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Environmental Consultants



September 2026

Te Kowhai East – Industrial Development Bat Management Plan (BMP)

Prepared for:
Te Kowhai East Limited Partnership



water



fauna



flora



land

Quality Assurance

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1.0 Introduction

1.1 Background

This Bat Management Plan (BMP) sets out the framework for managing the adverse effects of the Te Kowhai East Industrial Development on long-tailed bat at 30 Mathers Road (the 'Site'), northwest of Hamilton City (Figure 1). 'The Project' involves vegetation clearance and bulk earthworks across c. 185 ha site. While the site is predominantly pastoral with limited bat habitat values, a precautionary approach requires that pre-clearance surveys of potential bat roost trees be implemented to address the potential for long-tailed bats to be present at the time of clearance. In addition, bat sensitive lighting design guidance is outlined to future proof the development against potential increased bat activity along the enhanced Managheke Stream and stormwater corridor.

Long tailed bats (*Chalinolobus tuberculatus*) are known to occur within 25 km of the site and there are trees on site that could provide roosting habitat for bats. Long-tailed bats are 'Threatened - Nationally Critical' (O'Donnell et al., 2022) and are absolutely protected under the Wildlife Act (1953).

1.2 Purpose and Objectives of Management

The purpose of bat management is to avoid injury to, or mortality of, long-tailed bats during construction and minimise disturbance of long-tailed bats during operation.

This will be achieved through the following objectives:

- Identification of potential bat roost trees.
- Restrict clearance of potential bat roost trees to the period of greatest bat activity (October to April inclusive).
- Avoid injury or death of bats during clearance of 'high risk' potential bat roost trees through implementation of the Department of Conservation's Bat Roost Protocols (DOC 2024) prior to the felling (October to April inclusive).
- Mitigate adverse effects of artificial light on bats through the incorporation of bat sensitive lighting design.

1.3 Related Management Plans

This BMP should be read alongside the following related plans (Table 1):

Table 1: Related Management Plans

Plan code	Plan name	Interface with this MSEP
TKE-EcIA-001	Ecological Impact Assessment	Source for baseline habitat assessment, effects characterisation and application of effects management hierarchy.
TKE-EMP-001	Earthworks Management Plan	Bulk earthworks programme that determines drain works timing within each stage.
TKE-BMHCP-001	Black Mudfish Habitat Creation Plan	BMHCP forms part of the wider restoration framework providing foraging habitat for bats.
TKE-CMP-001	Construction Management Plan	Overall construction management, incident reporting, and pre-commencement notification per TKE-CMP-001 Section A8.1 content.
TKE-MSEP-001	Mangaheka Stream Enhancement Plan	MSEP forms part of the wider restoration framework providing foraging habitat for bats.

1.4 Responsibilities and Key Contacts

This BMP has been prepared by Ecological Solutions Limited.

Coordination of specific roles, functions and responsibilities will be undertaken by Te Kowhai Limited partnership, who will establish systems and standards that ensure the timely and efficient implementation of management actions and resolve any trade-offs that arise.

Appropriately qualified ecologists will hold responsibility for overseeing implementation of ecological aspects of the BMP and working with contractors to ensure delivery as set out in the plan. A Department of Conservation (DOC) certified bat ecologist will carry out roost checks and implement the bat roost protocols as outlined in Section 3.2.1.

2.0 Site Description

Historic and existing land use on site is mainly agricultural, characterised by pasture grass and active grazing management. However, there are several large trees on site that have potential bat roost features: cracks, crevices, and peeling bark. An example of these features on site are shown in Figure 2, and indicative locations of potential bat roost trees on site are shown in Figure 3. A bat survey performed by Ecological Solutions (2026) from 17 December 2025 to 14 January 2026 using a total of 21 automatic bat monitors (ABMs) found no confirmed bat activity.



Figure 1: Location of the Site.



Figure 2: Examples of potential roost features on site.



Figure 3: Indicative locations of potential bat roost trees.

