

VOLUME 4

Takaanini Level Crossings Assessment of Ecological Effects

October 2023

Version 1.0

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2 Appendix B Maps

3 Appendix C Desktop Bird Records

4 Appendix D Terrestrial Value Assessment Tables

5 Appendix E Freshwater Value Assessment Tables

Glossary of Defined Terms and Acronyms

We note that ‘Takaanini’ (with double vowels is used throughout the Report Acknowledging the ongoing kōrero and guidance from Manawhenua on the cultural landscape. ‘Takanini’ is used where reference is made to a specific and existing named place (e.g., Takanini Road, Takanini Town Centre etc.). Manawhenua is also used throughout the Report as while gifting the programme name as Te Tupu Ngātahi, Manawhenua confirmed this was an appropriate spelling (capital ‘M’ and one word). Notwithstanding this, the term is spelled as two words in other fora and the proposed designation conditions – Mana Whenua.

| Acronym/Term | Description |
|-----------------|---|
| AEE | Assessment of Effects on the Environment report |
| AT | Auckland Transport |
| AUP:OP | Auckland Unitary Plan: Operative in Part |
| BF | Brownfield |
| Council | Auckland Council |
| DOC | Department of Conservation |
| EIANZ | Ecological Impact Assessment New Zealand: terrestrial and freshwater ecosystems |
| ED | Ecological District |
| EG | Exotic Grassland |
| GIS | Geographic Information System |
| KiwiRail | KiwiRail Holdings Limited |
| MDRS | Medium Density Residential Standards |
| N/A | Not Applicable |
| NES | National Environmental Standard |
| NES-FM | National Environmental Standard on Freshwater Management |
| NIMT | North Island Main Trunk rail line |
| NIWA | National Institute of Water and Atmospheric Research |
| NPS | National Policy Statement |
| NPS-FM | National Policy Statement on Freshwater Management |
| NPS-IB | National Policy Statement on Indigenous Biodiversity |
| NPS-UD | National Policy Statement on Urban Development |
| NoR | Notice of Requirement |
| OW | Open Water |
| PC78 | Plange Change 78 to the Auckland Unitary Plan (operative in part) |
| RHA | Rapid Habitat Assessment |
| RMA | Resource Management Act 1991 |
| SEA | Significant Ecological Area |
| SEV | Stream Ecological Value |

| Acronym/Term | Description |
|--------------------------|--|
| SNA | Significant Natural Area |
| TAR | Threatened and At-Risk |
| Te Tupu Ngātahi | Te Tupu Ngātahi Supporting Growth |
| TLC / the Project | Takaanini Level Crossings Project |
| Waka Kotahi | Waka Kotahi New Zealand Transport Agency |
| ZOI | Zone of Influence |

Executive Summary

This Ecological Impact Assessment (**EclA**) has been prepared to inform the Assessment of Effects on the Environment (**AEE**) for two Notices of Requirement (**NoR**) being sought by Auckland Transport (**AT**) for the Takaanini Level Crossings Project (**TLC / the Project**) under the Resource Management Act 1991 (**RMA**). The Project proposes to construct five new bridges across five project areas: NoR 1 relates to four of the proposed Project areas (referred to as Spartan Road, Manuia Road, Manuroa Road and Taka Street) while NoR 2 relates to the remaining Project area (referred to as Walters Road). Specifically, this EclA considers the actual and potential effects associated with the construction and operation of the TLC on the existing and likely future environment as it relates to ecological effects and recommends measures that may be implemented to avoid, remedy and / or mitigate these effects.

As the Project relates to proposed designations, this EclA assesses district plan matters only. Regional matters (along with Wildlife Act (1953) compliance) will be subject to a future consenting phase along with a supporting EclA. As such, regional matters have not been formally assessed in this report, however, the relevant matters have been screened to inform the designation boundary and future regional resource consents.

In order to inform the ecological baseline, ecological features (terrestrial, freshwater and wetland) within and adjacent to the project areas were identified, mapped and their ecological value assessed using information from desktop and site investigations.

Terrestrial habitats were described as brownfield (**BF**), exotic grassland – mown and rank (**EG**), Planted Vegetation – Exotic (amenity) (PL.3) and exotic treeland (TL.3) which were assessed as **Negligible – Low** ecological value. There was some native plantings (PL.1) and native treeland (TL.1) present and due to the predominance of native species, the ecological value of this habitat was assessed as **Moderate**. Based on desktop records (species specific surveys were not undertaken), there is the potential for Copper Skink (**High** ecological value) to occur within some habitats where there is appropriate understory and density (PL.1, PL.3, TL.1, EG (rank) and TL.3).

No natural streams were identified however three constructed channels (**Low** ecological value) with connectivity to either the Papakura Stream or the Paherehure Inlet were identified within the designation boundaries at Spartan Road (S1), Manuroa Road (S2) and Taka Street (S3).

Two modified wetlands, outside of the NoR boundary, but within 100 m to the Manuia Road project area were identified. They were not assessed with the RHA method nor their value assessed because they are not directly impacted by the Project. Additional wetland surveys may be required at the future regional consenting phase including an assessment of any indirect project effects.

There is the potential for Threatened and At-Risk (**TAR**) bird species such as the little black shag (observed during site walkovers) and pied shag to be present within the modified wetlands (W1 and W2) adjacent to the Manuia Road project area. These bird species have a **High** ecological value.

Construction and operational effects from the Project activities were assessed in relation to District Plan matters under the AUP:OP (refer Appendix A of this report). There were no District Plan ecological effects where the level of effect from the Project was assessed to be **Moderate** or higher and therefore no impact management is required.

1 Introduction

1.1 Purpose and scope of this Report

This Ecological Impact Assessment (**EciA**) has been prepared to inform the Assessment of Effects on the Environment (**AEE**) for two Notices of Requirement (**NoR**) being sought by Auckland Transport (**AT**) for the Takaanini Level Crossings Project (**TLC / the Project**) under the Resource Management Act 1991 (**RMA**). The Project proposes to construct five new bridges across five project areas: NoR 1 relates to four of the proposed Project areas (referred to as Spartan Road, Manuia Road, Manuroa Road and Taka Street) while NoR 2 relates to the remaining Project area (referred to as Walters Road). Specifically, this report considers the actual and potential effects associated with the construction and operation of the TLC on the existing and likely future environment as it relates to ecological effects and recommends measures that may be implemented to avoid, remedy and/or mitigate these effects.

This report should be read alongside the AEE, which contains further details on the history and context of the TLC. The AEE also contains a detailed description of works to be authorised within each NoR, and the typical construction methodologies that will be used to implement this work. These have been reviewed by the author of this report and have been considered as part of this assessment of ecological effects. As such, they are not repeated here. Where a description of an activity is necessary to understand the potential effects, it has been included in this report for clarity.

1.2 Report Structure

The structure of this report is set out in Table 1 below. The assessment considers the actual and potential effects of the Project as a whole in the first instance. Where required, the assessment then focusses on the actual and potential effects arising within individual project areas (i.e., Spartan Road, Manuia Road, Manuroa Road, Taka Street which falls within NoR 1 and Walters Road which falls within NoR 2). Where appropriate, measures to avoid, remedy or mitigate effects are also recommended.

Where the individual project areas are discussed, sub-sections are arranged by project area in geographical order along the North Island Main Trunk line (**NIMT**) moving north to south.

Table 1: Report Structure

| Sections | Section number |
|---|----------------|
| Description of the TLC | 2 |
| Overview of the assessment approach | 3 |
| Overview of the methodology used to undertake the assessment and identification of the assessment criteria and any relevant standards or guidelines | 4 |
| Identification and description of the ecological baseline | 5.1 |
| Assessment of ecological effects for the overall TLC network | 5.3.1 and 5.3 |
| Overall conclusion of the level of potential adverse ecological effects of the TLC | 5.4 and 6 |
| Design and future regional consenting considerations | 5.5 |

2 Project Description

The overall Project proposes the removal and/or replacement of four existing road over rail level crossings at Spartan Road, Manuroa Road, Taka Street and Walters Road in Takaanini. As further discussed in the AEE, the Project responds to functionality and safety issues anticipated at these crossings from the increasing number of train movements along the NIMT. The Project and indicative design also takes into account the long-term planned expansion of the NIMT from the current two rail tracks to up to four tracks. The increased rail frequency will lead to greater barrier arm down-time and therefore increased severance and congestion in the area.

The Project primarily involves the construction of five new bridges to support safe and reliable east-west transport movement across the NIMT in Takaanini. This includes dedicated active mode bridges at Spartan Road and Manuroa Road, and two-lane arterial road bridges with active mode facilities at Manuia Road, Taka Street and Walters Road. Manuia Road is a new east-west connection in the network, acting as a replacement for vehicular trips that would have used the closed Spartan and Manuroa Road level crossings. The bridges and associated works/improvements are located across five project areas and will be progressed as two NoR packages (refer to Figure 1 and Table 2).

The indicative design has been prepared for assessment purposes, and to indicate what the final design of the Project may look like. The final design will be refined and confirmed at the detailed design stage. Key features of the works common across project areas include the following:

- Bridge structures across the NIMT with a vertical clearance from existing ground level to road surface of approx.7.8 m;
- Works to tie in with existing roads;
- Batters and/or retaining and associated cut and fill activities;
- Vegetation removal within the project areas to enable construction; and
- Areas identified for construction related activities including site compounds, construction laydown, alternative access, and construction traffic manoeuvring.

Further details of each project area are provided in the following sections.

Table 2: The TLC project areas and NoR packages

| NoR Reference | Project area | Description | Requiring Authority |
|--|---------------------|--|---------------------|
| Takaanini Level Crossings Project NoR 1 | Spartan Road | Closure of the existing level crossing, construction of a new bridge with walking and cycling facilities across the NIMT and associated works. | Auckland Transport |
| | Manuia Road | Construction of a new bridge with general traffic lanes and walking and cycling facilities across the NIMT and associated works. | |
| | Manuroa Road | Closure of the existing level crossing, construction of a new bridge with walking and cycling facilities across the NIMT and associated works. | |
| | Taka Street | Closure of the existing level crossing, construction of a new bridge with general traffic lanes and walking and cycling facilities across the NIMT and associated works. | |
| Takaanini Level Crossings Project NoR 2 | Walters Road | Closure of the existing level crossing, construction of a new bridge with general traffic lanes and walking and cycling facilities across the NIMT and associated works. | |



Figure 1: Overview of the Project, project areas and extent of the NoRs

2.1 NoR 1 – Spartan Road, Manuia Road, Manuroa Road and Taka Street

2.1.1 Spartan Road project area

As set out in Table 3 below, the proposed works within the Spartan Road project area include closure of the existing level crossing and replacement with a new active modes bridge across the NIMT.

Table 3: Overview of Spartan Road project area

| NoR 1 - Spartan Road project area | |
|-----------------------------------|--|
| | |
| Key features | |
| Overview | <ul style="list-style-type: none"> • Closure of the existing road corridor to vehicular traffic across the NIMT. • Construction of an active mode bridge across the NIMT. • Construction of cul-de-sacs (accommodating footpaths) and works to tie into the existing corridor on either side of the NIMT along Spartan Road. • Ramps and stairs will connect to the bridge on either side (east and west) of the NIMT and will tie into the cul-de-sacs. |
| Other structures | <ul style="list-style-type: none"> • None |
| Other road closures / cul-de-sacs | <ul style="list-style-type: none"> • None |

| | |
|---------------------------|---|
| Speed environment | <ul style="list-style-type: none"> 50km/h (where it is trafficked) |
| Access lanes | <ul style="list-style-type: none"> None |
| Intersections | <ul style="list-style-type: none"> None |
| Stormwater infrastructure | <ul style="list-style-type: none"> Kerb and channel along road edge |
| Typical cross sections |  <p style="text-align: center;">ACTIVE MODE BRIDGE</p> |

2.1.2 Manuia Road project area

As set out in Table 4 below, the proposed works within the Manuia Road project area include construction of a new grade-separated road crossing (bridge) across the NIMT. The new bridge will accommodate one vehicle lane in each direction and active mode facilities.

