



Western Ring Route – Waterview Connection



Assessment of Herpetofauna Ecological Effects



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Quality Assurance Statement

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1. Introduction

In 2009 the NZTA confirmed its intention that the 'Waterview Connection Project' (the Project) would be lodged with the Environmental Protection Authority as a Proposal of National Significance. The Project includes works previously investigated and developed as two separate Projects: being the SH16 Causeway Project and the SH20 Waterview Connection. The key elements of the Waterview Connection Project are:

- Completing the Western Ring Route (which extends from Manukau to Albany via Waitakere);
- Improving resilience of the SH16 causeway between the Great North Road and Rosebank Interchanges to correct historic subsidence and "future proof" it against sea level rise;
- Providing increased capacity on the SH16 corridor (between the St Lukes and Te Atatu Interchanges);
- Providing a new section of SH20 (through a combination of surface and tunnelled road) between the Great North Road and Maoro Street Interchanges; and
- Providing a cycleway throughout the surface road elements of the Project corridor.

2. Purpose and Project Description

The purpose of this report is to provide an assessment of the Project on the habitat of herpetofauna, and an assessment of the significance of these effects. The Project footprint contains areas of vegetation comprising a range of different habitat types that may potentially harbour ecologically significant populations of protected (Wildlife Act 1953) herpetofauna, specifically native lizards.

Native lizards are known to occur in the Tamaki Ecological District, including copper skinks (*Oligosoma aeneum*), ornate skinks (*O. ornatum*), forest geckos (*Hoplodactylus granulatus*), pacific geckos (*H. pacificus*) and Auckland green geckos (*Naultinus elegans elegans*). All of these species are protected and known to occur within the Auckland Isthmus. Rainbow skinks (*Lampropholis delicata*) are not protected; the Auckland Regional Council and Department of Conservation (DOC) consider them a potential pest and they will be managed as a pest species in some areas.

Typical habitat types within which native lizards occur within the Auckland Region range from rank grass and scrub, regenerating bush and older established bush. Some of these habitat types occur within the proposed footprint of the Project.

Bioresearches Group Limited (BGL) and Boffa Miskell Limited (BML) have provided assessments of the ecological effects associated with aspects of the Project on herpetofauna, specifically lizards. This document consolidates the information from those assessments and presents a final report detailing all known lizard communities within the proposed footprint of the Project. Additionally, an assessment of the ecological significance of the findings, an assessment of ecological effects and appropriate mitigation measures to minimise and offset the effects are detailed in this report, and further addressed in the Lizard Management Plan and is included in the Appendix A of this report.

3. Methods

Several methods were used to assess the habitat within the Project footprint in terms of its values for native herpetofauna (specifically lizards). These included desktop investigations and an onsite visual assessment of the habitat. Additionally, lizard surveys were conducted along a length of the existing SH16 corridor from St Lukes to Te Atatu Interchange, as well as through the proposed SH20 footprint, from Maioro Street Interchange to Great North Road Interchange. Areas surveyed were those that were considered to potentially provide suitable lizard habitat. Specific methodologies are described below.

3.1 Desktop Investigation

High resolution aerial imagery of the Project footprint was reviewed to provide indications of the likely nature and extent of herpetofauna habitats and to guide the selection of appropriate field survey methods. The Department of Conservation's 'Amphibian and Reptile Distribution Scheme' (ARDS) database was accessed (11 January 2010) to determine which species have been previously recorded in the wider area.

3.2 Habitat Assessment

The areas of potential lizard habitat were considered to be in motorway-side vegetation, traffic islands and recreation reserves. Such vegetation types include patches of mixed native and exotic scrubland (i.e. hebe, *Hebe* spp.; privet, *Ligustrum* spp.; gorse, *Ulex europaeus*; blackberry, *Rubus fruticosus*), rank grass (i.e. kikuyu, *Pennisetum clandestinum*), interspersed clumps of pampas (*Cortaderia* spp.), flax (*Phormium tenax*) and stands of mature trees (i.e. kanuka, *Leptospermum kunzea*; wattle, *Acacia* spp.; tree ferns, *Cyathea* spp.; cabbage trees, *Cordyline australis*). Areas of short, mown grass were not considered to represent suitable lizard habitat however areas of rank grass were, particularly areas of rank grass that were connected to scrubland areas. Rock piles, log piles and debris (e.g. corrugated sheets, rubbish) were considered to provide additional refuges for lizards. The habitat quality at the southern portal of the proposed tunnels was constrained by the waterlogged nature of the soil. Potential refuges in this area appeared much wetter than those that would typically be occupied by skinks.

