



Seven Oaks Kinloch

Ecology Assessment Report

Prepared for:

Seven Oaks Kinloch Ltd

Prepared by:

Phoenix Ecology Ltd



**PHOENIX
ECOLOGY**

SUSTAINABLE LAND + WATER

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Author: Dr Hannah Mueller
 Reviewed by: Titia Schamhart
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1. Introduction

1.1. Background and purpose

Phoenix Ecology Ltd has been contracted by Seven Oaks Kinloch Ltd to conduct an ecological assessment at a proposed Kinloch subdivision site ('the site'). The site is located at Okaia Drive in Kinloch, above the shores of Lake Taupō (Figure 1). The subdivision is proposed as an extension of Okaia Drive, located to the west of Okaia Stream on a terrace looking above the lake.

The purpose of this report is to present a terrestrial ecology assessment of the site and reserve areas, discuss potential adverse effects, including the matters noted above, and make recommendations on avoiding, minimising or remedying any potential effects.

The ecological assessment conducted for this report includes the following aspects:

- Background review of ecological databases and geospatial information;
- Assessment of terrestrial habitats, including vegetation communities and fauna values; and
- Bioacoustics monitoring for bats across the site.

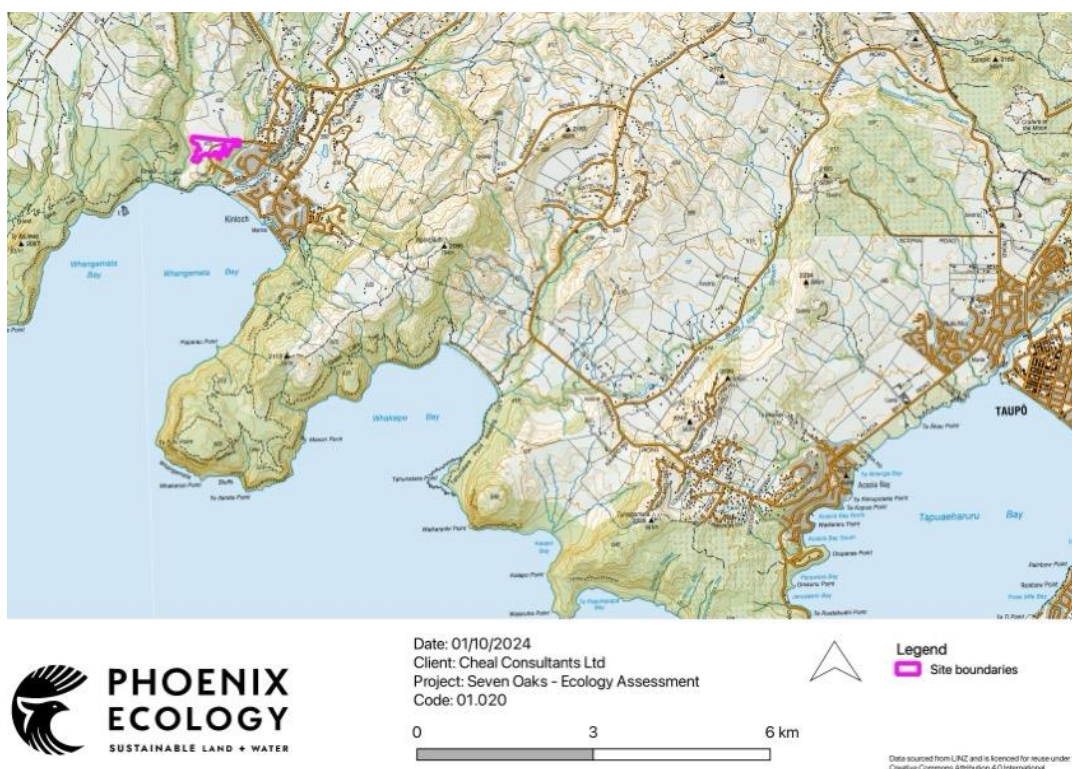


Figure 1 Site location

1.2. Site description

The site is located at Kinloch, approximately 15 km to the west of Taupō, on the shore of Lake Taupō (Figure 1), and comprises of terraces perched above the lake, currently in pastoral land use. The site proposed for residential development is zoned Low Density Residential.

The site is currently used for dry stock farming, comprising currently grazed grassed vegetation cover. The surrounding landscape consist of agricultural land use, mostly dry stock farming and pine plantation forestry. The site also is adjacent to existing new subdivisions associated with the urban



expansion of Kinloch, including an existing stage of the Seven Oaks subdivision to the south on a lower terrace between the site and the lakeshore.

Lastly, the site also abuts Department of Conservation (DOC) reserves featuring indigenous vegetation cover, including Okaia Stream Scenic Reserve in the east, and Otaketake Stream Scenic Reserve in the west (Figure 2).