Table 4: Overview of the Manuia Road project area

| NoR 1 – Manuia Road project area | |
|----------------------------------|--|
| | |
| Key features | |
| Overview | <ul style="list-style-type: none"> • There is currently no existing east-west corridor / level crossing across the NIMT in this project area. • Construction of a new arterial road bridge across the NIMT accommodating two lanes (one in each direction) and separated active mode facilities. • Construction of new arterial road corridors tying into either side of the bridge (east and west of the NIMT) accommodating two vehicle lanes (one in each direction) and separated active mode facilities. |
| Other structures | <ul style="list-style-type: none"> • Retaining/abutment walls (either side of the NIMT) |
| Other road closures / cul-de-sac | <ul style="list-style-type: none"> • Reconstruction of existing cul-de-sac at Hitchcock Road (east of the NIMT) to tie into the new intersection at Oakleigh Avenue / Manuia Road / Hitchcock Avenue (as described below) and upgrade with footpath. |
| Speed environment | <ul style="list-style-type: none"> • 50km/h |
| Access lanes | <ul style="list-style-type: none"> • Existing Manuia Road will be reconfigured into an access lane for remaining properties, tying in with the new Manuia Road corridor/ bridge (west of NIMT). |
| Intersections | <ul style="list-style-type: none"> • Upgrade of the existing Great South Road / Challen Close / Manuia Road intersection to provide for signalisation, footpath upgrades and tie in works with the existing roads. |

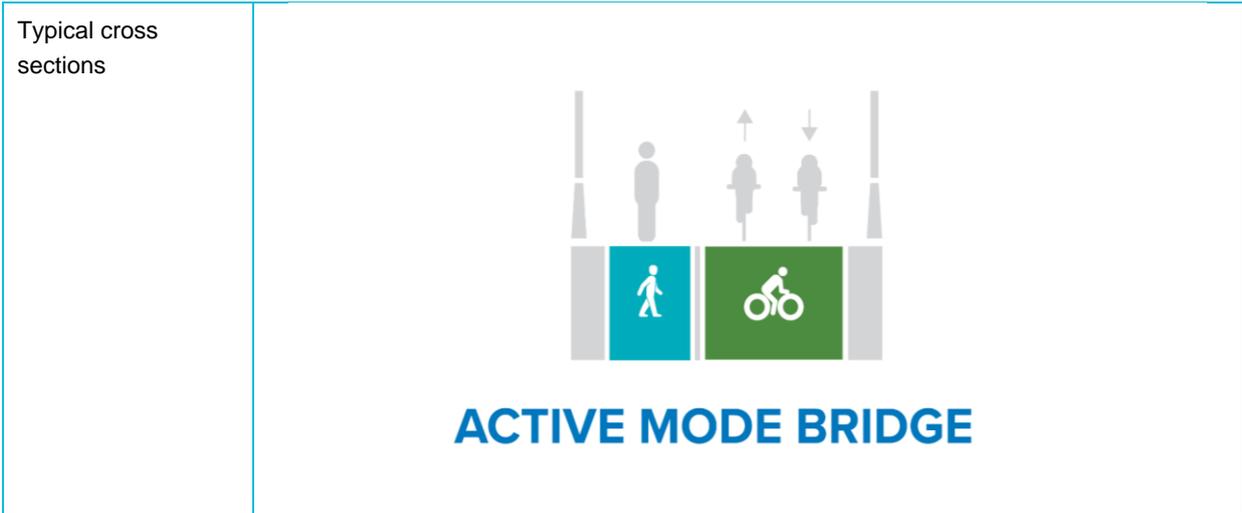
| | |
|----------------------------------|--|
| | <ul style="list-style-type: none"> • New roundabout intersection at Oakleigh Avenue / Manuia Road / Hitchcock Avenue with active mode facilities and tie in works. |
| <p>Stormwater infrastructure</p> | <ul style="list-style-type: none"> • Stormwater culvert and associated flood offset storage area • Kerb and channel along road edge <p><i>Note: NoR has also considered space requirements for future stormwater treatment devices (though subject to future Regional Plan consenting process)</i></p> |
| <p>Typical cross sections</p> | |

2.1.3 Manuroa Road project area

As set out in Table 5 below, the proposed works within the Manuroa Road project area include closure of the existing level crossing and replacement with a new active modes bridge across the NIMT.

Table 5: Overview of the Manuroa Road project area

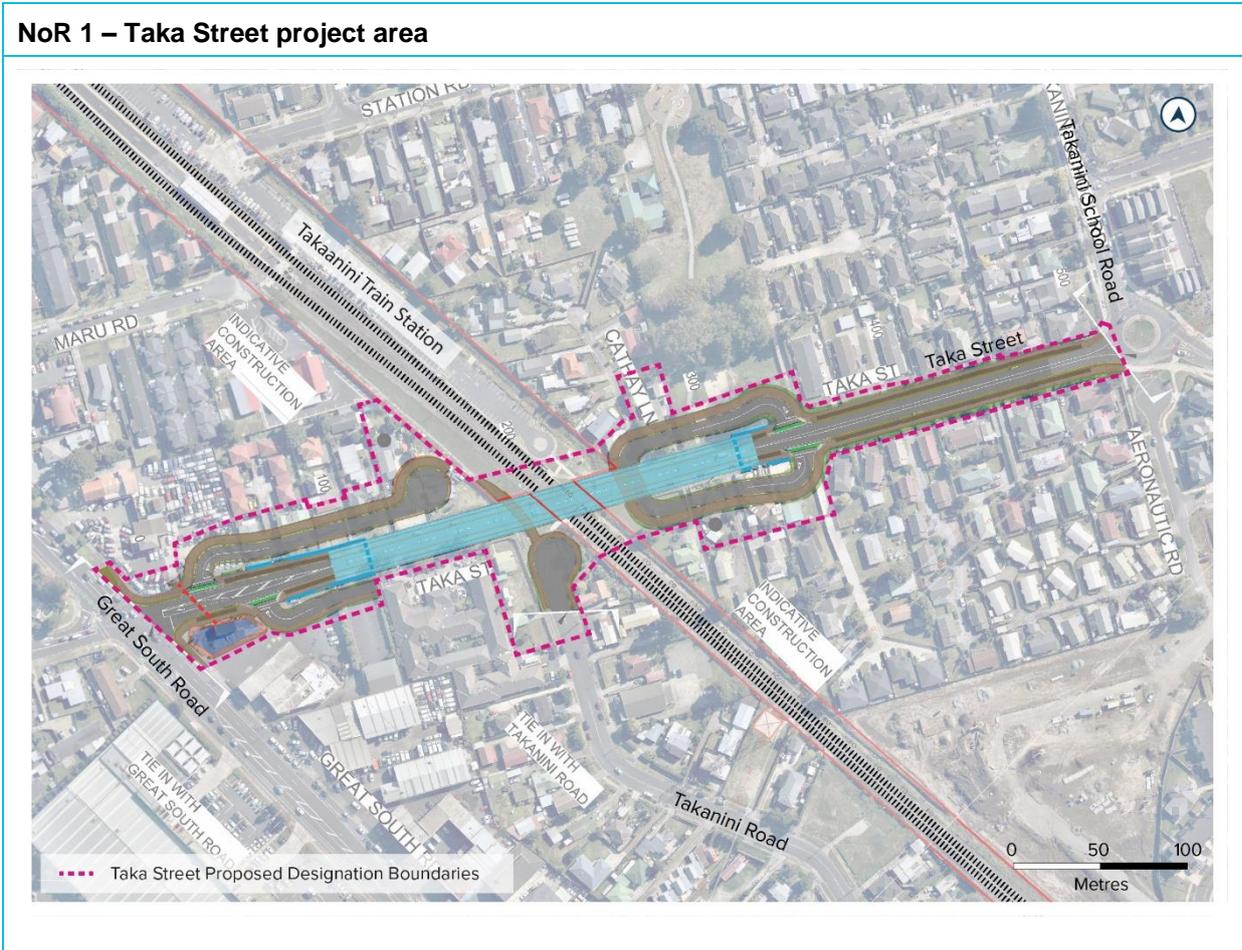
| NoR 1 – Manuroa Road project area | |
|--|--|
| | |
| Key features | |
| Overview | <ul style="list-style-type: none"> • Closure of the existing road corridor to vehicular traffic across the NIMT. • Construction of an active mode bridge across the NIMT. • Construction of cul-de-sacs (accommodating footpaths) and works to tie into the existing corridor on either side of the NIMT along Manuroa Road. • Ramps and stairs will connect to the bridge on either side (east and west) of the NIMT and will tie into the cul-de-sacs. |
| Other structures | <ul style="list-style-type: none"> • None |
| Other road closures / cul-de-sac | <ul style="list-style-type: none"> • None |
| Speed environment | <ul style="list-style-type: none"> • 50km/h (where it is trafficked) |
| Access lanes | <ul style="list-style-type: none"> • None |
| Intersections | <ul style="list-style-type: none"> • None |
| Stormwater infrastructure | <ul style="list-style-type: none"> • Kerb and channel along road edge |

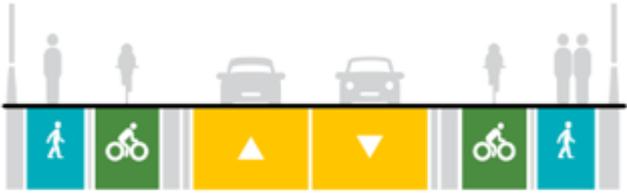


2.1.4 Taka Street project area

As set out in Table 6 below, the proposed works within the Taka Street project area include closure of the existing level crossing and replacement with a new grade-separated road crossing (bridge) across the NIMT. The new bridge will accommodate one vehicle lane in each direction and active mode facilities.

Table 6: Overview of the Taka Street project area



| Key features | |
|----------------------------------|---|
| Overview | <ul style="list-style-type: none"> • Construction of an arterial road bridge across the NIMT accommodating two vehicle lanes (one in each direction) and separated active mode facilities. • Construction of arterial road corridors tying into either side of the bridge and existing intersections (east and west of the NIMT). The corridors will accommodate two vehicle lanes (one in each direction) and separated active mode facilities. |
| Other structures | <ul style="list-style-type: none"> • Retaining / abutment walls |
| Other road closures / cul-de-sac | <ul style="list-style-type: none"> • Closure of existing Takanini Road (north) to vehicular traffic at the intersection with Taka Street bridge i.e., no through-traffic provision. Replacement with a cul-de-sac and works to tie into the existing corridor of Takanini Road to the south. Active modes connection from Takanini Road to Takaanini Station (under the new Taka Street bridge). |
| Speed environment | <ul style="list-style-type: none"> • 50km/h |
| Access lanes | <ul style="list-style-type: none"> • Construction of four access lanes: <ul style="list-style-type: none"> • Construction of a new access lane (cul-de-sac) located west of the NIMT and north of the Taka Street road corridor. It accommodates a footpath on the northern side and bi-directional traffic. The access lane will tie in with the Taka Street corridor and allows access to existing properties to remain and Takaanini Station. • Construction of a new access lane located west of the NIMT and south of the Taka Street road corridor. It accommodates a footpath on the southern side and bi-directional traffic. The access lane will tie in with the Taka Street corridor and allows access to existing properties to remain. • Construction of two access lanes located west of the NIMT (north and south of the Taka Street road corridor and looping under the new Taka Street bridge). They accommodate a footpath on the outer edge and bi-directional traffic. The access lane(s) will tie in with the Taka Street corridor and allow access to existing properties to remain including Takaanini Reserve and Cathay Lane. |
| Intersections | <ul style="list-style-type: none"> • None |
| Stormwater infrastructure | <ul style="list-style-type: none"> • Stormwater culvert and associated flood offset storage area • Kerb and channel along road edge <p><i>Note: NoR has also considered space requirements for future stormwater treatment devices (though subject to future Regional Plan consenting process)</i></p> |
| Typical cross sections |  <p>TWO LANE ARTERIAL BRIDGE</p> |

