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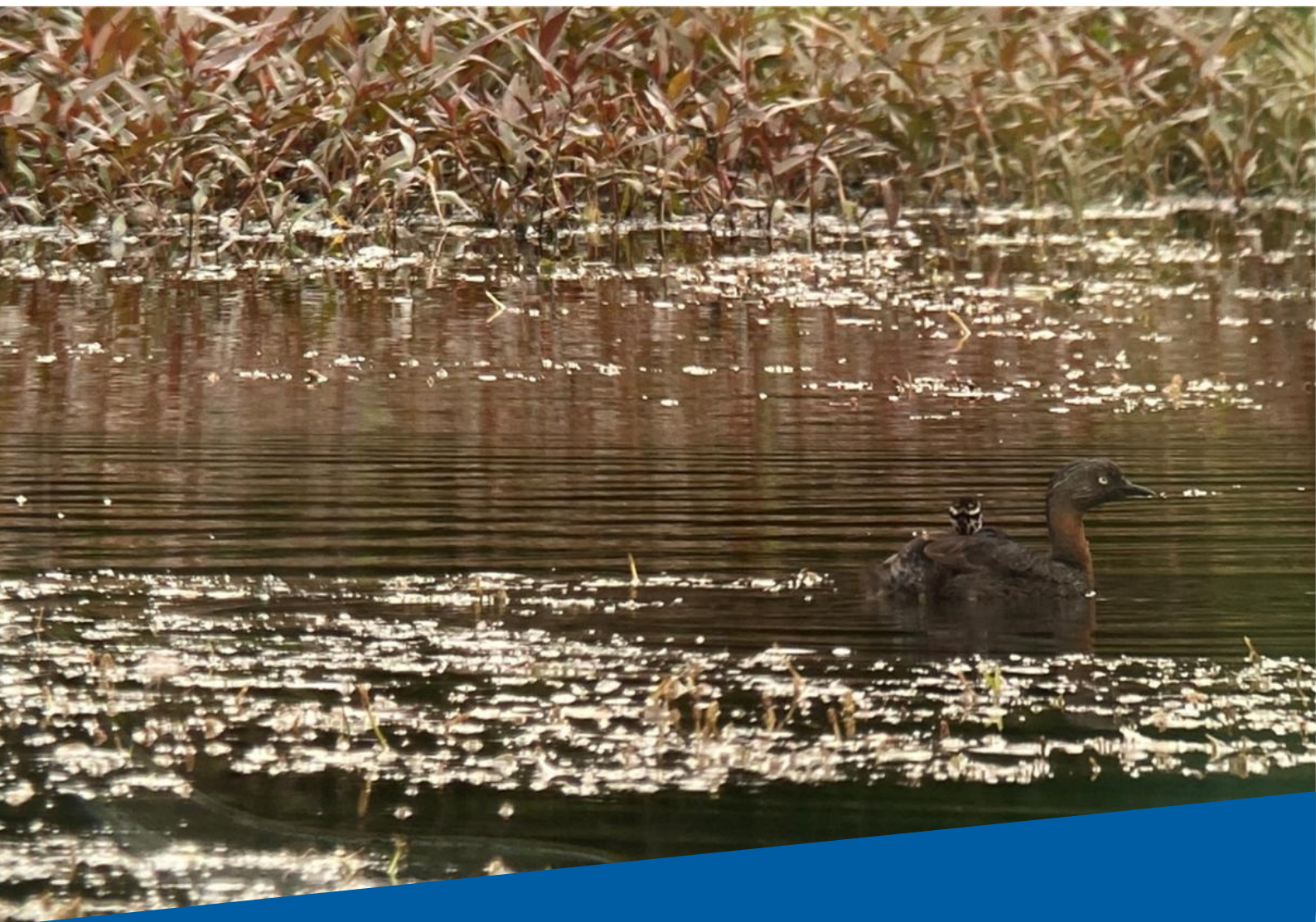
Ecology Impacts Assessment

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Redvale Landfill Expansion Project

Ecological Impact Assessment

for: Waste Management New Zealand



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Cover Illustration: Dabchick carrying chicks on their back, on Pond 6.

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1 INTRODUCTION

Bioresearches was engaged by WM New Zealand (WMNZ) to undertake an Ecological Impact Assessment (EclA) of the proposed 'Redvale Expansion Project' on terrestrial and freshwater ecological values at Redvale Landfill, located in the suburb of Dairy Flat, Tāmaki Makaurau, hereby referred to as 'the Site' (Figure 1). This assessment should be read in conjunction with the Ecological Values Assessment report (EVA) (Bioresearches, 2026), which outlines the methods and results of ecological surveys conducted at the Site over 2024 and 2025.

The current land use consent for Redvale Landfill stipulates that the landfill must cease accepting waste by 31 December 2028 and the regional consents for the landfilling activity also expire on this date. Due to a delay in the authorisation and establishment of the replacement Auckland Regional Landfill (ARL) a transition plan is required. To address this potential gap in critical landfill infrastructure for residual waste disposal in the Auckland region, WMNZ is proposing to extend the operation of Redvale to the end of 2038 and develop 4.56 Mm³ of additional airspace at the existing facility. This includes 3.13 Mm³ in additional Class 1 Landfill expansion on top of the existing Class 1 refuse placement area and 1.43 Mm³ of Class 2 Landfill extension. The proposed works include the following:

- Class 1 landfill expansion: placement of waste within the existing landfill footprint, involving the removal of final cover and steepening of the final cap slope to accommodate additional waste.
- Class 2 footprint extension: extension of the landfill to the southwest to accommodate disposal of waste meeting Class 2 landfill waste acceptance criteria (WAC).
- Relocation of ancillary activities: the relocation of ancillary activities, inclusive of existing ponds, to allow for the placement of waste.

A full description of the proposal is included in the Assessment of Environmental Effects (AEE) prepared for the project.