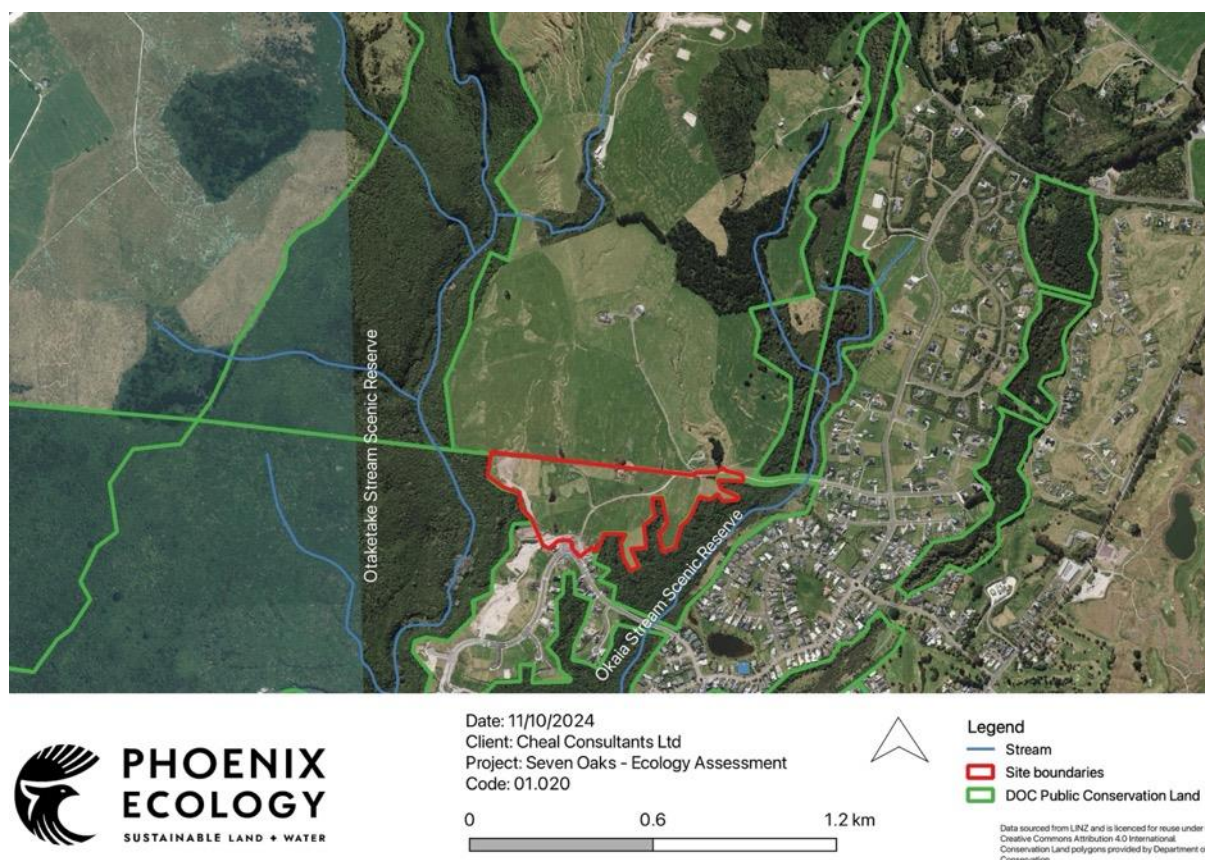


Figure 2 Ecological site context

2. Methodology

2.1. Desktop review

A desktop assessment of the site was undertaken prior to the site inspection to identify major vegetation types and landscape context using aerial photography. Other relevant databases data sources were reviewed to gain an understanding of existing concerns and ecological features on site.

Land environments in the surroundings of the site were analysed using the Threatened Environment Classification developed by Landcare Research. The threat classification for the remaining indigenous biodiversity in New Zealand's environments is based on three components: how much indigenous cover remains within land environments, how much land is legally protected, and how past loss of indigenous cover and natural heritage protection are distributed across New Zealand's landscape (Walker et al. 2015).



The review of relevant background literature, existing ecological reports and databases conducted to understand the ecological values within the site and surrounding areas also included:

- NZ Herpetofauna Atlas database published by the Department for Conservation;
- iNaturalist and NZ Bird Atlas;
- DOC National Bat Database (DOC 2024); and
- NZ Plant Conservation Network (NZPCN) plant distribution database.

Any threatened species found were recorded and their threat status checked against the relevant national threatened species classification lists (O'Donnell et al. 2023; Burns et al. 2021; Robertson et al. 2021; and Hitchmough et al. 2021).

2.2. Site walkover

Following a preliminary desktop assessment, the habitat characteristics of the site and surrounding area were assessed during an initial site visit on 28 May 2024. A site walkover of the site and adjoining reserves was undertaken to preliminarily assess the ecological values and habitat potentially affected by the proposed works.

More detailed assessments of vegetation and potential fauna habitat were undertaken during the deployment and retrieval of acoustic bat monitoring equipment in September 2024. Both native and exotic plant communities were recorded, and a qualitative assessment of vegetation habitats was conducted. The assessment included, but was not limited to, areas of vegetation on site, and immediately adjacent to the site.

A qualitative assessment of suitable habitats for indigenous birds and lizards were also conducted as part of the site visits. During the 23 September site visit, areas containing logs, debris, piles of materials, and vegetation were inspected for their potential to serve as refuges or foraging habitat for lizards.

The site is currently used for grazing, and no potential natural inland wetland areas were identified during the walkovers.

Site photos are presented in Appendix 1.

2.3. Bats

A bat monitoring and habitat assessment survey was conducted at the site. On 2 September 2024, an initial site visit was conducted to deploy the ABMs and perform a rough habitat assessment. During this visit, a randomised selection of large trees was examined to evaluate their potential as bat roosts. The key characteristics assessed included the presence of cavities, loose bark, cracks, and hollows, all of which are known to provide the sheltered conditions favoured by bats (refer to photos in Appendix 1).

