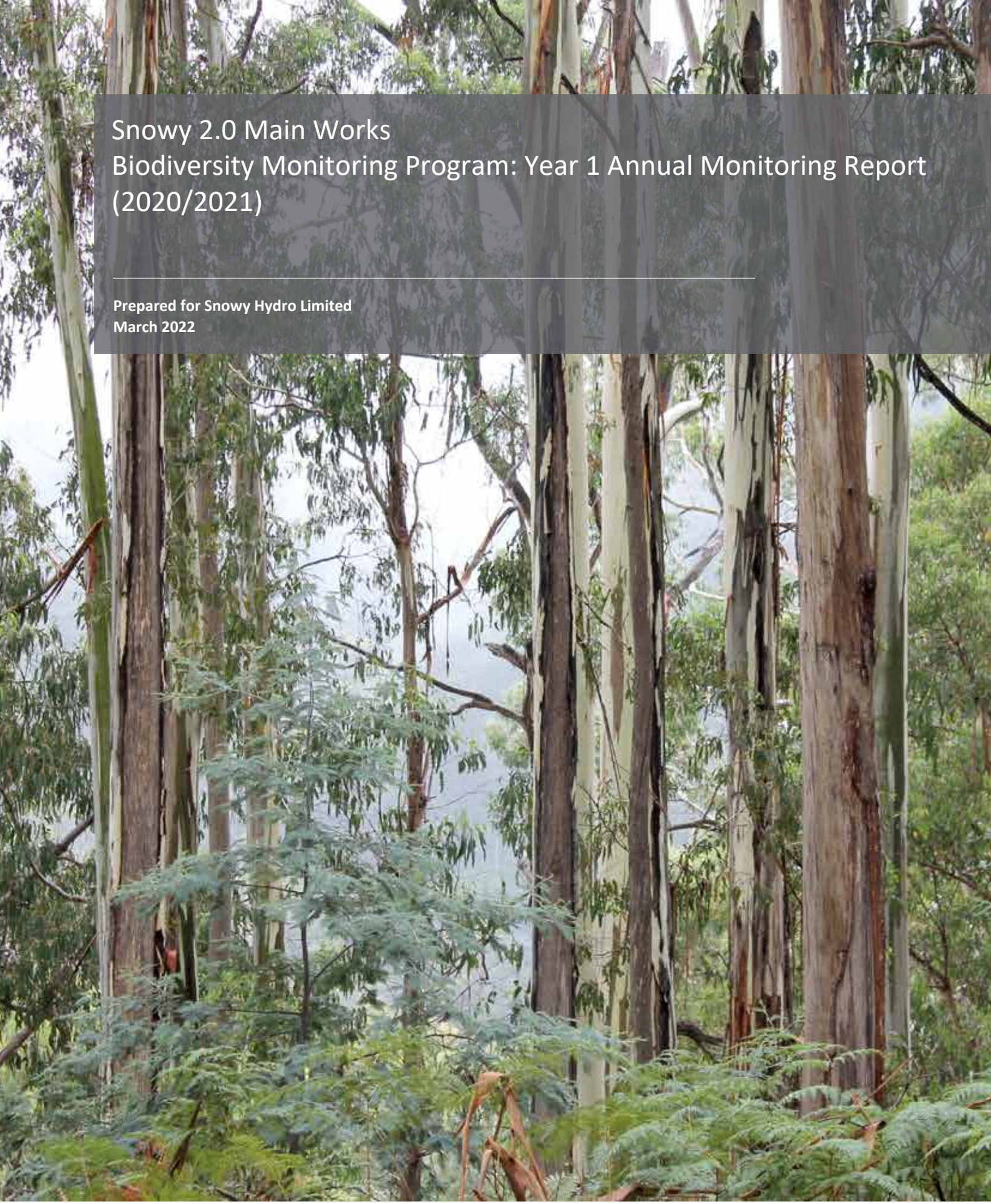

Snowy 2.0 Main Works
Biodiversity Monitoring Program: Year 1 Annual Monitoring Report (2020/2021)

Prepared for Snowy Hydro Limited
March 2022

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Snowy 2.0 Main Works

Biodiversity Monitoring Program: Year 1 Annual Monitoring Report (2020/2021)

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Executive Summary

Snowy Hydro Limited (Snowy Hydro) is the proponent of the Snowy 2.0 Project (Snowy 2.0), a large-scale pumped hydro-electric storage and generation project which will increase hydro-electric capacity within the existing Snowy Mountains Hydro-electric Scheme (Snowy Scheme). This will be achieved by linking the existing Tantangara and Talbingo reservoirs within the Snowy Scheme through a series of underground tunnels and new underground hydro-electric power station.

Snowy Hydro and their project partner Future Generation Joint Venture (FGJV) are currently undertaking the construction work for Snowy 2.0 'Main Works'. The Main Works project includes pre-construction activities such as pre-clearing works, pre-construction/site establishment, geotechnical investigation and survey, and installing environmental mitigation measures. Construction activities include access road and bridge work, excavation and tunnelling, excavated rock management, intake and gate-shaft construction, progressive rehabilitation, fit out, testing and commissioning, and final rehabilitation.

An Environmental Impact Statement (EIS) for the Main Works for Snowy 2.0 (Main Work EIS) was submitted to the Department of Planning, Industry and Environment (DPIE) in September 2019 (EMM, 2019), with a Preferred Infrastructure Report and Response to Submissions submitted to DPIE in February 2020 (EMM, 2020). Approval was granted in May 2020.

The Main Works Biodiversity Monitoring Program (BMP) (EMM, 2020) forms Appendix B of the Main Works Biodiversity Management Plan (Snowy Hydro and FGJV, 2020) and sets out a monitoring framework to ensure that impacts arising from the Main Works project are consistent with those outlined in the EIS. The BMP is required to be implemented as part of the Main Works project.

EMM Consulting Pty Ltd (EMM) was commissioned by Snowy Hydro to complete the first year of the monitoring program associated with the BMP. Year 1 of the monitoring program was undertaken between October 2020 and October 2021. This '*Biodiversity Monitoring Program: Year 1 Annual Monitoring Report (2020/2021)*' ("monitoring report") presents the results of the year 1 monitoring program activities. The objectives of the report are to:

- detail any changes, gaps or limitations to the biodiversity monitoring methodology outlined in the BMP. This includes monitoring components, method of data collection (frequency and location), method of data analysis and reporting requirements;
- provide the biodiversity monitoring results for all monitoring events between 21 October 2020 and 20 October 2021, comprising baseline (Q1) and construction (Q2, Q3, Q4) monitoring periods (EMM Year 1 Quarter 1, 2021) (EMM Year 1 Quarter 2, 2021) (EMM Year 1 Quarter 3, 2021) (EMM Year 1 Quarter 4, 2021);
- compare results across monitoring periods against threshold triggers for adaptive management presented in the BMP, identifying any relevant additional trends related to Main Works impacts, and identify where adaptive management is required; and
- provide recommendations for improvements and amendments to the BMP.

Year 1 monitoring surveys complete during 2020/2021 included 18 field surveys conducted over 119 days, including 1,490 people hours. A total of 156 sites were established and monitored across the Main Works project area and control areas.

A summary of the BMP monitoring periods is provided in Table ES1. A summary of the monitoring results from Year 1 is provided in Table ES2 triggered pest control in accordance with the Weed, Pest and Pathogen Management Plan (FGJV, 2020). No other adaptive management has been triggered at this stage.

Table ES1 Summary of MW BMP monitoring periods

Quarter	Monitoring period	Monitoring dates
Q1	Baseline	21 October 2020 – 20 January 2021
Q2	Construction	21 January 2021 – 20 April 2021
Q3	Construction	21 April 2021 – 20 July 2021
Q4	Construction	21 July 2021 – 20 October 2021

Table ES2 Summary of monitoring components, adaptive management triggers, and baseline and construction conditions

Monitoring component	Trigger for adaptive management	Q1 – Baseline condition	Q2 – Construction condition	Q3 – Construction condition	Q4 – Construction condition	Review of adaptive management triggers
Threatened Flora monitoring	• Percentage decline in the number of plants observed within a single monitoring plot, observed over two consecutive monitoring periods and outside of the standard deviation observed at control sites. • Decline must be observed in conjunction with a primary impact (eg increase in weed cover).	• A total of 199 individuals of Clover Glycine (*Glycine latrobeana*) were recorded across four impact sites (TF02, TF03, TF04, TF14) and 452 individuals across four control sites (TF07, TF08, TF09, TF10). • One individual of Kiandra Leek Orchid (*Prasophyllum retroflexum*) was recorded at one impact site (TF04) and eight individuals at two control sites (TF06, TF09). • No threatened flora species were recorded at four impact sites (TF01, TF11, TF12, TF13) and one control site (TF05).	• Threatened Flora monitoring was not required to be undertaken during Q2.	• Threatened Flora monitoring was not required to be undertaken during Q3.	• Threatened Flora monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Small mammal occupancy monitoring	• Absence of target species from a site during construction and operational monitoring, where the species was recorded during pre-construction/baseline surveys; • No changes in presence/absence at control sites; • Absence recorded for greater than one year; and • Absence is combined with an observed increase or new occurrence of a primary impact (decline in habitat complexity, weeds, pathogens, or feral herbivores/predators).	• The Smoky Mouse was recorded at one impact site (SM05-I) and no control sies. • The Eastern Pygmy Possum was recorded at seven impact sites (SM03-I, SM10-I, SM14-I, SM16-I, SM18-I, SM20-I, SM21-I) and seven control sites (SM02-C, SM04-C, SM06-C, SM08-C, SM09-C, SM11-C, SM17-C). • The Broad-toothed Rat was recorded at three control sites (SM28-C, SM30-C, SM33-C) and no impact sites. • No monitoring sites recorded Broad-toothed Rat scats.	• Two control sites (SM08 and SM11) were replaced (with SM40 and SM41) due to access issues. • The Smoky Mouse was recorded at two impact sites (SM05-I, SM22-I) and one control site (SM09-C). • The Eastern Pygmy-possum was recorded at ten impact sites (SM03-I, SM05-I, SM07-I, SM15-I, SM16-I, SM20-I, SM21-I, SM22-I, SM23-I, SM24-I) and four control sites (SM04-C, SM06-C, SM09-C, SM17-C). • The Broad-toothed Rat was recorded at five control sites (SM28-C, SM30-C, SM32-C, SM33-C, SM38-C) and no impact sites. • Broad-toothed Rat scats were recorded at two control sites (FP 30, FP32) and no impact sites: – FP30: rare (old); and – FP32: rare (intermediate). • Images captured by SM15-I-RC2 over Autumn were lost during data transfer.	• The Smoky Mouse was recorded at four impact sites (SM05-I, SM22-I, SM24-I, SM35-I) and no control sites. • The Eastern Pygmy-possum was recorded at one impact site (SM05-I) and one control site (SM02-C). The species is likely to be in torpor over the monitoring period. • The Broad-toothed Rat was recorded at three control sites (SM28-C, SM30-C, SM32-C) and no impact sites. • Broad-toothed Rat faecal pellet searches were unable to be completed in Winter due to weather constraints. The third monitoring event was completed in Q4 on a separate occasion to the fourth monitoring event. • Broad-toothed Rat faecal pellet monitoring was unable to be conducted due to weather and unsafe conditions. • SM01-I-RC1 was removed by FGJV and has been re-set outside of the construction footprint. • SM33-C-RC2 and SM38-C-RC1 were stolen and therefore no Winter data was collected from these cameras. • SM26-C-RC1 and SM39-C-RC1 suffered technical failure, likely due to low temperatures and failure of batteries. Therefore, no Winter data was collected from these cameras.	• The Smoky Mouse was recorded at three impact sites (SM05-I, SM22-I, SM23-I) and two control sites (SM09-C, SM17-C). • The Eastern Pygmy-possum was recorded at three impact sites (SM14-I, SM21-I, SM23-I) and three control sites (SM02-C, SM09-C, SM40-C). • The Broad-toothed Rat was recorded at three control sites (SM30-C, SM32-C, SM39-C) and no impact sites. • Broad-toothed Rat scats were recorded at one impact site (FP17) and three control sites (FP26, FP32, FP33) during the third event in September 2021: – FP17: rare (old); – FP26: rare (old); – FP32: uncommon (old); and – FP33: rare (old). • Broad-toothed Rat scats were recorded at two control sites (FC26, FP32) and no impact sites during the fourth event in October 2021: – FP26: rare (old); and – FP32: rare (old). • SM06-C-RC2 suffered technical failure and did not collect 30 days of data. • SM33-C-RC2 and SM38-C-RC1 were not replaced after being stolen in winter (as requested by SHL) and therefore no Spring data was collected from these cameras.	• Smoky Mouse was recorded at one impact site during baseline surveys (Q1). The species was recorded at this site during Q2 (but not in Q3 or Q4). The species was not recorded at any control sites during Q1. – Based on this, adaptive management is unlikely to be triggered as no change at control sites can be detected. – Further monitoring should review presence/absence of the species at all impact sites as compared to control sites to look at overall declines. • The Eastern Pygmy-possum was recorded at seven impact sites during baseline surveys (Q1). The species was not recorded at one impact site (SM18-I) during operational monitoring (Q2-Q4) where it was recorded during baseline. – Similar trends were observed at control sites with the species not recorded at two control sites during operational monitoring (Q2-Q4) where it was recorded during baseline surveys (SM08-C, SM11-C). – Further monitoring will determine if these absences occur for greater than one year. • The Broad-toothed Rat was recorded at one faecal pellet monitoring impact site (FP17) during the third monitoring event. However, the species was not recorded on cameras within the impact area. – Based on this, adaptive management is unlikely to be triggered as no change at impact sites can be detected. • Adaptive management not triggered.

Small mammal habitat characteristic monitoring	• Observed degradation in vegetation structure and habitat characteristics of occupied habitat; and • Observed degradation is combined with an observed increase in weed cover or other project related impacts.	• The average percentage of native cover at impact sites ranged from 0% to 99%, compared to that of exotic which ranged from 0% to 66%. • The average percentage of native cover at control sites ranged from 0% to 95%, compared to that of exotic cover which ranged from 0% to 79%. • Two control sites (SM08 and SM11) were unable to be established due to inaccessibility along Dead Man's Fire Trail and will be replaced during Year 2 (with SM40 and SM41).	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q2.	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q3.	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Alpine Tree Frog occupancy monitoring	• A decline in relative abundance (that upon review by species experts, is also considered as biologically significant) occurs during construction and/or operation at impact sites that does not occur at the control sites. • Decline in relative abundance is accompanied by a decline in other monitoring parameters.	• Sixteen sightings of the Alpine Tree Frog were recorded at three of four impact sites (TC02, NC01, KPC01) and 144 sightings at all four control sites (TC03, ER02, MR01, NC03). • No Alpine Tree Frogs were recorded at TR01.	• Alpine Tree Frog monitoring was not required to be undertaken during Q2.	• Alpine Tree Frog monitoring was not required to be undertaken during Q3.	• Alpine Tree Frog monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring. • If the Alpine Tree Frog is not recorded at TR01 in Year 2, it is recommended that this site is moved, with a new impact monitoring location established to replace TR01.
Booroolong Frog occupancy monitoring	• A decline in relative abundance (that upon review by species experts, is also considered as biologically significant) occurs during construction and/or operation at impact sites that does not occur at the control sites. • Decline in relative abundance is accompanied by a decline in other monitoring parameters.	• Twenty sightings of the Booroolong Frog were recorded at all four impact sites (WC01, YR02, YR05, YR06) and five sightings at the two control sites (YR08, YR09).	• Booroolong Frog monitoring was not required to be undertaken during Q2.	• Booroolong Frog monitoring was not required to be undertaken during Q3.	• Booroolong Frog monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Booroolong Frog habitat characteristics monitoring	• Observed degradation, change or loss of rocky (breeding) habitat or pools at impact sites that does not also occur at the reference sites.	• Incorrect data captured in Q1.	• Five out of six monitoring transects were flown during February, outside the breeding season. • No data was captured for control site YR09.	• Booroolong Frog habitat characteristics monitoring was not required to be undertaken during Q3.	• Booroolong Frog habitat characteristics monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.

Alpine She-oak Skink occupancy monitoring	• Absence of target species from a site during construction and operational monitoring, where the species was recorded during pre-construction/baseline surveys; • No changes in presence/absence at control sites; • Absence recorded for greater than one year; and • Absence is combined with an observed increase or new occurrence of a primary impact (weeds).	• Two Alpine She-oak Skinks were recorded at a single impact site (TG02) and five Alpine She-oak Skinks were recorded at three control sites (TG06, TG07, TG08). • No Alpine She-oak Skinks were recorded at four impact sites (TG01, TG03, TG05) and one control site (TG09). • TG04 was unable to be established due to access issues.	• Four Alpine She-oak Skinks were recorded at two control sites (TG07, TG08) and no impact sites. • No Alpine She-oak Skinks were recorded at any impact sites (TG01, TG02, TG03, TG05) and two control sites (TG06, TG09). • TG04 was established during April.	• Alpine She-oak Skink monitoring was not required to be undertaken during Q3.	• Three Alpine She-oak Skinks were recorded at a single impact site (TG03) and two Alpine She-oak Skinks were recorded at a single control site (TG08). • No Alpine She-oak Skinks were recorded at four impact sites (TG01, TG02, TG04, TG05) and three control sites (TG06, TG07, TG09).	• The Alpine She-oak Skink was recorded at a single impact site during Q1. The species was not recorded at this impact site during construction monitoring (Q2-Q4). – Similar trends were observed at control sites. The species was not recorded at one of the three control sites during operational monitoring (Q2-Q4) where it was recorded during baseline surveys (TG06). – Further monitoring will determine if these absences occur for greater than one year. • Adaptive management not triggered.
Feral animal occupancy monitoring	• Sighting of feral animals within proximity to known Smoky Mouse habitat or project infrastructure.	• Nine feral animal species were recorded across 36 sites (63% of monitored sites) comprising: – European Hare (*Lepus europaeus*) was recorded at 13 sites; – Feral Cat (*Felis catus*) was recorded at 17 sites; – Feral Horse (*Equuus caballus*) was recorded at 16 sites; – Rabbit (*Oryctolagus cuniculus*) was recorded at 26 sites; – Red Deer(*Cervus elaphus.*) was recorded at one site; – Red Fox (*Vulpes vulpes*) was recorded at 10 sites; – Rusa Deer (*Cervus timorensis*) was recorded at one site; – Sambar Deer (*Cervus unicolor*)) was recorded at two sites; and – Wild Dog (*Canis lupus*) was recorded at 11 sites.	• Ten feral animal species were recorded across 46 sites (81% of monitored sites) comprising: – European Hare was recorded at six sites; – Feral Cat was recorded at 19 sites; – Feral Horse was recorded at 13 sites; – Feral Pig (*Sus scrofa*) was recorded at one site. – Rabbit was recorded at 27 sites; – Red Deer was recorded at eight sites; – Red Fox was recorded at 15 sites; – Rusa Deer was recorded at two sites; – Sambar Deer was recorded at five sites; and – Wild Dog was recorded at 15 sites.	• Seven feral animal species were recorded across 41 sites (71% monitored sites) comprising: – European Hare was recorded at five sites; – Feral Cat was recorded at 15 sites; – Feral Horse was recorded at nine sites; – Rabbit was recorded at 20 sites; – Red Fox was recorded at 25 sites; – Sambar Deer was recorded at seven sites; and – Wild Dog was recorded at nine sites.	• Eight feral animal species were recorded across 37 sites (64%) comprising: – European Hare was recorded at six sites; – Feral Cat was recorded at 11 sites; – Feral Horse was recorded at nine sites; – Rabbit was recorded at 22 sites; – Red Fox was recorded at 17 sites; – Rusa Deer was recorded at three sites; – Sambar Deer was recorded at nine sites; and – Wild Dog was recorded at 10 sites.	• Sighting of feral animals triggers control in accordance with the Weed, Pest and Pathogen Management Plan. Feral animal control to be undertaken within areas with feral records. • Priority areas for control include Marica and upper Lobs Hole within proximity to Smoky Mouse habitat.

Feral animal abundance monitoring	• Sighting of feral animals within proximity to known Smoky Mouse habitat or project infrastructure.	• Feral animal abundance monitoring was not undertaken during Q1.	<u>First monitoring event</u> • Three feral animals were recorded across the Main Works project area: – 57 individuals of Rabbit; – 25 individuals of Feral Horse; and – 2 individuals of Feral Cat. • Average abundance for each road/key infrastructure area: – Lobs Hole Ravine Road Bottom (LHRR Bottom) = 0.20 animals/km (Rabbit); – Lobs Hole Ravine Road North (LHRR North) = 0.28 animals/km (Rabbit); – Lobs Hole Ravine Road South (LHRR South) = 0.28 animals/km (Rabbit and Feral Cat); – Marica = 0.15 animals/km (Rabbit); – Tantangara Dam = 4.34 animals/km (Rabbit); and – Tantangara Road = 2.49 animals/km (Rabbit, Feral Horse and Feral Cat).	<u>Second monitoring event</u> • Two feral animals were recorded across the Main Works project area: – 16 individuals of Rabbit; and – 1 European Hare. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 0.52 animals/km (Rabbit and European Hare); – LHRR North = 0.23 animals/km (Rabbit); – Tantangara Dam = 0.96 animals/km (Rabbit); and – Tantangara Road = 0.06 animals/km (Rabbit).	<u>Third monitoring event</u> • Two feral animals were recorded across the Main Works project area: – 56 individuals of Rabbit; and – 34 individuals of Feral Horse. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 1.56 animals/km (Rabbit); – LHRR North = 0.69 animals/km (Rabbit); – LHRR South = 0.14 animals/km; – Marica = 3.65 animals/km (Rabbit and Feral Horse); – Tantangara Dam = 2.11 animals/km (Rabbit); and – Tantangara Road = 0.84 animals/km (Rabbit and Feral Horse). <u>Fourth monitoring event</u> • Four feral animals were recorded across the Main Works project area: – 37 individuals of Rabbit; – 11 individuals of Feral Horse; – 1 individual of European Hare; and – 1 individual of Red Fox. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 0.73 animals/km (Rabbit); – LHRR South = 0.21 animals/km (Rabbit); – Marica = 0.48 animals/km (Rabbit, Feral Horse and Red Fox); – Rock Forest = 0.77 animals/km (Rabbit); – Tantangara Dam = 2.44 animals/km (Rabbit and Feral Horse); and – Tantangara Road = 0.51 animals/km (Rabbit, European Hare and Feral Horse).	• Sighting of feral animals triggers control in accordance with the Weed, Pest and Pathogen Management Plan. Feral animal control to be undertaken within areas with recorded animals. • Priority areas for control include Marica and upper Lobs Hole within proximity to Smoky Mouse habitat.

