THE ecology COMPANY

MEMORANDUM

TO: Luke McNeish, Tai Poutini Resources Limited

FROM: Dr Gary Bramley

SUBJECT: Westland Mineral Sands Company Limited resource consent application to undertake mineral sand mining activities at Okari (West Coast Regional Council RC-2021-0095 and Buller District Council RC210051). Request for Further Information.

DATE: February 8, 2022

CC:

1. BACKGROUND AND SCOPE

Westland Mineral Sands Company Limited has applied for resource consents from the West Coast Regional Council (**'WCRC'**) and Buller District Council (**'BDC'**) to construct and operate a mineral sand mining operation at Okari Road, south of Cape Foulwind near Westport. Pursuant to section 92(1) of the Resource Management Act (1991) WCRC and BDC have requested further information in relation to the consent application in order to assist in determining the extent of the proposal, the effects that the activity will have on the environment and the ways in which any adverse effects may be avoided, remedied or mitigated.

The request for further information includes three matters relating to ecological values at the site as follows[1]:

> 5. …there are likely to be other significant species present on the site or surrounding areas that have not been considered in the Ecology Memo prepared by Dr Gary Bramley (e.g. herpetofauna, bats, kiwi and other seabirds). Please provide a revised ecological assessment that details all the terrestrial ecological values that may be impacted by the proposal and how any potential effects will be avoided, remedied or mitigated.

[1] The numbers are as provided in the request for further information dated 16 December 2021

13. Please provide evidence of the full extent of the identified wetlands and any other wetlands in the area that would meet the definition of a natural inland wetland under the NES Freshwater. The area that has been Scheduled in the Land & Water Plan may not cover the full extent of the wetlands according to the NES Freshwater definition.

18. Please provide the … Avifauna Management Plan. Please note that if the revised ecological assessment determines that other species may be adversely affected and these effects are proposed to managed through implementation of Management Plans, drafts of these plans should also be provided.

The purpose of this memo is to provide the further information requested by WCRC and BDC.

2. ADDITIONAL ECOLOGICAL SURVEY

2.1 Survey for Bats

One AR4 acoustic recorder manufactured by the Department of Conservation (Wellington) was set at the edge of Silverstream Wetland to record bats using the site. The recorder was left in place between 3 and 21 December (19 nights). The recorder was set to begin recording approximately 30 minutes after sunset and cease recording approximately 30 minutes after sunrise. Conditions during the survey were suitable for detecting bat activity with night time temperatures exceeding 10ºC, although approximately 250mm of rain[2] fell during December, which reduced recording quality on some nights.

Visual and auditory inspection of waveforms within BTM image files via Department of Conservation Bat Search Software version 3.12 was used to identify identify potential bat signals.

2.2 Survey for Birds

Our earlier memo dated 8 September identified eBird records of 61 species within approximately 10km of the site. A further four species including tāiko (Westland petrel, *Procellaria westlandica*), mātātā (South Island fernbird, *Bowdleria punctata punctata*), matuku (Australasian bittern, *Botaurus poiciloptilus*) and kororā (little blue penguin, *Eudyptula minor*) have not been recorded in the area, but were identified as being likely to occur and potentially affected by the proposal.

Four automated acoustic recorder (AR4) units manufactured by Department of Conservation, Wellington were deployed to collect acoustic signals from birds between 3

[2] https://www.metservice.com/rural/regions/buller/locations/westport/past-weather. Accessed 3 February 2022.

and 21 December 2021. The AR4 recorders were located around the edge of both Okari Road Wetland (two recorders) and Silverstream Wetland (two recorders). Recorders were set to record for two hours each morning and evening. The recorders began recording from approximately 30 minutes before sunset and approximately one and half hours before sunrise. These hours were chosen to coincide with the peak calling period for matuku (Australasia bittern) (O'Donnell and Williams 2015). Other birds also commonly call at dawn and dusk, and this period is also suitable for detecting rōroa (great spotted kiwi, *Apteryx haastii*).

