Ecological supplementary report - Bats

March 2018

Ecology New Zealand Limited

NZ TRANSPORT AGENCY WAKA KOTAHI
Mt Messenger Bypass

New Zealand Government

Quality Assurance Statement			
Prepared by:		Simon Chapman	Ecology New Zealand Ltd
Reviewed by:		Matt Baber	Tonkin & Taylor Ltd
Approved for release:		Duncan Kenderdine	Mt Messenger Alliance

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Glossary

Term	Meaning
ABM	Automatic bat monitor
AEE	Assessment of Effects on the Environment Report
Bat Assessment	Chapman, S. and Choromanski, M. 2017. Assessment of Ecological Effects – Bats ~ Technical Report 7f. Mt Messenger Alliance.
DOC	Department of Conservation
EcIA guidelines	Ecological Impact Assessment guidelines
EIANZ	Environment Institute of Australia and New Zealand
ELMP	Ecology and Landscape Management Plan
Pest Management Area	Area of land proposed to be actively managed for pests, across a number of parcels of land
Project	The Mt Messenger Bypass project
Project footprint	The Project footprint includes the road footprint (i.e. the road and its anticipated batters and cuts, spoil disposal sites, haul roads and stormwater ponds), and includes the Additional Works Area (AWA) and 5m edge effects parcel.
RMA	Resource Management Act 1991
SH3	State Highway 3
Transport Agency	New Zealand Transport Agency
VRP	Vegetation Removal Protocols

1 Introduction

The NZ Transport Agency (Transport Agency) is proposing to construct and operate a new section of State Highway 3 (SH3), generally between Uruti and Ahititi to the north of New Plymouth. The Transport Agency lodged applications for resource consents and a Notice of Requirement on 15 December 2017 to alter the existing SH3 designation, to enable the Mt Messenger Bypass project (the Project) to proceed.

This application included assessments of ecological effects attached as Technical Reports 7a – 7h, in Volume 3 of the Assessment of Effects on the Environment (AEE) report. The Assessment of Ecological Effects – Bats, dated December 2017, was completed as part of this package. The purpose of the Bat Assessment was to assess potential adverse effects of the Project on long-tailed (*Chalinolobus tuberculatus* "North Island", 'long-tailed bat' hereafter) and lesser short-tailed bats (*Mystacina tuberculata rhyacobia*; 'short-tailed bat' hereafter), to inform the assessment of effects in the AEE and the proposed mitigation and offset package for the Project.

The ecology technical reports noted the conservative and precautionary approach taken in assessing potential adverse ecological effects from the Project, and that more information would be available following summer field investigations.

These field investigations, which have now concluded, have informed this supplementary report. The purpose of this report is to describe those investigations and their results as they relate to bats, and to update the original Bat Assessment as appropriate.

2 Further ecological investigations

2.1 Introduction

The Bat Assessment report, dated December 2017 (Chapman & Choromanski, 2017), included assessments of ecological values and potential adverse effects of the project on long-tailed and short-tailed bats, based on the information available at the time the assessment was completed. As noted in that report and in Section 1 above, a conservative approach was taken when assessing potential adverse effects, noting that future investigations would produce information to support and strengthen these ecological effects assessments.

To gather supplementary bat distribution and habitat use data, further acoustic bat survey was undertaken across the Project footprint and wider Project area during the warmer months of spring when bat activity levels are consistently higher.

In addition to the additional survey, efforts were made to trap bats within the Project footprint and wider Project area to allow an intensive radio-tracking programme to be undertaken. This trapping programme aimed to capture breeding females and radio-track them to their roosts and foraging areas. Targeting breeding females would increase the likelihood of locating maternity roosts. Maternity roosts are significant for local bat populations as they provide the conditions necessary for raising pups. Locating these roosts would provide fine-scale insight into the characteristics and use of communal bat roosts used by the local long-tailed bat population within and near the Project footprint.

2.2 Methodology

2.2.1 Acoustic survey

Acoustic bat surveys were undertaken across the Project footprint and wider Project area using Automatic Bat Monitors (ABMs; -Department of Conservation issue, AR4 model). ABMs were used to continue surveying bat activity at select existing survey sites, and to survey three new sites within the northern extent of the Project footprint where landowner permission was granted to ecology field teams for the first time.

