

Attributes to be considered	4 - BF	4 - EG	4 - MF4	4 - PL.1	4 - PL.2	4 - PL.3	4 - TL.1	4 - TL.2	4 - TL.3	4 - VS2	4 - WF 13	Justification
												<p>terrestrial TAR native bird species. Arboreal geckos anticipated to use areas of MF4, VS2, and WF13. TL.1 scored lower as it is restricted to a few isolated trees. VS2 scored lower as it is fragmented between Matakana Road and Sandspit Road, but could be used as a stepping stone between the SEAs to the west, north, and east of this habitat. Area of WF13 is also designated as a Significant Ecological Area (SEA_T_2260).</p> <p>All other habitat is not important in terms of connectivity for the survival of any species at any scale.</p>
<b>Combined value</b>	<b>N</b>	<b>L</b>	<b>H</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>VH</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 6.5 NOR 5: Sandspit Road Upgrade

Table 18-14 Assessment of ecological value for terrestrial ecology features for NOR 5

Attributes to be considered	5 - BF	5 - EF	5 - EG	5 - ES	5 - MF4	5 - PL.1	5 - PL.3	5 - TL.2	5 - TL.3	5 - VS2	5 - WF 11	5 - WF 7.1	Justification
<b>Representativeness</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>4</b>	
Typical structure and composition	1	1	1	1	3	2	1	2	1	3	4	4	<p>BF, EF, EG, ES, PL.3, TL.3: Habitats have been significantly altered by human activities (exotic dominated).</p> <p>PL.1, TL.2: Habitat and species have been affected by human activities. TL.2 included due to its restricted extent and development either side. PL.1 included as it is restricted to a few isolated trees.</p>

Attributes to be considered	5 - BF	5 - EF	5 - EG	5 - ES	5 - MF4	5 - PL. 1	5 - PL. 3	5 - TL. 2	5 - TL. 3	5 - VS2	5 - WF 11	5- WF 7.1	Justification
													MF4, VS2, WF11: Habitat has been insignificantly affected by human activities.
Indigenous representation	1	2	1	2	4	4	2	3	2	4	4	4	BF, EG: <10% of the species are indigenous. ES, EF, PL.3, TL.3: 10-50% of the species are indigenous. TL.2: 50-90% of the species are indigenous. MF4, PL.1, VS2, WF11, WF7.1: >90% of the species are indigenous.
<b>Rarity/distinctiveness</b>	<b>0</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	
Species of conservation significance	-	4	3	3	4	2	2	4	4	4	4	4	<p>Long-tailed bat (Threatened – Nationally Critical, value score of 4) present and potentially using suitable habitat (EF, MF4, TL.2, TL.3, VS2, WF11).</p> <p>TAR bird species including New Zealand pipit (At Risk - Declining, value score of 3), North Island kākā (At Risk - Recovering, value score of 3), long-tailed cuckoo (Threatened - Nationally Vulnerable, value score of 4) expected to utilise suitable habitat (EG for pipit, and EF, MF4, TL.2, TL.3, VS2, WF11 for kākā and long-tailed cuckoo).</p> <p>Copper skink and omate skink (At Risk - Declining, value score 3) likely to utilise suitable habitat (all habitat types with appropriate understorey excluding BF).</p> <p>Elegant gecko (At Risk - Declining, value score of 3), forest gecko (At Risk - Declining, value score of 3), and pacific gecko (Not Threatened nationally, however considered Regionally Declining (Melzer et al., 2022) in the Auckland region, therefore given a Moderate ecological value), likely to utilise suitable habitat (MF4, TL.1, TL.2, WF11).</p>

Attributes to be considered	5 - BF	5 - EF	5 - EG	5 - ES	5 - MF4	5 - PL. 1	5 - PL. 3	5 - TL. 2	5 - TL. 3	5 - VS2	5 - WF 11	5- WF 7.1	Justification
													PL.1 and PL.3 scored lower due to small habitat extent and location along roadside/residential gardens.
Distinctive ecological values	-	-	-	-	3	-	-	-	-	2	3	3	MF4, VS2, WF11: Habitat playing an important role in provisional or regulatory ecosystem services typically on Regional scale (native forest cover). VS2 scored lower due to smaller extent and existing fragmentation.  All other habitats not playing an important role in provisional or regulatory ecosystem services at any scale.
<b>Diversity and pattern</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>4</b>	
Habitat diversity	1	1	1	1	2	1	1	1	1	2	4	4	Increased habitat diversity in areas with indigenous species present and in areas with late succession.  WF11, WF7.1: Very High diversity of vegetation and geomorphological structure and Moderate patchiness interspersed.
Species diversity	1	1	1	1	2	1	1	1	1	2	3	3	Increased species diversity in areas with indigenous species present and in areas with late succession: WF11
Patterns in habitat use	1	3	1	1	3	1	1	3	3	3	3	3	EF, MF4, TL.1, TL.2, TL.3, VS2, WF11 rated high due to potential seasonal utilisation by long-tailed bat, North Island kākā, and long-tailed cuckoo.  All other habitats are not important for lifecycle completion or periodic habitat utilisation on any scale.
<b>Ecological context</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>4</b>	
Size, shape and buffering	-	2	-	-	3	-	-	3	-	-	2	2	Large extent of TL.2, and provides buffering to permanent stream WW5-S1. Large extent of MF4, provides buffering to WW5-S1 and WW5-

Attributes to be considered	5 - BF	5 - EF	5 - EG	5 - ES	5 - MF4	5 - PL. 1	5 - PL. 3	5 - TL. 2	5 - TL. 3	5 - VS2	5 - WF 11	5- WF 7.1	Justification
													S2. Moderate extent of EF also provides buffering to WW5-S2. Moderate extent of WF11 provides some buffering function to MF4 habitat. All other habitat is represented by small and isolated patches of habitat.
Sensitivity to change	-	-	-	-	3	-	-	-	-	2	2	2	MF4, VS2, WF11, WF7.1: Intact habitat and late succession.  MF4: Regional IUCN threat status is Critically Endangered. All other habitats are generally modified with no residual sensitive receptors.
Ecological networks (linkages, pathways, migration)	-	3	-	-	3	-	-	3	2	2	2	4	Aged woody structure (EF, MF4, TL.2, TL.3, VS2, and WF11) increase stepping stone value (connecting other areas of ecological value) for long-tailed bats and other terrestrial TAR native bird species. Arboreal geckos anticipated to use areas of MF4, VS2, and WF11. VS2 scored lower as it is fragmented between Matakana Road and Sandspit Road, but could be used as a stepping stone between the SEAs to the west, north, and east of this habitat. Area of WF11 south of Matakana Road is also designated as a Significant Ecological Area. WF11 relatively small and isolated. WF7.1 provided ecological connection to upslope and downslope forested areas (including SNAs) All other habitats are not important in terms of connectivity for the survival of any species at any scale.
<b>Combined value</b>	<b>N</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>H</b>	<b>L</b>	<b>L</b>	<b>H</b>	<b>M</b>	<b>H</b>	<b>H</b>	<b>VH</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 6.6 NOR 6: New Western Link - South

Table 18-15 Assessment of ecological value for terrestrial ecology features for NOR 6

Attributes to be considered	6 - BF	6 - EG	6 - ES	6 - PL.1	6 - TL.3	Justification
<b>Representativeness</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>2</b>	
Typical structure and composition	1	1	1	2	2	BF, EG, ES: Habitats have been significantly altered by human activities (exotic dominated). PL.1, TL.3: Habitat and species have been affected by human activities.
Indigenous representation	1	1	2	4	2	BF, EG: <10% of the species are indigenous. ES, TL.3: 10-50% of the species are indigenous. PL.1: >90% of the species are indigenous.
<b>Rarity/distinctiveness</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>4</b>	
Species of conservation significance	-	3	2	3	4	Long-tailed bat (Threatened – Nationally Critical, value score of 4) present and potentially using suitable habitat (TL.3).  TAR bird species including New Zealand pipit (At Risk - Declining, value score of 3) expected to utilise suitable habitat (EG).  Copper skink (At Risk - Declining, value score 3) likely to utilise suitable habitat (all habitat types excluding BF).  ES rated lower due to small extent that is isolated and located adjacent to the road.
Distinctive ecological values	-	-	-	-	-	All habitats not playing an important role in provisional or regulatory ecosystem services at any scale.
<b>Diversity and pattern</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	
Habitat diversity	1	1	1	1	1	Low diversity of vegetation and geomorphological structure and low patchiness/interspersion (uniformity).
Species diversity	1	1	1	1	1	Species diversity not significant at any scale.

Attributes to be considered	6 - BF	6 - EG	6 - ES	6 - PL.1	6 - TL.3	Justification
Patterns in habitat use	1	1	1	1	1	All habitats are not important for lifecycle completion or periodic habitat utilisation on any scale.
<b>Ecological context</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	
Size, shape and buffering	-	-	-	1	-	PL.1 provides limited buffering to intermittent streams WW6-S1 and WW6-S2. All other habitats are represented by small and isolated patches of habitat.
Sensitivity to change	-	-	-	-	-	All habitats are generally modified with no residual sensitive receptors.
Ecological networks (linkages, pathways, migration)	-	-	-	-	-	All habitats in the context of NOR 6 are not considered important in terms of connectivity for the survival of any species at any scale.
<b>Combined value</b>	<b>N</b>	<b>L</b>	<b>L</b>	<b>M</b>	<b>L</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 6.7 NOR 7: Sandspit Link

Table 18-16 Assessment of ecological value for terrestrial ecology features for NOR 7

Attributes to be considered	7 - BF	7 - EG	7 - MF4	7 - PL.1	7 - PL.3	7 - TL.1	7 - TL.3	7 - WF 11	7 - WF 7.1	Justification
<b>Representativeness</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>4</b>	
Typical structure and composition	1	1	4	2	1	3	2	3	2	BF, EG, PL.3: Habitats have been significantly altered by human activities (exotic dominated). PL.1, TL.3: Habitat and species have been affected by human activities. TL.1, MF4: Habitat has been insignificantly affected by human activities (MF4 scored higher as it is native forest cover). WF11: Totara dominated, no or little understory, modified remnant forest WF7.1: modified and remnant
Indigenous representation	1	1	4	4	2	4	2	4	4	BF, EG: <10% of the species are indigenous. PL.3, TL.3: 10-50% of the species are indigenous. MF4, PL.1, TL.1, WF11, WF7.1: >90% of the species are indigenous.
<b>Rarity/distinctiveness</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>4</b>	
Species of conservation significance	-	3	4	2	2	2	4	4	4	Long-tailed bat (Threatened – Nationally Critical, value score of 4) present and potentially using suitable habitat (MF4, TL.1, TL.3, WF11, WF7.1).  TAR bird species including New Zealand pipit (At Risk - Declining, value score of 3), North Island kākā (At Risk - Recovering, value score of 3), long-tailed cuckoo (Threatened - Nationally Vulnerable, value score of 4) expected to utilise suitable habitat (EG for pipit, and MF4, PL.1, TL.1, WF11 for kākā and long-tailed cuckoo).  Copper skink and omate skink (At Risk - Declining, value score 3) likely to utilise suitable habitat (all habitat types excluding BF).

Attributes to be considered	7 - BF	7 - EG	7 - MF4	7 - PL.1	7 - PL.3	7 - TL.1	7 - TL.3	7 - WF 11	7 - WF 7.1	Justification
										Elegant gecko (At Risk - Declining, value score of 3), forest gecko (At Risk - Declining, value score of 3), and pacific gecko (Not Threatened nationally, however considered Regionally Declining (Melzer et al., 2022) in the Auckland region, therefore given a Moderate ecological value), likely to utilise suitable habitat (MF4, PL.1, TL.1, WF11). PL.1 and PL.3 scored lower due to small habitat extent/early growth.  TL.1 scored lower as the habitat is restricted to a few trees adjacent to wetland WW7-W3.
Distinctive ecological values	-	-	3	-	-	-	-	3	3	MF4, WF11, WF7.1: Habitat playing an important role in provisional or regulatory ecosystem services typically on Regional scale (native forest cover).  All other habitats not playing an important role in provisional or regulatory ecosystem services at any scale.
<b>Diversity and pattern</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>3</b>	
Habitat diversity	1	1	3	1	1	2	2	4	3	MF4, WF11, WF7.1: Very High diversity of vegetation and geomorphological structure and Moderate patchiness interspersed. TL.1 and TL.3 scored lower as restricted to stands or rows of a few trees.  All other habitats have a Low diversity of vegetation and geomorphological structure and low patchiness/interspersion (uniformity).
Species diversity	1	1	3	1	1	1	1	4	3	Increased species diversity in areas with indigenous species present and late succession: MF4, WF11, WF7.1. MF4 scored slightly lower as the habitat is restricted to a buffer around stream WW7-S4.  Species diversity not significant at any scale for all other habitats.
Patterns in habitat use	1	1	3	1	1	2	2	3	3	MF4, TL.1, TL.3, WF11, WF7.1 rated high due to potential seasonal utilisation by long-tailed bat, North Island kākā, and long-tailed cuckoo.

Attributes to be considered	7 - BF	7 - EG	7 - MF4	7 - PL.1	7 - PL.3	7 - TL.1	7 - TL.3	7 - WF 11	7 - WF 7.1	Justification
										<p>TL.1 and TL.3 scored lower as restricted to stands or rows of a few trees.</p> <p>All other habitats are not important for lifecycle completion or periodic habitat utilisation on any scale.</p>
<b>Ecological context</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	
Size, shape and buffering	-	-	2	-	-	-	1	2	2	<p>Large extent of WF11 provides buffering to numerous streams in the area. Relatively small extent of remnant WF11 left.</p> <p>MF4 provides buffering to WW7-S4.</p> <p>Small extent of TL.3 provides some buffering function to streams in the NOR.</p> <p>All other habitat is represented by small and isolated patches of habitat.</p>
Sensitivity to change	-	-	3	-	-	-	-	2	2	<p>MF4, WF11, WF7.1: Intact habitat and late succession.</p> <p>MF4: Regional IUCN threat status is Critically Endangered.</p> <p>WF11: Regional IUCN threat status is Endangered.</p> <p>All other habitats are generally modified with no residual sensitive receptors.</p>
Ecological networks (linkages, pathways, migration)		1	3	1	1	2	2	2	2	<p>All habitats (excluding BF) are locally an important breeding and feeding link in terms of connectivity for the survival of species (e.g. native birds).</p> <p>Aged woody structure (MF4, TL.1, TL.3, WF11) increase stepping stone value (connecting other areas of ecological value) for long-tailed bats and other terrestrial TAR native bird species. WF11, TL.1 and TL.3 scored lower due to limited extent.</p>
<b>Combined value</b>	<b>N</b>	<b>L</b>	<b>H</b>	<b>L</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>H</b>	<b>H</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 6.8 NOR 8: Wider Western Link (North)

Table 18-17 Assessment of ecological value for terrestrial ecology features for NOR 8

Attributes to be considered	8 - BF	8 - EG	8 - PL.2	8 - PL.3	8 - TL.3	8 - VS2	8 - WF7	Justification
<b>Representativeness</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>4</b>	
Typical structure and composition	1	1	2	1	2	3	3	BF, EG, PL.3: Habitats have been significantly altered by human activities (exotic dominated). PL.2, TL.3: Habitat and species have been affected by human activities. VS2, WF7: Habitat has been insignificantly affected by human activities.
Indigenous representation	1	1	4	2	2	4	4	BF, EG: <10% of the species are indigenous. PL.3, TL.3: 10-50% of the species are indigenous. PL.2, VS2, WF7: >90% of the species are indigenous.
<b>Rarity/distinctiveness</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>4</b>	
Species of conservation significance	-	3	2	2	4	4	4	Long-tailed bat (Threatened – Nationally Critical, value score of 4) present and potentially using suitable habitat (TL.3, VS2, WF7).  TAR bird species including New Zealand pipit (At Risk - Declining, value score of 3), North Island kākā (At Risk - Recovering, value score of 3), long-tailed cuckoo (Threatened - Nationally Vulnerable, value score of 4) expected to utilise suitable habitat (EG for pipit, and VS2, WF7 for kākā and long-tailed cuckoo).  Copper skink and omate skink (At Risk - Declining, value score 3) likely to utilise suitable habitat (all habitat types excluding BF).  Elegant gecko (At Risk - Declining, value score of 3), forest gecko (At Risk - Declining, value score of 3), and pacific gecko (Not Threatened nationally, however considered Regionally Declining (Melzer et al., 2022) in the Auckland region, therefore given a Moderate ecological value), likely to utilise suitable habitat (VS2, WF7).

Attributes to be considered	8 - BF	8 - EG	8 - PL.2	8 - PL.3	8 - TL.3	8 - VS2	8 - WF7	Justification
								PL.2 and PL.3 scored lower due to small extent of habitat and location along roadside.
Distinctive ecological values	-	-	-	-	-	3	3	VS2, WF7: Habitat playing an important role in provisional or regulatory ecosystem services typically on Regional scale (native forest cover).  All other habitats not playing an important role in provisional or regulatory ecosystem services at any scale.
<b>Diversity and pattern</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>3</b>	
Habitat diversity	1	1	1	1	1	3	3	VS2, WF7: Very High diversity of vegetation and geomorphological structure and Moderate patchiness interspersed.  All other habitats have a Low diversity of vegetation and geomorphological structure and low patchiness/interspersion (uniformity).
Species diversity	1	1	1	1	1	2	2	Increased species diversity in areas with indigenous species present and late succession: VS2, WF7.  Species diversity not significant at any scale for all other habitats.
Patterns in habitat use	1	1	1	1	1	3	3	VS2 and WF7 rated high due to potential seasonal utilisation by long-tailed bat, North Island kākā, and long-tailed cuckoo.  All other habitats are not important for lifecycle completion or periodic habitat utilisation on any scale.
<b>Ecological context</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>3</b>	
Size, shape and buffering	-	-	-	-	-	2	2	Both WF11 and VS2 provide a buffering function to permanent stream WW8-S3.  All other habitats are represented by small and isolated patches.

Attributes to be considered	8 - BF	8 - EG	8 - PL.2	8 - PL.3	8 - TL.3	8 - VS2	8 - WF7	Justification
Sensitivity to change	-	-	-	-	-	2	3	VS2, WF7: Intact habitat and late succession. WF7: Regional IUCN threat status: Critically Endangered. All other habitats are generally modified with no residual sensitive receptors.
Ecological networks (linkages, pathways, migration)	-	1	1	1	1	3	3	All habitats (excluding BF) are locally an important breeding and feeding link in terms of connectivity for the survival of species (e.g. native birds).  Aged woody structure (VS2, WF7) increases stepping stone value (connecting other areas of ecological value) for long-tailed bats and other terrestrial TAR native bird species.
<b>Combined value</b>	<b>N</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>H</b>	<b>H</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 7 Appendix 7 – Aquatic Value Assessment

### 7.1 NOR 1: Northern Public Transport Interchange and Park & Ride, and Western Link - North (Northern Section)

Table 18-18 Assessment of ecological value for aquatic ecology features for NOR 1

Attributes to be considered	WW1-S1	WW1-S2	Justification
<b>Representativeness</b>	<b>1</b>	<b>1</b>	
Riparian habitat modification	1	1	WW1-S1, WW1-S2 riparian features have been significantly altered by agricultural/horticultural activities (desktop assessment).
<b>Rarity/distinctiveness</b>	<b>1</b>	<b>3</b>	
Species of conservation significance	1	3	<p>Īnanga (At Risk - Declining) and longfin eel (At Risk – Declining) has been recorded in the wider catchment associated with NOR 1 (Mahurangi River). There is a high likelihood that these species utilise permanent streams (WW1-S2).</p> <p>WW1-S1 recently modified due to construction (unrelated to the Project).</p> <p>Common native species were identified via desktop in wider catchment.</p>
<b>Diversity and pattern</b>	<b>2</b>	<b>2</b>	
Level of natural diversity	2	2	<p>WW1-S1 desktop proxy: M, P, LO, LG, 3 = 2</p> <p>WW1-S2 desktop proxy: SS, P, LO, LG, 4 = 2</p>
<b>Ecological context</b>	<b>4</b>	<b>4</b>	
Stream order	2	3	<p>Order 1 streams = WW1-S1</p> <p>Order 2 streams = WW1-S2</p>

Attributes to be considered	WW1 -S1	WW1 -S2	Justification
Hydroperiod	4	4	Permanent streams = WW1-S1, WW1-S2
<b>Combined value</b>	<b>L</b>	<b>M</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

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

Table 18-19 Assessment of ecological value for aquatic ecology features for NOR 2

Attributes to be considered	WW2-S1	WW2-S2	WW2-S3	WW2-S4	Justification
<b>Representativeness</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>1</b>	
Riparian habitat modification	3	2	3	1	RHA total score is 70-90% relative to reference = WW2-S1, WW2-S3 RHA total score is 40-70% relative to reference = WW2-S2 All other RHA total scores are <40%.
<b>Rarity/distinctiveness</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	
Species of conservation significance	3	3	3	2	Īnanga (At Risk Declining) and longfin eel (At Risk – Declining) has been recorded in the wider catchment associated with NOR 2 (value score of 3).  Longfin eel (At Risk - Declining) and gambusia observed at WW2-S2.  Common native species were identified via desktop in wider catchment.  Fish habitat scores are 19/20 (WW2-S1), 13/20 (WW2-S2), 17/20 (WW2-S3), and 10/20 (WW2-S4).
<b>Diversity and pattern</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>2</b>	
Level of natural diversity	4	3	3	2	Instream RHA scores: WW2-S1 = 43 (4) WW2-S2 = 26 (3) WW2-S3 = 34 (3) WW2-S4 = 17 (2)
<b>Ecological context</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>3</b>	