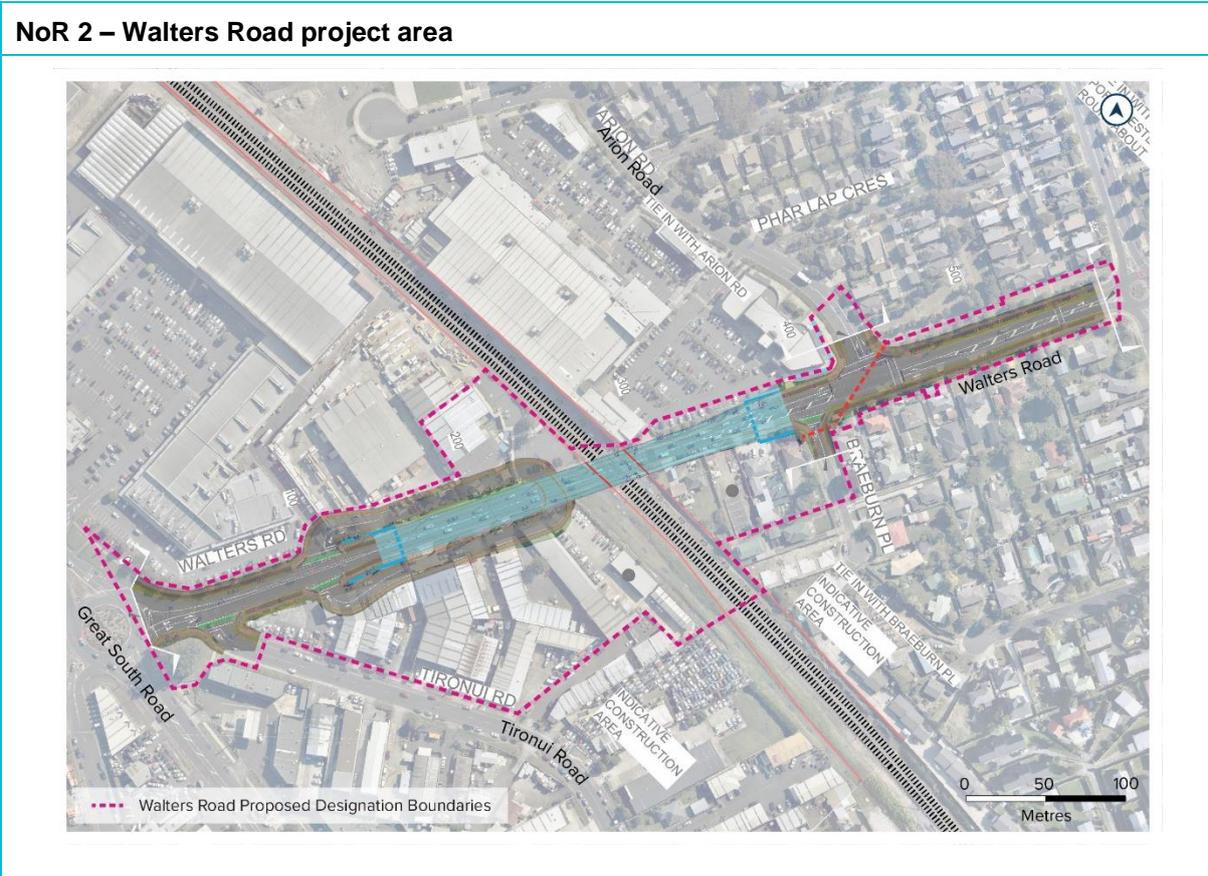


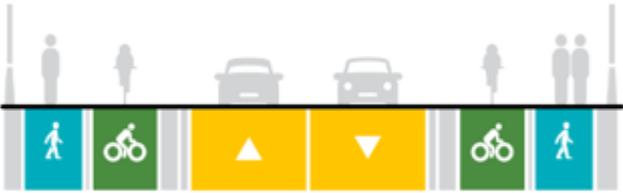
2.2 NoR 2 – Walters Road

2.2.1 Walters Road project area

As set out in Table 7 below, the proposed works within the Walters Road project area include closure of the existing level crossing and replacement with a new grade-separated road crossing (bridge) across the NIMT. The new bridge will accommodate one vehicle lanes in each direction and active mode facilities.

Table 7: Overview of Walters Road project area



| Key features | |
|----------------------------------|---|
| Overview | <ul style="list-style-type: none"> Construction of an arterial road bridge across the NIMT accommodating two vehicle lanes (one in each direction) and separated active mode facilities. Construction of arterial road corridors tying into either side of the bridge and existing intersections (east and west of the NIMT). The corridors will accommodate two vehicle lanes (one in each direction) and separated active mode facilities. |
| Other structures | <ul style="list-style-type: none"> Retaining / abutment walls |
| Other road closures / cul-de-sac | <ul style="list-style-type: none"> None |
| Speed environment | <ul style="list-style-type: none"> 50km/h |
| Access lanes | <ul style="list-style-type: none"> Construction of two access lanes located west of the NIMT (north and south of the Walters Road corridor and looping under the new Walters Road bridge). They accommodate a footpath on the outer edge and bi-directional traffic. The access lane(s) will tie in with the Walters Road corridor and allow access to remaining properties. |
| Intersections | <ul style="list-style-type: none"> Upgrade of the existing Arion Road / Walters Road intersection to provide for footpath upgrades and works to tie into existing Arion Road. Upgrade of the existing Braeburn Place / Walters Road intersection to provide for footpath upgrades and works to tie into existing Braeburn Place. Upgrade of the existing Tironui Road / Walters Road intersection to provide for footpath upgrades and works to tie into existing Tironui Road. |
| Stormwater infrastructure | <ul style="list-style-type: none"> Stormwater culvert Kerb and channel along road edge <p><i>Note: NoR has also considered space requirements for future stormwater treatment devices (though subject to future Regional Plan consenting process)</i></p> |
| Typical cross sections |  <p>The diagram illustrates a cross-section of a two-lane arterial bridge. From left to right, it shows: a pedestrian lane (blue square with a white person icon), a bicycle lane (green square with a white bicycle icon), a vehicle lane (yellow square with a white upward-pointing triangle), another vehicle lane (yellow square with a white downward-pointing triangle), another bicycle lane (green square with a white bicycle icon), and another pedestrian lane (blue square with a white person icon). Silhouettes of a person, a cyclist, and two cars are shown above the respective lanes. The text 'TWO LANE ARTERIAL BRIDGE' is written in blue below the diagram.</p> |



3 Assessment approach

3.1 EclA Assessment

This EclA is generally consistent with the approach outlined in the EclA Guidelines published by the Environmental Institute of Australia and New Zealand (EIANZ) (Roper-Lindsay *et al.*, 2018). The EIANZ Guidelines (2018) provide a standardised framework for undertaking ecological effects assessments and is generally used in EclA’s in New Zealand as good practice. The assessment process is summarised in Figure 2 below.

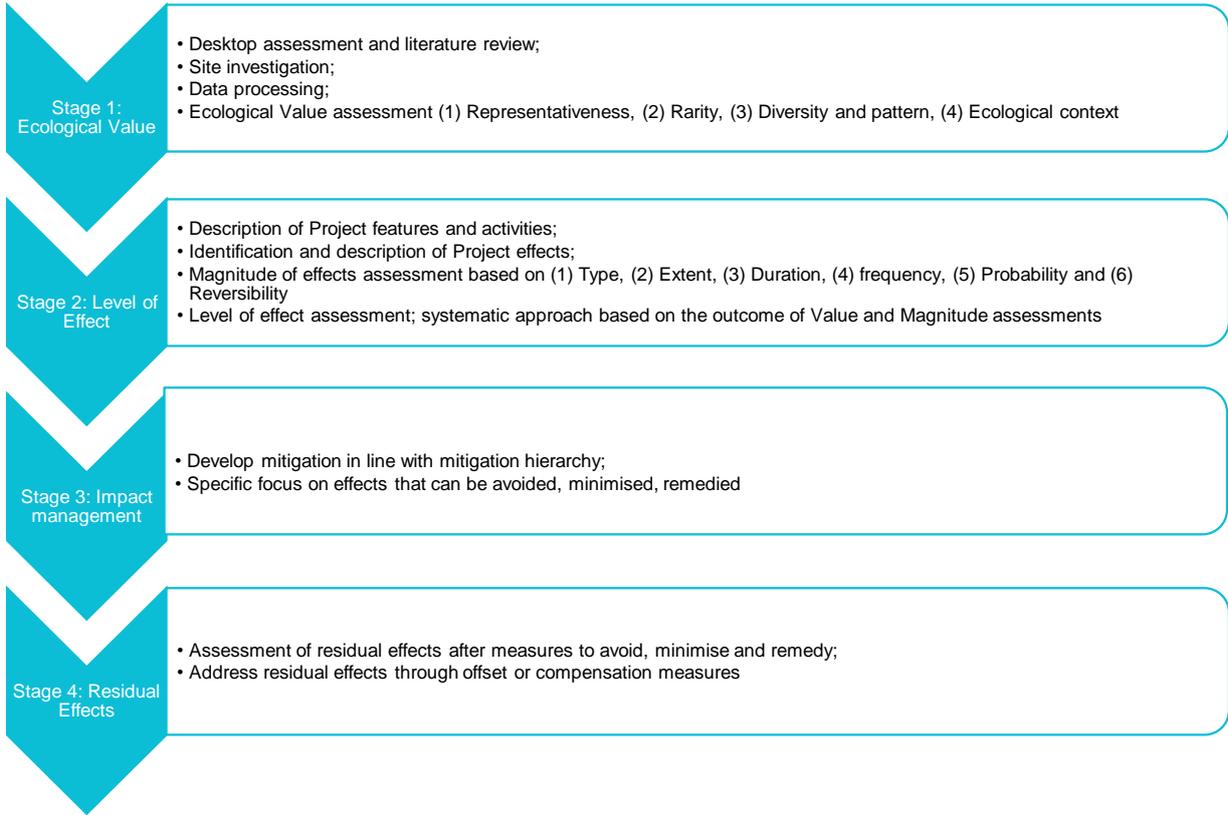


Figure 2: EclA process followed for this assessment

3.2 Assessment of District Plan Matters and Approach to Regional Matters

Designations are a form of ‘spot zoning’ over a route in a District Plan. The designation authorises AT, as requiring authority, to undertake work and activity without the need for land use consent. A designated area is still subject to restrictions on land use under regional matters in the Auckland unitary Plan: Operative in Part (AUP:OP) and the necessary resource consents will be obtained closer to construction of the TLC.

As this report relates to a proposed designation, the ecological effects assessment assesses District Plan matters only. Regional Plan matters will be subject to the aforementioned future consenting phase along with a supporting EclA. As such Regional Plan matters have not been formally assessed

in this report, however the relevant matters have been screened to inform the designation boundaries and any regional consenting 'red flags' are presented in Section 5.5.

For reference, Appendix A of this report sets out the split between District and Regional matters in the AUP:OP.

3.3 Wildlife Act

The Wildlife Act (1953) includes specific provisions for activities that may disturb, injure, or kill native animals. Wildlife Act matters have been considered in relation to the future construction phase of work and are discussed in Section 5.5. Construction and operational activities that may require consideration under the Wildlife Act are outlined in Appendix A of this report.

3.4 National Policy Statements

3.4.1 National Policy Statement for Freshwater Management

The overarching concept of the National Policy Statement for Freshwater Management (**NPS-FM**) is Te Mana o te Wai, which refers to the fundamental importance of water, and recognises that protecting the health of freshwater protects the health and well-being of the environment. The NPS-FM seeks to ensure that natural and physical resources are managed in a way that prioritises:

- Firstly, the health and well-being of water bodies and freshwater ecosystems;
- Followed by the health needs of people; and
- Then, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

In particular, the NPS-FM seeks to protect natural wetlands, rivers, outstanding waterbodies, and habitats of indigenous freshwater species.

Ecological effects associated with activities that require regional consents and consideration under the NPS-FM were considered to inform design and alignment options for the TLC.

3.4.1 National Policy Statement for Indigenous Biodiversity

The National Policy Statement for Indigenous Biodiversity (**NPS-IB**) seeks to maintain indigenous biodiversity across New Zealand so that there is at least no overall loss in indigenous biodiversity. The NPS-IB highlights the need for a cautionary approach to considering effects on indigenous biodiversity both within and beyond Significant Natural Areas (**SNAs**) and including areas supporting highly mobile fauna. Increased indigenous vegetation cover in urban and non-urban environments is promoted, as is information gathering and monitoring of indigenous biodiversity.

At the same time, the NPS-IB sets out a need to recognise and allow for activities which contribute to New Zealand's social, economic, cultural, and environmental wellbeing. The NPS-IB provides a consenting pathway for specified infrastructure which provides significant national or regional public benefit, and which has a functional or operational need to locate in a particular location, when there are no practicable alternatives.

