossings are proposed.

These do not suggest significant constraints, and the adoption of a conservative approach of unsupported slopes cut at no steeper than 3H:1V will meet target stability factors for safety.

In conclusion, any slope stability geotechnical issues can be addressed within the proposed designation boundary such that effects on adjacent properties and the wider environment will be less than minor.

8.3.9 Property, Land Use and Business Effects

The E-W Project design philosophy has been to avoid and minimise potential adverse effects on private properties and businesses through alignment and project design, where this is practicable. This has included specific consideration of the potential property and business impacts in the assessment of alternatives as discussed in Section 8.2 and detailed in Appendix A0.

Where impacts on property, land use and businesses cannot be avoided, the potential effects are categorised into two broad groups:

- Directly affected properties/landowners; and
- Properties and businesses affected by proximity to the E-W Project.

An assessment of these potential property, land use and business disruption effects is provided in the following sub-sections.

8.3.9.0 Directly Affected Properties

The proposed designations (NoR2a, NoR2b and NoR2c) require land to provide a sufficient footprint to enable the construction and operation of the E-W Project (Designation Drawings are provided in Volume 3). Based on the proposed designation footprints, 38 private properties will be directly affected.

A description of existing land uses of the directly affected properties is provided in Section 6.1. In summary:

- A significant portion of the E-W Project area within Redhills is currently private farmland. The land is primarily used for grazing and contains minimal farming-related structures;

- The land surrounding the existing Red Hills Road, Nixon Road and Nelson Road intersection is predominantly comprised of rural lifestyle properties;
- The eastern area of the Redhills bordering Fred Taylor Drive is currently undergoing urban development.

The potential pre-construction, construction and post construction effects on directly affected properties is discussed in the following sub-sections.

8.3.9.1 Pre-Construction

The proposed designations have a lapse duration of 15 years to provide a sufficient timeframe to enable construction of the E-W Project in response to the progressive urbanisation of Redhills. While the length of the lapse date reflects the need to provide long term certainty regarding the alignment of the E-W Project.

The proposed designation will not preclude the continued (unchanged) use of any directly affected properties prior to construction. However, in accordance with section 176 of the RMA, written consent would be required from AT for any works that would “prevent or hinder” the E-W Project, including:

- Undertaking any use of the land;
- Subdividing the land; and
- Changing the character, intensity, or scale of the use of the land.

The purpose of the E-W Project is to support urban growth in Redhills. As outlined in Section 6.3, the majority of the E-W Project is located within Redhills, a greenfield area which is likely to experience a high level of change as the area transitions from rural to urban land use. The E-W Project is likely to be constructed within a transitional environment and will be operated within an urban or rapidly urbanising environment. As such, the E-W Project is unlikely to affect the current land use of Redhills until such a time that the area starts to develop which would be concurrent with the construction of the E-W Project. At this point potential land development issues would be addressed through the construction and operation of the E-W Project (further discussed in Sections 8.3.9.2 and 8.3.9.3).

As discussed, development is not precluded within the designation areas, however any development within the designation areas will require approval pursuant to section 176 of the RMA. As outlined in Section 10.2.6, AT has actively sought to engage with developers through the E-W Project development process to address development plans and adapt where practicable to enable development in and around the E-W Project corridor. AT will continue this process once the designations are confirmed, using section 176 of the RMA as the mechanism for approval with particular regard to the compatibility and viability of construction, flexibility of the E-W Project design and where possible avoiding effects on reasonable future changes to land use which do not prevent or hinder the E-W Project.

Considering these effects, the pre-construction of the E-W Project will have no more than minor effects on property, land use and business.

8.3.9.2 Construction

During construction the E-W Project will temporarily require land to enable construction activities (detailed in Section 8.1). Within Redhills, the identified land is predominantly pastoral, with a small number of rural residential properties adjacent to the existing Red Hills Road, Nixon Road and Nelson Road intersection. Potential effects from temporary land requirement include temporary loss of

grazing pasture, stock-proof fencing, disruption to farm activities, disruption to access, changes to driveway gradient, loss of vegetation and temporarily affected amenity.

It is proposed that the designations will be drawn back to the operational boundary once construction is complete. Effects from temporary land acquisition can be mitigated through site specific arrangements which will be developed with the individual landowners through the Public Works Act processes.

Potential adverse effects from construction activities are addressed throughout Section 8.3 with appropriate mitigation identified to avoid or minimise effects on properties in proximity to the works. Particular mitigation measures for residential property and business disruption during construction include:

- Implementation of a CTMP to manage construction traffic and disruption to the local transport network (Section 8.3.2.1.1), including methods to:
 - Maintain vehicle access to property and/or private roads where practicable, or to provide alternative access arrangements when it will not be; and
 - Communicate traffic management measures to affected parties.
- Implementation of a CNVMP and any Schedules produced to manage construction noise and vibration effects on sensitive receivers (Section 8.3.3.1.3), including methods to:
 - Communicate and engage with nearby residents and stakeholders; and
 - Minimise construction disruption for affected properties during construction.
- Implementation of a Stakeholder and Communication Management Plan to identify how the public and stakeholders will be communicated with throughout construction, including methods to:
 - Determine adequate notice periods for the commencement of construction activities and works that affect access to properties;
 - Inform parties of the expected timing, duration and staging of works and regular updating of progress; and
 - Provide feedback, inquires and complaints during the construction process.

These measures will appropriately minimise disruption to affected properties and allow the continued use of properties where possible. Potential effects will be temporary and therefore it is considered that they will be less than minor.

8.3.9.3 Post Construction

The E-W Project will permanently require land which is required for the finished E-W Project (permanent transport corridor). The primary effect is loss of productive and residential land which will be mitigated through the Public Works Act process.

Any residual land (land not permanently required) will be reinstated in coordination with landowners through the temporary land acquisition process. The finished form of the corridor and viability of land adjacent to the road corridor will be evaluated based on the principles of the ULDM. The purpose of this document is to:

“Enable integration of the Project's permanent works into the surrounding landscape and urban context; and

Ensure that the completed Project mitigates potential adverse landscape and visual effects as far as practicable and contributes to a quality urban environment.”

The ULDMP requires the consideration of the future land use context as this relates to the E-W Project corridor and seeks to ensure a suitable urban outcome for the area. Key considerations include:

- Design to integrate with the adjacent urban (or proposed urban) landscape context, including the surrounding existing or proposed topography, urban environment and landscape character.
- Integration of batters and cut/fill slopes in the landscape, measures may include:
 - Grading cut and fill slopes to integrate with the surrounding landform.
 - Minimising encroachment into water bodies and indigenous vegetation.
 - Planting batters that coincide with wetland and stream courses.

The ULDMP is anticipated to be further developed in coordination with adjacent development where this is practical. In this way the ULDMP will ensure that the E-W Project appropriately integrates with future land uses which are directly adjacent to the corridor and avoids, where possible, the potential to create residual land as a result of the E-W Project. It is therefore considered that the effects of land requirement will be no more than minor on these landowners.

8.3.9.4 Properties Impacted by Proximity

Aside from the properties which will be directly affected by the designation, there is the potential that other properties outside the designation footprint could be affected by the E-W Project as a result of their proximity to the construction activities.