Weed presence / absence monitoring	• New occurrence of weeds within proximity to project infrastructure. • Monitoring results are identifying increases in density of high priority weeds.	• Sixteen priority weed species were recorded within 50 m of the main project roads, accommodation camps and key construction compounds. • Nine priority weed species were recorded within 50 m of the threatened flora monitoring locations.	• Weed presence / absence monitoring was not required to be undertaken during Q2.	• Weed presence/absence monitoring was not required to be undertaken during Q3.	• Weed presence/absence monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Phytophthora presence/absence monitoring	• A soil sample returns a positive result for Phytophthora species of concerns such as *Phytophthora cinnamomic* or *Phytophthora gregata*.	• Soil sampling for *Phytophthora* spp. was undertaken at two sites: – Tantangara washdown; and – Marica washdown. • No *Phytophthora* spp. detected. • No area of dieback observed.	• Soil sampling for *Phytophthora* spp. was undertaken at an additional six sites: – Marica 01; – Tantangara Adit 01; – Tantangara Road 02; – Lobs 01; – Lobs Hole R5; and – Lobs Hole R0.5. • *Phytophthora* was detected within sample Lobs 01, located at the bottom of Lobs Hole. Further testing identified the species as *Phytophthora cryptogea/psueudocryptogea.* • No *Phytophthora* was detected in the remaining samples. • No area of dieback observed. • An additional 5 samples were collected within proximity to Lobs 01 to determine the extent of Phytophthora in Lobs Hole: – PMS1 – PMS5. • *Phytophthora cryptogea/psueudocryptogea* was identified within samples PMS1 and PMS5.	• *Phytophthora* presence/absence monitoring was not required to be undertaken during Q3.	• Soil sampling for *Phytophthora* spp. was undertaken at an additional 20 sites across the project area as a part of adaptive management and to determine the range and extent of the species surrounding the project area: – PS01 – PS20. • No *Phytophthora* was detected in the samples.	• Adaptive management was triggered following *Phytophthora* spp. detection in Q2. • Adaptive management/mitigation was implemented following detection. This included: – additional sampling within proximity to the location which tested positive to determine the extent of Phytophthora *cryptogea/psueudocryptogea*; and – additional sampling at 20 sites across the project area to collect baseline data and determine whether *Phytophthora cryptogea/psueudocryptogea* is present within any other parts of the Park within proximity to the project area. • No *Phytophthora* spp. was detected in the 20 additional samples; therefore. no additional adaptive management was triggered.

Table ES2 Summary of monitoring components, adaptive management triggers, and baseline and construction conditions

Monitoring component	Trigger for adaptive management	Q1 – Baseline condition	Q2 – Construction condition	Q3 – Construction condition	Q4 – Construction condition	Review of adaptive management triggers
Threatened Flora monitoring	• Percentage decline in the number of plants observed within a single monitoring plot, observed over two consecutive monitoring periods and outside of the standard deviation observed at control sites. • Decline must be observed in conjunction with a primary impact (eg increase in weed cover).	• A total of 199 individuals of Clover Glycine (*Glycine latrobeana*) were recorded across four impact sites (TF02, TF03, TF04, TF14) and 452 individuals across four control sites (TF07, TF08, TF09, TF10). • One individual of Kiandra Leek Orchid (*Prasophyllum retroflexum*) was recorded at one impact site (TF04) and eight individuals at two control sites (TF06, TF09). • No threatened flora species were recorded at four impact sites (TF01, TF11, TF12, TF13) and one control site (TF05).	• Threatened Flora monitoring was not required to be undertaken during Q2.	• Threatened Flora monitoring was not required to be undertaken during Q3.	• Threatened Flora monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Small mammal occupancy monitoring	• Absence of target species from a site during construction and operational monitoring, where the species was recorded during pre-construction/baseline surveys; • No changes in presence/absence at control sites; • Absence recorded for greater than one year; and • Absence is combined with an observed increase or new occurrence of a primary impact (decline in habitat complexity, weeds, pathogens, or feral herbivores/predators).	• The Smoky Mouse was recorded at one impact site (SM05-I) and no control sies. • The Eastern Pygmy Possum was recorded at seven impact sites (SM03-I, SM10-I, SM14-I, SM16-I, SM18-I, SM20-I, SM21-I) and seven control sites (SM02-C, SM04-C, SM06-C, SM08-C, SM09-C, SM11-C, SM17-C). • The Broad-toothed Rat was recorded at three control sites (SM28-C, SM30-C, SM33-C) and no impact sites. • No monitoring sites recorded Broad-toothed Rat scats.	• Two control sites (SM08 and SM11) were replaced (with SM40 and SM41) due to access issues. • The Smoky Mouse was recorded at two impact sites (SM05-I, SM22-I) and one control site (SM09-C). • The Eastern Pygmy-possum was recorded at ten impact sites (SM03-I, SM05-I, SM07-I, SM15-I, SM16-I, SM20-I, SM21-I, SM22-I, SM23-I, SM24-I) and four control sites (SM04-C, SM06-C, SM09-C, SM17-C). • The Broad-toothed Rat was recorded at five control sites (SM28-C, SM30-C, SM32-C, SM33-C, SM38-C) and no impact sites. • Broad-toothed Rat scats were recorded at two control sites (FP 30, FP32) and no impact sites: – FP30: rare (old); and – FP32: rare (intermediate). • Images captured by SM15-I-RC2 over Autumn were lost during data transfer.	• The Smoky Mouse was recorded at four impact sites (SM05-I, SM22-I, SM24-I, SM35-I) and no control sites. • The Eastern Pygmy-possum was recorded at one impact site (SM05-I) and one control site (SM02-C). The species is likely to be in torpor over the monitoring period. • The Broad-toothed Rat was recorded at three control sites (SM28-C, SM30-C, SM32-C) and no impact sites. • Broad-toothed Rat faecal pellet searches were unable to be completed in Winter due to weather constraints. The third monitoring event was completed in Q4 on a separate occasion to the fourth monitoring event. • Broad-toothed Rat faecal pellet monitoring was unable to be conducted due to weather and unsafe conditions. • SM01-I-RC1 was removed by FGJV and has been re-set outside of the construction footprint. • SM33-C-RC2 and SM38-C-RC1 were stolen and therefore no Winter data was collected from these cameras. • SM26-C-RC1 and SM39-C-RC1 suffered technical failure, likely due to low temperatures and failure of batteries. Therefore, no Winter data was collected from these cameras.	• The Smoky Mouse was recorded at three impact sites (SM05-I, SM22-I, SM23-I) and two control sites (SM09-C, SM17-C). • The Eastern Pygmy-possum was recorded at three impact sites (SM14-I, SM21-I, SM23-I) and three control sites (SM02-C, SM09-C, SM40-C). • The Broad-toothed Rat was recorded at three control sites (SM30-C, SM32-C, SM39-C) and no impact sites. • Broad-toothed Rat scats were recorded at one impact site (FP17) and three control sites (FP26, FP32, FP33) during the third event in September 2021: – FP17: rare (old); – FP26: rare (old); – FP32: uncommon (old); and – FP33: rare (old). • Broad-toothed Rat scats were recorded at two control sites (FC26, FP32) and no impact sites during the fourth event in October 2021: – FP26: rare (old); and – FP32: rare (old). • SM06-C-RC2 suffered technical failure and did not collect 30 days of data. • SM33-C-RC2 and SM38-C-RC1 were not replaced after being stolen in winter (as requested by SHL) and therefore no Spring data was collected from these cameras.	• Smoky Mouse was recorded at one impact site during baseline surveys (Q1). The species was recorded at this site during Q2 (but not in Q3 or Q4). The species was not recorded at any control sites during Q1. – Based on this, adaptive management is unlikely to be triggered as no change at control sites can be detected. – Further monitoring should review presence/absence of the species at all impact sites as compared to control sites to look at overall declines. • The Eastern Pygmy-possum was recorded at seven impact sites during baseline surveys (Q1). The species was not recorded at one impact site (SM18-I) during operational monitoring (Q2-Q4) where it was recorded during baseline. – Similar trends were observed at control sites with the species not recorded at two control sites during operational monitoring (Q2-Q4) where it was recorded during baseline surveys (SM08-C, SM11-C). – Further monitoring will determine if these absences occur for greater than one year. • The Broad-toothed Rat was recorded at one faecal pellet monitoring impact site (FP17) during the third monitoring event. However, the species was not recorded on cameras within the impact area. – Based on this, adaptive management is unlikely to be triggered as no change at impact sites can be detected. • Adaptive management not triggered.

Small mammal habitat characteristic monitoring	• Observed degradation in vegetation structure and habitat characteristics of occupied habitat; and • Observed degradation is combined with an observed increase in weed cover or other project related impacts.	• The average percentage of native cover at impact sites ranged from 0% to 99%, compared to that of exotic which ranged from 0% to 66%. • The average percentage of native cover at control sites ranged from 0% to 95%, compared to that of exotic cover which ranged from 0% to 79%. • Two control sites (SM08 and SM11) were unable to be established due to inaccessibility along Dead Man's Fire Trail and will be replaced during Year 2 (with SM40 and SM41).	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q2.	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q3.	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Alpine Tree Frog occupancy monitoring	• A decline in relative abundance (that upon review by species experts, is also considered as biologically significant) occurs during construction and/or operation at impact sites that does not occur at the control sites. • Decline in relative abundance is accompanied by a decline in other monitoring parameters.	• Sixteen sightings of the Alpine Tree Frog were recorded at three of four impact sites (TC02, NC01, KPC01) and 144 sightings at all four control sites (TC03, ER02, MR01, NC03). • No Alpine Tree Frogs were recorded at TR01.	• Alpine Tree Frog monitoring was not required to be undertaken during Q2.	• Alpine Tree Frog monitoring was not required to be undertaken during Q3.	• Alpine Tree Frog monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring. • If the Alpine Tree Frog is not recorded at TR01 in Year 2, it is recommended that this site is moved, with a new impact monitoring location established to replace TR01.
Booroolong Frog occupancy monitoring	• A decline in relative abundance (that upon review by species experts, is also considered as biologically significant) occurs during construction and/or operation at impact sites that does not occur at the control sites. • Decline in relative abundance is accompanied by a decline in other monitoring parameters.	• Twenty sightings of the Booroolong Frog were recorded at all four impact sites (WC01, YR02, YR05, YR06) and five sightings at the two control sites (YR08, YR09).	• Booroolong Frog monitoring was not required to be undertaken during Q2.	• Booroolong Frog monitoring was not required to be undertaken during Q3.	• Booroolong Frog monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Booroolong Frog habitat characteristics monitoring	• Observed degradation, change or loss of rocky (breeding) habitat or pools at impact sites that does not also occur at the reference sites.	• Incorrect data captured in Q1.	• Five out of six monitoring transects were flown during February, outside the breeding season. • No data was captured for control site YR09.	• Booroolong Frog habitat characteristics monitoring was not required to be undertaken during Q3.	• Booroolong Frog habitat characteristics monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.

Alpine She-oak Skink occupancy monitoring	• Absence of target species from a site during construction and operational monitoring, where the species was recorded during pre-construction/baseline surveys; • No changes in presence/absence at control sites; • Absence recorded for greater than one year; and • Absence is combined with an observed increase or new occurrence of a primary impact (weeds).	• Two Alpine She-oak Skinks were recorded at a single impact site (TG02) and five Alpine She-oak Skinks were recorded at three control sites (TG06, TG07, TG08). • No Alpine She-oak Skinks were recorded at four impact sites (TG01, TG03, TG05) and one control site (TG09). • TG04 was unable to be established due to access issues.	• Four Alpine She-oak Skinks were recorded at two control sites (TG07, TG08) and no impact sites. • No Alpine She-oak Skinks were recorded at any impact sites (TG01, TG02, TG03, TG05) and two control sites (TG06, TG09). • TG04 was established during April.	• Alpine She-oak Skink monitoring was not required to be undertaken during Q3.	• Three Alpine She-oak Skinks were recorded at a single impact site (TG03) and two Alpine She-oak Skinks were recorded at a single control site (TG08). • No Alpine She-oak Skinks were recorded at four impact sites (TG01, TG02, TG04, TG05) and three control sites (TG06, TG07, TG09).	• The Alpine She-oak Skink was recorded at a single impact site during Q1. The species was not recorded at this impact site during construction monitoring (Q2-Q4). – Similar trends were observed at control sites. The species was not recorded at one of the three control sites during operational monitoring (Q2-Q4) where it was recorded during baseline surveys (TG06). – Further monitoring will determine if these absences occur for greater than one year. • Adaptive management not triggered.
Feral animal occupancy monitoring	• Sighting of feral animals within proximity to known Smoky Mouse habitat or project infrastructure.	• Nine feral animal species were recorded across 36 sites (63% of monitored sites) comprising: – European Hare (*Lepus europaeus*) was recorded at 13 sites; – Feral Cat (*Felis catus*) was recorded at 17 sites; – Feral Horse (*Equuus caballus*) was recorded at 16 sites; – Rabbit (*Oryctolagus cuniculus*) was recorded at 26 sites; – Red Deer(*Cervus elaphus.*) was recorded at one site; – Red Fox (*Vulpes vulpes*) was recorded at 10 sites; – Rusa Deer (*Cervus timorensis*) was recorded at one site; – Sambar Deer (*Cervus unicolor*)) was recorded at two sites; and – Wild Dog (*Canis lupus*) was recorded at 11 sites.	• Ten feral animal species were recorded across 46 sites (81% of monitored sites) comprising: – European Hare was recorded at six sites; – Feral Cat was recorded at 19 sites; – Feral Horse was recorded at 13 sites; – Feral Pig (*Sus scrofa*) was recorded at one site. – Rabbit was recorded at 27 sites; – Red Deer was recorded at eight sites; – Red Fox was recorded at 15 sites; – Rusa Deer was recorded at two sites; – Sambar Deer was recorded at five sites; and – Wild Dog was recorded at 15 sites.	• Seven feral animal species were recorded across 41 sites (71% monitored sites) comprising: – European Hare was recorded at five sites; – Feral Cat was recorded at 15 sites; – Feral Horse was recorded at nine sites; – Rabbit was recorded at 20 sites; – Red Fox was recorded at 25 sites; – Sambar Deer was recorded at seven sites; and – Wild Dog was recorded at nine sites.	• Eight feral animal species were recorded across 37 sites (64%) comprising: – European Hare was recorded at six sites; – Feral Cat was recorded at 11 sites; – Feral Horse was recorded at nine sites; – Rabbit was recorded at 22 sites; – Red Fox was recorded at 17 sites; – Rusa Deer was recorded at three sites; – Sambar Deer was recorded at nine sites; and – Wild Dog was recorded at 10 sites.	• Sighting of feral animals triggers control in accordance with the Weed, Pest and Pathogen Management Plan. Feral animal control to be undertaken within areas with feral records. • Priority areas for control include Marica and upper Lobs Hole within proximity to Smoky Mouse habitat.

Feral animal abundance monitoring	• Sighting of feral animals within proximity to known Smoky Mouse habitat or project infrastructure.	• Feral animal abundance monitoring was not undertaken during Q1.	<u>First monitoring event</u> • Three feral animals were recorded across the Main Works project area: – 57 individuals of Rabbit; – 25 individuals of Feral Horse; and – 2 individuals of Feral Cat. • Average abundance for each road/key infrastructure area: – Lobs Hole Ravine Road Bottom (LHRR Bottom) = 0.20 animals/km (Rabbit); – Lobs Hole Ravine Road North (LHRR North) = 0.28 animals/km (Rabbit); – Lobs Hole Ravine Road South (LHRR South) = 0.28 animals/km (Rabbit and Feral Cat); – Marica = 0.15 animals/km (Rabbit); – Tantangara Dam = 4.34 animals/km (Rabbit); and – Tantangara Road = 2.49 animals/km (Rabbit, Feral Horse and Feral Cat).	<u>Second monitoring event</u> • Two feral animals were recorded across the Main Works project area: – 16 individuals of Rabbit; and – 1 European Hare. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 0.52 animals/km (Rabbit and European Hare); – LHRR North = 0.23 animals/km (Rabbit); – Tantangara Dam = 0.96 animals/km (Rabbit); and – Tantangara Road = 0.06 animals/km (Rabbit).	<u>Third monitoring event</u> • Two feral animals were recorded across the Main Works project area: – 56 individuals of Rabbit; and – 34 individuals of Feral Horse. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 1.56 animals/km (Rabbit); – LHRR North = 0.69 animals/km (Rabbit); – LHRR South = 0.14 animals/km; – Marica = 3.65 animals/km (Rabbit and Feral Horse); – Tantangara Dam = 2.11 animals/km (Rabbit); and – Tantangara Road = 0.84 animals/km (Rabbit and Feral Horse). <u>Fourth monitoring event</u> • Four feral animals were recorded across the Main Works project area: – 37 individuals of Rabbit; – 11 individuals of Feral Horse; – 1 individual of European Hare; and – 1 individual of Red Fox. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 0.73 animals/km (Rabbit); – LHRR South = 0.21 animals/km (Rabbit); – Marica = 0.48 animals/km (Rabbit, Feral Horse and Red Fox); – Rock Forest = 0.77 animals/km (Rabbit); – Tantangara Dam = 2.44 animals/km (Rabbit and Feral Horse); and – Tantangara Road = 0.51 animals/km (Rabbit, European Hare and Feral Horse).	• Sighting of feral animals triggers control in accordance with the Weed, Pest and Pathogen Management Plan. Feral animal control to be undertaken within areas with recorded animals. • Priority areas for control include Marica and upper Lobs Hole within proximity to Smoky Mouse habitat.

Weed presence / absence monitoring	• New occurrence of weeds within proximity to project infrastructure. • Monitoring results are identifying increases in density of high priority weeds.	• Sixteen priority weed species were recorded within 50 m of the main project roads, accommodation camps and key construction compounds. • Nine priority weed species were recorded within 50 m of the threatened flora monitoring locations.	• Weed presence / absence monitoring was not required to be undertaken during Q2.	• Weed presence/absence monitoring was not required to be undertaken during Q3.	• Weed presence/absence monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Phytophthora presence/absence monitoring	• A soil sample returns a positive result for Phytophthora species of concerns such as *Phytophthora cinnamomic* or *Phytophthora gregata*.	• Soil sampling for *Phytophthora* spp. was undertaken at two sites: – Tantangara washdown; and – Marica washdown. • No *Phytophthora* spp. detected. • No area of dieback observed.	• Soil sampling for *Phytophthora* spp. was undertaken at an additional six sites: – Marica 01; – Tantangara Adit 01; – Tantangara Road 02; – Lobs 01; – Lobs Hole R5; and – Lobs Hole R0.5. • *Phytophthora* was detected within sample Lobs 01, located at the bottom of Lobs Hole. Further testing identified the species as *Phytophthora cryptogea/psueudocryptogea.* • No *Phytophthora* was detected in the remaining samples. • No area of dieback observed. • An additional 5 samples were collected within proximity to Lobs 01 to determine the extent of Phytophthora in Lobs Hole: – PMS1 – PMS5. • *Phytophthora cryptogea/psueudocryptogea* was identified within samples PMS1 and PMS5.	• *Phytophthora* presence/absence monitoring was not required to be undertaken during Q3.	• Soil sampling for *Phytophthora* spp. was undertaken at an additional 20 sites across the project area as a part of adaptive management and to determine the range and extent of the species surrounding the project area: – PS01 – PS20. • No *Phytophthora* was detected in the samples.	• Adaptive management was triggered following *Phytophthora* spp. detection in Q2. • Adaptive management/mitigation was implemented following detection. This included: – additional sampling within proximity to the location which tested positive to determine the extent of Phytophthora *cryptogea/psueudocryptogea*; and – additional sampling at 20 sites across the project area to collect baseline data and determine whether *Phytophthora cryptogea/psueudocryptogea* is present within any other parts of the Park within proximity to the project area. • No *Phytophthora* spp. was detected in the 20 additional samples; therefore. no additional adaptive management was triggered.

Table ES2 Summary of monitoring components, adaptive management triggers, and baseline and construction conditions

Monitoring component	Trigger for adaptive management	Q1 – Baseline condition	Q2 – Construction condition	Q3 – Construction condition	Q4 – Construction condition	Review of adaptive management triggers
Threatened Flora monitoring	• Percentage decline in the number of plants observed within a single monitoring plot, observed over two consecutive monitoring periods and outside of the standard deviation observed at control sites. • Decline must be observed in conjunction with a primary impact (eg increase in weed cover).	• A total of 199 individuals of Clover Glycine (*Glycine latrobeana*) were recorded across four impact sites (TF02, TF03, TF04, TF14) and 452 individuals across four control sites (TF07, TF08, TF09, TF10). • One individual of Kiandra Leek Orchid (*Prasophyllum retroflexum*) was recorded at one impact site (TF04) and eight individuals at two control sites (TF06, TF09). • No threatened flora species were recorded at four impact sites (TF01, TF11, TF12, TF13) and one control site (TF05).	• Threatened Flora monitoring was not required to be undertaken during Q2.	• Threatened Flora monitoring was not required to be undertaken during Q3.	• Threatened Flora monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Small mammal occupancy monitoring	• Absence of target species from a site during construction and operational monitoring, where the species was recorded during pre-construction/baseline surveys; • No changes in presence/absence at control sites; • Absence recorded for greater than one year; and • Absence is combined with an observed increase or new occurrence of a primary impact (decline in habitat complexity, weeds, pathogens, or feral herbivores/predators).	• The Smoky Mouse was recorded at one impact site (SM05-I) and no control sies. • The Eastern Pygmy Possum was recorded at seven impact sites (SM03-I, SM10-I, SM14-I, SM16-I, SM18-I, SM20-I, SM21-I) and seven control sites (SM02-C, SM04-C, SM06-C, SM08-C, SM09-C, SM11-C, SM17-C). • The Broad-toothed Rat was recorded at three control sites (SM28-C, SM30-C, SM33-C) and no impact sites. • No monitoring sites recorded Broad-toothed Rat scats.	• Two control sites (SM08 and SM11) were replaced (with SM40 and SM41) due to access issues. • The Smoky Mouse was recorded at two impact sites (SM05-I, SM22-I) and one control site (SM09-C). • The Eastern Pygmy-possum was recorded at ten impact sites (SM03-I, SM05-I, SM07-I, SM15-I, SM16-I, SM20-I, SM21-I, SM22-I, SM23-I, SM24-I) and four control sites (SM04-C, SM06-C, SM09-C, SM17-C). • The Broad-toothed Rat was recorded at five control sites (SM28-C, SM30-C, SM32-C, SM33-C, SM38-C) and no impact sites. • Broad-toothed Rat scats were recorded at two control sites (FP 30, FP32) and no impact sites: – FP30: rare (old); and – FP32: rare (intermediate). • Images captured by SM15-I-RC2 over Autumn were lost during data transfer.	• The Smoky Mouse was recorded at four impact sites (SM05-I, SM22-I, SM24-I, SM35-I) and no control sites. • The Eastern Pygmy-possum was recorded at one impact site (SM05-I) and one control site (SM02-C). The species is likely to be in torpor over the monitoring period. • The Broad-toothed Rat was recorded at three control sites (SM28-C, SM30-C, SM32-C) and no impact sites. • Broad-toothed Rat faecal pellet searches were unable to be completed in Winter due to weather constraints. The third monitoring event was completed in Q4 on a separate occasion to the fourth monitoring event. • Broad-toothed Rat faecal pellet monitoring was unable to be conducted due to weather and unsafe conditions. • SM01-I-RC1 was removed by FGJV and has been re-set outside of the construction footprint. • SM33-C-RC2 and SM38-C-RC1 were stolen and therefore no Winter data was collected from these cameras. • SM26-C-RC1 and SM39-C-RC1 suffered technical failure, likely due to low temperatures and failure of batteries. Therefore, no Winter data was collected from these cameras.	• The Smoky Mouse was recorded at three impact sites (SM05-I, SM22-I, SM23-I) and two control sites (SM09-C, SM17-C). • The Eastern Pygmy-possum was recorded at three impact sites (SM14-I, SM21-I, SM23-I) and three control sites (SM02-C, SM09-C, SM40-C). • The Broad-toothed Rat was recorded at three control sites (SM30-C, SM32-C, SM39-C) and no impact sites. • Broad-toothed Rat scats were recorded at one impact site (FP17) and three control sites (FP26, FP32, FP33) during the third event in September 2021: – FP17: rare (old); – FP26: rare (old); – FP32: uncommon (old); and – FP33: rare (old). • Broad-toothed Rat scats were recorded at two control sites (FC26, FP32) and no impact sites during the fourth event in October 2021: – FP26: rare (old); and – FP32: rare (old). • SM06-C-RC2 suffered technical failure and did not collect 30 days of data. • SM33-C-RC2 and SM38-C-RC1 were not replaced after being stolen in winter (as requested by SHL) and therefore no Spring data was collected from these cameras.	• Smoky Mouse was recorded at one impact site during baseline surveys (Q1). The species was recorded at this site during Q2 (but not in Q3 or Q4). The species was not recorded at any control sites during Q1. – Based on this, adaptive management is unlikely to be triggered as no change at control sites can be detected. – Further monitoring should review presence/absence of the species at all impact sites as compared to control sites to look at overall declines. • The Eastern Pygmy-possum was recorded at seven impact sites during baseline surveys (Q1). The species was not recorded at one impact site (SM18-I) during operational monitoring (Q2-Q4) where it was recorded during baseline. – Similar trends were observed at control sites with the species not recorded at two control sites during operational monitoring (Q2-Q4) where it was recorded during baseline surveys (SM08-C, SM11-C). – Further monitoring will determine if these absences occur for greater than one year. • The Broad-toothed Rat was recorded at one faecal pellet monitoring impact site (FP17) during the third monitoring event. However, the species was not recorded on cameras within the impact area. – Based on this, adaptive management is unlikely to be triggered as no change at impact sites can be detected. • Adaptive management not triggered.