The New Zealand long-tailed bat (*Chalinolobus tuberculatus*, Threatened – Nationally Critical, O'Donnell et al. 2023) typically favours native forests but can also adapt to exotic forestry and farmlands (O'Donnell, 2000). This species prefers to roost in tree cavities, usually found in large, mature trees (Sedgeley & O'Donnell, 1999). Evaluating these trees for roosting potential was an important component of the habitat assessment.



Baseline bat monitoring involved deploying Acoustic Bat Monitors (ABMs), specifically omnidirectional 'FC' recorders known as "AR4," across the immediate development site and wider area (covering both pasture and adjoining reserves) using a systematic grid pattern to ensure even spatial coverage (refer to Figure 3 for precise locations, with weather conditions outlined in Appendix 4). This grid deployment strategy was designed to minimise sampling bias and ensure comprehensive coverage.

Research indicates that bat survey locations should be spaced between 100 and 200 metres apart to avoid overlapping recordings (Barataud et al., 2015, Trust, n.d.). Given the site's mixture of buildings, pastures, bush, and mature trees, a spacing of 160 metres between monitors was chosen. This distance maximised coverage while minimising the risk of duplicate recordings in the diverse habitats present at the site. Importantly, monitors were only placed in locations that were safely accessible, ensuring that deployment did not put personnel or equipment at risk, and that optimal survey conditions could be maintained

Monitors were also placed along the boundaries of adjacent reserves outside the development site. These areas, though not directly impacted by the proposed subdivision, provide important foraging grounds and potential roosting habitats for bats. By extending the survey beyond the development site, we aimed to capture a more comprehensive understanding of bat presence and activity across the wider landscape. However, as this is a single presence/absence survey, it will not provide information on any potential displacement or shifts in bat activity due to the development itself.

The ABMs were deployed for a continuous period of three weeks to ensure data collection over a variety of weather conditions, moon phases, and bat activity levels. The monitors recorded bat echolocation calls from 60 minutes before sunset until 60 minutes after sunrise, capturing the key periods of bat activity.

2.4. Determination of ecological significance

Ecological significance was assessed based on the criteria outlined in Section 11A of the WRPS. The assessment of each criterion followed Table 1 of "Guidelines for determining areas of significant indigenous vegetation and habitats of indigenous fauna in the Waikato Region" (WRC and Wildland Consultants 2021).

If an area of vegetation or habitat was found to be significant (meeting one or more of the criteria) then it was further assessed to determine a level of significance. These levels are "International", "National", "Regional", or "Local", following Table 2 of "Guidelines for determining areas of significant indigenous vegetation and habitats of indigenous fauna in the Waikato Region" (WRC and Wildland Consultants 2021).

In addition the National Policy Statement for Indigenous Biodiversity (NPS-IB) was used to determine ecological significance for indigenous flora and fauna and their habitats.

2.5. Assessment of ecological effects

The assessment of ecological effects informed by the Ecological Impact Assessment (EclA) guidelines of the Environment Institute of Australia and New Zealand (Roper-Lindsay et al. 2018), identifying ecological values, magnitude of effect, and overall level of effect. Waikato Regional Council significance criteria were also used for the assessment (Appendix 2). Site plans are presented in Appendix 3.

The following steps were used for this assessment:



- Ecological values are assigned based on assessing the values of species, communities and habitats identified against criteria set out in the EclA guidelines (Section 4.1).
- The magnitude of effect of the site works on ecological values is evaluated (Section 4.3). The 'Magnitude of Effect' is based on:
 - The scale of the unmitigated effect per se (i.e. the proposed works and changes to the ecological landscape, impacts on fauna and habitat values);
 - The proportion of habitat loss versus local availability;
 - The expected duration of effect (e.g. permanent versus temporary); and
 - The intensity of the effect (i.e. the extent to which habitat loss within the site is complete or partial).
- The overall level of effect in the absence of mitigation is determined using a matrix that is based on the ecological values and the magnitude of effects on these values in the absence of any efforts to avoid, minimise and remedy for potential effects (Section 4.4).



3. Results

3.1. Landscape context

The site is located within the Taupō Ecological District (ED). The district comprises a rolling landscape centred around Lake Taupō of volcanic origin. The climate features warm summers and cool winters, with heavy rainfalls (1200-2400mm p.a.). Original forest cover included red, silver, black and mountain beech, which have been greatly reduced through logging. North and immediately west of the lake comprised formerly scrub and grassland with rare pockets of relic forest (including notably black beech). Land use change has led to former scrublands being largely converted to exotic forests and sheep and cattle farms; much of the logged forest was also converted, mainly to exotic forests.

The site is located in an area that is identified as 'Chronically Threatened', 10-20% indigenous cover left under the LENZ threatened environment classification (TEC) system (Cieraad et al. 2015).

3.2. Vegetation

The project site comprises of exotic grazed pasture. A small patch of exotic trees (likely poplar species) is present just outside the site boundaries, in the centre of the site.

The adjoining scenic reserves offer higher botanical values, consisting of regenerating indigenous species such as mahoe, kanuka and five-finger, with weed intrusion such as broom, gorse and blackberry especially on the reserve edges.