Potential adverse effects from construction activities are addressed throughout Section 8.3 with appropriate mitigation identified to avoid or minimise effects on properties in proximity to the works. The particular mitigation measures for directly affected properties during construction, which are described in Section 8.3.9.0, are also applicable to properties impacted by proximity.

The potential adverse effects to properties and businesses in proximity to the E-W Project area would be temporary and through the implementation of appropriate construction management, can be avoided or minimised, such that they are no more than minor.

9 Proposed Measures to Manage Adverse Effects

The concept design for the RATN (as reflected in this AEE and supporting drawings and assessments) has sought to avoid or mitigate adverse effects through the route selection process and the concept design of the RATN elements. Where it has not been practicable to avoid adverse effects, through route selection or design, measures are proposed to remedy or mitigate any residual adverse effects.

This will be achieved through the development and implementation of a suite of measures covering detailed design, construction and operation management plans and monitoring. These measures are included in the proposed designation conditions as relevant, for each NoR (refer Appendix C) and are summarised in Table 22 below.

Table 22: Summary of measures to avoid, remedy or mitigate potential adverse effects

AEE Section /Topic	Measure	Condition #
Transportation	Construction Traffic Management Plan	16
Traffic Noise and Vibration	Traffic noise mitigation measures as set out in designation conditions	24 - 38
Construction Noise and Vibration	Construction Noise and Vibration Management Plan Schedule to a Construction Noise and Vibration Management	17 - 20
Archaeology and Heritage	Accidental Discovery Rule under the AUP:OIP	n/a
Cultural	Mana whenua partnership Cultural Advisory Report Urban Landscape and Design Management Plan Stakeholder and Communications and Engagement Management Plan Cultural Monitoring Plan Ecological Management Plan Accidental Discovery Rule under the AUP:OIP	8 9 13 15 22
Landscape and Visual	Urban Landscape and Design Management Plan Tree Management Plan	9 23
Ecology	Pre-construction Ecological Survey Ecological Management Plan	21 22
Natural Hazards	Construction Environmental Management Plan Flood risk outcomes as set out in designation conditions	12 10
Property, Land Use and Business	Stakeholder and Communications and Engagement Management Plan Complaints register Construction Noise and Vibration Management Plan Construction Traffic Management Plan	13 14 17-20 16

Urban Design Evaluation	Urban Landscape and Design Management Plan	9
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10 Engagement

This section provides a summary of engagement that has been undertaken to date and which is ongoing for the RATN. It summarises the approach during each phase, focusing on key themes and common issues raised across the RATN and the North West Network more generally.

Prior to detailed design and construction, further engagement will be undertaken by the requiring authority, as needed to manage impacts of the RATN. This is set out in detail in the AEE and the proposed conditions.

10.1 Overview of Engagement

Engagement with partners, stakeholders, potentially affected parties and the wider community has been ongoing. Table 23 provides a brief summary of the key RATN development stages and engagement undertaken.

Table 23: Project Stage Engagement Summary

Project Stage	Timing	Description
Programme Business Case (PBC) – Auckland wide	2015 - 2016	<p>Engagement undertaken:</p> <ul style="list-style-type: none"> Workshops, meetings and events with Manawhenua, Local Boards, communities and a wide range of stakeholders, to understand the issues, opportunities and community aspirations in each growth area (Auckland-wide). Manawhenua were engaged to: <ul style="list-style-type: none"> Seek feedback on the draft preferred transport networks; To develop a set of Manawhenua values that could be considered and further developed at the next stage of the RATN; and To provide cultural, historical and social knowledge and information that will help to inform the RATN. Two stages of consultation undertaken ('long-list' options phase and preferred Programme stage) – both stages involved a series of public based community open day events, feedback sessions, online forms and a business owner / operator survey. <p>Outcome:</p> <ul style="list-style-type: none"> A process-led refinement of the long list into preferred options leading to the completion and publication of the Preferred Transport Network Plans in 2016. These high-level maps showed a range of indicative transport connections required to support the growth in each growth area of Auckland.
Indicative Business Case (IBC) – North West area wide	2018/19	<p>Engagement undertaken:</p> <ul style="list-style-type: none"> Engagement sought to build on the PBC and receive feedback and input from partners, stakeholders and the general public on the short-listed options being considered for the four Supporting Growth business case areas, including the North West. Engagement was undertaken via information days, workshops and meetings to develop an IBC for the entire North West growth area.

		<p>Outcome:</p> <ul style="list-style-type: none"> The RATN options were subsequently modified and refined as the process progressed. As a result, the Indicative Strategic Transport Networks were identified in Redhills and Whenuapai to support growth. These Indicative Network maps were published in mid-2019.
Detailed Business Case (DBC) – North West HIF	2019	<p>Engagement undertaken:</p> <ul style="list-style-type: none"> Engagement with stakeholders, developers, and landowners was undertaken to prepare a NW HIF DBC and understand the issues and opportunities of the Indicative Strategic Transport Networks developed during the IBC phase. Focus was on meetings with landowners and developers affected by the RATN and informing the wider community on the Indicative Strategic Transport Network. <p>Outcome:</p> <ul style="list-style-type: none"> Designs were subsequently modified and refined. As part of this, the Indicative Strategic Transport Network was further developed in this phase to create preferred routes for the RATN.
Notices of Requirement – North West HIF	2019/20 and 2022	<p>Engagement undertaken:</p> <ul style="list-style-type: none"> Engagement with stakeholders, developers, and landowners has been undertaken to prepare NoRs for the new and upgraded arterials in Redhills and Whenuapai to support growth (including this RATN). This has included briefings and presentations to local boards and elected representatives, Community Drop-in sessions held at Te Manawa in Westgate, letters and plans sent to identified affected landowners, and emails, phone calls and meetings with landowners. Engagement was undertaken during 2019 and 2020 when the NoRs were first prepared. Due to funding constraints, the RATN was not lodged with Council until 2022. Further engagement was undertaken during 2022 prior to lodgement. The purpose of engagement in 2022 was to refresh the project purpose with Local Boards as well as key stakeholders, with the focus being directed to landowner engagement. <p>Outcome:</p> <ul style="list-style-type: none"> The preferred routes were further refined as part of this phase to create indicative alignments for the RATN.

10.2 Engagement with Partners, Stakeholders and Landowners / Developers

The Programme partners and stakeholders have continued to be involved throughout the various RATN development stages. This has included engagement with key stakeholder groups and developers on a Programme-wide basis to gain an understanding of proposed work programmes, land holdings, projects, timing, integration opportunities and to establish enduring relationships. Where possible, engagement with landowners has been undertaken on a one-to-one basis to understand how they use their land (including any further development plans to the property) and how they would be affected by the RATN.

As illustrated in Figure 19 below, the feedback from these stakeholder groups, including landowners and developers, has been used to build knowledge, to understand risk, and to refine the design of the RATN where practicable and appropriate.