Attributes to be considered	WW2-S1	WW2-S2	WW2-S3	WW2-S4	Justification
Stream order	4	3	4	1	Order 4 streams = WW2-S1, WW2-S3 Order 2 streams = WW2-S2 All other streams are zero order streams.
Hydroperiod	4	4	4	3	Intermittent streams = WW2-S4 Permanent streams = WW2-S1, WW2-S2, WW2-S3
Connectivity and migration	4	-	4	-	Riparian connectivity between SEAs in the wider landscape.
<b>Combined value</b>	<b>H</b>	<b>M</b>	<b>H</b>	<b>L</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

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

Table 18-20 Assessment of ecological value for aquatic ecology features for NOR 3

Attributes to be considered	WW3-S1a	WW3-S1b	WW3-S1c	WW3-S2a	WW3-S2b	WW3-S3a	WW3-S3b	WW3-S4a	WW3-S4b	Justification
<b>Representativeness</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	
Riparian habitat modification	2	2	2	1	1	1	1	2	2	RHA total score is 40-70% relative to reference = WW3-S1a, WW3-S1b, WW3-S1c, WW3-S4a, WW3-S4b All other RHA total scores are <40%.
<b>Rarity/distinctiveness</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	
Species of conservation significance	3	3	3	3	3	2	3	3	3	Longfin eel (At Risk – Declining) has been recorded in the wider catchment associated with NOR 3.  Common native species were identified via desktop in wider catchment.  Fish habitat: WW3-S1a = 11 (3) WW3-S1b = 13 (3) WW3-S1c = 11 (3) WW3-S2a = 11 (3) WW3-S2b = 11 (3) WW3-S3a = 7 (2) WW3-S3b = 11 (3) WW3-S4a = 13 (3) WW3-S4b = 15 (3)
<b>Diversity and pattern</b>	<b>3</b>	<b>2</b>								
Level of natural diversity	3	2	2	2	2	2	2	2	2	Instream RHA scores: WW3-S1a = 26 (3) WW3-S1b = 25 (2)

Attributes to be considered	WW3-S1a	WW3-S1b	WW3-S1c	WW3-S2a	WW3-S2b	WW3-S3a	WW3-S3b	WW3-S4a	WW3-S4b	Justification
										WW3-S1c = 17 (2) WW3-S2a = 21 (2) WW3-S2b = 21 (2) WW3-S3a = 13.5 (2) WW3-S3b = 17 (2) WW3-S4a = 22 (2) WW3-S4b = 21 (2)
<b>Ecological context</b>	<b>4</b>									
Stream order	3	3	1	2	2	1	1	2	1	Order 2 streams = WW3-S1a, WW3-S1b Order 1 streams = WW3-S2a, WW3-S2b, WW3-S4a All other streams are zero order streams.
Hydroperiod	4	4	4	4	4	4	4	4	4	All streams are permanent streams.
<b>Combined value</b>										

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 7.4 NOR 4: Matakana Road Upgrade

Table 18-21 Assessment of ecological value for aquatic ecology features for NOR 4

Attributes to be considered	WW4-S1	WW4-S2	WW4-S3	Justification
<b>Representativeness</b>	<b>1</b>	<b>1</b>	<b>1</b>	
Riparian habitat modification	1	1	1	All RHA total scores are <40%.
<b>Rarity/distinctiveness</b>	<b>1</b>	<b>1</b>	<b>1</b>	
Species of conservation significance	1	1	1	Īnanga (At Risk - Declining) and longfin eel (At Risk – Declining) has been recorded in the wider catchment associated with NOR 4. However, fish cover diversity and abundance score very low in the RHA. Common native species were identified via desktop in wider catchment.
<b>Diversity and pattern</b>	<b>1</b>	<b>1</b>	<b>1</b>	
Level of natural diversity	1	1	1	Instream RHA scores: WW4-S1 = 5 (1) WW4-S2 = 5 (1) WW4-S3 = 5 (1)
<b>Ecological context</b>	<b>3</b>	<b>3</b>	<b>3</b>	
Stream order	1	1	1	All streams are zero order streams.
Hydroperiod	3	3	3	All streams are intermittent.
<b>Combined value</b>	<b>L</b>	<b>L</b>	<b>L</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 7.5 NOR 5: Sandspit Road Upgrade

Table 18-22 Assessment of ecological value for aquatic ecology features for NOR 5

Attributes to be considered	WW5-S1	WW5-S2	WW5-S3	WW5-S4	WW5-S5	WW5-S6	Justification
<b>Representativeness</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	
Riparian habitat modification	3	2	1	1	1	2	RHA total score is 70-90% relative to reference = WW5-S1 RHA total score is 40-70% relative to reference = WW5-S2, WW5-S6 RHA total score is <40% relative to reference = WW5-S3, WW5-S4, WW5-S5
<b>Rarity/distinctiveness</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	
Species of conservation significance	3	3	1	2	1	2	Īnanga (At Risk – Declining) and longfin eel (At Risk – Declining) has been recorded in the wider catchment associated with the Project Area (value score of 3). Hochstetter's frog (At Risk - Declining) potentially found in area. Fish habitat scores are: WW5-S1 = 16/20 (3) WW5-S2 = 14/20 (3) WW5-S3 = 4/20 (1) WW5-S4 = 8/20 (2) WW5-S5 = 5/20 (1) WW5-S6 = 6/20 (2)
<b>Diversity and pattern</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	
Level of natural diversity	4	3	1	2	1	2	Instream RHA scores: WW5-S1 = 43 (4) WW5-S2 = 30 (3) WW5-S3 = 8 (1) WW5-S4 = 14 (2) WW5-S5 = 12 (1) WW5-S6 = 18 (2)

Attributes to be considered	WW5-S1	WW5-S2	WW5-S3	WW5-S4	WW5-S5	WW5-S6	Justification
<b>Ecological context</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	
Stream order	3	2	1	1	1	1	Order 2 stream = WW5-S1 Order 1 stream = WW5-S2 All other streams are zero order.
Hydroperiod	4	4	3	3	3	3	Permanent streams = WW5-S1, WW5-S2 All other streams are intermittent.
<b>Combined value</b>	<b>H</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>M</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 7.6 NOR 6: New Western Link - South

Table 18-23 Assessment of ecological value for aquatic ecology features for NOR 6

Attributes to be considered	WW6-S1	WW6-S2	Justification
<b>Representativeness</b>	<b>2</b>	<b>2</b>	
Riparian habitat modification	2	2	RHA total score is 40-70% relative to reference = WW6-S1, WW6-S2
<b>Rarity/distinctiveness</b>	<b>2</b>	<b>2</b>	
Species of conservation significance	2	2	Īnanga (At Risk – Declining) and longfin eel (At Risk – Declining) has been recorded in the wider catchment associated with the Project Area (value score of 3). However, fish habitat scores are 7/20 (WW6-S2) and 9/20 (WW6-S2), therefore this category has been given a value score of 2.
<b>Diversity and pattern</b>	<b>2</b>	<b>2</b>	
Level of natural diversity	2	2	Instream RHA scores: WW6-S1 = 16 (2) WW6-S2 = 15 (2)
<b>Ecological context</b>	<b>3</b>	<b>3</b>	
Stream order	1	1	Zero order streams = WW6-S1, WW6-S2
Hydroperiod	3	3	Intermittent streams = WW6-S1, WW6-S2
<b>Combined value</b>	<b>M</b>	<b>M</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 7.7 NOR 7: Sandspit Link

Table 18-24 Assessment of ecological value for aquatic ecology features for NOR 7

Attributes to be considered	WW7-S1	WW7-S2a	WW7-S2b	WW7-S3a	WW7-S3b	WW7-S4	WW7-S5	WW7-S6a	WW7-S6b	Justification
<b>Representativeness</b>	1	2	1	2	1	3	1	1	1	
Riparian habitat modification	1	2	1	2	1	3	1	1	1	RHA total score is 70-90% relative to reference = WW7-S4 RHA total score is 40-70% relative to reference = WW7-S2a, WW7-S3a All other RHA total scores are <40%.
<b>Rarity/distinctiveness</b>	2	2	1	2	1	3	1	2	1	
Species of conservation significance	2	2	1	2	1	3	1	2	1	Īnanga (At Risk - Declining) and longfin eel (At Risk – Declining) has been recorded in the wider catchment associated with NOR 7.  Hochstetter's frog (At Risk - Declining) potentially found in WW7-S4  Common native species were identified via desktop in wider catchment.
<b>Diversity and pattern</b>	2	2	1	2	1	4	1	2	1	
Level of natural diversity	2	2	1	2	1	4	1	2	1	Instream RHA scores: WW7-S1 = 13 (2) WW7-S2a = 19 (2) WW7-S2b = 8.5 (1) WW7-S3a = 17 (2) WW7-S3b = 9 (1) WW7-S4 = 45 (4) WW7-S5 = 8 (1) WW7-S6a = 16 (2) WW7-S6b = 8 (1)
<b>Ecological context</b>	3	4	3	4	3	4	3	3	3	

Attributes to be considered	WW7-S1	WW7-S2a	WW7-S2b	WW7-S3a	WW7-S3b	WW7-S4	WW7-S5	WW7-S6a	WW7-S6b	Justification
Stream order	1	1	1	1	1	3	1	1	1	Order 2 streams = WW7-S4 All other streams are zero order streams.
Hydroperiod	3	4	3	4	3	4	3	3	3	Permanent streams = WW7-S2a, WW7-S3a, WW7-S4 All other streams are intermittent.
<b>Combined value</b>	<b>L</b>	<b>M</b>	<b>L</b>	<b>M</b>	<b>L</b>	<b>H</b>	<b>L</b>	<b>L</b>	<b>L</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 7.8 NOR 8: Wider Western Link (North)

Table 18-25 Assessment of ecological value for aquatic ecology features for NOR 8

Attributes to be considered	WW8-S1	WW8-S2	WW8-S3	Justification
<b>Representativeness</b>	<b>2</b>	<b>2</b>	<b>3</b>	
Riparian habitat modification	2	2	3	RHA total score is 40-70% relative to reference = WW8-S1, WW8-S3 WW8-S3: Riparian features have been insignificantly affected by human activities (although surrounded by horticultural/agricultural activities, riparian margin remains relatively unchanged).
<b>Rarity/distinctiveness</b>	<b>2</b>	<b>2</b>	<b>3</b>	
Species of conservation significance	2	2	3	Longfin eel (At Risk – Declining) has been recorded in the wider catchment associated with NOR 8. Common native species were identified via desktop in wider catchment. High quality fish habitat is likely present at WW8-S3. Good quality fish habitat is present at WW8-S2 and WW8-S1.
<b>Diversity and pattern</b>	<b>2</b>	<b>2</b>	<b>3</b>	
Level of natural diversity	2	2	3	Instream RHA scores: WW8-S1 = 2 WW8-S2 = 2 WW8-S3 = 3 (Desktop)
<b>Ecological context</b>	<b>3</b>	<b>3</b>	<b>4</b>	
Stream order	1	1	4	Order 4 streams = WW8-S3 All other streams are zero order streams.

Attributes to be considered	WW8-S1	WW8-S2	WW8-S3	Justification
Hydroperiod	3	3	4	Intermittent streams = WW8-S1, WW8-S2 Permanent streams = WW8-S3
Connectivity and migration	-	-	4	Ecological connectivity in the wider landscape
<b>Combined value</b>	<b>M</b>	<b>M</b>	<b>H</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 8 Appendix 8 – Wetland Value Assessment

### 8.1 NOR 1: Northern Public Transport Interchange and Park & Ride, and Western Link - North (Northern Section)

Table 18-26 Assessment of ecological value for wetland ecology features for NOR 1

Attributes to be considered	WW1 -W1	WW1 -W2	Justification
<b>Representativeness</b>	<b>2</b>	<b>1</b>	
Hydrological modification	2	1	Scoring considered abstraction (including the presence and extent of exotic trees with high evapotranspiration rates), regulation by impoundments, drains or increased runoff from agricultural land or urban development.
<b>Rarity/distinctiveness</b>	<b>3</b>	<b>2</b>	
Species of conservation significance	3	2	Australasian bittern (Threatened – Nationally Critical, value score of 4) and spotless crane (At Risk - Declining, value score of 3) likely utilising large (> 5000 m <sup>2</sup> ) wetlands that are present in the NOR (WW1-W1). Australasian bittern likely to only forage in this habitat, not nest, therefore a score of 3 has been assigned.  Non-TAR native species (value score of 2) expected to utilise all wetlands in the NOR.
Vegetation type of conservation significance	1	1	Exotic dominated vegetation.
<b>Diversity and pattern</b>	<b>3</b>	<b>1</b>	
Diversity of habitat types	3	1	Scores reflect differences in the representation of different habitats associated with the period of inundation and or saturation. For example, for small wetlands (< 100 m <sup>2</sup> ) that provide only temporary (<3 months/yr.) saturation was scored lower while larger wetlands (> 500 m <sup>2</sup> ) with permanent, seasonal and temporary habitat scored higher.
<b>Ecological context</b>	<b>3</b>	<b>1</b>	

Attributes to be considered	WW1 -W1	WW1 -W2	Justification
Flood attenuation	3	1	Scores reflect differences in wetland size in relation to its catchment (a wetland size that is >10% of its catchment was scored higher). Additional consideration was given to the way in which stormflows are spread across the wetland. Other factors considered are surface roughness, slope, size of flood benches and sinuosity.
Streamflow augmentation	2	1	Scores reflect differences in the size and representation of different hydroperiods for each wetland. Wetlands with > 50% permanent saturation/inundation and that are directly connected to a downslope stream were scored higher. A temporary isolated wetland (such as a small seep) scored lower.
Sediment trapping	2	1	Scores reflect differences in estimated likely sediment yields from the catchments of each wetland (highest for steep catchments with no vegetation cover) against the ability of each wetland to trap sediment. Wetlands with diffuse flow patterns have high capacity to trap sediment and so scored higher while wetlands with strongly channelled flows and drains scored lower. Scoring also considered how frequently stormflows move through the wetland (>1 in 5 years likely to score lower, while >1 per year score higher).
Water purification	3	1	Scores consider sources of contamination in the wetland's catchment (agrichemicals, urban runoff etc) and the wetland's capacity to treat water (size relative to catchment and hydrological modification). As an example, a pasture wetland that is >10% of catchment and which retains hydrological integrity scored higher, while a very small wetland that was <1% of its catchment and modified scored lower.
Connectivity and migration	2	1	Scores reflect differences in the position of wetlands within the larger stream networks.
<b>Combined value</b>	<b>M</b>	<b>L</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

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

Table 18-27 Assessment of ecological value for wetland ecology features for NOR 2

Attributes to be considered	WW2 -W1	WW2 -W2	Justification
<b>Representativeness</b>	<b>1</b>	<b>1</b>	
Hydrological modification	1	1	Scoring considered abstraction (including the presence and extent of exotic trees with high evapotranspiration rates), regulation by impoundments, drains or increased runoff from agricultural land or urban development.
<b>Rarity/distinctiveness</b>	<b>2</b>	<b>2</b>	
Species of conservation significance	2	2	Non-TAR native species (value score of 2) expected to utilise all wetlands in the NOR.
Vegetation type of conservation significance	1	1	Exotic dominated vegetation.
<b>Diversity and pattern</b>	<b>2</b>	<b>1</b>	
Diversity of habitat types	2	1	Scores reflect differences in the representation of different habitats associated with the period of inundation and or saturation. For example, for small wetlands (< 100 m2) that provide only temporary (<3 months/yr.) saturation was scored lower while larger wetlands (> 500 m2) with permanent, seasonal and temporary habitat scored higher.
<b>Ecological context</b>	<b>2</b>	<b>1</b>	
Flood attenuation	1	1	Scores reflect differences in wetland size in relation to its catchment (a wetland size that is >10% of its catchment was scored higher). Additional consideration was given to the way in which stormflows are spread across the wetland. Other factors considered are surface roughness, slope, size of flood benches and sinuosity.
Streamflow augmentation	1	1	Scores reflect differences in the size and representation of different hydroperiods for each wetland. Wetlands with > 50% permanent saturation/inundation and that are directly connected to a downslope stream were scored higher. A temporary isolated wetland (such as a small seep) scored lower.

Attributes to be considered	WW2 -W1	WW2 -W2	Justification
Sediment trapping	1	1	Scores reflect differences in estimated likely sediment yields from the catchments of each wetland (highest for steep catchments with no vegetation cover) against the ability of each wetland to trap sediment. Wetlands with diffuse flow patterns have high capacity to trap sediment and so scored higher while wetlands with strongly channelled flows and drains scored lower. Scoring also considered how frequently stormflows move through the wetland (>1 in 5 years likely to score lower, while >1 per year score higher).
Water purification	2	1	Scores consider sources of contamination in the wetland's catchment (agrichemicals, urban runoff etc) and the wetland's capacity to treat water (size relative to catchment and hydrological modification). As an example, a pasture wetland that is >10% of catchment and which retains hydrological integrity scored higher, while a very small wetland that was <1% of its catchment and modified scored lower.
Connectivity and migration	1	1	Scores reflect differences in the position of wetlands within the larger stream networks.
<b>Combined value</b>	<b>L</b>	<b>L</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

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

Table 18-28 Assessment of ecological value for wetland ecology features for NOR 3

Attributes to be considered	WW3-W1	WW3-W2	WW3-W3	WW3-W4	WW3-W5	Justification
<b>Representativeness</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	
Hydrological modification	1	1	1	2	1	Scoring considered abstraction (including the presence and extent of exotic trees with high evapotranspiration rates), regulation by impoundments, drains or increased runoff from agricultural land or urban development.
<b>Rarity/distinctiveness</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	
Species of conservation significance	3	2	3	3	3	Australasian bittern (Threatened – Nationally Critical, value score of 4) and spotless crane (At Risk - Declining, value score of 3) potential to be utilising moderately sized wetlands (> 1000 m <sup>2</sup> ) in the NOR (WW3-W1, WW3-W3, WW3-W4, WW3-W5). Australasian bittern likely to only forage in this habitat, not nest, therefore a score of 3 has been assigned.  Non-TAR native species (value score of 2) expected to utilise all wetlands in the NOR.
Vegetation type of conservation significance	1	1	1	1	1	Exotic dominated vegetation.
<b>Diversity and pattern</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	
Diversity of habitat types	2	1	2	2	1	Scores reflect differences in the representation of different habitats associated with the period of inundation and or saturation. For example, for small wetlands (< 100 m <sup>2</sup> ) that provide only temporary (<3 months/yr.) saturation was scored lower while larger wetlands (> 500 m <sup>2</sup> ) with permanent, seasonal and temporary habitat scored higher.
<b>Ecological context</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	
Flood attenuation	2	1	2	2	2	Scores reflect differences in wetland size in relation to its catchment (a wetland size that is >10% of its catchment was scored higher). Additional consideration was given to the way in which stormflows

Attributes to be considered	WW3-W1	WW3-W2	WW3-W3	WW3-W4	WW3-W5	Justification
						are spread across the wetland. Other factors considered are surface roughness, slope, size of flood benches and sinuosity.
Streamflow augmentation	1	1	1	1	1	Scores reflect differences in the size and representation of different hydroperiods for each wetland. Wetlands with > 50% permanent saturation/inundation and that are directly connected to a downslope stream were scored higher. A temporary isolated wetland (such as a small seep) scored lower.
Sediment trapping	1	1	2	1	2	Scores reflect differences in estimated likely sediment yields from the catchments of each wetland (highest for steep catchments with no vegetation cover) against the ability of each wetland to trap sediment. Wetlands with diffuse flow patterns have high capacity to trap sediment and so scored higher while wetlands with strongly channelled flows and drains scored lower. Scoring also considered how frequently stormflows move through the wetland (>1 in 5 years likely to score lower, while >1 per year score higher).
Water purification	3	1	3	3	3	Scores consider sources of contamination in the wetland's catchment (agricultural, urban runoff etc) and the wetland's capacity to treat water (size relative to catchment and hydrological modification). As an example, a pasture wetland that is >10% of catchment and which retains hydrological integrity scored higher, while a very small wetland that was <1% of its catchment and modified scored lower.
Connectivity and migration	1	1	1	1	1	Scores reflect differences in the position of wetlands within the larger stream networks.
<b>Combined value</b>	<b>M</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>L</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 8.4 NOR 4: Matakana Road Upgrade

Table 18-29 Assessment of ecological value for wetland ecology features for NOR 4

Attributes to be considered	WW4-W1	WW4-W2	WW4-W3	Justification
<b>Representativeness</b>	<b>2</b>	<b>2</b>	<b>2</b>	
Hydrological modification	2	2	2	Scoring considered abstraction (including the presence and extent of exotic trees with high evapotranspiration rates), regulation by impoundments, drains or increased runoff from agricultural land or urban development.
<b>Rarity/distinctiveness</b>	<b>3</b>	<b>3</b>	<b>2</b>	
Species of conservation significance	3	3	2	Australasian bittern (Threatened – Nationally Critical, value score of 4) and spotless crane (At Risk - Declining, value score of 3). Potential to utilise moderate to large sized wetlands (> 1000 m <sup>2</sup> ) in the NOR (WW4-W1, WW4-W2) for foraging (unlikely to be nesting in this habitat). Australasian bittern likely to only forage in this habitat, not nest, therefore a score of 3 has been assigned. Non-TAR native species (value score of 2) expected to utilise all wetlands in the NOR.
Vegetation type of conservation significance	1	1	1	Exotic dominated vegetation.
<b>Diversity and pattern</b>	<b>2</b>	<b>2</b>	<b>1</b>	
Diversity of habitat types	2	2	1	Scores reflect differences in the representation of different habitats associated with the period of inundation and or saturation. For example, for small wetlands (< 100 m <sup>2</sup> ) that provide only temporary (<3 months/yr.) saturation was scored lower while larger wetlands (> 500 m <sup>2</sup> ) with permanent, seasonal and temporary habitat scored higher.
<b>Ecological context</b>	<b>3</b>	<b>3</b>	<b>1</b>	
Flood attenuation	2	2	1	Scores reflect differences in wetland size in relation to its catchment (a wetland size that is >10% of its catchment was scored higher). Additional consideration was given to the way in which stormflows are spread across the wetland. Other factors considered are surface roughness, slope, size of flood benches and sinuosity.