Small mammal habitat characteristic monitoring	• Observed degradation in vegetation structure and habitat characteristics of occupied habitat; and • Observed degradation is combined with an observed increase in weed cover or other project related impacts.	• The average percentage of native cover at impact sites ranged from 0% to 99%, compared to that of exotic which ranged from 0% to 66%. • The average percentage of native cover at control sites ranged from 0% to 95%, compared to that of exotic cover which ranged from 0% to 79%. • Two control sites (SM08 and SM11) were unable to be established due to inaccessibility along Dead Man's Fire Trail and will be replaced during Year 2 (with SM40 and SM41).	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q2.	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q3.	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Alpine Tree Frog occupancy monitoring	• A decline in relative abundance (that upon review by species experts, is also considered as biologically significant) occurs during construction and/or operation at impact sites that does not occur at the control sites. • Decline in relative abundance is accompanied by a decline in other monitoring parameters.	• Sixteen sightings of the Alpine Tree Frog were recorded at three of four impact sites (TC02, NC01, KPC01) and 144 sightings at all four control sites (TC03, ER02, MR01, NC03). • No Alpine Tree Frogs were recorded at TR01.	• Alpine Tree Frog monitoring was not required to be undertaken during Q2.	• Alpine Tree Frog monitoring was not required to be undertaken during Q3.	• Alpine Tree Frog monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring. • If the Alpine Tree Frog is not recorded at TR01 in Year 2, it is recommended that this site is moved, with a new impact monitoring location established to replace TR01.
Booroolong Frog occupancy monitoring	• A decline in relative abundance (that upon review by species experts, is also considered as biologically significant) occurs during construction and/or operation at impact sites that does not occur at the control sites. • Decline in relative abundance is accompanied by a decline in other monitoring parameters.	• Twenty sightings of the Booroolong Frog were recorded at all four impact sites (WC01, YR02, YR05, YR06) and five sightings at the two control sites (YR08, YR09).	• Booroolong Frog monitoring was not required to be undertaken during Q2.	• Booroolong Frog monitoring was not required to be undertaken during Q3.	• Booroolong Frog monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Booroolong Frog habitat characteristics monitoring	• Observed degradation, change or loss of rocky (breeding) habitat or pools at impact sites that does not also occur at the reference sites.	• Incorrect data captured in Q1.	• Five out of six monitoring transects were flown during February, outside the breeding season. • No data was captured for control site YR09.	• Booroolong Frog habitat characteristics monitoring was not required to be undertaken during Q3.	• Booroolong Frog habitat characteristics monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.

Alpine She-oak Skink occupancy monitoring	• Absence of target species from a site during construction and operational monitoring, where the species was recorded during pre-construction/baseline surveys; • No changes in presence/absence at control sites; • Absence recorded for greater than one year; and • Absence is combined with an observed increase or new occurrence of a primary impact (weeds).	• Two Alpine She-oak Skinks were recorded at a single impact site (TG02) and five Alpine She-oak Skinks were recorded at three control sites (TG06, TG07, TG08). • No Alpine She-oak Skinks were recorded at four impact sites (TG01, TG03, TG05) and one control site (TG09). • TG04 was unable to be established due to access issues.	• Four Alpine She-oak Skinks were recorded at two control sites (TG07, TG08) and no impact sites. • No Alpine She-oak Skinks were recorded at any impact sites (TG01, TG02, TG03, TG05) and two control sites (TG06, TG09). • TG04 was established during April.	• Alpine She-oak Skink monitoring was not required to be undertaken during Q3.	• Three Alpine She-oak Skinks were recorded at a single impact site (TG03) and two Alpine She-oak Skinks were recorded at a single control site (TG08). • No Alpine She-oak Skinks were recorded at four impact sites (TG01, TG02, TG04, TG05) and three control sites (TG06, TG07, TG09).	• The Alpine She-oak Skink was recorded at a single impact site during Q1. The species was not recorded at this impact site during construction monitoring (Q2-Q4). – Similar trends were observed at control sites. The species was not recorded at one of the three control sites during operational monitoring (Q2-Q4) where it was recorded during baseline surveys (TG06). – Further monitoring will determine if these absences occur for greater than one year. • Adaptive management not triggered.
Feral animal occupancy monitoring	• Sighting of feral animals within proximity to known Smoky Mouse habitat or project infrastructure.	• Nine feral animal species were recorded across 36 sites (63% of monitored sites) comprising: – European Hare (*Lepus europaeus*) was recorded at 13 sites; – Feral Cat (*Felis catus*) was recorded at 17 sites; – Feral Horse (*Equuus caballus*) was recorded at 16 sites; – Rabbit (*Oryctolagus cuniculus*) was recorded at 26 sites; – Red Deer(*Cervus elaphus.*) was recorded at one site; – Red Fox (*Vulpes vulpes*) was recorded at 10 sites; – Rusa Deer (*Cervus timorensis*) was recorded at one site; – Sambar Deer (*Cervus unicolor*)) was recorded at two sites; and – Wild Dog (*Canis lupus*) was recorded at 11 sites.	• Ten feral animal species were recorded across 46 sites (81% of monitored sites) comprising: – European Hare was recorded at six sites; – Feral Cat was recorded at 19 sites; – Feral Horse was recorded at 13 sites; – Feral Pig (*Sus scrofa*) was recorded at one site. – Rabbit was recorded at 27 sites; – Red Deer was recorded at eight sites; – Red Fox was recorded at 15 sites; – Rusa Deer was recorded at two sites; – Sambar Deer was recorded at five sites; and – Wild Dog was recorded at 15 sites.	• Seven feral animal species were recorded across 41 sites (71% monitored sites) comprising: – European Hare was recorded at five sites; – Feral Cat was recorded at 15 sites; – Feral Horse was recorded at nine sites; – Rabbit was recorded at 20 sites; – Red Fox was recorded at 25 sites; – Sambar Deer was recorded at seven sites; and – Wild Dog was recorded at nine sites.	• Eight feral animal species were recorded across 37 sites (64%) comprising: – European Hare was recorded at six sites; – Feral Cat was recorded at 11 sites; – Feral Horse was recorded at nine sites; – Rabbit was recorded at 22 sites; – Red Fox was recorded at 17 sites; – Rusa Deer was recorded at three sites; – Sambar Deer was recorded at nine sites; and – Wild Dog was recorded at 10 sites.	• Sighting of feral animals triggers control in accordance with the Weed, Pest and Pathogen Management Plan. Feral animal control to be undertaken within areas with feral records. • Priority areas for control include Marica and upper Lobs Hole within proximity to Smoky Mouse habitat.

Feral animal abundance monitoring	• Sighting of feral animals within proximity to known Smoky Mouse habitat or project infrastructure.	• Feral animal abundance monitoring was not undertaken during Q1.	<u>First monitoring event</u> • Three feral animals were recorded across the Main Works project area: – 57 individuals of Rabbit; – 25 individuals of Feral Horse; and – 2 individuals of Feral Cat. • Average abundance for each road/key infrastructure area: – Lobs Hole Ravine Road Bottom (LHRR Bottom) = 0.20 animals/km (Rabbit); – Lobs Hole Ravine Road North (LHRR North) = 0.28 animals/km (Rabbit); – Lobs Hole Ravine Road South (LHRR South) = 0.28 animals/km (Rabbit and Feral Cat); – Marica = 0.15 animals/km (Rabbit); – Tantangara Dam = 4.34 animals/km (Rabbit); and – Tantangara Road = 2.49 animals/km (Rabbit, Feral Horse and Feral Cat).	<u>Second monitoring event</u> • Two feral animals were recorded across the Main Works project area: – 16 individuals of Rabbit; and – 1 European Hare. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 0.52 animals/km (Rabbit and European Hare); – LHRR North = 0.23 animals/km (Rabbit); – Tantangara Dam = 0.96 animals/km (Rabbit); and – Tantangara Road = 0.06 animals/km (Rabbit).	<u>Third monitoring event</u> • Two feral animals were recorded across the Main Works project area: – 56 individuals of Rabbit; and – 34 individuals of Feral Horse. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 1.56 animals/km (Rabbit); – LHRR North = 0.69 animals/km (Rabbit); – LHRR South = 0.14 animals/km; – Marica = 3.65 animals/km (Rabbit and Feral Horse); – Tantangara Dam = 2.11 animals/km (Rabbit); and – Tantangara Road = 0.84 animals/km (Rabbit and Feral Horse). <u>Fourth monitoring event</u> • Four feral animals were recorded across the Main Works project area: – 37 individuals of Rabbit; – 11 individuals of Feral Horse; – 1 individual of European Hare; and – 1 individual of Red Fox. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 0.73 animals/km (Rabbit); – LHRR South = 0.21 animals/km (Rabbit); – Marica = 0.48 animals/km (Rabbit, Feral Horse and Red Fox); – Rock Forest = 0.77 animals/km (Rabbit); – Tantangara Dam = 2.44 animals/km (Rabbit and Feral Horse); and – Tantangara Road = 0.51 animals/km (Rabbit, European Hare and Feral Horse).	• Sighting of feral animals triggers control in accordance with the Weed, Pest and Pathogen Management Plan. Feral animal control to be undertaken within areas with recorded animals. • Priority areas for control include Marica and upper Lobs Hole within proximity to Smoky Mouse habitat.

Weed presence / absence monitoring	• New occurrence of weeds within proximity to project infrastructure. • Monitoring results are identifying increases in density of high priority weeds.	• Sixteen priority weed species were recorded within 50 m of the main project roads, accommodation camps and key construction compounds. • Nine priority weed species were recorded within 50 m of the threatened flora monitoring locations.	• Weed presence / absence monitoring was not required to be undertaken during Q2.	• Weed presence/absence monitoring was not required to be undertaken during Q3.	• Weed presence/absence monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Phytophthora presence/absence monitoring	• A soil sample returns a positive result for Phytophthora species of concerns such as *Phytophthora cinnamomic* or *Phytophthora gregata*.	• Soil sampling for *Phytophthora* spp. was undertaken at two sites: – Tantangara washdown; and – Marica washdown. • No *Phytophthora* spp. detected. • No area of dieback observed.	• Soil sampling for *Phytophthora* spp. was undertaken at an additional six sites: – Marica 01; – Tantangara Adit 01; – Tantangara Road 02; – Lobs 01; – Lobs Hole R5; and – Lobs Hole R0.5. • *Phytophthora* was detected within sample Lobs 01, located at the bottom of Lobs Hole. Further testing identified the species as *Phytophthora cryptogea/psueudocryptogea.* • No *Phytophthora* was detected in the remaining samples. • No area of dieback observed. • An additional 5 samples were collected within proximity to Lobs 01 to determine the extent of Phytophthora in Lobs Hole: – PMS1 – PMS5. • *Phytophthora cryptogea/psueudocryptogea* was identified within samples PMS1 and PMS5.	• *Phytophthora* presence/absence monitoring was not required to be undertaken during Q3.	• Soil sampling for *Phytophthora* spp. was undertaken at an additional 20 sites across the project area as a part of adaptive management and to determine the range and extent of the species surrounding the project area: – PS01 – PS20. • No *Phytophthora* was detected in the samples.	• Adaptive management was triggered following *Phytophthora* spp. detection in Q2. • Adaptive management/mitigation was implemented following detection. This included: – additional sampling within proximity to the location which tested positive to determine the extent of Phytophthora *cryptogea/psueudocryptogea*; and – additional sampling at 20 sites across the project area to collect baseline data and determine whether *Phytophthora cryptogea/psueudocryptogea* is present within any other parts of the Park within proximity to the project area. • No *Phytophthora* spp. was detected in the 20 additional samples; therefore. no additional adaptive management was triggered.

Table ES2 Summary of monitoring components, adaptive management triggers, and baseline and construction conditions

Monitoring component	Trigger for adaptive management	Q1 – Baseline condition	Q2 – Construction condition	Q3 – Construction condition	Q4 – Construction condition	Review of adaptive management triggers
Threatened Flora monitoring	• Percentage decline in the number of plants observed within a single monitoring plot, observed over two consecutive monitoring periods and outside of the standard deviation observed at control sites. • Decline must be observed in conjunction with a primary impact (eg increase in weed cover).	• A total of 199 individuals of Clover Glycine (*Glycine latrobeana*) were recorded across four impact sites (TF02, TF03, TF04, TF14) and 452 individuals across four control sites (TF07, TF08, TF09, TF10). • One individual of Kiandra Leek Orchid (*Prasophyllum retroflexum*) was recorded at one impact site (TF04) and eight individuals at two control sites (TF06, TF09). • No threatened flora species were recorded at four impact sites (TF01, TF11, TF12, TF13) and one control site (TF05).	• Threatened Flora monitoring was not required to be undertaken during Q2.	• Threatened Flora monitoring was not required to be undertaken during Q3.	• Threatened Flora monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Small mammal occupancy monitoring	• Absence of target species from a site during construction and operational monitoring, where the species was recorded during pre-construction/baseline surveys; • No changes in presence/absence at control sites; • Absence recorded for greater than one year; and • Absence is combined with an observed increase or new occurrence of a primary impact (decline in habitat complexity, weeds, pathogens, or feral herbivores/predators).	• The Smoky Mouse was recorded at one impact site (SM05-I) and no control sies. • The Eastern Pygmy Possum was recorded at seven impact sites (SM03-I, SM10-I, SM14-I, SM16-I, SM18-I, SM20-I, SM21-I) and seven control sites (SM02-C, SM04-C, SM06-C, SM08-C, SM09-C, SM11-C, SM17-C). • The Broad-toothed Rat was recorded at three control sites (SM28-C, SM30-C, SM33-C) and no impact sites. • No monitoring sites recorded Broad-toothed Rat scats.	• Two control sites (SM08 and SM11) were replaced (with SM40 and SM41) due to access issues. • The Smoky Mouse was recorded at two impact sites (SM05-I, SM22-I) and one control site (SM09-C). • The Eastern Pygmy-possum was recorded at ten impact sites (SM03-I, SM05-I, SM07-I, SM15-I, SM16-I, SM20-I, SM21-I, SM22-I, SM23-I, SM24-I) and four control sites (SM04-C, SM06-C, SM09-C, SM17-C). • The Broad-toothed Rat was recorded at five control sites (SM28-C, SM30-C, SM32-C, SM33-C, SM38-C) and no impact sites. • Broad-toothed Rat scats were recorded at two control sites (FP 30, FP32) and no impact sites: – FP30: rare (old); and – FP32: rare (intermediate). • Images captured by SM15-I-RC2 over Autumn were lost during data transfer.	• The Smoky Mouse was recorded at four impact sites (SM05-I, SM22-I, SM24-I, SM35-I) and no control sites. • The Eastern Pygmy-possum was recorded at one impact site (SM05-I) and one control site (SM02-C). The species is likely to be in torpor over the monitoring period. • The Broad-toothed Rat was recorded at three control sites (SM28-C, SM30-C, SM32-C) and no impact sites. • Broad-toothed Rat faecal pellet searches were unable to be completed in Winter due to weather constraints. The third monitoring event was completed in Q4 on a separate occasion to the fourth monitoring event. • Broad-toothed Rat faecal pellet monitoring was unable to be conducted due to weather and unsafe conditions. • SM01-I-RC1 was removed by FGJV and has been re-set outside of the construction footprint. • SM33-C-RC2 and SM38-C-RC1 were stolen and therefore no Winter data was collected from these cameras. • SM26-C-RC1 and SM39-C-RC1 suffered technical failure, likely due to low temperatures and failure of batteries. Therefore, no Winter data was collected from these cameras.	• The Smoky Mouse was recorded at three impact sites (SM05-I, SM22-I, SM23-I) and two control sites (SM09-C, SM17-C). • The Eastern Pygmy-possum was recorded at three impact sites (SM14-I, SM21-I, SM23-I) and three control sites (SM02-C, SM09-C, SM40-C). • The Broad-toothed Rat was recorded at three control sites (SM30-C, SM32-C, SM39-C) and no impact sites. • Broad-toothed Rat scats were recorded at one impact site (FP17) and three control sites (FP26, FP32, FP33) during the third event in September 2021: – FP17: rare (old); – FP26: rare (old); – FP32: uncommon (old); and – FP33: rare (old). • Broad-toothed Rat scats were recorded at two control sites (FC26, FP32) and no impact sites during the fourth event in October 2021: – FP26: rare (old); and – FP32: rare (old). • SM06-C-RC2 suffered technical failure and did not collect 30 days of data. • SM33-C-RC2 and SM38-C-RC1 were not replaced after being stolen in winter (as requested by SHL) and therefore no Spring data was collected from these cameras.	• Smoky Mouse was recorded at one impact site during baseline surveys (Q1). The species was recorded at this site during Q2 (but not in Q3 or Q4). The species was not recorded at any control sites during Q1. – Based on this, adaptive management is unlikely to be triggered as no change at control sites can be detected. – Further monitoring should review presence/absence of the species at all impact sites as compared to control sites to look at overall declines. • The Eastern Pygmy-possum was recorded at seven impact sites during baseline surveys (Q1). The species was not recorded at one impact site (SM18-I) during operational monitoring (Q2-Q4) where it was recorded during baseline. – Similar trends were observed at control sites with the species not recorded at two control sites during operational monitoring (Q2-Q4) where it was recorded during baseline surveys (SM08-C, SM11-C). – Further monitoring will determine if these absences occur for greater than one year. • The Broad-toothed Rat was recorded at one faecal pellet monitoring impact site (FP17) during the third monitoring event. However, the species was not recorded on cameras within the impact area. – Based on this, adaptive management is unlikely to be triggered as no change at impact sites can be detected. • Adaptive management not triggered.

Small mammal habitat characteristic monitoring	• Observed degradation in vegetation structure and habitat characteristics of occupied habitat; and • Observed degradation is combined with an observed increase in weed cover or other project related impacts.	• The average percentage of native cover at impact sites ranged from 0% to 99%, compared to that of exotic which ranged from 0% to 66%. • The average percentage of native cover at control sites ranged from 0% to 95%, compared to that of exotic cover which ranged from 0% to 79%. • Two control sites (SM08 and SM11) were unable to be established due to inaccessibility along Dead Man's Fire Trail and will be replaced during Year 2 (with SM40 and SM41).	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q2.	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q3.	• Small mammal habitat characteristic monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Alpine Tree Frog occupancy monitoring	• A decline in relative abundance (that upon review by species experts, is also considered as biologically significant) occurs during construction and/or operation at impact sites that does not occur at the control sites. • Decline in relative abundance is accompanied by a decline in other monitoring parameters.	• Sixteen sightings of the Alpine Tree Frog were recorded at three of four impact sites (TC02, NC01, KPC01) and 144 sightings at all four control sites (TC03, ER02, MR01, NC03). • No Alpine Tree Frogs were recorded at TR01.	• Alpine Tree Frog monitoring was not required to be undertaken during Q2.	• Alpine Tree Frog monitoring was not required to be undertaken during Q3.	• Alpine Tree Frog monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring. • If the Alpine Tree Frog is not recorded at TR01 in Year 2, it is recommended that this site is moved, with a new impact monitoring location established to replace TR01.
Booroolong Frog occupancy monitoring	• A decline in relative abundance (that upon review by species experts, is also considered as biologically significant) occurs during construction and/or operation at impact sites that does not occur at the control sites. • Decline in relative abundance is accompanied by a decline in other monitoring parameters.	• Twenty sightings of the Booroolong Frog were recorded at all four impact sites (WC01, YR02, YR05, YR06) and five sightings at the two control sites (YR08, YR09).	• Booroolong Frog monitoring was not required to be undertaken during Q2.	• Booroolong Frog monitoring was not required to be undertaken during Q3.	• Booroolong Frog monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Booroolong Frog habitat characteristics monitoring	• Observed degradation, change or loss of rocky (breeding) habitat or pools at impact sites that does not also occur at the reference sites.	• Incorrect data captured in Q1.	• Five out of six monitoring transects were flown during February, outside the breeding season. • No data was captured for control site YR09.	• Booroolong Frog habitat characteristics monitoring was not required to be undertaken during Q3.	• Booroolong Frog habitat characteristics monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.