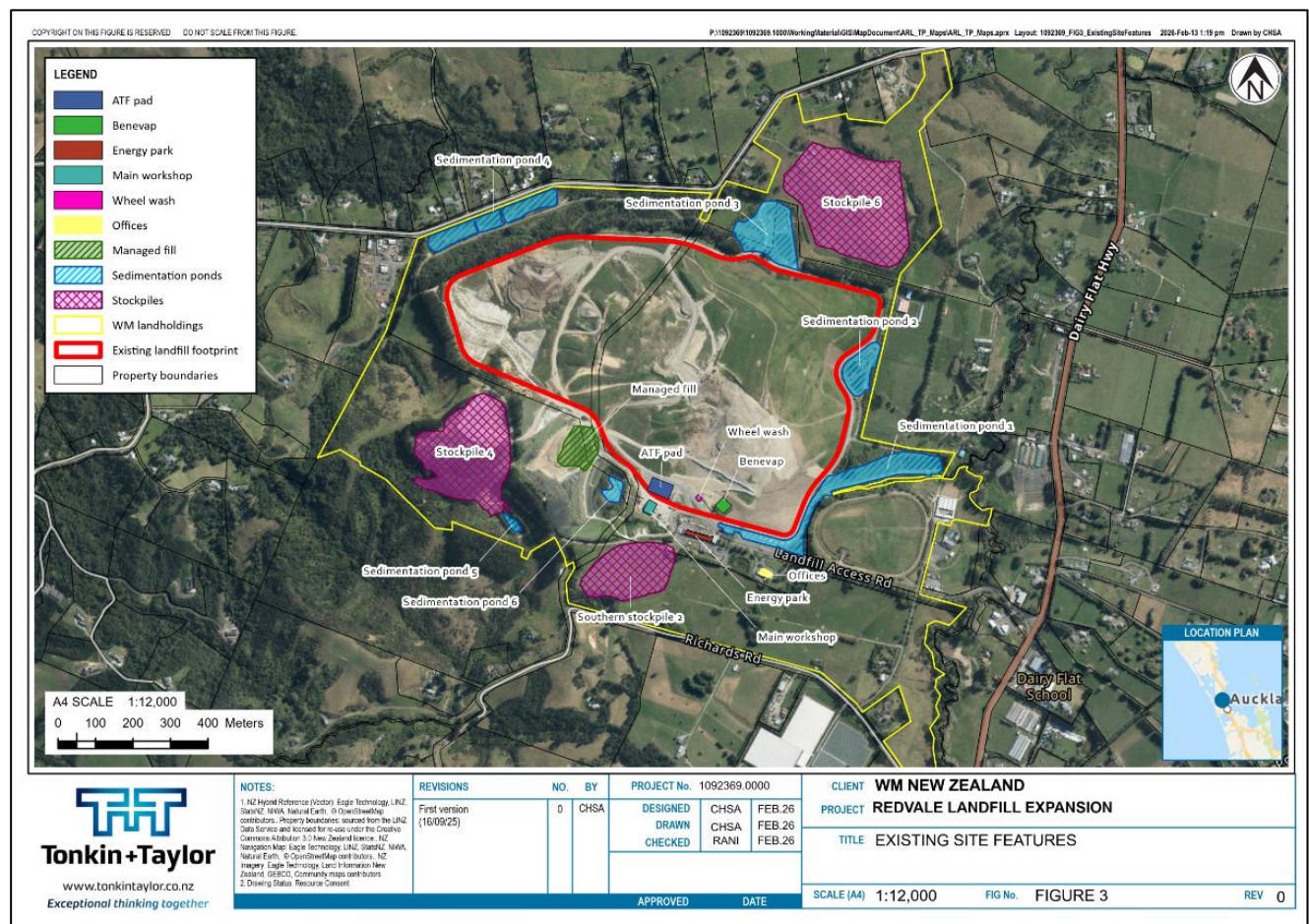


Figure 1. An overview of the WMNZ property and existing site features

1.1 Proposed Works

A full description of the proposed works at the site is described within the attached AEE. The following aspects of the work directly relate to the assessed ecological values at the site are described below and shown in Figure 2:

- Infill and reclamation of two constructed stormwater ponds:
 - Pond 6 (~3325m²); and
 - Office Pond (~878m²)
- Permanent removal of vegetation including:
 - ~ 0.8 ha of planted native vegetation;
 - ~ 0.8 ha of mixed native and exotic vegetation; and
 - Short, maintained grass (lawn or grazed)

No natural watercourses or wetlands are proposed to be reclaimed as part of the Project.

Noise generated from operation activities includes the use of plant, compactors, excavators and heavy machinery from works such as excavations to create new cells, leachate drain construction, daily placement of refuse, electricity generators, leachate evaporator and flares, and all ancillary works associated with Landfill tip face operation (WMNZ, 2024). Noise generated during construction works will also include all earthworks, landfill

access road construction, construction of the new Class 2 landfill cell and relocation of landfill infrastructure. Additionally, ongoing vibration is expected from the use of gensets and compactors during the Landfill operation. As per the Assessment of Noise Effects, the operational noise (ranging between 21 dB LAeq and 49 dB LAeq) from landfilling activities is predicted to be at a similar level and character to what currently occurs during the daytime (Marshall Day Acoustics, 2026).

The potential effects as a result of the proposed works are discussed in further detail in the following sections.

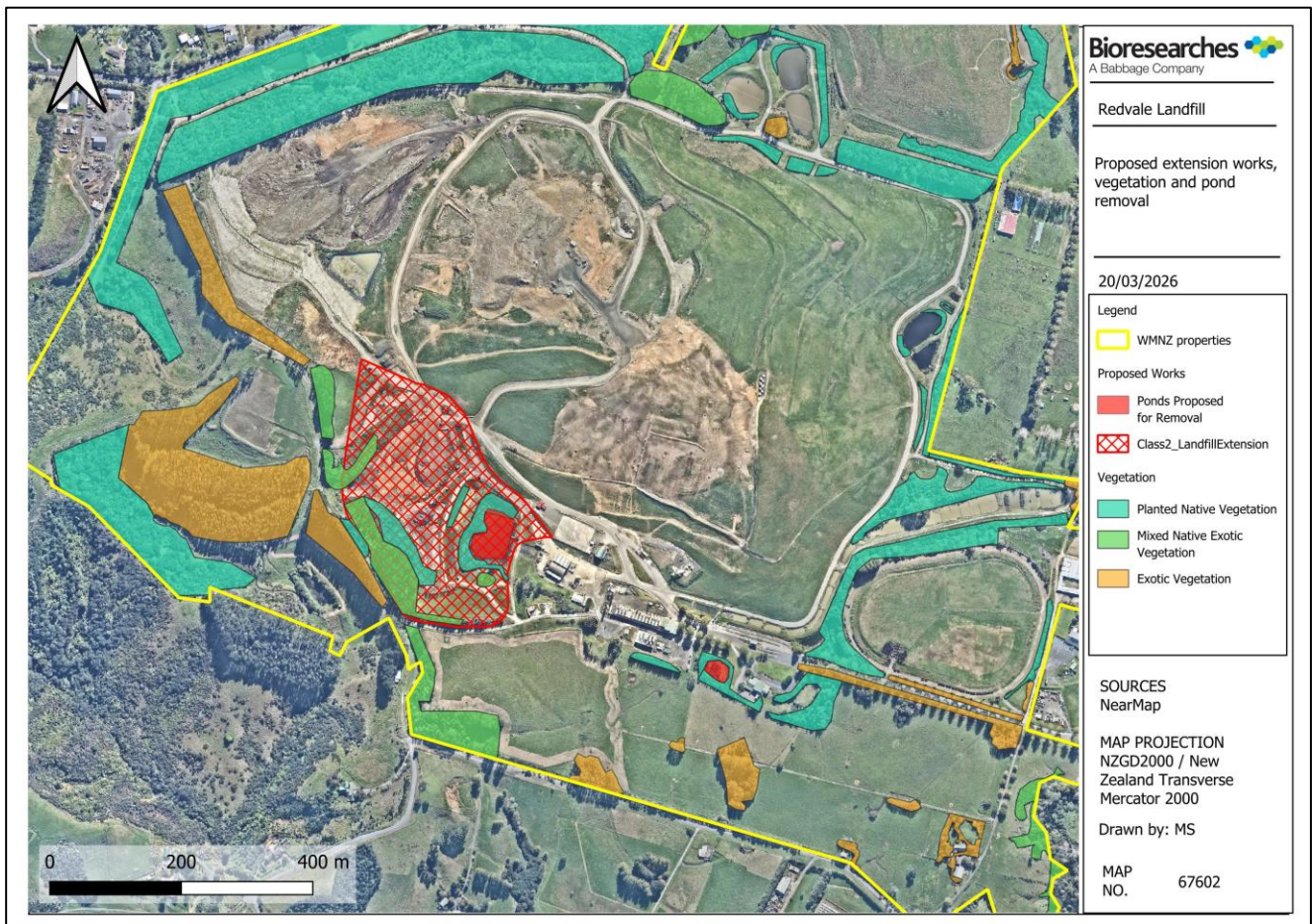


Figure 2. Proposed works on Site outlining the extent of vegetation and pond removal

2 ASSESSMENT OF ECOLOGICAL EFFECTS

2.1 General Method Statement

This effects assessment generally follows the EclA Guidelines for use in New Zealand published by the Environmental Institute of Australia and New Zealand (EIANZ) (Roper-Lindsay et al., 2018). The EclA Guidelines provide a standardised matrix framework that allows ecological effects assessments to be clear, transparent, and consistent. The EclAG framework is generally used in Ecological Impact Assessments in New Zealand as good practice, and a detailed analysis of this methodology is presented in Appendix A.