3.3. Bats

Long-tailed bats (*Chalinolobus tuberculata*) have been recorded previously within the wider landscape of the site, with the closest records 15 km to the north and the east of the site, both recorded in 2015 areas (DOC 2024).

Current knowledge indicates that long-tailed bats frequent forest edges, feeding above the forest canopy, along forest margins, over farmland, and streams and lakes (Borkin & Parsons 2010). While long-tailed bats often use the largest and oldest trees in the forest for roosting, solitary roosts have also been found in less mature vegetation that provide suitable refuge. Bats have been found roosting in a variety of habitat types including willows and pine plantation (Sedgeley & O'Donnell 2004, Borkin & Parsons 2010).

While short-tailed bats (*Mystacina tuberculata rhyacobia*; At Risk – Declining) are generally found in large areas of indigenous forest, they can use marginal land including forest edges onto farmland for commuting and foraging (Bennett 2019).

Monitoring effort

The bat survey was conducted over a period of 21 nights, using a redundancy approach to monitor 18 sites, with two automatic bioacoustics monitors (ABMs) deployed at each site to ensure data collection in case of equipment failure. Data from malfunctioning monitors or those with fewer functional nights were excluded from the analysis, with only the monitor that recorded the most functional nights at each site being used.



Bat activity

During the 21 nights of monitoring, only four sites—specifically sites 7, 13, 14, and 16—recorded a single long-tailed bat pass, representing the only confirmed bat activity during the survey period. However, several possible short-tailed bat (central lesser short-tailed bat) calls were also recorded at sites 7, 18, 20, 4, and 21. While it is not possible to determine that these detections are definitively from short-tailed bats, given their tendency to avoid forest edges, the possibility cannot be ruled out and should not be overlooked. This suggests that bat presence in the surveyed areas remains limited. To determine with certainty whether short-tailed bats are using the area, further monitoring would be needed. However, they have conservatively been assumed to be present in this assessment and the recommendations made.

Weather conditions

The weather data collected during the survey indicated that 13 nights met the criteria for suitable monitoring conditions, defined as temperatures above 8°C, wind speeds below 20 km/h, and rainfall under 10 mm/h (Appendix 4).

Monitoring data

Monitoring results are summarised in Table 1. The automatic bioacoustics monitors (ABMs) deployed across various sites during the survey successfully recorded data for varying durations. Monitors at site 01, site 03, site 04, site 05, site 06, site 09, site 10, site 11, site 12, site 13, site 15, site 17, and site 18 recorded for the full 22 nights of the survey. Meanwhile, monitors at site 02, site 07, and site 16 were functional for 21 nights, and the monitor at site 09 recorded for 20 nights. The monitor at site 14 was operational for 9 nights. While all monitors had recently been maintained by DOC, small equipment failures are common, which accounted for the reduced operational periods at some sites.





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Legend

- Site boundaries
- No Bats
- Long-tailed bats
- Possible STBs
- Both

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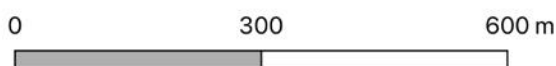


Figure 3 Bat monitoring locations and results of the September 2024 survey.



Table 1 ABM and Site IDs with Recorded Bat Activity

Site ID	ABM	Bats
1	BW09	None
2	BW12	None
3	BW15	None
4	BW18	Possible STB
5	BW24	None
6	BW25	None
7	BW39	LTB, Possible STB
8	DB8	None
9	DB3	None
10	DB17	None
11	DB30	None
12	DB9	None
13	PE1	LTB
14	PE2	None
15	PE4	None
16	PE8	LTB
17	PE9	None
18	DB2	Possible STB
20	TBD	Possible STB
21	TBD	Possible STB

Habitat assessment

The majority of the site comprised open paddocks with minimal tree coverage remaining. However, the site is bordered by several reserves, each containing extensive tree cover with excellent potential for bat roosting. Long-tailed bats (LTB) are known to forage and commute along tree lines, making these boundary areas particularly significant. A single stand of trees is located at the northern boundary of the site (just outside the boundary for this application), surrounded by paddocks. Bat activity was recorded here, highlighting its value as a commuting and foraging corridor.

Additionally, one of the manmade ponds on-site has also recorded bat activity, emphasising the importance of these ponds as potential foraging and drinking habitats. Currently, there is little to no artificial lighting within the site, which further enhances its suitability as high-value foraging habitat for bats, as the absence of light pollution is known to benefit nocturnal species such as long-tailed bats. Despite the limited tree presence within the site itself, these features contribute to the site's ecological value for bats.

The area appears to be less suitable for short-tailed bats, with unlikely presence of roosting habitat across the site, though potential roost trees are present within the adjoining DOC reserves. If presence was confirmed in further surveys, it appears most likely that short-tailed bats use the project area to move between areas, or feed opportunistically along forest edges.



3.4. Avifauna

Bird habitat is very limited at the site, which consists of grazed pasture. Records of indigenous bird species within a 5 km radius of the site for which suitable habitat is present at the site are included in Table 2 below. These include species that utilise open pasture and those that could be present within the reserves adjoining the site.

Of these species, most notably NZ pipit could be utilising the open pasture habitat, but were not observed during the site assessments.