Bird calls were identified using audio cues and visual images generated by Raven Pro 1.6.1 software (Cornell, 2021). Both high and low frequency signals collected by the acoustic recorders were processed to determine whether calls originated from target species.

2.3 Survey for Lizards

Investigation of the Department of Conservation Herpetofauna database in January 2022 combined with recent surveys which had not yet been uploaded to the database (King 2019) indicated the presence of six lizard species within a 20km radius of the site as shown in Table 1.

Table 1: Lizards recorded within the Department of Conservation Herpetofauna database, or likely to occur, within 20km of Westland Mineral Sands site, Okari Road.

Species	Common name	Habitat	Nearest Record	Likelihood of being present
Naultinus tuberculatus	West Coast green gecko	Shrubland, forest, treeland	c. 200m	High
Mokopirirakau granulatus	Forest gecko	Shrubland, forest	c. <5km	Moderate
Oligosoma polychroma	Northern grass skink	Grassland, shrubland	None recorded	Moderate
Oligosoma newmani	Newman's speckled skink	Grassland, embedded river cobbles, rocky tors	c. <9km	Unlikely
Oligosoma aff. *infrapunctatum* "Hokitika"	Hokitika skink	Grassland, embedded river cobbles, rocky tors	c. 10km	Unlikely
Oligosoma aff. *infrapunctatum* "Westport"	Westport skink	Grassland, embedded river cobbles, rocky tors	c. 10km	Unlikely

Given the topography and available habitat for lizards within the proposed footprint, only three of the six species identified in Table 1 are considered likely to occur within or adjacent to the proposed mining area including West Coast green gecko, Forest gecko and Northern grass skink. Of these species, West Coast green gecko are considered 'threatened (nationally vulnerable)', Forest gecko are considered 'at risk (declining)' and Northern grass skink are considered 'not threatened' (Hitchmough et al. 2021).

Lizard surveys were carried out over the week beginning the 24th of January 2022 by herpetologist Samantha King. Lizard surveys were undertaken along the edges of the shrubland vegetation surrounding the proposed mine footprint. The surveys consisted of diurnal and nocturnal visual encounter surveys (**'VES'**). A combination of manual searches (lifting and searching amongst foliage) and diurnal VES was carried out in the early morning (between 7:30 am – 12 pm) and one night of spotlighting (nocturnal VES) was undertaken (between 9:15 pm and 12 am).

In addition, 20 funnel (Gee Minnow) traps were set for lizards, baited using pear and bedded with dry grass and checked once every 24 hours over four days (three nights). Trap checks were undertaken in the afternoon.

All lizards were captured where possible, and standard measurements were taken, including snout to vent length (SVL). The reproductive status of lizards was also checked.

Weather was generally not ideal for diurnal lizard VES since the conditions were mostly fine and exceeded 24ºC during the day. VES are much more effective at temperatures between 14 and 22 degrees. The weather during the nocturnal VES was also unfavourable (cold, temperatures below 16 degrees, or heavy rain).

2.4 Identified wetlands

The identification of wetlands is based on data collected during site visits undertaken 26 August and 3 December 2021 as well as review of the historical aerial photographs of the site available on retrolens and Google Earth Pro.

The Ministry for the Environment guidelines for wetland delineation (MfE 2020) was adopted as follows:

1) Determine the project area.

2) Decide if 'normal circumstances' are present; i.e. typical climatic/hydrologic conditions, and no recent disturbances or modifications to the project area. If yes, proceed to step 3. If no, proceed to step 7.

3) Identify and map the major vegetation types using aerial photographs, maps, inventory reports, other data, and, if necessary, on-site field verification.

4) Off-site methods to identify wetland presence and sketch approximate boundaries. Wetlands may be confirmed without an on-site inspection depending on:

    i the amount and quality of data (vegetation, soils, hydrology, topography);

    ii wetland ecological expertise to interpret the data.