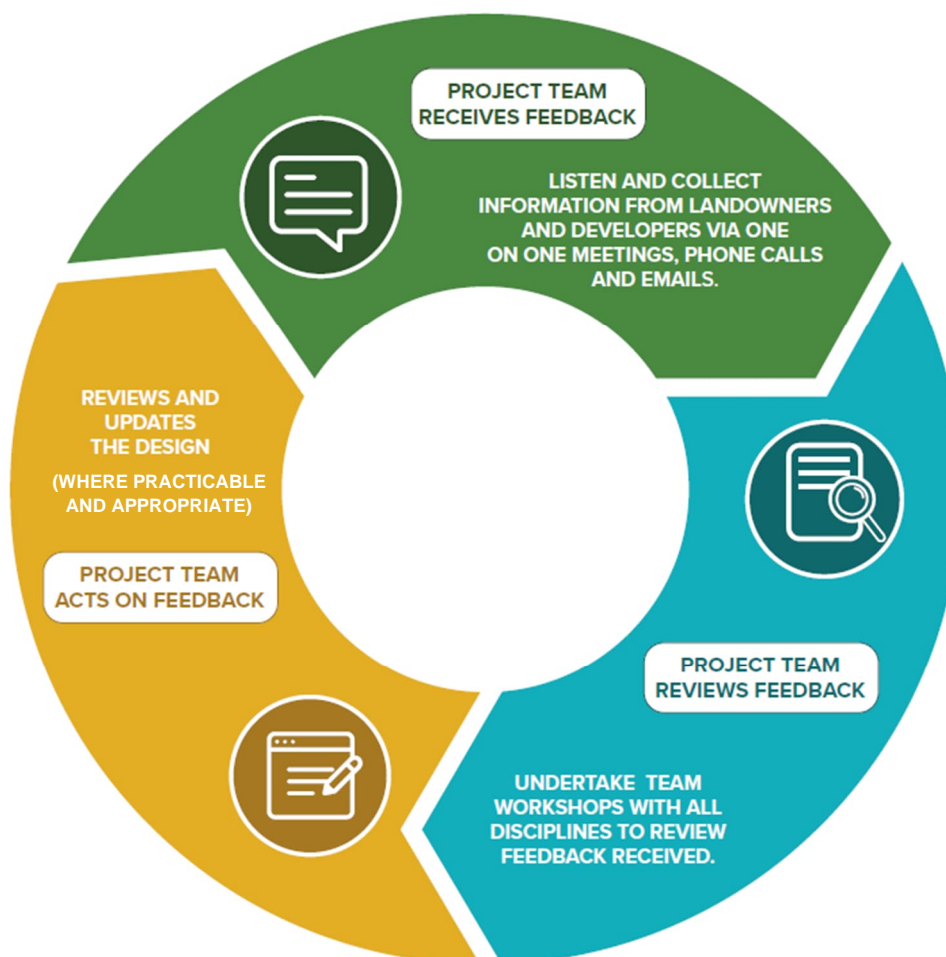


Figure 19: Engagement feedback loop

10.2.1 Waka Kotahi

Waka Kotahi are investors and partners to the Programme and engagement has been undertaken with Waka Kotahi through the development of the RATN. Engagement with Waka Kotahi has been facilitated via the Owner Interface Managers within the Programme, and through regular forums leading up to business case milestones and attendance at business case workshops. Other projects and business cases are also being progressed within the North West area to provide for predicted growth and safety improvements. The Programme has sought to integrate across these other projects and has been involved in updates and workshops, with information shared between the projects to align key messaging.

10.2.2 Auckland Council

There is close alignment between the Programme and the Council which supports the Programme's desired outcome of integration of land use and transport. Programme wide, a regular Integration

Forum between the Programme and the Council has been facilitated to enable these commitments, and to actively identify and manage risks and opportunities that are inherent to the Programme.

Engagement with the Council regarding the RATN has been closely aligned with the structure planning and zoning process that has already been completed, resulting in the Redhills Precinct Plan (and its associated indicative transport network).

Additional engagement undertaken with the Council through the North West business case stages included attendance at business case workshops, stakeholder workshops, Council attendance at North West Public Information Days and various meetings with the Council Resource Consents and Policy Planning and Parks team.

10.2.3 Manawhenua

Manawhenua are recognised as Treaty Partners by AT and Waka Kotahi, and as such the Programme recognises their responsibilities and commitments in regard to engagement with Manawhenua.

Across the Programme, Manawhenua have been involved in the development of the indicative strategic transport networks.

The Programme recognises the Crown Settlement Area of Interest & Statutory Acknowledgement instruments in place for Te Kawerau ā Maki and Ngāti Whātua o Kaipara. Both iwi were actively involved throughout the business case process.

Ngāti Whātua o Orākei, Te Runanga o Ngāti Whātua, Ngāti Te Ata Waiohua, and Te Ākitai Waiohua have noted their interest in the area with the Council and council-controlled organisations and were involved in the development of the RATN since November 2017.

Te Tupu Ngātahi maintains a Manawhenua Forum (for operational and kaitiaki level interaction that focuses on project-wide delivery and consistency), with specific discussion on the RATN. This has involved presenting to manawhenua on a regular basis, seeking input on the corridor development and potential effects on cultural values. This has informed the corridor alignments and the mitigation measures proposed. Iwi invited to the Northern Te Tupu Ngātahi hui includes Ngai Tai Ki Tamaki; Ngati Maru; Ngati Whanaunga; Ngati Whātua o Kaipara; Te Ākitai Waiohua; Ngati Paoa Trust Board; Te Kawerau a Maki; Ngati Tamatera, Te Runanga o Ngati Whatua and Ngati Manuhiri.

Further opportunities for governance level relationships are provided via the Tamaki Transport Table and the existing connections with governance through the owner participants (AT and Waka Kotahi).

Manawhenua contributed to the development of criteria and values to be integrated into the MCA framework.

Ngāti Whātua o Kaipara and Te Kawerau ā Maki have both prepared CIAs for the Project. These are summarised in Section 7.3.5 of this AEE.

The Programme involved Manawhenua as partners in decision-making and considered their views when identifying priorities for investment options. This included seeking feedback on the draft preferred transport networks, developing a set of Manawhenua values to be considered and further developed, and attending the option evaluation and recommendation making processes.

Throughout the process, key Manawhenua issues and opportunities were identified, as summarised in Table 24.

Table 24: North West Specific Manawhenua Issues and Opportunities

Key issues	Opportunities
<ul style="list-style-type: none"> • Impacts on riparian planting • Property development impacting stream health • Protection / consideration of growing areas and history 	<ul style="list-style-type: none"> • Restoration of streams and waterways • Mitigation planting and art work • Improvement of forest and native vegetation areas through the Crown Settlement Area of Interest & Statutory Acknowledgement of Te Kawerau ā Maki & Ngāti Whātua o Kaipara

The Programme has also held various hui with Manawhenua to feed into the development of the RATN, with these Hui both informing and enabling Manawhenua to influence the preferred network options.

Manawhenua also participated in the site walkover in November 2019 with the wider RATN Project Team and Council specialists.

10.2.4 Engagement with Stakeholders

Engagement with stakeholders has been undertaken primarily at a Programme-wide level, through a series of Stakeholder Reference Group presentations and one-to-one meetings. Engagement methods and communication techniques have been tailored to each stakeholder, largely with the purpose to discuss issues / opportunities in relation to the RATN. Table 25 provides an overview of the key stakeholders and the purpose of engagement with each.