This section focuses on assessing project-related effects on terrestrial and freshwater ecological values, based upon the activities associated with the proposed works (Figure 2). The magnitude of these ecological effects and the consequent level of effects of each of these activities is described in the sections that follow. The assessed magnitude and level of effects are described in the sections below and summarised in Table 2.

As mentioned, this EclA relies on the methods and findings detailed in the Ecological Values Assessment. Both assessments are intended to be read together for a comprehensive understanding of the project's ecological context and effects.

2.2 Magnitude of effect

2.2.1 Vegetation

The proposed works will result in the removal of ~0.8ha low-value planted native vegetation, ~0.8ha low-value mixed native and exotic vegetation, and negligible value exotic managed grassland.

Native species with an elevated threat status, and that are proposed for removal, are planted specimens, including; kauri (*Agathis australis* - At Risk – Declining), ngaio (*Myoporum laetum* - At Risk – Declining), and kāpuka (*Griselinia littoralis* - Threatened - Endangered). The planted vegetation includes several species that do not naturally occur in the Auckland region (e.g., *Olearia lineata* cv. 'Dartonii'). Contemporary best practice guidance, including the Auckland Council,¹ now recommends the use of plant material sourced from within the relevant ecological district (within the Auckland region) to maintain local genetic integrity.² Removal of these species would likely preserve the biodiversity of local plant populations, and maintain the ecological character of the region, resulting in a negligible, or potential positive outcome for local biodiversity (e.g. safeguard local genetic integrity).

Other native plant species proposed for removal, are relatively common and widespread throughout the Auckland Region and surrounding landscape. These includes native species such as kanuka (*Kunzea robusta*) and manuka (*Leptospermum sp.*), harakeke (*Phormium tenax*), hangehange (*Geniostoma ligustrifolium*), kawakawa (*Piper excelsum*), ribbonwood (*Plagianthus divaricatus*), cutty grass (*Carex geminata*), cabbage tree (*Cordyline australis*), and soft mingimingi (*Leucopogon fasciculatus*), which all have regional and national conservation status of 'Not Threatened' (Simpkins et al, 2025). Overall, the magnitude of the loss of native trees on site would represent a low magnitude in proportion to the Auckland region and surrounding landscape.

¹ Branko Veljanovski and Paul Klinac (ver 1.2; June 2024) "Chapter 7: Landscape" Auckland Code of Practice for Land Development and Subdivision at section 7.2.6 (page 11); Auckland Council Eco-sourcing brochure BC2616.

As the exotic pine vegetation and exotic grassland is not representative of a naturally occurring habitat type, the removal of these would have a negligible botanic effect on the indigenous biodiversity within the Auckland Region.

In consideration of the above, the magnitude of effect for loss of vegetation is assessed as **low**.

2.2.2 Long-tailed Bat

Given the absence of any activity recorded within the Site across three survey periods totalling 2,007 survey nights, described in the EVA (Bioresearches, 2026), the Site is considered unlikely to provide important habitat to native bats. The absence of long-tailed bats removes the need for specific bat management measures. However, as a precautionary measure and acknowledging that it cannot be entirely ruled out that a bat may be present when works occur, the protocols for minimising the risk of felling occupied bat roosts (DOC 2024) will be implemented, should any high risk trees require removal (i.e. >15 cm diameter/DBH) to ensure harm is not done to any bat that may be on the site at the time of vegetation removal.

If the DOC roost protocols are followed for high-risk trees, the magnitude of effect on bats would be **negligible**.

2.2.3 Avifauna

2.2.3.1 Mortality during works

The proposed works, including vegetation removal and pond draining, have the potential to cause disturbance, significant harm or mortality to avifauna, particularly during the breeding season, when nests with eggs or flightless chicks may be present.

As set out in the Ecological Values Assessment, dabchicks have been identified at the site. Dabchicks undergo a post-breeding flight moult during which all flight feathers are shed simultaneously, rendering individuals flightless for approximately three weeks³ which potentially increases their vulnerability during Project works. Moult is an energy demanding and stressful time for birds, and would limit the ability for individuals to relocate themselves to other freshwater ponds, potentially exposing them to predation, and increasing their risk of injury or mortality during works. An Avifauna Management Plan (AMP) should therefore be followed to avoid and/or minimise any adverse effects potentially resulting from the proposed works, further described in Section 2.3.1.

Potential effects on Very high value dabchicks, such as mortality or injury to birds during dewatering, would be avoided (**Negligible magnitude**) by ensuring that the removal of these ponds is undertaken outside the dabchick breeding season - when adults are not present (and were not recorded as being present) on the ponds.

If this avifauna management is followed, it is considered that the magnitude of effect would be **negligible**.

2.2.3.2 Habitat loss and Potential Displacement

Dabchick

The Proposal would require the removal of two constructed ponds, Pond 6 and Office Pond (Figure 1, Figure 3), both of which have the potential to be used by dabchicks for breeding. Of these, Pond 6 supported a breeding pair during the surveys.

³ https://www.nzbirdsonline.org.nz/assets/95597/1691725054-036_new-20zealand-20dabchick.pdf

Three pairs of dabchicks were recorded on Ponds 1, 2, and 6 during the breeding season, with at least five further ponds identified within the site as having the potential to support dabchick pairs but were not occupied during the surveys (e.g. Ponds 3 and 4, which collectively are seven ponds).

Pond 6 was identified as high value habitat to dabchicks, as a pair of dabchicks and two chicks were recorded inhabiting the pond during the breeding season (Bioresearches, 2026) (Figure 2). The Office Pond was considered of moderate value to dabchicks because it may provide suitable habitat for dabchicks, but was not occupied by dabchicks during surveys. Several other Ponds that have the potential to be used by dabchicks (including those that birds were recorded breeding on), would not be directly impacted by the proposal and would continue to be available for breeding on.



Figure 3. *Office Pond (L) showing dense macrophytes and aquatic vegetation covering the majority of the surface. Pond 6 proposed for removal (R). where one pair of dabchicks were recorded with chicks during the breeding season in 2024.*

While this assessment considers that, following the loss of up to two ponds that support potential breeding habitat (but likely only one, where breeding was recorded), the Site will continue to support other suitable ponds that dabchicks could alternatively use during the breeding season. Further, other ponds beyond the WM site, and within the surrounding landscape (Figure 4) are likely to have capacity to support breeding pairs, and this will increase as such potential habitats mature over time (e.g. planted riparian vegetation). For example, stormwater infrastructure is often used by dabchicks, including by dispersing subadults and breeding pairs (e.g. Westgate, Albany Lakes Civic Park and the stormwater pond at Kopupaka Playground - the latter of which supported successful breeding approximately 3-4 years after construction). With consideration to this, the magnitude of the loss of these two ponds, of which only one was recorded as being used at the WM site, is considered low. This is assessed as a minor shift away from baseline conditions (Roper-Lindsay et al. 2018). For moderate to high value pond habitat, a **low magnitude** results in a low level of effect.

Figure 4. *Areas of open water within the surrounding landscape as per Auckland Council Ecosystem Current Extent (April 2021) (below)*



Redvale Landfill

Open water locations in
surrounding landscape

Legend

-  WMNZ properties
 -  Open water
- Ecosystem Current Extent
(Auckland Council GeoMaps)

SOURCES
NearMap

MAP PROJECTION
NZGD2000 / New
Zealand Transverse
Mercator 2000

Drawn by: MS

MAP
NO. 67602

Little Black Shags and Black Shags

As little black shags and black shags are colonial nesters, that mainly forage within marine environments, they are considered to be present only intermittently on Site, using structures around or on freshwater habitats for occasional roosting. The habitat is considered sub-optimal due to the anthropogenic disturbances in the surrounding landscape, and small size of the ponds, so the loss of pond habitats as a resource, is considered to be **negligible**.