At the date of preparing this report, the NPS-IB had not been given effect to in the AUP:OP. However, many of the policy directions in the NPS-IB are already contained within the AUP:OP and in relation to

large scale infrastructure projects there is not a notable change in policy direction. The assessment of the Project against the NPS-IB is therefore substantively similar to the assessment against the corresponding AUP:OP provisions along with EIANZ 2018.

Ecological effects associated with activities that require regional consents and consideration under the NPS-IB are discussed in this report and were considered to inform design and alignment options for the TLC Project.

4 Assessment Methodology

Desktop and site investigations were undertaken for ecological features at each of the project areas (within the NoRs) using the assessment methodology described further in this section.

4.1 Zone of Influence

The Zone of Influence (**ZOI**) of the Project relates to an area occupied by habitats and species that are adjacent to and may go beyond the boundaries of the project areas. It is defined in the EIANZ Guidelines (2018) as “the areas / resources that may be affected by the biophysical changes caused by the proposed Project and associated activities.” The distance of the ZOI and type of effect from the Project can be different for different species and habitat types. ZOI is used throughout this report to describe the impacts of the Project (construction and operation) on adjacent or connected terrestrial, freshwater and wetland habitats and associated native species. For example, all SEAs within 2 km of the project areas have been included in the desktop review, along with their connectivity to the project areas. This is to ensure that important habitat within the wider landscape has been taken into consideration and can be used to inform the potential for flora and fauna to be present within the project areas and also whether the Project ZOI extends out to these SEAs.

The ZOI of the Project on different species differs depending on how they use their environment e.g. mobile species such as long-tailed bats have a larger home range and more diverse habitat requirements compared to lizards and threatened plant species which may be restricted to a small area or specific habitat type. This affects how a species could be impacted by the Project and was taken into consideration during the desktop review and site investigations. To reflect the likelihood of a species occurring or dispersal ability within the project areas, varying search distances were used depending on the species context.

4.2 Desktop review

A desktop review of existing ecological records was undertaken to gain an understanding of the species and habitats that could be present within the ZOI of the NoR boundaries.

The sources of information that were reviewed to determine the likelihood of a species or habitat occurring within or adjacent to the NoR boundaries include:

- Auckland Council (**Council**) Geomaps¹;
- Department of Conservation (**DOC**) Bioweb records²;
- Department of Conservation Threat Classification Series³;
- Ecological Regions and Districts of New Zealand (McEwen, 1987);
- iNaturalist records⁴ (research grade observations), records within approximately 5 km radius of the overall study area (including the NoR boundaries);
- Indigenous terrestrial and wetland ecosystems of Auckland (Singers et al., 2017);

¹ <https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html>

² <https://www.doc.govt.nz/our-work/monitoring-reporting/request-monitoring-data/>

³ All Department of Conservation Threat Classification Documents are listed in the below webpage. When individual reports are referenced hereafter, they are referenced in-text and in Section 12. <https://www.doc.govt.nz/about-us/science-publications/conservation-publications/nz-threat-classification-system/>

⁴ <https://www.inaturalist.org/>

- National Institute of Water and Atmospheric Research (**NIWA**) freshwater fish database⁵;
- New Zealand Bird Atlas eBird database⁶; recorded within 10 km² grid squares. Results from grid square AB66, positioned over the Whenuapai area; and
- NZ River Name Lines (LINZ Data Service⁷).

4.3 Site investigations

Site investigations were undertaken on 30 August and 15 September 2022 in order to:

- Prepare an ecological baseline of terrestrial, freshwater and wetland ecology;
- Inform the assessment of the NoRs against the relevant district matters (terrestrial ecology);
- Set out freshwater and wetland matters which may be considered as part of a future regional resource consent, or under relevant wildlife legislation; and
- Inform the designation footprint.

4.3.1 Terrestrial habitat

A site investigation was undertaken by experienced ecologists to map and describe the habitats⁸ present within and adjacent to each of the five project areas located within the NoR boundaries. Habitats were classified into ecosystem type based on those described in Singers et al. (2017). The habitats were also assessed as to their potential to support indigenous fauna, including birds, bats, and lizards.

The habitat assessment focused on areas of potentially significant value, such as habitat that was identified as a SEA under the AUP:OP, classified as forest habitat on Council's Geomaps – Ecosystems Current Extent (Singers et al., 2017) or appears to be wetland or forest habitat based on aerial photos and during site investigation. Species records from relevant literature and biodiversity databases were utilised to focus search efforts on certain areas within the NoR boundaries.

Broad indigenous vegetation communities were mapped on recent aerial photography and incorporated into the Project's Geographic Information System (**GIS**) database. The vegetation assessment included recording the dominant or characteristic species present and the general quality described, including structure, maturity, presence of weeds and evidence of grazing and foliar dieback. Vegetation survey work also included searches for any rare or threatened plant species, previously recorded within the NoR boundaries.

Common plant names are predominantly used within this report. Maps showing the vegetation cover within and adjacent to the NoR boundaries are provided in Appendix B of this report. The terrestrial ecological value assessment methodology is discussed in Section 4.4.

4.3.2 Freshwater habitat

Streams within the ZOI of the NoR boundaries that are identified on Council Geomaps ('Named Streams') were ground truthed and classified as permanent, intermittent or ephemeral, according to

⁵ <https://nzffdms.niwa.co.nz/search>.

⁶ <https://ebird.org/atlasnz/home>.

⁷ <https://data.linz.govt.nz/layer/103632-nz-river-name-lines-pilot/>.

⁸ Ecosystem codes from Singers et al. (2017) were used.

the stream definitions described by Storey and Wadhwa (2009). Any additional streams observed during site investigations were also classified. Streams are mapped in Appendix B of this report.

Freshwater assessments were undertaken by ecologists on all streams identified within the ZOI of the NoRs. In addition to stream classifications, the Rapid Habitat Assessment (**RHA**) protocol was implemented. The RHA provides a standardised protocol for making a quick, qualitative, site-based assessment of physical stream habitat conditions (Clapcott, 2015). Stream Ecological Valuation (**SEV**) assessments were not undertaken at this stage, but may be completed to support future resource consent applications as necessary. Macroinvertebrate and fish surveys were not undertaken as part of this assessment. However, NIWA fish records (Franklin et al., 2018) were used to inform potential ecological value of streams. The freshwater ecological value assessment methodology is discussed in Section 4.4.

4.3.3 Wetland habitat

Potential wetland habitat areas within 100 m⁹ of the NoRs were identified by experienced ecologists based on Council Geomaps contours and the presence of wetland vegetation on aerial maps (including a review of historical images).

Any potential wetlands that may be affected by the project areas were then ground truthed during the site investigation either through the application of the rapid test where vegetation indicators were apparent or sample plots where vegetation was ambiguous. The wetland delineation followed the method outlined within the wetland delineation protocol (Clarkson, 2018), noting limitations in terms of access and scope discussed in more detail below. Areas conforming with the delineation guidelines were mapped and described in terms of vegetation cover, soil, and hydrology. Instances where wetland delineation relied on desktop assessment, due to access constraints, were noted and a more conservative delineation was adopted. Ambiguous areas were assumed to be wetlands, where these areas were not accessible. We note that the scope of the specialist study, for route protection, did not provide for a detailed wetland delineation (i.e. mapping accuracy of <1:10 000). The key focus was to confirm wetland presence and approximate extent. This approach is considered practical for the purposes of route protection, while it is expected that a more detailed wetland assessment will be undertaken during the resource consenting phase, as necessary.

Wetlands were assessed based on the RMA definition of a wetland¹⁰ and classified into ecosystem type based on those described in Singers et al. (2017). If the habitat present met this definition, it was then further evaluated against the provisions of the National Policy Statement for Freshwater Management 2022 (**NPS-FM**) for natural inland wetlands (assessed for potential exclusion on the basis of being deliberately constructed or pasture dominated and used for grazing). Details regarding the wetland value assessment is outlined in Section 4.4.

4.4 Ecological value assessment

The ecological value of ecological features were assessed by assigning a score of 0 (None), 1 (Low), 2 (Moderate), 3 (High) or 4 (Very High) based on professional judgement (with justification) to aspects associated with each of the four ecological matters: (1) Representativeness; (2) Rarity/distinctiveness;

⁹ A distance of 100m was used to align with the NPS-FM.

¹⁰ Wetland includes permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions".

(3) Diversity and pattern; and (4) Ecological context. Considerations in relation to the four matters and corresponding aspects for terrestrial, freshwater and wetland features are detailed below:

Terrestrial Ecology

- 1) **Representativeness:** Typical structure, species composition and indigenous representation
- 2) **Rarity/distinctiveness:** Species of conservation significance, distinctive ecological values
- 3) **Diversity and pattern:** Habitat diversity, species diversity and patterns in habitat use
- 4) **Ecological context:** Size, shape and buffering function, sensitivity to change, ecological networks (linkages, pathways, migration)

Freshwater Ecology

- 1) **Representativeness:** RHA score for accessible sites and riparian habitat modification based on desktop stream and catchment assessments
- 2) **Rarity/distinctiveness:** Species of conservation significance informed by the potential occurrence of Threatened and At-Risk (**TAR**) fish species
- 3) **Diversity and pattern:** Level of natural diversity informed by the habitat diversity subsection of the RHA. Stream order, slope and hydroperiod were applied as desktop proxies to judge the likely habitat diversity for streams where access was constraint
- 4) **Ecological context:** Stream order and hydroperiod

Wetland Ecology

- 1) **Representativeness:** Hydrological modification based on observations of drains, ponds and catchment land use. Native vegetation informed by site visit and review of landcover information;
- 2) **Rarity/distinctiveness:** Wetland type (rare or distinctive); distinctive ecological values (ecosystem services) in a larger catchment context;
- 3) **Diversity and pattern:** Representation of different hydroperiods (permanent, seasonal or temporary) and the structural complexity of vegetation cover
- 4) **Ecological context:** flood attenuation, streamflow regulation, sediment trapping, water purification, connectivity, and migration.

The score for each matter was constrained to the highest score for each aspect (for example a High score allocated to a wetland for flood attenuation will result in a High score for the Ecological context matter). The combined ecological value score (ranging from **Very High** to **Negligible**), for the four matters, was determined in accordance with the EIANZ Guidelines (2018) and was recorded within a matrix spreadsheet for use within the EclA

5 The TLC NoRs – Overall network

This section assesses ecological matters across the entire TLC network i.e., the combination of road closures and / or grade separated crossings across the five corridors. This section also recommends measures to avoid, remedy, or mitigate actual or potential adverse effects considering the network as a whole.

5.1 Ecological Baseline

This section presents the findings of the site and desktop investigations in relation to the terrestrial, freshwater and wetland habitats and associated fauna species ('ecological features') associated with the five project areas within the ZOI of the NoR boundaries.

All features were investigated and mapped (see Appendix B of this report) to provide context for the effects assessment and inform the proposed designation boundaries. Based on this information and desktop assessments, an ecological value has been calculated for each ecological feature within the NoRs.

5.1.1 Historical ecological context

The project areas are present within the Manukau Ecological District (ED), which has a warm humid climate and is characterised by poorly drained and gleyed alluvial soils and peats, originally from river flats and swamps (McEwen, 1987). The district is now largely modified, due to urban settlement (Manukau City) and surrounding suburbs.

Originally forested, the ED is the most southerly extent of the northern North Island lowland forest type, with abundant taraire (*Beilschmiedia tarairi*) and pūriri (*Vitex lucens*) (McEwen, 1987). Now only 1.6% of the land area remains in native vegetation cover in the Manukau ED (Auckland Regional Council, 2013). For context, a reduction to around 20% of former extent is usually considered to be significant. A reduction to below 5% is considered to be severe (Walker et al., 2008).

5.1.2 Significant Ecological Areas

Where natural habitat remains, the AUP:OP has mapped and classified habitats as terrestrial or marine SEAs (where such habitat meets the SEA criteria at that time). SEAs which occur within 2 km of the project areas, are presented in Appendix B of this report and described in Table 8. As described in Section 4.1, a distance of 2 km was selected as the potential ZOI for the project areas.