5) On-site methods to delineate wetland presence and accurate boundaries:

    i for small areas (≤2ha), establish a representative plot in each major vegetation type and record the plot vegetation in three strata: tree, sapling/shrub, herb;

    ii for larger areas, establish representative plots along transects (as per Clarkson 2014) and sample the vegetation in three strata: tree, sapling/shrub, herb.

6) Hydrophytic vegetation determination. Based on the data you have gathered, conduct a hydrophytic vegetation determination using the following flow chart (Figure 2).

7) The above procedure will be used in the vast majority of wetland delineations. However, recent disturbance or abnormal environmental conditions may result in atypical or problematic wetland situations in which one or more of the three criteria (vegetation, hydrology, soils) is/are absent. In these cases, more information and quantitative data will be required and the US procedures for these situations are recommended (sections E–G in Environment Laboratory 1987, and subsequent updates).

Climatic, hydrologic and vegetation conditions were considered to be normal at the site, so the steps in Figure 2 were followed.

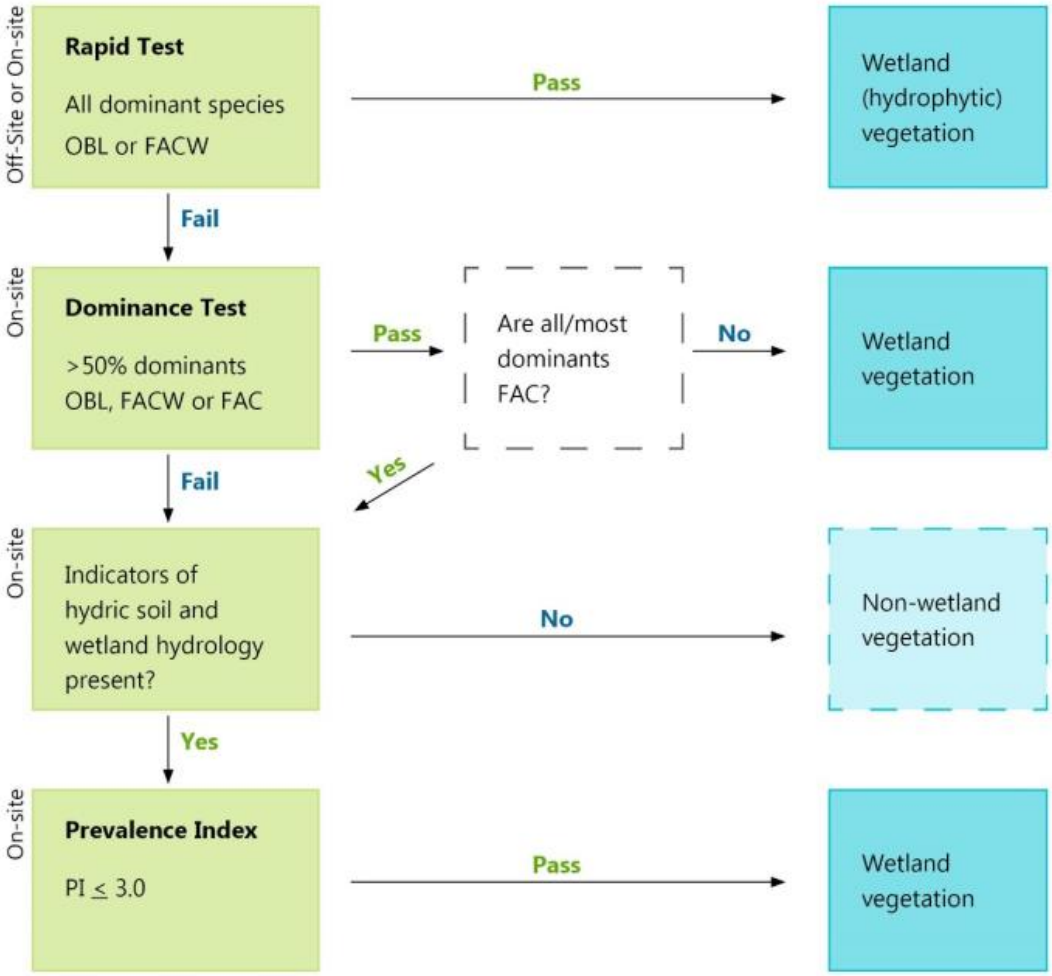

Figure 2: Flow chart of steps for hydrophytic (wetland) vegetation determination (from MfE 2020).

3. RESULTS

3.1 Bats

No bats were recorded during the 19 nights of recording near Silverstream wetland.

3.2 Birds

24 birds were recorded during the survey including 15 native species and nine introduced and naturalized species as shown in Table 2.

Table 2: Birds recorded on acoustic monitors at Westland Mineral Sands site, Okari Road.

Scientific Name	Common Name
*Alauda arvensis**	skylark
*Anas platyrhynchos**	mallard
Anthornis melanura melanura	korimako, bellbird
Apteryx haastii	rōroa, great spotted kiwi
*Carduelis chloris**	greenfinch
*Carduelis flammea**	redpoll
*Emberiza citrinella**	yellowhammer
Eudynamys taitensis	koekoeā, long-tailed cuckoo
*Fringilla coelebs**	chaffinch
Gallirallus australis australis	western weka
Gerygone igata	riroriro, grey warbler
*Gymnorhina tibicen**	Australian magpie
Haematopus finschi	tōrea, South Island pied oystercatcher