Table 25: Key stakeholders for the RATN

Key Stakeholders	Purpose of Engagement
Auckland Council Councillors	<ul style="list-style-type: none"> • Discuss issues / opportunities in relation to the RATN
Auckland Council Local Boards	<ul style="list-style-type: none"> • Discuss issues / opportunities in relation to the RATN
Watercare	<ul style="list-style-type: none"> • Discuss issues / opportunities in relation to the RATN • To align Watercare planned infrastructure in both Whenuapai and Redhills
The Ministry of Education	<ul style="list-style-type: none"> • Discuss issues / opportunities in relation to the RATN • Discuss new potential school locations
Vector	<ul style="list-style-type: none"> • Discuss issues / opportunities in relation to the RATN • Vector have infrastructure across all urban areas.
Transpower	<ul style="list-style-type: none"> • Discuss issues / opportunities in relation to the RATN • To discuss their plans for undergrounding / master planning within the Redhills area, National Grid requirements, implications of moving the National Grid, and Transpower's projects identified in its Auckland Strategy • Transpower is a network utility provider for land that has been identified in the AUP:OIP as subject to a National Grid Corridor Overlay through the RATN area

Engagement with these stakeholders was largely through one-on-one meetings or email updates to explain both the study areas and our plans for further refining the network, and to explore opportunities to work together to minimise impacts and enable positive outcomes.

Local Boards were provided with project update presentations and memorandums in July and August 2022, and briefings were held with elected representatives.

The Programme met with Transpower multiple times due to the close proximity of sections of the RATN to the two Transpower high voltage overhead power pylons that run north-west to south-east through the centre of Redhills. Key matters discussed involved:

- The relationship between the new arterial corridors and land uses in close proximity to the pylons;
- Advised on AUP:OIP provisions and corridor and National Standards;
- Concerned about approvals and any pylon (asset) impacts through project work.

Furthermore, a Utility Infrastructure Alignment forum lead by Watercare is held regularly and provides an opportunity for integration between infrastructure and utilities projects in the North West. The North West Infrastructure Forum includes representation from:

- Watercare
- Vector
- Chorus
- AT
- Waka Kotahi

The Programme delivered numerous presentations to introduce the Programme as a whole, discuss public feedback periods and the timeline of the Programme. It was also an opportunity to receive updates from infrastructure providers on plans for the North West.

10.2.5 Engagement with Landowners

During the DBC and NoR phases of the RATN, one-to-one meetings were arranged with potentially and directly affected landowners within the RATN area to discuss impacts and opportunities. Initial engagement took the form of informing landowners that they are located within the investigation area, via a letter. Landowners were then met with individually, including both residential (owner-occupied and tenanted) and business owners, at various stages of the RATN development to gain an understanding of local knowledge of the area, how they use their land, to talk through the indicative strategic transport networks and to understand any arising constraints, issues and opportunities.

The alignment design was further developed and refined during early 2020 which resulted in minor to significant changes to property impacts and designation boundaries. In June 2020 those landowners were contacted by letter where there had been a change in impact or a new impact. A plan was attached to the letter showing their property and the new road alignment and face to face meetings were offered. These included 11 landowners in the RATN area that had not been engaged with yet.

The purpose of the engagement was to:

- Engage with newly impacted landowners that hadn't been met with yet.
- Re-engage with landowners and communicate the post-design changes and impact to their property
- Understand from those landowners whose properties are now fully designated their sentiments and appetite for undertaking topographical driveway surveys to see if there is a suitable access solution.

When the RATN recommenced in 2022, further landowner engagement was undertaken, commencing with letters and project overview maps being sent to all property owners identified as potentially affected by the proposed designation. Once the proposed designation boundaries were confirmed, a plan of each property was produced and a further letter and copy of the plan were sent to each property owner. This encouraged landowners to get in touch with Te Tupu Ngātahi should they have any further questions or require a meeting. 20 phone calls and emails were received in relation to the RATN.

Meetings with landowners were held at local community venues or online via Microsoft Teams. These meetings were attended by two members of the Project Team and, in some cases, a property specialist from AT. These meetings allowed landowners to ask questions and understand the route protection process and timing. To date, 15 meetings have taken place with landowners in relation to the RATN. In summary, four key periods of landowner engagement were undertaken (focusing on both the Trig Road Project and the RATN):

- For the 2019 North West DBC landowner engagement period, the Programme sent letters to 112 landowners. A total of 75¹³ landowner meetings were undertaken over a five-week period.
- For the 2019 North West NoR landowner engagement period, the Programme sent letters to 112 landowners. A total of 55¹⁴ landowner meetings were undertaken over a five-week period.
- For the 2020 North West NoR landowner engagement period the Programme sent letters to 83 landowners where there was a change in impact to their property. Approximately 59¹⁵ landowner meetings were undertaken over a four-week period. This included 24 landowners newly impacted by the further design work that was undertaken.
- For the 2022 North West NoR landowner engagement period, 15 landowner meetings were undertaken for the RATN.

The predominant themes of feedback received across the four engagement periods for the RATN were:

- **Site Boundary:** Concerns with loss of land and acquisition, queries if boundaries would stay the same, and concerns with the repercussions of the road coming closer to their house.
- **Access:** Questioning how this is impacted, and how it will be restored.
- **Property Acquisition:** Most landowners mentioned this, questioning what the process is, how compensation is determined, and whether it would be full or partial acquisition. During the 2020 engagement period an AT Property Specialist attended most of the landowner meetings to provide information on the property acquisition process including compensation and timeframes.
- **Property – Loss of Value:** Loss of property value was a main theme raised during the 2020 engagement period.

¹³ 75 being the number of landowners who responded to requests from the North West DBC team for a landowner meeting

¹⁴ 55 being the number of landowners who responded to requests from the North West NoR team for a landowner meeting

¹⁵ 49 being the number of landowners who responded to requests from the North West NoR team for a landowner meeting

- **Re-development Potential:** Landowners concerned with the loss of land and the impacts this has on their ability to subdivide or develop land.
- **Alignment Concerns:** Landowners generally expressed interest in wanting more detail on alignments – there was an ongoing trend that the lack of detail is frustrating and causes a lack of certainty, in response to this more detail was provided during the 2020 engagement period.
- **Timing:** Landowners enquired about timeframes for NoR lodgment and the construction period. Landowners raised during the 2022 engagement period that they were surprised the RATN was still occurring as they had thought it had been cancelled rather than put on hold. As a result, generally, landowners expressed that due to the delay and uncertainty around the timing of the RATN they wanted to move forward with property acquisition.

In summary, the Project Team has undertaken ongoing engagement with affected landowners throughout the development of the RATN. This has both informed affected landowners of the RATN and potential impacts, and identified the key themes of concerns to landowners, with further information provided and surveys undertaken (where appropriate) to close out concerns. As such, the landowner engagement provided and detailed in this section is considered sufficient.

10.2.6 Engagement with Developers

To facilitate effective developer engagement across the Programme, a Land Development Co-ordination Team was initiated that included appropriate representatives from within the Programme (including AT, and Council personnel) that meets and coordinates discussions with developers.