Other Avifauna

There would be net loss of bird habitat, including removal of large trees within the southwestern portion of the site, the majority of which is exotic pine, which is a relatively small area within the surrounding landscape that contains a matrix of much larger vegetation patches.

This habitat is assessed as having low suitability for many native avifauna, as it lacks the structural complexity and characteristic of a mature, indigenous seral ecosystem which provides more diverse resources such as food, mates and nesting opportunities. Consequently, native bird species are likely to use the site only intermittently, primarily for foraging, with breeding opportunities limited and largely confined to the presence of larger trees. Some native bird species (e.g. fantails (*Rhipidura fuliginosa*), and grey warblers (*Gerygone igata*) have relatively small territories (~0.1 - 0.2km; Innes et al, 2022), and therefore some of the observed birds may be resident within the fragment. However, as a low abundance of birds was recorded within the EVA, and a small proportion of the sites vegetation is proposed for removal (<2 ha), with larger vegetation patches available within the surrounding landscape, these effects are anticipated to be negligible to less than minor on the resident populations.

Other native species, such as tūī (*Prosthemadera novaeseelandiae*) are more mobile and may utilise several forest fragments in the surrounding area. The existing site is considered suboptimal value for most native bird species, given the high anthropogenic disturbances from WMNZ activities (i.e., vehicle activity, machinery). This is supported by low species abundance and presence recorded on site within the EVA.

Seagulls, specifically black-backed gulls (*Larus dominicanus*) and red-billed gulls (*Chroicocephalus novaehollandiae*), were recorded congregating around areas of landfill in high densities, or were found roosting on man-made structures such as roofs and platforms. These species are not likely to be present within the terrestrial vegetation or the freshwater pond habitats, and therefore not directly impacted by the proposed works. However, as gulls are opportunistic omnivores, landfills provide a major, low-energy food source for them, which has been shown to facilitate population expansions, whilst reduction in landfill access and/or closures have been linked to reductions in gull population (Galbraith, 2015). Gull populations may therefore also expand and contract in response to the working face area of the landfill and the availability of food.

As the impacted bird species discussed above are highly mobile, and the loss of vegetation fragments and resources are considered to be low, the magnitude of effect is therefore considered to be **low**.

2.2.4 Lizards

There would be loss of herpetofauna habitat associated with small areas of planted and weedy regenerating vegetation, especially in areas where refugia is present alongside this habitat (i.e., logs, debris, rubbish). This represents a small area within the surrounding landscape that contains a matrix of much larger vegetation patches. The magnitude of loss of these areas is considered to be **low** for herpetofauna given the larger areas of higher quality habitat within the surrounding landscape.

As copper skink have been recorded on site (but generally beyond the Project footprint), the removal of vegetation on Site and associated earthworks could place native lizards at the risk of injury or death if unmanaged.

A Lizard Management Plan (LMP) is therefore recommended to manage potential effects of proposed works (i.e. vegetation clearance and earthworks) to lizards. Details of the requirements and protocols within the LMP outlined in Section 2.3.2.

If the LMP is adhered to during the works phase, it is considered that the magnitude of effects of the proposed vegetation clearance to lizards would be **negligible**.

2.2.5 Freshwater

No natural streams or wetlands are proposed to be reclaimed during the fill operations. The primary adverse effects to freshwater ecosystems during the project include modifications to the catchment via water diversion as a result of pond reclamation (shown in Figure 2) and the potential harm or mortality to native freshwater fish. The freshwater features are shown in Figure 5 for reference, as discussed within the following sections.

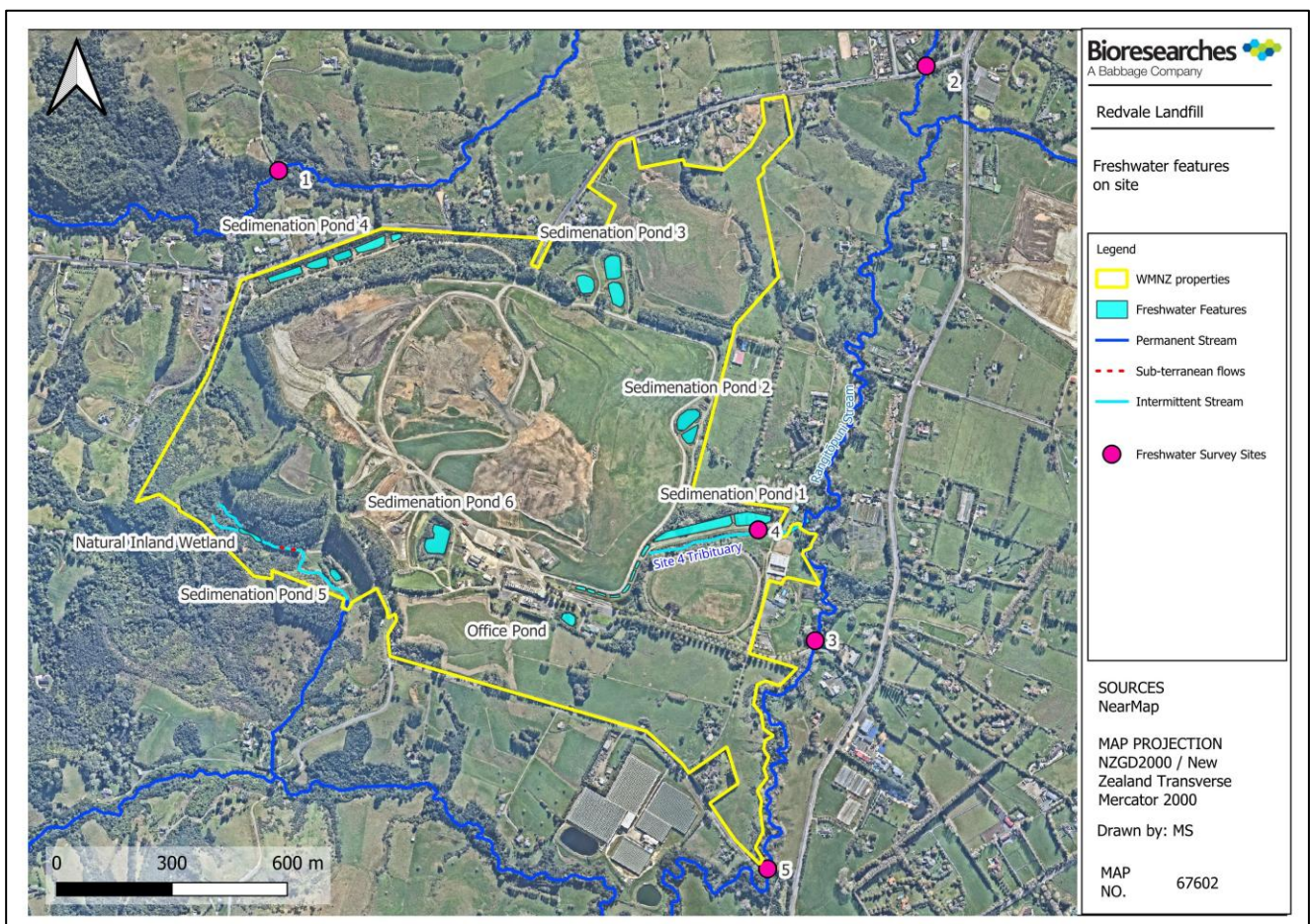


Figure 5. Freshwater features on site

2.2.5.1 Water management and leachate effects

Redvale Landfill separates leachate and stormwater run-off; the former is collected in sumps built into the basal lining system, pumped out then either evaporated on site using the BeneVap or, alternatively, trucked off site for disposal at an appropriately licensed facility. Stormwater from within the landfill footprint is diverted to the

nearest site pond for treatment, and if the quality meets the existing resource consent requirements it is discharged off site. Clean water from outside the landfill and Managed Fill footprints is diverted away from the landfill as it does not require treatment. Therefore, any discharges that enter the streams and wetlands adjacent to the site, meet appropriate limits as set out in the resource consent (refer to the Stormwater Report).