Alpine She-oak Skink occupancy monitoring	• Absence of target species from a site during construction and operational monitoring, where the species was recorded during pre-construction/baseline surveys; • No changes in presence/absence at control sites; • Absence recorded for greater than one year; and • Absence is combined with an observed increase or new occurrence of a primary impact (weeds).	• Two Alpine She-oak Skinks were recorded at a single impact site (TG02) and five Alpine She-oak Skinks were recorded at three control sites (TG06, TG07, TG08). • No Alpine She-oak Skinks were recorded at four impact sites (TG01, TG03, TG05) and one control site (TG09). • TG04 was unable to be established due to access issues.	• Four Alpine She-oak Skinks were recorded at two control sites (TG07, TG08) and no impact sites. • No Alpine She-oak Skinks were recorded at any impact sites (TG01, TG02, TG03, TG05) and two control sites (TG06, TG09). • TG04 was established during April.	• Alpine She-oak Skink monitoring was not required to be undertaken during Q3.	• Three Alpine She-oak Skinks were recorded at a single impact site (TG03) and two Alpine She-oak Skinks were recorded at a single control site (TG08). • No Alpine She-oak Skinks were recorded at four impact sites (TG01, TG02, TG04, TG05) and three control sites (TG06, TG07, TG09).	• The Alpine She-oak Skink was recorded at a single impact site during Q1. The species was not recorded at this impact site during construction monitoring (Q2-Q4). – Similar trends were observed at control sites. The species was not recorded at one of the three control sites during operational monitoring (Q2-Q4) where it was recorded during baseline surveys (TG06). – Further monitoring will determine if these absences occur for greater than one year. • Adaptive management not triggered.
Feral animal occupancy monitoring	• Sighting of feral animals within proximity to known Smoky Mouse habitat or project infrastructure.	• Nine feral animal species were recorded across 36 sites (63% of monitored sites) comprising: – European Hare (*Lepus europaeus*) was recorded at 13 sites; – Feral Cat (*Felis catus*) was recorded at 17 sites; – Feral Horse (*Equuus caballus*) was recorded at 16 sites; – Rabbit (*Oryctolagus cuniculus*) was recorded at 26 sites; – Red Deer(*Cervus elaphus.*) was recorded at one site; – Red Fox (*Vulpes vulpes*) was recorded at 10 sites; – Rusa Deer (*Cervus timorensis*) was recorded at one site; – Sambar Deer (*Cervus unicolor*)) was recorded at two sites; and – Wild Dog (*Canis lupus*) was recorded at 11 sites.	• Ten feral animal species were recorded across 46 sites (81% of monitored sites) comprising: – European Hare was recorded at six sites; – Feral Cat was recorded at 19 sites; – Feral Horse was recorded at 13 sites; – Feral Pig (*Sus scrofa*) was recorded at one site. – Rabbit was recorded at 27 sites; – Red Deer was recorded at eight sites; – Red Fox was recorded at 15 sites; – Rusa Deer was recorded at two sites; – Sambar Deer was recorded at five sites; and – Wild Dog was recorded at 15 sites.	• Seven feral animal species were recorded across 41 sites (71% monitored sites) comprising: – European Hare was recorded at five sites; – Feral Cat was recorded at 15 sites; – Feral Horse was recorded at nine sites; – Rabbit was recorded at 20 sites; – Red Fox was recorded at 25 sites; – Sambar Deer was recorded at seven sites; and – Wild Dog was recorded at nine sites.	• Eight feral animal species were recorded across 37 sites (64%) comprising: – European Hare was recorded at six sites; – Feral Cat was recorded at 11 sites; – Feral Horse was recorded at nine sites; – Rabbit was recorded at 22 sites; – Red Fox was recorded at 17 sites; – Rusa Deer was recorded at three sites; – Sambar Deer was recorded at nine sites; and – Wild Dog was recorded at 10 sites.	• Sighting of feral animals triggers control in accordance with the Weed, Pest and Pathogen Management Plan. Feral animal control to be undertaken within areas with feral records. • Priority areas for control include Marica and upper Lobs Hole within proximity to Smoky Mouse habitat.

Feral animal abundance monitoring	• Sighting of feral animals within proximity to known Smoky Mouse habitat or project infrastructure.	• Feral animal abundance monitoring was not undertaken during Q1.	<u>First monitoring event</u> • Three feral animals were recorded across the Main Works project area: – 57 individuals of Rabbit; – 25 individuals of Feral Horse; and – 2 individuals of Feral Cat. • Average abundance for each road/key infrastructure area: – Lobs Hole Ravine Road Bottom (LHRR Bottom) = 0.20 animals/km (Rabbit); – Lobs Hole Ravine Road North (LHRR North) = 0.28 animals/km (Rabbit); – Lobs Hole Ravine Road South (LHRR South) = 0.28 animals/km (Rabbit and Feral Cat); – Marica = 0.15 animals/km (Rabbit); – Tantangara Dam = 4.34 animals/km (Rabbit); and – Tantangara Road = 2.49 animals/km (Rabbit, Feral Horse and Feral Cat).	<u>Second monitoring event</u> • Two feral animals were recorded across the Main Works project area: – 16 individuals of Rabbit; and – 1 European Hare. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 0.52 animals/km (Rabbit and European Hare); – LHRR North = 0.23 animals/km (Rabbit); – Tantangara Dam = 0.96 animals/km (Rabbit); and – Tantangara Road = 0.06 animals/km (Rabbit).	<u>Third monitoring event</u> • Two feral animals were recorded across the Main Works project area: – 56 individuals of Rabbit; and – 34 individuals of Feral Horse. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 1.56 animals/km (Rabbit); – LHRR North = 0.69 animals/km (Rabbit); – LHRR South = 0.14 animals/km; – Marica = 3.65 animals/km (Rabbit and Feral Horse); – Tantangara Dam = 2.11 animals/km (Rabbit); and – Tantangara Road = 0.84 animals/km (Rabbit and Feral Horse). <u>Fourth monitoring event</u> • Four feral animals were recorded across the Main Works project area: – 37 individuals of Rabbit; – 11 individuals of Feral Horse; – 1 individual of European Hare; and – 1 individual of Red Fox. • Average abundance for each road/key infrastructure area: – LHRR Bottom = 0.73 animals/km (Rabbit); – LHRR South = 0.21 animals/km (Rabbit); – Marica = 0.48 animals/km (Rabbit, Feral Horse and Red Fox); – Rock Forest = 0.77 animals/km (Rabbit); – Tantangara Dam = 2.44 animals/km (Rabbit and Feral Horse); and – Tantangara Road = 0.51 animals/km (Rabbit, European Hare and Feral Horse).	• Sighting of feral animals triggers control in accordance with the Weed, Pest and Pathogen Management Plan. Feral animal control to be undertaken within areas with recorded animals. • Priority areas for control include Marica and upper Lobs Hole within proximity to Smoky Mouse habitat.

Weed presence / absence monitoring	• New occurrence of weeds within proximity to project infrastructure. • Monitoring results are identifying increases in density of high priority weeds.	• Sixteen priority weed species were recorded within 50 m of the main project roads, accommodation camps and key construction compounds. • Nine priority weed species were recorded within 50 m of the threatened flora monitoring locations.	• Weed presence / absence monitoring was not required to be undertaken during Q2.	• Weed presence/absence monitoring was not required to be undertaken during Q3.	• Weed presence/absence monitoring was not required to be undertaken during Q4.	• Baseline data was captured in Year 1. Requirement for adaptive management will be assessed following further monitoring.
Phytophthora presence/absence monitoring	• A soil sample returns a positive result for Phytophthora species of concerns such as *Phytophthora cinnamomic* or *Phytophthora gregata*.	• Soil sampling for *Phytophthora* spp. was undertaken at two sites: – Tantangara washdown; and – Marica washdown. • No *Phytophthora* spp. detected. • No area of dieback observed.	• Soil sampling for *Phytophthora* spp. was undertaken at an additional six sites: – Marica 01; – Tantangara Adit 01; – Tantangara Road 02; – Lobs 01; – Lobs Hole R5; and – Lobs Hole R0.5. • *Phytophthora* was detected within sample Lobs 01, located at the bottom of Lobs Hole. Further testing identified the species as *Phytophthora cryptogea/psueudocryptogea.* • No *Phytophthora* was detected in the remaining samples. • No area of dieback observed. • An additional 5 samples were collected within proximity to Lobs 01 to determine the extent of Phytophthora in Lobs Hole: – PMS1 – PMS5. • *Phytophthora cryptogea/psueudocryptogea* was identified within samples PMS1 and PMS5.	• *Phytophthora* presence/absence monitoring was not required to be undertaken during Q3.	• Soil sampling for *Phytophthora* spp. was undertaken at an additional 20 sites across the project area as a part of adaptive management and to determine the range and extent of the species surrounding the project area: – PS01 – PS20. • No *Phytophthora* was detected in the samples.	• Adaptive management was triggered following *Phytophthora* spp. detection in Q2. • Adaptive management/mitigation was implemented following detection. This included: – additional sampling within proximity to the location which tested positive to determine the extent of Phytophthora *cryptogea/psueudocryptogea*; and – additional sampling at 20 sites across the project area to collect baseline data and determine whether *Phytophthora cryptogea/psueudocryptogea* is present within any other parts of the Park within proximity to the project area. • No *Phytophthora* spp. was detected in the 20 additional samples; therefore. no additional adaptive management was triggered.

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1 Introduction

1.1 Project overview

Snowy Hydro Limited (Snowy Hydro) is the proponent of the Snowy 2.0 Project (Snowy 2.0), a large-scale pumped hydro-electric storage and generation project which will increase hydro-electric capacity within the existing Snowy Mountains Hydro-electric Scheme (Snowy Scheme). This will be achieved by linking the existing Tantangara and Talbingo reservoirs within the Snowy Scheme through a series of underground tunnels and new underground hydro-electric power station.

The nearest large towns are Cooma and Tumut, approximately 70 kilometres (km) south-east and 50 km north-northwest of the Main Works project, respectively (Figure 1.1). Several small communities and townships are located nearby, including Talbingo, Tumbarumba, Batlow, Cabramurra and Adaminaby. Talbingo and Cabramurra were built for the original Snowy Scheme workers and their families, and Adaminaby was relocated to alongside the Snowy Mountains Highway from its original location (now known as Old Adaminaby) in 1957 due to the construction of Lake Eucumbene.

Snowy Hydro and their project partner Future Generation Joint Venture (FGJV) are currently undertaking construction work for Snowy 2.0 ('Main Works') (Figure 1.2). The Main Works project includes pre-construction activities such as pre-clearing works, pre-construction/site establishment, geotechnical investigation and survey, and installing environmental mitigation measures. Construction activities include access road and bridge work, excavation and tunnelling, excavated rock management, intake and gate-shaft construction, progressive rehabilitation, fit out, testing and commissioning, and final rehabilitation.

1.2 Project approval

On 7 March 2018, the New South Wales (NSW) Minister for Planning declared Snowy 2.0 to be State Significant Infrastructure (SSI) and Critical State Significant Infrastructure (CSSI), under the *Environmental Planning and Assessment Act 1979* (EP&A Act) on the basis that it is critical to NSW for economic, environmental or social reasons.

The Environmental Impact Statement (EIS) for the Main Works project (Main Works EIS) was submitted to Department of Planning, Industry and Environment (DPIE or the Department) in September 2019 and was publicly exhibited between 26 September 2019 and 6 November 2019 (EMM, 2019). A total of 222 submissions were received during the public exhibition period. In February 2020, the Preferred Infrastructure Report and Response to Submissions Report (PIR) was issued to DPIE to outline the preferred project design and address the public and agency submissions (EMM, 2020). The Main Works PIR included Revised Environmental Management Measures (REMMs) within Appendix C, which were also to be implemented for the project.

Following consideration of the Main Works EIS and PIR, approval was granted by the Minister for Planning and Public Spaces on 20 May 2020, through issue of Infrastructure Approval SSI 9687. In addition to the State approval, a referral (EPBC 2018/8322) was prepared and lodged with the Commonwealth Department of Agriculture, Water and Environment (DAWE) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Commonwealth Minister's delegate determined on 5 December 2018 that Snowy 2.0 Main Works is a "controlled action" under the EPBC Act and the Project was assessed by accredited assessment under Part 5, Division 5.2 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). Approval was granted under the EPBC Act on 29 June 2020 (EPBC 2018/8322).

1.3 Main Works Overview

The Snowy 2.0 Main Works project includes, but is not limited to, construction of the following:

- an underground pumped hydro-electric power station complex;
- water intake structures at Tantangara and Talbingo reservoirs;
- power waterway tunnels, chambers and shafts;
- access tunnels;
- new and upgraded roads to allow ongoing access and maintenance;
- power, water and communication infrastructure, including:
    - a cable yard to facilitate connection between the NEM electricity transmission network and Snowy 2.0;
    - permanent auxiliary power connection;
    - permanent communication cables;
    - permanent water supply to the underground power station; and
- post-construction revegetation and rehabilitation.

1.4 Aim, purpose and objectives

The Main Works EIS (EMM, 2019) and PIR (EMM, 2020), prepared to assess impacts on the environment, included an assessment of biodiversity impacts. The EIS identified that the main biodiversity issue for the project were the impacts to several threatened flora and fauna species and their habitat, including the Kiandra Leek Orchid (*Prasophyllum retroflexum*), Clover Glycine (*Glycine latrobeana*), Smoky Mouse (*Pseudomys fumeus*), Eastern Pygmy Possum (*Cercartetus nanus*), Broad-toothed Rat (*Mastacomys fuscus*), Alpine She-oak Skink (*Cyclodomorphus praealtus*), Alpine Tree Frog (*Litoria verreauxii alpina*) and the Booroolong Frog (*Litoria booroolongensis*), which were confirmed to be present within and adjacent to the Main Works project disturbance footprint. The EIS also identified potential indirect impacts to biodiversity, including the potential for introduction and/or exacerbation of weeds and pathogens, feral herbivores and feral predators.

To address these issues, the Main Works Biodiversity Management Plan was developed (Snowy Hydro and FGJV, 2020). The Biodiversity Monitoring Program (BMP) (EMM, 2020) forms Appendix B of the Biodiversity Management Plan (Snowy Hydro and FGJV, 2020) and sets out a monitoring framework to ensure that impacts arising from the Main Works project are project are consistent with those outlined in the EIS. The BMP was required to be implemented during pre-construction and construction stages of the Main Works project.

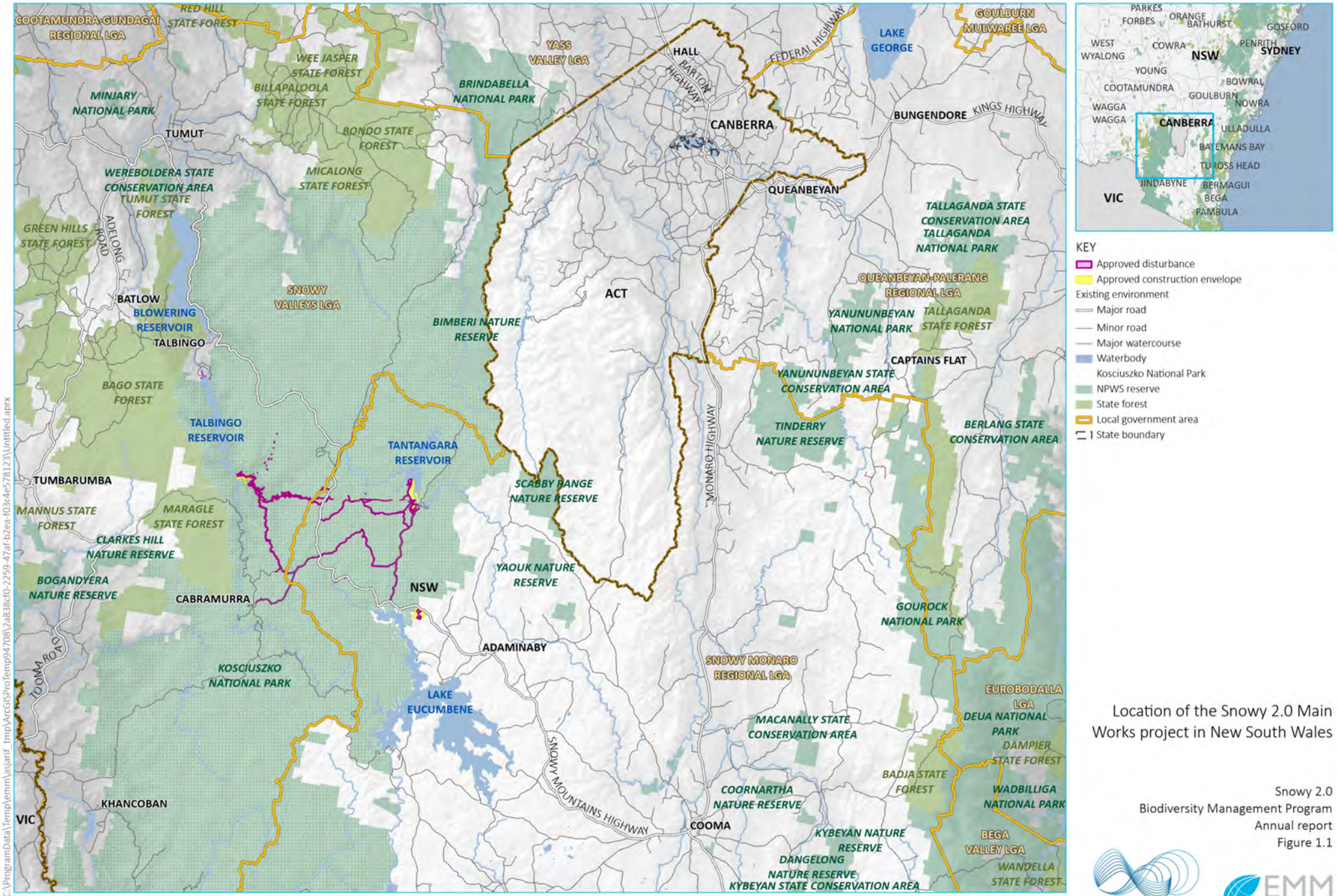
The aim of the BMP is to ensure that impacts arising from the Main Works project do not exceed those predicted to occur within the EIS. The key objectives of the BMP are to:

- identify the entities that require monitoring during construction;
- specify the existing condition, distribution and presence of the monitored entities;
- detail the monitoring parameters for each entity including:

  - survey method, frequency and location;
  - data collection and analysis approach;
  - reporting requirements;
- provide threshold triggers for implementation of adaptive management procedures;
- provide adaptive management procedures; and
- facilitate compliance with relevant conditions of approval.

EMM Consulting Pty Ltd (EMM) was commissioned by Snowy Hydro to complete the Main Works monitoring program associated with the BMP. The 2020/2021 monitoring program was undertaken between October 2020 October 2021. This '*Biodiversity Monitoring Program: Year 1 Annual Monitoring Report (2020/2021)*' ("monitoring report") presents the results of all monitoring program activities during Year 1. The objectives of the report are to:

- detail any changes, gaps or limitations to the biodiversity monitoring methodology outlined in the BMP. This includes monitoring components, method of data collection (frequency and location), method of data analysis and reporting requirements;
- provide the biodiversity monitoring results for all monitoring events between 21 October 2020 and 20 October 2021, comprising baseline (Q1) and construction (Q2, Q3, Q4) monitoring periods (EMM Year 1 Quarter 1, 2021), (EMM Year 1 Quarter 2, 2021), (EMM Year 1 Quarter 3, 2021), (EMM Year 1 Quarter 4, 2021);
- compare results across monitoring periods against threshold triggers for adaptive management presented in the BMP, identifying any relevant additional trends related to Main Works impacts, and identify where adaptive management is required; and
- provide recommendations for improvements and amendments to the BMP.



KEY

- Approved disturbance
- Approved construction envelope

Existing environment

- Major road
- Minor road
- Major watercourse
- Waterbody
- Kosciuszko National Park
- NPWS reserve
- State forest
- Local government area
- State boundary

Location of the Snowy 2.0 Main Works project in New South Wales

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 1.1

Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006)

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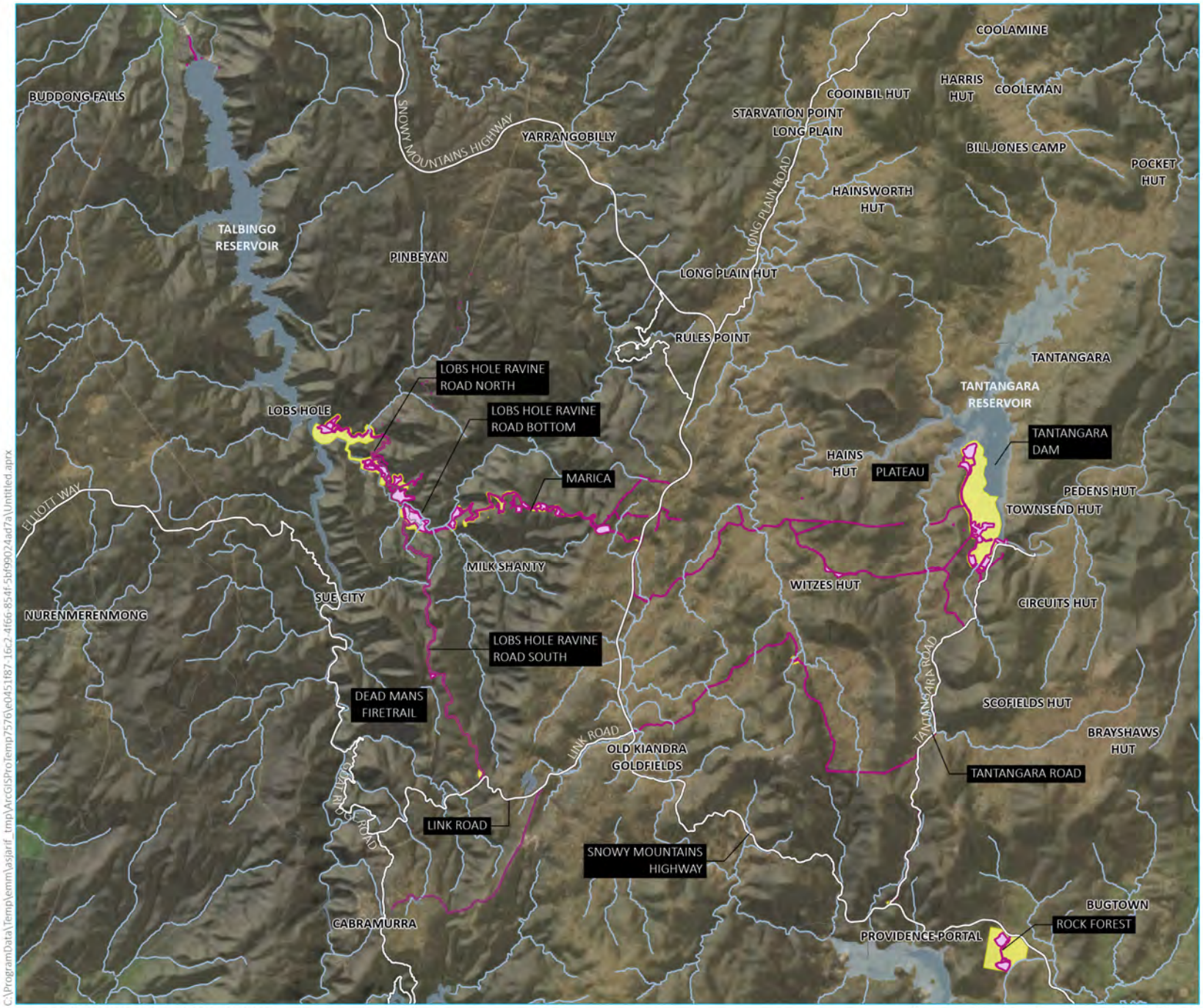

KEY

- Approved disturbance
- Approved construction envelope

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 5 10 km

GDA 1994 MGA Zone 55

N

Location of Snowy 2.0 Main Works Infrastructure

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 1.2

snowy 2.0

EMM creating opportunities

2 Methods

The monitoring schedule and methods implemented during the 2020/2021 monitoring periods were largely consistent with those outlined in the BMP (EMM, 2020). A summary of the BMP monitoring periods referred to throughout this report are provided in Table 2.1.

Table 2.1 Summary of MW BMP monitoring periods

Monitoring Period		Monitoring Dates
Q1	Baseline	21 October 2020 – 20 January 2021
Q2	Construction	21 January 2021 – 20 April 2021
Q3	Construction	21 April 2021 – 20 July 2021
Q4	Construction	21 July 2021 – 20 October 2021

2.1 Survey design

Eighteen field surveys were undertaken throughout 2020/2021 and were conducted over 119 days, including 1,490 people hours. During the first year of monitoring a total of 156 sites were established and monitored across the Main Works project area and control areas (Figure 2.1 to Figure 2.6, Appendix A).