The Programme has undertaken a direct approach to engagement with developers, predominantly through one-to-one meetings. The purpose of these meetings was to ensure the Project Team had a greater understanding of their land holdings and to establish relationships for ongoing engagement and discuss how their land is potentially impacted by the proposed alignments. Additionally, engagement has also been undertaken with developers with interests in the RATN area, in addition to those with property impacted by the other North West projects being progressed by the Programme.

During the 2022 engagement period, developers, commercial landowners and local businesses were contacted and draft designation plans were shared with these stakeholders via online and in person meetings.

The predominant themes from engagement with developers can be summarised as follows:

- Developers with development plans that are ready to develop need to align timing and sequencing with the Programme.
- Developers interested in developing are seeking a better understanding of transport networks in relation to their land.
- Existing developments may be impacted by transport networks and upgrades.
- Developers in the general vicinity are interested in the way the areas may develop and how transport networks may influence growth.
- Developers are interested in projects in the wider business case areas and other growth-related infrastructure that is to be implemented by others.
- Questions surrounding funding of transport networks and cost of development.
- Expectations for greater level of detail at the NoR stage, with specific requests such as the engineering approach, access changes, timing of works, acquisition processes and opportunities for design compromise to reflect developer plans.

Developers have generally been supportive of the Programme, recognising the need to improve transport infrastructure to enable the release of developable land in the areas. The delivery timing of transport infrastructure is of significant interest for developers, in order to establish certainty for their own development plans.

10.3 Community Engagement

Engagement with the community for the RATN has been undertaken as part of the wider engagement for the North West.

This engagement was largely through Public Information Days and survey questions, and included written responses, online and hardcopy surveys, and webpage views. Furthermore, to reflect the future 'communities', engagement with youth (high school students) and young professionals was undertaken across three workshops.

The North West Project Team also attended a community drop-in session in October 2022 at Te Manawa Library in Westgate. This was organised by the Waka Kotahi State Highway 16 Brigham Creek to Waimauku Safety Improvements project which has crossover with the North West projects. Approximately 40 people visited the Te Tupu Ngātahi stand to talk to the team and pick up information handouts. Attendees included both landowners affected by the RATN and local community leaders.

The Te Tupu Ngātahi website was also updated to provide information about the RATN, including an updated project overview map and information sheets about how the proposed designation may be used in the future.

The summary of this community feedback relevant to the RATN is presented in Table 26 below.

Table 26: Summary of Key Public Feedback Themes relating to Redhills

Key Theme	Feedback Summary
Area Specific Feedback	
Redhills	<ul style="list-style-type: none"> Mixed response between options for the north-south connection Desire for existing arterial roads to be upgraded, especially regarding safety, walking and cycling networks and congestion Fred Taylor Drive, Don Buck Road and Metcalfe Road were identified to be of highest priority to the public Consideration of topography in design Public transport is poorly integrated
General Transport	
Walking and Cycling	<ul style="list-style-type: none"> Lack of safe cyclists and pedestrian facilities and crossings, and strong support for increased facilities (including separation between vehicles and cyclists) Support for increased facilities between residential areas and town centres, increased linkages to regional cycle network Need for cycle facilities at transport centres
Safety	<ul style="list-style-type: none"> Key concern for all transport mode users Rural roads not fit for urban growth Existing road corridors too narrow High engagement regarding speed limit review, with it commonly perceived too high

Public Transport	<ul style="list-style-type: none"> • Currently poor or non-existent service and desire for immediate improvement • Desire for provision of Park and Rides and local feeder buses to support public transport (largely regarding ferries) • Consistent themes of improving connections, level of service (frequency, speed, increased destinations) and connectivity; and integrating modes of transport
Local Bus Network	<ul style="list-style-type: none"> • Greater accessibility to bus services, including suggestions for more bus stops, Park and Rides and shuttle buses to major transport stations – specific areas that require bus stops / stations provided and destinations provided • Concerns with the current low frequency of bus services • Suggestions for bus lanes and express services
Rail (light and heavy)	<ul style="list-style-type: none"> • Some thought light rail would be better and quicker than buses, providing more options for transport

10.4 Ongoing Consultation

Te Tupu Ngātahi continues to meet and engage with potentially impacted landowners as required. The Te Tupu Ngātahi website will continue to be updated with the key steps in the NoR process (i.e. public notification, hearing dates, decisions and appeals) and the Programme will continue to engage with submitters post lodgement during the hearings process.

11 Resource Management Amendment Act 2020

To date, the overlap between the RMA regime and climate change has been limited as sections 104E and 70A of the RMA have constrained the ability of local authorities to account for climate change considerations in exercising their roles and functions. However, the amendment to the RMA that came into effect on 30 November 2022 is intended to better align the RMA with the CCRA. The Resource Management Amendment Act 2020 repeals the restrictions under the RMA in relation to climate change with the following consequences:

- The repeal of section 104E means that effects on climate change of a discharge to air of greenhouse gases can in future be considered in the context of an application for a discharge permit or coastal permit to do something that would otherwise contravene section 15 or section 15B.
- The repeal of section 70A means that when making a rule to control the discharge into air of greenhouse gases a regional council may now have regard to the effects of such a discharge on climate change.
- An amendment to section 74(2)(c) means that when preparing or changing a district plan, a territorial authority must now have regard to any ERP or national adaptation plan made in accordance with the CCRA.

The above RMA amendments do not directly affect the RATN NORs as no resource consent is sought or required for the discharge of contaminants to air. The control of discharges of contaminants into air remains a regional council function in accordance with s 30(1)(f) of the RMA. As such, the effects associated with a discharge to air will remain a regional plan matter. The proposed implementation timeframe for the RATN (15 years) means that only designations are proposed at this stage and the designations will not authorise regional plan consenting requirements. Resource consents will be required in the future to authorise activities controlled under the regional plan matters of the AUP:OP or the relevant planning document that applies at the time of implementation.

12 Statutory Assessment

The following assessment is provided in accordance with the relevant sections under the RMA applicable to the RATN (NoR1, NoR2a, NoR2b, NoR2c).

12.1 Section 171 Recommendation by a Territorial Authority

Section 171(1) of the RMA sets out the matters which are to be taken into consideration by the Council when considering a NoR.

These matters have been addressed throughout the AEE and associated technical assessments. In summary:

- Section 171 (1)(a): Relevant provisions of policy statements and plans have been addressed in Section 12 (this section) and in Appendix B. In summary, this analysis concludes that it is considered that the proposed works are consistent with the following:
 - The AUP:OIP;
 - The AUP:OIP Regional Policy Statement (**RPS**);
 - National Policy Statements (**NPS**) including the NPS:FM, the NPS:UD and the NPS:ET.
- Section 171 (1)(b)(i): Adequate consideration of alternative sites, routes and methods has been addressed in Section 7.2 for the N-S Project (NoR1), Section 8.2 for the E-W Project (NoR2a, NoR2b and NoR2c), and in 0.
- Section 171 (1)(b)(ii): Effects on the environment and Part 2 are addressed in Sections 7.3 for the N-S Project (NoR1), Section 8.3 for the E-W Project (NoR2a, NoR2b and NoR2c) and Section 12 (this section).
- Section 171 (1)(c): The works and proposed designations are reasonably necessary to achieve the Project Objectives for the proposed designations because:
 - The proposed works will assist in the efficient operation of the local transport network.
 - The proposed works identify and protect an urban arterial transport network in Redhills and key connections to the existing transport network. No transport network currently exists in Redhills, and these arterial corridors will provide access to and support the planned urban growth in Redhills.
 - Sufficient space and facilities will be provided to ensure that the proposed transport corridors are safe for all transport users, including vehicles, public transport, walking and cycling.
 - The proposed works contribute to mode shift by providing a choice of transport options through the provision of separated and protected walking and cycling facilities, including signalised pedestrian / cycle crossing facilities, and public transport measures to improve bus travel time and reliability.
 - The proposed designations will allow AT and / or its authorised agents to undertake the works for the construction, operation and maintenance of the RATN comprising transport corridors and associated ancillary components / activities.
 - The proposed designations will enable works to be undertaken in a comprehensive and integrated manner.