3.0 Managing Effects on Bats

3.1 Project Bat Ecologist

Implementation of the bat management plan is to be supervised by a DOC certified competent bat specialist. The project bat ecologist (PBE) will be experienced at implementing bat management protocols and a recognised Level 3.1, 3.2, and 3.3 competent bat ecologist (DOC 2024).

3.2 Potential Bat Roost Tree Surveys

A survey for potential bat roost trees on site was performed as part of the ecological impact assessment (Ecological Solutions 2026). Given the expected time delay between when this assessment was performed and the commencement of vegetation clearance activities, a follow up survey will be undertaken prior to vegetation clearance to identify any trees within the Project Area that may have developed roost features in the intervening time.

Potential bat roost trees are defined as:

Trees >15 cm diameter at breast height (DBH) with potential bat roost features.

Potential bat roost features in trees include:

- Broken branches or trunks.
- Cavities.
- Cracks.
- Epiphytes.
- Flaking, peeling or loose bark.
- Hollows.
- Knot holes.
- Shelter features (cavities/hollows) formed as a result of double leader growth.

Any trees of 15 cm DBH or greater that have not already been identified as having potential bat roost features will be surveyed by the PBE or an ecologist with competency 3.3 (DOC 2024). All trees identified as potential bat roost trees will be marked in the field, georeferenced and recorded in terms of species, diameter at breast height and type of potential bat roost feature. Details of the potential bat roost trees to be managed will be detailed in a completion/compliance report as outlined in Section 4.0.

All trees identified as having potential bat roost features and needing to be felled will be subject to implementation of the bat roost protocols for vegetation clearance. The following Bat Roost Protocols (BRPs) detail measures required to mitigate direct or indirect injury and or mortality risks to bats during clearance of potential bat roost trees. These measures are aligned with DOC's Protocols (DOC 2024) for minimising the risk of felling occupied bat roosts. Where they may differ in interpretation, the DOC BRP guidance document will prevail.

3.2.1 Bat Roost Protocols

The following steps are illustrated in DOC's decision-making flow chart for tree removal in bat areas (DOC 2024) (Figure 4) and are to be undertaken within all areas identified on-site as

having potential bat roost trees.

3.2.1.1 Pre-felling Bat Occupancy Checks (1 October – 30 April)

After potential bat roosts trees have been identified and demarcated, occupancy by bats will be confirmed immediately prior to felling. No tree shall be felled where there is any evidence of occupancy. Occupancy will be determined through one or more of the following methodologies to the satisfaction of the PBE or an ecologist holding relevant level 3 certification and experience implementing BRPs.

If during implementation of the below methods bats are sighted, or sign detected, or a roost (active/inactive) is confirmed, the PBE, as soon as possible, shall:

- Notify the tree felling supervisor to inform them which affected tree(s) cannot be felled due to detection of bat sign.
- Provide in writing (e.g., by email) to the construction manager, Hamilton City Council's bat ecologist, and DOC (Waikato Region), details of the results of the survey and an outline of measures for the protection or relocation of the roost tree. The tree cannot be felled until the roost has been confirmed to be vacated by one or more of the methodologies outlined below, and to the satisfaction of the PBE.
- Record (including photos) any vegetation containing bat roosts, detailing the date; size, location and species of tree or other vegetation; roost type, e.g., cavity, peeling bark, broken branch; detail outlining how presence of bats was confirmed; and the number of bats present.

Automatic Bat Monitor (ABM) Surveys

This section discusses the use of ABMs to confirm roost occupancy. It is noted that if bat activity is expected to occur consistently in the area, and 2 nights with zero bat passes is unlikely to be obtained, visual inspection or roost watching methods shall be used.

- ABM surveys shall use DOC AR-4/AR-5 model detectors or a professional grade full spectrum static device.
- Monitoring during a full moon should be avoided. Monitoring is to be carried out from one hour prior to dusk to one hour after dawn.
- The ABM(s) should be placed so that detection of bats is likely if they are using the potential roost/s.
- As it is possible for bats to enter or leave a roost without echolocating, or to not leave the roost for a night, monitoring will be undertaken for at least two valid survey nights immediately prior to clearance.
- ABM data is to be analysed by the PBE on the morning of proposed felling to indicate the potential for bat roosting.
- If no bats are detected, the vegetation must be removed on the day immediately following the last valid survey night following the vegetation removal protocols below, OR
- If bats are detected, re-consider again whether the tree must be felled. Where the tree requires felling, evidence that bats have vacated the roost shall be confirmed by:
 - ABM survey must continue until no bat activity is recorded for two consecutive nights; or
 - Visual inspections methodologies shall be carried out; or
 - Roost watch methodologies shall be carried out.