Attributes to be considered	WW4 -W1	WW4 -W2	WW4 -W3	Justification
Streamflow augmentation	2	2	1	Scores reflect differences in the size and representation of different hydroperiods for each wetland. Wetlands with > 50% permanent saturation/inundation and that are directly connected to a downslope stream were scored higher. A temporary isolated wetland (such as a small seep) scored lower.
Sediment trapping	3	3	1	Scores reflect differences in estimated likely sediment yields from the catchments of each wetland (highest for steep catchments with no vegetation cover) against the ability of each wetland to trap sediment. Wetlands with diffuse flow patterns have high capacity to trap sediment and so scored higher while wetlands with strongly channelled flows and drains scored lower. Scoring also considered how frequently stormflows move through the wetland (>1 in 5 years likely to score lower, while >1 per year score higher).
Water purification	3	3	1	Scores consider sources of contamination in the wetland's catchment (agrchemicals, urban runoff etc) and the wetland's capacity to treat water (size relative to catchment and hydrological modification). As an example, a pasture wetland that is >10% of catchment and which retains hydrological integrity scored higher, while a very small wetland that was <1% of its catchment and modified scored lower.
Connectivity and migration	1	1	1	Scores reflect differences in the position of wetlands within the larger stream networks.
<b>Combined value</b>	<b>M</b>	<b>M</b>	<b>L</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 8.5 NOR 5: Sandspit Road Upgrade

Table 18-30 Assessment of ecological value for wetland ecology features for NOR 5

Attributes to be considered	WW5-W1	WW5-W2	WW5-W3	Justification
<b>Representativeness</b>	<b>1</b>	<b>1</b>	<b>1</b>	
Hydrological modification	1	1	1	Scoring considered abstraction (including the presence and extent of exotic trees with high evapotranspiration rates), regulation by impoundments, drains or increased runoff from agricultural land or urban development.
<b>Rarity/distinctiveness</b>	<b>2</b>	<b>3</b>	<b>3</b>	
Species of conservation significance	2	3	3	Australasian bittern (Threatened – Nationally Critical, value score of 4) and spotless crane (At Risk - Declining, value score of 3) potential to utilise moderate to large sized wetlands (> 3000 m2) in the NOR (WW5-W2, WW5-W3) for foraging. Australasian bittern likely to only forage in this habitat, not nest, therefore a score of 3 has been assigned. Non-TAR native species (value score of 2) expected to utilise all wetlands in the NOR.
Vegetation type of conservation significance	1	1	1	Exotic dominated vegetation.
<b>Diversity and pattern</b>	<b>2</b>	<b>2</b>	<b>2</b>	
Diversity of habitat types	2	2	2	Scores reflect differences in the representation of different habitats associated with the period of inundation and or saturation. For example, for small wetlands (< 100 m2) that provide only temporary (<3 months/yr.) saturation was scored lower while larger wetlands (> 500 m2) with permanent, seasonal and temporary habitat scored higher.
<b>Ecological context</b>	<b>1</b>	<b>2</b>	<b>2</b>	
Flood attenuation	1	2	2	Scores reflect differences in wetland size in relation to its catchment (a wetland size that is >10% of its catchment was scored higher). Additional consideration was given to the way in which stormflows are spread across the wetland. Other factors considered are surface roughness, slope, size of flood benches and sinuosity.

Attributes to be considered	WW5-W1	WW5-W2	WW5-W3	Justification
Streamflow augmentation	1	1	1	Scores reflect differences in the size and representation of different hydroperiods for each wetland. Wetlands with > 50% permanent saturation/inundation and that are directly connected to a downslope stream were scored higher. A temporary isolated wetland (such as a small seep) scored lower.
Sediment trapping	1	2	2	Scores reflect differences in estimated likely sediment yields from the catchments of each wetland (highest for steep catchments with no vegetation cover) against the ability of each wetland to trap sediment. Wetlands with diffuse flow patterns have high capacity to trap sediment and so scored higher while wetlands with strongly channelled flows and drains scored lower. Scoring also considered how frequently stormflows move through the wetland (>1 in 5 years likely to score lower, while >1 per year score higher).
Water purification	1	1	2	Scores consider sources of contamination in the wetland's catchment (agrichemicals, urban runoff etc) and the wetland's capacity to treat water (size relative to catchment and hydrological modification). As an example, a pasture wetland that is >10% of catchment and which retains hydrological integrity scored higher, while a very small wetland that was <1% of its catchment and modified scored lower.
Connectivity and migration	1	1	1	Scores reflect differences in the position of wetlands within the larger stream networks.
<b>Combined value</b>	<b>L</b>	<b>L</b>	<b>L</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 8.6 NOR 6: New Western Link - South

Table 18-31 Assessment of ecological value for wetland ecology features for NOR 6

Attributes to be considered	WW6-O1	WW6-O2	WW6-W1	Justification
<b>Representativeness</b>	<b>1</b>	<b>1</b>	<b>1</b>	
Hydrological modification	1	1	1	Scoring considered abstraction (including the presence and extent of exotic trees with high evapotranspiration rates), regulation by impoundments, drains or increased runoff from agricultural land or urban development.
<b>Rarity/distinctiveness</b>	<b>2</b>	<b>2</b>	<b>3</b>	
Species of conservation significance	2	2	3	Australasian bittern (Threatened – Nationally Critical, value score of 4) and spotless crane (At Risk - Declining, value score of 3) potential to utilise the area of WL19 (WW6-W1) and associated intermittent stream which is proposed to be bridged. Also, potential to utilise an exotic wetland at the eastern side of the NOR (WW3-W1 - assessed in the NOR 3 value assessment). Australasian bittern likely to only forage in this habitat, not nest, therefore a score of 3 has been assigned. Non-TAR native species (value score of 2) expected to utilise all wetlands and ponds in the NOR.
Vegetation type of conservation significance	1	1	3	WW6-O1 & WW6-O2: stormwater pond with limited exotic vegetation. WW6-W1: Raupō reedland, endangered ecosystem type.
<b>Diversity and pattern</b>	<b>1</b>	<b>1</b>	<b>3</b>	
Diversity of habitat types	1	1	3	Scores reflect differences in the representation of different habitats associated with the period of inundation and or saturation. For example, for small wetlands (< 100 m2) that provide only temporary (<3 months/yr.) saturation was scored lower while larger wetlands (> 500 m2) with permanent, seasonal and temporary habitat scored higher.
<b>Ecological context</b>	<b>2</b>	<b>3</b>	<b>3</b>	
Flood attenuation	1	1	2	Scores reflect differences in wetland size in relation to its catchment (a wetland size that is >10% of its catchment was scored higher). Additional consideration was given to the way in which stormflows are spread across the wetland. Other factors considered are surface roughness, slope, size of flood benches and sinuosity.

Attributes to be considered	WW6 -O1	WW6 -O2	WW6 -W1	Justification
Streamflow augmentation	1	1	3	Scores reflect differences in the size and representation of different hydroperiods for each wetland. Wetlands with > 50% permanent saturation/inundation and that are directly connected to a downslope stream were scored higher. A temporary isolated wetland (such as a small seep) scored lower.
Sediment trapping	2	3	2	Scores reflect differences in estimated likely sediment yields from the catchments of each wetland (highest for steep catchments with no vegetation cover) against the ability of each wetland to trap sediment. Wetlands with diffuse flow patterns have high capacity to trap sediment and so scored higher while wetlands with strongly channelled flows and drains scored lower. Scoring also considered how frequently stormflows move through the wetland (>1 in 5 years likely to score lower, while >1 per year score higher).
Water purification	2	3	2	Scores consider sources of contamination in the wetland's catchment (agricultural, urban runoff etc) and the wetland's capacity to treat water (size relative to catchment and hydrological modification). As an example, a pasture wetland that is >10% of catchment and which retains hydrological integrity scored higher, while a very small wetland that was <1% of its catchment and modified scored lower.
Connectivity and migration	1	1	1	Scores reflect differences in the position of wetlands within the larger stream networks.
<b>Combined value</b>	<b>L</b>	<b>L</b>	<b>M</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 8.7 NOR 7: Sandspit Link

Table 18-32 Assessment of ecological value for wetland ecology features for NOR 7

Attributes to be considered	WW7-W1	WW7-W2	WW7-W3	WW7-W4	WW7-W5	WW7-W6	WW7-W7	WW7-W8	Justification
<b>Representativeness</b>	1	1	2	1	2	2	1	1	
Hydrological modification	1	1	2	1	2	2	1	1	Scoring considered abstraction (including the presence and extent of exotic trees with high evapotranspiration rates), regulation by impoundments, drains or increased runoff from agricultural land or urban development.
<b>Rarity/distinctiveness</b>	2	2	3	2	2	2	2	2	
Species of conservation significance	2	2	3	2	2	2	2	2	<p>Australasian bittern (Threatened – Nationally Critical, value score of 4) and spotless crane (At Risk - Declining, value score of 3) potentially utilising large wetlands (&gt; 5000 m<sup>2</sup>) that are present in the NOR (WW7-W3) for foraging and nesting. Australasian bittern likely to only forage in this habitat, not nest, therefore a score of 3 has been assigned.</p> <p>Black shag (At Risk - Naturally Uncommon), little black shag (At Risk - Naturally Uncommon), pied shag (At Risk - Recovering), little shag (At Risk - Relict) (all value score of 3), likely utilising open water in the NOR but not expected to be utilising or relying on wetlands in this NOR.</p> <p>Non-TAR native species (value score of 2) expected to utilise all wetlands and ponds in the NOR.</p>
Vegetation type of conservation significance	1	1	1	1	1	1	1	1	Exotic dominated vegetation.
<b>Diversity and pattern</b>	2	2	3	1	2	2	2	2	

Attributes to be considered	WW7 -W1	WW7 -W2	WW7 -W3	WW7 -W4	WW7 -W5	WW7 -W6	WW7 -W7	WW7 -W8	Justification
Diversity of habitat types	2	2	3	1	2	2	2	2	Scores reflect differences in the representation of different habitats associated with the period of inundation and or saturation. For example, for small wetlands (< 100 m2) that provide only temporary (<3 months/yr.) saturation was scored lower while larger wetlands (> 500 m2) with permanent, seasonal and temporary habitat scored higher.
<b>Ecological context</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	
Flood attenuation	1	1	3	1	2	2	2	1	Scores reflect differences in wetland size in relation to its catchment (a wetland size that is >10% of its catchment was scored higher). Additional consideration was given to the way in which stormflows are spread across the wetland. Other factors considered are surface roughness, slope, size of flood benches and sinuosity.
Streamflow augmentation	1	1	2	1	1	1	2	1	Scores reflect differences in the size and representation of different hydroperiods for each wetland. Wetlands with > 50% permanent saturation/inundation and that are directly connected to a downslope stream were scored higher. A temporary isolated wetland (such as a small seep) scored lower.
Sediment trapping	1	1	3	1	2	2	2	1	Scores reflect differences in estimated likely sediment yields from the catchments of each wetland (highest for steep catchments with no vegetation cover) against the ability of each wetland to trap sediment. Wetlands with diffuse flow patterns have high capacity to trap sediment and so scored higher while wetlands with strongly channelled flows and drains scored lower. Scoring also considered how frequently stormflows move through the wetland (>1 in 5 years likely to score lower, while >1 per year score higher).
Water purification	1	1	3	1	2	2	2	1	Scores consider sources of contamination in the wetland's catchment (agricultural, urban runoff etc) and the wetland's capacity to treat water (size relative to catchment and hydrological modification). As an example, a pasture wetland that is >10% of catchment and which retains hydrological integrity scored higher, while a very small wetland that was <1% of its catchment and modified scored lower.
Connectivity and migration	1	2	2	1	1	1	1	1	Scores reflect differences in the position of wetlands within the larger stream networks.

Attributes to be considered	WW7 -W1	WW7 -W2	WW7 -W3	WW7 -W4	WW7 -W5	WW7 -W6	WW7 -W7	WW7 -W8	Justification
<b>Combined value</b>	<b>L</b>	<b>L</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 8.8 NOR 8: Wider Western Link (North)

Table 18-33 Assessment of ecological value for wetland ecology features for NOR 8

Attributes to be considered	WW8-W1	WW8-W2	WW8-W3	WW8-W4	Justification
<b>Representativeness</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	
Hydrological modification	2	1	1	2	Scoring considered abstraction (including the presence and extent of exotic trees with high evapotranspiration rates), regulation by impoundments, drains or increased runoff from agricultural land or urban development.
<b>Rarity/distinctiveness</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>3</b>	
Species of conservation significance	4	2	2	3	Dabchick (Threatened - Nationally Increasing, value score of 4) likely utilising open water associated with planted wetlands in the NOR (WW8-W1) for foraging and nesting.  Australasian bittern (Threatened – Nationally Critical, value score of 4) and spotless crake (At Risk - Declining, value score of 3) likely utilising large (> 5000 m <sup>2</sup> ) wetlands present in the NOR (WW8-W1 and WW8-W4) for foraging, spotless crake may also be nesting in these areas. Australasian bittern likely to only forage in this habitat, not nest, therefore a score of 3 has been assigned.  Non-TAR native species (value score of 2) expected to utilise all wetlands and ponds in the NOR.
Vegetation type of conservation significance	2	1	1	1	Planted native vegetation at WW8-W1 (Non-TAR species). Exotic dominated vegetation at all other wetlands.
<b>Diversity and pattern</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>2</b>	
Diversity of habitat types	3	1	1	2	Scores reflect differences in the representation of different habitats associated with the period of inundation and or saturation. For example, for small wetlands (< 100 m <sup>2</sup> ) that provide only temporary (<3 months/yr.) saturation was scored lower while larger wetlands (> 500 m <sup>2</sup> ) with permanent, seasonal and temporary habitat scored higher.
<b>Ecological context</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>	

Attributes to be considered	WW8-W1	WW8-W2	WW8-W3	WW8-W4	Justification
Flood attenuation	2	1	1	3	Scores reflect differences in wetland size in relation to its catchment (a wetland size that is >10% of its catchment was scored higher). Additional consideration was given to the way in which stormflows are spread across the wetland. Other factors considered are surface roughness, slope, size of flood benches and sinuosity.
Streamflow augmentation	3	1	1	2	Scores reflect differences in the size and representation of different hydroperiods for each wetland. Wetlands with > 50% permanent saturation/inundation and that are directly connected to a downslope stream were scored higher. A temporary isolated wetland (such as a small seep) scored lower.
Sediment trapping	2	1	1	3	Scores reflect differences in estimated likely sediment yields from the catchments of each wetland (highest for steep catchments with no vegetation cover) against the ability of each wetland to trap sediment. Wetlands with diffuse flow patterns have high capacity to trap sediment and so scored higher while wetlands with strongly channelled flows and drains scored lower. Scoring also considered how frequently stormflows move through the wetland (>1 in 5 years likely to score lower, while >1 per year score higher).
Water purification	3	1	1	3	Scores consider sources of contamination in the wetland's catchment (agricultural, urban runoff etc) and the wetland's capacity to treat water (size relative to catchment and hydrological modification). As an example, a pasture wetland that is >10% of catchment and which retains hydrological integrity scored higher, while a very small wetland that was <1% of its catchment and modified scored lower.
Connectivity and migration	2	1	1	2	Scores reflect differences in the position of wetlands within the larger stream networks.
<b>Combined value</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>M</b>	

Notes: N = Negligible, L = Low, M = Moderate, H = High, VH = Very High

## 9 Appendix 9 – Impact Assessment

NoR R1														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R1-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Baseline. Stream-wetland complex, predominantly exotic scrub (gorse). Permanent stream is approximately 150 metres southwest of existing State Highway 1 and within 50 metres of ongoing construction in the area (unrelated to the Project). If bats are present, they are unlikely to be disturbed by construction activities (due to habituation to current conditions).	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R1-Bat	Very High	Operation- Bats	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	Baseline. Permanent stream to be bridged (new fragmentation), stream potentially used by bats commuting between SEA to the West of the Project Area, to Seas within the Project Area. Probability Unlikely due to Existing degree of fragmentation. Extent decreased to Local as potential connectivity effects will be local in the context of this NOR	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R1-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Baseline. Stream-wetland complex, predominantly exotic scrub (gorse). Permanent stream is approximately 150 metres southwest of existing State Highway 1 and within 50 metres of ongoing construction in the area (unrelated to the Project). If bats are present, they are unlikely to be disturbed by presence of the road (due to habituation to current conditions).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R1-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Business Zones. Bats unlikely to be disturbed by construction activities in this environment.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R1-Bat	Very High	Operation- Bats	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	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Business Zones. However, it is anticipated that streams and riparian areas are maintained in the likely future ecological environment. The permanent stream may facilitate commuting for bats between Seas in the area and the stream crossing would be new fragmentation. Probability Unlikely due to urban expansion and uncertainty regarding the quality of riparian features in the future	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R1-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Business Zones. Bats unlikely to be disturbed by presence of the road in this environment.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R1 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Stream-wetland complex, predominantly exotic scrub (gorse). Permanent stream is approximately 150 metres southwest of existing State Highway 1 and within 50 metres of ongoing construction in the area (unrelated to the Project). If birds are present, they are likely to be disturbed by construction activities resulting in small, local changes to the population dynamics. The most conservative non-TAR species, such as grey warbler, has been used for this assessment.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Very Low
Operation	Presence of the road	R1 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Permanent stream to be bridged (new fragmentation), stream likely utilised by non-TAR native birds, therefore loss in connectivity is highly likely, resulting in changes to the population dynamics. The most conservative non-TAR species, such as grey warbler, has been used for this assessment.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Very Low
Operation	Presence of the road	R1 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Permanent stream to be bridged (new fragmentation), stream likely utilised by non-TAR native birds, therefore loss in connectivity is highly likely, resulting in changes to the population dynamics. The most conservative non-TAR species, such as grey warbler, has been used for this assessment.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Very Low

NoR R1														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R1 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline.  Stream-wetland complex, predominantly exotic scrub (gorse). Permanent stream is approximately 150 metres southwest of existing State Highway 1 and within 50 metres of ongoing construction in the area (unrelated to the Project). If birds are present, they are likely to be disturbed by presence of the road (due to habituation to current conditions), resulting in changes to the population dynamics.  The most conservative non-TAR species, such as grey warbler, has been used for this assessment.	Indirect	Local	Permanent (>25 years)	Continuously	Likely	Irreversible	Low	Very Low
Construction	Noise/lighting/vibration/dust	R1 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Business Zones. It is anticipated that birds present will be habituated to disturbance in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely		Negligible	Very Low
Operation	Presence of the road	R1 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Business Zones. It is anticipated that the habitat will already be fragmented in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely		Negligible	Very Low
Operation	Presence of the road	R1 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Business Zones. It is anticipated that birds present will be habituated to disturbance in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Continuously	Unlikely		Low	Very Low
Construction	Noise/lighting/vibration/dust	R1 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline.  New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R1).  Note: 'Definite' likelihood assigned, as New Zealand pipit will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Definite	Totally	Moderate	High
Operation	Presence of the road	R1 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline.  New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R1).  Effect is unlikely due to low densities of New Zealand pipit expected in the Zone of Influence.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R1 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline.  New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R1).  Effect is unlikely due to low densities of New Zealand pipit expected in the Zone of Influence.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R1 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Business Zones. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R1 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Business Zones. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline..	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R1														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R1 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Business Zones. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R1 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Australasian bittern have the potential to utilise large wetlands (> 5000 m2) in the NoR for foraging. In NoR R1, this is wetland WW1-W1. They are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore disturbance resulting in changes to the population dynamics is considered unlikely.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R1 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Australasian bittern have the potential to utilise large wetlands (> 5000 m2) in the NoR for foraging. In NoR R1, this is wetland WW1-W1. They are considered a mobile species in this area, with high dispersal. Therefore loss in connectivity resulting in changes to the population dynamics is considered unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R1 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Australasian bittern have the potential to utilise large wetlands (> 5000 m2) in the NoR for foraging. In NoR R1, this is wetland WW1-W1. They are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore disturbance resulting in changes to the population dynamics is considered unlikely.	Indirect	Local	Permanent (>25 years)	Periodically	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R1 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Business Zones. Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R1 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Business Zones. It is anticipated that the habitat will already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R1 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Business Zones. Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Periodically	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R1 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Spotless crane have the potential to utilise large wetlands (> 5000 m2) in the NoR. In NoR R1, this is wetland WW1-W1. Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023). Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate

NoR R1														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R1 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Spotless crane have the potential to utilise large wetlands (> 5000 m2) in the NoR. In NoR R1, this is wetland WW1-W1.  Spotless crane are considered to have 'good dispersal ability' (Cotter, 2016).  Therefore loss in connectivity resulting in changes to the population dynamics is considered unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R1 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Spotless crane have the potential to utilise large wetlands (> 5000 m2) in the NoR. In NoR R1, this is wetland WW1-W1.  Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023).  Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.	Indirect	Local	Permanent (>25 years)	Infrequently	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R1 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Business Zones.  Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by construction activities.  Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate
Operation	Presence of the road	R1 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Business Zones. It is anticipated that the delineated wetland area (spotless crane habitat) will remain, however will already be fragmented in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R1 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Business Zones.  Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by the presence of the road.  Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.	Indirect	Local	Permanent (>25 years)	Infrequently	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R1 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Stream-wetland complex, predominantly exotic scrub (gorse). Permanent stream is approximately 150 metres southwest of existing State Highway 1 and within 50 metres of ongoing construction in the area (unrelated to the Project).  Disturbance to copper skink resulting in changes to the local population dynamics is considered likely (due to the value of gorse as copper skink habitat).	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low
Operation	Presence of the road	R1 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline.  Loss in connectivity for copper skink resulting in changes to the population dynamics is considered unlikely due to their 'small home range' (New Zealand Herpetological Society, 2022).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R1

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R1 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Stream-wetland complex, predominantly exotic scrub (gorse). Permanent stream is approximately 150 metres southwest of existing State Highway 1 and within 50 metres of ongoing construction in the area (unrelated to the Project). Disturbance to copper skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R1 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Business Zones. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Only residual copper skink habitat in the FEE will be associated with riparian margin, therefore an expected decrease in frequency and likelihood Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R1 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Business Zones. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R1 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Business Zones. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low

NoR R2

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R2-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Baseline. Upgrade of existing road, however a large stand of native terrestrial vegetation (WF11) is present 25 metres north of the NoR. Bat roosts may be present and potentially be disturbed by noise, vibration and light from construction activities. Two permanent streams will be crossed in NoR, which are likely to be utilised by bats for commuting and foraging.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R2-Bat	Very High	Operation- Bats	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	Baseline. Two permanent stream will be crossed in NoR, which are likely to be utilised by bats for commuting and foraging. Although the streams are already bridged, there is increased probability of additional fragmentation (particularly along the Mahurangi River).	Indirect	Regional	Permanent (>25 years)		Likely	Irreversible	Moderate	High
Operation	Presence of the road	R2-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Baseline. Proximity of road operation to bat habitat informs Likely disturbance effect during operation. Upgrade of existing road, bats in area are likely habituated to road disturbance.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R2-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Bats unlikely to be disturbed by construction activities in this environment.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R2-Bat	Very High	Operation- Bats	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	Likely Future Ecological Environment. The eastern portion of the NoR is located in Future Urban Zone, while the area west of the Mahurangi River will remain rural. It is anticipated that the ecological values of streams and riparian areas will increase in the future. The permanent streams would become an important commuting corridor for bats between SEAs in the area, and there is increased probability of additional fragmentation.	Indirect	Regional	Permanent (>25 years)		Likely	Irreversible	Moderate	High
Operation	Presence of the road	R2-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Likely Future Ecological Environment. Area of higher bat habitat value located in future rural zone, therefore same as baseline. NoR is located in Future Urban Zone. Bats unlikely to be disturbed by presence of the road in this environment.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R2 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Upgrade of existing road, a large stand of native terrestrial vegetation (TL.1) is present 25 metres north of the NoR. Two permanent streams will also be crossed in NoR (already bridged). If birds are present, they are unlikely to be disturbed by construction activities (due to habituation to current conditions) and is unlikely to result result in changes to the population dynamics. The most conservative non-TAR species, such as grey warbler, has been used for this assessment.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of existing road, a large stand of native terrestrial vegetation (TL.1) is present 25 metres north of the NoR. Two permanent streams will also be crossed in NoR (already bridged). Existing baseline fragmentation (existing road and bridged streams) means that loss in connectivity resulting in changes to the population dynamics is unlikely. The most conservative non-TAR species, such as grey warbler, has been used for this assessment.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Upgrade of existing road, a large stand of native terrestrial vegetation (TL.1) is present 25 metres north of the NoR. Two permanent streams will also be crossed in NoR (already bridged). If birds are present, they are unlikely to be disturbed by presence of the road (due to habituation to current conditions), and is unlikely to result in changes to the population dynamics. The most conservative non-TAR species, such as grey warbler, has been used for this assessment.	Indirect	Local	Permanent (>25 years)	Continuously	Unlikely	Irreversible	Low	Very Low

NoR R2

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R2 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that the habitat will already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Continuously	Unlikely	Irreversible	Low	Very Low
Construction	Noise/lighting/vibration/dust	R2 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R2). Note: 'Definite' likelihood assigned, as New Zealand pipit will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Definite	Totally	Moderate	High
Operation	Presence of the road	R2 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R2). Effect is unlikely due to low densities of New Zealand pipit expected in the Zone of Influence.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R2). Effect is unlikely due to low densities of New Zealand pipit expected in the Zone of Influence.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low

NoR R2

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R2 - North Island kākā	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Kākā are considered a highly mobile species in this area, with seasonal use and high dispersal. Therefore they are unlikely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - North Island kākā	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Existing baseline fragmentation (existing road and bridged streams) means that loss in connectivity resulting in changes to the population dynamics is unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - North Island kākā	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Kākā are considered a highly mobile species in this area, with seasonal use and high dispersal. Therefore they are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - North Island kākā	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - North Island kākā	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that the habitat will already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - North Island kākā	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - Long-tailed cuckoo	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Long-tailed cuckoo are considered a highly mobile species in this area, with high dispersal. Therefore they are unlikely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R2 - Long-tailed cuckoo	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Existing baseline fragmentation (existing road and bridged streams) means that loss in connectivity resulting in changes to the population dynamics is unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R2 - Long-tailed cuckoo	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Long-tailed cuckoo are considered a highly mobile species in this area, with high dispersal. In addition, as the NoR is an upgrade of an existing road, it is expected that long-tailed cuckoo would be habituated to road disturbance. Therefore they are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Low

NoR R2														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R2 - Long-tailed cuckoo	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R2 - Long-tailed cuckoo	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that the habitat will already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R2 - Long-tailed cuckoo	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R2 - Black shag	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Likely utilising open water in the NoR (WW2-S1, WW2-S2, WW2-S3). The NoR is for an upgrade of an existing road, which already crosses WW2-S2 and WW2-S3. It is anticipated that they are unlikely to be disturbed by construction activities (due to habituation to current conditions).	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Black shag	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Likely utilising open water in the NoR (WW2-S1, WW2-S2, WW2-S3). Existing baseline fragmentation, and although there will be a slight increase in fragmentation (increased bridge size) at WW2-S2 and WW2-S3, it is unlikely that this loss in connectivity would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Black shag	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Likely utilising open water in the NoR (WW2-S1, WW2-S2, WW2-S3). The NoR is for an upgrade of an existing road, which already crosses WW2-S2 and WW2-S3. It is anticipated that they are unlikely to be disturbed by the presence of the road (due to habituation to current conditions).	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - Black shag	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Black shag	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. However, open water is anticipated to remain (WW2-S1, WW2-S2, WW2-S3). Existing baseline fragmentation, and although there will be a slight increase in fragmentation (increased bridge size) at WW2-S2 and WW2-S3, it is unlikely that this loss in connectivity would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Black shag	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low

NoR R2

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R2 - Little black shag, pied shag, little shag	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Likely utilising open water in the NoR (WW2-S1, WW2-S2, WW2-S3).</p> <p>The NoR is for an upgrade of an existing road, which already crosses WW2-S2 and WW2-S3. It is anticipated that they are unlikely to be disturbed by construction activities (due to habituation to current conditions) .</p> <p>Additionally, habitat at NoR R2 is considered less suitable for little black shag, pied shag, and little shag. Therefore, the habitat is less likely to be utilised in this area (compared to the black shag).</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Little black shag, pied shag, little shag	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Likely utilising open water in the NoR (WW2-S1, WW2-S2, WW2-S3).</p> <p>Existing baseline fragmentation, and although there will be a slight increase in fragmentation (increased bridge size) at WW2-S2 and WW2-S3, it is unlikely that this loss in connectivity would result in changes to the population dynamics.</p> <p>Additionally, habitat at NoR R2 is considered less suitable for little black shag, pied shag, and little shag. Therefore, the habitat is less likely to be utilised in this area (compared to the black shag).</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Little black shag, pied shag, little shag	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Likely utilising open water in the NoR (WW2-S1, WW2-S2, WW2-S3).</p> <p>The NoR is for an upgrade of an existing road, which already crosses WW2-S2 and WW2-S3. It is anticipated that they are unlikely to be disturbed by the presence of the road (due to habituation to current conditions) .</p> <p>Additionally, habitat at NoR R2 is considered less suitable for little black shag, pied shag, and little shag. Therefore, the habitat is less likely to be utilised in this area (compared to the black shag).</p>	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - Little black shag, pied shag, little shag	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone.</p> <p>It is anticipated that birds present will be habituated to disturbance in this environment.</p> <p>Additionally, habitat at NoR R2 is considered less suitable for little black shag, pied shag, and little shag. Therefore, the habitat is less likely to be utilised in this area (compared to the black shag).</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Little black shag, pied shag, little shag	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. However, open water is anticipated to remain (WW2-S1, WW2-S2, WW2-S3).</p> <p>Additionally, habitat at NoR R2 is considered less suitable for little black shag, pied shag, and little shag. Therefore, the habitat is less likely to be utilised in this area (compared to the black shag).</p> <p>Existing baseline fragmentation, and although there will be a slight increase in fragmentation (increased bridge size) at WW2-S2 and WW2-S3, it is unlikely that this loss in connectivity would result in changes to the population dynamics.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R2														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R2 - Little black shag, pied shag, little shag	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Additionally, habitat at NoR R2 is considered less suitable for little black shag, pied shag, and little shag. Therefore, the habitat is less likely to be utilised in this area (compared to the black shag). Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. As the NoR is an upgrade of existing road, disturbance to copper skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. As the NoR is an upgrade of existing road, loss in connectivity for copper skink resulting in changes to the population dynamics is considered unlikely due to their 'small home range' (New Zealand Herpetological Society, 2022).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. As the NoR is an upgrade of existing road, disturbance to copper skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - Ornate skink	High	Construction- Herpetofauna (native)	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Baseline. As the NoR is an upgrade of existing road, disturbance to ornate skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Ornate skink	High	Operation- Herpetofauna (native)	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	Baseline. As the NoR is an upgrade of existing road, loss in connectivity for ornate skink resulting in changes to the population dynamics is considered unlikely due to their 'small home range, often of only a few metres if the habitat is suitable' (Taranaki Regional Council, 2022).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Ornate skink	High	Operation- Herpetofauna (native)	Disturbance and displacement of (new and existing) nests and individuals due to lighting and noise/vibration	Baseline. As the NoR is an upgrade of existing road, disturbance to ornate skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R2														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R2 - Ornate skink	High	Construction-Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Ornate skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Ornate skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - Elegant gecko and forest gecko	High	Construction-Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Arboreal gecko species are expected to utilise the large stand of native terrestrial vegetation (WF11) present 25 metres north of the NoR, and potentially the stand of mixed native/exotic terrestrial vegetation (TL.2) adjacent to WW2-S2. As they are nocturnal species, it is likely that they are sensitive to construction disturbance, particularly construction lighting at night.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low
Operation	Presence of the road	R2 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Although data is limited on the home range of geckos, it is unlikely that a loss in connectivity that results in changes to the population dynamics will occur, due to the limited habitat loss that will occur. There will be some loss of WF11 along the northern edge of the existing road, and it is expected that TL.2 adjacent to WW2-S2 will be retained.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Arboreal gecko species are expected to utilise the large stand of native terrestrial vegetation (WF11) present 25 metres north of the NoR, and the stand of mixed native/exotic terrestrial vegetation (TL.2) adjacent to WW2-S2. As they are nocturnal species, it is likely that they are sensitive to lighting at night. However, as the NoR is an upgrade of an existing road, it is expected that these species would already be habituated to disturbance from the presence of the road.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - Elegant gecko and forest gecko	High	Construction-Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams, the upgrade of the existing road is not expected to impact the remaining suitable habitat in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R2

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R2 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - Pacific gecko	Moderate	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Arboreal gecko species are expected to utilise the large stand of native terrestrial vegetation (WF11) present 25 metres north of the NoR, and potentially the stand of mixed native/exotic terrestrial vegetation (TL.2) adjacent to WW2-S2. As they are nocturnal species, it is likely that they are sensitive to construction disturbance, particularly construction lighting at night.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low
Operation	Presence of the road	R2 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Although data is limited on the home range of gecko, it is unlikely that a loss in connectivity that results in changes to the population dynamics will occur, due to the limited habitat loss that will occur. There will be some loss of WF11 along the northern edge of the existing road, and it is expected that TL.2 adjacent to WW2-S2 will be retained.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Arboreal gecko species are expected to utilise the large stand of native terrestrial vegetation (WF11) present 25 metres north of the NoR, and the stand of mixed native/exotic terrestrial vegetation (TL.2) adjacent to WW2-S2. As they are nocturnal species, it is likely that they are sensitive to lighting at night. However, as the NoR is an upgrade of an existing road, it is expected that these species would already be habituated to disturbance from the presence of the road.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R2 - Pacific gecko	Moderate	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)		Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R2 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams, the upgrade of the existing road is not expected to impact the remaining suitable habitat in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R2 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R3														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R3-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Baseline. Upgrade of existing State Highway 1, bats are unlikely to be disturbed by construction activities due to the absence of high roost habitat and habituation to noise/light/vibration/dust.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R3-Bat	Very High	Operation- Bats	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	Baseline. Numerous stream crossings, streams in the southern half of the NoR have higher importance for commuting and foraging. However, streams are already bridged and the proposed upgrade is not expected to increase the likelihood of additional fragmentation	Indirect	Regional	Permanent (>25 years)		Unlikely	Irreversible	Low	Moderate
Operation	Presence of the road		Negligible	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Baseline. Upgrade of existing road, bats in area are likely habituated to road disturbance.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R3-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Bats unlikely to be disturbed by construction activities in this environment.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R3-Bat	Very High	Operation- Bats	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	Likely Future Ecological Environment. NoR is located in Future Urban Zone. However, it is anticipated that streams and riparian areas are maintained in the likely future ecological environment. The likelihood of additional fragmentation is considered Unlikely due relative small scale of the proposed upgrade, and the nature of the streams	Indirect	Regional	Permanent (>25 years)		Unlikely	Irreversible	Low	Moderate
Operation	Presence of the road	R3-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Likely Future Ecological Environment. NoR is located in Future Urban Zone and is an upgrade of an existing road. Bats unlikely to be disturbed by the presence of the road in this environment.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R3 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. If birds are present, they are unlikely to be disturbed by construction activities (due to habituation to current conditions). The most conservative non-TAR species, such as grey warbler, has been used for this assessment.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R3 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. Existing baseline fragmentation (existing road and bridged/culverted streams) means that loss in connectivity resulting in changes to the population dynamics is unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R3 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. If birds are present, they are unlikely to be disturbed by the presence of the road (due to habituation to current conditions).	Indirect	Local	Permanent (>25 years)	Continuously	Unlikely	Irreversible	Low	Very Low
Construction	Noise/lighting/vibration/dust	R3 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R3 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that the habitat will already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R3 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Continuously	Unlikely	Irreversible	Low	Very Low

NoR R3

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R3 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R3). Note: 'Definite' likelihood assigned, as New Zealand pipit will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Definite	Totally	Moderate	High
Operation	Presence of the road	R3 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R3). Effect is unlikely due to low densities of New Zealand pipit expected in the Zone of Influence.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R3 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R3). Effect is unlikely due to low densities of New Zealand pipit expected in the Zone of Influence.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R3 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R3 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R3 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R3 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. Potential to utilise moderately sized wetlands (> 1000 m2) in the NoR (WW3-W1, WW3-W3, WW3-W4, WW3-W5) for foraging and nesting. Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023). Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate

NoR R3

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R3 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. Potential to utilise moderately sized wetlands (> 1000 m2) in the NoR (WW3-W1, WW3-W3, WW3-W4, WW3-W5) for foraging and nesting. However, spotless crane are considered to have 'good dispersal ability' (Cotter, 2016). Therefore loss in connectivity resulting in changes to the population dynamics is considered unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R3 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. Potential to utilise moderately sized wetlands (> 1000 m2) in the NoR (WW3-W1, WW3-W3, WW3-W4, WW3-W5) for foraging and nesting. Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023). Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R3 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by construction activities. Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate
Operation	Presence of the road	R3 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that the delineated wetland will be retained, spotless crane are considered to have 'good dispersal ability' (Cotter, 2016). Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R3 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by the presence of the road. Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Likely	Irreversible	Low	Moderate

NoR R3

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R3 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing State Highway 1.</p> <p>Possible to utilise moderately sized wetlands (&gt; 1000 m2) in the NoR (WW3-W1, WW3-W3, WW3-W4, WW3-W5) for foraging (unlikely to be nesting in this habitat).</p> <p>Due to location of the proposed stormwater pond in relation to wetlands WW3-W3 and WW3-W4, it is likely that birds using this habitat will be disturbed. However, Australasian bittern are considered a highly mobile species in this area, with high dispersal.</p> <p>Therefore, it is unlikely that construction disturbance will result in changes to the population dynamics.</p>	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R3 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing State Highway 1.</p> <p>Potential to utilise moderately sized wetlands (&gt; 1000 m2) in the NoR (WW3-W1, WW3-W3, WW3-W4, WW3-W5) for foraging (unlikely to be nesting in this habitat).</p> <p>As Australasian bittern are considered a highly mobile species in this area, with high dispersal, a loss in connectivity that results in changes to the population dynamics is considered unlikely.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R3 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing State Highway 1.</p> <p>Potential to utilise moderately sized wetlands (&gt; 1000 m2) in the NoR (WW3-W1, WW3-W3, WW3-W4, WW3-W5) for foraging (unlikely to be nesting in this habitat).</p> <p>Due to the existing disturbance from SH1, it is unlikely that disturbance from the presence of the road will result in changes to the population dynamics.</p>	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R3 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone.</p> <p>Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R3 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone.</p> <p>Although it is anticipated that the delineated wetland will be retained, as Australasian bittern are considered a highly mobile species in this area, with high dispersal, a loss in connectivity that results in changes to the population dynamics is considered unlikely.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R3 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone.</p> <p>Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R3 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing State Highway 1.</p> <p>Disturbance to copper skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low

NoR R3

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R3 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. Loss in connectivity for copper skink resulting in changes to the population dynamics is considered unlikely due to their 'small home range' (New Zealand Herpetological Society, 2022) and the existing fragmentation.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R3 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. Disturbance to copper skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R3 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R3 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R3 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R4														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R4-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Baseline. Upgrade of an existing road. No stream crossings. Important stream corridor (Mahurangi River tributaries) east and west of the NoR at the southern end, that is likely utilised by bats for foraging and commuting. Roosts may be present in adjacent native terrestrial vegetation. Bats likely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R4-Bat	Very High	Operation- Bats	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	Baseline. Assume bat presence for native forest and treeland habitat. Proposed upgrades will cause additional fragmentation between existing SNAs to the south of the NOR. Potential cumulative effects due to proximity of Matakana and Sandspit Rd upgrades to SNAs. Upgrade of an existing road. No stream crossings. No additional fragmentation expected. Probability assessed as 'Likely' due to the presence of robust vegetation under baseline conditions Note: Extent (ZOI) changed to 'Local' as no additional fragmentation expected, to decrease Level of Effect from 'Moderate' to 'Low'. Mitigation light spill management around southern section during operation. No buffer planting required	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Operation	Presence of the road	R4-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Baseline. Upgrade of an existing road. No stream crossings. Important stream corridor (Mahurangi River tributary) south of the NoR, but this is buffered by native terrestrial vegetation (MF4). Bats likely already habituated to road disturbance due to the existing road.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R4-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Likely Future Ecological Environment. Bat habitat (particularly to the south of the NoR) will remain present in the FUZ. NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is a buffer of Future Urban Zone between this vegetation and the NoR. Therefore bats are unlikely to be disturbed by construction activities in this environment.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R4-Bat	Very High	Operation- Bats	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	Likely Future Ecological Environment. Bat habitat (particularly to the south of the NoR) will remain the FUZ. NoR is located in Future Urban Zone to the east, and Residential Zones to the west. No additional fragmentation is anticipated in this environment. Probability assessed as 'Likely' due to the presence of robust vegetation structure that will remain in the FUZ Note: Extent (ZOI) changed to 'Local' as no additional fragmentation expected, to decrease Level of Effect from 'Moderate' to 'Low'. Mitigation light spill management around southern section during operation. No buffer planting required	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Operation	Presence of the road	R4-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Likely Future Ecological Environment. NoR is located in Future Urban Zone to the east, and Residential Zones to the west. NoR is an upgrade of an existing road. Bats unlikely to be disturbed by road activities in this environment.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R4 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Upgrade of the existing Matakana Road. If birds are present, they are unlikely to be disturbed by construction activities (due to habituation to current conditions). The most conservative non-TAR species, such as grey warbler, has been used for this assessment.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R4 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of the existing Matakana Road. Existing baseline fragmentation (existing road and bridged/culverted streams) means that loss in connectivity resulting in changes to the population dynamics is unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R4