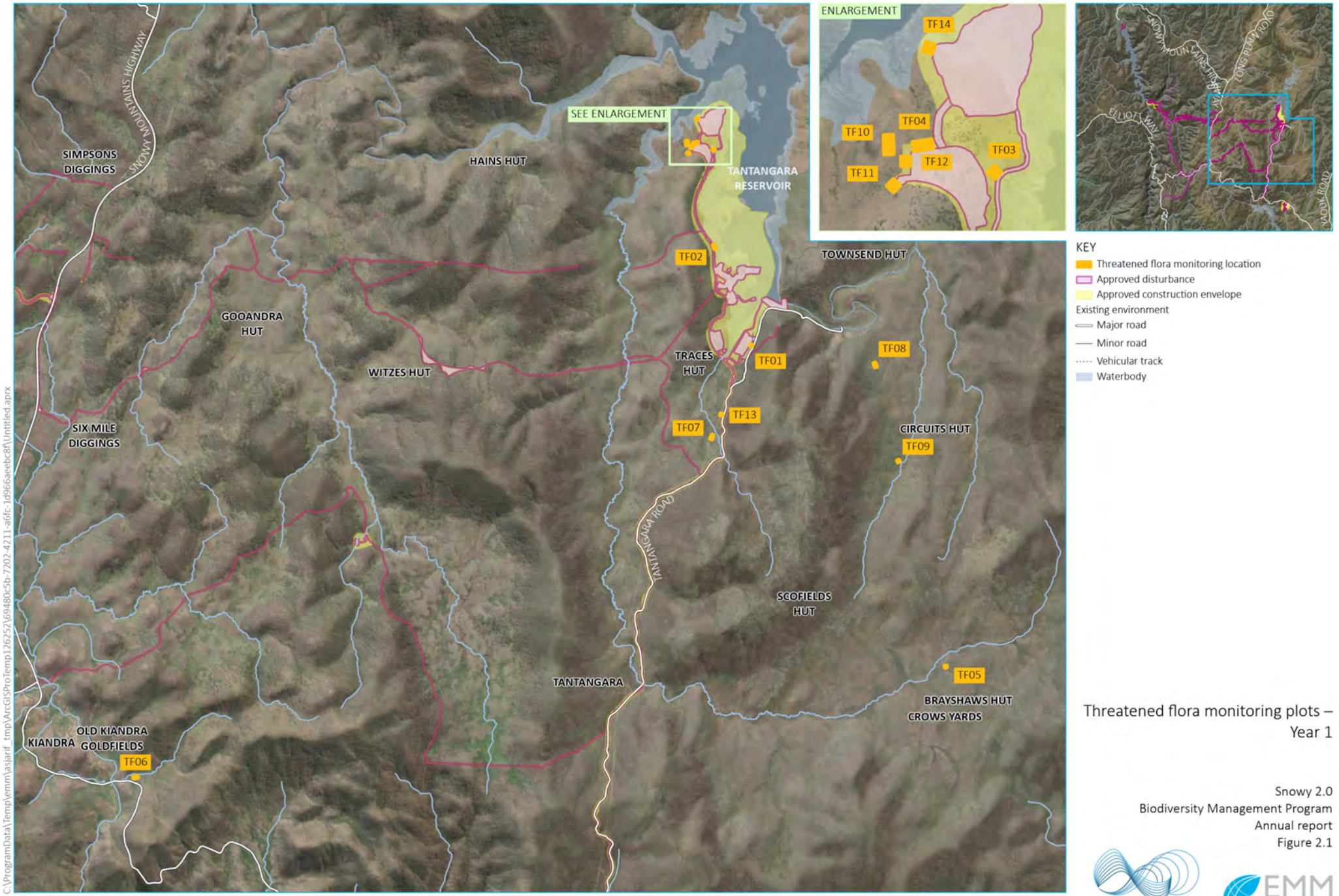
Thirty-nine EMM personnel have been part of the Snowy 2.0 BMP during the first year, with a total of 3,047 people hours. An extensive amount of time has been implemented on data QA, collation and analysis to ensure the BMP is adequately assessing the potential impacts of the project.

The total number of sites assessed, and frequency of assessment, during the 2020/2021 monitoring period aligned with the BMP, excluding the limitations and gaps described below (Section 2.2). Main Works project area sites were separated by proximity to infrastructure location, with the location of these areas presented in Figure 1.2:

- Lobs Hole Ravine Road North (LHRR North);
- Lobs Hole Ravine Road South (LHRR South);
- Lobs Hole Ravine Road Bottom (LHRR Bottom);
- Tantangara Dam;
- Tantangara Road;
- Plateau;
- Marica; and
- Rock Forest.

Additional control site areas include:

- Dead Mans;
- Link Road; and
- Snowy Mountains Highway.



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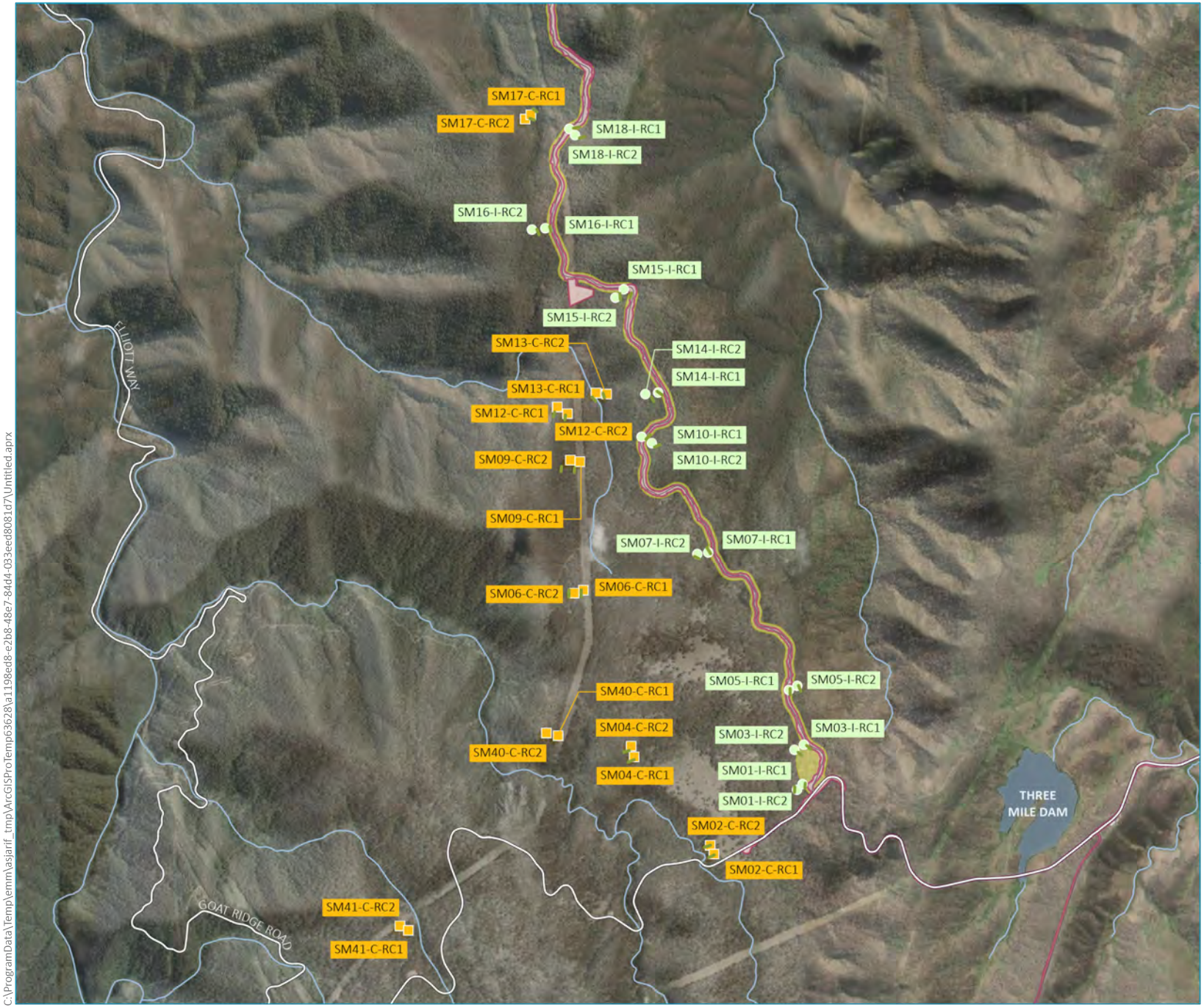
Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

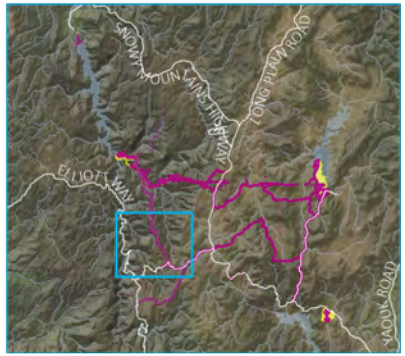
Threatened flora monitoring plots – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.1

snowy 2.0

EMM creating opportunities





KEY

- Approved disturbance
- Approved construction envelope

Small mammal RCMS monitoring location

- Control
- Impact

BTR fecal pellet monitoring location

- Control
- Impact
- Small mammal habitat transect

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

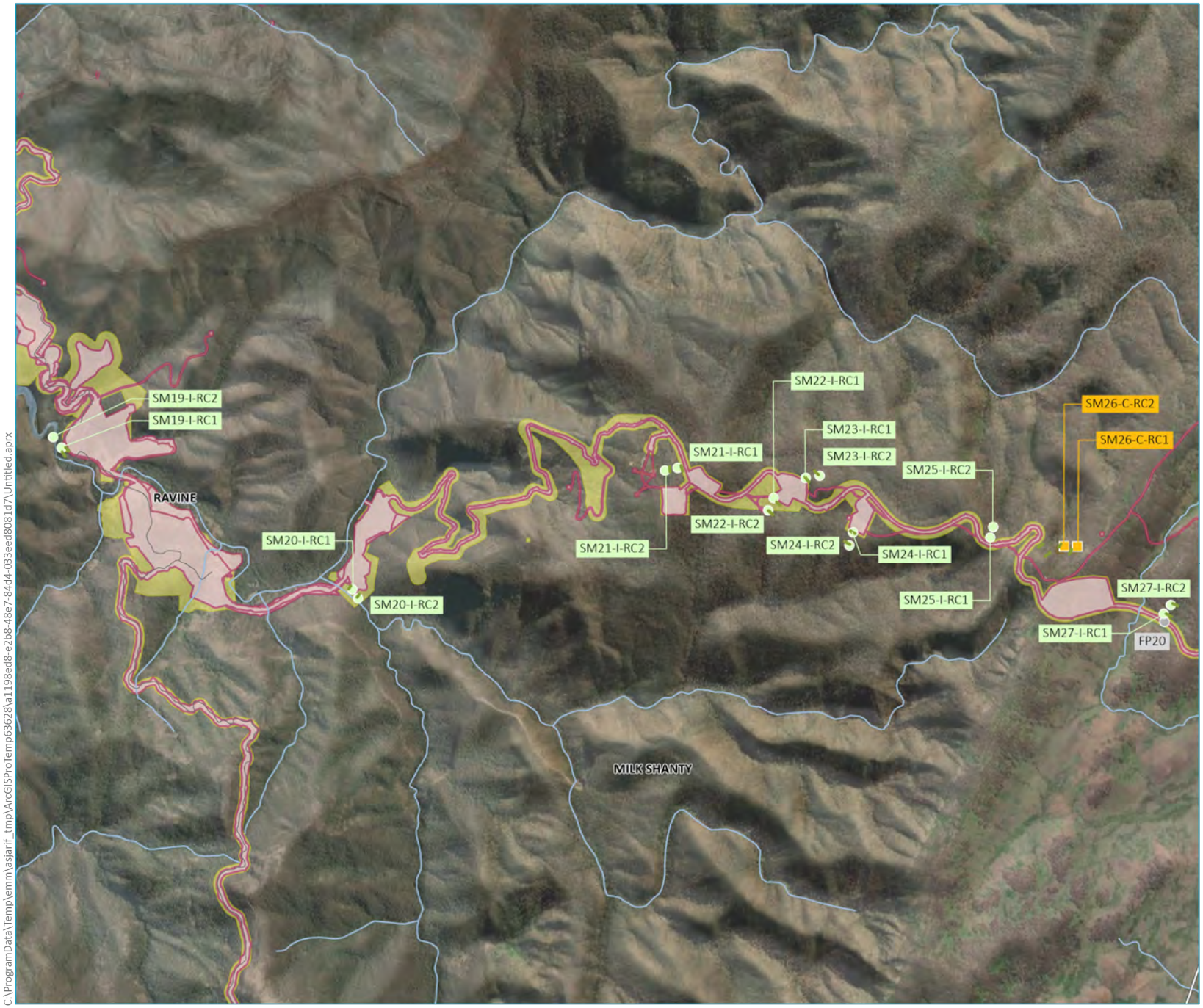
N

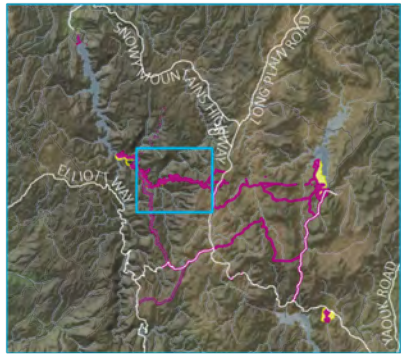
Small mammal occupancy and habitat characteristic monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.2a

snowy 2.0

EMM creating opportunities





KEY

- Approved disturbance
- Approved construction envelope

Small mammal RCMS monitoring location

- Control
- Impact

BTR fecal pellet monitoring location

- Control
- Impact
- Small mammal habitat transect

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

Small mammal occupancy and habitat characteristic monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.2b

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km
GDA 1994 MGA Zone 55

N

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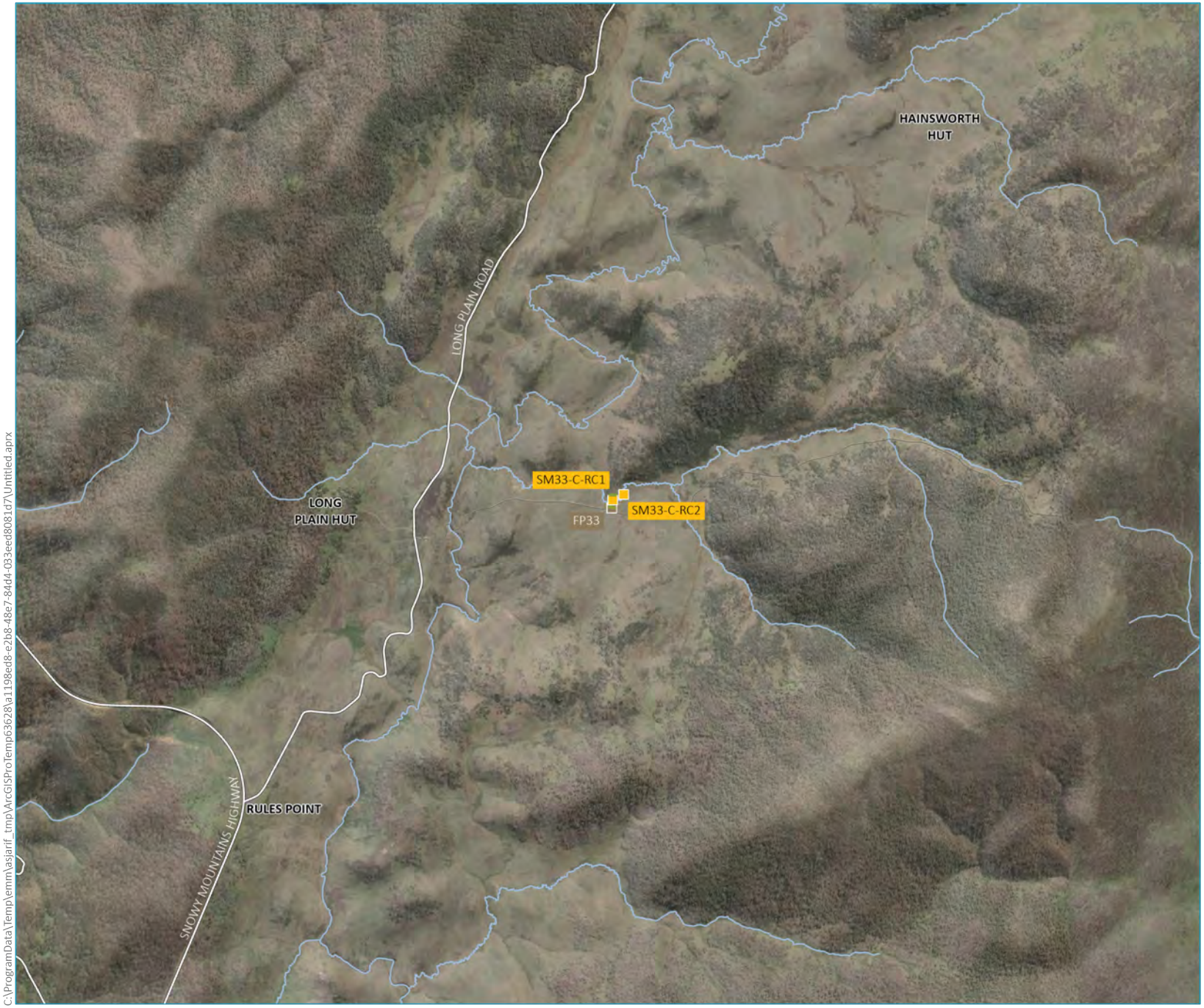

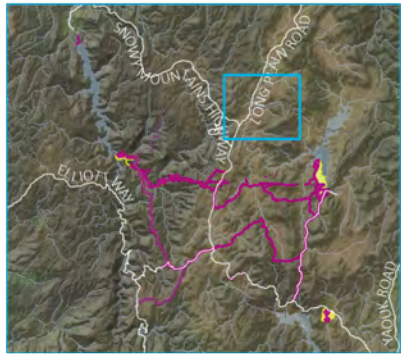

KEY

- Approved disturbance
- Approved construction envelope

Small mammal RCMS monitoring location

- Control
- Impact

BTR fecal pellet monitoring location

- Control
- Impact
- Small mammal habitat transect

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

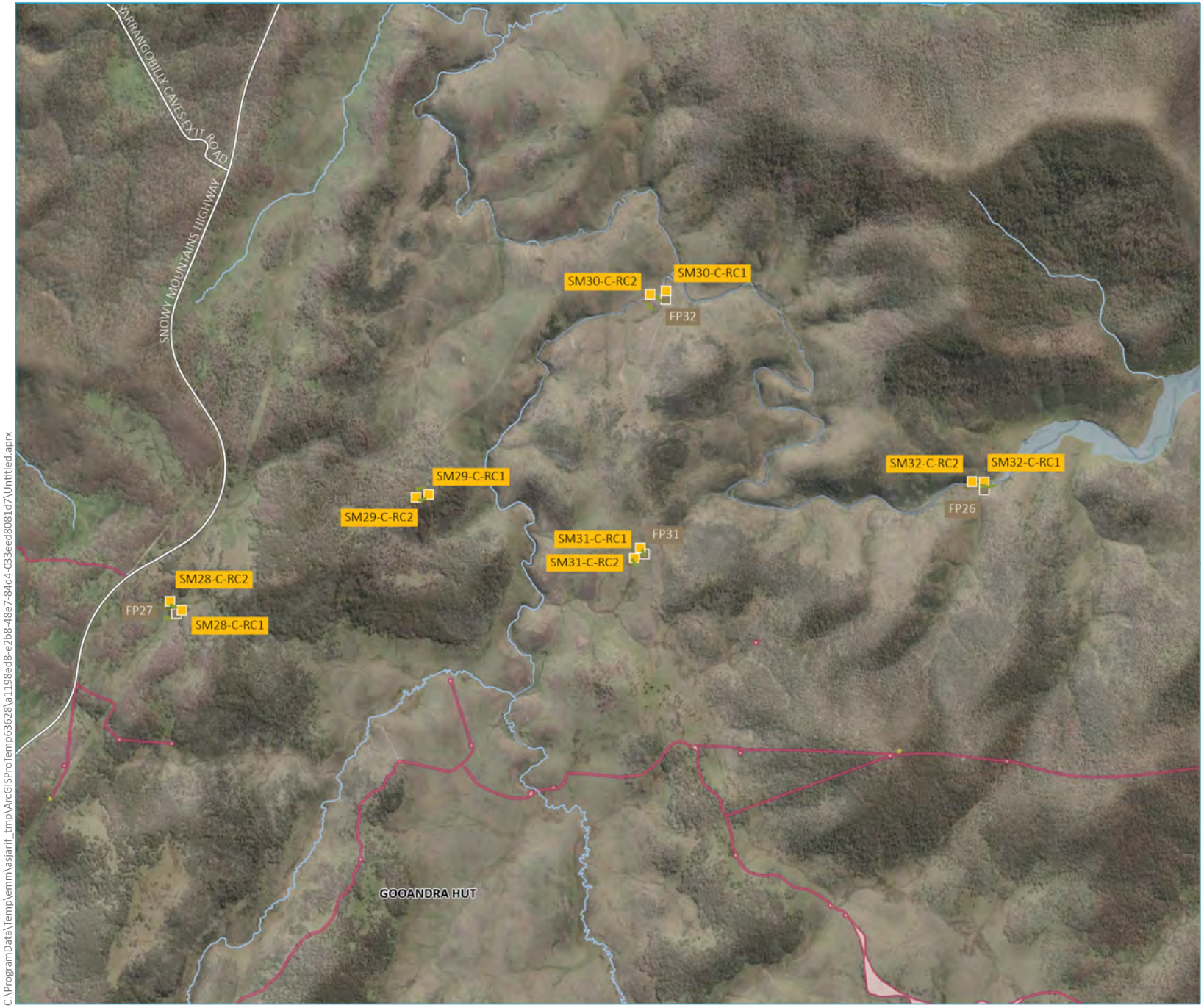
N

Small mammal occupancy and habitat characteristic monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.2c

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Small mammal RCMS monitoring location

- Control
- Impact

BTR fecal pellet monitoring location

- Control
- Impact
- Small mammal habitat transect

Existing environment

- Major road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp63628\a1198ed8-e2b8-48e7-84d4-033eed8081d7\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