Table 8: Significant Ecological Areas present within 2 km of the NoRs

| SEA | Relevant project area and distance (km) | Relevance to the project | SEA Type Terrestrial/ Marine | SEA Description and relevance |
|------------|---|---|------------------------------|---|
| SEA_M2_171 | Spartan Road (0.7 km) Manuia Road (0.5 km) | Hydrologically connected via stormwater discharge to the Papakura Stream. As the ultimate receiving environment any adverse effects on water quality | Marine | This area covers the inner Pahurehure Inlet which includes various mudflats and mangrove- |

| SEA | Relevant project area and distance (km) | Relevance to the project | SEA Type Terrestrial/ Marine | SEA Description and relevance |
|--------------|--|---|------------------------------------|---|
| | Manuroa Road (0.7 km) Taka Street (0.9 km) Walter Road (1.2 km) | could impact this location (albeit they are Regional Plan matters). | | lined inlets with a natural succession between terrestrial, freshwater and marine habitats. These areas are an important habitat for indigenous freshwater fish and wetland bird species. |
| SEA_M2_171W1 | Spartan Road (0.8 km) Manuia Road (0.8 km) Manuroa Road (0.9 km) Taka Street (1 km) Walter Road (1.2 km) | Hydrologically connected via stormwater discharge to the Papakura Stream. As the ultimate receiving environment any adverse effects on water quality could impact this location (albeit they are Regional Plan matters). | Marine | Extensive mudflats area important feeding habitat for wading bird species along coastline. |
| SEA_T_544 | Walter Road (0.3 km) Taka Street (1.3 km) Manuroa Road (1.7 km) Manuia Road (0.7 km) | No terrestrial ecological connectivity to the site, due to existing urban areas. | Terrestrial | This area has a Raupō reedland ecosystem dominated by abundant raupō, with species of pūrua grass, lake club rush, jointed twig rush, toetoe, pūkio and harakeke |
| SEA_T_542 | Spartan Road (1.1 km) Manuia Road (0.9 km) Manuroa Road (1 km) Taka Street (1 km) Walter Road (1.8 km) | No terrestrial ecological connectivity to the site, due to existing urban areas. | Terrestrial | This area includes estuarine bay which is dominated by mangroves, fringe of saline rush lands on silts and sedimentary rocks. Very small areas of freshwaters reedland exists on fringes. |

5.1.3 Terrestrial habitat

Table 9 summarises the vegetation types and their classification (Singers et al., 2017) identified during site investigations associated with the five project areas. Some of the terrestrial vegetation is considered relevant under the AUP:OP district plan provisions and is discussed further in Section 5.3.2.1. Maps are presented in Appendix B of this report.

Table 9: Vegetation types present within the NoRs, categorised according to Singers et al. (2017)

| Vegetation Type | Relevant project area | Abbreviation | Habitat Description |
|---------------------------------------|---|--------------|---|
| Brown Field (includes cropland) | Spartan Road, Manuia Road, Manuroa Road, Taka Street and Walters Road | BF | This definition includes industrial hard standing concrete and unmanaged bare ground. |
| Exotic Grassland | Spartan Road, Manuia Road, Manuroa Road, Taka Street and Walters Road | EG | Grassland dominated by exotic species. This includes maintained and unmaintained exotic grass patches located within grass berms and lawns within private properties. |
| Planted Vegetation – Native (recent) | Manuroa Road, Manuia Road, Taka Street and Walter Road. | PL.1 | Native restoration plantings with <50% exotic biomass. Planted native scrub and forest <20 years old. Species include Harakeke (<i>Phormium tenax</i>), Titoki (<i>Alectryon excelsus</i>) Nīkau palm (<i>Phoplostylis sapida</i>), pāpāuma (<i>Griselinia lucida</i>). |
| Planted Vegetation – Exotic (amenity) | Spartan Road, Manuia Road, Manuroa Road, Taka Street and Walters Road | PL.3 | Exotic amenity plantings, including low shrubs, hedgerows, small trees and orchards. This includes parks and gardens and roadside vegetation dominated by exotic species. Species include agapanthus (<i>Agapanthus sp.</i>), bottle bush (<i>Callistemon sp.</i>), hibiscus (<i>Hibiscus sp.</i>), lemon tree (<i>Citrus limon</i>) and sedges (<i>Carex sp.</i>) |
| Treeland – native-dominated treeland | Manuia Road, Manuroa Road, Taka Street, Walters Road | TL.1 | Tree cover exceeding >75% native tree species that of any other growth form but tree canopy discontinuous above lower non-woody vegetation. In this context, has been used to identify individual, groups and scattered native trees. This includes kauri (<i>Agathis australis</i>), pohutukawa (<i>Metrosideros excelsa</i>) and Tōtara (<i>Podocarpus totara</i>) trees. |
| Treeland – Exotic-Dominated | Spartan Road, Manuia Road, Manuroa Road, | TL.3 | Tree canopy cover 20-80%: <25% native with exotic tree cover dominant. This includes scattered trees, gardens, and mature trees within amenity |

| Vegetation Type | Relevant project area | Abbreviation | Habitat Description |
|-----------------|-------------------------------|--------------|---|
| | Taka Street and Walters Road. | | plantings, such as mature oak (<i>Quercus sp.</i>), plane tree (<i>Platanus sp.</i>) and poplar (<i>Populus sp.</i>). |

TAR Plant Species

Individual Threatened or At Risk (**TAR**) plant/tree species were identified during the site investigations.

The surveys identified the presence of planted kauri (*Agathis australis*), impacted by the Manuroa Road project area. Kauri are listed as 'Threatened – Nationally Vulnerable' because of the spread of kauri dieback (*Phytophthora agathidicida*), which has the potential to significantly impact indigenous forest (de Lange et al, 2017).

Pōhutukawa (*Metrosideros excelsa*) were identified at Manuroa Road and Walters Road project areas. Manuka (*Leptospermum scoparium*) and Kanuka (*Kunzea ericoides*) were identified within a small area of native revegetation within the edge of the rail corridor near Manuroa Road. These three species are listed as 'Threatened – Nationally Vulnerable' because of the spread of myrtle rust (*Austropuccinia psidii*) within New Zealand and the risk that this poses to indigenous forest (de Lange et al, 2017).

Within the project context these TAR plants are not considered relevant as they are planted, isolated and not associated with any native forest areas. In addition, they are not considered relevant under the AUP:OP district plan provisions (and as such are not relevant to the effects assessment in Section 5.3) because they are on private land and/or under 4 m in height.

5.1.4 Terrestrial fauna

Bats

Bats have been excluded from this assessment based upon the lack of desktop records (closest record 4 km) and due to the lack of suitable foraging habitat or trees with potential roost features.

Birds

The desktop review identified 28 urban, freshwater, and coastal bird species (14 of which are native) within a 2 km radius of the project areas (see Appendix C of this report). This included four native bird species which are listed as TAR species: pied shag, little black shag, eastern bar-tailed godwit and dabchick (Robertson et al., 2021). Due to their habitat requirements, little black shag and pied shag may be present within modified wetlands (W1 and W2) (refer to Section 5.1.9 for wetland details) adjacent to the Manuia Road project area.

No dedicated bird surveys were undertaken for the project areas however, incidental observations of bird species were noted during the site walkover. The birds seen or heard within and adjacent to the study area are listed in Table 10.

One TAR species, little black shag (*Phalacrocorax sulcirostris*), was observed foraging at the modified wetland (W1) located on Oakleigh Avenue.

Table 10: Incidental bird observations at TLC and conservations status (Robertson et al., 2021)

| Common Name | Māori Name | Scientific Name | Conservation Status |
|---------------------|--------------------|--|------------------------------|
| Chaffinch | Pahirini | <i>Fringilla coelebs</i> | Introduced and Naturalised |
| European Greenfinch | - | <i>Chloris chloris</i> | Introduced and Naturalised |
| House sparrow | Tiu | <i>Fringilla coelebs</i> | Introduced and Naturalised |
| White back Magpie | Makipae | <i>Gymnorhina tibicen</i> | Introduced and Naturalised |
| Common Indian Mynah | - | <i>Acridotheres tristis</i> | Introduced and Naturalised |
| Little black shag | Kawau tūī | <i>Phalacrocorax sulcirostris</i> | At Risk - Naturally Uncommon |
| Spur winged plover | - | <i>Vanellus miles novaehollandiae</i> | Not Threatened |
| Tūī | Tūī | <i>Prosthemadera novaeseelandiae novaeseelandiae</i> | Not Threatened |
| Welcome swallow | Warou | <i>Hirundo neoxena neoxena</i> | Not Threatened |
| Blackbird | Manu pango | <i>Turdus merula</i> | Introduced and Naturalised |
| Song thrush | Manu-kai-hua-rakau | <i>Turdus philomelos</i> | Introduced and Naturalised |
| Rock pigeon | Kererū aropari | <i>Columba livia</i> | Introduced and Naturalised |
| Spotted dove | - | <i>Streptopelia chinensis</i> | Introduced and Naturalised |
| New Zealand Fantail | Pīwakawaka | <i>Rhipidura fuliginosa</i> | Not Threatened |
| Eastern Rosella | Kākā uhi whero | <i>Platycercus eximius</i> | Introduced and Naturalised |
| Silvereye | Tauhou | <i>Zosterops lateralis</i> | Not Threatened |
| Common Starling | Tāringi | <i>Sturnus vulgaris</i> | Introduced and Naturalised |

Lizards

A review of the DOC Bioweb database found four indigenous lizard records within a 10 km radius of the NoR boundaries (Table 11:). No records were found within the NoR boundaries. This may indicate that lizard surveys have not been completed in the local area, rather than lizards are not present.

Three of the four indigenous lizard species identified in the DOC Bioweb search have a threat status of 'At Risk' (Hitchmough et al. 2021, van Winkel et al. 2018).

Copper skink (At Risk – Declining) is widespread and frequently recorded within highly modified habitats such as exotic scrub and rank grassland. The closest record is approximately 3 km from the NoR boundaries. As such, this species is highly likely to occur within and adjacent to the NoR boundaries.

Table 11: Indigenous lizard species records within 10 km of the boundaries of the NoRs

| Common Name | Scientific Name | Threat Class (Hitchmough et al., 2021) |
|----------------------|---------------------------------|--|
| Auckland green gecko | <i>Naultinus elegans</i> | At Risk - Declining |
| Pacific gecko | <i>Dactylocnemis pacificus</i> | Not Threatened |
| Copper skink | <i>Oligosoma aeneum</i> | At Risk - Declining |
| Forest skink | <i>Mokopirirakau granulatus</i> | At Risk - Declining |

Indigenous lizards were not identified during opportunistic searches completed during the site investigation. However, the introduced plague skink was identified on Oakleigh Avenue, associated with the Manuia Road project area. Copper skinks are likely to be associated with the vegetation units presented in Table 9 where there is appropriate dense understorey and cover. The habitat with a higher potential to support copper skinks within the project areas is represented by native planting (PL.1) within Spartan Road, Manuroa Road, Taka Street and Walters Road project areas and mature gardens associated with Manuia Road, Manuroa Road, Taka Street and Walters Road project areas. Other vegetation types that are potentially associated with lizard refuge include unmanaged/rank exotic grass (ES), amenity planting (PL.3) and treeland (TL.3) and where suitable refugia such as log piles, and debris occur in association with suitable habitat.

5.1.5 Terrestrial ecological value

Table 9 describes the terrestrial vegetation observed within the NoR boundaries. The ecological value for brownfield (BF) exotic grassland (EG), Planted Vegetation – Exotic (amenity) (PL.3) and exotic treeland (TL.3) were assessed as **Negligible - Low**. Due to the predominance of native species, the ecological value for native plantings (PL.1) and native treeland (TL.1) was assessed as **Moderate**.

Notwithstanding the ecological value associated with vegetation/habitat units, specific consideration still needs to be given to individual species and their conservation significance for the following reasons (in accordance with the EclA Guidelines):

- The habitat value may dilute the conservation value associated with specific species. For example, the combined value for exotic grassland is **Negligible**, while the value for copper skink (At Risk – Declining) is **High**. The combined value of **Low** therefore understates the conservation value of the species;

- Species may not be restricted to a single vegetation unit. Copper skinks are locally mobile and will use various open and closed canopy habitats within their home range; and
- Potential effects on species may be unrelated to habitat units. For example, impact on highly mobile species (such as wetland birds) by noise and light may be independent of the habitat loss associated with the Project footprint.