These ABMs were deployed across 21 sites between 15th September and November 27th 2017 (Appendix A). ABMs were serviced monthly by replacing batteries and changing memory cards to gather field data. Immediately prior to and during the trapping programme, several ABMs were briefly relocated to potential trapping sites to assess site suitability (site reconnaissance – see 2.2.2). Those data are not included in this report.

2.2.2 Bat trapping and tracking

The trapping and tracking of long-tailed bats was attempted over a consecutive nine-night period between November 28th and December 6th 2017. A nocturnal trapping effort was undertaken using five harp traps (Austbat standard 4.2 m^2 Two-bank harp trap) (Appendix B). Initial trap locations were selected by identifying areas of high bat activity (especially at dawn and dusk) observed from acoustic survey data recorded during November 2017 (see Section 2.3.2, Appendix).

The locations of subsequent potential trapping sites were selected during brief 'reconnaissance' site surveys. These surveys (generally over 2-3 nights) targeted features such as vegetation corridors and vegetated streams that were considered likely to confine and funnel bat activity to low and/or narrow flight paths. Where a potential trapping location was identified, an ABM was installed overnight. Where bat activity was sufficiently high (generally greater than 20 bat passes per night), the site was considered for trapping. Traps were opened approximately 30 minutes before sunset and closed at dawn. Traps were checked at 10pm, midnight and at dawn.

A single night of mist netting was also undertaken on 6 December 2017 to supplement harp trapping. Though mist netting is not a common trapping technique for this species, mist netting was attempted as a supplementary method to increase the likelihood of bat capture. The mist net (Avinet 38 mm Mesh for Bats) comprised of three stacked nets forming an approximately 90 m^2 catch area (Appendix B). Mist nets were opened at approximately 30 minutes before sunset and closed at dawn. Nets were monitored continuously during this period, both visually and using a real-time handheld bat detector (Magenta Bat4 Precision bat detector).

2.2.1 Assessment of effects methodology

As in the original Bat Assessment report (Chapman & Choromanski, 2017), this assessment of effects, based on the spring 2017 acoustic survey and spring/summer trapping efforts, broadly follows the EcIA Guidelines (EIANZ, 2015) with some adaptation, including to allow for expert opinion to be applied within the context of the EIANZ framework. Section 2.3 of the original Bat Assessment report sets out the methodology in full, including the three-step assessment of ecological values, the magnitude of unmitigated effects, and the level of unmitigated effects.

2.3 Results from further investigations

2.3.1 Acoustic survey

Long-tailed bat activity was recorded at all spring survey sites except ABM 92 (Table 2.1). Two of the three ABMs located at new sites in the northern extent of the Project footprint malfunctioned and are excluded from analyses, while the third ABM in that area (ABM 98) detected relatively high levels of long-tailed bat activity. Maps showing long-tailed bat distribution and summarised activity levels across all seasons and previously surveyed areas within the Project alignment and wider Project area were updated to incorporate the spring survey data and are provided in Appendices D and E respectively.

Some of the bat activity recorded within the project footprint was suggestive of feeding and roosting behaviours within and near the Project footprint (data not presented). Feeding activity was recorded at ABM 85, ABM 90, ABM 98 and several consecutive nights of relatively high levels of bat activity at dawn and dusk were recorded at ABM 90 which is potentially suggestive of bats departing a roost (potentially within the Project footprint) within proximity of this ABM at dusk and returning to the roost at dawn.

No short-tailed bat activity was detected at any site in this survey.

2.3.2 Bat trapping and radio tracking

No bats were captured during the nine nights of attempted trapping between 28 November and 6 December 2017. This is despite significant trapping effort, involving a total of 11 trapping sites, deployed across four areas within the Project footprint and wider Project areas (Appendix C; Table 2.1).

Trapping comprised of no less than five harp traps set side-to-side or individually across two or more sites per night. During trapping, ABMs were installed in immediate proximity to traps to determine if bats were active nearby. Bats were detected very near to one trap (possibly within a few metres), but the lack of trapping success suggests that at least some bats could observe and avoid these traps.