No indigenous bird species were encountered during the site visits. No ‘Threatened’ bird species are likely to be present at the site.

Table 2 Bird species recorded within a 5km radius that could be present at the site

Common name	Scientific name	Threat classification (Robertson et al. 2021)	Usual habitat
New Zealand pipit	<i>Anthus novaeseelandiae novaeseelandiae</i>	At Risk - Declining	Open pasture
Grey warbler	<i>Gerygone igata</i>	Not Threatened	Forest
Spur-winged plover	<i>Vanellus miles</i>	Not Threatened	Open pasture
Paradise shelduck	<i>Tadorna veriegata</i>	Not Threatened	Open pasture
Kereru	<i>Hemiphaga novaeseelandiae novaeseelandiae</i>	Not Threatened	Forest

3.5. Lizards

No records of indigenous herpetofauna were found within a 5 km radius of the site. Two records of Southern bell frog (*Ranoidea ranfiromis*) (Introduced and Naturalised – Burns et al. 2018) were found.

The habitat present on site does not offer any suitable habitat for indigenous frog species. Habitat for indigenous lizards is limited to small amounts of debris, stacks of rocks and logs present across the site for ground skink (Appendix 1).

The site is currently grazed and some parts have recently been subject to earthworks, limiting the quality and availability of suitable lizard habitat and refugia.

Spot searches of microhabitats were conducted for ground skink and no evidence of lizards being present was found. It is possible that ground skink species such as Copper skink (*Oligosoma aeneum*, At Risk – Declining, Hitchmough et al. 2021) are present in very low densities.

Suitable, higher quality habitat for skinks does exist within the adjoining reserves, where arboreal geckos could also be present.



3.6. Aquatic habitats

No aquatic habitat including wetlands were found to be present at the site. While aquatic assessments were beyond the scope of this report, an assessment of the stream system in the neighbouring reserve has been conducted previously (Ecological Solutions 2018).

3.7. Pest animals

No mammalian pest sign (e.g., scat or tracks) was observed within most of the site during the assessments. However, the paddocks closest to the adjoining DOC reserve showed significant evidence of recent feral pig activity, such as ground disturbance from foraging. Evidence of substantial pig presence was also noted from the DOC reserve areas.

It is also likely that common rural species such as possums, rats, mice, mustelids, hedgehogs, and feral cats are present in the area.

4. Assessment of Ecological Effects

4.1. Ecological values

The site consists of currently grazed pasture, surrounded by both agricultural land use and two scenic reserves that are assessed to be of high ecological value. While botanical values at the site overall are low (consisting only of exotic pasture grasses and no wetland vegetation), the area does provide potential habitat for indigenous fauna species, bats and lizards in particular. Ecological values present at the development site have therefore been assessed overall as **moderate**.

Discussion of the terrestrial ecological values of the site against the EIANZ assessment criteria is provided in Sections 6.1.1 to 6.1.4 below.

Representativeness

The extent to which the area is typical or characteristic. Size.

The vegetation onsite is considered to have a **negligible** value with regard to ecological representativeness. No indigenous vegetation is present within the development footprint.

Rarity/distinctiveness

Amount of habitat or vegetation remaining. Supporting nationally or locally threatened, at risk or uncommon species. Regional or national distribution limits. Endemism. Distinctive ecological features. Natural rarity.

No indigenous vegetation is remaining at the site, but forest edges and open pasture support potential habitat for Threatened and At Risk fauna species, including long-tailed bats (confirmed), short-tailed bats (potentially confirmed), NZ pipit (recorded within 5 km of the site), and copper skink (potentially present in very low densities). Overall, and in the context of the surrounding mature forested areas, the site is considered to be of **moderate** value with regard to rarity and distinctiveness.



Diversity and pattern

Level of natural diversity. Biodiversity reflecting underlying diversity.

The site is considered to be of **moderate** value with regard to diversity and pattern, estimated conservatively due to the presence of several indigenous fauna species, also reflecting the absence of indigenous vegetation and therefore negligible flora values and diversity.

Ecological context

Contribution to network, buffer, linkage, pathways. Role in ecosystem functioning. Important fauna habitat.

The site is considered to be of **low** value with regard to ecological context, as by itself it offers only limited habitat due to its highly modified nature and absence of indigenous vegetation. Most value is likely derived from the presence of the adjoining reserves, which the site fragments rather than offering linkages or buffers.

Overall ecological value

The overall ecological value of the site, based on fauna habitat provision, is assessed to be **moderate**.

4.2. Ecological effects

The works proposed to establish the subdivision include the construction of 87 lots and building platforms across the site, with a minimum Lot size of 800m², and an average lot size of 1275m². Buildings within 50m of a reserve will have maximum height of 4.5m, and all buildings in Stage 12 will have maximum height of 4.5m. Buildings will be setback 7.5m from the reserve boundaries. The construction of an associated roading network and stormwater infrastructure is also proposed (Appendix 3).

Matters of ecological effects raised during previous feedback from submitters included potential impacts on bats, effects of pets (cats) on indigenous fauna, increased disturbance of indigenous fauna through noise and lighting of construction and presence of the subdivision, and impacts of weeds on neighbouring reserves.