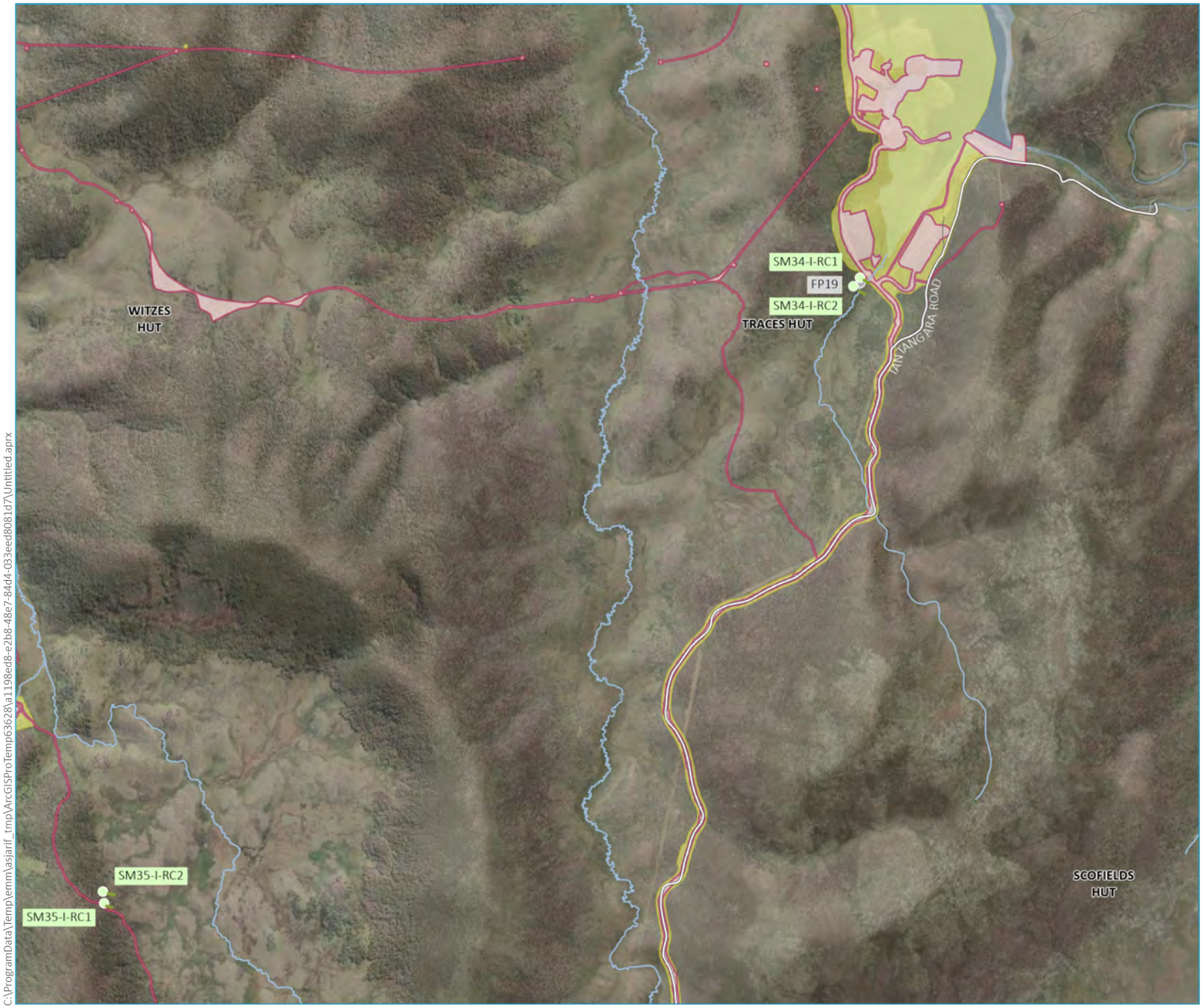
N

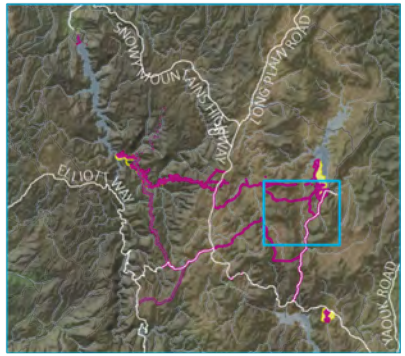
Small mammal occupancy and habitat characteristic monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.2d

snowy 2.0

EMM creating opportunities





KEY

- Approved disturbance
- Approved construction envelope

Small mammal RCMS monitoring location

- Control
- Impact

BTR fecal pellet monitoring location

- Control
- Impact
- Small mammal habitat transect

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp63628\a1198ed8-e2b8-48e7-84d4-033eed8081d7\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

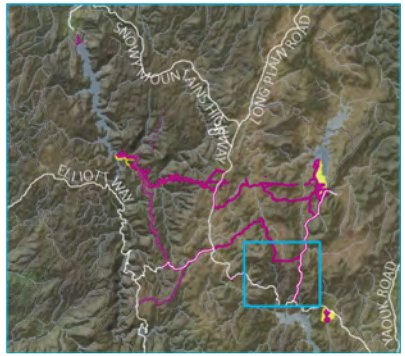
N

Small mammal occupancy and habitat characteristic monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.2e

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Small mammal RCMS monitoring location

- Control
- Impact

BTR fecal pellet monitoring location

- Control
- Impact
- Small mammal habitat transect

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp63628\a1198ed8-e2b8-48e7-84d4-033eed8081d7\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

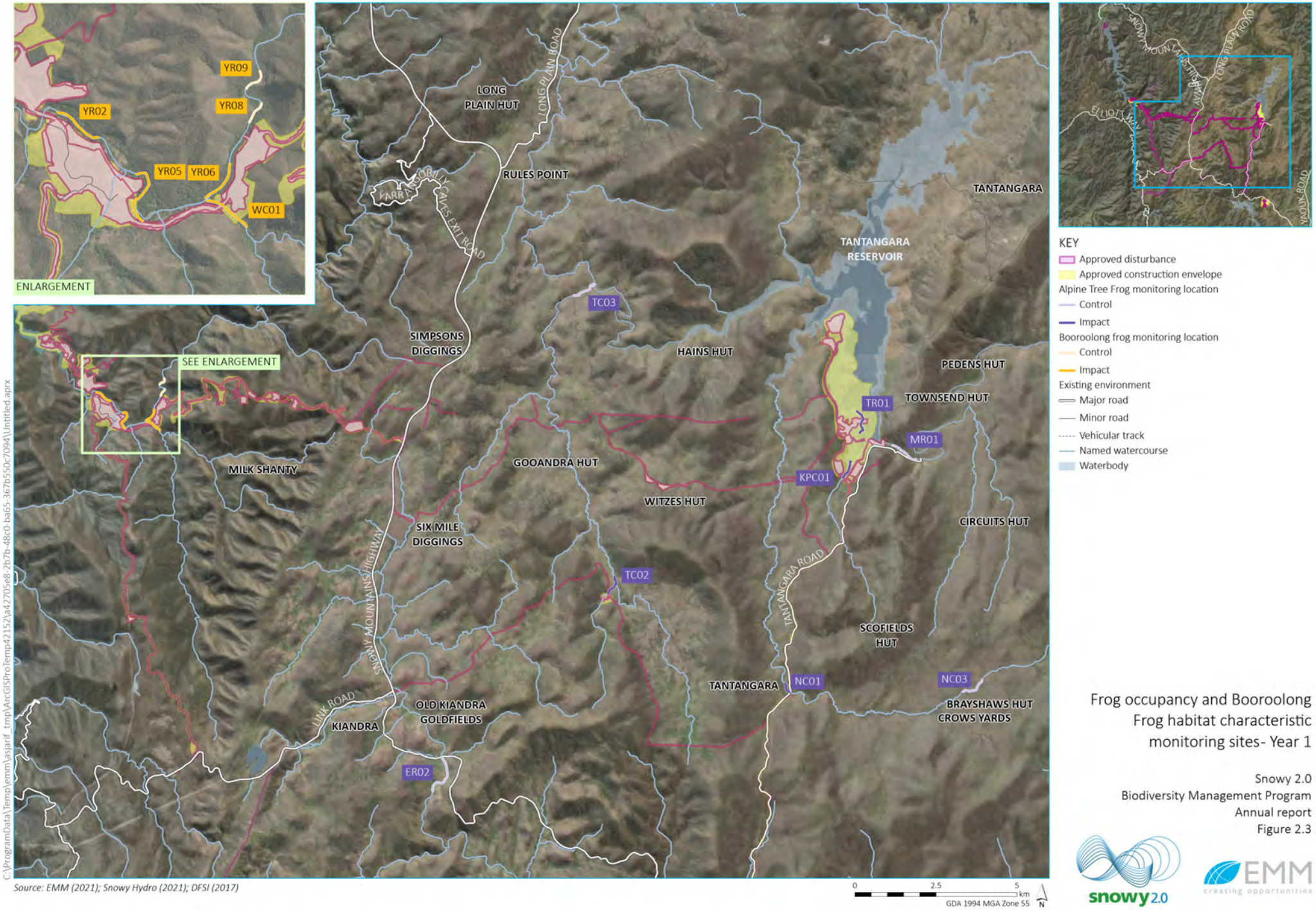
N

Small mammal occupancy and habitat characteristic monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.2f

snowy 2.0

EMM creating opportunities



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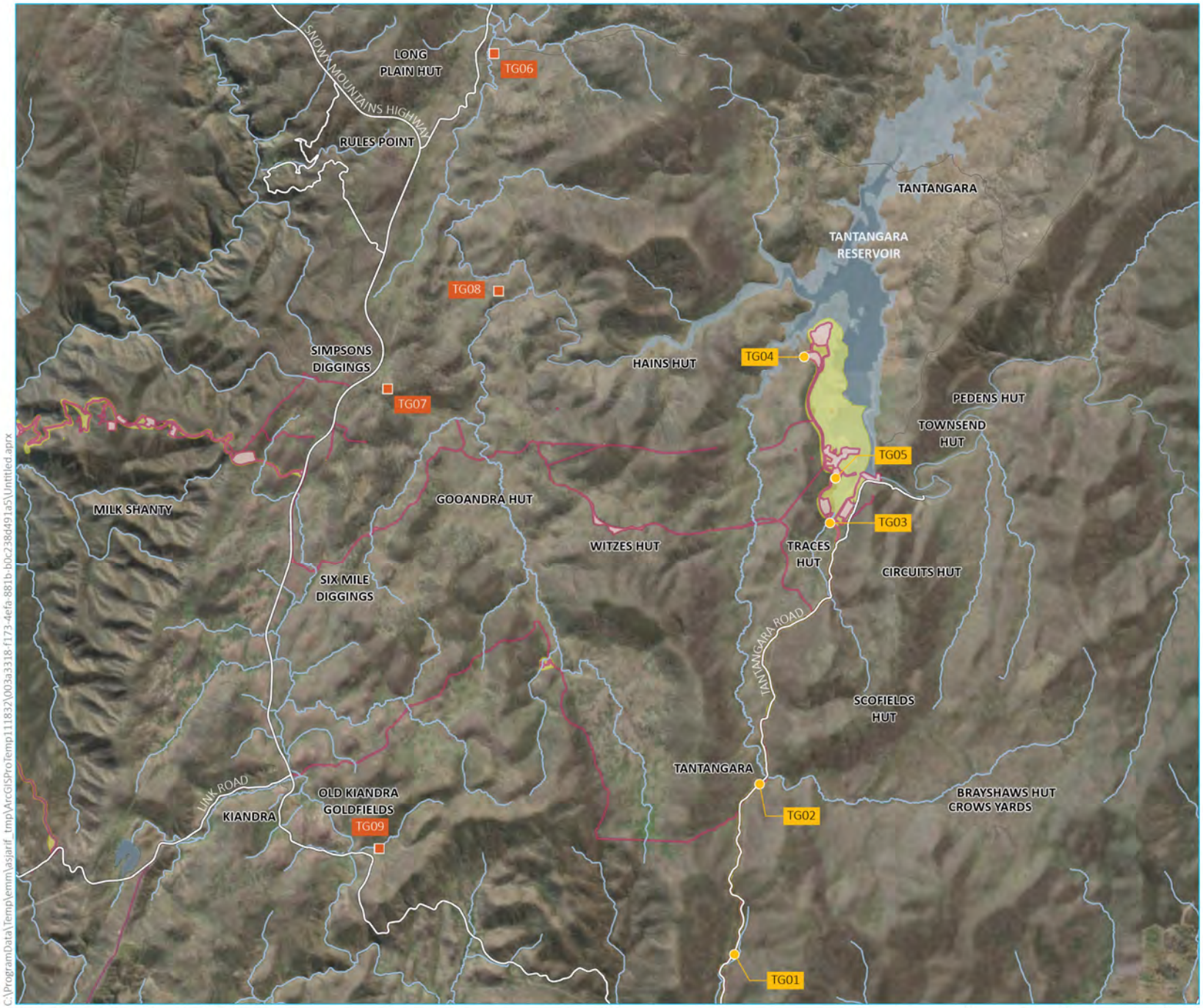
Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

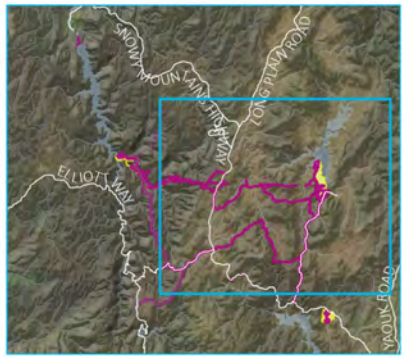
Frog occupancy and Booroolong Frog habitat characteristic monitoring sites- Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.3

snowy 2.0

EMM
creating opportunities





KEY

- Approved disturbance
- Approved construction envelope

Alpine She-oak Skink monitoring location

- Control
- Impact

Existing environment

- Major road
- Minor road
- Vehicular track
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp111832\003a3318-f173-4efa-881b-b0c238d491a5\Untitled.aprx

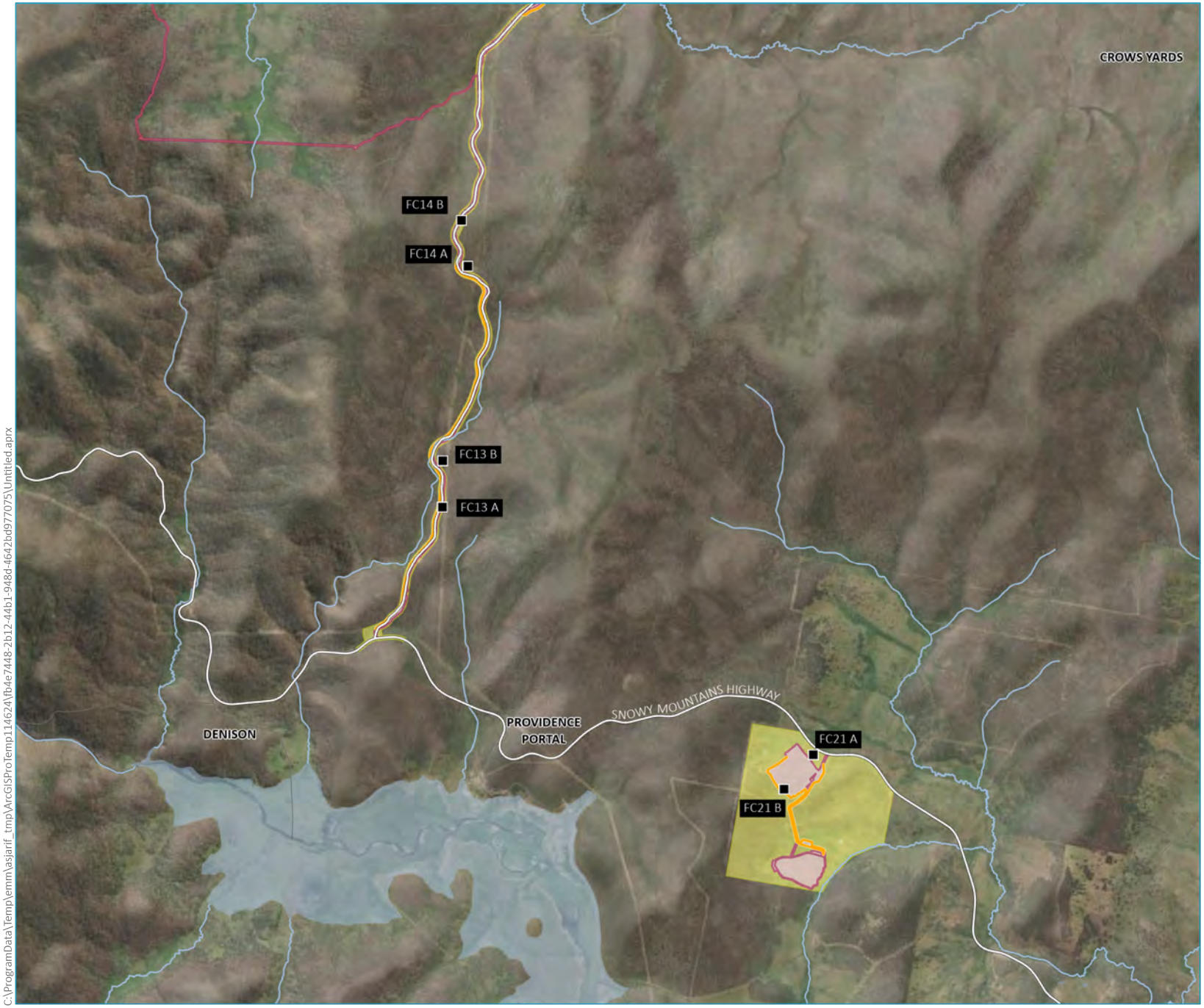
Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

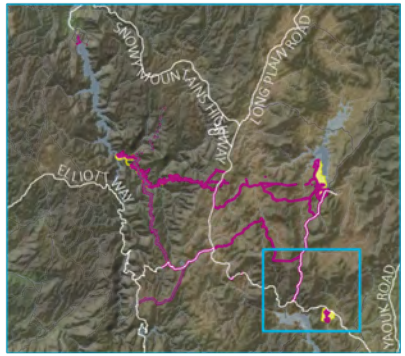
Alpine She-oak Skink occupancy monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.4

snowy 2.0

EMM
creating opportunities





KEY

- Approved disturbance
- Approved construction envelope
- Feral animal camera
- Spotlighting transect

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp114624\fb4e7448-2b12-44b1-948d-4642bd977075\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

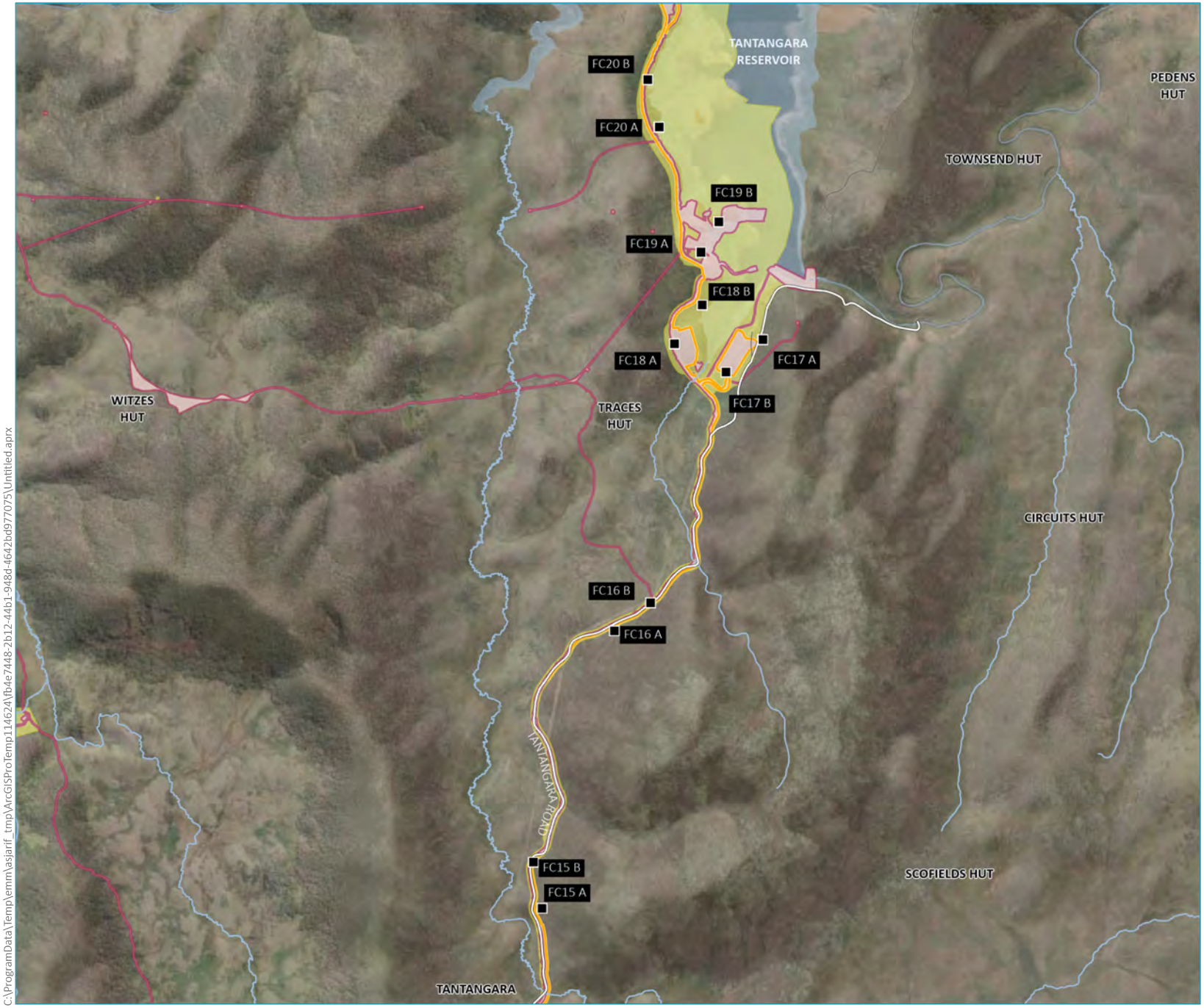
N

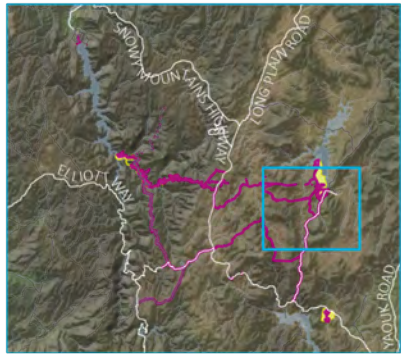
Feral animal occupancy and abundance monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.5a

snowy 2.0

EMM creating opportunities





KEY

- Approved disturbance
- Approved construction envelope
- Feral animal camera
- Spotlighting transect

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp114624\fb4e7448-2b12-44b1-948d-4642bd977075\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