Table 2.1– Summary of long-tailed bat activity recorded during Spring 2017

Site Number	Valid Survey Nights*	Survey Nights with bats	Total Bat Passes	Mean Bat Passes/Night
ABM 77	38	37	1578	41.53
ABM 78	55	49	903	16.42
ABM 79	42	18	29	0.69
ABM 80	10	9	24	2.40
ABM 81	39	22	300	7.69
ABM 82	44	23	78	1.77
ABM 83	23	10	22	0.96
ABM 84	45	41	296	6.58
ABM 85	20	16	119	5.95
ABM 86	53	16	49	0.92
ABM 87	32	9	15	0.47
ABM 88	8	7	44	5.50
ABM 89	36	9	10	0.28
ABM 90	54	51	2959	54.80
ABM 91	17	17	1330	78.24
ABM 92	26	0	0	0.00
ABM 93	46	44	826	17.96
ABM 94	11	10	156	14.18
ABM 95	34	33	745	21.88
ABM 97	35	30	241	6.89
ABM 98	29	28	4541	156.59

*A survey night was deemed valid if a bat pass was detected that night on any ABM across the surveyed area.

2.4 Discussion

2.4.1 Acoustic survey

The spring survey results confirm that long-tailed bats are widely active within and adjacent to the Project footprint, and that this species is likely to intermittently roost in trees within and adjacent to the Project footprint. Long-tailed bat activity was detected at almost all sites surveyed, at levels consistently higher than those recorded in the cooler winter months previously surveyed.

Continued surveys throughout spring failed to detect the presence of short-tailed bats within the Project footprint and surveyed wider Project areas. Despite historical records within 5-6 km of the Project footprint, short-tailed bats have not yet been detected within or adjacent to the Project footprint in any survey; however, they are notoriously difficult to detect, and it is possible they may be present intermittently or in low numbers.

These results are consistent with prior findings described in the Bat Assessment (Chapman & Choromanski, 2017).

The high proportion of surveyed sites with long-tailed bats consistently present, and the relatively high levels of long-tailed bat activity recorded at some survey sites, provide strong indications that the Project footprint and wider Project area provide important habitat for long-tailed bats. The detection of dawn/dusk long-tailed bat activity peaks over several consecutive days suggests long-tailed bats were, for at least some of the spring survey period, roosting within or in close proximity to the northern section of the Project footprint near ABM 90. Two mature emergent northern rata (*Metrosideros robusta*) within close proximity to this ABM were identified as potential roost trees. These trees, at the base of a minor gully, were also a target for trapping efforts (Appendix C, Trap 03). The results of the spring survey indicate that long-tailed bat roosts, foraging areas and commuting routes (flight paths) are present, or likely to be present, within and adjacent to the Project footprint.

2.4.2 Bat trapping and radio tracking

No bats were captured during any of the nine nights of trapping. Typically, capturing the first individuals in any long-tailed bat trapping programme is problematic, due to the transient nature of long-tailed bats, and the identification of active flight paths in a previously unstudied area. These issues are compounded in a landscape such as at Mt Messenger with an abundance of suitable roosting, foraging and commuting habitat in the wider area.

Weather conditions during the trapping programme may also have impacted trapping success. On clear, still nights, such as those in the survey period, bats are less likely to use sheltered flyways, which are preferred flight paths in windy conditions and which were generally targeted by trapping (B. Lloyd, pers. comm.).

A particularly bright full moon (3 December 2017) may have also made traps more visible to bats for much of the trapping period, possibly resulting in the avoidance of harp traps by bats. This was evident as the midlines across the opened mist net deployed on 6 December were visible to the naked human eye throughout the night.

2.4.3 Mitigation

While it is likely that long-tailed bats roost intermittently in trees within or adjacent to the Project footprint, they are known to make use of large 'pools' of roost trees in this forest type, switching between trees approximately every two days on average (O'Donnell, 2010). Therefore, while these survey results suggest that long-tailed bat roost trees may be present, they do not identify the precise location of any roosts within or adjacent to the Project footprint, nor can they be used to determine which roost or roosts are active at any particular point in time.

