

	Disturbance and displacement of existing and future herpetofauna due to light, noise, and vibration effects from the 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 due to the presence of the infrastructure	
<b>Effect Description</b>	<b>Baseline</b>	<b>Likely Future Ecological Environment</b>	<b>Baseline</b>	<b>Likely Future Ecological Environment</b>
<b>level of effect</b>				
<b>Management of residual effect</b>	N/A	N/A	N/A	N/A

### 14.2.3 Effects Conclusions

The ecological level of effects assessed as **Moderate** or higher for NOR 8 are described in Sections 14.2.3.1 and 14.2.3.2.

#### 14.2.3.1 Construction Effects

##### Long-tailed bats

- **Moderate** level of for disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics during construction for the Baseline and Likely Future Ecological Environment.

##### New Zealand pipit

- **High** level of effect for disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics during construction for the Baseline only.

The post mitigation level of effect is considered to be **Low** for construction related effects.

##### Spotless crane

- **Moderate** level of effect for disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics during construction for the Baseline and Likely Future Ecological Environment.

The post mitigation level of effect is considered to be **Very Low** for construction related effects.

##### Dabchick

- **Moderate** level of effect for disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics during construction for the Baseline and Likely Future Ecological Environment.

The post mitigation level of effect is considered to be **Very Low** for construction related effects.

#### 14.2.3.2 Operational Effects

##### Long-tailed bats

- **Very High** level of effect for the loss in connectivity due to the presence of the road resulting in changes to the population dynamics during operation for the Baseline. **High** level of effect for the Likely Future Ecological Environment.
- **Moderate** level of effect for disturbance and displacement to roosts and individuals of (new and existing) due to the presence of the infrastructure (noise, light, vibration etc) resulting in changes to the population dynamics during operation for the Baseline and Likely Future Ecological Environment.

The post mitigation level of effect is considered to be **Very Low to Low** for operational related effects.

### Spotless crane

- **Moderate** level of effect for disturbance and displacement to nests and individuals of (new and existing) due to the presence of the infrastructure (noise, light, vibration etc) resulting in changes to the population dynamics during operation for the Baseline and Likely Future Ecological Environment.

The post mitigation level of effect is considered to be **Very Low** for operational related effects.

### Dabchick

- **Moderate** level of effect for disturbance and displacement to nests and individuals of (new and existing) due to the presence of the infrastructure (noise, light, vibration etc) resulting in changes to the population dynamics during operation for the Baseline and Likely Future Ecological Environment.

The post mitigation level of effect is considered to be **Very Low** for operational related effects.

## 15 Warkworth Cumulative Effects

Upgrading existing roads and building new roads within a future urban environment with streams, wetlands, and open space conservation areas can have several cumulative ecological effects. Main potential effects include:

- **Native species disturbance:** Disturbance (through light, noise and vibration) associated with road construction and operation, along with similar effects associated with other activities in the vicinity, may have a cumulative effect on the native species. Although many of the native species observed are expected to use the Project Area and wider landscape and will habituate to noise light and vibration disturbance effects, long-tailed bats are more sensitive to disturbance and will require strategic mitigation as the future infrastructure develops.
- **Habitat fragmentation:** Roads can act as barriers to the movement of animals, including migratory species, leading to fragmentation of habitats. This can result in reduced genetic diversity, population declines, and changes to community structure.
- **Loss of habitat:** Road construction often involves clearing of vegetation, which can lead to the loss of habitat for native plant and animal species. This can lead to a decline in biodiversity and changes to ecosystem function.
- **Water quality impacts:** Roads can increase the amount of impervious surface in an area, leading to increased runoff and decreased infiltration of rainwater. This can result in increased erosion and sedimentation in nearby streams and wetlands, and the transport of pollutants from roads into aquatic ecosystems.
- **Changes in hydrology:** Roads can alter the natural flow of water in an area by changing the amount and timing of runoff, and by blocking or diverting water. This can lead to changes in the structure and function of streams and wetlands, as well as changes to the groundwater recharge rate.

To mitigate cumulative disturbance and connectivity effects, careful planning and design of roads and transportation infrastructure is important, such as incorporating measures such as green infrastructure, wildlife crossings, and vegetated buffers to protect sensitive habitats. Additionally, ongoing monitoring and adaptive management can help identify and address any unexpected impacts that may arise.

## 16 Design and Future Resource Consent Considerations

Ecological effects associated with activities that require regional consents and consideration under the NPS-FM are briefly discussed in the following sections to inform design and alignment options for the Project Area. Wildlife Act Authority permits are also discussed in relation to the potential killing or injuring of native fauna associated with the Project activities.

It is important to note that during the future detailed design process (as an additional consideration under the future regional consent process) there is scope within the designation to address (including to avoid) some potential effects/concerns/regional matters through design considerations at the detailed design phase.

### 16.1 Terrestrial Ecology

Construction of the Project will result in temporary and permanent loss of vegetation within the Project Area, including suitable habitat that is potentially being used by native fauna (long-tailed bats, avifauna, herpetofauna, and invertebrates).

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) which will be used to support future regional resource consent (for example, removal of vegetation in the riparian setback) and wildlife permit applications (if required).

The terrestrial vegetation to be lost (temporary and permanent) is comprised of both native and exotic vegetation which ranges in ecological value from Exotic Grassland (**Low** value) to Pūriri Forest (**High** value) (Section 5.2.1 and Appendix 6). Some of these areas are likely to provide habitat to native fauna, as discussed in Sections 16.1.1 to 16.1.4

This section includes detail of the terrestrial vegetation that is classified as SEA and occurs within the designation boundary of each NOR (Table 16-1). It is noted that the detailed design of the road and construction footprint will aim to avoid SEAs as far as practicable and therefore the approximate extent outlined in Table 16-1 is conservative (because it accounts for all SEA vegetation loss that occurs within the designation boundary).

Appendix 13 – Biodiversity Compensation Model (BCM) for potential SEA loss details the result of the Biodiversity Compensation Model (BCM) undertaken for each NOR potentially affected by SEA loss. The model results indicate a conservative offset extent of 2.04 ha (NOR 2), 0.34 ha (NOR 4) and 3.05 ha (NOR 5). For each potentially affected NOR, degraded habitat adjacent to existing SEAs and within the designation boundary provide restoration potential. NORs not affected by potential SEA loss provide further offset potential where degraded habitats within the designation boundaries are in proximity to an existing SEA (for example NOR 8 and SEA\_T\_2367) or near higher value features (for example stream and wetlands associated with NOR 3 and NOR 6). Overall, based on these initial estimates, it is expected that the potential (maximum) loss of SEAs can be compensated for within the existing designation boundary. It is expected that further detailed offset modelling (using BOAM or similar) will be used during the regional consenting phase of work and will be based upon more detailed site investigations of impacted SEAs and potential offset locations.

Table 16-1 Potential area of SEA loss within the designation boundary

Feature	Classification*	Footprint (m <sup>2</sup> )		
		NOR 2	NOR 4	NOR 5
SEA_T_5440	WF7.1			1,264
SEA_T_6684	MF4			579
SEA_T_6684	EF			1,934
SEA_T_5440	TL3		774	
SEA_T_6676	TL3	1,287		
SEA_T_6676	WF11	1,147		

Notes: \* = Classification as per Singers et al. (2017).

### 16.1.1 Long-tailed bats

Mature vegetation in suitable habitat areas (as identified in each NOR section) may provide potential habitat for bat roosts and facilitate bat movement in the broader landscape. The presence of bats and roosts will be re-assessed prior to obtaining any Regional resource consents for vegetation removal (relevant under regional matters) and to support an application for a wildlife permit. The loss of some of this habitat is already assessed because they are district plan trees.

The presence of bat habitat and bat roosts will require a BMP. The objectives of bat management will be to:

- Identify bat priority areas that may be affected by the Project.
- Avoid bat priority areas through alignment and design.
- Avoid effects of lighting and noise on bats within bat priority areas.
- Avoid injury and/or death of roosting bats during vegetation removal.
- Avoid disturbance through construction management (seasonal restriction on vegetation removal December to April)
- Outline additional mitigation where avoidance is not feasible including any offset/compensation that may be required.

### 16.1.2 Avifauna

Native avifauna as identified in Section 5.2.3 have the potential to be present within the Project Area. The habitats that native avifauna may utilise are detailed in each NOR section. Vegetation clearance required for construction could result in the loss of these habitats and any vegetation clearance within the bird nesting season (September – February) will need to be managed in accordance with the Wildlife Act 1953. The loss of some of this habitat is already assessed because they are district plan trees.

Additionally, species not identified in Section 5.2.3 such as Northern New Zealand dotterel have the potential to nest in construction sites (due to habitat preference). Therefore, impacts (including disturbance) will need to be managed during construction.

### 16.1.3 Herpetofauna

Native herpetofauna as identified in Section 5.2.4 have the potential to be present within vegetation impacted by the Project. Therefore, there is potential that site clearance required for construction could kill or injure native herpetofauna species and result in the removal of their habitat. Any vegetation clearance where native herpetofauna are likely to occur will also need to be managed in accordance with the Wildlife Act 1953.

### 16.1.4 Invertebrates

Kauri snail (*Paryphanta* spp.), flax snails (*Placostylus* spp.), large land snails (*Powelliphanta* spp.), and Auckland tree wētā (*Hemideina thoracica*) are potentially present in in NOR 2 (Woodcocks Road Upgrade), NOR 4 (Matakana Road Upgrade), and NOR 7 (Sandspit Link). Impact management will be required under the Wildlife Act to prevent killing or injuring these species. As part of this management pre-clearance inspections should be undertaken prior to vegetation removal.