Haematopus unicolor	tōrea tai, variable oystercatcher
Hemiphaga novaeseelandiae	kererū, New Zealand pigeon
Porphyrio melanotus	pūkeko
Porzana tabuensis tabuensis	pūweto, spotless crake
Prosthemadera novaeseelandiae novaeseelandiae	tūī
Puffinus griseus	tītī, sooty shearwater, muttonbird
Rhipidura fuliginosa fuliginosa	pīwakawaka, South Island fantail
*Turdus merula**	blackbird
*Turdus philomelos**	song thrush
Vanellus miles novaehollandiae	spur-wing plover
Zosterops lateralis lateralis	tauhou, silvereye

Of the species listed in Table 2, two (rōroa and koekoeā) are regarded as 'threatened (nationally vulnerable)' and three are regarded as 'at risk (declining)' including pūweto/spotless crake, tōrea and tītī. Tōrea tai are regarded as 'at risk (recovering)'. The remaining 18 species are considered 'not threatened' (Robertson et al. 2021).

3.3 Lizards

Four West Coast green geckos (*Naultinus tuberculatus*) and one sloughed skin were detected during the surveys, including one gravid adult, female, two sub-adult males and one juvenile (sex unknown). No lizards were found within the proposed mine footprint, but the individuals detected were located adjacent and immediately outside the footprint. Three geckos were found during manual searches on the inland dune coastal forest edge. One gecko and the sloughed skin were found along the edge of the Okari Road Wetland. Only one lizard was found active in foliage.

No skinks or other geckos were detected during the survey.

3.3 Identified wetlands

The West Coast Regional Land and Water Plan identifies two wetlands in the vicinity, FOUP029 Silverstream and FOUP052 Okari Road. Both of these wetlands were identified in the Assessment of Environmental Effects which accompanied the application. Schedule 2 of the West Coast Regional Land and Water Plan Schedule identifies wetlands that either are, or are likely to be, ecologically significant. A wetland in Schedule 2 is considered to be significant if it meets any one of the ecological criteria in Schedule 3. Wetlands identified in Schedule 2 require an assessment using the ecological criteria on Schedule 3 during any resource consent process.