3.3 Artificial Lizard Refuges

Artificial refuges (ARs) were used by both BGL and BML to survey for lizards. ARs used in all surveys consisted of corrugated sheets of Onduline® (500 mm x 500 mm). Onduline® is an organic, bitumen-saturated material used in reptile surveys throughout New Zealand due to its lightweight and suitable thermal properties (Lettink

& Cree 2007, Wilson *et al.* 2007). The Onduline® sheets were laid singularly or in stacks of two, set with a 5–10 mm gap between sheets by placing small stones and/ or twigs between each AR pair.

The ARs installed in areas of potential habitat along the footprint of the SH16 upgrade were placed out in clusters of four ('sampling stations'), including bush interior, vegetation edges and dense grassland (Table 3.1; Figure 3.1). The ARs were laid throughout a range of vegetation types and were typically laid alongside clumps of vegetation, logs, and rock outcrops where potential reptile encounters were considered most likely.

In addition, 15 ARs were laid individually (cf. clusters of four ARs; 'sampling stations') in grassland and bush habitat around the proposed location of the northern portal (proposed tunnel). A further 40 ARs were installed in transects (i.e. each transect comprising 10 ARs spaced at 10 m intervals) in suitable habitat around the proposed location of the southern portal (Table 3.1; Figure 3.1).

The habitat within 'Sector 2: Whau River' was not considered to be suitable for lizards and was not included in the surveys. Similarly, potential habitat that exists in 'Sector 8: Avondale Heights Tunnel' is not expected to be disturbed by the Project and was therefore excluded from the herpetofaunal surveys.

The ARs were left to settle in the environment for three weeks to allow time for colonisation by resident lizards. The ARs were checked for the presence of lizards on three or four subsequent occasions thereafter, during mild/ fine weather conditions. Repeated AR checks were conducted to increase the probability of detection, as native lizards typically utilise numerous retreat sites within their home ranges.