Baseline surveys of the Rangitopuni stream and its tributaries which flow within close proximity to the site show no discernible effect is occurring as a result of the landfill operations, including the discharges occurring from the operations. Sites upstream of the Landfill (i.e. no effects/impacts occurring) have similar characteristics in regard to water and sediment quality, fish, and macroinvertebrate communities, and macrophyte and periphyton growth. All stream reaches, upstream and downstream of the Site, show evidence of high pressure and stress, with overall low levels of dissolved oxygen, high conductivity and heavy metal concentrations, detailed in the EVA (Bioresearches, 2026). However, these factors are dependent upon the volume of water present and the dilution factor for contaminants present within the catchment. Provided that the stormwater management remains in place, the continuation of the landfill operations should not result in dependant adverse effects to the Rangitopuni Stream and its tributaries.

The generation and collection of leachate contaminated water was considered to have a **negligible** magnitude of effect on freshwater ecosystems due to the avoidance of interaction/interception of this leachate to streams and wetlands adjacent to the site, resulting in an overall **very low** level of effect.

2.2.5.2 Pond reclamation and catchment effects

The primary adverse effect of the pond reclamation is the diversion of water from its existing pathway to the clean water diversions. The removal of the ponds does not represent a loss of natural freshwater ecosystems (i.e. streams, wetlands or lakes) as these are constructed man-made ponds; however they do contribute to the upper catchment of Site 4, south of Pond 1, which supports an intermittent stream. The removal of the ponds, in regard to potential catchment reduction was considered to be of **low** magnitude of effect, as the water from the Office Pond catchment will continue to flow to the stream, albeit more directly.

The ponds provide low quality aquatic habitat to native freshwater fauna, with previous surveys of ponds within the area showing only tolerant shortfin eel (*Anguilla australis*) to be present. The removal of these ponds does not result in the loss of high quality or appropriate habitat for indigenous fish species. Potential effects to freshwater fauna residing within these ponds is outlined in Section 2.2.5.3.

Due to the extensive modification of the site and waterways within the site, the removal of Pond 6 may represent a small reduction in contributing catchment to the intermittent stream associated with Site 4. Currently, water decants from Pond 6 (and during large storm events overtops the spillway) and enters the stormwater system where the water enters a concrete lined channel which flows to Site 4. Following landfill expansion and managed landfill operations, Pond 6 and the Approved Transitional Facility (ATF) pad will discharge into Pond 1, which will be expanded to increase capacity. Clean water which previously discharged into the Office Pond (the site of the proposed ATF pad) will be diverted to the intermittent tributary associated with Site 4. This diversion will ensure an additional catchment area of ~42,000 m² (Based on Auckland Council GeoMaps Overland Flow Path layer) is flowing into Site 4, and supporting the intermittent classification.

Ensuring the overland flow paths are adequately diverted to Site 4 to mitigate for reductions in catchment flows, the removal of the ponds and their impact on the contributing catchment was considered to be of **Low** magnitude, resulting in an overall **Very Low** level of effect.

2.2.5.3 Native Fish

The magnitude and level of the potential effect on native fauna is considered to be **Moderate** if the works are unmanaged due to the nature of the activity of infilling of Pond 6 and the Office Pond which are known habitat

for native eels. The extent of habitat loss/alteration (complete loss of the ponds); the density and threat status of impacted species (high density, but limited to one non-threatened native fish, the shortfin eel); and the ability of fauna to escape the disturbance (largely restricted to the freshwater habitats). Without mitigation, there is a high potential for injury or mortality of native freshwater fauna during in-filling of the constructed ponds.

It is recommended that a Native Fish Capture and Relocation Plan (NFCRP) is in place to ensure that any native fish present are suitably relocated during the first stages of the works in Pond 6 and Office Pond and any stream works. The NFCRP included, at a minimum, methods to capture fish, measures to prevent fish re-entering the reach, fishing efforts, relocation sites, storage and transportation to prevent stress and death/predation.

Following the implementation of NFCRP protocols, this will reduce the magnitude of effect on freshwater fauna to a **Low** magnitude of effect.

2.2.5.4 Earthworks and sedimentation to aquatic ecosystems

The project will include aspects of earthworks which are likely to generate sediment, specifically for the construction of the Class 2 extension, which may enter adjacent watercourses during rainfall events if unmanaged. Whilst the earthworks are temporary, increased sedimentation can lead to alterations in benthic substrates, smothering of or harm to freshwater fauna through alterations in water chemistry, heat absorption and light refraction, increased turbidity, and in-filling of interstitial spaces (preferred macroinvertebrate habitat). Excess sediment within waterbodies is generally harmful to the health of aquatic biota.

Due to the extent of works required, the project is being undertaken in stages. Consequently, the extent, duration, area of disturbance and degree of sedimentation that may occur is relatively minimised, and likely to have an overall **low** magnitude of effect on freshwater ecosystems. However, to further minimise the potential for excess fine sediment entering the catchment, and appropriately mitigate the potential adverse effects on freshwater habitats, the following recommendations are provided:

An erosion and sediment control plan (ESCP) has been prepared by WMNZ as part of the existing Landfill Management Plan, which addresses the construction works in Pond 6 (during Class 2 liner extension works) and the Office Pond (creating a pad for the relocated ATF), to minimise the risk of sedimentation resulting from the proposed works. With regard to protection of aquatic health, maintenance and management of the controls adjacent to the streams and ponds which contain connectivity to natural stream environments should be stringent, with erosion and sediment controls checked prior to and immediately following heavy rain events to minimise the potential for failure and sedimentation of the downstream receiving environment. Earthworks should be undertaken during periods of sustained dry weather to limit sediment run-off. Specific methodologies for minimising sedimentation entering the freshwater ecosystems are provided within the ESCP.

2.2.6 Noise and Vibration

As per the Assessment of Noise Effects (Marshall Day, 2026), construction noise will be managed in accordance with the Landfill Management Plan and will comply with the relevant limits in the Auckland Unitary Plan – Operative in Part Operational and the requirements of NZS 6803: 1999 "Acoustic – Construction Noise". The effects of noise and vibration are not considered to exceed that of the current baseline, and therefore, noise and vibration has been assessed as a **negligible** effect.

2.3 Effects Management Recommendations

The NPS-IB requires that any significant adverse effects on indigenous biodiversity (outside an SNA) be managed by applying the effects management hierarchy (S 3.16, NPS-IB). The effects management hierarchy requires that adverse effects be avoided first, where practicable, followed by actions to minimise and remedy. Following these measures, more than minor residual adverse effects must be offset, and where offset is not possible, then compensated. Where compensation is not appropriate, the activity itself is avoided.

Identified adverse effects of the Project are generally nil to moderate levels, and it is expected that those moderate level effects would be further reduced to low, following effects management and recommended mitigation measures. Effects management protocols are detailed within relevant management plans (AMP, LMP and Native Fish Capture and Relocation Plan (NFCRP), and discussed in the below sections 2.3.1 to 2.3.3), with the effects management hierarchy outlined below:

1. Avoid:

- Mortality to native wildlife, including avifauna, by undertaking vegetation removal outside the bird breeding season, or alternatively ensuring no nesting birds are present at the time of removal by way of pre-clearance bird nesting surveys;
- Mortality or significant harm to dabchicks, their eggs or chicks by ensuring any ponds that require drainage, are drained prior to the dabchick breeding season (i.e. breeding season is June to March, so ponds drained in April-May);
- Wetland reclamation;
- Streamworks.