- The proposed designations will add protection to the route from future incompatible development which may preclude or put at risk the construction and / or operation and maintenance of the corridor.
- The proposed designations will be included in the AUP:OIP providing certainty to the public as to the intended use of the land and nature of the activity authorised.
- Other matters that inform the territorial authority’s consideration are addressed in Section 12.1.1 below.

In summary, the RATN is consistent with the relevant provisions of the NPS’s, gives effect to the RPS and is generally consistent with the relevant objectives and policies of the AUP:OIP. Adequate consideration has been given to alternative sites, routes and methods and the RATN will avoid, remedy or mitigate any adverse effects on the environment. Lastly, the proposed works and proposed designations are reasonably necessary for achieving the objectives of AT for the RATN. Given the above factors, it is considered that the Council can recommend confirmation of the requirement by AT.

12.1.1 Section 171(1)(d) Other Matters

Section 171(1)(d) requires the territorial authority to have particular regard to:

‘Any other matter the territorial authority considers reasonably necessary in order to make a recommendation on the requirement’

It is considered that there are no other matters under s171(1)(d) that are reasonably necessary to make a recommendation on the NORs.

12.2 Other Policy Considerations

Other legislation and policy that has informed development and will inform the implementation of the Project is set out in Table 27, Table 28 and Table 29.

Table 27: Assessment against potential other matters - National

National
Government Policy Statement on land transport (GPS) for 2021/22 – 2030/31
<p>The Government Policy Statement on Land Transport 2021 continues the strategic direction of GPS 2018, but provides stronger guidance on what Government is seeking from land transport investments. The GPS outlines the Government’s strategy to guide land transport investment over the next 10 years, influencing decisions on how money from the National Land Transport Fund will be invested across activity classes, such as state highways and public transport. The overall strategic priorities for GPS 2021, the national objectives for land transport and the themes and the results the Government wishes to achieve through the allocation of the Fund are summarised as follows:</p> <ul style="list-style-type: none"> • Safety – a safe system, free of death and serious injury • Access – a system that provides increased access to economic and social opportunities • Climate change – a low carbon transport system that supports emissions reductions, while improving safety and inclusive access • Improving freight connections – improving freight connections for economic development. <p>The RATN provides a safe and reliable transport network that supports growth, enables sustainable travel choice, provides for high levels of road safety and improves access to employment and social amenities. The</p>

National

RATN will provide safe transport infrastructure, including safe walking and cycling facilities on all corridors, safe intersection design based on AT standards, and crossing facilities for vulnerable users. The proposed road network will enhance bus travel time and reliability by providing dedicated bus facilities and bus priority. The GPS 2021 prioritises reduction of greenhouse gas emissions and a shift to active modes, public transport and low emission vehicles. This focus is well aligned to the upgraded transport corridor which provides an increase in modal choice including active modes and public transport, thereby seeking to reduce reliance on single occupancy vehicles. Overall, the RATN positively contributes towards the strategic priorities in the GPS.

The Thirty Year New Zealand Infrastructure Plan 2015

The Thirty Year New Zealand Infrastructure Plan makes changes to the current approach to planning and management and to encourage investment in New Zealand's infrastructure while recognising the challenges the country needs to navigate. The Plan envisages that by 2045 New Zealand's infrastructure will be resilient, co-ordinated and contribute to a strong economy and high living standards.

The Plan notes that challenges exist around projected population growth with Auckland forecast to grow by another 716,000 people by 2045 meaning that over the next 25 years, the city will need to provide 400,000 more dwellings. The RATN provides an integrated approach to land-use and infrastructure planning which is critical to deliver good urban outcomes. The plan envisages \$18.7 billion being spent on infrastructure between 2015 and 2025. The RATN forms part of this spending and falls within the scope of this Plan by enabling and providing for future urban growth in Redhills.

Road to Zero: New Zealand's Road Safety Strategy 2020-2030

Road to Zero outlines a strategy to guide improvements in safety on our roads, streets, footpaths, cycleways, bus lanes and state highways in New Zealand over the next 10 years. The vision of the strategy is a *New Zealand where no one is killed or seriously injured in road crashes*. The Strategy focuses on achieving this vision through system management, road user choices, vehicle safety, work-related road safety and infrastructure improvements and speed management.

The RATN plays a role in providing opportunity to plan and design system improvements that embed the Road to Zero strategy. The RATN will provide for high levels of road safety for all users. The RATN will improve transport facilities for all modes, resulting in improved safety for those that travel by car, commercial vehicle, active mode and public transport.

Heritage New Zealand Pouhere Taonga Act 2014

Under the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA) no person shall modify or destroy an archaeological site unless an authority is granted by Heritage New Zealand Pouhere Taonga (whether or not a site is a recorded archaeological site).

An archaeological assessment has been provided (Volume 4) which states that no known archaeological sites are located within the RATN area. As such there are no requirements to obtain authority under the HNZPTA.

Table 28: Assessment against other potential matters - Regional

Regional

Auckland Transport Alignment Project (ATAP)

The Auckland Transport Alignment Project ("ATAP") is a joint project involving Auckland Council, the Ministry of Transport, AT, Waka Kotahi, the Treasury and the State Services Commission. The final report (April 2018) sets out a clear direction for the development of Auckland's transport system over the next 10 years. The vision seeks transport investment decisions that deliver broad economic, social, environmental and cultural benefits to Auckland and New Zealand by providing safe, reliable and sustainable access to opportunities.

Regional

Specifically, this includes easily connecting people, goods and services to where they need to go; providing high quality and affordable travel choices for people of all ages and abilities; seeking to eliminate harm to people and the environment; supporting and shaping Auckland's growth, and; creating a prosperous, vibrant and inclusive city.

The ATAP package highlights the need for significant investment in transport infrastructure to enable urban growth in greenfield FUZ areas, encourage the use of public transport and active modes, and to provide a reasonable level of service to future residents. ATAP specifically notes investment into three main areas including for arterial roads and footpaths (including bus and cycle lanes where required). The RATN is consistent with ATAP as it will provide safe and reliable transport corridors that integrates with land use planning, supports growth, enables sustainable travel choice for all transport users, provides for high levels of road safety and improves access to employment and social amenities.