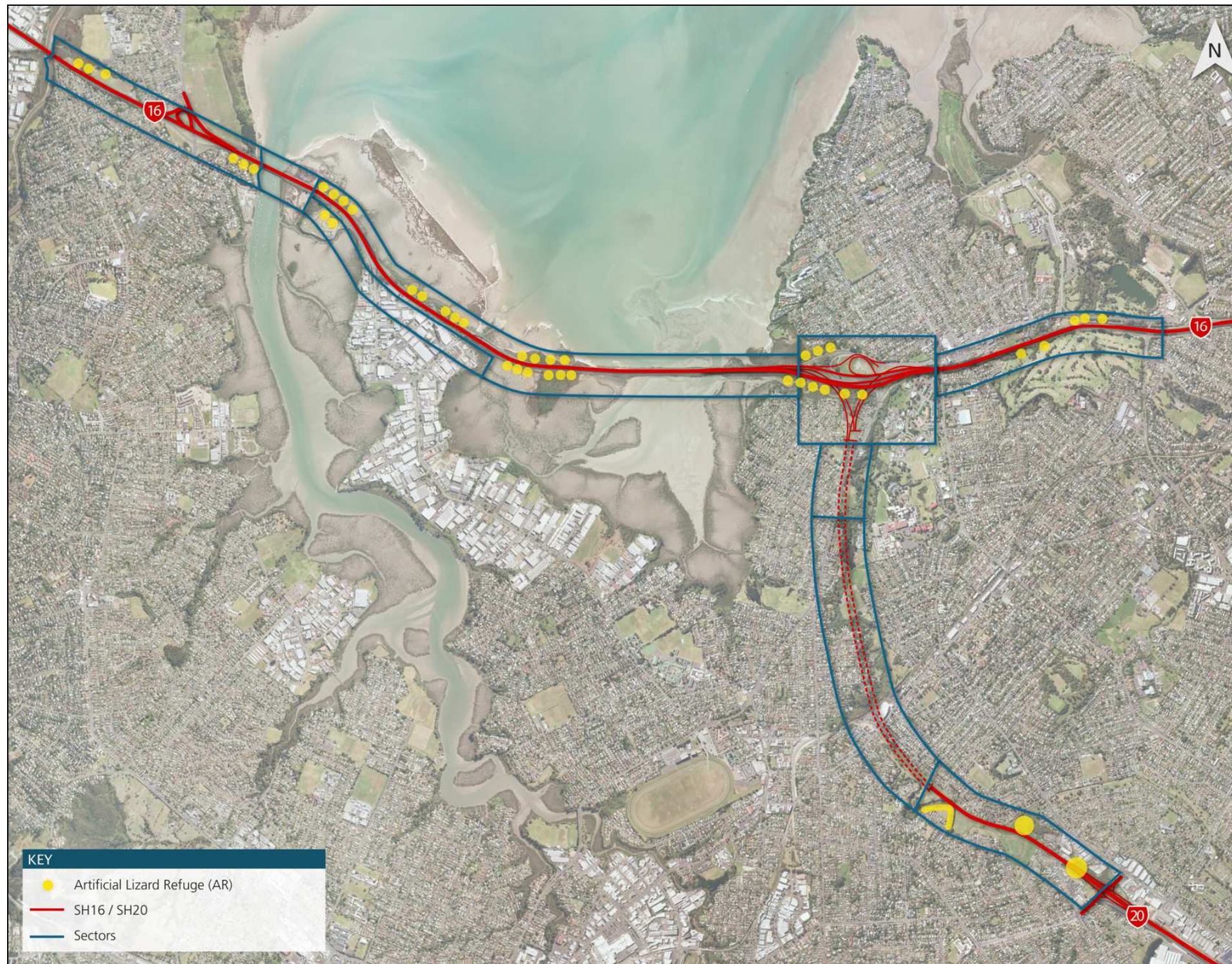


Figure 3.1 Aerial photograph of the Waterview Connection Project, showing the location of Artificial Lizard Refuge (AR) stations. Each yellow dot represents a cluster of four ARs.

Table 3.1 The number of artificial lizard refuges (ARs) installed in each Sector of the Project.

Sector	Site name	Number of AR stations	Total number of ARs
1	Te Atatu Interchange	7	28
2	Whau River	0	0
3	Rosebank - Terrestrial	6	24
4	Reclamation	18	72
5	Great North Road Interchange	10	55
6	SH16 to St Lukes	6	24
8	Avondale Heights Tunnel	0	0
9	Alan Wood Reserve	-	40
10	Maio Street Interchange	0	0

3.4 Manual Habitat Searching

Searches involved walking slowly through potential habitat while visually scanning the ground and vegetation for basking/ foraging lizards during diurnal site visits. Potential refuges (e.g. logs, rocks, loose vegetation, debris, tin sheets) were lifted and checked for the presence of lizards and vegetation (e.g. pampas clumps, foliage, tree trunks, and bark) was searched opportunistically. Lizard locations were recorded using a hand-held GPS unit (e.g. *Garmin 60Cx*, Garmin Ltd). Approximately 15 hours of manual searching was undertaken within potential habitat in Sectors 5, 7 and 9.

3.5 Nocturnal Spotlight Searching

Spotlight torches were used to search vegetation for lizards, in areas of suitable habitat. Arboreal lizards are generally easier to detect at night by slowly scanning the vegetation with a torch light, while searching for the lizards' distinctive body shapes and/ or reflective eye-shine (Whitaker, 1994). Searches began after dusk, during mild, precipitation-free nights and were conducted by trained herpetologists (working in pairs). Surveyors walked slowly along linear landscape features (e.g. bush edges, riparian margins, and tracks) and within the bush interior to cover all accessible habitats. Approximately six person hours of nocturnal

spotlighting was undertaken in areas surrounding the northern portal and Great North Road Interchange, during May 2008 (Figure 3.2). This area was the only site that was considered to provide suitable potential habitat for arboreal lizard species.



Figure 3.2 Aerial photograph of Sector 5 of the Project, showing areas of woody vegetation spotlight-searched for lizards. Map modified from Beca drawing 3814238-240-C-107.

4. Survey Results

4.1 Desktop Investigation

Desktop investigations indicated the presence of mixed vegetation, including short mown grasses, low scrub, and established bush, within the Project footprint. The Department of Conservation's ARDS (Amphibian and Reptile Distribution Scheme) database revealed previous records of copper skinks and introduced rainbow skinks in the immediate vicinity of the footprint. In addition, observations of three other native lizard species – ornate skinks, forest geckos, Auckland green geckos – have been recorded within 6 km of the surrounding area.