The criteria in Schedule 3 include ecological context, representativeness, rarity and distinctiveness. With respect to these criteria, Silverstream Wetland can be considered significant with respect to ecological context, representativeness, rarity and distinctiveness. Okari Road Wetland can also be considered significant with respect to all four criteria.

Reference to historical photos available at www.retrolens.co.nz indicates that vegetation clearance across the majority of the site took place sometime between 1955 and 1974. Given its location between old dunes, the entire area proposed for mining was mostly likely a wetland (known as a 'dune slack') prior this clearance taking place. Dune slacks are moist depressions between shore dunes which are often ephemeral and/or shallow. The farmed area within which the mine would be located has been drained for farming (including 'humped and hollowed' at some locations) and the drains have generally been maintained over time. The vegetation within the farmed area, including the areas which have been drained, was being farmed at the time the NPS-FM took effect and would have met the NPS-FM definition of improved pasture as follows:
'An area of land where exotic pasture species have been deliberately sown or maintained for the purpose of pasture production, and species composition and growth has been modified and is being managed for livestock grazing.'

Historical photographs of the area available at retrolens.co.nz and GoogleEarthPro (i.e., offsite delineation) do not include any areas of vegetation that might signal the presence of a wetland within the area to be mined. Walk over surveys of the site (i.e., onsite delineation) did not reveal any areas outside those identified by Schedule 2 of the West Coast Regional Land and Water Plan which included wetland vegetation. On that basis, the area to be mined does not contain any additional areas which would meet the NES-FW definition of a natural inland wetland.

4. ASSESSMENT OF EFFECTS

4.1 Bats

Short-tailed bats (*Mystacina tuberculata*) are very unlikely to venture into such open country, but long-tailed bats (*Chalinolobus tuberculatus*) may make use of the wetland habitats and shrubland edges near the mine for feeding if they are present in the area. The proposed mine site does not include suitable roost habitat trees for long-tailed bats (mature or senescent trees with holes, crevices and flaking bark). Although we cannot rule out the presence of bats in the area based on data from so few nights, it is unlikely that bats are using the pasture habitats within the proposed mine area. Long-tailed bats may be using the adjoining natural habitats, but this is considered unlikely on the basis of available information.

4.2 Birds

Acoustic survey has confirmed that pūweto/spotless crake and rōroa (at least one pair) are present in the vicinity of the site. Of the species known, or considered likely, to occur in the area, six are considered likely to be affected by the proposal including:

- mātātā/South Island fernbird;
- matuku/Australasian bittern;
- kororā/little blue penguin;
- pūweto/spotless crake;
- rōroa/great spotted kiwi; and
- tāiko/Westland petrel.

Of these species, three (mātātā, matuku and pūweto) are secretive birds that use wetland habitats and are unlikely to venture far beyond the boundary of those habitats, but might be affected by noise, lights, traffic and human activity nearby. These effects, singly or collectively, could disturb birds to the extent that either they are displaced from their habitat locally or they leave the area altogether. Disturbance could also reduce breeding success.

Rōroa are also unlikely to use the pasture habitats within the mining area, but may be affected by noise, light, traffic and human activity. This could displace individuals and reduce breeding success.

Kororā typically breed in small colonies numbering a few pairs, or sometimes singly. Birds can be found nesting some distance inland, and in a variety of habitats (Marchant and Higgins 1990). Birds nest in a burrow, sometimes digging their own, sometimes adopting burrows of other birds, and sometimes making use of small crevices or gaps in the

substrate. They also make use of small spaces under buildings and dense vegetation and nest boxes where these are provided. Penguins feed at sea and return to the burrow to feed chicks, often near dusk and dawn. Burrows are used throughout the year and the same site is often used for nesting over many years. At this site, kororā are not known to nest within the mine footprint, but may need to cross roads to reach their burrows when they would be affected by traffic travelling to and from the mine during the hours of darkness. Traffic movements could result in penguin mortality, or reduce their access to their burrows reducing chick survival and productivity.