The 2017 Bat Assessment included the recommendation to implement Vegetation Removal Protocols (VRP) during enabling works to minimise risks of injury/death for roosting bats (Smith et. al., 2017). The VRP should detail protocols for habitat assessments and acoustic surveys to ensure no active bat roost is present in any trees at time of removal. The potential presence of a bat roost(s) of an unknown size within the Project footprint emphasises the requirement for VRP to be implemented across the Project footprint during all tree clearance activities (to be detailed within the Ecology and Landscape Management Plan).

To mitigate impacts on roosting long-tailed bats, the implementation of VRPs firstly aims to ensure that all trees within the Project footprint are appropriately risk rated (by a DOC-approved competent bat ecologist) to identify potential high-risk roosting trees. Once these trees are identified, acoustic surveys are undertaken during suitable weather conditions (e.g. warm nights with little to no heavy rain) immediately prior to vegetation clearance to ensure that no bat roosting activity indicative of roosting behaviour is detected before trees are removed. If ongoing indicative roosting activity is detected at any tree or tree group, further management action will be required to minimise adverse effects on bats. This approach has previously been used successfully on other projects. For example, roost watches were used along the Hamilton Section of the Waikato Expressway project (M. Choromanski, Pers. obs. January 2017), and flood lighting of roost trees was used as a deterrent to bats on the SH1 Puhoi to Warkworth project (B Lloyd, pers. comm., Dec 2017).

Long-term predator management within a designated mitigation area is recommended to mitigate impacts on the local bat population. Recent studies have shown that predator management can enhance the long-term survival of long-tailed bats (O'Donnell et al., 2017). Predator management does, however, need to be undertaken across large contiguous areas to be effective (O'Donnell 2014 and 2017). It is therefore advantageous if the designated mitigation site adjoins existing areas where predator control is also being undertaken (e.g., the Parininihi Kōkako Project area), to ensure a sufficiently large area is appropriately managed overall.

Bat surveys were not undertaken within the proposed Pest Management Area (PMA) as part of this assessment because the location of the proposed PMA had not been determined.

3 Conclusions

Supplementary spring bat survey has confirmed widespread long-tailed bat activity across the wider Project area, and suggests it is likely that long-tailed bats roost in trees within or adjacent to the Project footprint; however no evidence of short-tailed bat presence has been found.

An attempted bat trapping and radio-tracking tracking programme failed to trap any bats. This was likely attributed to general difficulties associated with trapping in a previously unstudied area, in conjunction with unfavourable weather conditions.

Potential feeding and roosting behaviour within and near the Project footprint reinforce the need for bat mitigation as recommended in the original Bat Assessment (Chapman & Choromanski, 2017). As a minimum, it is recommended that VRP are implemented prior to vegetation removal and that a pest management area contiguous with, or near to, an existing pest-controlled area is established and operated in perpetuity.

4 References

Borkin K. M., & Ludlow, E. (2009). Notes on New Zealand mammals 9: Long-tailed bat (*Chalinolobus tuberculatus*) chased by morepork (*Ninox novaeseelandiae*).

Chapman, S. and Choromanski, M. 2017. Assessment of Ecological Effects - Bats ~ Technical Report 7f. Mt Messenger Alliance.

Lloyd, B., (2017). Report on an attempt to trap long-tailed bats near Mount Messenger, Technical Report. Mt Messenger Alliance.

O'Donnell, C.F.J. 2010. The ecology and conservation of New Zealand bats. In: Island bats: evolution, ecology and conservation. Chicago University Press, Chicago. 460-495 pp.

O'Donnell C.F.J. 2014: Setting up a long-tailed bat management prescription at a new site. Advice Note DOCDM-1444273. Department of Conservation, Christchurch, New Zealand