In general terms, habitat loss associated with the proposed housing development and associated infrastructure has the potential to create a range of adverse effects on biodiversity values, during enabling works construction (resulting from direct physical disturbance), seasonal construction, and on an ongoing basis the permanent modification of present fauna habitat values, including loss of current dark spaces. These potential adverse effects on biodiversity values during and after construction may include:

- Direct mortality or injury to species during vegetation clearance and earthworks activities. Outside of bird breeding season, bird mortality would be low, however, during breeding season vegetation removal has the potential to result in the destruction of nests, eggs and fledglings (including for open grassland species);
- Disturbance to present indigenous fauna species during earthworks;
- Habitat loss for fauna utilising open pasture through development of currently grassed areas;
- Changes in sediment discharges and stormwater runoff to receiving environments; and



- Lighting and noise associated with changing existing land use from pastoral to residential.

Magnitude of effect

The following magnitude of effects is expected on the site associated with the proposal. The assessment has considered the temporal scale of the effect, the landscape context and effect on the range or population, as well as efforts to avoid and minimise effects as described in the sections below.

Potential effects and their magnitude are discussed in the sections below.

Direct disturbance

Earthworks are proposed across the development site to enable the construction of building platforms, roading and stormwater infrastructure.

These works have the potential to disturb any fauna species that may be present, including long-tailed bats that may be roosting in mature trees if any require removal (limited to a small area of exotic trees just outside the boundary) and birds that may be nesting in open pasture.

To minimise these effects, suitable fauna management protocols including bat roost protocols (only if required) and avoidance of peak breeding season for birds (where possible) or alternatively the adoption of avifauna protocols (pre-clearance checks for nesting birds) should be implemented.

These protocols are designed to avoid as much as possible the direct impact on any fauna species during works.

The magnitude of effect is expected to be Low.

Habitat loss

Currently grassed areas (paddocks) will be lost to residential development but are unlikely to provide substantial habitat values for indigenous species due to their heavily grazed and impacted characteristics, described above.

Some loss of bat commuting and foraging habitat is expected as part of the proposal. The stand of trees at the northern boundary of the site is expected to remain. Given the large amount of more favourable habitat for this species in the wider landscape, and the large home ranges of bats, it is expected that bats will have the ability to adapt their commuting and foraging behaviours around the rural-residential subdivision, which is unlikely to form a key or core area of their current habitat and home range. The magnitude of effect is expected to be **Low**.

Bird habitat loss is likely to be minimal, and limited to those potentially utilising open pasture areas. Given the lack of mature vegetation and the site context and habitat availability in the landscape, the magnitude of effects on native birds and their habitats is considered **Low**.

Proposed restoration planting and weed control across the proposed subdivision reserves offer the potential to improve habitat values in these areas.

Sediment and stormwater runoff

Increased amounts of sediment could discharge into any downstream receiving environments during the construction period. Adequate sediment and erosion control measures will need to be



implemented during the construction phase and earthworks will need to be undertaken during the earthworks season to minimise sediment effects.

Increased stormwater runoff due to the increase in impervious surfaces present at the site is expected without appropriate controls. To manage this, it is understood that best practice offline stormwater treatment will be implanted prior to any stormwater entering the restored watercourses on site to minimise these effects.

Stormwater and erosion controls are guided by an existing earthworks consent, including monitoring of controls, and will be implemented at the site to manage runoff for up to 'one-in-ten-year' storm events.

Lighting and noise

Lighting and noise associated with the proposed subdivision have the potential to disturb fauna in the vicinity of the impact area, in particular the adjoining reserves. This is particularly the case given the currently available dark spaces at the site, and the potential for cumulative effects as other adjacent areas have recently been developed, and are proposed to be developed.

Artificial light at night (ALAN) has been found to negatively impact various bat species, including the relatively slow-flying short-tailed bats (*Mystacina tuberculata*, STB). Although there are only a few unpublished records specifically related to short-tailed bats and artificial lighting (DOC, personal communication, September 2024), research on other bat species supports the concern that artificial lighting can disrupt their foraging, commuting, and roosting behaviour (Bats and Lighting, n.d.; Rowse et al., 2016).

For slow-flying species like STB, artificial lighting increases the risk of predation and can deter them from entering lit areas. This fragmentation of their natural habitat can lead to reduced foraging opportunities and compromised commuting routes (Bat Conservation Trust, 2023; Stone et al., 2015).

Given these concerns, it is recommended to minimise or eliminate artificial lighting in areas where short-tailed bats are likely to be present. Low-intensity, warm-coloured lights (2700K) are preferable, and any necessary lighting should be shielded and directed away from bat habitats. Limiting light exposure during peak bat activity hours, such as by using timers, can further help mitigate the negative effects of ALAN on STBs and other bat species. Ideally, any artificial lighting in critical habitats (like roosting, foraging, or commuting areas) should be kept below 1 lux, which is considered low enough not to significantly disrupt nocturnal wildlife (Rowse et al., 2016).

The disturbance of fauna should be minimised through wildlife-sensitive lighting design, and through establishing buffer plantings along all lot sites adjacent to the reserve areas to minimise effects of noise and lighting on this key habitat area.

Currently, a setback of 7.5 m is proposed from reserves, and conditions will contain a consent notice that no external lighting will be permitted in this buffer to minimise the intrusion of light and noise into the reserve areas.