## 16.2 Freshwater Ecology

The construction of the Project will directly impact 20 streams, ranging from **Low** to **High** ecological value. Approximately 868 m of stream reclamation will be required to accommodate the Project works. The predicted permanent and intermittent stream loss for the Project is presented in Table 16-2. These calculations will require re-evaluation (including a Stream Ecological Valuation) as part of the future regional consent process. All assessed streams have been modified and degraded to varying degrees and there is an opportunity to restore riparian habitat along these features

During the detailed design phase, stream crossing plans (i.e., bridge or culvert) will be confirmed as well as details regarding fish passage requirements. Under a future regional and NPS-FM consent for instream works, earthworks and vegetation removal, impact management would also be required for fish salvage and relocation, sediment control and management of the riparian condition.

**Table 16-2 Potential stream loss (permanent and intermittent) within the Project Area**

Stream ID	Hydroperiod	Ecological Value	Length to be lost (m)*	Relevant NOR
WW2-S4	Intermittent	Low	20	NOR 2
WW3-S2a	Permanent	Moderate	14	NOR 3
WW3-S2b	Permanent	Moderate	29	NOR 3
WW3-S3a	Permanent	Moderate	4	NOR 3
WW3-S3b	Permanent	Moderate	8	NOR 3
WW3-S4a	Permanent	Moderate	11	NOR 3
WW3-S4b	Permanent	Moderate	140	NOR 3
WW4-S1	Intermittent	Low	21	NOR 4
WW4-S2	Intermittent	Low	27	NOR 4
WW4-S3	Intermittent	Low	28	NOR 4
WW5-S1	Permanent	High	10	NOR 5
WW5-S3	Intermittent	Low	43 (NOR 5), 104 (NOR 7)	NOR 5, NOR 7
WW5-S4	Intermittent	Low	18	NOR 5
WW5-S5	Intermittent	Low	17	NOR 5
WW5-S6	Intermittent	Low	17	NOR 5
WW7-S2b	Intermittent	Low	70	NOR 7
WW7-S3a	Permanent	Moderate	31	NOR 7
WW7-S5	Intermittent	Low	45	NOR 7

Stream ID	Hydroperiod	Ecological Value	Length to be lost (m)*	Relevant NOR
WW8-S1	Intermittent	Moderate	122	NOR 8
WW8-S2	Intermittent	Moderate	89	NOR 8

Notes: \* = Some assessments were carried out at a desktop level, making it difficult to accurately delineate stream width and length. Therefore, lengths are indicative.

### 16.3 Wetland Ecology

Wetland extent and approximate value was considered during the Multi Criteria Assessment (MCA) to inform the Alternatives Assessment for all of the proposed alignment options. This was achieved through a desktop wetland delineation for all of the NOR options along with a proxy-based assessment of ecological value (catchment condition, vegetation cover, relationship with other ecological features).

The construction of the Project will impact 17 natural inland wetlands, and one artificial wetland ranging from **Low** to **Moderate** ecological value. Approximately 14,863 m<sup>2</sup> of direct wetland loss will occur (Table 16-3). These calculations will require re-evaluation (including comprehensive wetland delineation and ecological valuation) as part of the future regional consent process. All assessed wetlands have been modified and degraded to varying degrees and there is an opportunity to restore riparian habitat along these features

During the detailed design phase, wetland crossing plans (i.e., bridge or culvert) will be confirmed as well as details regarding fish passage requirements. Under a future regional and NPS-FM consent for wetland works, earthworks and vegetation removal or discharge impact management would also be required for fish salvage and relocation, sediment control and management of the riparian condition.

**Table 16-3 Potential wetland loss within the Project Area**

Wetland ID	Vegetation Type	Ecological Value	Loss (m <sup>2</sup> )	Relevant NOR
WW2-W2	Exotic Wetland (EW)	Low	57	NOR 2
WW3-W3	Exotic Wetland (EW)	Moderate	908	NOR 3
WW3-W4	Exotic Wetland (EW)	Moderate	180	NOR 3
WW3-W5	Exotic Wetland (EW)	Low	476	NOR 3
WW4-W1	Exotic Wetland (EW)	Moderate	130	NOR 4
WW4-W2	Exotic Wetland (EW)	Moderate	124	NOR 4
WW4-W3	Exotic Wetland (EW)	Low	603	NOR 4
WW5-W1	Exotic Wetland (EW)	Low	195	NOR 5
WW5-W3	Exotic Wetland (EW)	Low	130	NOR 5
WW6-O2^	Open Water (OW)	Low	225	NOR 6

Wetland ID	Vegetation Type	Ecological Value	Loss (m <sup>2</sup> )	Relevant NOR
WW7-W3	Exotic Wetland (EW)	Moderate	2,422	NOR 7
WW7-W4	Exotic Wetland (EW)	Low	56	NOR 7
WW7-W5	Exotic Wetland (EW)	Low	610	NOR 7
WW7-W6	Exotic Wetland (EW)	Low	83	NOR 7
WW7-W7	Exotic Wetland (EW)	Low	143	NOR 7
WW8-W1	Planted Wetland (PLW)	Moderate	4,622	NOR 8
WW8-W2	Exotic Wetland (EW)	Low	148	NOR 8
WW8-W4	Exotic Wetland (EW)	Moderate	3,751	NOR 8

Notes: \* = Some assessments were carried out at a desktop level, therefore areas are indicative. ^ = Artificial wetland.

## 17 Conclusion

### Construction Effects

Table 17-1 to Table 17-3 provides a summary of district matter ecological effects during construction prior to any mitigation. The summary represents the level of effect for the baseline and the likely future ecological environment as one where they are the same and with a \* where they differ. Where the level of effect was assessed to be **Moderate** or higher, then mitigation has been developed.

Construction effect mitigation measures will include:

- A Bat Management Plan (BMP) for NOR 2, NOR 4, NOR 5, NOR 7, and NOR 8 should be developed to include consideration for:
  - Surveys prior to construction to confirm presence/likely absence. Surveys to confirm bat roost locations if activity is confirmed.
  - Confirmation of maternity roosts may require a seasonal restriction on construction activity (no or restricted construction during Dec-Mar).
  - Siting of compounds and laydown areas to avoid bat habitat.
  - Lighting design to reduce light levels and spill from construction areas.
  - Restriction of nightworks around bat habitat.
  - Bat management should be incorporated with any regional consent conditions (i.e., BMPs) that may be required for regional compliance.
- An Avifauna Management Plan (AMP) for all NORs should be developed to include consideration for:
  - New Zealand pipit (all NORs)
    - Pre-construction nesting bird surveys in suitable habitat (EG, ES).
    - Timing consideration for construction works (avoiding breeding season, where practicable).
    - Methods to minimise disturbance if the breeding season cannot be avoided.
  - Spotless crane (all NORs excluding NOR 2)
    - Pre-construction nesting bird surveys at specific wetland habitat.
    - Timing consideration for construction works (avoiding breeding season, where practicable).
    - Methods to protect and buffer nesting birds (if present).
  - Dabchick (NOR 8)
    - Pre-construction nesting bird surveys at wetland WW8-W1.
    - Timing consideration for construction works (avoiding breeding season, where practicable).
    - Methods to protect and buffer nesting birds (if present).

**Table 17-1 Summary of ecological effects during construction prior to mitigation for long-tailed bats**

Construction – Long-tailed bats	
NOR	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust, vibration etc.)
NOR 1	Low
NOR 2	<b>Moderate</b>

Construction – Long-tailed bats	
NOR 3	Low
NOR 4	<b>Moderate</b>
NOR 5	<b>Moderate</b>
NOR 6	Low
NOR 7	<b>Moderate</b>
NOR 8	<b>Moderate</b>

Notes: \* = Indicates a level of effect associated with the Likely Future Ecological Environment that is different from the baseline level of effects.

**Table 17-2 Summary of ecological effects during construction prior to mitigation for avifauna**

	Construction – Avifauna
<b>NOR</b>	<b>Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc.)</b>
<b>NOR 1</b>	
Non-TAR birds	Very Low
New Zealand pipit	<b>High</b> *Very Low
Australasian bittern	Low
Spotless crane	<b>Moderate</b>
<b>NOR 2</b>	
Non-TAR birds	Very Low
New Zealand pipit	<b>High</b> *Very Low
North Island kākā	Very Low
Long-tailed cuckoo	Low
Black shag, little black shag, little shag, pied shag	Very Low
<b>NOR 3</b>	
Non-TAR birds	Very Low
New Zealand pipit	<b>High</b> *Very Low

	Construction – Avifauna
Australasian bittern	Low
Spotless crake	<b>Moderate</b>
<b>NOR 4</b>	
Non-TAR birds	Very Low
New Zealand pipit	<b>High</b> *Very Low
North Island kākā	Very Low
Long-tailed cuckoo	Low
Australasian bittern	Low
Spotless crake	<b>Moderate</b>
<b>NOR 5</b>	
Non-TAR birds	Very Low
New Zealand pipit	<b>High</b> *Very Low
North Island kākā	Very Low
Long-tailed cuckoo	Low
Australasian bittern	Low
Spotless crake	<b>Moderate</b>
<b>NOR 6</b>	
Non-TAR birds	Very Low
New Zealand pipit	<b>High</b> *Very Low
Australasian bittern	Low
Spotless crake	<b>Moderate</b>
<b>NOR 7</b>	
Non-TAR birds	Very Low
New Zealand pipit	<b>High</b> *Very Low
North Island kākā	Very Low
Long-tailed cuckoo	Low

	Construction – Avifauna
Black shag, little black shag, little shag, pied shag	Very Low
Australasian bittern	Low
Spotless crake	<b>Moderate</b>
<b>NOR 8</b>	
Non-TAR birds	Very Low
New Zealand pipit	<b>High</b> *Very Low
North Island kākā	Very Low
Long-tailed cuckoo	Low
Australasian bittern	Low
Spotless crake	<b>Moderate</b>
Dabchick	<b>Moderate</b>

Notes: \* = Indicates a level of effect associated with the Likely Future Ecological Environment that is different from the baseline level of effects.