For the reasons outlined above, the ecological value assessments for individual species (TAR species only) that were either observed or have the potential to occur (based on desktop records and habitat potential) within the ZOI of the NoR boundaries are detailed in Table 12.

Table 12: Ecological value for terrestrial fauna (TAR species only)

| Fauna Type | Species Within Habitat | Associated Habitat Units | Conservation Status (NZ Classification system) | Ecological Value |
|--------------------------|------------------------|--------------------------------------|--|------------------|
| Herpetofauna – lizards | Copper skink | PL.1, PL.3, TL.1, EG (rank) and TL.3 | At Risk - Declining | High |
| Avifauna – wetland birds | Little black shag | Wetlands W1 and W2 | At Risk - Naturally Uncommon | High |
| | Pied shag | | At Risk - Recovering | |

5.1.6 Freshwater habitat

The NZ River Name Lines (LINZ Data Service) map and Council Geomaps were reviewed. No natural streams were identified within the proposed designation boundaries during the desktop and site walkovers, but some are within the ZOI of the project areas because of their hydrological connection via drains or stormwater.

- A tributary (modified stream channel) of the Papakura Stream (S4) was identified <10 m north-west of the Manuia Road project area and discharges into the Papakura Stream (refer Figure 3: and Appendix B Maps). This tributary also connects two modified wetlands (W1 and W2) that are adjacent to the Manuia Road project area (described in Section 5.1.9).



Figure 3: Modified stream channel (S4) connecting wetland W1 and W2 adjacent to the Manuia Road project area

Three constructed channels were identified within the designation boundaries at Spartan Road (S1), Manuroa Road (S2) and Taka Street (S3) (Table 13). The streams are not considered to be natural and are considered to be man-made drainage and stormwater runoff / attenuation features. They are mapped in Appendix B of this report and are listed in Table 13.

Table 13: Summary of stream classifications and descriptions

| Stream Number | Classification | Hydrological connection | Upstream fish habitat |
|----------------------|---|---|-----------------------|
| S1 (Spartan Road) | Artificially constructed (land drain) | Connected to Papakura Stream tributary, 130 m downslope. | Limited |
| S2 (Manuroa Road) | Artificially constructed (Swale) | Connected to stormwater pipes which discharge to Papakura Stream, >1 km away. | Limited |
| S3 (Taka Street) | Artificially constructed (Swale and drain) | Connected to stormwater pipes which discharge via Waimana | Limited |

| Stream Number | Classification | Hydrological connection | Upstream fish habitat |
|---------------|----------------|---|-----------------------|
| | | Reserve to Pahurehure Inlet, 0.8 km away. | |

Rapid Habitat Assessment

Only artificial watercourses (drains) were identified within the designation boundaries and were subsequently surveyed using the RHA. The results of the RHA values are presented Table 14 and measured a **Poor** habitat quality score for all the three identified artificial watercourses.

Table 14: Summary of artificial watercourses and their RHA values

| Stream | Deposited Sediment | Invertebrate habitat diversity | Invertebrate habitat abundance | Fish cover diversity | Fish cover abundance | Hydraulic heterogeneity | Bank erosion | Bank vegetation | Riparian width | Riparian shade | RHA Habitat Quality Score | Corresponding Habitat Value* |
|--------|--------------------|--------------------------------|--------------------------------|----------------------|----------------------|-------------------------|--------------|-----------------|----------------|----------------|---------------------------|------------------------------|
| S1 | 4 | 4 | 1 | 2 | 2 | 1 | 7 | 1 | 1 | 1 | 24 | P |
| S2 | 2 | 5 | 1 | 4 | 5 | 1 | 10 | 4 | 3 | 2 | 37 | P |
| S3 | 1 | 2 | 1 | 1 | 6 | 1 | 7 | 1 | 2 | 1 | 23 | P |

* = Corresponding habitat values for each habitat quality score P = Poor M = Moderate G = Good E = Excellent

5.1.7 Freshwater fauna

Given the low habitat value for fish within artificial drains, freshwater fauna has not been considered further. However, as the Not Threatened native shortfin eel are particularly adaptable to low quality habitat, there is potential that this species may occur, and should be considered as necessary, during the future resource consenting phase of work (refer Section 5.5.4).

5.1.8 Freshwater ecological value

Information obtained for the ecological baseline (Section 5.1.6 and 5.1.7) was used to score the matters that inform the ecological value. The three artificial watercourses (S1, S2 and S3) were assessed as **Low** ecological value features.

5.1.9 Wetland habitat

Two modified wetlands within 100 m of the Manuia Road project area have been identified. They were not assessed with the RHA method because they are not directly impacted by the Project. A broad description of these wetlands is however presented below.

W1 (Oakleigh Avenue) and W2 (Scott Field Drive)

These two wetlands are connected with one modified stream channel (refer Appendix B Maps). The location of these wetlands are described as follow:

- The first wetland (W1) is situated on Oakleigh Avenue with an area of 1,400 m². It is located approximately 50 m north downslope of the Manuia Road project area (refer Figure 4).
- The second wetland (W2) is situated on Scott Field Drive with an area of 750 m². It is located 80 m east upslope of the Manuia Road project area.

Both wetlands (W1-W1/W2) are described as open water (**OW**) with a fringe of aquatic wetland species (largely kuawa/ lake club rush). The wetlands have a buffer of riparian vegetation, largely Planted Vegetation – Native (recent) (PL.1). The wetlands are characterised by deep water indicative of permanent saturation and has been heavily modified historically. The Papakura Stream and the Pahurehure Inlet are the ultimate receiving environment to which these wetlands are connected through a remaining stream tributary (S4) and series of piped watercourse, which would likely have been a stream tributary prior to significant modification. The direct catchment of the wetland is highly urbanised and now largely maintained by piped stormwater flows. Due to the likely historic presence of a wetland feature in this location, these wetlands can be described as modified natural wetlands and would therefore most likely meet the definition of a natural wetland under the NPS-FM. Additional wetland surveys may be required at the future regional consenting phase including an assessment of any indirect project effects (refer Section 5.5.5).



Figure 4: Modified natural wetland (W1) where a little black shag was observed. Located on Oakleigh Avenue, associated with the Manuia Road project area.

5.2 Likely Future Environment

The TLC will be constructed and will operate in the existing urban environment or the likely future environment (i.e. what can be built under the existing AUP:OP live zones).

The TLC corridors are situated primarily within existing urban areas with live zoning including residential, commercial, and open space zones. There is some future urban zoned land in the wider area to the northeast / east. The existing activities within the area are generally reflective of the existing underlying zoning.

The likely future environment is anticipated to remain urban and comprised of similar activities as the existing environment. The density of residential development is however anticipated to change and increase in future. In particular, this includes in the residential zones around Te Mahia and Takaanini stations, in line with the implementation of the National Policy Statement on Urban Development (**NPS-UD**) in the AUP:OP. The remaining residential areas will experience an uplift of density through the implementation of the Medium Density Residential Standards (**MDRS**) through the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021. Plan Change 78 to the Auckland Unitary Plan (Operative in Part) (**PC78**) (notified at the time of assessment) seeks to give effect to the NPS-UD and incorporate the MDRS into residential zoning. It is noted that there are some areas of existing residential zoned land (particularly east of the NIMT) that have recently been intensified (i.e., new builds), and as such are unlikely to change in the near future.

Given the above, it is not anticipated that the likely future environment will differ significantly in comparison to the current ecological baseline.

5.3 Assessment of ecological effects and measures to avoid, remedy or mitigate actual or potential adverse effects

Section 5.3 assesses the ecological effects of project activities which relate to District Plan matters under the AUP:OP.

5.3.1 Positive ecological effects

Positive ecological effects are currently anticipated as a result of the Project and further positive outcomes and enhancement opportunities should continue to be developed during detailed design. If implemented, these are currently likely to include:

- Landscape planting to include native eco-sourced trees and revegetation of amenity areas;
- If landscaping can tie-in with surrounding features, habitat connectivity could be improved; and
- Upgrades to stormwater design. This could include naturalising the existing unlined drainage channels with indigenous vegetation, to provide improved water quality and attenuation.

5.3.2 Construction effects - Terrestrial ecology

The potential construction effects (direct and indirect) to the terrestrial habitat and species within the ZOI of the NoR boundaries (as they relate to district matters) have been identified:

- Vegetation removal subject to District Plan controls (see Appendix A of this report) – permanent loss of habitat/ecosystem, fragmentation and edge effects; and
- Effects on native fauna including loss of foraging habitat and mortality/injury. Disturbance and displacement to nests and individual (existing) native fauna (birds)¹¹ 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 bridges.

The following sections detail the magnitude of effect and subsequent level of effect on ecological features. Impact management is presented where the level of effect is assessed to be **Moderate** or higher.

5.3.2.1 Terrestrial vegetation

Vegetation to be removed that is subject to District Plan controls is presented in the Assessment of Arboricultural Effects and has been reviewed for this assessment. Table 15 displays an assessment of ecological effects for terrestrial vegetation and impact management during construction.

¹¹ Lizards have been excluded from this aspect of the assessment because effects are considered negligible.

Table 15: Assessment of ecological effects for terrestrial vegetation (district plan vegetation only) and impact management during construction

| Effect description | Permanent loss of habitat/ecosystem, fragmentation, and edge effects due to vegetation removal (district plan trees only) | Effects on native fauna (birds and lizards) including loss of foraging habitat and mortality/injury due to vegetation removal (district plan trees only). |
|--|--|--|
| <p>Level of effect prior to impact management</p> | <p>Taking into account the replanting that will occur as part of the Project landscape plan (as to be addressed by the Urban and Landscape Design Management Plan (ULDMP)), the magnitude of effect of District Plan vegetation removal is considered to be Negligible.</p> <p>The district plan vegetation is predominantly exotic street trees of Low ecological value and the overall level of effect is assessed as Negligible.</p> | <p>Birds</p> <p>The magnitude of effect is assessed as Moderate due to definite presence of native birds associated with district plan vegetation and the high probability that these effects could occur.</p> <p>The ecological value of birds in the context of habitat features are assessed to be Low, and the overall level of effect due to vegetation removal is assessed as Low prior to mitigation. As such no impact management is required.</p> |
| <p>Impact management and residual level of effect</p> | <p>N/A as not required.</p> | <p>District Plan vegetation clearance will still need to be managed in accordance with the Wildlife Act 1953 in relation to native birds. Management controls during vegetation clearance should include:</p> <ul style="list-style-type: none"> Avoidance of the bird nesting season (September to February) where practicable or nesting bird checks where occurring within the nesting season. |

5.3.2.2 Birds

Noise, vibration and lighting disturbance caused by construction activities could potentially displace indigenous forest birds from suitable nesting and foraging habitat within the ZOI of the designation boundaries. The same impact has been considered for TAR wetland birds potentially using the wetland ponds adjacent to the Manuia project area. Table 16 outlines the effect assessment for birds due to construction activities related to noise and light.

Table 16: Assessment of construction effects and impact management for birds

| Effect description | Disturbance and displacement to nests and individual birds (existing) adjacent to construction activities (noise, light, dust etc.) |
|--|---|
| <p>Level of effect prior to impact management</p> | <p><u>Non-TAR birds</u></p> <p>The magnitude of effect is assessed as Moderate due to the definite presence of birds associated with several habitat features of the project areas.</p> <p>The ecological value of birds in the context of the habitat features are assessed to be Low, and the overall level of effect due to construction disturbance is assessed as Low prior to mitigation. As such no impact management is required.</p> <p><u>TAR birds</u></p> <p>The magnitude of effect is assessed as Low due to a lower probability (potential occurrence, single small pond to be affected and nearby ponds providing alternative habitat if disturbance occurs) and short duration of effect if disturbance occurs.</p> <p>The ecological value of TAR wetland bird species is High, and the overall level of effect due to construction disturbance is assessed as Low prior to mitigation. As such no impact management is required.</p> |
| <p>Impact management and residual level of effect</p> | <p>N/A as not required.</p> |

5.3.3 Operational effects - Terrestrial ecology

Potential operational effects from the Project that relate to District Plan matters are summarised below.

- Loss in connectivity to indigenous fauna (birds) 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 (birds) due to light, noise and vibration effects from the operation of the road.