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R4 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Upgrade of existing State Highway 1. If birds are present, they are unlikely to be disturbed by the presence of the road (due to habituation to current conditions).	Indirect	Local	Permanent (>25 years)	Continuously	Unlikely	Irreversible	Low	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R4 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR. It is anticipated that the habitat will already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Continuously	Unlikely	Irreversible	Low	Very Low
Construction	Noise/lighting/vibration/dust	R4 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (EG is present in NoR R4). Note: 'Definite' likelihood assigned, as New Zealand pipit will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Definite	Totally	Moderate	High
Operation	Presence of the road	R4 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (EG is present in NoR R4). Effect is unlikely due to low densities of New Zealand pipit expected in the Zone of Influence.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (EG is present in NoR R4). Effect is unlikely due to low densities of New Zealand pipit expected in the Zone of Influence.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low

NoR R4

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R4 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.  Suitable habitat for New Zealand pipit (EG, ES) is not anticipated to be present in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R4 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.  Suitable habitat for New Zealand pipit (EG, ES) is not anticipated to be present in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.  Suitable habitat for New Zealand pipit (EG, ES) is not anticipated to be present in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - North Island kākā	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline.  Kākā are considered a highly mobile species in this area, with seasonal use and high dispersal.  Therefore they are unlikely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R4 - North Island kākā	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline.  Existing baseline fragmentation (existing road and bridged streams) means that loss in connectivity resulting in changes to the population dynamics is unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - North Island kākā	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline.  Kākā are considered a highly mobile species in this area, with seasonal use and high dispersal.  In addition, as the NoR is an upgrade of an existing road, it is expected that kākā would be habituated to road disturbance. Therefore they are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - North Island kākā	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.  In this environment, kākā are unlikely to be disturbed by construction activities.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Very Low

NoR R4

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R4 - North Island kākā	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.  It is expected that there would already be existing fragmentation in this environment, therefore loss in connectivity resulting in changes to the population dynamics is unlikely.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - North Island kākā	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.  In this environment, and as the NoR is an upgrade of an existing road, it is expected that kākā would be habituated to road disturbance. Therefore they are unlikely to be disturbed by the presence of the road.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Long-tailed cuckoo	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline.  Long-tailed cuckoo are considered a highly mobile species in this area, with high dispersal.  Therefore they are unlikely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R4 - Long-tailed cuckoo	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline.  Existing baseline fragmentation (existing road and bridged streams) means that loss in connectivity resulting in changes to the population dynamics is unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R4 - Long-tailed cuckoo	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline.  Long-tailed cuckoo are considered a highly mobile species in this area, with high dispersal.  In addition, as the NoR is an upgrade of an existing road, it is expected that long-tailed cuckoo would be habituated to road disturbance. Therefore they are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R4 - Long-tailed cuckoo	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.  In this environment, long-tailed cuckoo are unlikely to be disturbed by construction activities.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low

NoR R4														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R4 - Long-tailed cuckoo	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>It is expected that there would already be existing fragmentation in this environment, therefore loss in connectivity resulting in changes to the population dynamics is unlikely.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R4 - Long-tailed cuckoo	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>In this environment, and as the NoR is an upgrade of an existing road, it is expected that long-tailed cuckoo would be habituated to road disturbance. Therefore they are unlikely to be disturbed by the presence of the road.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R4 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of the existing Matakana Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 1000 m2) in the NoR (WW4-W1, WW4-W2) for foraging and nesting.</p> <p>Due to location of the proposed cut/fill areas in relation to wetlands WW4-W1 and WW4-W2, it is likely that birds using this habitat will be disturbed.</p> <p>Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023).</p> <p>Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate
Operation	Presence of the road	R4 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing Matakana Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 1000 m2) in the NoR (WW4-W1, WW4-W2) for foraging and nesting.</p> <p>However, spotless crane are considered to have 'good dispersal ability' (Cotter, 2016).</p> <p>Therefore loss in connectivity resulting in changes to the population dynamics is considered unlikely.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of the existing Matakana Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 1000 m2) in the NoR (WW4-W1, WW4-W2) for foraging and nesting.</p> <p>Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023).</p> <p>Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.</p>	Indirect	Local	Permanent (>25 years)	Periodically	Likely	Irreversible	Low	Moderate

NoR R4

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R4 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by construction activities.</p> <p>Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate
Operation	Presence of the road	R4 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Although it is anticipated that the delineated wetland will be retained, spotless crane are considered to have 'good dispersal ability' (Cotter, 2016).</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by the presence of the road.</p> <p>Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.</p>	Indirect	Local	Permanent (>25 years)	Periodically	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R4 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of the existing Matakana Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 1000 m2) in the NoR (WW4-W1, WW4-W2) for foraging (unlikely to be nesting in this habitat).</p> <p>Due to location of the proposed cut/fill areas in relation to wetlands WW4-W1 and WW4-W2, it is likely that birds using this habitat will be disturbed. However, Australasian bittern are considered a highly mobile species in this area, with high dispersal.</p> <p>Therefore, it is unlikely that construction disturbance will result in changes to the population dynamics.</p>	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R4 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of the existing Matakana Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 1000 m2) in the NoR (WW4-W1, WW4-W2) for foraging (unlikely to be nesting in this habitat).</p> <p>As Australasian bittern are considered a highly mobile species in this area, with high dispersal, a loss in connectivity that results in changes to the population dynamics is considered unlikely.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low

NoR R4														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R4 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Upgrade of the existing Matakana Road. Potential to utilise moderate to large sized wetlands (> 1000 m2) in the NoR (WW4-W1, WW4-W2) for foraging (unlikely to be nesting in this habitat). Due to the existing disturbance from SH1, it is unlikely that disturbance from the presence of the road will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R4 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR. Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R4 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR. Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R4 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR. Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R4 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. As the NoR is an upgrade of existing road, disturbance to copper skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R4 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. As the NoR is an upgrade of existing road, loss in connectivity for copper skink resulting in changes to the population dynamics is considered unlikely due to their 'small home range' (New Zealand Herpetological Society, 2022).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. As the NoR is an upgrade of existing road, disturbance to copper skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low

NoR R4

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R4 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Ornate skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>As the NoR is an upgrade of existing road, disturbance to ornate skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R4 - Ornate skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>As the NoR is an upgrade of existing road, loss in connectivity for ornate skink resulting in changes to the population dynamics is considered unlikely due to the their 'small home range, often of only a few metres if the habitat is suitable' (Taranaki Regional Council, 2022).</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - Ornate skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Baseline.</p> <p>As the NoR is an upgrade of existing road, disturbance to ornate skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Ornate skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R4 - Ornate skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R4

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R4 - Ornate skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Elegant gecko and forest gecko	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Arboreal gecko species are expected to utilise the large stands of native terrestrial vegetation (WF13, MF4, and VS2) that are present within the southern section of the NoR.</p> <p>As they are nocturnal species, it is likely that they are highly sensitive to construction disturbance, particularly construction lighting at night.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low
Operation	Presence of the road	R4 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Although data is limited on the home range of geckos, it is unlikely that a loss in connectivity that results in changes to the population dynamics will occur, due to the limited habitat loss that will occur. There will be some loss of WF13 (western side of Matakana Road), MF4, and VS2 (eastern side of Matakana Road). However, the majority of these habitats will not be impacted.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Arboreal gecko species are expected to utilise the large stands of native terrestrial vegetation (WF13, MF4, and VS2) that are present within the southern section of the NoR.</p> <p>As they are nocturnal species, it is likely that they are sensitive to lighting at night. However, as the NoR is an upgrade of an existing road, it is expected that these species would already be habituated to disturbance from the presence of the road.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Elegant gecko and forest gecko	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, it is expected that gecko will already be habituated to disturbance in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R4 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, the upgrade of the existing road is not expected to impact the remaining suitable habitat in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R4

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R4 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, it is expected that gecko will already be habituated to disturbance in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Pacific gecko	Moderate	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Arboreal gecko species are expected to utilise the large stands of native terrestrial vegetation (WF13, MF4, and VS2) that are present within the southern section of the NoR.</p> <p>As they are nocturnal species, it is likely that they are highly sensitive to construction disturbance, particularly construction lighting at night.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low
Operation	Presence of the road	R4 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Although data is limited on the home range of geckos, it is unlikely that a loss in connectivity that results in changes to the population dynamics will occur, due to the limited habitat loss that will occur. There will be some loss of WF13 (western side of Matakana Road), MF4, and VS2 (eastern side of Matakana Road). However, the majority of these habitats will not be impacted.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Arboreal gecko species are expected to utilise the large stands of native terrestrial vegetation (WF13, MF4, and VS2) that are present within the southern section of the NoR.</p> <p>As they are nocturnal species, it is likely that they are sensitive to lighting at night. However, as the NoR is an upgrade of an existing road, it is expected that these species would already be habituated to disturbance from the presence of the road.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Pacific gecko	Moderate	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, it is expected that gecko will already be habituated to disturbance in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R4 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, the upgrade of the existing road is not expected to impact the remaining suitable habitat in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R4

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R4 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, it is expected that gecko will already be habituated to disturbance in this environment.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Hochstetter's frog	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing Matakana Road.</p> <p>Hochstetter's frog populations may be present in the permanent streams in the southern section of the NoR (near the Matakana Road/Sandspit Road intersection).</p> <p>Due to their nocturnal nature, it is expected that Hochstetter's frog will be highly sensitive to construction activities, particularly lighting at night.</p> <p>However, as the existing Sandspit Road is located between the NoR and WW5-S1, and the area of WF13 (that is also a SEA) acts as a buffer between the existing Matakana Road and the permanent stream south of the NoR, it is unlikely that any disturbance to Hochstetter's frog populations present won't result in changes in the population dynamics.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R4 - Hochstetter's frog	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing Matakana Road.</p> <p>No streams will be impacted in the southern section of the NoR.</p> <p>Therefore, loss in connectivity is considered unlikely.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - Hochstetter's frog	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing Matakana Road.</p> <p>Hochstetter's frog populations may be present in the permanent streams in the southern section of the NoR (near the Matakana Road/Sandspit Road intersection).</p> <p>Due to their nocturnal nature, it is expected that Hochstetter's frog will be highly sensitive to disturbance from the road, particularly lighting at night.</p> <p>However, as the existing Sandspit Road is located between the NoR and WW5-S1, and the area of WF13 (that is also a SEA) acts as a buffer between the existing Matakana Road and the permanent stream south of the NoR, it is unlikely that any disturbance to Hochstetter's frog populations present won't result in changes in the population dynamics.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R4 - Hochstetter's frog	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>It is expected that any populations present would be habituated to disturbance in this environment, therefore it is not anticipated that disturbance to Hochstetter's frogs will result in changes to the population dynamics.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low

NoR R4

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R4 - Hochstetter's frog	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>It is anticipated that there would be existing fragmentation in this environment.</p> <p>Therefore, the magnitude and level of effect are considered lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R4 - Hochstetter's frog	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone to the east, and Residential Zones to the west. Native vegetation on the east of Matakana Road is expected to be retained, however there is an area of Future Urban Zone between this vegetation and the NoR.</p> <p>It is expected that any populations present would be habituated to disturbance in this environment, therefore it is not anticipated that disturbance to Hochstetter's frogs will result in changes to the population dynamics.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R5														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R5-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Baseline. Upgrade of existing road, including two stream crossings of important stream corridor (Mahurangi River tributary), likely utilised for bats for foraging and commuting. Roosts also likely to be present in associated native vegetation. Bats highly likely to be disturbed by construction activities due to close proximity to bat corridor and potential roosts.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R5-Bat	Very High	Operation- Bats	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	Baseline. Two stream crossings of important stream corridor (Mahurangi River tributary). Although it is an upgrade of an existing road, and these crossings are already bridged, additional fragmentation may occur.	Indirect	Regional	Permanent (>25 years)		Unlikely	Irreversible	Low	Moderate
Operation	Presence of the road	R5-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Baseline. Upgrade of existing road. It is anticipated that bats in the area are already habituated to road disturbance due the existing road.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R5-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. There is one area of native vegetation south of Withers Lane that will be retained with no area of Future Urban Zone. Due to the importance of this stream corridor for bats, it is anticipated that bats could be disturbed by construction activities in this area of the NoR.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R5-Bat	Very High	Operation- Bats	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	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is an upgrade of an existing road, it is expected that the Mahurangi River tributary and associated native vegetation to the east of the tributary will be retained, and the importance of the tributary as a corridor for bats will be increased due to the development in the area. Additional fragmentation is expected to occur.	Indirect	Regional	Permanent (>25 years)		Unlikely	Irreversible	Low	Moderate
Operation	Presence of the road	R5-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Likely Future Ecological Environment. NoR is located in Future Urban Zone and is an upgrade of an existing road. Bats unlikely to be disturbed by the presence of the road in this environment.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R5 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Upgrade of the existing Sandspit Road. If birds are present, they are unlikely to be disturbed by construction activities (due to habituation to current conditions). The most conservative non-TAR species, such as grey warbler, has been used for this assessment.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R5 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of the existing Sandspit Road. Existing baseline fragmentation (existing road and bridged/culverted streams) means that loss in connectivity resulting in changes to the population dynamics is unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Upgrade of the existing Sandspit Road. If birds are present, they are unlikely to be disturbed by the presence of the road (due to habituation to current conditions).	Indirect	Local	Permanent (>25 years)	Continuously	Unlikely	Irreversible	Low	Very Low

NoR R5

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R5 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.  It is anticipated that birds present will be habituated to disturbance in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R5 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.  It is anticipated that the habitat will already be fragmented in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.  It is anticipated that birds present will be habituated to disturbance in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Continuously	Unlikely	Irreversible	Low	Very Low
Construction	Noise/lighting/vibration/dust	R5 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline.  New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R5).  Note: 'Definite' likelihood assigned, as New Zealand pipit will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Definite	Totally	Moderate	High
Operation	Presence of the road	R5 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline.  New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R5).  Effect is unlikely due to low densities of New Zealand pipit expected in the Zone of Influence.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline.  New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R5).  Effect is unlikely due to low densities of New Zealand pipit expected in the Zone of Influence.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone.  Suitable habitat for New Zealand pipit (EG, ES) is not anticipated to be present in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low

NoR R5

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R5 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit (EG, ES) is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit (EG, ES) is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - North Island kākā	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Kākā are considered a highly mobile species in this area, with seasonal use and high dispersal. Therefore they are unlikely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R5 - North Island kākā	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Existing baseline fragmentation (existing road and bridged streams) means that loss in connectivity resulting in changes to the population dynamics is unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - North Island kākā	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Kākā are considered a highly mobile species in this area, with seasonal use and high dispersal. In addition, as the NoR is an upgrade of an existing road, it is expected that kākā would be habituated to road disturbance. Therefore they are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - North Island kākā	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. In this environment, kākā are unlikely to be disturbed by construction activities. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R5 - North Island kākā	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. It is expected that there would already be existing fragmentation in this environment, therefore loss in connectivity resulting in changes to the population dynamics is unlikely. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R5

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R5 - North Island kākā	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>In this environment, and as the NoR is an upgrade of an existing road, it is expected that kākā would be habituated to road disturbance. Therefore they are unlikely to be disturbed by the presence of the road.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - Long-tailed cuckoo	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Long-tailed cuckoo are considered a highly mobile species in this area, with high dispersal.</p> <p>Therefore they are unlikely to be disturbed by construction activities.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R5 - Long-tailed cuckoo	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Existing baseline fragmentation (existing road and bridged streams) means that loss in connectivity resulting in changes to the population dynamics is unlikely.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R5 - Long-tailed cuckoo	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Long-tailed cuckoo are considered a highly mobile species in this area, with high dispersal.</p> <p>In addition, as the NoR is an upgrade of an existing road, it is expected that long-tailed cuckoo would be habituated to road disturbance. Therefore they are unlikely to be disturbed by the presence of the road.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R5 - Long-tailed cuckoo	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>In this environment, long-tailed cuckoo are unlikely to be disturbed by construction activities.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R5 - Long-tailed cuckoo	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>It is expected that there would already be existing fragmentation in this environment, therefore loss in connectivity resulting in changes to the population dynamics is unlikely.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R5 - Long-tailed cuckoo	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>In this environment, and as the NoR is an upgrade of an existing road, it is expected that long-tailed cuckoo would be habituated to road disturbance. Therefore they are unlikely to be disturbed by the presence of the road.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Low

NoR R5

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R5 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of the existing Sandspit Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 3000 m2) in the NoR (WW5-W2, WW5-W3) for foraging and nesting.</p> <p>Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023).</p> <p>Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate
Operation	Presence of the road	R5 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of the existing Sandspit Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 3000 m2) in the NoR (WW5-W2, WW5-W3) for foraging and nesting.</p> <p>However, spotless crane are considered to have 'good dispersal ability' (Cotter, 2016).</p> <p>Therefore loss in connectivity resulting in changes to the population dynamics is considered unlikely.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of the existing Sandspit Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 3000 m2) in the NoR (WW5-W2, WW5-W3) for foraging and nesting.</p> <p>Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023).</p> <p>Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.</p>	Indirect	Local	Permanent (>25 years)	Frequently	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R5 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by construction activities.</p> <p>Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate
Operation	Presence of the road	R5 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>Although it is anticipated that the delineated wetland will be retained, spotless crane are considered to have 'good dispersal ability' (Cotter, 2016).</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R5														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R5 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by the presence of the road.</p> <p>Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.</p>	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R5 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of the existing Sandspit Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 3000 m2) in the NoR (WW5-W2, WW5-W3) for foraging (unlikely to be nesting in this habitat).</p> <p>Australasian bittern are considered a highly mobile species in this area, with high dispersal.</p> <p>Therefore, it is unlikely that construction disturbance will result in changes to the population dynamics.</p>	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R5 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of the existing Sandspit Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 3000 m2) in the NoR (WW5-W2, WW5-W3) for foraging (unlikely to be nesting in this habitat).</p> <p>As Australasian bittern are considered a highly mobile species in this area, with high dispersal, a loss in connectivity that results in changes to the population dynamics is considered unlikely.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R5 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of the existing Sandspit Road.</p> <p>Potential to utilise moderate to large sized wetlands (&gt; 3000 m2) in the NoR (WW5-W2, WW5-W3) for foraging (unlikely to be nesting in this habitat).</p> <p>Due to the existing disturbance from Sandspit Road, it is unlikely that disturbance from the presence of the road will result in changes to the population dynamics.</p>	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R5 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R5 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low

NoR R5														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R5 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.  Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R5 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road.  As the NoR is an upgrade of existing road, disturbance to copper skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R5 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road.  As the NoR is an upgrade of existing road, loss in connectivity for copper skink resulting in changes to the population dynamics is considered unlikely due to their 'small home range' (New Zealand Herpetological Society, 2022).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road.  As the NoR is an upgrade of existing road, disturbance to copper skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.  Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R5 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.  Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.  Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R5

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R5 - Ornate skink	High	Construction-Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road. As the NoR is an upgrade of existing road, disturbance to ornate skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R5 - Ornate skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road. As the NoR is an upgrade of existing road, loss in connectivity for ornate skink resulting in changes to the population dynamics is considered unlikely due to the their 'small home range, often of only a few metres if the habitat is suitable' (Taranaki Regional Council, 2022).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Ornate skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road. As the NoR is an upgrade of existing road, disturbance to ornate skink resulting in changes to the population dynamics is considered unlikely (due to habituation to existing disturbance).	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - Ornate skink	High	Construction-Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R5 - Ornate skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Ornate skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - Elegant gecko and forest gecko	High	Construction-Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road. Arboreal gecko species are expected to utilise the large stands of native terrestrial vegetation (VS2, MF4, WF11), and potentially large areas of TL.2 and EF that are present within the NoR. As they are nocturnal species, it is likely that they are highly sensitive to construction disturbance, particularly construction lighting at night.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low

NoR R5

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R5 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road. Although data is limited on the home range of geckos, it is unlikely that a loss in connectivity that results in changes to the population dynamics will occur, due to the limited habitat loss that will occur. There will be some loss of TL.2, WF11, and EF ). However, the majority of these habitats will not be impacted.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road. Arboreal gecko species are expected to utilise the large stands of native terrestrial vegetation (VS2, MF4, WF11), and potentially large areas of TL.2 and EF that are present within the southern section of the NoR. As they are nocturnal species, it is likely that they are sensitive to lighting at night. However, as the NoR is an upgrade of an existing road, it is expected that these species would already be habituated to disturbance from the presence of the road.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - Elegant gecko and forest gecko	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R5 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, the upgrade of the existing road is not expected to impact the remaining suitable habitat in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - Pacific gecko	Moderate	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road. Arboreal gecko species are expected to utilise the large stands of native terrestrial vegetation (VS2, MF4, WF11), and potentially large areas of TL.2 and EF that are present within the the NoR. As they are nocturnal species, it is likely that they are highly sensitive to construction disturbance, particularly construction lighting at night.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low

NoR R5

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R5 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road. Although data is limited on the home range of geckos, it is unlikely that a loss in connectivity that results in changes to the population dynamics will occur, due to the limited habitat loss that will occur. There will be some loss of TL.2, WF11, and EF ). However, the majority of these habitats will not be impacted.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Upgrade of existing Sandspit Road. Arboreal gecko species are expected to utilise the large stands of native terrestrial vegetation (VS2, MF4, WF11), and potentially large areas of TL.2 and EF that are present within the southern section of the NoR. As they are nocturnal species, it is likely that they are sensitive to lighting at night. However, as the NoR is an upgrade of an existing road, it is expected that these species would already be habituated to disturbance from the presence of the road.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - Pacific gecko	Moderate	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R5 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, the upgrade of the existing road is not expected to impact the remaining suitable habitat in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR. Although it is anticipated that suitable gecko habitat will be retained in the buffer of the permanent streams and in adjacent SEAs, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R5