**Table 17-3 Summary of ecological effects during construction prior to mitigation for herpetofauna**

	Construction – Herpetofauna
<b>NOR</b>	<b>Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc.)</b>
<b>NOR 1</b>	
Copper skink	Low *Very Low
<b>NOR 2</b>	
Copper skink, ornate skink	Very Low
Elegant gecko, forest gecko	Low *Very Low
Pacific gecko	Low *Very Low
<b>NOR 3</b>	
Copper skink	Very Low

Construction – Herpetofauna	
<b>NOR 4</b>	
Copper skink, ornate skink	Very Low
Elegant gecko, forest gecko	Low *Very Low
Pacific gecko	Low *Very Low
Hochstetter's frog	Very Low
<b>NOR 5</b>	
Copper skink, ornate skink	Very Low
Elegant gecko, forest gecko	Low *Very Low
Pacific gecko	Low *Very Low
Hochstetter's frog	Low
<b>NOR 6</b>	
Copper skink	Very Low
<b>NOR 7</b>	
Copper skink, ornate skink	Low *Very Low
Elegant gecko, forest gecko	Low *Very Low
Pacific gecko	Low *Very Low
Hochstetter's frog	Low *Very Low
<b>NOR 8</b>	
Copper skink, ornate skink	Low *Very Low
Elegant gecko, forest gecko	Low *Very Low

Construction – Herpetofauna	
Pacific gecko	Low *Very Low

Notes: \* = Indicates a level of effect associated with the Likely Future Ecological Environment that is different from the baseline level of effects.

The residual (post-mitigation) level of effect for all construction effects are considered **Negligible to Low**.

### Operational Effects

Table 17-4 to Table 17-6 provides a summary of district matter ecological effects during operation prior to any mitigation. The summary represents the level of effect for the baseline and the likely future ecological environment as one where they are the same and with a \* where they differ. Where the level of effect was assessed to be **Moderate** or higher, then mitigation has been developed.

Operational effect mitigation measures will include:

- A Bat Management Plan (BMP) for NOR 2, NOR 3, NOR 4, NOR 5, NOR 7, and NOR 8 should be developed to include consideration for:
  - Indicative early-stage/mature buffer planting, late-stage buffer planting, and retention of existing mature trees between the road alignment and features with potential for bat roosts as outlined in the indicative bat mitigation in Appendix 12 – Indicative Mitigation Areas.
  - Light and noise management through design.
  - Future presence of roosts within the alignment (placement of flaps on features with high roost potential).
  - Assumptions in the efficacy of the proposed mitigation will be addressed through an adaptive management framework that will outline bat activity thresholds, robust monitoring, and potential corrective action.
- An Avifauna Management Plan (AMP) for all NORs should be developed to include consideration for:
  - Spotless crane (all NORs excluding NOR 2)
    - Retention of vegetation near wetland habitat, where practicable.
    - Buffer planting between the road alignment and suitable habitat adjacent to the road.
  - Dabchick (NOR 8)
    - Retention of vegetation near wetland habitat, where practicable.
    - Buffer planting between the road alignment and suitable habitat adjacent to the road.

**Table 17-4 Summary of ecological effects during operation prior to mitigation for long-tailed bats**

Operation – Long-tailed bats		
NOR	Disturbance and displacement of (new and existing) roosts and individuals due to the presence of the road (noise, vibration, light etc.)	Loss in connectivity due to permanent habitat loss, light, and noise effects from the road, leading to fragmentation of terrestrial habitat and influencing bat movement in the broader landscape

Operation – Long-tailed bats		
NOR 1	Low	Low
NOR 2	<b>Moderate</b>	<b>High</b>
NOR 3	Very Low	<b>Moderate</b>
NOR 4	Low	<b>Moderate</b>
NOR 5	Low	<b>Moderate</b>
NOR 6	Low	Low
NOR 7	<b>Moderate</b>	<b>Moderate</b>
NOR 8	<b>Moderate</b>	<b>Very High</b> <b>*High</b>

Notes: \* = Indicates a level of effect associated with the Likely Future Ecological Environment that is different from the baseline level of effects.

**Table 17-5 Summary of ecological effects during operation prior to mitigation for avifauna**

Operation – Avifauna		
<b>NOR</b>	<b>Disturbance and displacement to nests and individual birds (existing) due to the presence of the road (noise, light, dust etc.)</b>	<b>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</b>
<b>NOR 1</b>		
Non-TAR birds	Very Low	Very Low
New Zealand pipit	Very Low	Very Low
Australasian bittern	Low	Low
Spotless crane	<b>Moderate</b>	Very Low
<b>NOR 2</b>		
Non-TAR birds	Very Low	Very Low
New Zealand pipit	Very Low	Very Low
North Island kākā	Very Low	Very Low
Long-tailed cuckoo	Low	Low
Black shag, little black shag, little shag, pied shag	Very Low	Very Low
<b>NOR 3</b>		

Operation – Avifauna		
Non-TAR birds	Very Low	Very Low
New Zealand pipit	Very Low	Very Low
Australasian bittern	Low	Low
Spotless crake	<b>Moderate</b>	Very Low
<b>NOR 4</b>		
Non-TAR birds	Very Low	Very Low
New Zealand pipit	Very Low	Very Low
North Island kākā	Very Low	Very Low
Long-tailed cuckoo	Low	Low
Australasian bittern	Low	Low
Spotless crake	<b>Moderate</b>	Very Low
<b>NOR 5</b>		
Non-TAR birds	Very Low	Very Low
New Zealand pipit	Very Low	Very Low
North Island kākā	Very Low	Very Low
Long-tailed cuckoo	Low	Low
Australasian bittern	Low	Low
Spotless crake	<b>Moderate</b>	Very Low
<b>NOR 6</b>		
Non-TAR birds	Low *Very Low	Very Low
New Zealand pipit	Low *Very Low	Very Low
Australasian bittern	Low	Low
Spotless crake	<b>Moderate</b>	Very Low
<b>NOR 7</b>		
Non-TAR birds	Low *Very Low	Low *Very Low
New Zealand pipit	Very Low	Very Low

Operation – Avifauna		
North Island kākā	Very Low	Very Low
Long-tailed cuckoo	Low	Low
Black shag, little black shag, little shag, pied shag	Very Low	Very Low
Australasian bittern	Low	Low
Spotless crane	<b>Moderate</b>	Very Low
<b>NOR 8</b>		
Non-TAR birds	Low *Very Low	Very Low
New Zealand pipit	Very Low	Very Low
North Island kākā	Very Low	Very Low
Long-tailed cuckoo	Low	Low
Australasian bittern	Low	Low
Spotless crane	<b>Moderate</b>	Low
Dabchick	<b>Moderate</b>	Low

Notes: \* = Indicates a level of effect associated with the Likely Future Ecological Environment that is different from the baseline level of effects.

**Table 17-6 Summary of ecological effects during operation prior to mitigation for herpetofauna**

Operation – Herpetofauna		
<b>NOR</b>	<b>Disturbance and displacement of existing and future herpetofauna due to the presence of the road (noise, vibration, light etc.)</b>	<b>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 due to the presence of the infrastructure</b>
<b>NOR 1</b>		
Copper skink	Very Low	Very Low
<b>NOR 2</b>		
Copper skink, ornate skink	Very Low	Very Low
Elegant gecko, forest gecko	Low *Very Low	Very Low

Operation – Herpetofauna		
Pacific gecko	Low *Very Low	Very Low
<b>NOR 3</b>		
Copper skink	Very Low	Very Low
<b>NOR 4</b>		
Copper skink, ornate skink	Very Low	Very Low
Elegant gecko, forest gecko	Very Low	Very Low
Pacific gecko	Very Low	Very Low
Hochstetter's frog	Very Low	Very Low
<b>NOR 5</b>		
Copper skink, ornate skink	Very Low	Very Low
Elegant gecko, forest gecko	Very Low	Very Low
Pacific gecko	Very Low	Very Low
Hochstetter's frog	Very Low	Low *Very Low
<b>NOR 6</b>		
Copper skink	Very Low	Very Low
<b>NOR 7</b>		
Copper skink, ornate skink	Low *Very Low	Low *Very Low
Elegant gecko, forest gecko	Low *Very Low	Low
Pacific gecko	Low *Very Low	Low
Hochstetter's frog	Low *Very Low	Low
<b>NOR 8</b>		

Operation – Herpetofauna		
Copper skink, ornate skink	Low *Very Low	Low *Very Low
Elegant gecko, forest gecko	Low *Very Low	Low *Very Low
Pacific gecko	Low *Very Low	Low *Very Low

Notes: \* = Indicates a level of effect associated with the Likely Future Ecological Environment that is different from the baseline level of effects.

The residual (post-mitigation) level of effect for all operational effects are considered **Negligible to Low**.

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# 1 Appendix 1 – Ecological Impact Assessment Methodology

The standard by which this EclA was undertaken follows the guidelines published by the Environment Institute of Australia and New Zealand (EIANZ Guidelines) (Roper-Lindsay et al., 2018).