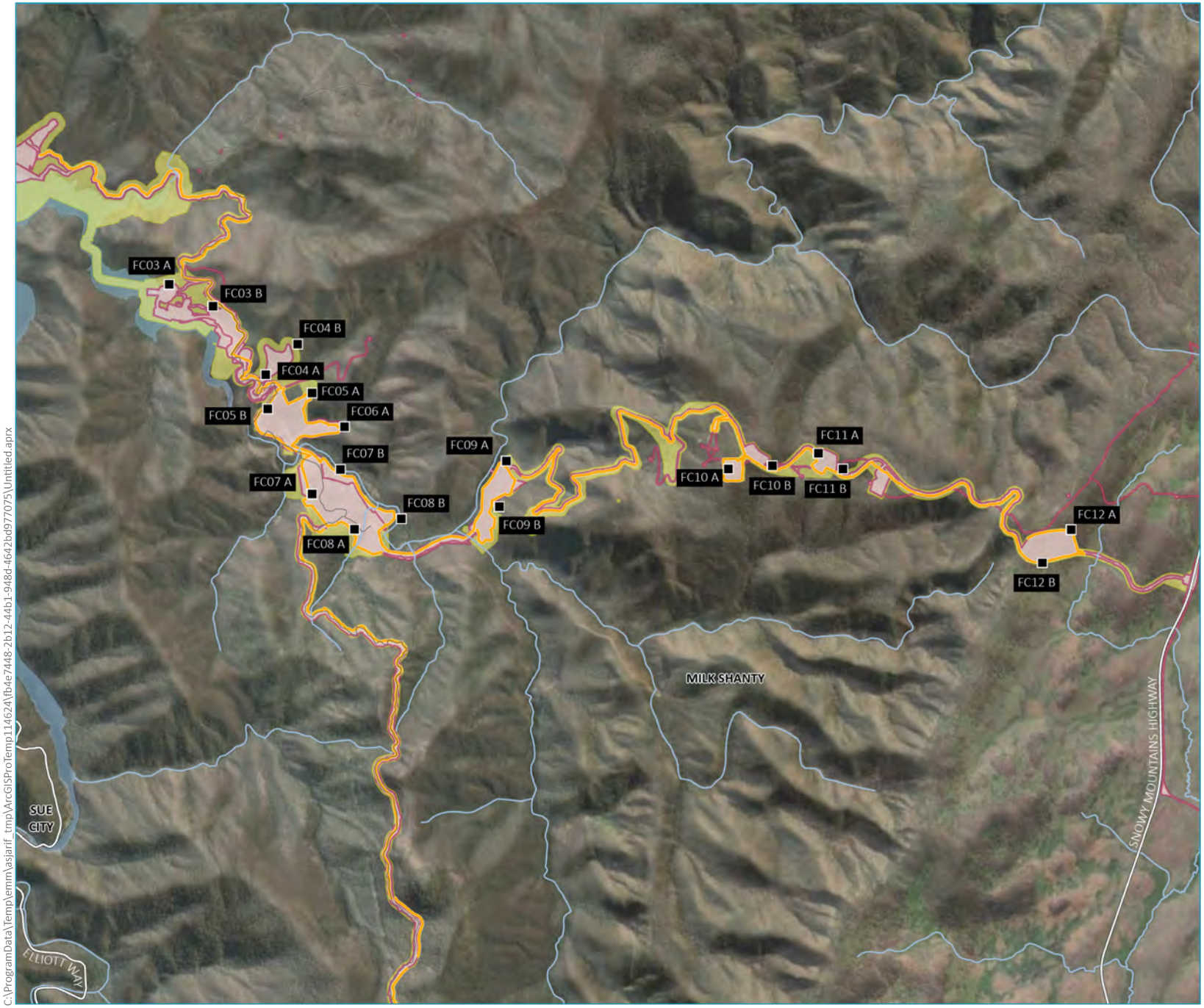
N

Feral animal occupancy and abundance monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.5b

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope
- Feral animal camera
- Spotlighting transect

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp114624\fb4e7448-2b12-44b1-948d-4642bd977075\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

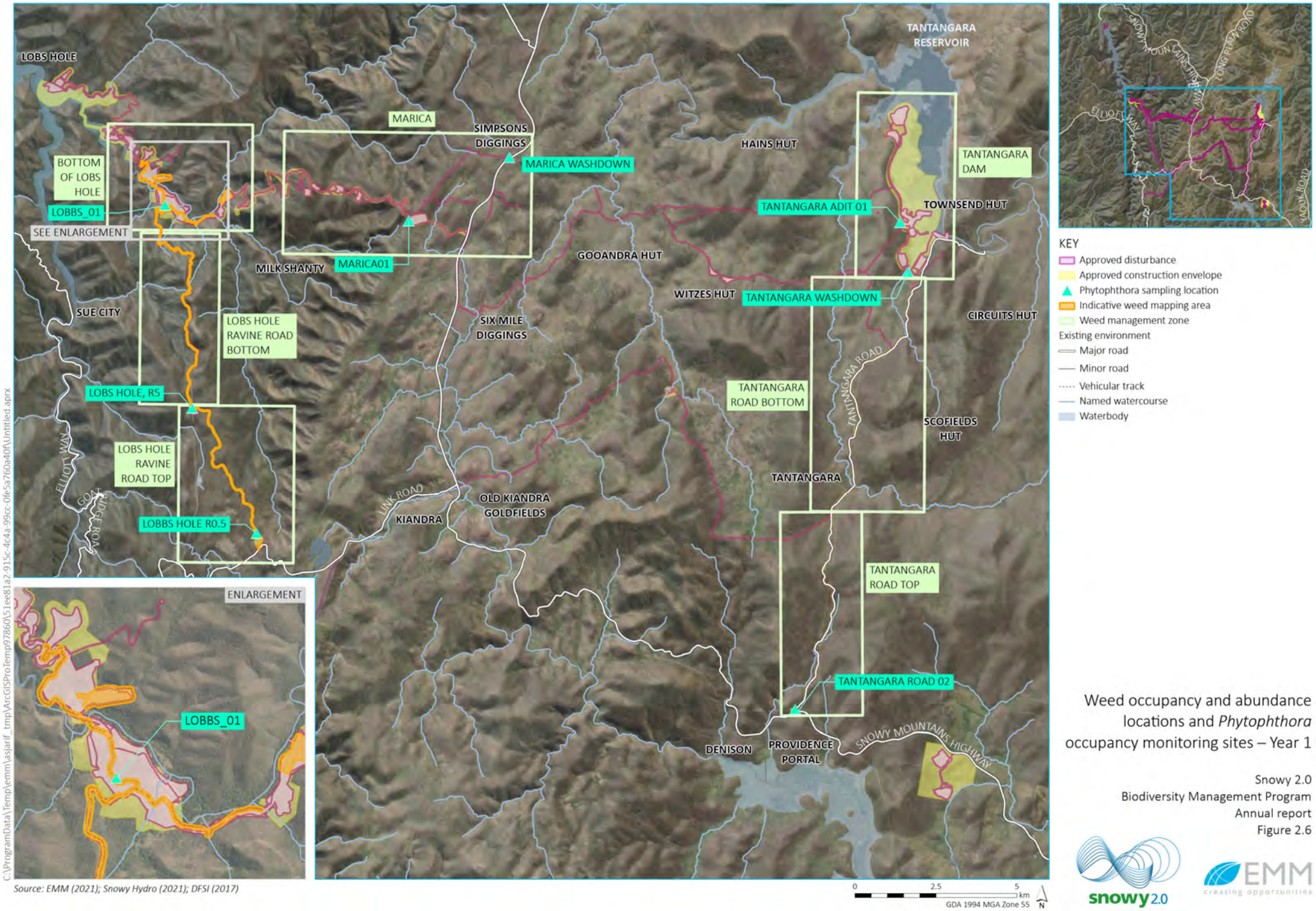
N

Feral animal occupancy and abundance monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.5c

snowy 2.0

EMM creating opportunities



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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Weed occupancy and abundance locations and *Phytophthora* occupancy monitoring sites – Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 2.6

snowy 2.0

EMM
creating opportunities

2.2 Limitations

Monitoring during year 1 was impacted by several factors including site accessibility limitations, particularly during winter, and the COVID-19 pandemic. Where deviations to the monitoring methodology occurred, a summary has been provided in Table 2.2.

Table 2.2 BMP limitations and gaps

Monitoring Component	Limitation / Gap
Threatened Flora	• Photo points were not taken for sites TF02, TF03, TF05, TF11 during the first event (December 2020) and TF08 during the second event (January 2021). Photo points have been captured during subsequent monitoring periods.
Small terrestrial mammal occupancy	• Two control sites (SM08 and SM11) were discontinued during Q2 due to ongoing access issues. These sites were replaced with SM40 and SM41 during Q2. • Images from SM15-I-RC2, SM27-I-RC1 and SM27-I-RC2 collected during Q3 were lost during data transfer. • Two control cameras (SM26-C-RC1 and SM39-C-RC1) suffered technical failure due to low temperatures during winter (Q3) and therefore there are data gaps for these sites. • SM06-C-RC2 suffered battery failure and only collected three days of data during Q4. • The third Broad-toothed Rat monitoring event was unable to be completed during winter (Q3) due to weather constraints. The third event was completed in September (Q4) followed by the fourth event was completed in October (Q4). • Image collection for the Q3 was less than 30 days for SM01-1-RC1 as this camera was removed by FGJV during clearing activities and re-set by EMM outside of the disturbance footprint at a later date. • Two control cameras (SM33-C-RC2 and SM38-C-RC1) were stolen during Q3 and therefore there are data gaps for these sites. The cameras have not been replaced at this stage due to the ongoing risk of theft. Snowy and EMM are looking for a solution to this issue.
Small terrestrial mammal habitat characteristics	• Two control sites (SM08 and SM11) were unable to be established due to ongoing access issues. These will be replaced with SM40 and SM41 during the Year 2 monitoring event.
Frog occupancy	• n/a
Booroolong Frog habitat characteristics	• Baseline data was captured outside the breeding seasons, during January and February 2021. • Baseline data captured had warping and shadowing reducing the quality of the imagery. • No data was captured for the control transect YR09 and part of control transect YR08 was missed.
Alpine She-oak Skink occupancy	• Impact site TG04 was established in Q2 due to restricted vehicle access to Northern Tantangara Peninsula. • The first check for TG04 was in October due to seasonal restrictions.

Table 2.2 BMP limitations and gaps

Monitoring Component	Limitation / Gap
Feral animal occupancy	• Two camera sites at Rock Forest (FC21A and FC21B) were only established in Q3 due to works not commencing in this area until Q3. • Four camera sites (FC01A, FC01B, FC02A, FC02B) at Ravine Bay were removed as Snowy Hydro/FGJV advised no impacts will occur in the area. This has since been revoked and these cameras will be reinstated once the road is constructed. • FC15B suffered technical failure during Q4 and therefore there is no data for Q4. • Camera theft on Tantangara Road resulted in data gaps for cameras FC14B, FC15B, FC14B and FC16B. • Cameras FC14B and FC16B were stolen multiple times and have not been replaced at this stage due to the ongoing risk of theft. Snowy and EMM are looking for a solution to this issue. Further details provided in Table 4.1.
Feral animal abundance	• The Rock Forest site was established during Q3; therefore, only two monitoring events were completed for this site.
Weed presence/absence	• The Rock Forest site was established during Q3; therefore, no weed monitoring was conducted.
Phytophthora	• n/a

Access to control sites such as the Plateau and Dead Man's Fire trail at numerous times throughout the monitoring year were difficult due to water levels at river crossings, fallen trees along tracks and wet weather conditions causing tracks to be boggy. Access restrictions were navigated by attempting alternate routes or attempting surveys at a later date when safe. This resulted in some surveys being conducted slightly outside of the recommended survey time or missed.

3 Results and discussion

3.1 Threatened flora monitoring

The objective of the threatened flora monitoring is to determine the health of threatened flora populations located adjacent to the disturbance area in order to document any changes as a result of the Main Works and to implement additional controls if necessary.

The Clover Glycine was recorded at eight sites during Year 1 baseline surveys including four impact sites (TF02, TF03, TF04, TF14) and four control sites (TF07, TF08, TF09, TF10), representing 57% of threatened flora monitoring sites. The Kiandra Leek Orchid was recorded at three sites during Year 1 baseline surveys including one impact site (TF04) and two control sites (TF06, TF09), representing 21% of threatened flora monitoring sites.

Threatened flora presence/absence at each monitoring site is summarised in Table 3.1 and presence at sites is graphically presented in Plate 3.1 and Plate 3.2. Monitoring events and further details of each record are presented in Appendix B, including photographs from photo points established at each monitoring site.

Table 3.1 Number of threatened flora individuals recorded

	Clover Glycine		Kiandra Leek Orchid	
Site	**First monitoring event (December 2020)**	**Second monitoring event (January 2021)**	**First monitoring event (December 2020)**	**Second monitoring event (January 2021)**
Impact				
TF01	0	0	0	0
TF02	28	39	0	0
TF03	15	35	0	0
TF04	12	17	1	0
TF11	0	0	0	0
TF12	0	0	0	0
TF13	0	0	0	0
TF14	23	30	0	0
Control				
TF05	0	0	0	0
TF06	0	0	7	0
TF07	39	15	0	0
TF08	25	62	0	0
TF09	182	60	1	0
TF10	20	49	0	0

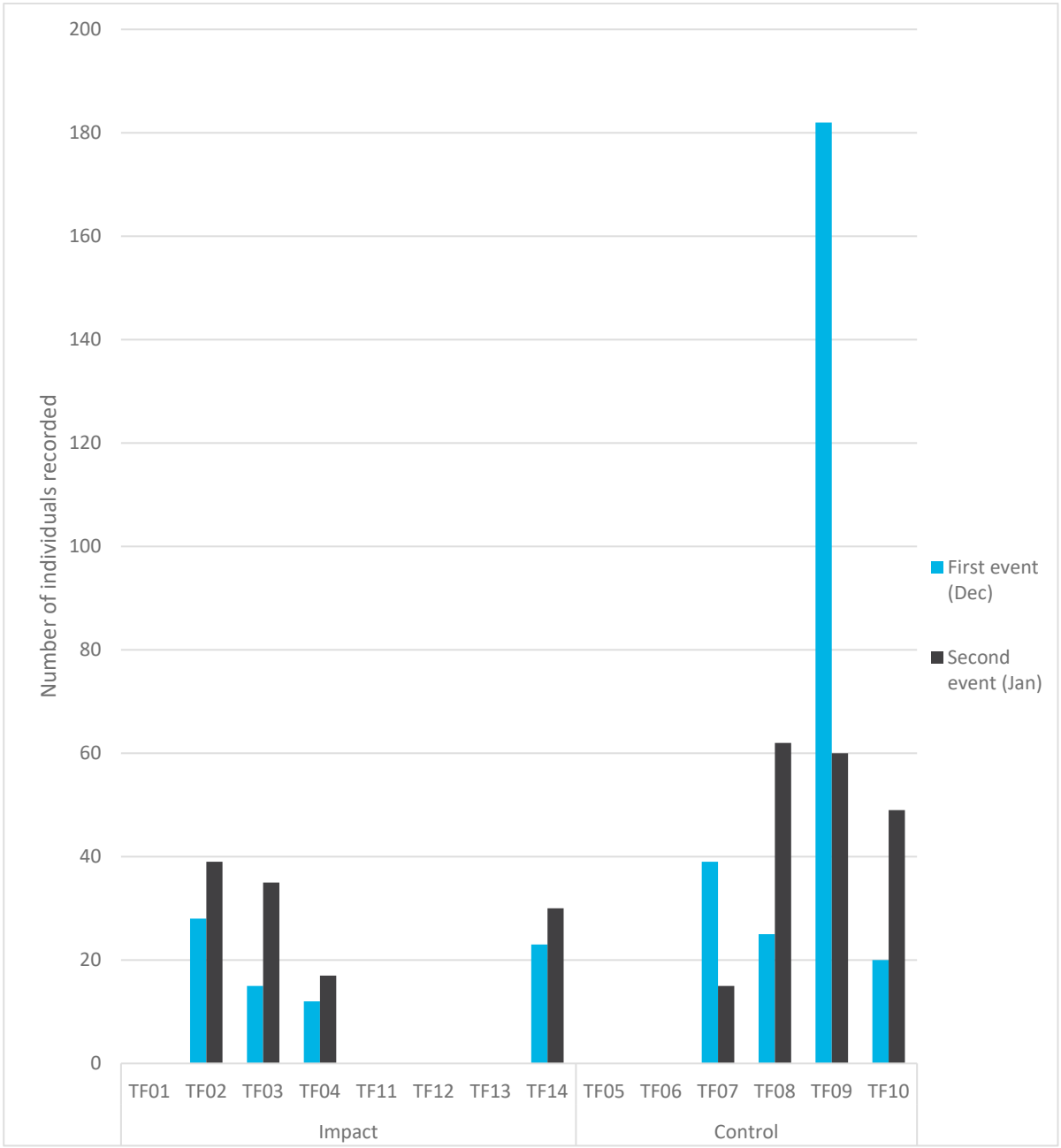


Plate 3.1 **Clover Glycine records during Year 1**

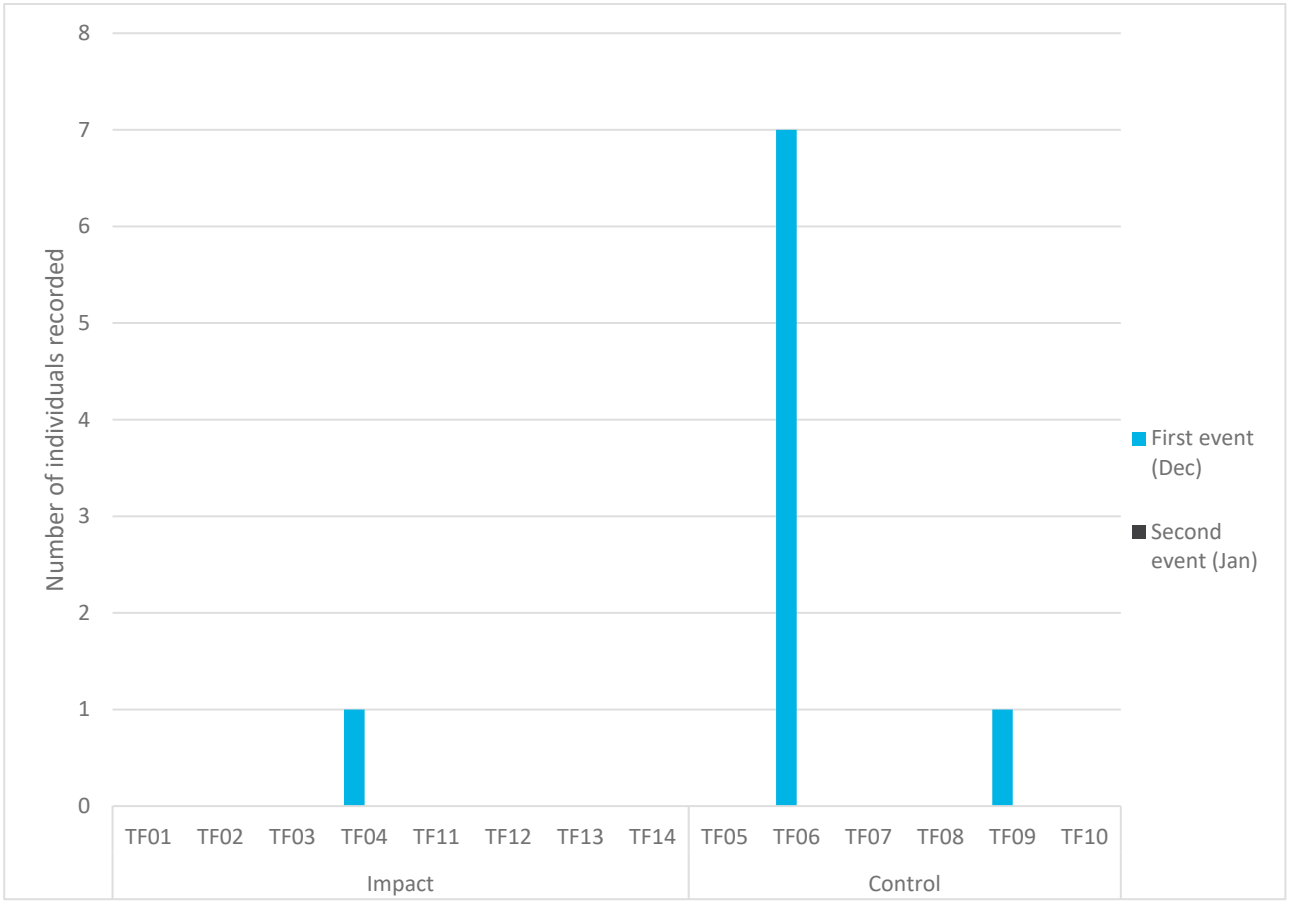


Plate 3.2 Kiandra Leek Orchid records during Year 1

A total of 199 individuals of Clover Glycine were recorded within impact sites and 452 individuals were recorded within control sites. No individuals of Clover Glycine were recorded at impact sites TF01, TF11, TF12 and TF13, and control sites TF05 and TF06. A single individual of Kiandra Leek Orchid was recorded within an impact site and eight individuals were recorded within control sites. No individuals of Kiandra Leek Orchid were recorded at impact sites TF01, TF02, TF03, TF11, TF12, TF13 and TF14, and control sites TF05, TF07, TF08 and TF10.

Year 1 involved the capture of baseline data only. In Year 2, changes in the presence and absence of Clover Glycine and Kiandra Leek Orchid will be compared to baseline data across impact and control sites to assess any potential impacts arising from the project.

No individuals of Clover Glycine or Kiandra Leek Orchid were recorded at TF01, TF05, TF11, TF12 and TF13 (Figure 3.1). It is recommended that sites where target species have not been recorded during Year 1 will be monitored during Year 2 (2021/22) monitoring period. If the species are not recorded during Year 2, it is recommended the sites are moved to new locations where the species is present.