Visual Inspections

Each tree with identified bat roost features may be inspected to confirm the presence of a roost. This may be subsequent or prior to ABM monitoring. Potential roost features must be visually inspected for occupancy in a manner that minimises roost disturbance. This may include inspection from the ground, by climbing or by using a scissor lift. All climbing must take place under the careful supervision of the PBE to prevent roost damage and injury to roosting bats.

1. To undertake an inspection while climbing, an arborist or trained climber will relay any potential evidence of bats (e.g. staining, cavities, guano) by way of live audio-visual equipment and/or photographs for review by a PBE prior to removal. A borescope may be required to inspect deeper cracks and hollows. The PBE will provide a toolbox workshop to all climbers on the limitations and risks of using borescopes and their potential to injure or disturb bats if not used correctly.
2. The climber(s) will be required to check all potential bat roost features:
 - **Can bats be seen** - An endoscopic camera should be available for this step and every possible corner of each potential roosting feature inspected, i.e., cavity/crack etc. Cracks, holes, and splits may lead to cavities or may be superficial. A cavity may be wet indicating no/low potential as a bat roost.
 - **Can bats be heard** - Search of tree features should be accompanied by use of a hand-held bat detector. If bats are present and not in torpor, then detection of presence listening at 25 kHz (for social calls) and 40 kHz (for echolocation calls) may help to determine if long-tailed bats are present. It is recommended that a hand-held detector which can save recordings is used to allow for the PBE to carefully inspect any potential calls heard by climbing arborists.
 - **Are there signs of bats** - Is guano present or urine staining?
3. If potential roost locations are within tree ferns or other 'delicate' vegetation, climbing will only be undertaken if it is safe to do so for the climber and if this will not damage the roost and potentially roosting bats during the time of inspection.
4. If roosting features are too large, complex, or delicate to be sufficiently searched, then roost watches will be required.
5. If no bats are detected, the vegetation can be removed on the day of the inspection following vegetation removal protocols below. OR
6. If the tree is confirmed as a roost, then the tree must not be cut down until bats vacate the roost. At this point re-consider again whether the tree must be felled. Where the tree requires felling, evidence that bats have vacated the roost shall be confirmed by methods which minimise roost disturbance and a final climbing re-inspection:
 - ABM survey or roost watching methodologies must be followed to determine bats have vacated the roost; and
 - Where evidence indicates the roost is vacated, a final climbing re-inspection shall be undertaken immediately prior to felling.

Roost Watches

If absence cannot be confirmed using ABMs or visual inspections of the roost, observations of bat roosting activity will provide an alternative roost confirmation methodology. This more labour-intensive method involves watching trees to identify bats emerging from or returning to roosts. It should be used in combination with activity patterns as assessed by previous ABM monitoring at the Site. Where watches are being done as the sole survey method, a minimum of two valid survey nights and two valid survey mornings are required at each potential roost

tree. Roost watches will occur immediately prior to clearance of potential bat roosts.

Note that roost watches must be performed by or under the supervision of an ecologist with Competency 3.2 (DOC 2024).

In this instance, the following methodology should be implemented:

Roost emergence watches

1. Each subject tree must be watched initially from no less than 30 minutes prior to sunset until it becomes too dark to see (~1 hour after sunset) by sufficient people to observe all potential exit points. Surveyors will need to employ night vision aids such as infrared/thermal cameras to all watches to extend up to 1.5 hours after sunset.
2. Ambient temperature should be $>10^{\circ}\text{C}$ and there should be no precipitation (otherwise bats may not emerge).
3. Mean wind speed during watches should not be greater than 18 km/h.
4. Observations shall be carried out close to the subject roost sites where flying bats are backlit against the sky. It may be useful to have more than one person observing potential roost sites from different angles to determine precise trees or vegetation and exit holes.
5. Hand-held bat detectors will be used to alert the ecologist(s) to the presence of bats nearby, narrowing down the potential roost site locations and allowing roosts to be confirmed.
6. An ABM will be installed for the period of the watch to ensure no bats have been missed.