## 1.1 Assessment of Ecological Value

The first step in the EclA approach is to assess the value of ecological features in terms of Representativeness, Rarity, Diversity and Pattern, and Ecological context. Details on each matter and its associated considerations are provided in Table 18-1 for terrestrial ecological value and Table 18-2 aquatic ecological value

**Table 18-1 Matters and considerations for the assessment of terrestrial ecological value**

<b>Representativeness</b>	
	Typical structure and composition
	Indigenous representation
<b>Rarity/distinctiveness</b>	
	Species of conservation significance
	Range restricted or endemic species
	Distinctive ecological values
<b>Diversity and pattern</b>	
	Habitat diversity
	Species diversity
	Patterns in habitat use
<b>Ecological context</b>	
	Size, shape and buffering
	Sensitivity to change
	Ecological networks (linkages, pathways, migration)

**Table 18-2 Matters and considerations for the assessment of aquatic ecological value**

<b>Representativeness (including SEV, RHA and ecological integrity)</b>	
	Extent to which site/catchment is typical of characteristic
	Instream habitat modification

Representativeness (including SEV, RHA and ecological integrity)	
	Riparian habitat modification
	Hydrological modification
	Catchment conditions
	Geomorphological modification
	Water quality modification
	Presence of alien and invasive species
	Invertebrate assemblage representation
	Fish assemblage representation
Rarity/descriptiveness	
	Pool characterisation
	Species of conservation significance
	Range restricted or endemic species
	Stream type (rare or distinctive)
Diversity and pattern	
	Distinctive ecological values
	Level of natural diversity
	Diversity metrics
	Complexity of community
Ecological context (Ecosystem services, importance sensitivity)	
	Stream order
	Catchment size
	Hydroperiod
	Sensitivity to flow modification
	Sensitivity water quality modification
	Sensitivity to sedimentation/erosion
	Connectivity and migration

## 1.2 Assessment of Ecological Effects

The ecological effects assessment includes several steps that collectively assess the way the Project will interact with elements of the physical and biological, environment to produce effects to habitat and receptors. The method for determining the level of effect is outlined in the following sections.

Basic impact characteristic terminology and respective descriptors are in line with the EIANZ Guidelines and are provided in Table 18-3.

**Table 18-3 Magnitude of effect assessment terminology**

Characteristic	Definition	Designations
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect)	Direct
		Indirect
Extent	The “reach” of the impact (e.g., confined to a small area around the Project Footprint, projected for several kilometres, etc.)	Local
		Regional
		National
Duration	The time period over which a resource/receptor is affected	Temporary (days or months)
		Short-term (<5 years)
		Long-term (15-25 years)
		Permanent (>25 years)
Frequency	A measure of the constancy or periodicity the receptor will be affected	Infrequently
		Periodically
		Frequently
		Continuously
Likelihood	The probability of an effect occurring if it is unplanned	Highly Unlikely
		Unlikely
		Likely
		Highly Likely
		Definite
Reversibility	The degree to which the ecological effect can be reversed in a reasonable time scale through natural processes or mitigation	Totally
		Partially
		Irreversible
		Not applicable

Based on the above-mentioned descriptors, the characteristics of each effect are used to assign a magnitude to the specific effect. Magnitude designations are provided in Table 18-4.

Table 18-4 Magnitude of effect descriptions

Magnitude	Description
Very High	Total loss of, or very major alteration to, key elements/features of the existing baseline conditions, such that the post-development character, composition and or attributes will be fundamentally changes and may be lost from the site altogether; and/or loss of very high proportion of the known population or range of the elements/features
High	Major loss or major alteration to key elements/features of the existing baseline such that the post-development character, composition and/or attributes will be fundamentally changed; and/or loss of a high proportion of the known population or range of the element/feature
Moderate	Loss or alteration to one or more key elements/features of the existing baseline such that the post-development character, composition and/or attributes will be partially changed; and/or loss of a moderate proportion of the known population or range of the element/feature
Low	Minor shift away from the existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline conditions will be similar or pre-development circumstances or patterns; and or having a minor effect on the known population or range of the element/feature
Negligible	Very slight change from the existing baseline condition. Change barely distinguishable, approximating to the 'no change' situation; and/or having negligible effect on the known population or range of the element/feature

The magnitude of an effect is considered in relation to the ecological value of the habitat or receptor to be impacted on. The ecological value of habitat or receptors are the primary focus of the ecological assessment. The ecological value of habitat or receptors are typically expressed on a local, district, regional or national scale. The ecological value designations are provided in Table 18-5.

Table 18-5 Ecological value descriptions

Value	Description
Very high	Area rates High for three or all the four assessment matters. Likely to be of National importance and recognised as such
High	Area rates High for two of the assessment matters, Moderate and Low for the remainder or Area rates High for 1 so the assessment matters, moderate for the remainder. Likely to be regionally important and recognised as such
Moderate	Area rates High for one matter, Moderate and Low Dortha remainder, or Area rates Moderate for 2 or more assessment matters Low or Very low for the remainder. Likely to be important at the level of the Ecological District
Low	Area rates Low or Very low for most assessment matters and Moderate for one. Limited ecological value other as local habitat for tolerant species
Negligible	Area rates Very low for three matters and Moderate, Low or Very low for the remainder

Once magnitude of effect and the ecological value of the habitat or receptor have been determined, the level of effect can be assigned for each effect using the matrix shown in Table 18-6.

**Table 18-6 Ecological effect matrix**

		Ecological Values				
		Very High	High	Moderate	Low	Negligible
Magnitude	Very High	Very High	Very High	High	Moderate	Low
	High	Very High	Very High	Moderate	Low	Very Low
	Moderate	High	High	Moderate	Low	Very Low
	Low	Moderate	Low	Low	Very Low	Very Low
	Negligible	Low	Very Low	Very Low	Very Low	Very Low
	Positive	Negligible	Negligible	Negligible	Negligible	Negligible

From Table 18-6, the level of effect designations are defined below:

- **Negligible:** An effect of negligible consequence is one where habitat or receptors will not be affected in any meaningful way by a Project activity, or the predicted effect is indistinguishable from natural background variations;
- **Low:** An effect of minor consequence is one where habitat or receptors will experience a noticeable effect, but the effect magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low ecological value. In either case, the magnitude should be well within applicable standards;
- **Moderate:** An effect of moderate consequence has an effect magnitude that is within applicable standards but higher than that of a minor effect. The emphasis for moderate effects is to show that the effect has been reduced or minimised in line with the mitigation hierarchy;
- **High:** A high level of effect of is one where an accepted limit or standard may be exceeded, or moderate magnitude of effect will occur to moderate or high value habitat or receptors;
- **Very High:** A very high level of effect will occur when the magnitude and value of effects are assessed as high or very high. Typically, very high level of effects notably exceeds standard limits.

### 1.3 Impact Management

Informed by the level of effects suitable impact management measures are provided consistent with the mitigation hierarchy. The priority in mitigation is to first apply mitigation measures to the source of the impact (avoid) and then to address the resultant effects (reduce or minimise) of the impact.

### 1.4 Residual Impacts

Once mitigation measures are declared, the next step in the effect assessment process was to assign residual impact significance. This is a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional recommended mitigation measures.

## 1.5 Managing Uncertainty

Biophysical impacts are difficult to predict with certainty, but uncertainty stemming from on-going development of the Project design and implementation is inevitable, and the environment is variable over time. If uncertainties are relevant to the effect assessment, they were stated and approached conservatively, to identify a range of likely residual effects and relevant mitigation measures.

## 1.6 Cumulative Effects

Cumulative impacts and effects are those that arise because of an impact and effect from the Project interacting with those from another activity to create an additional impact and effect. These are termed cumulative impacts and effects. No structured methods were employed to assess cumulative impacts, but where relevant descriptions of potential cumulative effects have been provided.

## 2 Appendix 2 – Auckland Unitary Plan Activities

### Auckland Unitary Plan – E26 Infrastructure

Table E26.4.3.1 below is relevant for considering effects and recommending mitigation in relation to tree removal. Note that, except for Trees in Roads, in Open Space Zones and Notable Trees, trees are not protected under the AUP.

**Table E26.4.3.1 Activity table - Network utilities and electricity generation – Trees in roads and open space zones and the Notable Trees Overlay**

Activity	Activity Status			Permitted Standards or Matters of Discretion / Control
	Trees in roads [dp]	Open space zones [dp]	Notable trees [dp]	
(A89) Tree removal of Notable Trees	N/A	N/A	Discretionary	N/A
(A90) Tree trimming, alteration or removal on roads adjoining rural zones and on roads adjoining the Future Urban Zone	Permitted	N/A	N/A	N/A
(A91) Tree alteration or removal of any tree less than 4m in height and/or less than 400mm in girth	Permitted	Permitted	Restricted Discretionary	N/A
(A92) Tree alteration or removal of any tree greater than 4m in height and/or greater than 400mm in girth	Restricted Discretionary	Restricted Discretionary	N/A	N/A
(A93) Tree trimming, alteration and removal not otherwise provided for	D	D	D	N/A

### Auckland Unitary Plan – E26 Infrastructure

The table below is relevant for considering effects and recommending mitigation in relation to vegetation clearance. Also refer to Table E15.4.1.

Table E26.3.3.1 Activity table – Network utilities and electricity generation and vegetation management

Activity	Activity Status						Permitted Standards
	Rural zones, coastal areas and riparian areas [rp]	SEA [rp]	ONF [dp]	HNC [dp]	ONL [dp]	ONC [dp]	
(A76) Vegetation alteration or removal	P	P	P	P	P	P	Refer to E26.3.5.4. Vegetation alteration or removal for Permitted Activity Standards
(A77) Vegetation alteration or removal that does not comply with Standards E26.3.5.1 to E26.3.5.4	RD	RD	RD	RD	RD	RD	
(A78) Vegetation alteration or removal not otherwise provided for	D	D	D	D	D	D	

Note: Greyed-out boxes relate to Regional Activities which are not considered as part of the NOR and will be relevant for future Regional Resource Consents.

### Auckland Unitary Plan – E15 Vegetation management and biodiversity

Table E15.4.1 below is relevant for considering effects of activities over and above those that are permitted and recommending mitigation in relation to vegetation clearance in urban and FUZ zones, and adjacent to riparian areas.