Beyond the 7.5 m buffer area, where outdoor lighting is required in lots adjoining reserves, it is recommended that the following considerations are encouraged¹, where feasible:

¹ Note that New Zealand does not have any official bat-friendly lighting guidelines at the moment, and the below is informed by the UK guidelines, research in Australia and discussions between NZ bat experts.



- Use of shielding to avoid upward light spill (including on any street lighting adjacent to reserves);
- Temperature of no more than 2700K;
- Use of non-reflective, dark surfaces where possible; and
- Use of adaptive controls such as motion sensors for any outdoor lighting.

Overall level of effect

The ecological value for the site is **Moderate** and the magnitude of the effect, assuming all recommendations to avoid and minimise suggested above, associated with the proposed subdivision development is **Low**. Based on the matrix presented in Table 3, the overall level of effect is therefore **Low**.

Table 3 Criteria for describing level of effects, based on the EIANZ 2018 guidelines (Table 10)

Ecological value >	Very high	High	Moderate	Low	Negligible
<i>Magnitude</i>					
Very high	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very low
Moderate	High	High	Moderate	Low	Very low
Low	Moderate	Low	Low	Very low	Very low
Negligible	Low	Very low	Very low	Very low	Very low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain

5. Recommendations

The proposed subdivision is situated on highly modified and currently grazed farmland. The development site has conservatively been assessed to be of moderate ecological value at present, with low value biodiversity attributes and no indigenous vegetation values.

However, the site, even though it is intensively grazed pastureland, may provide habitat for the nationally 'Threatened' long-tailed bat, At Risk short-tailed bat, and NZ pipit.

As discussed in Section 4, the overall effect of the proposed works is expected to be **Low**, if all recommendations to avoid and minimise effects are implemented. In summary, these include the following measures:

- Fauna management protocols where required to avoid direct effects;
- Sediment control and stormwater management (including treatment of stormwater prior to entering the watercourses);
- Buffering of lighting and noise effects on the adjacent reserve areas from development through setbacks; and
- The consideration of wildlife-sensitive features for outdoor lighting to minimise lighting effects.



A restoration planting plan for the subdivision reserve areas is recommended to guide restoration and habitat replacement with suitable plant species for the site context. This restoration plan should outline the following aspects:

- Establishment of corridors to link habitats across the site, as much as feasible;
- Species mix and planting spacings for each restoration area;
- Planting methods;
- Maintenance and monitoring requirements to ensure full vegetation cover;
- Weed control; and
- Pest animal control.

Planting and pest control are expected to improve ecological flora values at the site if implemented and maintained.



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Appendix 1: Site photos



Site overview – pasture and small area of exotic vegetation (outside project boundary)



Otaketake Stream Scenic Reserve on the Western border of the site, picture taken in between site 13 and 14 which both had one recorded bat pass.



Site 16 (circled) is a manmade pond, and Site 7 (circled) is a stand of trees (outside project footprint), both important for long-tailed bat (LTB) foraging and commuting. Pond will be removed and replaced by constructed stormwater control pond inside reserve area.



Site 13 with one recorded bat pass



The Otaketake Stream Scenic Reserve in between site 13 and site 14, both with one recorded bat pass



Manmade pond (site 16) with in the background a stand of trees (site 7), both with one recorded bat pass.



Stand of trees at the Northern boundary of the site (just beyond project footprint), with one recorded bat pass.



Stand of trees at the Northern boundary of the site (just beyond project footprint), with one recorded bat pass.