Roost re-entry watches

Roost re-entry watch timing should be based on patterns of activity recorded on-site with ABMs. Where this information is not available and at minimum, watches shall begin two hours prior to official sunrise until one hour after sunrise time. The PBE shall trigger longer watches should prior ABM activity indicate potential early roost re-entry.

1. Subsequent to emergence watches described above, observers must return the next morning and watch the tree to determine whether bats return to the subject vegetation.
2. At minimum, watches shall begin two hours prior to official sunrise until one hour after sunrise time.
3. If there are strong periods of wind or rain (more than 2.5 mm of rain, wind speeds greater than 18 km/h or wind gusts greater 60 km/h) throughout the night (after emergence watch but before re-entry watch) this may impact the timings of re-entry. If this occurs, then re-entry watches may need to be undertaken again during more favourable conditions.
4. Observations shall be carried out close to potential roost sites where flying bats are backlit against the sky. It may be useful to have more than one person observing potential roost sites from different angles to determine precise trees or vegetation and exit holes.
5. Hand-held bat detectors will be used to alert the ecologist(s) to the presence of bats nearby, narrowing down the potential roost site locations and allowing roosts to be confirmed; and
6. Infra-red and /or thermal cameras will be used as twilight will restrict observers to only see bats up to one hour prior to sunrise.
7. If no bats are detected during emergence and re-entry watches, the vegetation can be

removed on the day of the last re-entry watch following the vegetation removal protocols below, OR

8. If the tree is confirmed as a roost, then the tree must not be cut down until bats vacate the roost. At this point re-consider again whether the tree must be felled. Where the tree requires felling, evidence that bats have vacated the roost shall be confirmed by methods which minimize roost disturbance and a final climbing re-inspection:
9. If the tree is confirmed as a roost, then the tree must not be cut down until bats vacate the roost. At this point re-consider again whether the tree must be felled. Where clearance is required, confirmation of bat absence is required over two consecutive nights. The PBE shall consider whether it is appropriate to continue watches or cease and recommence watches one week later over an additional two nights to increase the likelihood bats have shifted roosts. It is unlikely that ABMs or visual inspections are appropriate where roost watches are used, but if so, these shall be considered by the PBE.

3.2.1.2 Vegetation Removal

The following methodologies shall be undertaken following the implementation of potential bat roost tree identification and pre-felling occupancy checks. Vegetation clearance will only occur if trees have been assessed as having no potential for bat roosting or there is sufficient evidence that bats are not occupying potential roost trees. This determination must be made by the PBE or a DOC approved ecologist with relevant Competency.

Trees with No Bat Roosting Potential

Any tree that is identified as having no potential for bat roosting (i.e., ≤ 14 cm DBH or ≥ 15 cm DBH with no roosting features) can be removed at any time of year. The removal of these trees needs to be undertaken in a manner that does not disturb any potential roost trees which may be in its vicinity. A minimum radius of 25 m should be established around potential bat roosts during clearance of trees with no roosting potential to avoid disturbance to these trees if bats are roosting. Removal of these trees must occur within two years of the original roost identification survey, if this does not occur these trees may need to be assessed again in case roost features have developed over time.

Potential Bat Roost Trees

1. Trees will only be felled from 1 October to 30 April inclusive.
2. Vegetation removal must take place on the day of surveys that confirm that there are no bats present.
3. If potential bat roosts are confirmed from emergence and roost re-entry watches, these trees will not be felled and a minimum 25 m no works radius will be set around them to prevent disturbance.
4. The PBE will be on-site to supervise the removal of all potential bat roost trees.
5. If safe to do so, the PBE will immediately inspect felled potential roost trees for signs of bats. To assist in this, the PBE will use a handheld bat detector and endoscope to scan and inspect roosting features to detect injured or stunned bats.
6. If bat activity is observed during vegetation clearance, then clearance will stop immediately and will not commence until further monitoring confirms that the bats have abandoned the roost. Trees and vegetation shall be marked, and site staff briefed immediately to indicate a roost is present.