Table E15.4.1 Activity table - Auckland-wide vegetation and biodiversity management rules

Activity	Activity Status	Permitted Standards
Riparian areas (as described below)		
(A16) Vegetation alteration or removal within 20m of rural streams, other than those in Rural – Rural Production Zone and Rural – Mixed Rural Zone	RD	N/A
(A17) Vegetation alteration or removal within 10m of rural streams in the Rural – Rural Production Zone and Rural – Mixed Rural Zone	RD	N/A

Activity	Activity Status	Permitted Standards
(A18) Vegetation alteration or removal within 20m of a natural inland wetland, in the bed of a river or stream (permanent or intermittent), or lake	RD	N/A
(A19) Vegetation alteration or removal within 10m of urban streams	RD	N/A
All other zones and areas not covered above (i.e. Urban Zones and FUZ)		
(A22A) Vegetation alteration or removal	P	Refer to E15.6. Vegetation alteration or removal for Permitted Activity Standards
All areas		
(A23) Permitted activities in Table E15.4.1 that do not comply with one or more of the standards in E15.6	RD	N/A

### Auckland Unitary Plan – E26 Infrastructure - Earthworks

The table below is relevant for considering effects of activities over and above those that are permitted and recommending mitigation in relation to earthworks.

**Table E26.5.3.1 Activity table - Earthworks all zones and roads [dp]**

Activity	Activity Status	Permitted Standards
(A95) Earthworks up to 2500m <sup>2</sup> other than for maintenance, repair, renewal, minor infrastructure upgrading	P	Refer to E26.5.5.2. General standards (District)
(A96) Earthworks up to 2500m <sup>3</sup> other than for maintenance, repair, renewal, minor infrastructure upgrading	P	Refer to E26.5.5.2. General standards (District)
(A97) Earthworks greater than 2500m <sup>2</sup> other than for maintenance, repair, renewal, minor infrastructure upgrading	RD	N/A
(A97A) Earthworks greater than 2500m <sup>3</sup> other than for maintenance, repair, renewal, minor infrastructure upgrading	RD	N/A

### 3 Appendix 3 – Regional Plan, District Plan and Wildlife Act Matters

Table 18-7 Ecological effects of road infrastructure construction broken down into AUP:OP Regional and District Plan matters, and Wildlife Act (1953)

Ecological feature	Activity	Ecological Effect	AUP:OP District Plan provisions	AUP:OP Regional Plan provisions	Wildlife Act (1953)
<b>Construction</b>					
<b>Terrestrial habitat</b>	Vegetation removal (including trees) outside of roads and public spaces in: <ul style="list-style-type: none"> <li>a) a rural zone</li> <li>b) riparian margins</li> <li>c) coastal areas</li> <li>d) SEAs</li> </ul> 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: <ul style="list-style-type: none"> <li>a) Roads</li> <li>b) Public spaces</li> <li>c) ONFs</li> <li>d) ONLs</li> <li>e) HNCs</li> <li>f) ONCs</li> </ul>	Permanent loss of habitat/ecosystem, fragmentation and edge effects.	✓		
	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.			✓
<b>Bats</b>	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).	✓		✓
<b>Birds (native)</b>	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).	✓		✓
<b>Herpetofauna (native)</b>	Vegetation removal.	Lizard habitat loss		✓	
	Vegetation removal.	Kill or injure individual			✓
	Construction activities (noise, light, dust etc).	Disturbance and displacement of individuals (existing).	✓		✓
	Reclamation/culvertin g/other structures e.g., bank armouring.	Permanent loss/modification of habitat/ecosystem.		✓	
<b>Freshwater habitat – wetland or stream (including riparian margins)</b>	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.		✓	
<b>Fish (native)</b>	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.			✓
<b>Operation</b>					
<b>Terrestrial habitat</b>	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.		✓	
<b>Bats</b>	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.	✓		✓
<b>Birds (native)</b>	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.	✓		✓
<b>Herpetofauna (native)</b>	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.	✓		✓
<b>Freshwater habitat – wetland or stream (including riparian margins)</b>	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.		✓	
<b>Fish (native)</b>	Presence of culvert.	Loss of connectivity due to culvert preventing fish passage up and downstream.		✓	

## 4 Appendix 4 – Desktop and Incidental Fauna Records

Table 18-8 Desktop bird records within 2 km of the Project Area

Common Name	Māori Name	Scientific Name	Conservation Status	Record Source
Australasian bittern	Matuku-hūrepo	<i>Botaurus poiciloptilus</i>	Threatened - Nationally Critical	eBird (Bird Atlas)
Australasian gannet	Tākapu	<i>Australasian gannet</i>	Not Threatened	eBird (Bird Atlas)
Australasian little grebe	Tokitokipio	<i>Tachybaptus novaehollandiae</i>	Non-Resident Native - Coloniser	eBird (Bird Atlas)
Australasian shoveler	Kuruwhengi	<i>Spatula rhynchotis</i>	Not Threatened	eBird (Bird Atlas)
Australian wood duck	-	<i>Australian wood duck</i> <i>Chenonetta jubata</i>	Non-Resident Native - Coloniser	eBird (Bird Atlas)
Banded dotterel	Pohowera	<i>Charadrius bicinctus</i>	At Risk - Declining	eBird (Bird Atlas)
Banded rail	Mioweka	<i>Gallirallus philippensis assimilis</i>	At Risk - Declining	eBird (Bird Atlas)
Barbary dove	-	<i>Streptopelia risoria</i>	Introduced and Naturalised	eBird (Bird Atlas), iNaturalist
Bar-tailed godwit	Kuaka	<i>Limosa lapponica bauer</i>	At Risk - Declining	eBird (Bird Atlas), iNaturalist
Bellbird	Korimako	<i>Anthornis melanura</i>	Not Threatened	eBird (Bird Atlas)
Black shag	Kawau	<i>Phalacrocorax carbo novaehollandiae</i>	At Risk - Naturally Uncommon	eBird (Bird Atlas)
Black-billed gull	Tarāpuka	<i>Larus bulleri</i>	Threatened - Nationally Critical	eBird (Bird Atlas)
Blackbird	Manu pango	<i>Turdus merula</i>	Introduced and Naturalised	eBird (Bird Atlas), iNaturalist
Black swan	Kakīānau	<i>Cygnus atratus</i>	Not Threatened	eBird (Bird Atlas)
Brown teal	Pāteke	<i>Anas chlorotis</i>	At Risk - Recovering	eBird (Bird Atlas), iNaturalist

Common Name	Māori Name	Scientific Name	Conservation Status	Record Source
Brown quail	Kuera	<i>Synoicus ypsilophorus</i>	Introduced and Naturalised	eBird (Bird Atlas)
Buller's shearwater	Rako	<i>Ardenna bulleri</i>	At Risk - Declining	eBird (Bird Atlas)
California quail	Tikaokao	<i>Callipepla californica</i>	Introduced and Naturalised	eBird (Bird Atlas)
Canada goose	-	<i>Branta canadensis</i>	Introduced and Naturalised	eBird (Bird Atlas)
Caspian tern	Taranui	<i>Hydroprogne caspia</i>	Threatened - Nationally Vulnerable	eBird (Bird Atlas), iNaturalist
Cattle egret	-	<i>Bubulcus ibis</i>	Non-Resident Native - Migrant	eBird (Bird Atlas)
Chaffinch	Pahirini	<i>Fringilla coelebs</i>	Introduced and Naturalised	eBird (Bird Atlas), iNaturalist
Common pheasant	Peihana	<i>Phasianus colchicus</i>	Introduced and Naturalised	eBird (Bird Atlas)
Common redpoll	-	<i>Acanthis flammea</i>	Introduced and Naturalised	eBird (Bird Atlas)
Cook's petrel	Tītī	<i>Pterodroma cookii</i>	At Risk - Relict	eBird (Bird Atlas)
Dabchick	Weweia	<i>Poliiocephalus rufopectus</i>	Threatened – Nationally Increasing	eBird (Bird Atlas)
Dunnock	-	<i>Prunella modularis</i>	Introduced and Naturalised	eBird (Bird Atlas)
Eastern rosella	-	<i>Platycercus eximius</i>	Introduced and Naturalised	eBird (Bird Atlas), iNaturalist
Fantail	Pīwakawaka	<i>Rhipidura fuliginosa placabilis</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Flesh-footed shearwater	Toanui	<i>Ardenna carneipes</i>	At Risk - Relict	eBird (Bird Atlas)
Fluttering shearwater	Pakahā	<i>Puffinus gavia</i>	At Risk - Relict	eBird (Bird Atlas)
Goldfinch	-	<i>Carduelis carduelis</i>	Introduced and Naturalised	eBird (Bird Atlas)
Greenfinch	-	<i>Carduelis chloris</i>	Introduced and Naturalised	eBird (Bird Atlas)

Common Name	Māori Name	Scientific Name	Conservation Status	Record Source
Grey duck	Pārerā	<i>Anas superciliosa</i>	Threatened – Nationally Vulnerable	eBird (Bird Atlas)
Grey duck x mallard hybrid	-	<i>Anas platyrhynchos x superciliosa</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Grey teal	Tētē-moroiti	<i>Anas gracilis</i>	Not Threatened	eBird (Bird Atlas)
Grey warbler	Riroriro	<i>Gerygone igata</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Greylag goose	Kuihi	<i>Anser anser</i>	Introduced and Naturalised	eBird (Bird Atlas), iNaturalist
House sparrow	Tiu	<i>Fringilla coelebs</i>	Introduced and Naturalised	eBird (Bird Atlas), iNaturalist
Kingfisher	Kōtare	<i>Todiramphus sanctus vagans</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Laughing kookaburra	-	<i>Dacelo novaeguineae</i>	Introduced and Naturalised	eBird (Bird Atlas)
Little black shag	Kawau tūī	<i>Phalacrocorax sulcirostris</i>	At Risk - Naturally Uncommon	eBird (Bird Atlas), iNaturalist
Little shag	Kawau paka	<i>Phalacrocorax melanoleucos</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Long-tailed cuckoo	Koekoeā	<i>Eudynamis taitensis</i>	Threatened – Nationally Vulnerable	Assumed present based on suitable habitat present in the Project Area.
Magpie	Makipae	<i>Gymnorhina tibicen</i>	Introduced and Naturalised	eBird (Bird Atlas)
Mallard	-	<i>Anas platyrhynchos</i>	Introduced and Naturalised	eBird (Bird Atlas), iNaturalist
Morepork	Ruru	<i>Ninox novaeseelandiae</i>	Not Threatened	eBird (Bird Atlas)
Muscovy duck	-	<i>Cairina moschata</i>	Introduced, not established	eBird (Bird Atlas), iNaturalist
Myna	-	<i>Acridotheres tristis</i>	Introduced and Naturalised	eBird (Bird Atlas)
New Zealand dotterel	Tūturiwhatu	<i>Charadrius obscurus</i>	Threatened – Nationally Increasing	eBird (Bird Atlas)