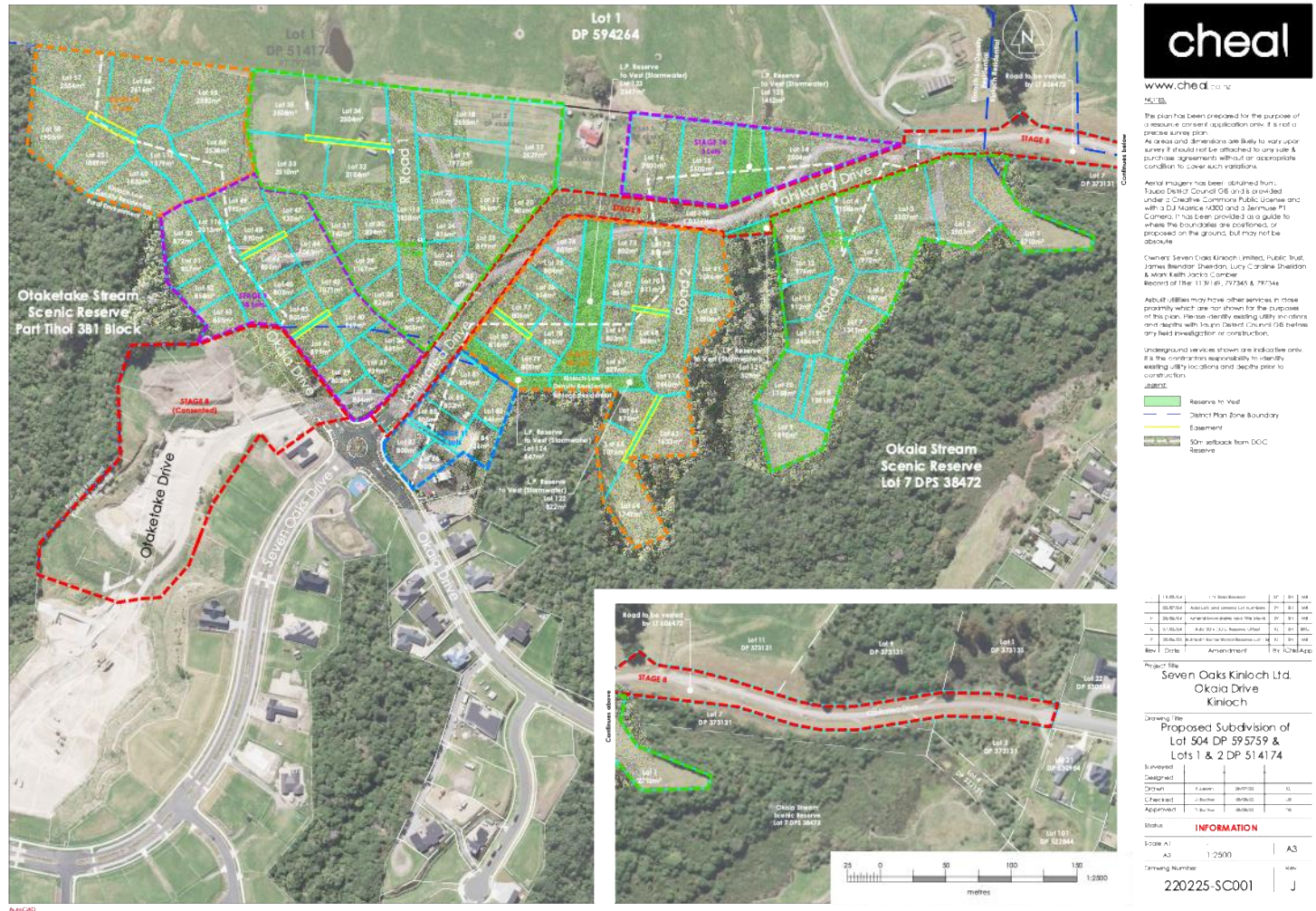


Examples of potential ground skink habitat on site.

Appendix 2: Waikato Regional Policy Statement: 11A Criteria for determining significance of indigenous biodiversity

Previously assessed site	
1	It is indigenous vegetation or habitat for indigenous fauna that is currently, or is recommended to be, set aside by statute or covenant or by the Nature Heritage Fund, or Ngā Whenua Rāhui committees, or the Queen Elizabeth the Second National Trust Board of Directors, specifically for the protection of biodiversity, and meets at least one of criteria 3-11.
Ecological values	
2	In the Coastal Marine Area, it is indigenous vegetation or habitat for indigenous fauna that has reduced in extent or degraded due to historic or present anthropogenic activity to a level where the ecological sustainability of the ecosystem is threatened.
3	It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: <ul style="list-style-type: none"> • classed as threatened or at risk, or • endemic to the Waikato Region, or • at the limit of their natural range.
4	It is indigenous vegetation, habitat or ecosystem type that is under-represented (20% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally.
5	It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, chenier plain, or karst ecosystems, hydrothermal vents or cold seeps.
6	It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with: <ul style="list-style-type: none"> • waste treatment; • wastewater renovation; • hydro electric power lakes (excluding Lake Taupō); • water storage for irrigation; or • water supply storage; <p>unless in those instances they meet the criteria in Whaley et al. (1995).</p>
7	It is an area of indigenous vegetation or naturally occurring habitat that is large relative to other examples in the Waikato region of similar habitat types, and which contains all or almost all indigenous species typical of that habitat type. Note this criterion is not intended to select the largest example only in the Waikato region of any habitat type.
8	It is aquatic habitat (excluding artificial water bodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part of a consented activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self-sustainability of an indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context "critical" means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and migratory and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats.
9	It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because: <ul style="list-style-type: none"> • its structure, composition, and ecological processes are largely intact; and • if protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock, discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time.
10	It is an area of indigenous vegetation or habitat that forms part of an ecological sequence, that is either not common in the Waikato region or an ecological district, or is an exceptional, representative example of its type.
Role in protecting ecologically significant area	
11	It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects.

Appendix 3: Site plans



Appendix 4: Weather data

Weather Conditions from 2nd to 22nd September 2024: Rainfall and Wind Data from NIWA Weather Station 37016, and Average Temperature Derived from 5 random ABMs.

Date	Rainfall (mm/h) between dusk and dawn	Wind Speed (km/h) between dusk and dawn	Minimal Temperature (°C) 4 hours after sunset
02/09/2024	0	2.9	6.7
03/09/2024	1.8	8.3	8.8
04/09/2024	0.3	5	2
05/09/2024	0	2.9	3.5
06/09/2024	0	7.6	10.3
07/09/2024	0.2	12.6	13
08/09/2024	7	15.1	6.7
09/09/2024	0	7.9	9.3
10/09/2024	0	9	10.3
11/09/2024	0.4	7.9	1.3
12/09/2024	0	5.8	3.7
13/09/2024	0	6.1	8.9
14/09/2024	4.8	7.6	12
15/09/2024	0.2	5.4	7
16/09/2024	4.4	7.6	6.3
17/09/2024	0	6.8	4.4
18/09/2024	0	5.4	5.4
19/09/2024	0.8	7.6	7.8
20/09/2024	2	8.3	10.2
21/09/2024	0.2	6.5	4.1
22/09/2024	3.6	7.2	9