Auckland Regional Land Transport Plan 2018-2028

The Regional Land Transport Plan (RLTP) sets out the funding programme for Auckland's transport services and activities over a 10-year period. Planned transport activities for the next three years are provided in detail while proposed activities for the following seven years are outlined. The RLTP is jointly delivered by AT, Waka Kotahi and KiwiRail, and forms part of the National Land Transport Programme. Te Tupu Ngātahi is identified as a committed, ongoing programme in the RLTP which it identifies will enable the sequence of land release specified in the FULSS, and improves access to places where people live and work.

Auckland Future Land Supply Strategy 2017

The FULSS was adopted by the Council in July 2017 and is a region wide strategic document detailing the location and timing for the release of new greenfield areas. It recognises the importance of aligning infrastructure planning with growth management and identifies Whenuapai as being development ready by the first half of Decade 1 (2018-2022). The RATN is critical to delivering this greenfield capacity, given the improved accessibility it will provide to future collector roads and sites along its length. Without the RATN, the opening up of these sites to greenfield development could be delayed and/or at lower development yields, thereby undermining the growth objectives of the FULSS and the wider sustainable urban development of Auckland.

Hauraki Gulf Marine Park Act 2000

The Hauraki Gulf Marine Park Act seeks to integrate the management of natural, historic and physical resources of the Hauraki Gulf, the islands and its catchment which includes the Redhills area within Schedule 3 'catchment' indicating areas that drain to the Hauraki Gulf. The Act recognises the national significance of the Hauraki Gulf and life supporting capacity of the environment of the Gulf. The RATN is designed with provision for stormwater treatment via stormwater ponds. Space is provided within the proposed designation boundary to accommodate the ponds, thereby enabling treatment of the runoff from the corridor before discharge into the receiving environment of the Hauraki Gulf. This will ensure the protection of the Hauraki Gulf environments life supporting capacity.

Auckland Plan 2050

The purpose of the Auckland Plan is to contribute to Auckland's social, economic, environmental and cultural well-being through a 30 year vision for Auckland's growth. It sets a strategic direction for Auckland and its communities that integrates social, economic, environmental, and cultural objectives. The Auckland Plan's Development Strategy outlines the direction Auckland will take managing expansion in future urban areas noting the constraint that these areas are predominantly rural at present and have little or no infrastructure in place to cope with urban development. The Auckland Plan outlines the need to provide the required bulk infrastructure (water, wastewater, storm water and transport) to these areas in the right place at the right time.

The Auckland Plan also seeks that Aucklanders will be able to get where they want to go more easily, safely and sustainably. The RATN will provide a safe and reliable arterial transport network that integrates with land use planning, supports growth, enables sustainable travel choice for all transport users, provides for high levels of road safety and improves access to employment and social amenities. The development of the RATN

Regional
has been a direct response to the Auckland Plan. The RATN will help facilitate the sustainable growth of the North West area enabling the bulk transport infrastructure required to unlock development potential.
Vision Zero for Tāmaki Makaurau: a transport safety strategy and action plan to 2030
Developed in 2019, Vision Zero extends the existing safe system approach, to place safety at the forefront of the future transport system for all modes by designing safe places for people. Vision Zero has a goal to eliminate transport deaths and serious injuries by 2050 (in line with the Auckland Plan 2050). The RATN plays a key role in providing opportunity to plan and design system improvements that embed Vision Zero principles, and specifically contribute to the Vision Zero priorities. The RATN will provide safe transport infrastructure, including safe walking and cycling facilities on all corridors, safe intersection design based on AT standards, and crossing facilities for vulnerable users. The RATN will improve transport facilities for all modes, resulting in improved safety for those that travel by car, commercial vehicle, active mode and public transport.
Te Tāruke-ā-Tāwhiri: Auckland's Climate Action Framework and Plan
The purpose of Auckland's Climate Action Framework and Plan is to increase Auckland's resilience to the impact of climate change and reduce emissions that cause climate change, with one of the key moves identified to deliver clean, safe and equitable transport options. The RATN has been designed having regard to and taking into account climate change and resilience to it. The RATN will deliver better accessibility and mode choice (thus reducing the present reliance on low occupancy vehicles). This provides an important component to realising the regional emissions benefits of an integrated network. This shows alignment with, and a positive contribution towards the Climate Action Framework and Plan.
Auckland's Urban Ngahere (Forest) Strategy
The Auckland Urban Ngahere (Forest) strategy recognises the ecosystem services as well as economic and cultural benefits delivered by green infrastructure within the urban environment and sets out objectives of the strategy which include the need to grow and protect urban ngahere in existing and future urban areas. Although the RATN seeks the removal of some trees within the proposed designation footprint, this will be mitigated by planting within the upgraded road corridor. The long-term outcome of comprehensive street tree planting will be more trees in the public realm and increased amenity value within the road corridor, consistent with the Auckland Urban Ngahere (Forest) strategy.

Table 29: Assessment against other potential matters - Local

Local Board Plans
The RATN is situated within the Henderson Massey local board area. The Henderson-Massey Local Board Plan outlines outcomes for the local board area. The plan identifies outcomes relating to an improved and well-connected transport system, including active modes, managing growth, economic prosperity and protection and care for the environment.
The RATN is consistent with the outcomes of the Local Board Plan. The upgrade will integrate well with proposed surrounding land uses and the wider transport network, to respond to the timing, scale and form of urban development triggers and staging of future infrastructure corridors. In doing so the RATN manages any adverse effects on the environment. The RATN will provide a multimodal, safe and reliable arterial corridor that supports growth, enables sustainable travel choice for all transport users, provides for high levels of road safety and improves access to employment and social amenities. The RATN will also support the economic outcomes sought by supporting economic growth and increased productivity. The RATN will help facilitate the sustainable growth of the Henderson-Massey area.

12.1 Part 2 (Purpose and Principles)

With regard to the relevance of Part 2, it has been well established, that where a plan has been competently prepared under the RMA it may be that in many cases there will be no need to refer to

Part 2. However, if there is doubt that a plan has been “competently prepared” under the RMA, then it will be appropriate and necessary to have regard to Part 2. That is the implication of the words “subject to Part 2” in section 171(1) of the RMA.

In the context of these application's, the objectives and policies of the relevant statutory documents were prepared having regard to Part 2 of the RMA, they capture all relevant planning considerations and contain a coherent set of policies designed to achieve clear environmental outcomes. They also provide a clear framework for assessing all relevant potential effects, and there is no need to go beyond these provisions and look to Part 2 in making this decision. However, in the interests of caution, an assessment has been provided.

Sections 12.1.1 to 12.1.4 consider the Project against the purpose and principles of Part 2 of the RMA.

12.1.1 Section 6 Assessment

Section 6 of the RMA states that in achieving the purpose of the Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for matters of national importance. The specified matters of national importance of particular relevance to the RATN are:

- (a) *the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:*
- (e) *the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:*
- (h) *the management of significant risks from natural hazards.*

With regard to natural character and indigenous ecology, the RATN has sought to avoid the most significant vegetation (SEAs). Stream crossings and wetland impacts are not yet determined and will require detailed design and subsequent regional resource consent applications. Nevertheless, the RATN has sought to avoid stream crossings and wetland impacts where it is practicable and locating the proposed road network in less-sensitive locations.