The following sections detail the magnitude of effect and subsequent level of effect on ecological features. Impact management is presented where the level of effect is assessed to be **Moderate** or higher.

5.3.3.1 Birds

Noise, vibration and lighting disturbance caused by the presence of the road could potentially displace indigenous birds from suitable nesting and foraging habitat within the ZOI of the designation boundaries, while noise, light and vibration may also affect connectivity in the broader landscape. Table 17 outlines the operational effect assessment and impact management for birds.

Table 17: Assessment of operational effects and impact management for birds

| Effect description | Disturbance and displacement to nests and individual birds (existing) due to the presence of the road (noise, light, dust etc.) | Loss in connectivity due to permanent habitat loss, light and noise effects from the road, leading to fragmentation of terrestrial, wetland and riparian habitat due to the presence of the infrastructure |
|--|---|---|
| <p>Level of effect prior to impact management</p> | <p><u>Non-TAR birds</u></p> <p>The magnitude of effect is assessed as Moderate due to the definite presence of native birds associated with several habitat features of the NoRs.</p> <p>The ecological value of birds in the context of habitat features are assessed to be Low, and the overall level of effect due to operational disturbance is assessed as Low prior to mitigation.</p> <p><u>TAR wetland birds</u></p> <p>The magnitude of effect is assessed as Low due to a lower probability of disturbance.</p> <p>The ecological value of these species is High, and the overall level of effect is assessed as Low prior to mitigation. As such no impact management is required.</p> | <p><u>Non-TAR birds</u></p> <p>The magnitude of effect is assessed as Moderate due to the highly likely probability and local extent of effect.</p> <p>The ecological value of birds in the context of habitat features are assessed to be Low, and the overall level of effect due to loss in connectivity (from road operation) is assessed as Low prior to mitigation. As such no impact management is required.</p> <p><u>TAR wetland birds</u></p> <p>The magnitude of effect is assessed as Low due to a lower probability of connectivity loss for this species.</p> <p>The ecological value of these species is High, and the overall level of effect is assessed as Low prior to mitigation. As such no impact management is required.</p> |
| <p>Impact management and residual level of effect</p> | <p>N/A as not required.</p> | <p>N/A as not required.</p> |

5.4 Conclusion

Construction and operational effects from the Project activities were assessed in relation to District Plan matters under the AUP:OP (refer Appendix A of this report). There were no District Plan ecological effects where the level of effect from the Project was assessed to be **Moderate** or higher and therefore no impact management is required.

The post mitigation level of effect is considered to be **Very Low**.

5.5 Design and future regional resource consent considerations

Ecological effects associated with activities that require Regional Plan consents and Wildlife Act authority permits are briefly discussed in the following sections, as they were considered to inform design and the designation boundaries for the Project.

5.5.1 Terrestrial ecology

Construction of the Project will result in temporary and permanent loss of vegetation within the NoR boundaries, including suitable habitat that is potentially being used by indigenous fauna (birds and lizards). This includes vegetation clearance which is a permitted activity for infrastructure under the AUP:OP.

The terrestrial habitats to be lost mostly comprised of exotic vegetation which are of **Negligible** or **Low** ecological value, however PI.1 and TL.1 were described as being of **Moderate** ecological value due to the dominance of native species 5.1.5. Some of these areas are likely to provide habitat to native fauna, as discussed in the sections below. As the design develops and resource consent applications are prepared, more detailed habitat and fauna surveys may be required to inform an EclA (in line with the EIANZ Guidelines). This will be used to support the resource consent application process as necessary, and should include any impact management requirements.

5.5.2 Birds

No threatened indigenous forest birds are likely to be present within most of the proposed designation boundaries, and TAR wetland birds may be associated with stormwater ponds/wetlands. Vegetation clearance required for construction could result in the loss of vegetation features of local value to native birds and if undertaken within the bird nesting season (September – February) will need to be managed in accordance with the Wildlife Act.

5.5.3 Lizards

Copper skink are likely to be present within a wide range of vegetation impacted by the proposed designation boundaries. There is the potential that site clearance required for construction could kill or injure indigenous lizard species and result in habitat loss. Any vegetation clearance where copper skink are likely to occur will be managed in accordance with the Wildlife Act, including permits to salvage lizards.

5.5.4 Freshwater ecology

There is no direct stream loss anticipated from the Project. However, fish salvage may be required within artificial drains impacted by the project works in the future.

As part of any future resource consents obtained for earthworks, an erosion and sediment control plan is recommended to ensure sediment discharge is controlled appropriately.

5.5.5 Wetland ecology

Wetland W1 and W2 have been described as natural wetland (albeit highly modified). Although not directly impacted by the Project, any works within 100 m of these features would need to be assessed under the NPS provisions / NES-FM as part of any future resource consent application.

As the design develops and resource consent applications are prepared as necessary, it is anticipated that an assessment of the effects on freshwater / wetland habitat will be undertaken and more detailed information collected on freshwater habitat classifications, along with the ecological value of streams and wetlands using the SEV stream survey method and Wetland Condition Index (Clarkson *et al.*, 2004) surveys (respectively).

6 Summary

Construction and operational effects from the Project activities were assessed in relation to District Plan matters under the AUP:OP (refer Appendix A of this report). There were no District Plan ecological effects where the level of effect from the Project was assessed to be **Moderate** or higher and therefore no impact management is required.

Ecological effects associated with activities that require Regional Plan consents and Wildlife Act Authority permits were considered for future permitting requirements and also to inform design and the designation boundaries for the Project.

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1 Appendix A Regional Plan, District Plan and Wildlife Act Matters

Table 18: Ecological effects of road infrastructure construction broken down into AUP:OP Regional and District Plan matters

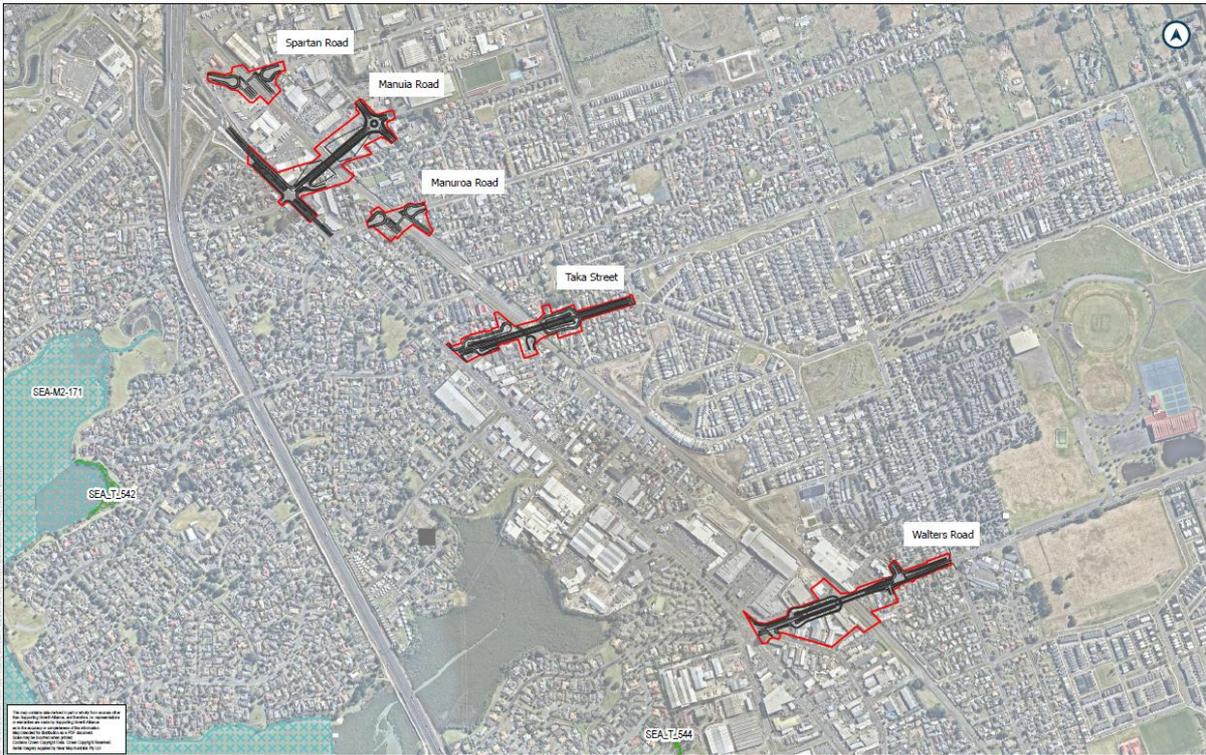
| Ecological feature | Activity | Ecological Effect | AUP:OP District Plan provisions | AUP:OP Regional Plan provisions | Wildlife Act (1953) |
|----------------------------|---|--|---------------------------------|---------------------------------|---------------------|
| Construction | | | | | |
| Terrestrial habitat | Vegetation removal (including trees) outside of roads and public spaces in: a) a rural zone b) riparian margins c) coastal areas d) SEAs This also includes other terrestrial habitat of value identified in the EclA. | Permanent loss of habitat/ecosystem, fragmentation and edge effects. | | ✓ | |
| | Vegetation removal (including trees) in: a) Roads b) Public spaces c) ONFs d) ONLs e) HNCs f) ONCs | Permanent loss of habitat/ecosystem, fragmentation and edge effects. Effects on native fauna including loss of foraging habitat and mortality/injury. | ✓ | | ✓ |
| | Earthworks – leading to invasion of bare earth surfaces with weeds and transfer of weeds (seeds and fragments) between earthworks areas. | Weed dispersal to previously unaffected areas of indigenous vegetation, reduction in terrestrial biodiversity. | | | ✓ |
| Bats | Vegetation removal. | Roost loss. | | ✓ | ✓ |
| | Vegetation removal. | Kill or injure individual. | | | ✓ |
| | Vegetation removal. | Loss of foraging habitat. | | ✓ | |
| | Construction activities (Noise, light, dust etc.). | Disturbance and displacement to roosts and to individuals (existing). | ✓ | | ✓ |
| Birds (native) | Vegetation removal. | Nest loss. | | ✓ | ✓ |
| | Vegetation removal. | Kill or injure individual. | | | ✓ |
| | Vegetation removal. | Loss of foraging habitat. | | ✓ | |

| Ecological feature | Activity | Ecological Effect | AUP:OP District Plan provisions | AUP:OP Regional Plan provisions | Wildlife Act (1953) |
|--|---|--|---------------------------------|---------------------------------|---------------------|
| | Construction activities (noise, light, dust etc). | Disturbance and displacement of roosts and individuals (existing). | ✓ | | ✓ |
| Herpetofauna (native) | Vegetation removal. | Lizard habitat loss | | ✓ | |
| | Vegetation removal. | Kill or injure individual | | | ✓ |
| | Construction activities (noise, light, dust etc). | Disturbance and displacement of individuals (existing). | ✓ | | ✓ |
| Freshwater habitat – wetland or stream (including riparian margins) | Reclamation/culvertin g/other structures e.g., bank armouring. | Permanent loss/modification of habitat/ecosystem. | | ✓ | |
| | Vegetation removal. | Permanent loss of habitat/ecosystem, fragmentation and edge effects. | | ✓ | |
| | Construction activities – earthworks (leading to sediment discharge), machinery use and chemical storage (leading to leaks/spills). | Uncontrolled discharge leading to habitat and water quality degradation. | | ✓ | |
| | Diversion, abstraction or bunding of watercourses and water level/flow/ periodicity changes. | Detrimental effects on habitats including plant composition and fauna. | | ✓ | |
| Fish (native) | Reclamation/diversion /other structures e.g., bank armouring. | Loss of aquatic habitat. | | ✓ | |
| | Reclamation/diversion /culverting/other structures e.g., bank armouring. | Kill or injure individual. | | | ✓ |
| Operation | | | | | |
| Terrestrial habitat | Presence of the road - use of road edges as dispersal corridors by invasive plant species. | Weed dispersal to previously unaffected areas of indigenous vegetation, reduction in terrestrial biodiversity. | | ✓ | |
| | Road maintenance - increased use of herbicides. | Increased weed incursion, unintentional spray of indigenous vegetation. | | ✓ | |
| Bats | Vehicle movement. | Kill or injure individual. | | | ✓ |