4.2 Habitat Assessment

The areas of potential lizard habitat that occur within the Project footprint exist in motorway-side vegetation at the eastern edge of Whau River (Sector 1), Rosebank peninsula (Sector 3), reclamation and Traherne Island (Sector 4), Great North Road Interchange (Sector 5), the end of Parr Rd. (Sector 6) and a large area of rank grass opposite the Chamerlain Park golf course (laydown site, Sector 6). Rank grass, flax and pampas bushes dominated all of these areas. Some areas of recreation reserves were within the Project footprint and provided suitable potential lizard habitat. These areas included a replanted area within Jack Colvin Park (Sector 1), and bush margins within Alan Wood Reserve and Hendon Park (Sector 9). The habitat quality at the southern portal (proposed tunnels) was constrained by the waterlogged nature of the soil. Potential refuges in this area appeared much wetter than those that would typically be occupied by skinks.

4.3 Artificial Lizard Refuges (ARs)

Two species of lizards were detected under ARs within the Project footprint. These were native copper skinks and introduced rainbow skinks. Rainbow skinks were present within all surveyed (7) Sectors and copper skinks occurred within 5 Sectors (1, 3, 5, 6, 9). Copper skink breeding populations (3+ or where juveniles were recorded) were detected at five sites. These were in Sectors 1 (Jack Colvin park & west-bound edge of Whau River); 5 (Waterview on-ramp); 6 (laydown site opposite golf course); and 9 (Hendon Park)