2. Minimise

- Mortality to native lizards by undertaking a capture-relocation of native lizards from habitats prior to and during vegetation removal.
- Mortality to native fish by undertaking a capture-relocation of native fish from freshwater habitats prior to and during vegetation removal.

Sedimentation into surrounding watercourses, an erosion and sediment control plan will be implemented, with the recommendation that earthworks in and near the riparian yards be undertaken during periods of sustained dry weather. Following application of the effect's management hierarchy, and associated management plans, higher level management hierarchy remediation including offsetting and compensation is not required for this Project.

2.3.1 Avifauna Management Plan

To protect native avifauna, strategies outlined in an AMP will be implemented. The AMP will describe how disturbance, injury, and mortality of native bird species will be minimised on-site, ensuring no net loss in population size or occupancy within their natural ranges. Specific protocols outlined in further detail within the AMP include the following:

- The credentials and contact information of the implementing ecologist/ornithologist;
- The timing and duration of AMP implementation;
- A summary of habitats and species covered;
- Breeding season management actions and protocols to mitigate adverse effects, including:

- Nest checks prior to vegetation or structure clearance during breeding seasons (see Table 1 for general season and note dabchick season: June–March);
- Year-round checks for moulting dabchick before any riparian vegetation clearance or pond dewatering;
- Procedures for nest demarcation and management;
- Molt surveys;
- Deterrent protocols (if appropriate) to prevent nesting on-site;
- Pre-works nest surveys and actions for locating eggs or chicks;
- Site-specific measures and ongoing monitoring;
- Communication and reporting protocols between the client and project ecologist/ornithologist.

2.3.1.1 Dabchick-Specific Protocols

Breeding Season (June–March):

Pond drainage and riparian vegetation clearance should be avoided during this period. If unavoidable, the following must be implemented (detailed in Bioresearches 2025a):

- Nest and Egg Surveys:
 - Conducted within 24 hours before any vegetation clearance or pond dewatering.
- Exclusion Zones:
 - If nests, eggs, or chicks are present, establish a 20 m exclusion zone within 24 hours.
 - This zone must remain until:
 - Chicks are independent (typically 10–14 weeks), or
 - Chicks have naturally fledged, or
 - No chick sightings occur for 48 hours (confirmed by the project ornithologist).

Ongoing Monitoring:

- Weekly inspections if dabchick pairs are present but not nesting.
- Trail cameras to monitor nesting ponds and ensure compliance. Footage will be reviewed weekly during nesting and chick-rearing stages.

Moulting Dabchick:

- Surveys are required before any riparian vegetation clearance or pond drainage.
- If moulting is confirmed, works must be delayed until flight feathers are fully developed and birds are capable of relocation.

2.3.1.2 Non-Threatened Avifauna Protocols

Protection of common native birds should be achieved by avoiding vegetation and structure removal during their breeding season (see Table 1). Where avoidance is not feasible:

- Conduct a nesting survey within 24 hours before works.
- If active nests are found, a 10 m exclusion zone must be enforced until chicks fledge.

Vegetation or structure clearance may only proceed if the area is confirmed clear of nesting birds, eggs, or chicks by a qualified ecologist.

Table 1. *Nesting habitats and breeding seasons of native birds recorded during the site survey that have potential to breed on site. Indicative breeding months (in light blue), main egg laying periods are indicated in dark blue. Information sourced from New Zealand birds online (nzbirdsonline.org.nz).*

Common name	Nesting Habitat							Nest Height (m)	Breeding Season											
	Ground	Long grass	Shrubs	Trees	Wetlands	Ponds	Buildings		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Australasian coot								0												
<i>Australasian harrier</i>								0-15												
<i>Australasian shoveler</i>								0												
<i>Black swan</i>								0												
Dabchick								0				*								
Fantail								1.5-5												
<i>Grey duck</i>																				
Grey teal								<4m												
Grey warbler								<8.5												
Kereru								1.8-20												
Kingfisher								<3.6												
<i>Mallard</i>								0												
Morepork								<12												
<i>Paradise shelduck</i>								<20												
<i>Pūkeko</i>								<0.8												
Shining cuckoo								<8.5												
Silvereye								<14												
Tūi								<30												
Welcome swallow								0.5-13												
White-faced heron								<22												

Note: Several species found on site are partially protected under the Wildlife Act 1953, listed as gamebirds (Schedule 1 of the Wildlife Act 1953) or 'partially protected wildlife' (Schedule 2 of the Wildlife Act 1953). These species are italicised. Species in bold have a conservation status of Threatened or At-Risk. Breeding dabchicks were not recorded at WMNZ during on-site surveys and are therefore more likely to lay eggs from August onwards. *= dabchick moult

2.3.2 Lizard Management Plan

To protect native lizards, strategies outlined in the LMP will be implemented. The LMP will describe how disturbance, injury, and mortality of native lizard species will be minimised on-site, ensuring no net loss in population size or occupancy within their natural ranges.

Specific protocols outlined in further detail within the LMP include the following:

- Credentials of the ecologist/herpetologist who will implement the plan;
- Timing of the implementation of the LMP;
- Vegetation clearance must avoid periods where lizards' activity is reduced (i.e. vegetation clearance should only occur from October- April inclusive);
- A description of methodology for survey, trapping and relocation of lizards rescued including but not limited to: salvage protocols, relocation protocols (including method used to identify suitable relocation site(s)), nocturnal and diurnal capture protocols, supervised habitat clearance/transfer protocols, artificial cover object protocols, and opportunistic relocation protocols;
- Prior to any vegetation clearance or habitat disturbance on-site, all works areas will be clearly demarcated to ensure that works do not encroach into peripheral undisturbed or protected habitat areas;
- Systematic habitat searching and a minimum 5-day period of ground trapping using artificial cover objects (ACOs) (including installation) will be utilised to capture lizards on site prior to vegetation clearance;
- Machine-assisted destructive searches; the contractor and the Project Herpetologist will search through vegetation as it is removed using an excavator with a toothed bucket or root-rake attachment;
- Post vegetation clearance search and recovery of any remaining lizards by the project herpetologist;
- A description of the relocation site(s); including discussion of: provision for additional refugia (1 pile per individual), e.g. depositing salvaged logs, wood or debris for newly released native skinks that have been rescued; any protection mechanisms (if required) to ensure the relocation site is maintained (e.g.) covenants, consent notices etc; any weed and pest management to ensure the relocation site is maintained as appropriate habitat;
- Pest control protocols where ≥ 10 native lizards are salvaged from the Project works;
- Success monitoring where ≥ 20 native lizards are found and relocated from the works site;
- Monitoring methods, including but not limited to: baseline surveying within the Site; baseline surveys outside the Site to identify potential release sites for salvaged lizard populations and lizard monitoring sites; ongoing annual surveys to evaluate translocation success; pre and post – translocation surveys; and monitoring of effectiveness of pest control and/or any potential adverse effects on lizards associated with pest control; and
- A completion report will be prepared by the Project herpetologist/ supporting ecologist/herpetologist within 1 month of completion of all vegetation removal detailing the number of lizards captured and all information as required of an Amphibian Reptile Distribution Scheme, Department of Conservation report.

2.3.3 Freshwater Fauna

To mitigate adverse effects on native freshwater fish, strategies outlined in a NFCRP are recommended to ensure that any native fish present are suitably relocated. The NFCRP should include, at a minimum:

- methods to capture fish,
- measures to prevent fish re-entering the reach,
- fishing efforts,
- relocation sites; and
- storage and transportation to prevent stress and death/predation.