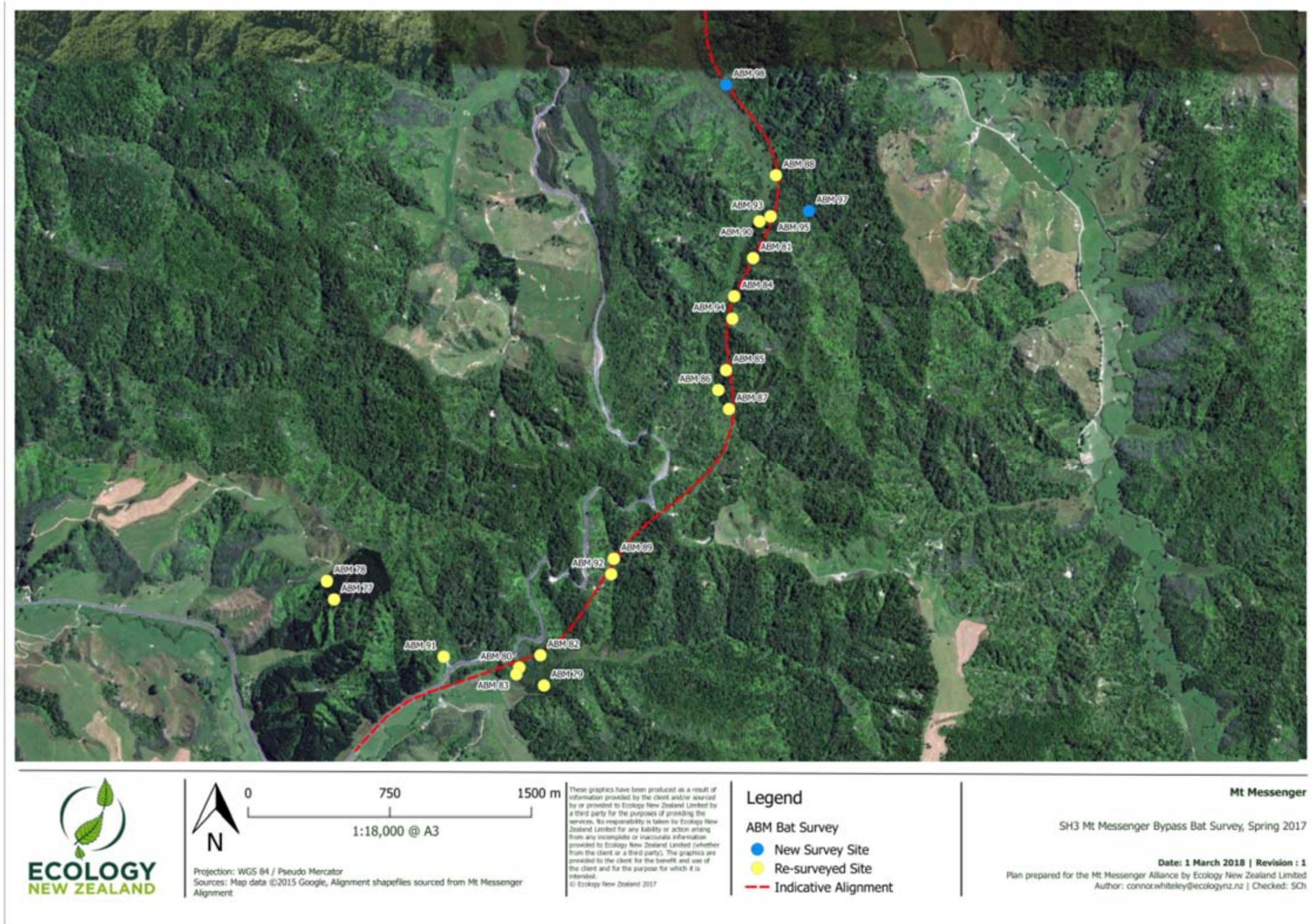
O'Donnell, C. F., Pryde, M. A., van Dam-Bates, P., & Elliott, G. P. 2017: Controlling invasive predators enhances the long-term survival of endangered New Zealand long-tailed bats (*Chalinolobus tuberculatus*): Implications for conservation of bats on oceanic islands. Biological Conservation, 214, 156-167.

Opus International Consultants Limited, 2017. Mt Messenger Bypass Investigation - Bat Baseline Survey, April 2017. Unpublished Report prepared for the NZ Transport Agency.

Smith, D., Borkin, K., Jones, C., Lindberg, A., Davies, F., & Eccles, G. (2017). Effects of land transport activities on New Zealand's endemic bat populations: reviews of ecological and regulatory literature (No. 623).