3.2.1.3 Bat Injury or Mortality

Implementation of the above methods aim to directly mitigate the risk of bats being injured or killed during tree felling. Unforeseen circumstances may still however lead to bats being injured or killed following the fulfilment of these protocols. In this instance, the following procedures will be implemented and supported by the PBE.

The following procedures should also be followed if tree felling contractors find bats while felling a tree not identified as a potential bat roost, the PBE and DOC must be contacted immediately if this occurs.

1. If bats are found on the ground or in the tree once felled, all further felling work must immediately cease. The felled tree must be thoroughly inspected for further bats. Felling can only re-start once permission has been obtained from the PBE after consultation with DOC.
2. If any bats are found on the ground or in the tree once felled, place the bat in a cloth bag in a dark, quiet place at ambient (or slightly warmer) temperature and take to the veterinarian at Hamilton Zoo Native Wildlife Rehabilitation team (07 838 6720 - 183 Brymer Road, Hamilton) for assessment as soon as possible. A maximum of two bats should be kept in one bag. After delivering the bat to the vet, contact DOC (0800 DOC HOT, 0800 362 468). Handling of bats should ideally be performed under the supervision of the PBE. However, if bats are encountered unexpectedly and the PBE is not present on site, the welfare of the bat should take precedence and handling can occur to maintain bat welfare, in line with the instructions provided here.
3. The PBE and vet must consult with DOC to consider appropriate rehabilitation options where suffering is minimal and chances of return to the wild are high.
4. Any dead bats found must be handed to DOC.
5. An incident investigation report will be prepared by the PBE following the discovery of the injured/dead bats. At minimum, the report shall provide details into the methods used to mitigate the event, the number of animals found injured or dead, the fate of the animals following vet care, and any additional mitigation measures that shall be undertaken prior to further tree removal. This report shall be submitted to DOC and Hamilton City Council within one week of the discovery of the animals.