2.3.4 Effects Summary

While the level of effects for some habitats and species were initially assessed as Moderate to Very High, following the effects management measures outlined above, the magnitude of effect on these habitats and species now ranges from **Nil** to **Low**. In accordance with EIANZ guidelines, any level of effect of moderate or above requires effects management (as discussed in Appendix A), therefore no further effects management measures are required for the nil to low level of effects assessed for this project. The overall values, magnitude and level of effect are summarised in Table 2 below.

Note that within Table 2, the level of effect for Dabchicks is lower than would normally be assigned following EIANZ guidelines. Normally, a low magnitude of effect for a **Very High** value dabchick results in a moderate level of effect. However, the EIANZ guidelines state, *“Fundamentally, the matrix is not a substitute for sound professional judgement and good science, but can be used to guide assessments of effects and demonstrate to those reading assessment documents that a repeatable, logical process has been applied to the data.”* Following the assessment in Section 2.2.3, and recommended management strategies discussed in Section 2.3.1 to avoid and minimise adverse effects, the level of effect on dabchick is considered a low level of effect, rather than moderate, as the number of dabchick possibly present on Site represents a very low proportion of the population (one pair), and direct effects are avoided through avifauna management strategies. Based on the comprehensive survey undertaken during the 2024-2025 seasons and the assessment discussed in this report, a low level of effect is considered applicable for this species.

Table 2. *The level of effect of the proposed works on the relevant species groups or habitats, as described in Section 3. The level of effect is calculated using the matrix presented in Table 7.*

Habitat / Taxa	Value	Value Justification	Activity	Magnitude of Effect (without management)	Effects Management Strategy	Magnitude of Effect (with management)	Level of effect following effects management
Fauna							
Avifauna - Dabchick	Very High	Three pairs of regionally threatened dabchicks (EIANZ value = very high) were recorded breeding on ponds within the Site, and fledged individuals were recorded using ponds as dispersal habitats.	Potential harm during the removal of dabchick habitat: Pond 6 and Office Pond	High	Dewatering outside breeding season and implementation of Avifauna Management Plan	Avoid: Negligible	Low
Avifauna – All other species	Low	Highly modified habitats provide limited foraging and nesting opportunities for common native species.	Potential harm during the removal of terrestrial vegetation	Low	Implementation of Avifauna Management Plan	Avoid: Negligible	Very Low
Lizards	High	Some weedy and planted vegetation and refugia on-site supports a likely low-density population of 'At Risk' copper skinks.	Potential harm during the removal of terrestrial vegetation	Low	Implementation of Lizard Management Plan (salvage and relocation)	Negligible	Very Low
Long-tailed Bats	Negligible	Given the absence of any activity recorded within the Site across three survey periods totalling 2,007 survey nights, the Site is considered unlikely to provide important habitat to native bats.	Potential harm during the removal of terrestrial vegetation	Negligible	Follow DOC bat roost protocols for high-risk trees	Negligible	Very Low
Native Fish	Low-Moderate	Presence of an 'At Risk' species within the Rangitopuni Stream, however onsite waterbodies only host tolerant species.	Potential harm or mortality during pond reclamation	Low	Implementation of Fish Management Plan (salvage and relocation)	Low	Very Low- Low
Habitats							
Dabchick breeding ponds	Moderate - High	A total of 12 of 16 pond series are considered suitable to support breeding dabchick.	Removal of Pond 6 and Office Pond	Low	None: Assessment determines suitable alternative ponds within WMNZ site and beyond	Low	Low

Habitat / Taxa	Value	Value Justification	Activity	Magnitude of Effect (without management)	Effects Management Strategy	Magnitude of Effect (with management)	Level of effect following effects management
Natural inland wetland	Low	Pest infested wetland confined to single flow path with no functional riparian buffer.	Earthworks and the diversion of water over 100 m from the natural inland wetland	Nil	Nil	Nil	Nil
Pond 6 & Office Pond*	Negligible	Not natural aquatic ecosystems, contain high turbidity and host tolerant aquatic fauna	Reclamation of constructed waterbody	Nil	Nil	Nil	Nil
Rangitopuni stream (Sites 1, 2, 3 and 5)	Moderate	Large permanent stream, albeit highly degraded through surrounding land-use practices. Rangitopuni contains At Risk aquatic fauna	Generation of leachate within close proximity to surface water	High	Avoidance through on-site collection and off-site disposal removing discharge to surface water systems	Negligible	Very Low
Site tributary (Site 4)	Low	Intermittent stream with limited habitat variability and hosts pollutant tolerant taxa.	Catchment reduction and diversion of water	High	Minimise- diversion of water to supplement reduction in catchment volume	Moderate	Low
			Generation of leachate within close proximity to surface water systems	High	Avoidance through on-site collection and off-site disposal removing discharge to surface water systems	Negligible	Very Low
			Adjacent earthworks and potential sedimentation	High	Minimise – Implement ECSP with stringent controls near open water	Low	Very Low
Terrestrial vegetation	Negligible - Low	Highly modified habitats which contain a limited number of naturally occurring native plant species.	Removal of vegetation	Low	Nil	Very Low	Very Low

* Does not include sediment treatment Pond 1, 2, 3, 4

3 SUMMARY

A summary of the management recommendations and level of effects with mitigation is provided in Table 2. Following management recommendations, the level of effect ranges **nil** to **low**. No further management recommendations are required.

In accordance with the NPS-FM and NPS-IB, the effects management hierarchy has been applied to this project to manage adverse effects of the proposed works on freshwater habitats and indigenous biodiversity, as described in section 2.

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APPLICABILITY AND LIMITATIONS

Restrictions of Intended Purpose

This report has been prepared solely for the benefit of Waste Management New Zealand as our client with respect to the brief. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such party's sole risk.

Legal Interpretation

Opinions and judgements expressed herein are based on our understanding and interpretation of current regulatory standards and should not be construed as legal opinions. Where opinions or judgements are to be relied on, they should be independently verified with appropriate legal advice.

Maps and Images

All maps, plans, and figures included in this report are indicative only and are not to be used or interpreted as engineering drafts. Do not scale any of the maps, plans or figures in this report. Any information shown here on maps, plans and figures should be independently verified on site before taking any action. Sources for map and plan compositions include LINZ Data and Map Services and local council GIS services. For further details regarding any maps, plans or figures in this report, please contact Bioresearches.

Appendix A *Ecological Impact Assessment Methodology*

The assessments were undertaken in general accordance with EclA guidelines, published by the Environment Institute of Australia and New Zealand (EIANZ; Roper-Lindsay *et al.* 2018). The Guidelines provide criteria for assigning value to habitat for assessment purposes. Values are assigned (High, Moderate, Low, Very Low; Table 4 and Table 5) based on the following four assessment matters (as described in Roper Lyndsay et al. 2018; Table 3 and Table 4):

1. Representativeness
2. Rarity / Distinctiveness
3. Diversity / Pattern
4. Ecological Context

The level of effect is then determined by determining the magnitude (Table 6) and combining the value of the ecological feature/attribute with the score or rating for magnitude of effect to create a criterion for describing the level of effects (Table 7). The cells in Table 7 italics in represent a 'significant' effect under the EIANZ 2018 guidelines.

Cells with low or very low levels of effect represent low risk to ecological values rather than low ecological values *per se*. A moderate level of effect requires careful assessment and analysis of the individual case. For moderate levels of effects or above, measures are expected to be introduced to avoid through design, or appropriate mitigation needs to be addressed (Roper-Lindsay *et al.* 2018).