Appendices

Appendix A: Bat survey ABM locations, Spring 2017



Appendix B: Images of selected trap sites

Trap site 01 (Harp trap)

Trap site 02 (Harp trap)

Trap site 03 (Harp trap)

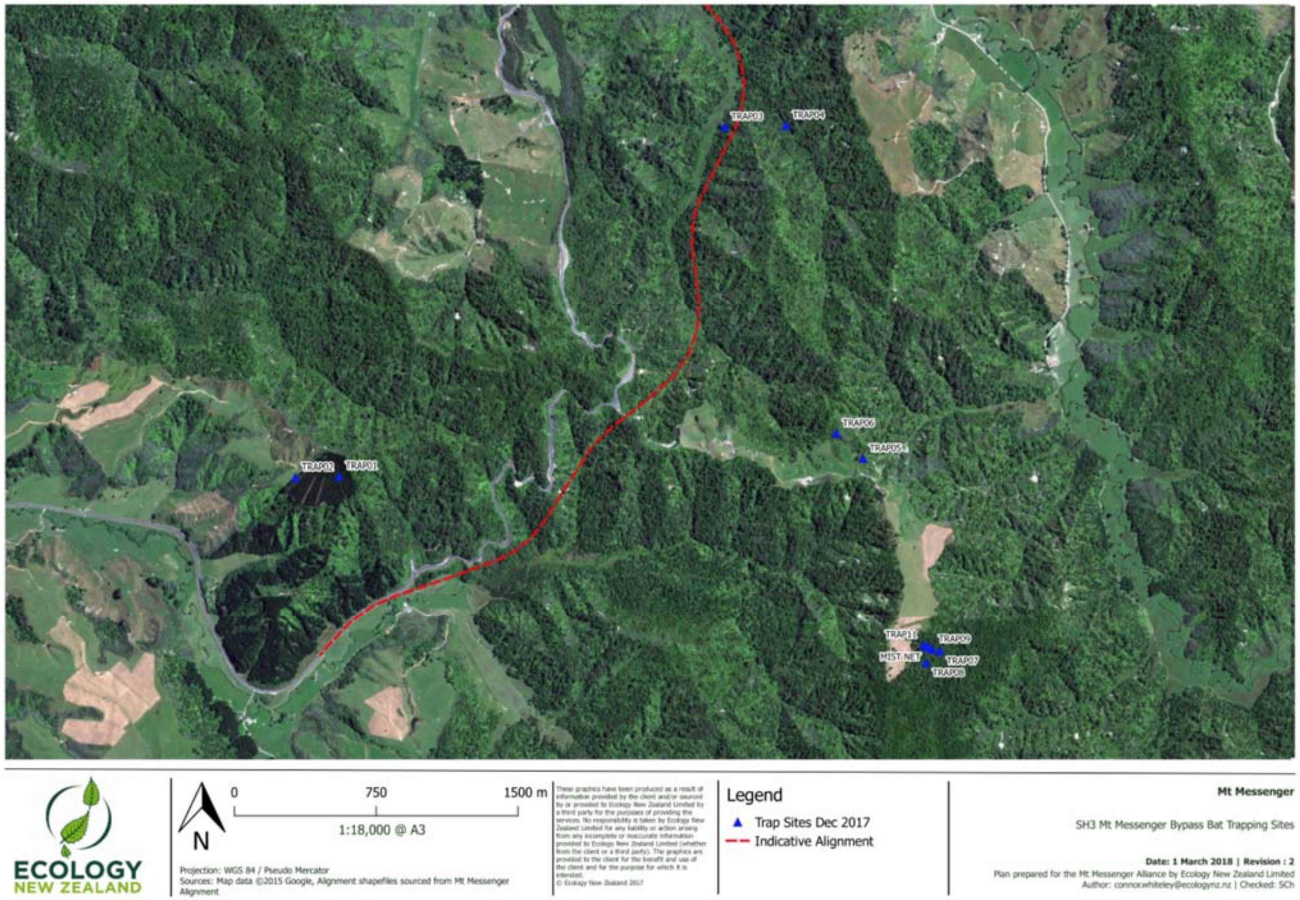
Trap site 04 (Harp trap)