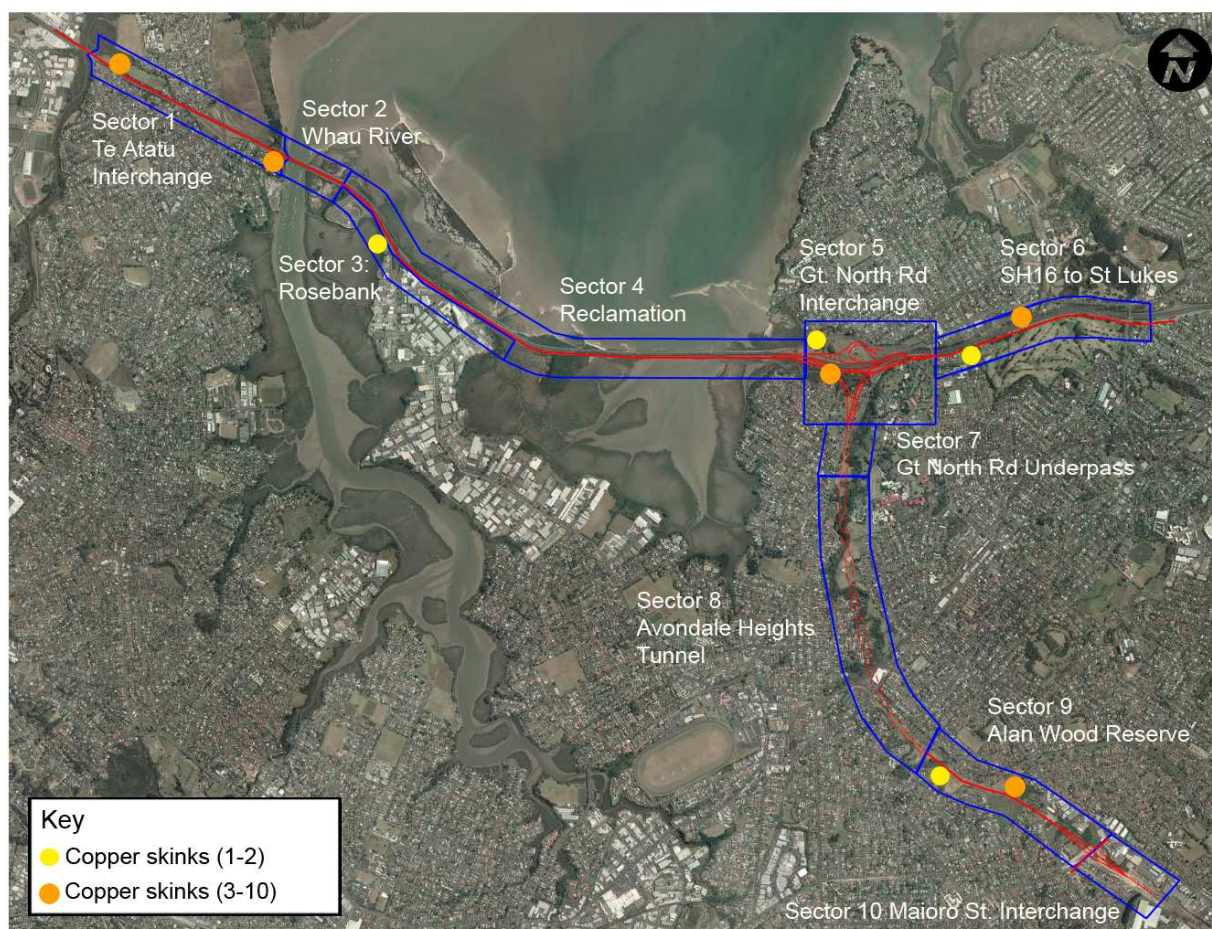


Figure 4.1 Sites where copper skinks occur within the Project footprint. Sites with populations (3+) are indicated in orange, fewer (1-2) are indicated in yellow. Red line denotes the motorway, blue boxes indicate ‘Sectors’.

4.4 Manual Habitat Searching

Habitat searches for lizards yielded similar results to the AR surveys, with the detection of copper and rainbow skinks within the Project footprint. Search efforts around Hendon Park and Jack Colvin Park (Te Atatu Rugby League Club) revealed the presence of gravid female and juvenile copper skinks, indicating that breeding populations exist within some areas of the Project footprint.

4.5 Nocturnal Spotlight Searching

No herpetofauna were detected during nocturnal spotlight searches.

5. Assessment of Effects on Herpetofauna

The clearance of vegetation, habitat features and other activities associated with the Project would lead to a number of adverse effects on resident herpetofauna. These are discussed in relation to native herpetofauna. The effects of the Project on rainbow skinks are not assessed, given their pest status.

5.1 Habitat Clearance & fragmentation

Low lying vegetation (i.e. scrub) is generally considered suitable habitat for many native lizard species, including copper skinks. Scrub vegetation may consist of native and exotic plants including grasses, flax (*Phormium tenax*), pampas (*Cortaderia* spp.), kikuyu grass (*Pennisetum clandestinum*), small shrubs, and tea tree (kanuka, *Kunzea ericoides*; manuka, *Leptospermum scoparium*). Copper skinks occur within this type of habitat within nine sites in Sectors 1, 3, 5, 6 and 9. This type of vegetation tends to be regarded as having low or no ecological value despite its potential to provide suitable habitat for ecologically significant native lizard populations.

The clearance of vegetation (native and non-native) and habitat features (organic and non-organic) proposed at all of the nine copper skink sites in Sectors 1, 3, 5, 6 and 9 will result in direct adverse effects (i.e. injury or mortality) to native herpetofauna, as well as a reduction in the availability of habitat and resources (i.e. food and shelter). Careless removal of debris and shelter structures (e.g. logs, rock and wood piles), via dragging or rolling debris and burying shelter structures under soil, could cause injury or mortality to resident herpetofauna at those sites. Indirect mortality may result from the consequent displacement of lizards into surrounding areas. For example, competitive exclusion by resident wildlife communities already present in adjacent habitat may result in failed attempts by lizards to establish in adjacent areas. Displaced lizards are also at greater risk of predation. At all sites within Sectors 1, 3, 5 and 6, there are no suitable surrounding areas that resident copper skinks could potentially disperse into. Therefore at these sites, mortality to all lizards is likely to occur during habitat clearance in the absence of mitigation.

Copper skinks may also be affected by pre-works activities typically associated with large-scale works Projects. Examples include the installation/establishment of site offices and other buildings, and parking and storage areas. While such activities are not always considered to be part of the physical works, they have the potential to adversely affect native lizards as described above in relation to vegetation clearance.

5.2 Disturbance

Noise and vibrations created by activities associated with works are likely to be short-term stressors, but these effects are considered to be no more than minor, given that some skink populations currently occur within close proximity to highway traffic.

Large volumes of dust created by activities associated with works can adversely impact lizards in adjacent habitat. Dust particles can fill in important interstitial spaces (small gaps) into which lizards and their invertebrate food source would otherwise retreat. Therefore excessive dust could potentially reduce adjacent habitat quantity and quality for lizards as well as their invertebrate food sources, particularly at Alan Wood Reserve and Hendon Park in Sector 9.

5.3 Magnitude of Adverse Effects

The magnitude of these adverse effects on resident herpetofauna is directly related to:

- The extent of the vegetation clearance
- The quality and quantity of resources that the vegetation provides
- The diversity of species and number of threatened species that the vegetation supports
- The reduced ability of fauna to disperse and re-establish from cleared habitat (particularly small lizards).