Table 3. *Attributes to be considered when assigning ecological value or importance to a site or area of terrestrial vegetation / habitat / community (as per Roper-Lindsay et al. 2018).*

Matters	Attributes to be considered
Representativeness	- Criteria for representative vegetation: - Typical structure and composition - Indigenous species dominate - Expected species and tiers are present - Criteria for representative vegetation: - Species assemblages that are typical of the habitat - Indigenous species that occur in most of the guilds expected for the habitat type
Rarity/Distinctiveness	- Criteria for rare/distinctive vegetation and habitats: - Naturally uncommon or induced scarcity - Amount of habitat or vegetation remaining - Distinctive ecological features - National Priority for Protection - Criteria for rare/distinctive species of species assemblages: - Habitat supporting nationally threatened or At-Risk species, or locally uncommon species - Regional or national distribution limits of species or communities - Unusual species or assemblages - Endemism
Diversity and pattern	- Level of natural diversity, abundance and distribution - Biodiversity reflecting underlying diversity - Biogeographical considerations- pattern, complexity - Temporal considerations, considerations of lifecycles, daily or seasonal cycles of habitat availability and utilisation

Matters	Attributes to be considered
Ecological context	• Site history and local environment conditions which have influenced the development of habitats and communities • The essential characteristics that determine an ecosystems integrity, form, functioning and resilience (from 'intrinsic value' as defined in RMA) • Size, shape and buffering • Condition and sensitivity to change • Contribution of the site to ecological networks, linkages, pathways and the protection and exchange of genetic material • Species role in ecosystem functioning - high level, key species identification, habitat as proxy

Table 4. *Matters that may be considered when assigning ecological value to a freshwater site or area (as per Table 7 of Roper-Lindsay et al. 2018).*

Matters	Attributes to be considered
Representativeness	• Extent to which site/catchment is typical or characteristic • Stream order • Permanent, intermittent or ephemeral waterway • Catchment size • Standing water characteristics
Rarity/ Distinctiveness	• Supporting nationally or locally Threatened, At Risk or uncommon species • National distribution limits • Endemism • Distinctive ecological features • Type of lake/pond/wetland/spring
Diversity and pattern	• Level of natural diversity • Diversity metrics • Complexity of community • Biogeographical considerations - pattern, complexity, size, shape
Ecological context	• Stream order • Instream habitat • Riparian habitat • Local environmental conditions and influences, site history and development • Intactness, health and resilience of populations and communities • Contribution to ecological networks, linkages, pathways • Role in ecosystem functioning – high level, proxies

Table 5. *Criteria for assigning value to habitat/species for assessment.*

Value	Determining Factors
Very High	Nationally Threatened species found in the 'zone of influence' (ZOI) either permanently or seasonally. Area rates 'High' for at least three of the assessment matters of Representativeness, Rarity/distinctiveness, Diversity and Pattern, and Ecological Context. Likely to be nationally important and recognised as such.
High	Species listed as At Risk – Declining found in the ZOI either permanently or seasonally. Area rates 'High' for two of the assessment matters, and 'Moderate' and 'Low' for the remainder OR area rates 'High' for one of the assessment matters and 'Moderate' for the remainder.

Value	Determining Factors
	Likely to be regionally significant and recognised as such.
Moderate	Species listed as At Risk – Relict, Naturally Uncommon, Recovering found in the ZOI either permanently or seasonally. Locally uncommon or distinctive species. Area rates ‘High’ for one of the assessment matters, ‘Moderate’ or ‘Low’ for the remainder OR area rates as ‘Moderate’ for at least two of the assessment matters and ‘Low’ or ‘Very Low’ for the remainder. Likely to be important at the level of the Ecological District.
Low	Nationally and locally common indigenous species. Area rates ‘Low’ or ‘Very Low’ for majority of assessment matters, and ‘Moderate’ for one. Limited ecological value other than as local habitat for tolerant native species.
Negligible	Exotic species including pests, species having recreational value. Area rates ‘Very Low’ for three assessment matters and ‘Moderate’, ‘Low’ or ‘Very Low’ for the remainder.

Table 6. Criteria for describing the magnitude of effects (EIANZ 2018)

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

Table 7. Criteria for describing the level of effects (EIANZ 2018). Where text is italicised, it indicates ‘significant effects’ where mitigation is required.

Magnitude of Effect	Ecological Value				
	Very High	High	Moderate	Low	Negligible
Very High	<i>Very High</i>	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	Low
High	<i>Very High</i>	<i>Very High</i>	<i>Moderate</i>	Low	Very Low
Moderate	<i>High</i>	<i>High</i>	<i>Moderate</i>	Low	Very Low
Low	<i>Moderate</i>	Low	Low	Very Low	Very Low
Negligible	Low	Very Low	Very Low	Very Low	Very Low
Positive	Net Gain	Net Gain	Net Gain	Net Gain	Net Gain

Appendix B Summary of physical and habitat characteristics of surveyed streams

Summary of the physical characteristics and biological survey results									
Site	1		2		3		4		5
Date	27/11/2024 (Spring)	25/03/2025 (Autumn)	27/11/2024 (Spring)	25/03/2025 (Autumn)	27/11/2024 (Spring)	25/03/2025 (Autumn)	28/11/2024 (Spring)	25/03/2025 (Autumn)	2/04/2025 (Autumn)
Habitat									
Average Width (m)	3.575	2.868	5.98	4.51	2.8	1.327	2.17	Dry	2.45
Average Depth (m)	0.6095	0.82	1.11	1.02	0.23	0.11	0.14	Dry	0.36
Dominant substrate	Silt & Wood	Silt & Wood	Silt, Boulder & Wood	Silt	Silt, Wood & Small - Medium Gravel	Silt & Small - Medium Gravel	Silt & Wood	N/A	Silt and Small gravel
Fish Cover	Macrophytes, bank vegetation		Macrophytes, instream debris, undercut banks, bank vegetation		Macrophytes, instream debris, bank vegetation		Macrophytes, instream debris, bank vegetation	N/A	Bank vegetation, wood
Macrophytes and Algae									
No. of Taxa	6	6	9	6	6	3	4	N/A	1
Average Percent Cover	70.58	29.80	52.50	51.21	34.57	34.21	34.84	N/A	0.83
Species Recorded	Duckweed, Curly pondweed, Water purslane, Nitella, Green mat, Green filamentous.	Willow weed, Watercress, Duckweed, Water celery, Curly pondweed, Nitella	Willow weed, Watercress, Curly pondweed, Water purslane, Blunt Pondweed, Nitella, Green filamentous, Brown mat.	Willow weed, Watercress, Starwort, Water celery, Curly pondweed, Nitella	Starwort, Water celery, Curly pondweed, Water purslane, Nitella.	Water celery, Curly pondweed, Nitella	Willow weed, Watercress, Buttercup, Mercer grass, Iron Flocc.	N/A	Nitella
Macroinvertebrates									
No. of Taxa	23	10	14	4	11	6	18	7	11
Dominant taxon	<i>Potamopyrgus</i>	<i>Potamopyrgus</i>	<i>Xanthocnemis</i>	<i>Xanthocnemis</i>	<i>Potamopyrgus Paracalliope</i>	<i>Physella</i>	<i>Potamopyrgus</i>	<i>Oligochaeta Culex</i>	<i>Culex</i>
%EPT	2.7	0.2	0	0	0	0	0	0	0
MCI	72 Poor	60 Poor	58 Poor	36 Poor	50 Poor	52 Poor	54 Poor	54 Poor	62 Poor
SQMCI	1.74 Poor	1.83 Poor	1.99 Poor	3.44 Poor	1.27 Poor	1.97 Poor	2.08 Poor	2.30 Poor	1.74 Poor
Fish (Streams fished on one occasion only)									
No. of species	3		2		3		1		5
No. of fish	35		56		78		1		90
Fish IBI	38 Good		26 Poor		44 Very Good		22 Poor		54 Excellent
Species recorded	Common bully, Shortfin Eel, Longfin Eel.		Common bully, Shortfin Eel		Banded kokopu, Crans bully, Shortfin Eel.		Shortfin eel		Crans bully, Common bully, Shortfin eel, Longfin eel, Banded kokopu

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