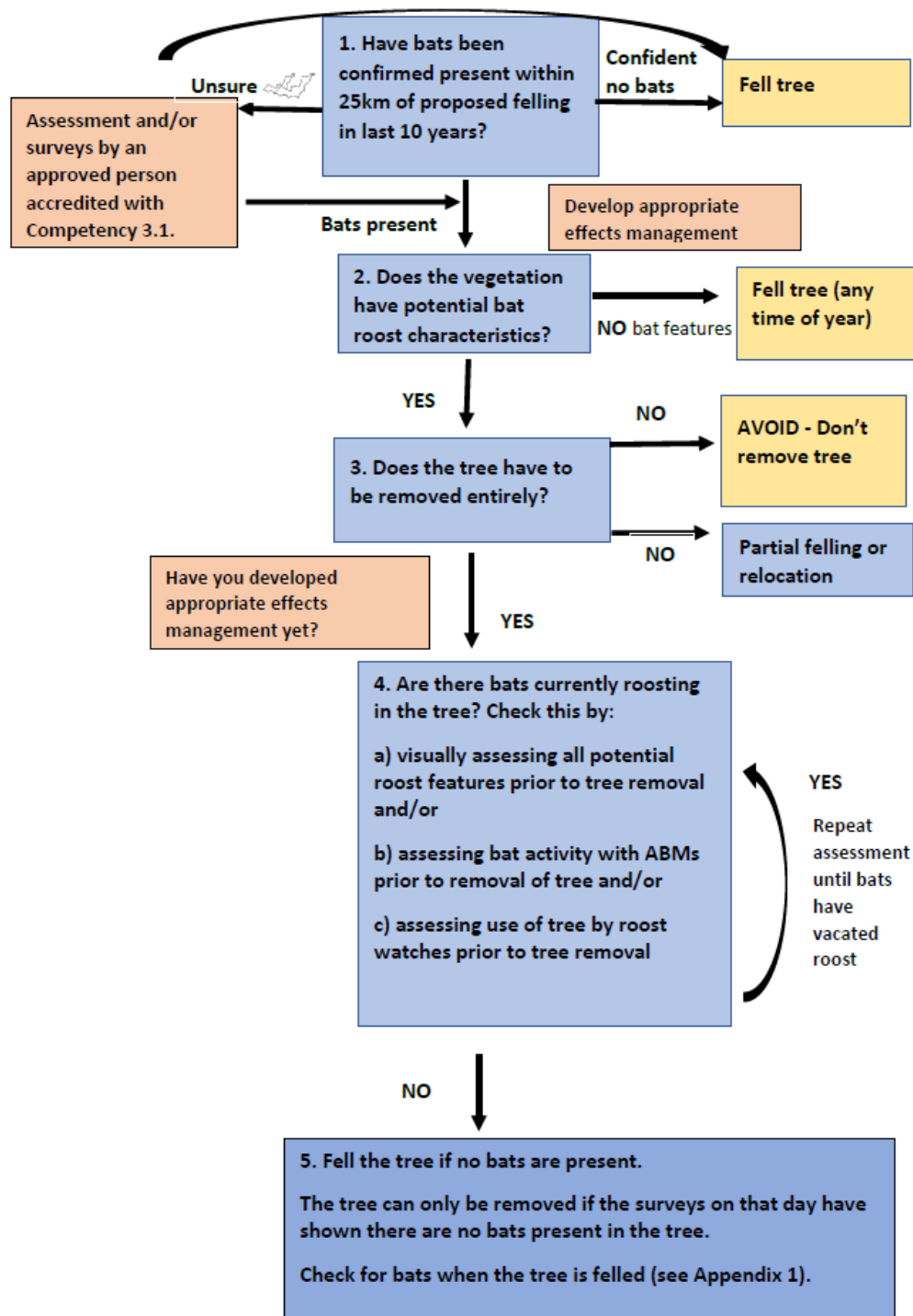


Figure 4: Tree Removal in Bat Areas Flow Chart (DOC BRP, version 4, October 2024).

3.3 Bat Sensitive Lighting Design

As a nocturnal species, long-tailed bats are adversely impacted by artificial lighting (e.g. Schamhart et al. 2024). To mitigate these effects, a bat sensitive lighting design will be incorporated into the Te Kowhai East Development. Specific measures to minimise adverse effects on long-tailed bats are detailed below, adapted from guidance in the Hamilton City Operative District Plan (Chapter 25.6 Lighting and Glare).

Bat sensitive lighting design will be applied to areas located immediately adjacent to the Mangaheke Stream and stormwater reserve.

- 1) All fixed outdoor lighting should be downward directional, baffled and angled so as to emit no direct upward illumination.
- 2) Lighting should be mounted as low as practicable.
- 3) White LED lighting bulbs should have a maximum colour temperature of 2700K.
- 4) Security lighting should be controlled via timers to activate for less than 5 minutes.

4.0 Reporting and Closure

4.1 Bat Roosts

A compliance monitoring report will be prepared following the completion of each season of vegetation removal which includes:

- Confirmation that vegetation removal was undertaken in accordance with the Bat Roost Protocols and associated consent conditions.
- Details of the works undertaken prior to the removal of high-risk bat roost trees (i.e., species, DBH, total number of trees, GPS coordinates, description of acoustic monitoring undertaken and results).
- Recommendation (if any) on potential changes to improve the effectiveness of bat management in relation to this project.
- If injured or dead bats are found during tree felling, DOC will be notified immediately and a report documenting the protocols undertaken will be completed.

Acoustic bat records will also be added to the Department of Conservation National Bat Database.

5.0 References

Department of Conservation. (2024). Protocols for minimising the risk of felling occupied bat roosts (Bat Roost Protocols). Version 4. October 2024. Approved by the New Zealand Department of Conservation's Bat Recovery Group.

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