The only known breeding colony for tāiko is located between Punakaiki River and Waiwhero Creek north of Barrytown. Adult and juvenile birds leaving the colony during darkness are known to be affected by lights either on shore or at sea which can cause disorientation and result in grounding. Not all groundings are fatal, but grounded birds can be injured and are more vulnerable to ground-based predators and collisions with vehicles. Grounded tāiko have been recorded between approximately Hokitika and Westport. Sixteen percent (23) of 141 tāiko discovered after a grounding between 2005 and 2015 were collected from the Westport area (Wilson 2016). Thus, tāiko may be adversely affected by lighting used at the mine.

Koekoeā were not identified as present in our earlier memo, but they are unlikely to be affected by the proposed mining to any more than a minor degree because they, and their host species (pīpipi/brown creeper (*Mohoua novaeseelandiae*) and mohua/yellowhead, (*Mohoua ochrocephala*) are birds of tall forest and in the case of mohua, are not known to occur on the West Coast.

In his submission relating to the proposal, Mr Richard Nichol has identified four additional species which are known to use the wider area including fairy prion (*Pachyptila turtu*), kōtuku/white heron (*Ardea modesta*), tūturiwhatu/banded dotterel (*Charadrius bicinctus*) and taranui/Caspian tern (*Hydroprogne caspia*). With the exception of kōtuku, these species are coastal/seabirds which may make use of the farmed area for feeding (particularly if the soils are disturbed), but are not likely to feed there normally or breed there. Thus, the potential for effects due to disturbance is comparatively low, but these species would be subject to similar types of disturbance to the other species identified and effects would be managed the same way (e.g., by controls on lighting). Kōtuku use coastal lagoons, wetlands and rivers for feeding outside the breeding season. Effects on kotuku would therefore be restricted to any effects affecting feeding behaviours such as reduced water quality or increased noise or activity at feeding sites. These effects could be managed via either a sediment control plan or as part of an avian management plan for the site.

Our earlier memo dated 8 September 2021 identified that suitable mitigations for affected bird species would include restrictions on traffic movements, monitoring to confirm the presence of secretive species (mātātā and matuku), controls on lighting and physical separation between the mining area and the high value habitats for birds (principally

wetlands and shrublands). These management actions are best prescribed via an Avian Management Plan which covers matters including (but not limited to):

- Monitoring of kororā, construction of fencing if necessary (with underpasses as required), provision of artificial nest boxes at sites away from roads, and traffic controls (e.g. speed limits) if required to protect birds crossing roads used by mine traffic.

- Monitoring of lighting and controls consistent with the Commonwealth of Australia (2020) guidelines in order to minimize light spill from the site and reduce effects on nocturnal birds including tāiko and rōroa.

- Provision of physical separation of the active mine areas from key habitats for birds, particularly during the breeding season;

- Survey to confirm the presence of mātātā and matuku prior to mining commencing in the northern part of the mining area and management to protect resident birds (including pūweto and rōroa) from adverse effects, including physical separation and/or pest control (if required).

4.3 Lizards

Although no lizards were found within the proposed mine footprint, including at the small area of suitable shrubland habitat to the south of the footprint, it is possible that one or two individual West Coast green gecko may be using this habitat. The lizards observed included a gravid female and a variety of ages and sexes suggesting that the population may be stable.

Despite not being recorded, there is a possibility that forest gecko are present within the coastal forest vegetation and northern grass skinks are present within refugia and rank grass on the periphery of the coastal forest outside the grazed farmland.

The close proximity of the lizards detected to the mine area, combined with the cryptic nature, slow reproductive rates and longevity of West Coast green gecko mean that they may be adversely affected by the proposed mining. The scale of effects could range from disturbance due to noise, lighting and human activity to injury or death and include habitat loss, reduction in habitat quality (e.g., due to dust deposition), displacement and breeding failure.