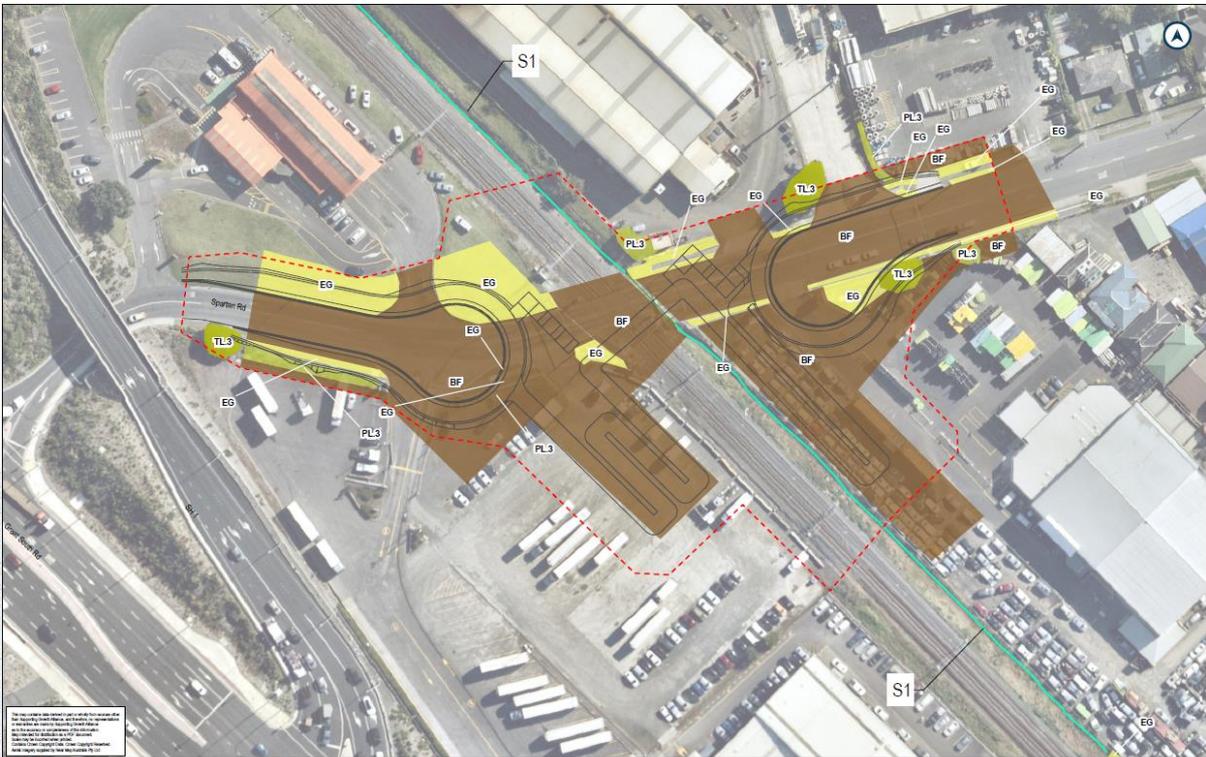
| Ecological feature | Activity | Ecological Effect | AUP:OP District Plan provisions | AUP:OP Regional Plan provisions | Wildlife Act (1953) |
|--|---|---|---------------------------------|---------------------------------|---------------------|
| | Presence of the road. | Loss in connectivity due to permanent habitat loss, light and noise effects from the road, leading to fragmentation of terrestrial, wetland and riparian habitat. | ✓ | | ✓ |
| | Lighting and noise/vibration. | Disturbance and displacement of (new and existing) roosts and individuals. | ✓ | | ✓ |
| Birds (native) | Vehicle movement. | Kill or injure individual. | | | ✓ |
| | Presence of the road. | Loss in connectivity due to permanent habitat loss, light and noise effects from the road, leading to fragmentation of terrestrial, wetland and riparian habitat. | ✓ | | ✓ |
| | Lighting and noise/vibration. | Disturbance and displacement of (new and existing) nests and individuals. | ✓ | | ✓ |
| Herpetofauna (native) | Vehicle movement. | Kill or injure individual. | | | ✓ |
| | Presence of the road. | Loss in connectivity due to permanent habitat loss, light and noise/vibration effects from the road, leading to fragmentation of terrestrial, wetland and riparian habitat. | ✓ | | ✓ |
| | Lighting. | Disturbance of nocturnal lizard behaviour. | ✓ | | ✓ |
| Freshwater habitat – wetland or stream (including riparian margins) | Vehicle (cartage) movement - risk of spills of potential toxins (oil, milk, chemicals). | Temporary degradation of instream/wetland habitat and water quality. | | ✓ | |
| | Presence of bridge. | Shading leading to change in ecosystem structure. | | ✓ | |
| | Gradual change in hydrology from presence of the road/stormwater, including reclamations. | Effect on downstream habitat (including erosion/sediment discharge) due to change in hydrology (increase or decrease). | | ✓ | |

| Ecological feature | Activity | Ecological Effect | AUP:OP District Plan provisions | AUP:OP Regional Plan provisions | Wildlife Act (1953) |
|----------------------|---|--|---------------------------------|---------------------------------|---------------------|
| | Stormwater discharges - pollutants (such as heavy metals and herbicides). | Permanent degradation of wetland or instream habitat and water quality. | | ✓ | |
| Fish (native) | Presence of culvert. | Loss of connectivity due to culvert preventing fish passage up and downstream. | | ✓ | |

2 Appendix B Maps



Significant Ecological Areas associated with Level Crossings



Spartan Road Level Crossing Terrestrial and Freshwater Habitat





Manuroa Road Level Crossing Terrestrial and Freshwater Habitats



Taka Street Level Crossing Terrestrial and Freshwater Habitat





LEGEND

| | | | |
|---------------------------|-----------------------|------------------------|------------------------|
| — Route Options | BF - Brownfield | PL.1 - Planted native | TL.1 - Native treeland |
| --- Proposed Designations | EG - Exotic grassland | PL.3 - Planted amenity | TL.3 - Exotic treeland |

Walter Road Level Crossing Terrestrial and Freshwater Habitat

3 Appendix C Desktop Bird Records

Table 19: Desktop bird records within 5 km of the NoRs

| Common Name | Māori Name | Scientific Name | Conservation Status | Record Source |
|-----------------------|--------------------|---|----------------------------|--------------------|
| Chaffinch | Pahirini | <i>Fringilla coelebs</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| European Greenfinch | - | <i>Chloris chloris</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| Fantail | Pīwakawaka | <i>Rhipidura fuliginosa placabilis</i> | Not Threatened | eBird (Bird Atlas) |
| House sparrow | Tiu | <i>Fringilla coelebs</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| White back Magpie | Makipae | <i>Gymnorhina tibicen</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| Common Indian Myna | - | <i>Acridotheres tristis</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| Pied shag | Kāruhiruhi | <i>Phalacrocorax varius</i> | Recovering | eBird (Bird Atlas) |
| Little black shag | Kawau tūī | <i>Phalacrocorax sulcirostris</i> | Naturally Uncommon | eBird (Bird Atlas) |
| Spur winged plover | - | <i>Vanellus miles novaehollandiae</i> | Not Threatened | eBird (Bird Atlas) |
| Australasian shoveler | Kuruwhengi | <i>Spatula rhynchotis</i> | Not Threatened | eBird (Bird Atlas) |
| Tūī | Tūī | <i>Prothemadera novaeseelandiae novaeseelandiae</i> | Not Threatened | eBird (Bird Atlas) |
| Welcome swallow | Warou | <i>Hirundo neoxena neoxena</i> | Not Threatened | eBird (Bird Atlas) |
| White-faced heron | Matuku moana | <i>Egretta novaehollandiae</i> | Not Threatened | eBird (Bird Atlas) |
| Sacred kingfisher | Kōtare | <i>Todiramphus sanctus</i> | Not Threatened | eBird (Bird Atlas) |
| Blackbird | Manu pango | <i>Turdus merula</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| Song thrush | Manu-kai-hua-rakau | <i>Turdus philomelos</i> | Introduced and Naturalised | eBird (Bird Atlas) |

| Common Name | Māori Name | Scientific Name | Conservation Status | Record Source |
|---------------------------|----------------|----------------------------------|----------------------------|--------------------|
| Rock pigeon | Kererū aropari | <i>Columba livia</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| Barbary dove | - | <i>Streptopelia risorii</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| Spotted dove | - | <i>Streptopelia chinensis</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| New Zealand Fantail | Pīwakawaka | <i>Rhipidura fuliginosa</i> | Not Threatened | eBird (Bird Atlas) |
| Grey teal | Tētē-moroiti | <i>Anas gracilis</i> | Not Threatened | eBird (Bird Atlas) |
| Eastern Bar-tailed Godwit | Kuaka | <i>Limosa lapponica</i> | Declining | eBird (Bird Atlas) |
| Eastern Rosella | Kākā uhi whero | <i>Platycercus eximius</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| Silvereye | Tauhou | <i>Zosterops lateralis</i> | Not Threatened | eBird (Bird Atlas) |
| New Zealand Pigeon | Kererū | <i>Hemiphaga novaeseelandiae</i> | Not Threatened | eBird (Bird Atlas) |
| Dabchick | Weweia | <i>Poliiocephalus rufopectus</i> | Nationally Increasing | eBird (Bird Atlas) |
| Yellowhammer | Hurukōwhai | <i>Emberizacitrinella</i> | Introduced and Naturalised | eBird (Bird Atlas) |
| Common Starling | Tāringi | <i>Sturnus vulgaris</i> | Introduced and Naturalised | eBird (Bird Atlas) |

4 Appendix D Terrestrial Value Assessment Tables

Table 20: Terrestrial Value Assessment

| Attributes to be considered | BF | EG | ES | PL.1 | PL.3 | TL.1 | TL3 | TAR Wetland Birds | Non – TAR Birds | Lizard | Justification |
|---|----------|----------|----------|----------|----------|----------|----------|-------------------|-----------------|----------|---------------|
| Representativeness | 1 | 1 | 2 | 3 | 2 | 3 | 2 | 0 | 0 | 0 | |
| Typical structure and composition | 1 | 1 | 2 | 2 | 2 | 3 | 2 | | | | |
| Indigenous representation | 1 | 1 | 2 | 3 | 2 | 3 | 2 | | | | |
| Rarity/distinctiveness | 1 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | |
| Species of conservation significance (fauna only) | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | | | |
| Species of conservation significance | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 3 | | | |
| Distinctive ecological values | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | |
| Diversity and pattern | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 1 | |
| Habitat diversity | | | 1 | 1 | 1 | 1 | 1 | | | | |
| Species diversity | 1 | 1 | 1 | 2 | 1 | 2 | 1 | | | | |
| Patterns in habitat use | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | | | |
| Ecological context | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | | | |

| Attributes to be considered | BF | EG | ES | PL.1 | PL.3 | TL.1 | TL3 | TAR Wetland Birds | Non – TAR Birds | Lizard | Justification |
|---|-------------------|-------------------|------------|-----------------|------------|-----------------|------------|-------------------|-----------------|-------------|---------------|
| Size, shape and buffering | | | | 1 | | 1 | | | | | |
| Sensitivity to change | | | | | | | | 1 | 1 | 1 | |
| Ecological networks (linkages, pathways, migration) | | | | 1 | | | | 1 | | | |
| Combined value | Negligible | Negligible | Low | Moderate | Low | Moderate | Low | High | Low | High | |

5 Appendix E Freshwater Value Assessment Tables

Table 21: Assessment of ecological value for freshwater ecology features for Spartan Road (S1), Manuia Road (S2) and Taka Street (S3).

| Attributes to be considered | S1 | S2 | S3 | Justification |
|--------------------------------------|------------|------------|------------|---------------|
| Representativeness | 1 | 1 | 1 | |
| Instream habitat modification | 1 | 1 | 1 | |
| Riparian habitat modification | 1 | 1 | 1 | |
| Rarity/distinctiveness | 1 | 1 | 1 | |
| Species of conservation significance | 1 | 1 | 1 | |
| Diversity and pattern | 1 | 1 | 1 | |
| Level of natural diversity | 1 | 1 | 1 | |
| Ecological context | 2 | 2 | 2 | |
| Stream order | 1 | 1 | 1 | |
| Hydroperiod | 2 | 2 | 2 | |
| Combined value | Low | Low | Low | |