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R5 - Hochstetter's frog	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing Sandspit Road.</p> <p>Hochstetter's frog populations may be present in the permanent streams in the southern section of the NoR (near the Matakana Road/Sandspit Road intersection).</p> <p>Due to their nocturnal nature, it is expected that Hochstetter's frog will be highly sensitive to construction activities, particularly lighting at night.</p> <p>WW5-S1 will be directly impacted by the NoR, therefore it is likely that construction disturbance to Hochstetter's frog populations could result in changes in the population dynamics.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Low
Operation	Presence of the road	R5 - Hochstetter's frog	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing Sandspit Road.</p> <p>WW5-S1 will be directly impacted by the NoR, with increased fragmentation from the current culvert, therefore loss in connectivity that could result in changes in the population dynamics is considered likely.</p>	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R5 - Hochstetter's frog	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Upgrade of existing Sandspit Road.</p> <p>As the NoR is an upgrade of an existing road, it is expected that Hochstetter's frog would be habituated to road disturbance.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R5 - Hochstetter's frog	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>Stream habitat will remain in the FEE and therefore similar likelihood as baseline NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>It is expected that any populations present would be habituated to disturbance in this environment, therefore it is not anticipated that disturbance to Hochstetter's frogs will result in changes to the population dynamics.</p> <p>Therefore, the magnitude and level of effect are considered lower than Baseline.</p>	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Low
Operation	Presence of the road	R5 - Hochstetter's frog	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p> <p>It is anticipated that there would be existing fragmentation in this environment.</p> <p>Therefore, the magnitude and level of effect are considered lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R5 - Hochstetter's frog	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone. Native vegetation on the east of Sandspit Road (on the eastern side of the Mahurangi River tributary) is expected to be retained, however there is an area of Future Urban Zone between this vegetation throughout most of the NoR.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R6

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R6-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Baseline. NoR area unlikely to be utilised by bats. Therefore bats are unlikely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R6-Bat	Very High	Operation- Bats	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	Baseline. NoR area unlikely to be utilised by bats. Negligible loss in connectivity is anticipated. Note: Extent (ZOI) changed to 'Local' as no additional fragmentation expected, to decrease Level of Effect from 'Moderate' to 'Low'.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R6-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Baseline. NoR area unlikely to be utilised by bats. Therefore bats are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R6-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones and NoR area unlikely to be utilised by bats. Therefore, bats are unlikely to be disturbed by construction activities in this environment.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R6-Bat	Very High	Operation- Bats	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	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. No loss in connectivity anticipated in this environment. Note: Extent (ZOI) changed to 'Local' as no additional fragmentation expected, to decrease Level of Effect from 'Moderate' to 'Low'.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R5-Bat		Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones and NoR area unlikely to be utilised by bats, therefore bats are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	
Construction	Noise/lighting/vibration/dust	R6 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. New road through an area that is predominantly grazed pasture, adjacent to an industrial/business area. The area is already fragmented by farming activities (mainly grazed pasture), however non-TAR native birds may be foraging and nesting in the area of WL19 (WW6-W1). There is limited availability of this habitat in the wider landscape. Therefore disturbance resulting in changes to the population dynamics is considered highly likely.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Very Low
Operation	Presence of the road	R6 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. New road through an area that is predominantly grazed pasture, adjacent to an industrial/business area. The area is already fragmented by farming activities (mainly grazed pasture), however non-TAR native birds may be reliant on the area of WL19 (WW6-W1). This is proposed to be bridged, however connectivity is anticipated to remain. Therefore a loss in connectivity is not considered to result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R6 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. New road through an area that is predominantly grazed pasture, adjacent to an industrial/business area. The area is already fragmented by farming activities (mainly grazed pasture), however non-TAR native birds may be foraging and nesting in the area of WL19 (WW6-W1). There is limited availability of this habitat in the wider landscape. Therefore disturbance resulting in changes to the population dynamics is considered highly likely.	Indirect	Local	Permanent (>25 years)	Continuously	Highly Likely	Irreversible	Moderate	Low

NoR R6

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R5 - Non-TAR bird		Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	
Operation	Presence of the road	R6 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. It is anticipated that the habitat will already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R6 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Continuously	Unlikely	Irreversible	Low	Very Low
Construction	Noise/lighting/vibration/dust	R6 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R6). New road through an area that is predominantly grazed pasture, adjacent to an industrial/business area. Note: 'Definite' likelihood assigned, as New Zealand pipit will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Definite	Totally	Moderate	High
Operation	Presence of the road	R6 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R6). New road through an area that is predominantly grazed pasture, adjacent to an industrial/business area. Due to the large area of pasture that is available, which is suitable habitat for pipit, higher densities of pipit are expected in this NoR. Although the NoR is a new road, the area on the northern side of the NoR is low quality habitat for pipit (due to existing disturbance and earthworks unrelated to the Project), therefore a loss in connectivity is unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R6 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (both present in NoR R6). New road through an area that is predominantly grazed pasture, adjacent to an industrial/business area. Due to the large area of pasture that is available, which is suitable habitat for pipit, higher densities of pipit are expected in this NoR. As the NoR is a new road, it is likely that pipit would be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)	Infrequently	Likely	Irreversible	Low	Low
Construction	Noise/lighting/vibration/dust	R6 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Suitable habitat for New Zealand pipit (EG, ES) is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low

NoR R6

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R6 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Suitable habitat for New Zealand pipit (EG, ES) is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R6 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Suitable habitat for New Zealand pipit (EG, ES) is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R6 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Spotless crane potentially foraging and nesting in an area of WL19 (WW6-W1) and associated intermittent stream, this is proposed to be bridged. Also potential to be foraging and nesting in an exotic wetland at the eastern side of the NoR (WW3-W1). Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023). Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate
Operation	Presence of the road	R6 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Spotless crane potentially foraging and nesting in an area of WL19 (WW6-W1) and associated intermittent stream, this is proposed to be bridged. Also potential to be foraging and nesting in an exotic wetland at the eastern side of the NoR (WW3-W1). Although the proposed bridge intersects the area of WL19, the wetland is located in a fragmented landscape, therefore it is not anticipated that the bridge would cause a loss in connectivity that would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R6 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Spotless crane potentially foraging and nesting in an area of WL19 (WW6-W1) and associated intermittent stream, this is proposed to be bridged. Also potential to be foraging and nesting in an exotic wetland at the eastern side of the NoR (WW3-W1). Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023). Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R6 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by construction activities. Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate

NoR R6

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R6 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Although the proposed bridge intersects the area of WL19, the wetland is located in a fragmented landscape, therefore it is not anticipated that the bridge would cause a loss in connectivity that would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R6 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by the presence of the road. Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R6 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Australasian bittern potentially foraging in an area of WL19 (WW6-W1) and associated intermittent stream, this is proposed to be bridged. Also potential to be foraging in an exotic wetland at the eastern side of the NoR (WW3-W1). Australasian bittern are considered a highly mobile species in this area, with high dispersal. Therefore, it is unlikely that construction disturbance will result in changes to the population dynamics.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R6 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Australasian bittern potentially foraging in an area of WL19 (WW6-W1) and associated intermittent stream, this is proposed to be bridged. Also potential to be foraging in an exotic wetland at the eastern side of the NoR (WW3-W1). As Australasian bittern are considered a highly mobile species in this area, with high dispersal, a loss in connectivity that results in changes to the population dynamics is considered unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R6 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Australasian bittern potentially foraging in an area of WL19 (WW6-W1) and associated intermittent stream, this is proposed to be bridged. Also potential to be foraging in an exotic wetland at the eastern side of the NoR (WW3-W1). Australasian bittern are considered a highly mobile species in this area, with high dispersal. Therefore, it is unlikely that disturbance from the presence of the road will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R6 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R6 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low

NoR R6

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R6 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R6 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Copper skink habitat in NoR R6 is located near areas of existing disturbance (e.g. areas of PL.1 and ES adjacent to Jamie Lane). Therefore it is considered unlikely that copper skink would be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R6 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Copper skink habitat is considered low quality in NoR R6, and habitat present is located in an already fragmented environment. Therefore loss in connectivity that results in changes to the population dynamics is considered unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R6 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Copper skink habitat in NoR R6 is located near areas of existing disturbance (e.g. areas of PL.1 and ES adjacent to Jamie Lane). Therefore it is considered unlikely that copper skink would be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R6 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R6 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R6 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone and Business Zones. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R7														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R7-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Baseline. Multiple new stream crossings and stream loss of corridors that are likely to be utilised by bats for commuting and foraging. Roosts also likely present in associated native vegetation near streams. Bats are highly likely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate
Operation	Presence of the road	R7-Bat	Very High	Operation- Bats	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	Baseline. Multiple new stream crossings and stream loss of corridors that are likely to be utilised by bats. Note: no significant ecological node upslope of where the NoR crosses the streams. Only a small portion of WF11 will be fragmented. Extent adjusted to 'Local' due to the lack of significant bat habitat upslope of where NoR crosses streams Mitigation: light sensitive design and road crossings, retain existing mature trees as far as practicable and late stage buffer planting between road deck and designation boundary at all stream crossings	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Operation	Presence of the road	R7-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Baseline. Multiple new stream crossings and stream loss of corridors likely to be utilised by bats for commuting and foraging. Roosts also likely present in associated native vegetation near streams. Bats are highly likely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R7-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone, however it is anticipated that the permanent streams and terrestrial vegetation east of the streams will remain, therefore the bat corridor will be retained. As the surrounding area is Future Urban Zone, it is likely that bats would be disturbed by construction activities (as opposed to highly likely).	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R7-Bat	Very High	Operation- Bats	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	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone, however it is anticipated that the permanent streams and terrestrial vegetation east of the streams will remain, therefore the bat corridor will be retained. Although the stream crossings/stream loss will be less than Baseline, the permanent streams will remain intact, therefore loss in connectivity is still anticipated to occur due to new stream crossings/stream loss. Extent adjusted to 'Local' due to the lack of significant bat habitat upslope of where NoR crosses streams	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Operation	Presence of the road	R7-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone, however it is anticipated that the permanent streams and terrestrial vegetation east of the streams will remain, therefore the bat corridor will be retained. As the surrounding area is Future Urban Zone, it is likely that bats would be disturbed by the presence of the road (as opposed to highly likely).	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R7 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. As the NoR is a new road that will be intersecting high quality habitat for non-TAR species, it is highly likely that disturbance will occur that will result in changes to the population dynamics.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Very Low
Operation	Presence of the road	R7 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that will be intersecting high quality habitat for non-TAR species, it is highly likely that loss in connectivity resulting in changes to the population dynamics with occur (particularly for species with a small home range, such as grey warbler).	Indirect	Local	Permanent (>25 years)		Highly Likely	Irreversible	Moderate	Low
Operation	Presence of the road	R7 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that will be intersecting high quality habitat for non-TAR species, it is highly likely that disturbance will occur that will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)	Frequently	Highly Likely	Irreversible	Moderate	Low

NoR R7

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R7 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R7 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that the habitat will already be fragmented in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (EG is present in NoR R7). Note: 'Definite' likelihood assigned, as New Zealand pipit will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Definite	Totally	Moderate	High
Operation	Presence of the road	R7 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (EG is present in NoR R7). Although a new road will be intersecting pipit habitat and high densities of pipit are expected in the NoR, the current wider landscape has a large extent of pipit habitat available, both south and north of the NoR. Therefore, it's unlikely that this loss in connectivity would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (EG is present in NoR R7). Although a new road will be intersecting pipit habitat and high densities of pipit are expected in the NoR, the current wider landscape has a large extent of pipit habitat available. Therefore, it's unlikely that disturbance to pipit from construction activities would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low

NoR R7

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R7 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - North Island kākā	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Kākā are considered a highly mobile species in this area, with seasonal use and high dispersal. Therefore they are unlikely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R7 - North Island kākā	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Although the new road will be intersecting potential kākā habitat (WF11, MF4), there is only a small extent of habitat available (with the exception of EF) leftover on the northern/eastern side of the NoR. As the majority of the suitable kākā habitat (WF11, MF4) will remain intact south/west of the NoR, it is unlikely that this loss in connectivity would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - North Island kākā	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Kākā are considered a highly mobile species in this area, with seasonal use and high dispersal. Therefore they are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - North Island kākā	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R7 - North Island kākā	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that kākā habitat would already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - North Island kākā	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low

NoR R7

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R7 - Long-tailed cuckoo	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Long-tailed cuckoo are considered a highly mobile species in this area, with high dispersal. Therefore they are unlikely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R7 - Long-tailed cuckoo	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Although the new road will be intersecting potential long-tailed cuckoo habitat (WF11, MF4), there is only a small extent of habitat available (with the exception of EF) leftover on the northern/eastern side of the NoR. As the majority of the suitable long-tailed cuckoo habitat (WF11, MF4) will remain intact south/west of the NoR, it is unlikely that this loss in connectivity would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R7 - Long-tailed cuckoo	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Long-tailed cuckoo are considered a highly mobile species in this area, with high dispersal. In addition, the majority of suitable habitat (WF11, MF4) south/west of the NoR remains intact. Therefore they are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R7 - Long-tailed cuckoo	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R7 - Long-tailed cuckoo	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that long-tailed cuckoo habitat would already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R7 - Long-tailed cuckoo	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R7 - Black shag	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Likely utilising permanent open water in the NoR (WW7-S2a, WW7-S3a, WW7-S4, WW5-S2). Black shag are likely foraging but not nesting in this habitat (as they breed colonially), in addition they are considered a mobile species. Therefore it is unlikely that disturbance from construction activities would result in changes to the population dynamics.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low

NoR R7

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R7 - Black shag	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Likely utilising permanent open water in the NoR (WW7-S2a, WW7-S3a, WW7-S4, WW5-S2). WW7-S2a, WW7-S4, and WW7-S6a will be bridged, and minimal habitat is available north of the NoR at WW7-S3a. Therefore, it is unlikely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - Black shag	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Likely utilising permanent open water in the NoR (WW7-S2a, WW7-S3a, WW7-S4, WW5-S2). Black shag are likely foraging but not nesting in this habitat (as they breed colonially), in addition they are considered a mobile species. Therefore it is unlikely that disturbance from the presence of the road would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - Black shag	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Although the open water habitat is expected to remain, it is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R7 - Black shag	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. WW7-S2a, WW7-S4, and WW7-S6a will be bridged, and minimal habitat will be available north of the NoR at WW7-S3a. Therefore, it is unlikely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - Black shag	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Although the open water habitat is expected to remain, it is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - Little black shag, pied shag, little shag	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Likely utilising permanent open water in the NoR (WW7-S2a, WW7-S3a, WW7-S4, WW5-S2). Shags are likely foraging but not nesting in this habitat (as they breed colonially), in addition they are considered a mobile species. Therefore it is unlikely that disturbance from construction activities would result in changes to the population dynamics.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low

NoR R7

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R7 - Little black shag, pied shag, little shag	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Likely utilising permanent open water in the NoR (WW7-S2a, WW7-S3a, WW7-S4, WW5-S2). WW7-S2a, WW7-S4, and WW7-S6a will be bridged, and minimal habitat is available north of the NoR at WW7-S3a. Therefore, it is unlikely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - Little black shag, pied shag, little shag	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Likely utilising permanent open water in the NoR (WW7-S2a, WW7-S3a, WW7-S4, WW5-S2). Shags are likely foraging but not nesting in this habitat (as they breed colonially), in addition they are considered a mobile species. Therefore it is unlikely that disturbance from the presence of the road would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - Little black shag, pied shag, little shag	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Although the open water habitat is expected to remain, it is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R7 - Little black shag, pied shag, little shag	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. WW7-S2a, WW7-S4, and WW7-S6a will be bridged, and minimal habitat will be available north of the NoR at WW7-S3a. Therefore, it is unlikely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - Little black shag, pied shag, little shag	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Although the open water habitat is expected to remain, it is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Likely utilising large wetlands (> 5000 m2) that are present in the NoR (WW7-W3) for foraging and nesting. As construction activities will take place within this wetland, it is highly likely that birds will be disturbed. Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023). Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate

NoR R7

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R7 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline.  Likely utilising large wetlands (> 5000 m2) that are present in the NoR (WW7-W3).  As the NoR is a new road that is located within this wetland, it is likely that loss in connectivity will occur.  However, as spotless crane are considered to have 'good dispersal ability' (Cotter, 2016), and due to the extent of WW7-W3 that will remain north and south of the NoR, it is unlikely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline.  Likely utilising large wetlands (> 5000 m2) that are present in the NoR (WW7-W3) for foraging and nesting.  As the NoR is a new road that is located within this wetland, it is likely that birds will be disturbed.  Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023).  Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R7 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone.  Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by construction activities.  Note: A manual 'High' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate
Operation	Presence of the road	R7 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone.  Although it is anticipated that the delineated wetland will be retained, spotless crane are considered to have 'good dispersal ability' (Cotter, 2016), and there is good extent of wetland habitat that will remain.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment.  NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone.  Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by the presence of the road.  Note: A manual 'High' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Likely	Irreversible	Low	Moderate

NoR R7

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R7 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Baseline.</p> <p>Lkely utilising large wetlands (&gt; 5000 m2) that are present in the NoR (WW7-W3) for foraging and nesting.</p> <p>As construction activities will take place within this wetland, it is highly likely that birds will be disturbed.</p> <p>However, as Australasian bittern are considered a highly mobile species in this area, with high dispersal, and due to the extent of WW7-W3 that will remain north and south of the NoR, it is unlikely that this disturbance will result in changes to the population dynamics.</p>	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R7 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Lkely utilising large wetlands (&gt; 5000 m2) that are present in the NoR (WW7-W3).</p> <p>As the NoR is a new road that is located within this wetland, it is highly likely that loss in connectivity will occur.</p> <p>However, as spotless crane are considered a highly mobile species in this area, with high dispersal, and due to the extent of WW7-W3 that will remain north and south of the NoR, it is unlikely that this loss in connectivity will result in changes to the population dynamics.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R7 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Baseline.</p> <p>Lkely utilising large wetlands (&gt; 5000 m2) that are present in the NoR (WW7-W3) for foraging and nesting.</p> <p>As the NoR is a new road that is located within this wetland, it is highly likely that birds will be disturbed.</p> <p>However, as Australasian bittern are considered a highly mobile species in this area, with high dispersal, and due to the extent of WW7-W3 that will remain north and south of the NoR, it is unlikely that this disturbance will result in changes to the population dynamics.</p>	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R7 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone.</p> <p>Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R7 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone.</p> <p>Although it is anticipated that the delineated wetland will be retained, as Australasian bittern are considered a highly mobile species in this area, with high dispersal, a loss in connectivity that results in changes to the population dynamics is considered unlikely.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R7 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	<p>Likely Future Ecological Environment.</p> <p>NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone.</p> <p>Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting.</p> <p>Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.</p>	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low

NoR R7														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R7 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential copper skink habitat, and due to their small home range, it is likely that copper skink will be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low
Operation	Presence of the road	R7 - Ornate skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential copper skink habitat, and due to their small home range, it is likely that loss in connectivity will occur.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R7 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential copper skink habitat, and due to their small range, it is likely that copper skink will be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Construction	Noise/lighting/vibration/dust	R7 - Copper skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R7 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R7 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - Ornate skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential ornate skink habitat, and due to their small home range, it is likely that ornate skink will be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low
Operation	Presence of the road	R7 - Ornate skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential ornate skink habitat, and due to their small home range, it is likely that loss in connectivity will occur.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R7 - Ornate skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential ornate skink habitat, and due to their small range, it is likely that ornate skink will be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Construction	Noise/lighting/vibration/dust	R7 - Ornate skink	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R7 - Ornate skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R7

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R7 - Ornate skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - Elegant gecko and forest gecko	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Arboreal gecko species are potentially utilising the large stands of native terrestrial vegetation (WF11, MF4) that are present within the NoR. As they are nocturnal species, and as the NoR is a new road, it is highly likely that they are highly sensitive to construction disturbance, particularly construction lighting at night.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Low
Operation	Presence of the road	R7 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Although data is limited on the home range of geckos, due to the extent of habitat loss (approximately 4150 m2 of WF111), and to conservatively assess this effect, it is likely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R7 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Arboreal gecko species are potentially utilising the large stands of native terrestrial vegetation (WF11, MF4) that are present within the NoR. As they are nocturnal species, and as the NoR is a new road, it is likely that they are highly sensitive to disturbance from the presence of the road (particularly lighting at night).	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Construction	Noise/lighting/vibration/dust	R7 - Elegant gecko and forest gecko	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Although it is anticipated that suitable gecko habitat will be retained in the buffer of streams, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R7 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that suitable gecko habitat will be retained in the buffer of streams, and the NoR will impact the areas of WF11 associated with WW7-S2b and WW7-S3a. To conservatively assess this effect, it is likely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R7 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Although it is anticipated that suitable gecko habitat will be retained in the buffer of streams, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - Pacific gecko	Moderate	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Arboreal gecko species are potentially utilising the large stands of native terrestrial vegetation (WF11, MF4) that are present within the NoR. As they are nocturnal species, and as the NoR is a new road, it is likely that they are highly sensitive to construction disturbance, particularly construction lighting at night.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Low