The magnitude of these adverse effects is regarded as significant without mitigation, at sites where copper skink populations were identified. These sites are at Jack Colvin Park and the west-bound edge of Whau River (Sector 1); Waterview on-ramp (Sector 5); Lay-down area opposite the golf course (Sector 6) and Alan Wood Reserve (Sector 9). At all of these sites, the extent of vegetation clearance would be significant (60%– 100% of current habitat) and affect a proportionally large quantity of resources. This would also greatly reduce the ability of native lizard populations to disperse from cleared habitat in these areas.

6. Conclusions/ Recommendations

Lizard surveys of the Project recorded the presence of two lizard species within the Project footprint – copper skinks and rainbow skinks.

Rainbow skinks existed at high abundance at all of the seven surveyed Sectors, particularly open, debris-laden habitats. Rainbow skinks are, however, an introduced and potential pest species from Australia and are not protected under the Wildlife Act (1953). This species does not therefore require any mitigation (i.e. relocation).

Copper skinks are a protected (Wildlife Act 1953), non-threatened native species (Hitchmough *et al.* 2007). They were detected at nine sites within five Sectors (1, 3, 5, 6, 9). Copper skink breeding populations (3 + or where juveniles were recorded) were considered to occur at five sites within four Sectors. These were in Sectors 1 (Jack Colvin park & west-bound edge of Whau River); 5 (Waterview on-ramp); 6 (laydown site opposite golf course); and 9 (Alan Wood Reserve).

Less than three copper skinks were identified at each of four of the ten surveyed sites. Given the survey effort and the confirmation of populations at five other sites within the Project footprint, the few copper skinks at these sites (Figure 4-1) do not suggest the presence of populations, which would be considered ecologically significant. The effect of the Project would therefore be no more than minor in these areas: Rosebank peninsula (Sector 3), Pt. Chevalier off-ramp (Sector 5), end of Parr Rd. (Sector 6), Hendon Park (Sector 9).

Copper skink populations were confirmed at five sites. These were in Sectors 1 (Jack Colvin park & west-bound edge of Whau River); 5 (Waterview on-ramp); 6 (laydown site opposite golf course) and 9 (Alan Wood Reserve). The habitat at these sites is considered to be locally ecologically significant due to the presence of copper skink populations and given that few populations of indigenous terrestrial vertebrates persist in urban environments. Therefore the populations of copper skinks within the Project footprint make a substantial contribution to local biodiversity and are of local, and possibly regional, ecological significance. However the habitats within which these populations occur are dominated by exotic species (e.g. kikuyu grass, *Pennisetum clandestinum*) and have low ecological value beyond the presence of native herpetofauna populations. The effects of the Project would therefore be significant at the areas where copper skink populations occur.

Potential adverse effects on copper skink populations could be avoided by relocating copper skinks from sites where populations were identified (Figure 4-1) to suitable habitat outside of the construction footprint. The relocation of native lizards to suitable habitat should occur prior to, and during the commencement of works. Measures recommended to provide appropriate mitigation for native herpetofauna populations within the Project are contained within the attached Lizard Management Plan (see Appendix A). That Plan provides recommendations as to rescue site management, lizard release sites, habitat enhancement, pest management and post-release monitoring. Implementation of lizard management as detailed within the Lizard Management Plan will adequately mitigate the effects of the Project on herpetofauna.

Although a separate process from this Resource Management Act assessment, approvals are required under the Wildlife Act from the Department of Conservation for native lizard relocations as well as vegetation clearance at other sites where copper skinks occur (sites where less than three lizards were identified). The NZTA will need to obtain such approvals before clearing copper skink habitat areas or relocating skinks.

7. References

Hitchmough R., Bull L., Cromarty P. (2007). New Zealand Threat Classification System Lists – 2005. Department of Conservation, 194 pp.

Lettink, M. & Cree, A. (2007). Relative use of three types of artificial retreats by terrestrial lizards in a grazed coastal shrubland, New Zealand. *Applied Herpetology*, 4, 227–243.

Wilson D. J., Mulvey R. L., & Clark R. D. (2007). Sampling skinks and geckos in artificial cover objects in a dry mixed grassland–shrubland with mammalian predator control. *New Zealand Journal of Ecology* 31 (2): 169–185.