Trap site 05 (harp trap)

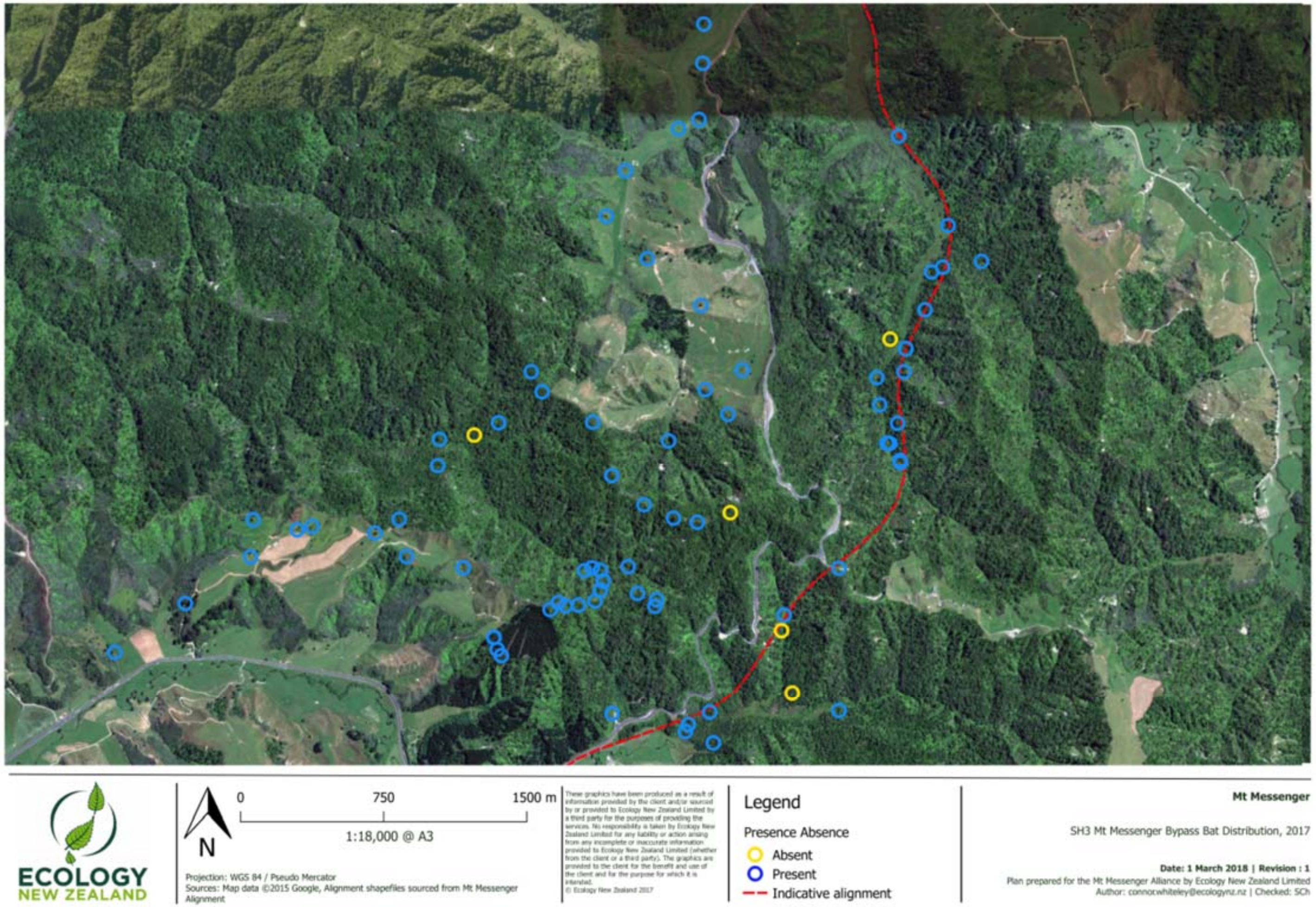
Trap site 08 (harp trap)

Closed mist net in position.

Appendix C: Harp trap and mist net locations, Spring 2017



Appendix D: Updated long-tailed bat disruption map



Appendix E: Updated long-tailed bat activity map