NoR R7

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R7 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Although data is limited on the home range of geckos, due to the extent of habitat loss (approximately 4150 m2 of WF111), and to conservatively assess this effect, it is likely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R7 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Arboreal gecko species are potentially utilising the large stands of native terrestrial vegetation (WF11, MF4) that are present within the NoR. As they are nocturnal species, and as the NoR is a new road, it is highly likely that they are highly sensitive to disturbance from the presence of the road (particularly lighting at night).	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Construction	Noise/lighting/vibration/dust	R7 - Pacific gecko	Moderate	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Although it is anticipated that suitable gecko habitat will be retained in the buffer of streams, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R7 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is anticipated that suitable gecko habitat will be retained in the buffer of streams, and the NoR will impact the areas of WF11 associated with WW7-S2b and WW7-S3a. To conservatively assess this effect, it is likely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R7 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. Although it is anticipated that suitable gecko habitat will be retained in the buffer of streams, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R7 - Hochstetter's frog	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Hochstetter's frog populations may be present in the permanent stream WW7-S4. Due to their nocturnal nature, it is expected that Hochstetter's frog will be highly sensitive to construction activities, particularly lighting at night. WW7-S4 will be bridged, therefore construction activities will take place within close proximity of potential habitat. Therefore it is likely that construction activities could cause disturbance to Hochstetter's frog populations. It is not assessed as highly likely as the disturbance is localised relative to the population.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low
Operation	Presence of the road	R7 - Hochstetter's frog	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. As WW7-S4 will be bridged, it is anticipated that connectivity will remain intact. There will be some loss in connectivity related to increased lighting disturbance, therefore loss in connectivity that could result in changes in the population dynamics is considered likely.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low

NoR R7

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R7 - Hochstetter's frog	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. As they are nocturnal species, and as the NoR is a new road, it is likely that they are highly sensitive to disturbance from the presence of the road (particularly lighting at night). Therefore it is likely that the presence of the road could cause disturbance to Hochstetter's frog populations. It is not assessed as highly likely as the disturbance is localised relative to the population.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Construction	Noise/lighting/vibration/dust	R7 - Hochstetter's frog	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is expected that any populations present would be habituated to disturbance in this environment, therefore it is not anticipated that disturbance to Hochstetter's frogs will result in changes to the population dynamics. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R7 - Hochstetter's frog	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. As Hochstetter's frog habitat is expected to remain in the Future Urban Zone (stream and riparian margin), the magnitude and level effect are considered the same as Baseline.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R7 - Hochstetter's frog	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special Purpose - Quarry Zone. It is expected that any populations present would be habituated to disturbance in this environment, therefore it is not anticipated that disturbance to Hochstetter's frogs will result in changes to the population dynamics. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R8														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R8-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Baseline. Multiple new stream crossings and stream loss of corridors that are likely to be utilised by bats for commuting and foraging. Bats are highly likely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R8-Bat	Very High	Operation- Bats	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	Baseline. Multiple new stream crossings and stream loss of corridors that are likely to be utilised by bats.	Indirect	Regional	Permanent (>25 years)		Highly Likely	Irreversible	High	Very High
Operation	Presence of the road	R8-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Baseline. Multiple new stream crossings and stream loss of corridors likely to be utilised by bats for commuting and foraging. Bats are highly likely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R8-Bat	Very High	Construction- Bats	Disturbance and displacement to roosts and individuals (existing) due to construction activities (noise, light, dust etc.)	Likely Future Ecological Environment. NoR is located in Future Urban Zone, and Special , however it is anticipated that the permanent streams and terrestrial vegetation west of the stream will remain, therefore the bat corridor will be retained. As the surrounding area is Future Urban Zone, it is likely that bats would be disturbed by construction activities (as opposed to highly likely).	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R8-Bat	Very High	Operation- Bats	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	Likely Future Ecological Environment. NoR is located in Future Urban Zone, however it is anticipated that the permanent streams and terrestrial vegetation west of the stream will remain, therefore the bat corridor will be retained. Although the stream crossings/stream loss will be less than Baseline, the permanent stream will remain intact, therefore loss in connectivity is still anticipated to occur due to new stream crossings/stream loss.	Indirect	Regional	Permanent (>25 years)		Likely	Irreversible	Moderate	High
Operation	Presence of the road	R8-Bat	Very High	Operation- Bats	Disturbance and displacement of (new and existing) roosts and individuals due to lighting and noise/vibration	Likely Future Ecological Environment. NoR is located in Future Urban Zone, however it is anticipated that the permanent streams and terrestrial vegetation west of the stream will remain, therefore the bat corridor will be retained. As the surrounding area is Future Urban Zone, it is likely that bats would be disturbed by the presence of the road (as opposed to highly likely).	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R8 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. As the NoR is a new road that will be intersecting high quality habitat (WW8-W1) for non-TAR species, it is highly likely that disturbance will occur that will result in changes to the population dynamics.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Very Low
Operation	Presence of the road	R8 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. The NoR is a new road that will be intersecting high quality habitat (WW8-W1) for non-TAR species, however there is some existing fragmentation to the west of the NoR (industry and the new motorway), therefore it is likely that loss in connectivity resulting in changes to the population dynamics will occur (particularly for species with a small home range).	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Very Low
Operation	Presence of the road	R8 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that will be intersecting high quality habitat (WW8-W1) for non-TAR species, it is highly likely that disturbance will occur that will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)	Frequently	Highly Likely	Irreversible	Moderate	Low
Construction	Noise/lighting/vibration/dust	R8 - Non-TAR bird	Low	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R8 - Non-TAR bird	Low	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that the habitat will already be fragmented in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R8														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R8 - Non-TAR bird	Low	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)	Frequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R8 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (EG is present in NoR R7). Note: 'Definite' likelihood assigned, as New Zealand pipit will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Definite	Totally	Moderate	High
Operation	Presence of the road	R8 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (EG is present in NoR R7). Although a new road will be intersecting pipit habitat and high densities of pipit are expected in the NoR, the current wider landscape has a large extent of pipit habitat available on the eastern side of the NoR. Therefore, it's unlikely that this loss in connectivity would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R8 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. New Zealand pipit have the potential to utilise any open habitat such as Exotic Grassland and Exotic Scrub (EG is present in NoR R7). Although a new road will be intersecting pipit habitat and high densities of pipit are expected in the NoR, the current wider landscape has a large extent of pipit habitat available. Therefore, it's unlikely that disturbance to pipit from construction activities would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R8 - New Zealand pipit	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R8 - New Zealand pipit	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R8 - New Zealand pipit	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for New Zealand pipit is not anticipated to be present in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R8 - North Island kākā	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Kākā are considered a highly mobile species in this area, with seasonal use and high dispersal. Therefore they are unlikely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Very Low

NoR R8

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R8 - North Island kākā	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Potential kākā habitat (VS2, WF7) is expected to remain intact (due to the height of the proposed bridge). Therefore it is unlikely that any loss in connectivity caused by the presence of the bridge would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R8 - North Island kākā	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Kākā are considered a highly mobile species in this area, with seasonal use and high dispersal. Therefore they are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R8 - North Island kākā	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R8 - North Island kākā	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that kākā habitat would already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R8 - North Island kākā	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R8 - Long-tailed cuckoo	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Long-tailed cuckoo are considered a highly mobile species in this area, with high dispersal. Therefore they are unlikely to be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R8 - Long-tailed cuckoo	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Potential long-tailed cuckoo habitat (VS2, WF7) is expected to remain intact (due to the height of the proposed bridge). Therefore it is unlikely that any loss in connectivity caused by the presence of the bridge would result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R8 - Long-tailed cuckoo	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Long-tailed cuckoo are considered a highly mobile species in this area, with high dispersal. In addition, the majority of suitable habitat (VS2, WF7) will remain intact due to the height of the bridge. Therefore they are unlikely to be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R8 - Long-tailed cuckoo	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low

NoR R8

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R8 - Long-tailed cuckoo	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that long-tailed cuckoo habitat would already be fragmented in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R8 - Long-tailed cuckoo	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that birds present will be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R8 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Spotless crane likely utilising large (> 5000 m2) wetlands present in the NoR (WW8-W1 and WW8-W4) for foraging and nesting. As construction activities will take place within these wetlands, it is highly likely that birds will be disturbed. Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023). Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate
Operation	Presence of the road	R8 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Spotless crane likely utilising large (> 5000 m2) wetlands present in the NoR (WW8-W1 and WW8-W4) for foraging and nesting. The new road will fragment these wetlands, with limited wetland extent remaining, therefore a loss in connectivity that results in changes to the population dynamics is considered likely.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R8 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Spotless crane likely utilising large (> 5000 m2) wetlands present in the NoR (WW8-W1 and WW8-W4) for foraging and nesting. As the NoR is a new road that is located within these wetlands, it is likely that birds will be disturbed. Spotless crane are known to be in the wider area as they have been picked up in nearby acoustic surveys, and have the potential to be nesting in wetlands present in the NoR (M. Baber, personal communication, 27 January 2023). Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R8 - Spotless crane	High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by construction activities. Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management during construction to prevent disturbance to nesting birds in the area.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Moderate

NoR R8

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R8 - Spotless crane	High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone.  The new road will fragment these wetlands, with limited wetland extent remaining, therefore a loss in connectivity that results in changes to the population dynamics is considered likely.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R8 - Spotless crane	High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone.  Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is higher potential for spotless crane to be foraging and nesting in this habitat, and could be disturbed by the presence of the road.  Note: A manual 'Moderate' level of effect has been assigned, as spotless crane will require specific management to prevent disturbance to nesting birds in the area from the presence of the road.	Indirect	Local	Permanent (>25 years)	Frequently	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R8 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline.  Australasian bittern likely utilising large (> 5000 m2) wetlands present in the NoR (WW8-W1 and WW8-W4) for foraging.  As construction activities will take place within these wetlands, it is highly likely that birds will be disturbed.  However, Australasian bittern are considered a highly mobile species in this area, with high dispersal. Additionally, bittern are not expected to nest in this area.  Therefore it is unlikely that disturbance from construction activities will result in changes to the population dynamics.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R8 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline.  Australasian bittern likely utilising large (> 5000 m2) wetlands present in the NoR (WW8-W1 and WW8-W4) for foraging.  The new road will fragment these wetlands, with limited wetland extent remaining, however, Australasian bittern are considered a highly mobile species in this area, with high dispersal.  Therefore a loss in connectivity that results in changes to the population dynamics is considered unlikely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R8 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline.  Australasian bittern likely utilising large (> 5000 m2) wetlands present in the NoR (WW8-W1 and WW8-W4) for foraging.  The new road will be built within these wetlands, therefore it is highly likely that birds will be disturbed.  However, Australasian bittern are considered a highly mobile species in this area, with high dispersal. Additionally, bittern are not expected to nest in this area.  Therefore it is unlikely that disturbance from the presence of the road will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R8 - Australasian bittern	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone.  Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Short-term (<5 years)	Infrequently	Unlikely	Totally	Negligible	Low
Operation	Presence of the road	R8 - Australasian bittern	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone.  Although it is anticipated that the delineated wetland will be retained, as Australasian bittern are considered a highly mobile species in this area, with high dispersal, a loss in connectivity that results in changes to the population dynamics is considered unlikely.  Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low

NoR R8

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R8 - Australasian bittern	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Australasian bittern are considered a mobile species in this area, with high dispersal, and unlikely to be nesting. Therefore, the magnitude and level of effect are considered the same as or lower than Baseline.	Indirect	Local	Permanent (>25 years)	Infrequently	Unlikely	Irreversible	Negligible	Low
Construction	Noise/lighting/vibration/dust	R8 - Dabchick	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Dabchick likely utilising open water associated with planted wetlands in the NoR (WW8-W1) for foraging and nesting. As construction activities will take place within these wetlands, it is highly likely that birds will be disturbed. In addition, there is limited habitat available for dabchick in the wider environment. Therefore it is likely that this disturbance will result in changes to the population dynamics.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R8 - Dabchick	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Baseline. Dabchick likely utilising open water associated with planted wetlands in the NoR (WW8-W1). The NoR will fragment these wetlands, with limited wetland extent remaining. In addition there is limited suitable habitat for dabchick in the wider landscape. Only western portion of wetland will remain during operation therefore fragmentation is unlikely Therefore a loss in connectivity that results in changes to the population dynamics is considered likely.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low
Operation	Presence of the road	R8 - Dabchick	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Baseline. Dabchick likely utilising open water associated with planted wetlands in the NoR (WW8-W1) for foraging and nesting. Western portion of WW8-W1 will remain and likely to be used by Dabchick As the NoR will fragment suitable habitat in the NoR (WW8-W1), it is unlikely that dabchick would utilise this wetland during operation of the road (due to the lowered quality of habitat).	Indirect	Local	Permanent (>25 years)	Frequently	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R8 - Dabchick	Very High	Construction- Birds	Disturbance and displacement to nests and individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is potential for dabchick to be foraging and nesting in this habitat, and could be disturbed by construction activities. Therefore, the magnitude and level of effect are considered the same as Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Moderate
Operation	Presence of the road	R8 - Dabchick	Very High	Operation- Birds (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Delineated wetlands will be retained (and habitat quality likely improved) in the Likely Future Ecological Environment. Therefore there is potential for dabchick to be foraging and nesting in this habitat, and could be disturbed by construction activities. Only western portion of wetland will remain during operation therefore fragmentation is unlikely The NoR will fragment these wetlands, with limited wetland extent remaining. In addition there is limited suitable habitat for dabchick in the wider landscape. Therefore, the magnitude and level of effect are considered the same as Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Low

NoR R8														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R8 - Dabchick	Very High	Operation- Birds (native)	Disturbance and displacement of (new and existing) nests and individuals due to light, noise, vibration etc due to the presence of the infrastructure, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Dabchick likely utilising open water associated with western portion of planted wetlands in the NoR (WW8-W1) for foraging and nesting. As the NoR will fragment suitable habitat in the NoR (WW8-W1), it is unlikely that dabchick would utilise this wetland during operation of the road (due to the lowered quality of habitat). Therefore, the magnitude and level of effect are considered the same as Baseline.	Indirect	Local	Permanent (>25 years)	Frequently	Likely	Irreversible	Low	Moderate
Construction	Noise/lighting/vibration/dust	R8 - Copper skink	High	Construction-Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential copper skink habitat, and due to their small home range, it is likely that copper skink will be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low
Operation	Presence of the road	R8 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential copper skink habitat, and due to their small home range, it is likely that loss in connectivity will occur.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R8 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential copper skink habitat, and due to their small range, it is likely that copper skink will be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Construction	Noise/lighting/vibration/dust	R8 - Copper skink	High	Construction-Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R8 - Copper skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R8 - Copper skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for copper skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R8 - Ornate skink	High	Construction-Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential ornate skink habitat, and due to their small home range, it is likely that ornate skink will be disturbed by construction activities.	Indirect	Local	Short-term (<5 years)	Frequently	Likely	Totally	Low	Low
Operation	Presence of the road	R8 - Ornate skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential ornate skink habitat, and due to their small home range, it is likely that loss in connectivity will occur.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R8 - Ornate skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. As the NoR is a new road that intersects potential ornate skink habitat, and due to their small range, it is likely that ornate skink will be disturbed by the presence of the road.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Construction	Noise/lighting/vibration/dust	R8 - Ornate skink	High	Construction-Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low

NoR R8														
Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Operation	Presence of the road	R8 - Ornate skink	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R8 - Ornate skink	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Suitable habitat for ornate skink is not anticipated to be present (or very limited/low quality) in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Construction	Noise/lighting/vibration/dust	R8 - Elegant gecko and forest gecko	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Arboreal gecko species are potentially utilising the stands of native terrestrial vegetation (VS2, WF7) that are present within the NoR. Construction activities will take place within these areas for the proposed bridge construction. As they are nocturnal species, and as the NoR is a new road, it is highly likely that they are highly sensitive to construction disturbance, particularly construction lighting at night.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Low
Operation	Presence of the road	R8 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Although data is limited on the home range of geckos, it is expected that some connectivity is retained as the gecko habitat will be bridged. Therefore it is unlikely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R8 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Arboreal gecko species are potentially utilising the stands of native terrestrial vegetation (VS2, WF7) that are present within the NoR. The NoR is a new road with a proposed bridge that will be built over these areas. As they are nocturnal species, and as the NoR is a new road, it is highly likely that they are highly sensitive to disturbance from the presence of the road (particularly lighting at night).	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Construction	Noise/lighting/vibration/dust	R8 - Elegant gecko and forest gecko	High	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that most of the gecko habitat will be retained in the permanent stream buffer of WW8-S3, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R8 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that most of the gecko habitat will be retained in the permanent stream buffer of WW8-S3. Although data is limited on the home range of geckos, it is expected that some connectivity is retained as the gecko habitat will be bridged. Therefore it is unlikely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R8 - Elegant gecko and forest gecko	High	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that most of the gecko habitat will be retained in the permanent stream buffer of WW8-S3, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

NoR R8

Phase	Project Activity	Resource Unit (Habitat/Species)	Ecological Value	Effect Description Main	Effect Description Detailed	Effects Description Manual	Type	Extent (ZOI)	Duration	Frequency	Likelihood	Reversibility	Magnitude (pre-mitigation)	Level of Effect (Pre-mitigation)
Construction	Noise/lighting/vibration/dust	R8 - Pacific gecko	Moderate	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Baseline. Arboreal gecko species are potentially utilising the stands of native terrestrial vegetation (VS2, WF7) that are present within the NoR. Construction activities will take place within these areas for the proposed bridge construction. As they are nocturnal species, and as the NoR is a new road, it is highly likely that they are highly sensitive to construction disturbance, particularly construction lighting at night.	Indirect	Local	Short-term (<5 years)	Frequently	Highly Likely	Totally	Low	Low
Operation	Presence of the road	R8 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Baseline. Although data is limited on the home range of geckos, it is expected that some connectivity is retained as the gecko habitat will be bridged. Therefore it is unlikely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Operation	Presence of the road	R8 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Baseline. Arboreal gecko species are potentially utilising the stands of native terrestrial vegetation (VS2, WF7) that are present within the NoR. The NoR is a new road with a proposed bridge that will be built over these areas. As they are nocturnal species, and as the NoR is a new road, it is highly likely that they are highly sensitive to disturbance from the presence of the road (particularly lighting at night).	Indirect	Local	Permanent (>25 years)		Likely	Irreversible	Low	Low
Construction	Noise/lighting/vibration/dust	R8 - Pacific gecko	Moderate	Construction- Herpetofauna (native)	Disturbance and displacement of individuals (existing) due to construction activities (noise, light, dust, vibration etc) resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that most of the gecko habitat will be retained in the permanent stream buffer of WW8-S3, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Short-term (<5 years)	Frequently	Unlikely	Totally	Negligible	Very Low
Operation	Presence of the road	R8 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	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, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. It is anticipated that most of the gecko habitat will be retained in the permanent stream buffer of WW8-S3. Although data is limited on the home range of geckos, it is expected that some connectivity is retained as the gecko habitat will be bridged. Therefore it is unlikely that this loss in connectivity will result in changes to the population dynamics.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low
Operation	Presence of the road	R8 - Pacific gecko	Moderate	Operation- Herpetofauna (native)	Disturbance of nocturnal lizard behaviour due to lighting associated with the infrastructure use, resulting in changes to the population dynamics	Likely Future Ecological Environment. NoR is located in Future Urban Zone. Although it is anticipated that most of the gecko habitat will be retained in the permanent stream buffer of WW8-S3, it is expected that gecko will already be habituated to disturbance in this environment. Therefore, the magnitude and level of effect are considered lower than Baseline.	Indirect	Local	Permanent (>25 years)		Unlikely	Irreversible	Negligible	Very Low

## 10 Appendix 10 – Rapid Habitat Assessment Results

Table 18-34 Summary of RHA values

Stream ID	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*
WW1-S1	-	-	-	-	-	-	-	-	-	-	N/A	N/A
WW1-S2	-	-	-	-	-	-	-	-	-	-	N/A	N/A
WW2-S1	7	8	10	9	10	6	7.5	7	8	8	80.5	G
WW2-S2	1	6	2	6	7	5	7	6	4	6	50	M
WW2-S3	1	9	4	9	8	4	6	7	8	8	64	G
WW2-S4	1	4	2	5	5	1	1	3	7	9	38	P
WW3-S1a	1	4	6	5	6	5	6.5	4	2.5	5	45	M
WW3-S1b	1	5	2	6	7	5	7	4	6	5	48	M
WW3-S1c	1	4	1	4	7	1	7	4	5.5	7	41.5	M
WW3-S2a	1	3	3	4	7	4	1	5	1	8	37	P
WW3-S2b	1	3	3	4	7	4	1	5	1	8	37	P
WW3-S3a	3	3	1.5	4	3	2	1	2	1.5	4	25	P
WW3-S3b	1	4	1	7	4	1	2	3	2	4	29	P
WW3-S4a	1	4	2	6	7	3	7	4	6	8	48	M
WW3-S4b	1	4	1	8	7	1	3	3	5	7	40	P
WW4-S1	1	1	1	1	1	1	1	2	5.5	3	17.5	P
WW4-S2	1	1	1	1	1	1	3	2	6	3	20	P
WW4-S3	1	1	1	1	1	1	3	2	4.5	3	18.5	P
WW5-S1	9	10	9	9	7	8	8	7	8	8	83	E
WW5-S2	3	8	3	8	6	5	5	5	8.5	9	60.5	M
WW5-S3	1	2	1	2	2	1	3	2	9	8	31	P

Stream ID	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*
WW5-S4	1	3	1	4	4	2	1	2	2	6	26	P
WW5-S5	1	4	1	2	3	2	1	3	2	8	27	P
WW5-S6	3	4	5	4	2	3	2	3	10	9	45	M
WW6-S1	1	3	3	3	4	3	3	6	7	7	40	P
WW6-S2	1	2	1	3	6	3	4	7	9	9	45	M
WW7-S1^	1	4	1	4	3	1	2	3	10	7	36	P
WW7-S2a	1	5	2	5	2	5	7.5	6	3	9	45.5	M
WW7-S2b	1	1	1.5	2	2	2	1	6	1	8	25.5	P
WW7-S3a	1	3	1	5	5	3	6	5	5.5	7	41.5	M
WW7-S3b	1	2	1	3	2	1	1	7	6	7	31	P
WW7-S4	7	9	8	9	9	10	7	5	7.5	9	80.5	G
WW7-S5	1	2	1	2	2	1	8	3	4.5	8	32.5	P
WW7-S6a	2	4	1	5	4	2	2	2	2	8	32	P
WW7-S6b	1	2	1	2	2	1	6	3	5.5	8	31.5	P
WW8-S1	1	4	1	6	6	2	5	6	6.5	8	45.5	M
WW8-S2	4	6	4	6	5	5	6	4	10	7	57	M
WW8-S3	-	-	-	-	-	-	-	-	-	-	N/A	N/A

**Notes:**

NA = Stream assessed at desktop level due to access restrictions.