At the lowest end of effects, creation of a road, stripping of topsoil, excavation within the mine and use of unsealed road surfaces has the potential to create dust which may spread from the mine area to the adjoining lizard habitat and could, unless controlled, settle on surrounding vegetation and soils. The effects of dust on vegetation can be physical, for

example by blocking stomata (pores through which gases are exchanged), shading or abrading leaves or increasing drought stress, or chemical, affecting either the leaf surface or the soil. Dust settling on leaves, can if sufficiently thick, affect productivity by reducing the amount of photosynthetically active radiation at the leaf surface, by reducing the temperature of the leaves or by blocking the stomata. If prolonged, these effects could lead to changes in plant health and ultimately species composition over time. The effects of dust on lizards have not been confirmed by scientific research, but having limited mobility it is likely that they are more affected than other species and it is possible that if there was heavy dust deposition this would reduce habitat quality for lizards and affect their habitat use. Dust is also an issue for people using the mine and adjoining landowners and is normally managed using regular application of water via water carts or similar. Application of water can mobilise sediment and this will need to be managed to prevent it entering adjoining wetlands or other habitats outside the footprint.

Other disturbance brought about by mining activity could include noise, vibration and lighting. The effects of these would vary with species.

Although the mine is located outside the indigenous vegetation and habitats known to be occupied by native lizards, the proposal includes removal of indigenous vegetation along the fringes of the pasture area (less than 0.5 hectares over three years). West Coast green gecko also make use of pest plant species including gorse and blackberry, particularly where these species provide an ecotone between pasture and shrubland. Areas of this type of habitat are present around the mining area and have been controlled via application of herbicide in the past. Where lizards are present, removal of these habitats would result in habitat loss. This reduction in habitat could result in either resident lizards being displaced to unsuitable adjoining habitat or individuals being displaced to suitable habitats nearby (with existing residents), which would increase local competition for resources and could bring about stress responses and a consequent reduction in breeding success. The loss of food species and refugia (such as crevices) could also increase exposure to predators resulting in elevated mortality.

Lizards are highly cryptic, poorly mobile, typically moving only short distances, and are inactive for parts of the year. Particularly during cooler weather, when lizards are less active, they may not be able to escape from activities undertaken within their habitats. Activities such as earthworks and vegetation clearance could result in injury or death to lizards. Lizards also make use of roads and road margins to bask or forage and whilst doing so would be vulnerable to traffic induced mortality.

All native lizard species are protected under the Wildlife Act (1953) and as such methods are required to protect them from the adverse effects of the proposal. An authorization under the Wildlife Act (1953) will be required to manage effects on lizards.

These effects can be addressed by effective implementation of a Lizard Management Plan which is developed in accordance with Department of Conservation guidelines for

lizard salvage and relocation at development sites (Department of Conservation, 2019). These guidelines outline methods to reduce potential effects on resident lizard populations where developments are being undertaken. As noted above, an authorization under the Wildlife Act (1953) would also be required and this would provide an opportunity for the Department of Conservation (as granting authority) to confirm that the proposed plan is acceptable.

Matters which should be covered in the Lizard Management Plan include the following:

- Survey prior to vegetation clearance of suitable lizard habitat in order to locate and salvage any resident individuals;
- Monitoring for presence of lizards within edge habitats;
- Provision of a 10 – 15 m buffer zone around all identified lizard habitat;
- Fencing the buffer areas with a high (>1 m) silt fence (made from UV stabilised woven polypropylene silt control fabric), to prevent lizards entering the mining area and prevent sediment from flowing into intact vegetation;
- Ongoing dust suppression;
- Predator control and monitoring if required; and
- Salvage and relocation as required.

4.3 Wetlands

The wetland areas identified in the West Coast Regional Land and Water Plan will need to be protected from adverse effects that will or might cause their drainage in accordance with the NES-FW. There are no other wetlands within the mining area or the immediate vicinity which require this protection.

5. REFERENCES

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