Common Name	Māori Name	Scientific Name	Conservation Status	Record Source
New Zealand pigeon	Kereru	<i>Hemiphaga novaeseelandiae</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
New Zealand pipit	Pīhoihoi	<i>Anthus novaeseelandiae</i>	At Risk - Declining	eBird (Bird Atlas)
New Zealand scaup	Pāpango	<i>Aythya novaeseelandiae</i>	Not Threatened	eBird (Bird Atlas)
North Island fernbird	Mātātā	<i>Poodytes punctatus</i>	At Risk – Declining	eBird (Bird Atlas)
North Island kākā	Kākā	<i>Nestor meridionalis septentrionalis</i>	At Risk – Recovering	eBird (Bird Atlas)
Northern blue penguin	Kororā	<i>Eudyptula minor iredalei</i>	At Risk - Declining	eBird (Bird Atlas)
Paradise shelduck	Pūtangitangi	<i>Tadorna variegata</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Peafowl	Pīkao	<i>Pavo cristatus</i>	Introduced and Naturalised	eBird (Bird Atlas)
Pied shag	Kāruhiruhi	<i>Phalacrocorax varius</i>	At Risk – Recovering	eBird (Bird Atlas), iNaturalist
Pied stilt	Poaka	<i>Himantopus himantopus leucocephalus</i>	Not Threatened	eBird (Bird Atlas)
Pūkeko	Pūkeko	<i>Porphyrio melanotus</i>	Not Threatened	eBird (Bird Atlas)
Red junglefowl (chicken)	Heihei	<i>Gallus gallus domesticus</i>	Introduced and Naturalised	eBird (Bird Atlas)
Red knot	Huahou	<i>Calidris canutus</i>	At Risk - Declining	eBird (Bird Atlas)
Red-billed gull	Tarāpunga	<i>Larus novaehollandiae scopulinus</i>	At Risk - Declining	eBird (Bird Atlas), iNaturalist
Reef heron	Matuku moana	<i>Egretta sacra</i>	Threatened – Nationally Endangered	eBird (Bird Atlas)
Rock pigeon	-	<i>Columba livia</i>	Introduced and Naturalised	eBird (Bird Atlas)
Royal spoonbill	Kōtuku ngutupapa	<i>Platalea regia</i>	At Risk – Naturally Uncommon	eBird (Bird Atlas), iNaturalist

Common Name	Māori Name	Scientific Name	Conservation Status	Record Source
Shining cuckoo	Pīpīwharau	<i>Chrysococcyx lucidus</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Silvereeye	Tauhou	<i>Zosterops lateralis</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Skylark	Kaireka	<i>Alauda arvensis</i>	Introduced and Naturalised	eBird (Bird Atlas)
Song thrush	-	<i>Turdus philomelos</i>	Introduced and Naturalised	eBird (Bird Atlas)
South Island pied oystercatcher	Tōrea	<i>Haematopus finschi</i>	At Risk - Declining	eBird (Bird Atlas)
Southern black-backed gull	Karoro	<i>Larus dominicanus</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Spotless crake	Pūweto	<i>Zapornia tabuensis</i>	At Risk – Declining	Assumed present based on suitable habitat present in the Project Area.
Spotted dove	-	<i>Streptopelia chinensis tigrina</i>	Introduced and Naturalised	eBird (Bird Atlas), iNaturalist
Spur winged plover	-	<i>Vanellus miles novaehollandiae</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Starling	-	<i>Sturnus vulgaris</i>	Introduced and Naturalised	eBird (Bird Atlas)
Swamp harrier	Kāhu	<i>Circus approximans</i>	Not Threatened	eBird (Bird Atlas)
Tomtit	Miromiro	<i>Petroica macrocephala</i>	Not Threatened	eBird (Bird Atlas)
Tūī	Tūī	<i>Prosthemadera novaeseelandiae</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
Variable oystercatcher	Tōrea pango	<i>Haematopus unicolor</i>	At Risk - Recovering	eBird (Bird Atlas)
Welcome swallow	Warou	<i>Hirundo neoxena</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
White-faced heron	Matuku moana	<i>Egretta novaehollandiae</i>	Not Threatened	eBird (Bird Atlas), iNaturalist
White-faced storm petrel	Takahikare	<i>Pelagodroma marina</i>	At Risk - Relict	eBird (Bird Atlas)

Common Name	Māori Name	Scientific Name	Conservation Status	Record Source
White-fronted tern	Tara	<i>Sterna striata</i>	At Risk - Declining	eBird (Bird Atlas), iNaturalist
Wild turkey	Korukoru	<i>Meleagris gallopavo</i>	Introduced and Naturalised	eBird (Bird Atlas)
Yellowhammer	-	<i>Emberiza citrinella</i>	Introduced and Naturalised	eBird (Bird Atlas)

Table 18-9 Incidental bird observations at all NORs

Common Name	Māori Name	Scientific Name	Conservation Status	Relevant NOR
Blackbird	Manu pango	<i>Turdus merula</i>	Introduced and Naturalised	NOR 3, NOR 7
Chaffinch	Pahirini	<i>Fringilla coelebs</i>	Introduced and Naturalised	NOR 3, NOR 7, NOR 8
Common pheasant	Peihana	<i>Phasianus colchicus</i>	Introduced and Naturalised	NOR 7, NOR 7, NOR 8
Eastern rosella	-	<i>Platycercus eximius</i>	Introduced and Naturalised	NOR 7
Fantail	Pīwakawaka	<i>Rhipidura fuliginosa placabilis</i>	Not Threatened	NOR 2, NOR 5, NOR 7, NOR 8
Goldfinch	-	<i>Carduelis carduelis</i>	Introduced and Naturalised	NOR 8
Grey warbler	Riroriro	<i>Gerygone igata</i>	Not Threatened	NOR 5, NOR 7, NOR 8
House sparrow	Tiu	<i>Fringilla coelebs</i>	Introduced and Naturalised	NOR 7
Kingfisher	Kōtare	<i>Todiramphus sanctus vagans</i>	Not Threatened	NOR 2, NOR 5, NOR 7
Mallard	-	<i>Anas platyrhynchos</i>	Introduced and Naturalised	NOR 3
Myna	-	<i>Acridotheres tristis</i>	Introduced and Naturalised	NOR 2
New Zealand pigeon	Kereru	<i>Hemiphaga novaeseelandiae</i>	Not Threatened	NOR 5
Paradise shelduck	Pūtangitangi	<i>Tadorna variegata</i>	Not Threatened	NOR 3, NOR 5, NOR 7

Common Name	Māori Name	Scientific Name	Conservation Status	Relevant NOR
Pūkeko	Pūkeko	<i>Porphyrio melanotus</i>	Not Threatened	NOR 3
Skylark	Kaireka	<i>Alauda arvensis</i>	Introduced and Naturalised	NOR 6, NOR 7
Song thrush	-	<i>Turdus philomelos</i>	Introduced and Naturalised	NOR 3
Spur winged plover	-	<i>Vanellus miles novaehollandiae</i>	Not Threatened	NOR 6, NOR 7
Starling	-	<i>Sturnus vulgaris</i>	Introduced and Naturalised	NOR 5, NOR 8
Swamp harrier	Kāhu	<i>Circus approximans</i>	Not Threatened	NOR 2, NOR 3, NOR 5, NOR 6, NOR 7
Tūī	Tūī	<i>Prothemadera novaeseelandiae</i>	Not Threatened	NOR 2, NOR 7, NOR 8
Welcome swallow	Warou	<i>Hirundo neoxena</i>	Not Threatened	NOR 2, NOR 6, NOR 7