\* = Corresponding habitat values for each habitat quality score

P = Poor (Score 10-40)

M = Moderate (Score 41-60)

G = Good (Score 61-80)

E = Excellent (Score 81+)

Light blue shading = Permanent stream

No shading = Intermittent stream

## 11 Appendix 11 – Significant Ecological Areas

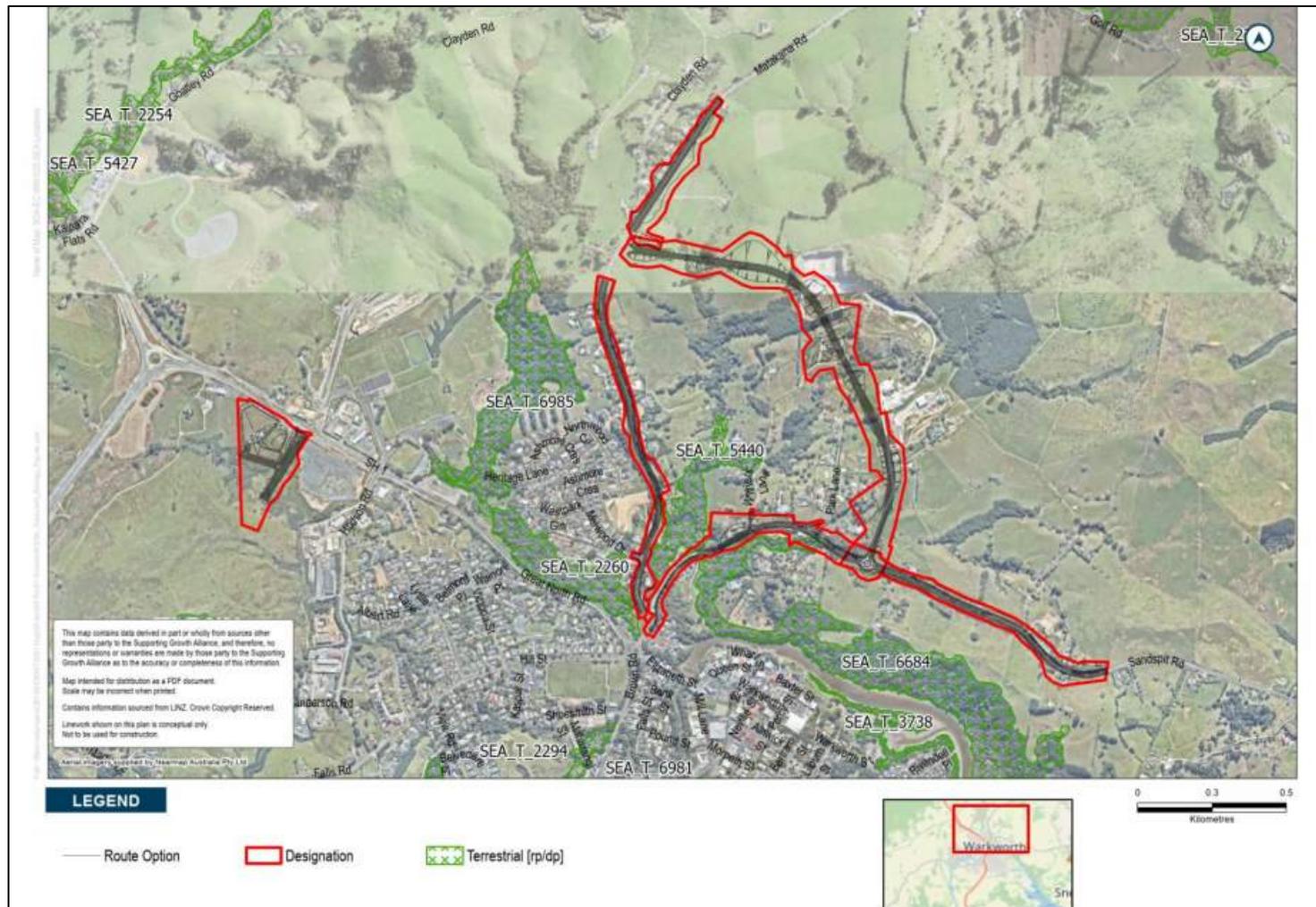


Figure 18-1 Significant Ecological Areas (SEAs) (northern area)

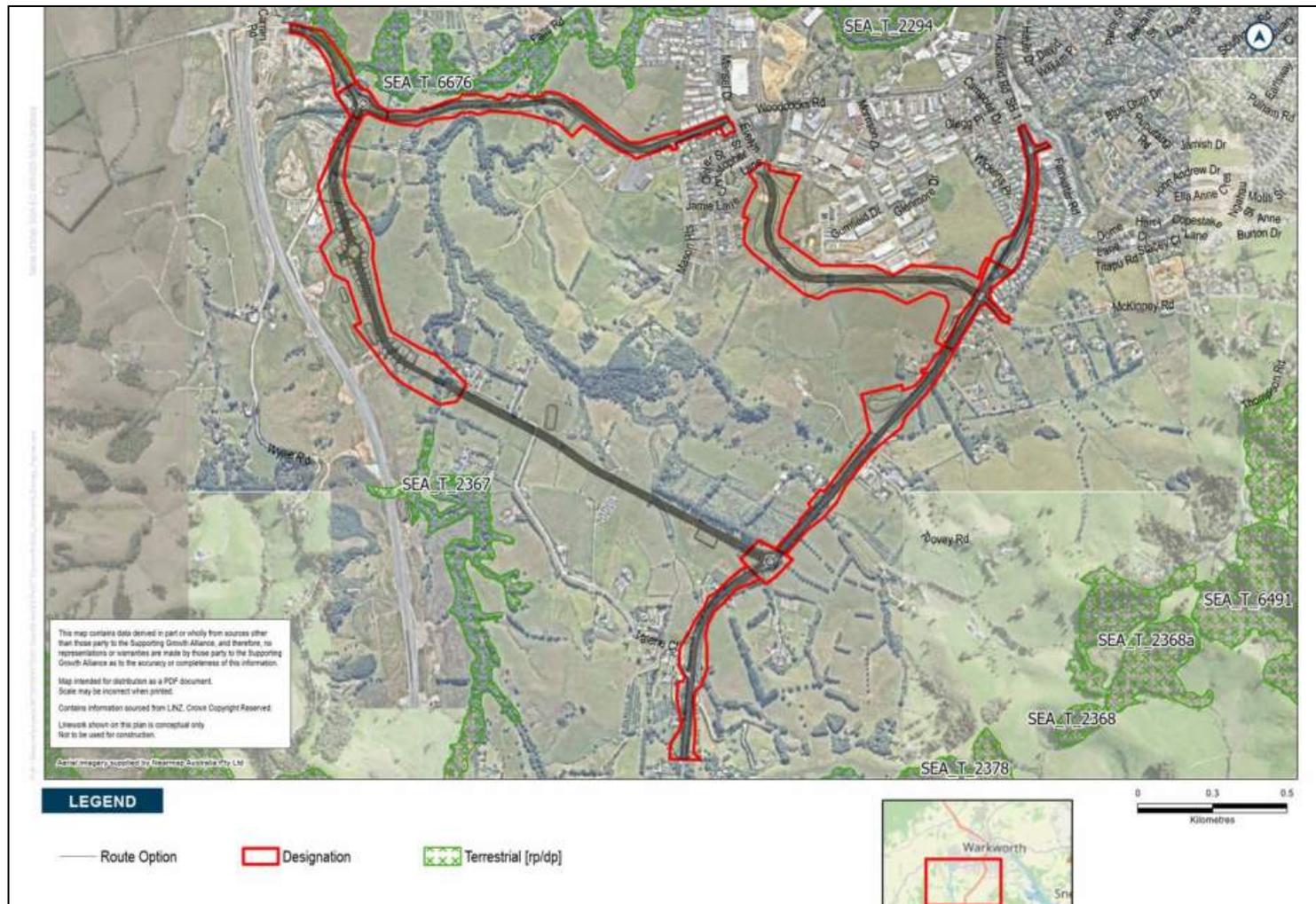


Figure 18-2 Significant Ecological Areas (SEAs) (southern area)

## 12 Appendix 12 – Indicative Mitigation Areas



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Map intended for distribution as a PDF document.  
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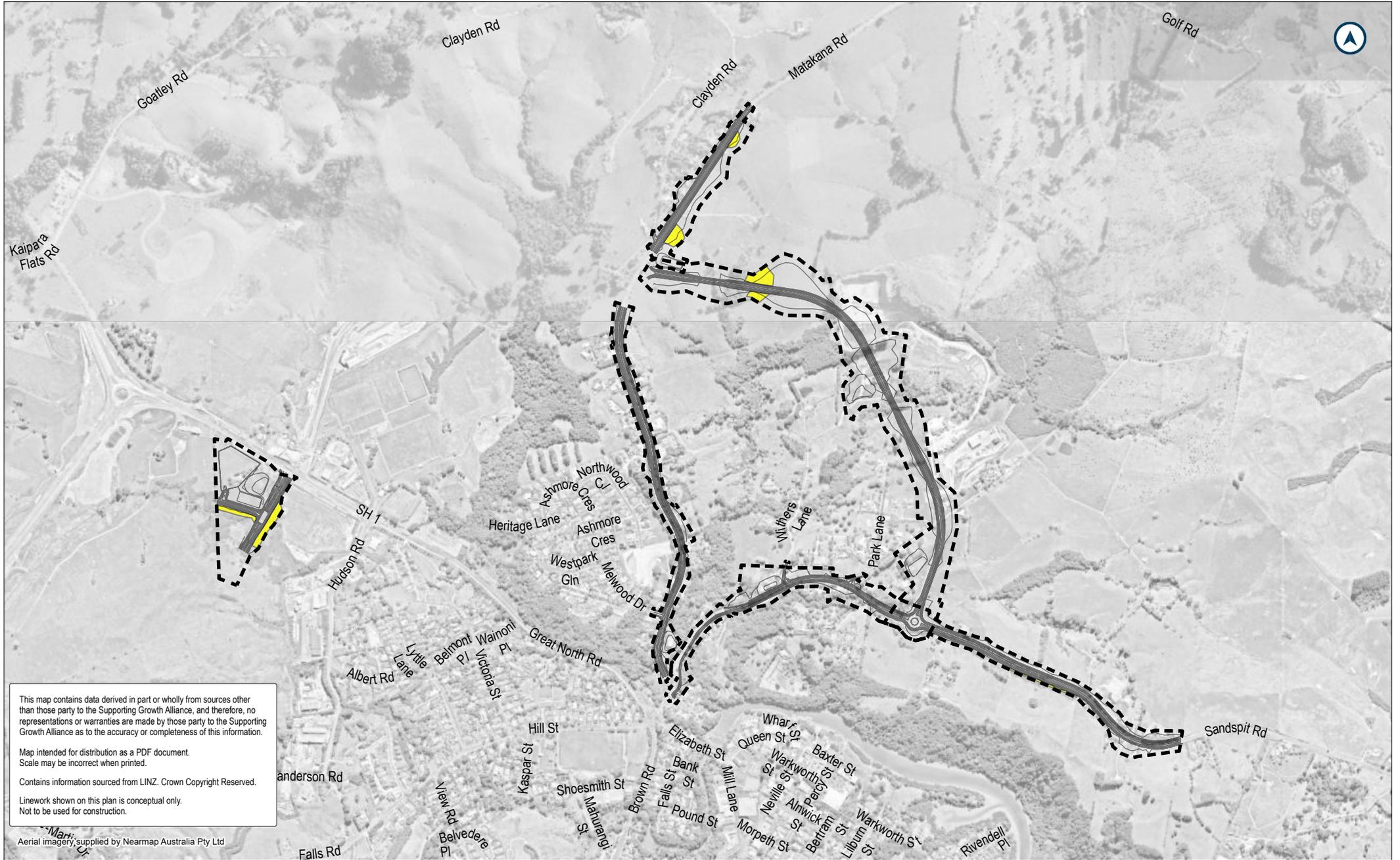
Aerial imagery supplied by Nearmap Australia Pty Ltd

### LEGEND

- Route Option
- - - Designation
- Indicative Bat Mitigation







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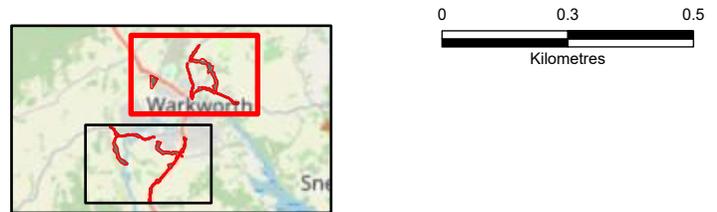
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### LEGEND

- Route Option
- Designation
- Indicative Bird Mitigation





## 13 Appendix 13 – Biodiversity Compensation Model (BCM) for potential SEA loss



Model Inputs			
Input descriptors	Input data		
Project/reference name	SGA Warkworth		
Biodiversity type	T		
Technical expert(s) input	Michiel Jonker		
Benchmark	5		
How many habitat types OR sites are impacted	2		
Number of proposed compensation actions	1		
Net gain target	10%		
<b>Habitat/Site Impact(s)</b>	<b>WF11</b>	<b>TL3</b>	
Impact risk contingency:	3		2
Impact uncertainty contingency:	3		2
Areal extent of impact (ha):	0.1147		0.1287
Value score prior to impact:	4		3
Value score after impact:	0.01		0.01
<b>Compensation Action(s)</b>	<b>Compensation Action 1</b>		
Discount rate:	3.0%		
Finite end point (years):	50		
Compensation confidence contingency:	3		
Areal extent (ha) of compensation type:	2.04		
Value score prior to compensation:	0.01		
Value score after compensation:	4		

Model outputs			
	Total impact score	WF11	TL3
<b>Impact score</b>	<b>-0.20971</b>	<b>-0.12082</b>	<b>-0.08889</b>
	Total compensation score	Compensation Action 1	
<b>Compensation score</b>	<b>0.23209</b>	<b>0.23209</b>	
<b>Net gain outcome</b>	<b>10.7%</b>		

This Biodiversity Compensation Model (BCM) and the accompanying User Guide has been developed by:

*M. Baber, J. Dickson, J. Quinn, J. Markham, G. Ussher, S. Jackson and S. Heggie-Gracie*

Figure 18-3 Biodiversity Compensation Model inputs and outputs for NOR 2 - Woodcocks Road Upgrade

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Model Inputs		
Input descriptors	Input data	
Project/reference name	SGA Warkworth	
Biodiversity type	TL3	
Technical expert(s) input	Michiel Jonker	
Benchmark	5	
How many habitat types OR sites are impacted	1	
Number of proposed compensation actions	1	
Net gain target	10%	
<b>Habitat/Site Impact(s)</b>	<b>WF7.1</b>	
Impact risk contingency:	2	
Impact uncertainty contingency:	2	
Areal extent of impact (ha):	0.0774	
Value score prior to impact:	3	
Value score after impact:	0.01	
<b>Compensation Action(s)</b>	<b>Compensation Action 1</b>	
Discount rate:	3.0%	
Finite end point (years):	50	
Compensation confidence contingency:	2	
Areal extent (ha) of compensation type:	0.4	
Value score prior to compensation:	0.01	
Value score after compensation:	4	
Model outputs		
	<b>Total impact score</b>	<b>WF7.1</b>
<b>Impact score</b>	<b>-0.05346</b>	<b>-0.05346</b>
	<b>Total compensation score</b>	<b>Compensation Action 1</b>
<b>Compensation score</b>	<b>0.06007</b>	<b>0.06007</b>
<b>Net gain outcome</b>	<b>12.4%</b>	
This Biodiversity Compensation Model (BCM) and the accompanying User Guide has been developed by: <i>M. Baber, J. Dickson, J. Quinn, J. Markham, G. Ussher, S. Jackson and S. Heggie-Gracie</i>		

Figure 18-4 Biodiversity Compensation Model inputs and outputs for NOR 4 - Matakana Road Upgrade

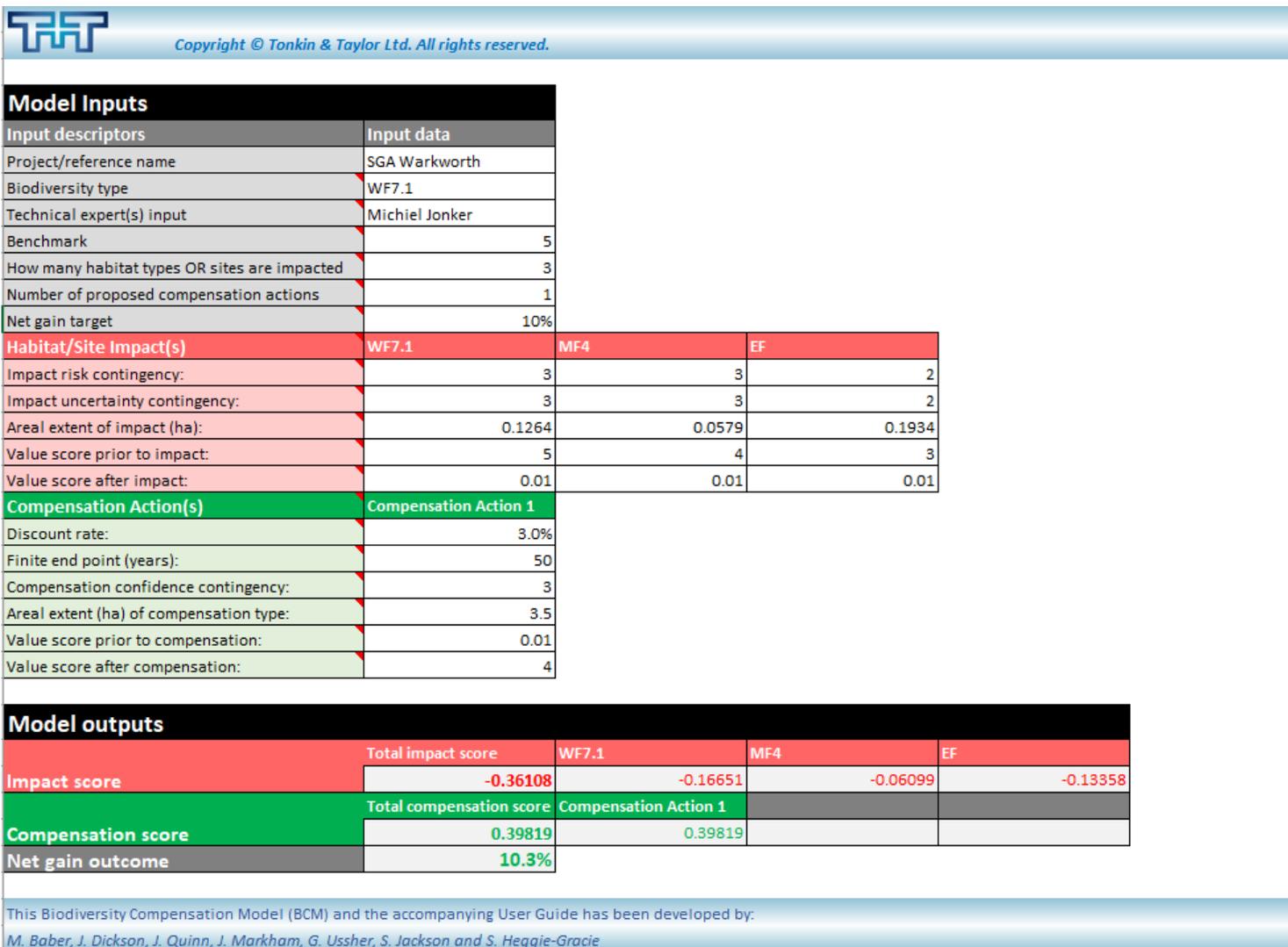


Figure 18-5 Biodiversity Compensation Model inputs and outputs for NOR 4 - Sandspit Road Upgrade