Manawhenua have been actively involved throughout development of the corridor, including through alternatives assessment and identification of the preferred options. The opportunity to provide CIA's was provided and the CIAs prepared by Te Kawerau ā Maki and Ngāti Whātua o Kaipara have been considered by the Project team.

The ongoing partnership with Manawhenua has provided an understanding and the incorporation of Manawhenua values and expression of kaitiakitanga throughout the development of the Project.

There are no sites of significance to Manawhenua, wāhi tapu, other taonga or Māori land identified under the AUP:OP within the transport corridor. The relationship of the respective iwi with the transport corridor, their ancestral lands, wāhi tapu and taonga will be recognised and provided for through the involvement of Manawhenua in developing and implementing various mitigation measures and management plans at the time of detailed design and construction.

The proposed designation provides sufficient space to allow for the provision of stormwater management for the RATN. This ensures appropriate attenuation can be provided which avoids the

adverse effects of flood hazards, both upstream and downstream of the RATN area. Furthermore, flood modelling assessments that have been undertaken identified overland flow paths in Redhills and concluded that the additional flooding effects as a result of the RATN will be no more than minor.

Given these factors, the RATN is considered to be consistent with section 6 of the RMA

12.1.2 Section 7 Assessment

Section 7 of the RMA relates to other matters that all persons exercising functions and powers under the RMA shall have particular regard to, in relation to managing the use, development, and protection of natural and physical resources, including (as particularly relevant to the RATN):

- (a) *kaitiakitanga:*
 - (aa) *the ethic of stewardship:*
 - (b) *the efficient use and development of natural and physical resources:*
 - (c) *the maintenance and enhancement of amenity values:*
 - (d) *intrinsic values of ecosystems:*
 - (f) *maintenance and enhancement of the quality of the environment:*
 - (i) *the effects of climate change:*

The values of kaitiakitanga and the ethic of stewardship have been adopted to direct the option assessment and design development process for the RATN. As previously discussed, the RATN Project team has worked with, and is continuing to work with Manawhenua to ensure that appropriate measures are employed to protect the mauri of the local environment.

The RATN also represents the efficient use and development of natural and physical resources by upgrading existing intersections where feasible and ensuring the design avoids high quality natural environments where practicable.

The RATN area, while currently rural in character, is zoned in the AUP:OIP for a range of residential and business zones, including higher density THAB zoning and a 'Business - Local Centre' zone in the centre of Redhills. The development of this land will contribute to the sustainable development and growth of the Redhills and wider North West area but cannot be achieved without adequate transport infrastructure investment. Within this context, the RATN is vital to the efficient delivery of urban development in the Auckland region. In addition, the RATN supports the efficient operation of the existing transport network through providing safer and more efficient intersections that provide for improved public transport routes and safe facilities for walking and cycling. The RATN will also provide an attractive contribution to the future urban character of the area, providing for the maintenance and enhancement of amenity values and the quality of the future receiving environment. Corridors will be provided which support multiple transport modes, with the provision for urban design features and planting at the completion of the corridors.

The RATN avoids any SEAs or where practicable avoids any other identified high value ecological habitats (particularly wetlands), recognising the intrinsic values of the local ecosystem.

Lastly, the RATN supports a compact urban form within the existing Rural Urban Boundary. It is also noted that the RATN includes provisions for future public transport services, such as the priority

measures provided on Dunlop Road, and provides for active transport modes, seeking to achieve mode shift.

As such, the RATN is considered to be consistent with section 7 of the RMA.

12.1.3 Section 8 Assessment

Section 8 of the RMA requires that the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) are taken into account when managing the use, development, and protection of natural and physical resources.

AT has partnered with Manawhenua throughout the development of the RATN. This has resulted in the selection of a transport corridor alignment which avoids and minimises adverse effects on cultural values where practicable. This has included minimising the disturbance of streams and ensuring that construction management plans will be in place to protect water quality and any uncovered cultural heritage.

Further engagement will be undertaken in the detailed design and construction phases to ensure that the principles of the Treaty of Waitangi are taken into account.

Given these factors, the RATN is considered to be consistent with section 8 of the RMA.

12.1.4 Section 5 Assessment

The RMA has a single overarching purpose: to promote the sustainable management of natural and physical resources. Sustainable management is defined in section 5 of the RMA as:

...managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –

- (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
- (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
- (c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

The RATN will enable people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety through the following:

- The RATN provides a vital transport connection for Redhills and the wider North West area, by providing an internal arterial transport network that provides connections to the existing strategic transport network through new and upgraded intersections. This will provide access to Redhills (zoned for a range of residential and business land uses under the AUP:OIP) and supports the ongoing urbanisation of the Redhills area, ensuring that the local transport network operates in an efficient manner. The RATN therefore supports the economic and social wellbeing of the community and wider North West area.
- The RATN has also been designed to provide for multiple transport modes in a manner which protects the health and safety of all road users. The RATN provides pedestrian, cycle and public transport facilities along all transport corridors. This enables greater choice of mode

and provides improved safety outcomes for transport users on existing corridors and safe transport corridors for transport users on new roads.

The effects of the RATN are addressed in Sections 7.3 and 8.3 of this report. The RATN represents the sustainable use of natural and physical resources, by avoiding and minimising adverse effects.

As outlined in the Assessment of Alternatives (Sections 7.2 and 8.2), the options development process has considered the life-supporting capacity of air, water, soil, and ecosystems by:

- Avoiding SEAs.
- Avoiding stream crossings and wetlands where practicable, locating the road network in less-sensitive locations and aligning the road corridors to minimise width of impact.

Measures to avoid, remedy or mitigate any adverse effects on the environment from the RATN have been outlined in Section 7.3 and Section 8.3 and the conditions proposed to secure these outcomes are summarised in (Section 9). Refer to Appendix C 0 for the full condition set.

Through this process, the RATN is considered to be consistent with section 5 of the RMA.

13 Conclusion

The RATN represents an important transport investment in the future of Auckland's northwest growth area. The RATN will support the planned development of land identified under the AUP:OIP as appropriate for continued urbanisation.

In assessing these effects, it is relevant to acknowledge the existing landscape and natural values associated with the RATN corridors are in transition, with the final receiving environment explicitly identified as changing from the current largely rural land use to an urban environment. As this change is proposed over the coming decades it is appropriate to plan for the infrastructure that will support it ahead of this transformation.

Within this urban context, the RATN will provide a high-quality transport corridor similar in character to other roads in metropolitan Auckland. In accordance with current best practice and the wider policy framework the RATN will provide for all modes safely and in particular for public transport, cycling and walking facilities. In this regard the RATN will have significant positive effects.

Any actual or potential adverse effects of the RATN generated during its construction, operation and / or maintenance, have been identified, assessed and have been avoided or mitigated by the management plans and other measures proposed by AT.

Overall, the RATN is consistent with the relevant statutory planning documents and regulatory tests, thereby satisfying the requirements of the RMA for the Council to recommend that the NoRs be confirmed by the requiring authority.

Appendix A: Assessment of Alternatives Report

Appendix B: Statutory Assessment

Appendix C: Proposed NoR Conditions