## **5 Appendix 5 – Ecological Habitat Maps**

### **5.1 NOR 1: Northern Public Transport Interchange and Park & Ride, and Western Link - North Western Link - North**

#### **5.1.1 Terrestrial Vegetation**



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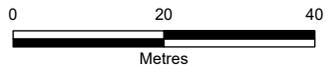
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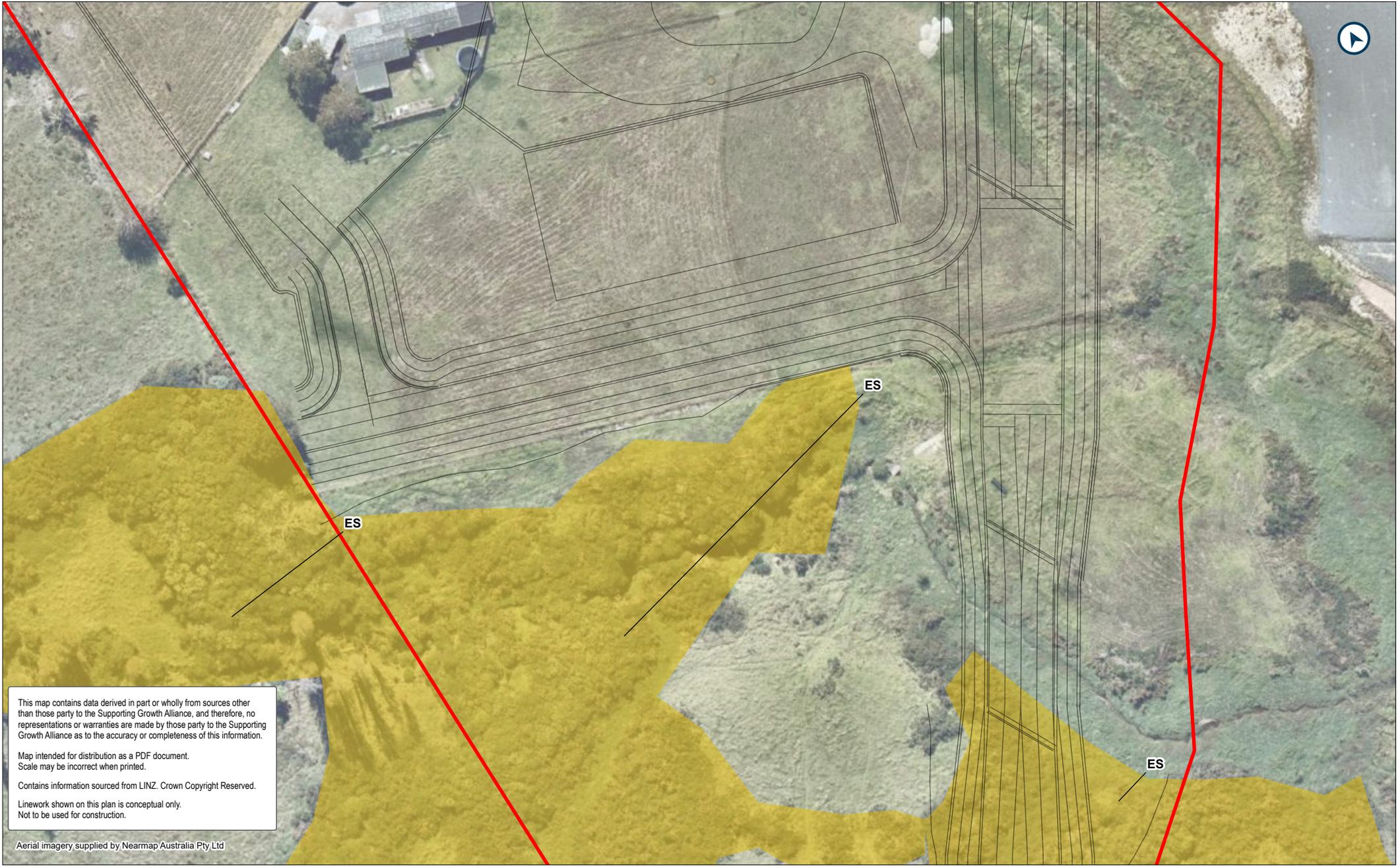
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### LEGEND

- Route Option
- Designation





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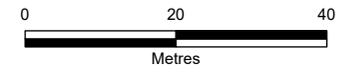
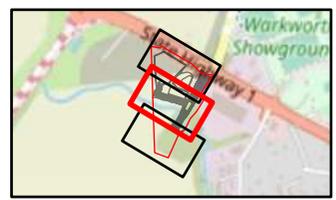
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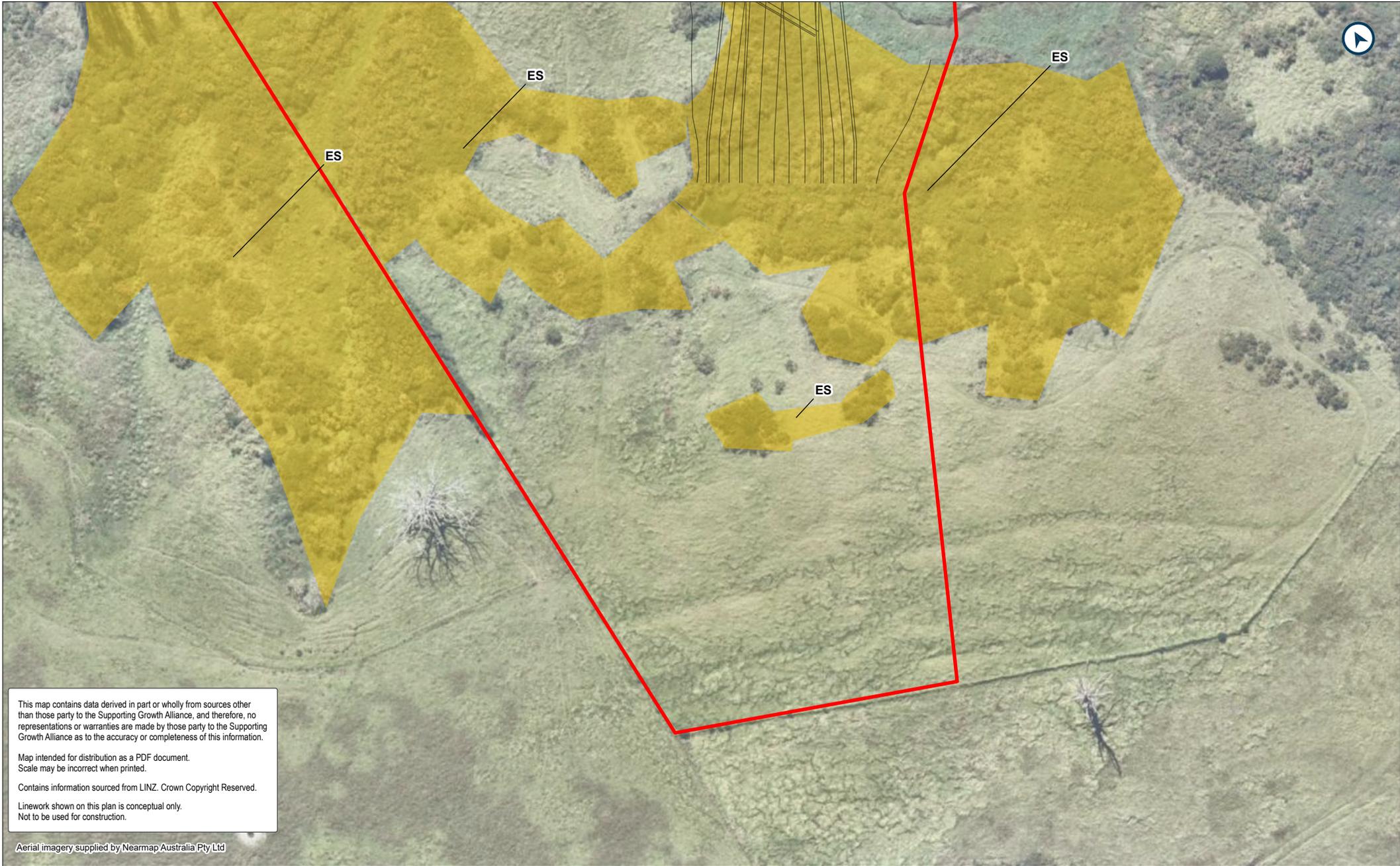
— Route Option

□ Designation

Habitat mapping

■ ES





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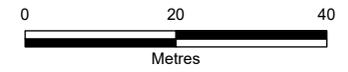
### LEGEND

— Route Option

□ Designation

Habitat mapping

■ ES



## 5.1.2 Freshwater Streams and Wetland Habitat



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### LEGEND

— Route Option

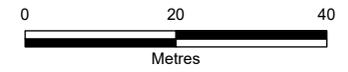
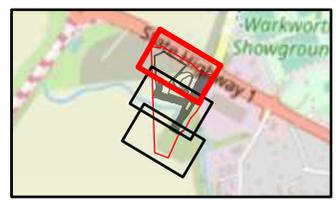
▭ Designation

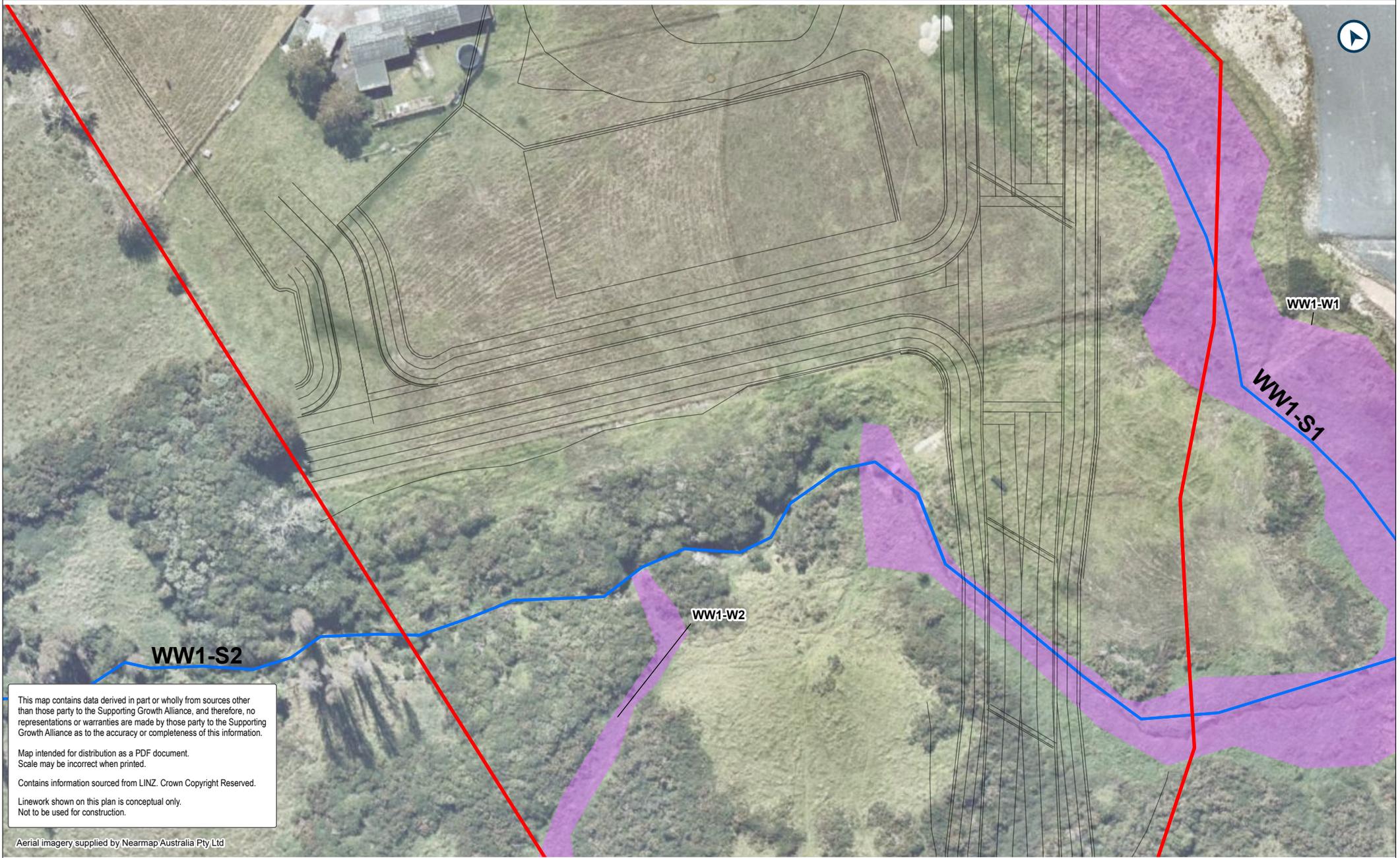
Stream classification

— Permanent

Habitat mapping

EW





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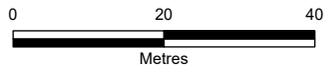
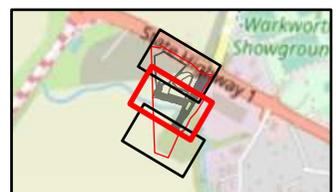
### LEGEND

— Route Option

▭ Designation

Stream classification  
— Permanent

Habitat mapping  
EW





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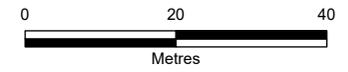
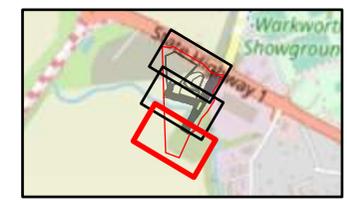
### LEGEND

— Route Option

▭ Designation

Stream classification  
— Permanent

Habitat mapping  
EW



## 5.2 NOR 2: Woodcocks Road Upgrade (Western Section)

### 5.2.1 Terrestrial Vegetation



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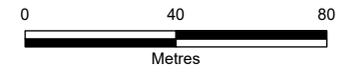
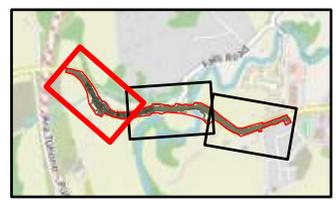
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### LEGEND

- Route Option
- Designation
- BF
- PL.1
- PL.2
- PL.3
- TL.3
- WF11





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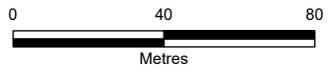
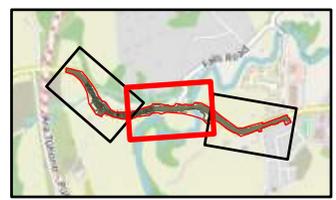
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### LEGEND

- Route Option
- Designation
- PL.3
- TL.3
- WF11
- TL.2
- VS2
- ES





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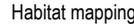
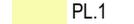
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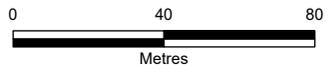
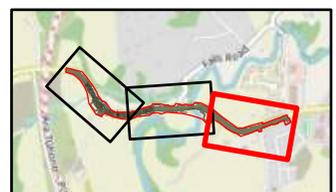
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### LEGEND

-  Route Option
-  Designation
-  Habitat mapping
-  PL.1
-  PL.3
-  TL.2
-  TL.3



## 5.2.2 Freshwater Streams and Wetland Habitat



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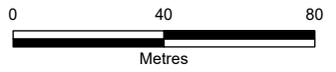
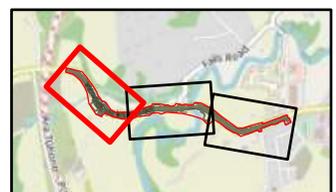
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### LEGEND

- Route Option
- Designation
- Stream classification  
Permanent
- Habitat mapping  
EW
- OW





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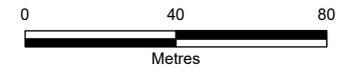
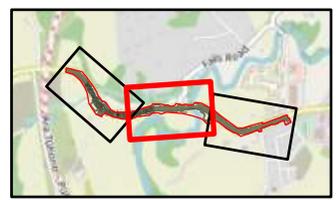
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### LEGEND

-  Route Option
-  Designation
-  Stream classification
-  Permanent





## 5.3 NOR 3: State Highway 1 Upgrade (Southern Section)

### 5.3.1 Terrestrial Vegetation



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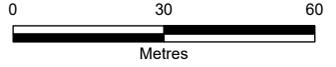
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### LEGEND

- Route Option
- Designation
- Habitat mapping
- PL.1
- PL.3
- TL
- TL.3





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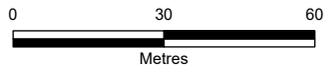
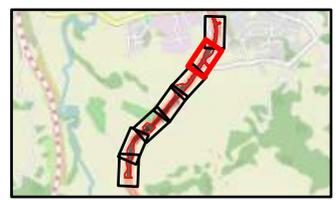
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### LEGEND

- Route Option
- ▭ Designation
- Habitat mapping
- ▭ ES
- ▭ PL.1
- ▭ PL.3
- ▭ TL
- ▭ TL.3







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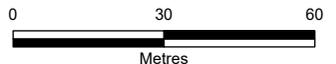
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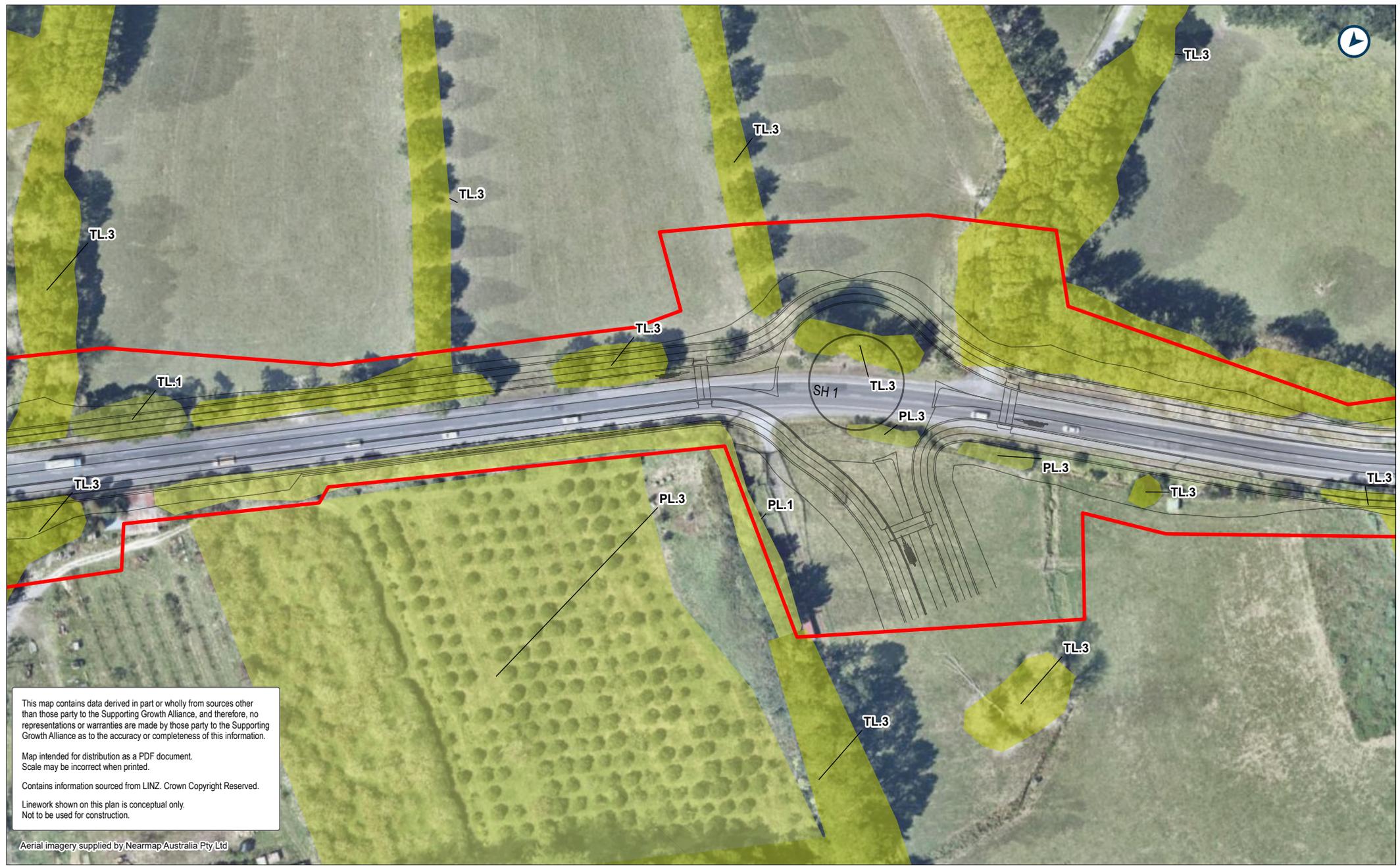
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### LEGEND

- Route Option
- Designation
- PL.3
- PL.1
- TL.3
- TL.1





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### LEGEND

- Route Option
- Designation
- Habitat mapping
- PL.1
- PL.3
- TL.1
- TL.3