KEY

- Approved disturbance
- Approved construction envelope
- Clover Glycine
- Kiandra Leek Orchid
- Threatened flora monitoring location

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp37052\f4eaeb02-413e-46e3-b193-0475889a9c7b\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

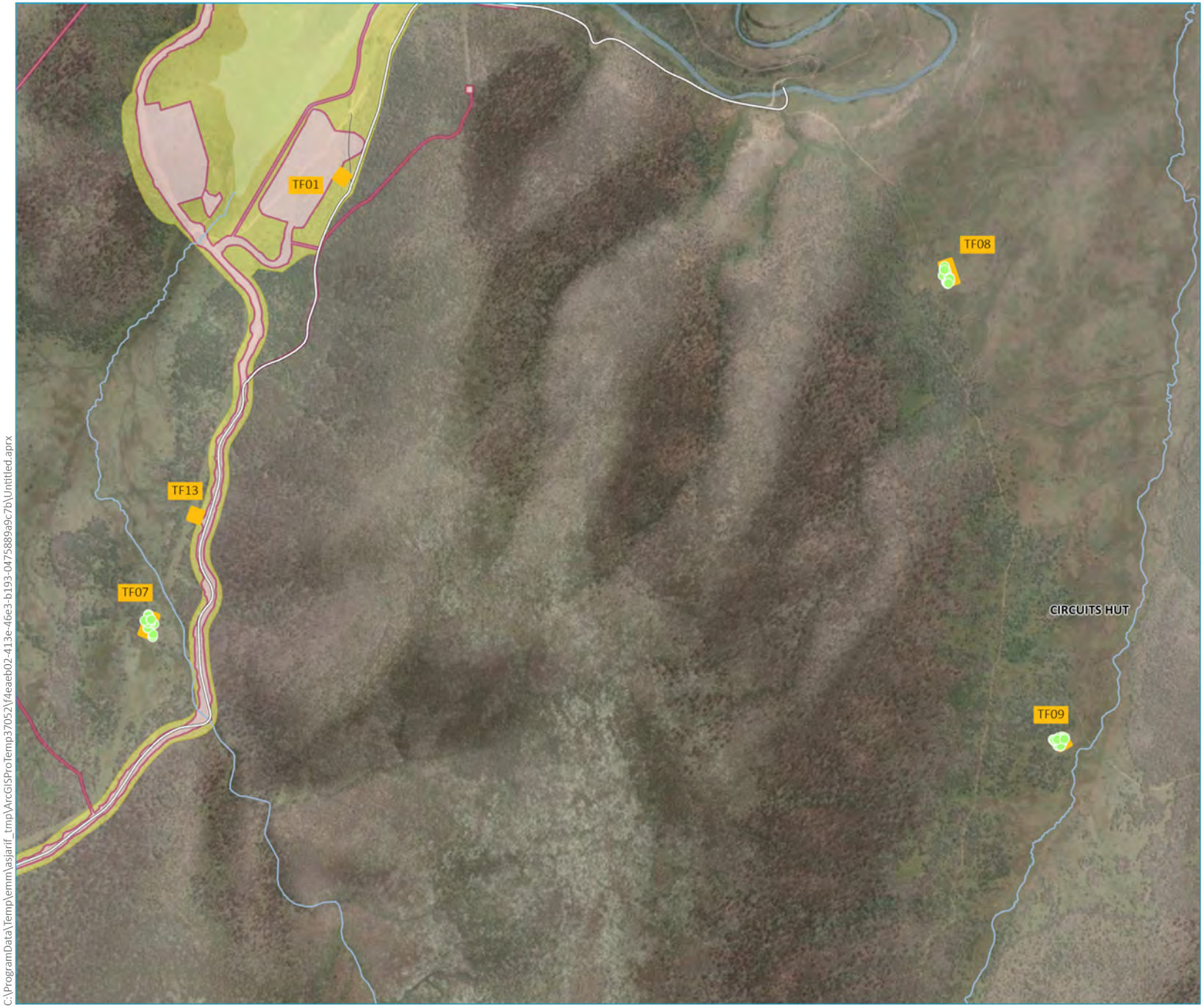
N

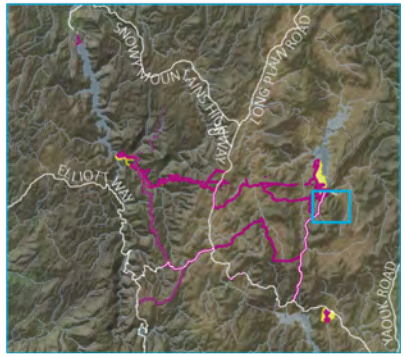
Threatened flora records during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.1 a

snowy 2.0

EMM creating opportunities





KEY

- Approved disturbance
- Approved construction envelope
- Clover Glycine
- Kiandra Leek Orchid
- Threatened flora monitoring location

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp37052\f4eaeb02-413e-46e3-b193-04758889a9c7b\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

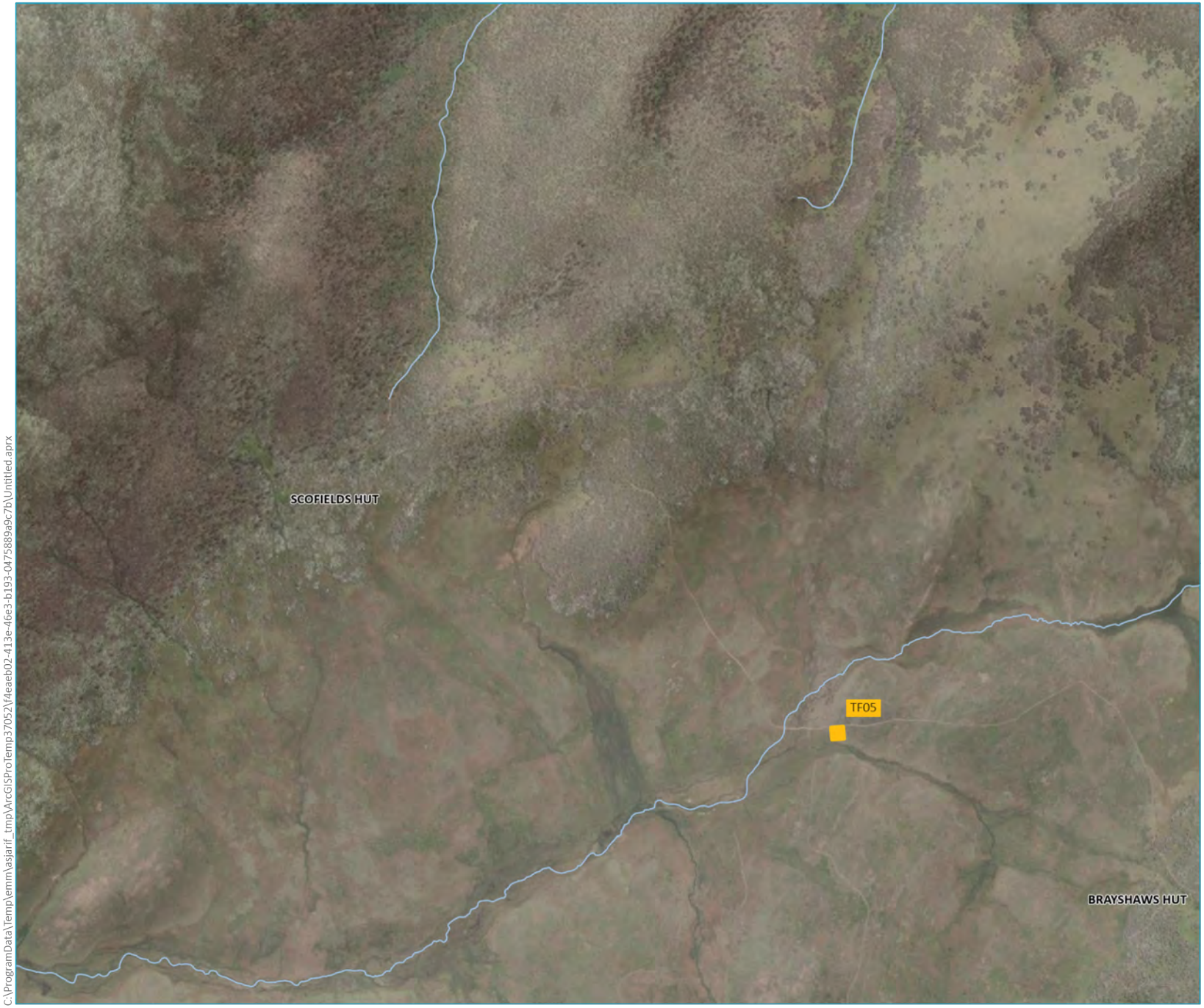
N

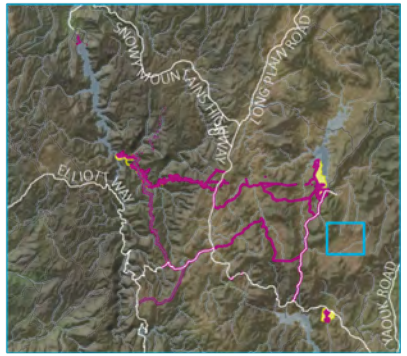
Threatened flora records during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.1b

snowy 2.0

EMM creating opportunities





KEY

Approved disturbance
Approved construction envelope
Clover Glycine
Kiandra Leek Orchid
Threatened flora monitoring location

Existing environment

Major road
Minor road
Vehicular track
Named watercourse
Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp37052\f4eaeb02-413e-46e3-b193-0475889a9c7b\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

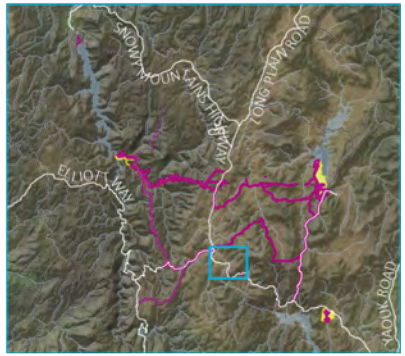
N

Threatened flora records during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.1c

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope
- Clover Glycine
- Kiandra Leek Orchid
- Threatened flora monitoring location

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp37052\f4eaeb02-413e-46e3-b193-04758889a9c7b\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Threatened flora records during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.1d

snowy 2.0

EMM creating opportunities

3.2 Small terrestrial mammal monitoring

3.2.1 Occupancy (presence/absence) monitoring

The objective of the small terrestrial mammal occupancy monitoring is to determine presence/absence of the Smoky Mouse, Eastern Pygmy-possum and Broad-toothed Rat at sites within proximity to the project and document any changes as a result of the Main Works.

i Smoky Mouse

The Smoky Mouse (Photograph 3.1) was recorded at seven sites during Year 1 including five impact sites (SM05-I, SM22-I, SM23-I, SM24-I and SM35-I) and two control sites (SM09-C and SM17-C), representing 17% of all small terrestrial mammal monitoring sites, and 48% of sites supporting suitable habitat for the Smoky Mouse.

Photograph 3.1 Smoky Mouse recorded from SM22-I-RC1 (A) and SM35-I-RC1 (B).

Smoky Mouse presence/absence at each monitoring site is summarised in Table 3.2 and presence at sites is graphically presented in Plate 3.3. Further detailed information including monitoring dates and presence/absence at each camera is provided in Appendix C.2.

Table 3.2 Smoky Mouse remote camera presence/absence

Site	Q1 (Summer)	Q2 (Autumn)	Q3 (Winter)	Q4 (Spring)
Impact				
SM01-I	-	-	-	-
SM03-I	-	-	-	-
SM05-I	Present	Present	Present	Present
SM07-I	-	-	-	-
SM10-I	-	-	-	-
SM14-I	-	-	-	-
SM15-I	-	-	-	-
SM16-I	-	-	-	-
SM18-I	-	-	-	-

Table 3.2 Smoky Mouse remote camera presence/absence

Site	Q1 (Summer)	Q2 (Autumn)	Q3 (Winter)	Q4 (Spring)
SM19-I				
SM20-I				
SM21-I	-	-	-	-
SM22-I	-	Present	Present	Present
SM23-I	-	-	-	Present
SM24-I	-	-	Present	-
SM25-I				
SM27-I				
SM34-I				
SM35-I	-	-	Present	-
SM36-I				
SM37-I				
Control				
SM02-C	-	-	-	-
SM04-C	-	-	-	-
SM06-C	-	-	-	-
SM08-C	-	NA	NA	NA
SM09-C	-	Present	-	Present
SM11-C	-	NA	NA	NA
SM12-C	-	-	-	-
SM13-C	-	-	-	-
SM17-C	-	-	-	Present
SM26-C	-	-	-	-
SM28-C				
SM29-C				
SM30-C				
SM31-C				
SM32-C				
SM33-C				
SM38-C				
SM39-C				
SM40-C	NA	-	-	-
SM41-C	NA	-	-	-

Notes: Highlighted cells represent sites with unsuitable habitat for the Smoky Mouse. Blank cells represent absence of species. NA indicates sites not present during that monitoring period.

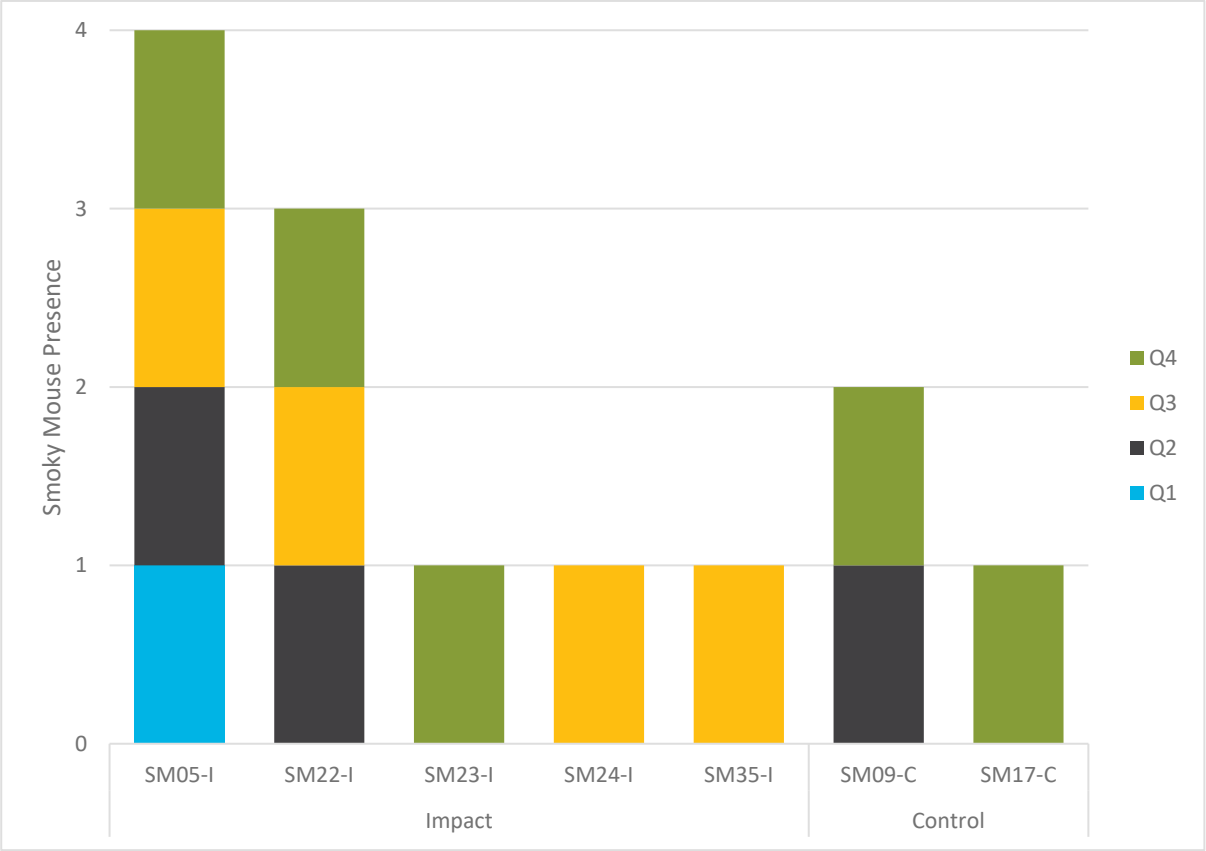
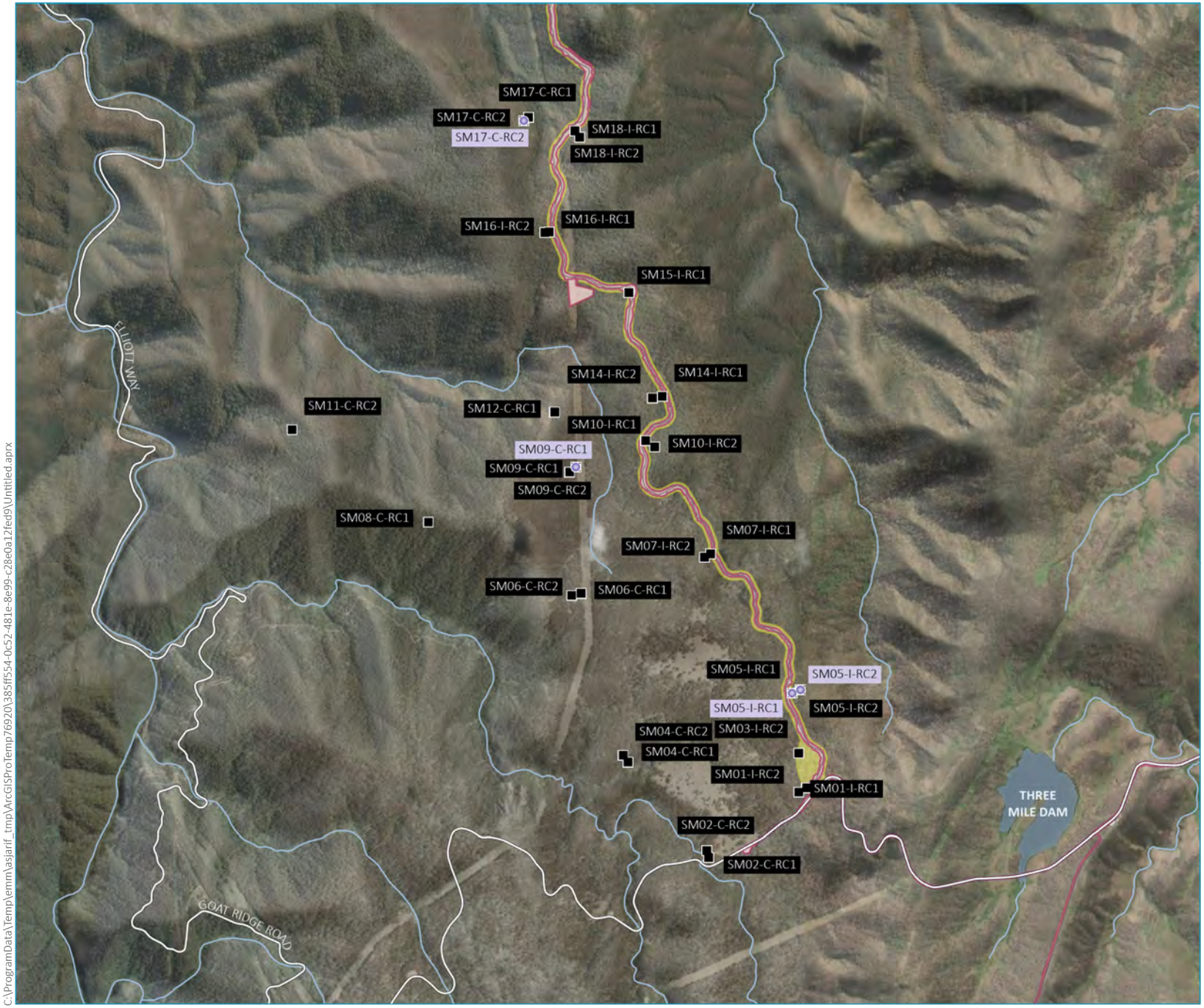


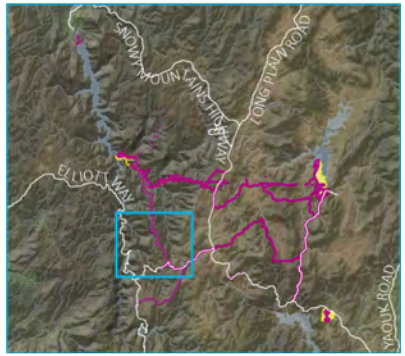
Plate 3.3 Smoky Mouse presence across monitoring periods.

During Q1 the Smoky Mouse was recorded at one impact site (SM05-I) and no control sites, representing 4% of the species sites. During Q2 the Smoky Mouse was recorded at two impact sites (SM05-I, SM22-I) and one control site (SM09-C), representing 12% of the species sites. During Q3 the Smoky Mouse was recorded at four impact sites (SM05-I, SM22-I, SM24-I, SM35-I) and no control sites, representing 15% of the species sites. During Q4 the Smoky Mouse was recorded at three impact sites (SM05-I, SM22-I, SM23-I) and two control sites (SM09-C, SM17-C), representing 19% of the species sites.

Changes in occupancy records between monitoring periods may be a result of various factors such as post-fire recovery, seasonal variation, movement within and between sites, predation, and / or relative efficacy of camera placement. Continued monitoring will provide better identification of any changes occurring in Smoky Mouse occupancy among sites.

Given the Smoky Mouse was recorded at one impact and no control sites during Q1, adaptive management is not required and is unlikely to be triggered as no change at control sites can be detected. Further monitoring should review presence/absence of the species at all impact sites as compared to control sites to look at overall declines.





KEY

- Approved disturbance
- Approved construction envelope

Camera records- Smoky Mouse

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmpArcGISProTemp76920\385ff554-0c52-481e-8e99-c28e0a12fed9\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Smoky Mouse presence/absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.2a

snowy 2.0

EMM creating opportunities

KEY

- Approved disturbance
- Approved construction envelope

Camera records - Smoky Mouse

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp76920\385ff554-0c52-481e-8e99-c28e0a12fed9\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

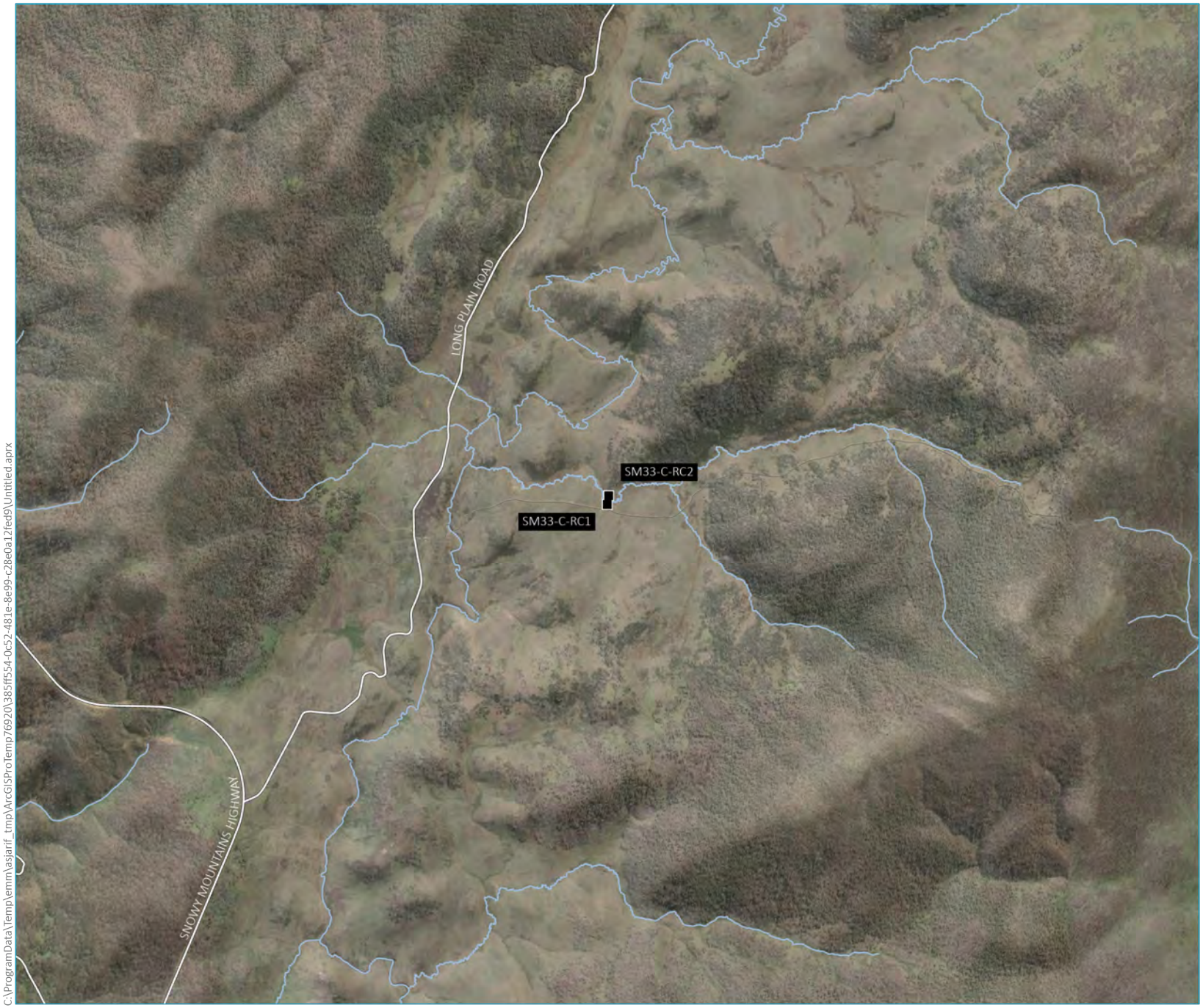
N

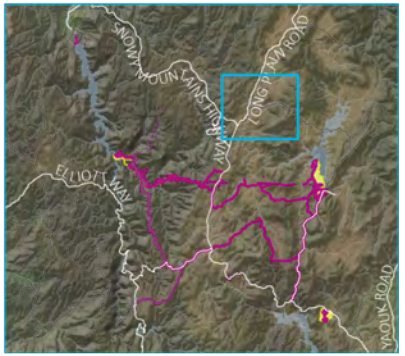
Smoky Mouse presence/absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.2b

snowy 2.0

EMM creating opportunities





KEY

- Approved disturbance
- Approved construction envelope

Camera records - Smoky Mouse

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp76920\385ff554-0c52-481e-8e99-c28e0a12fed9\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

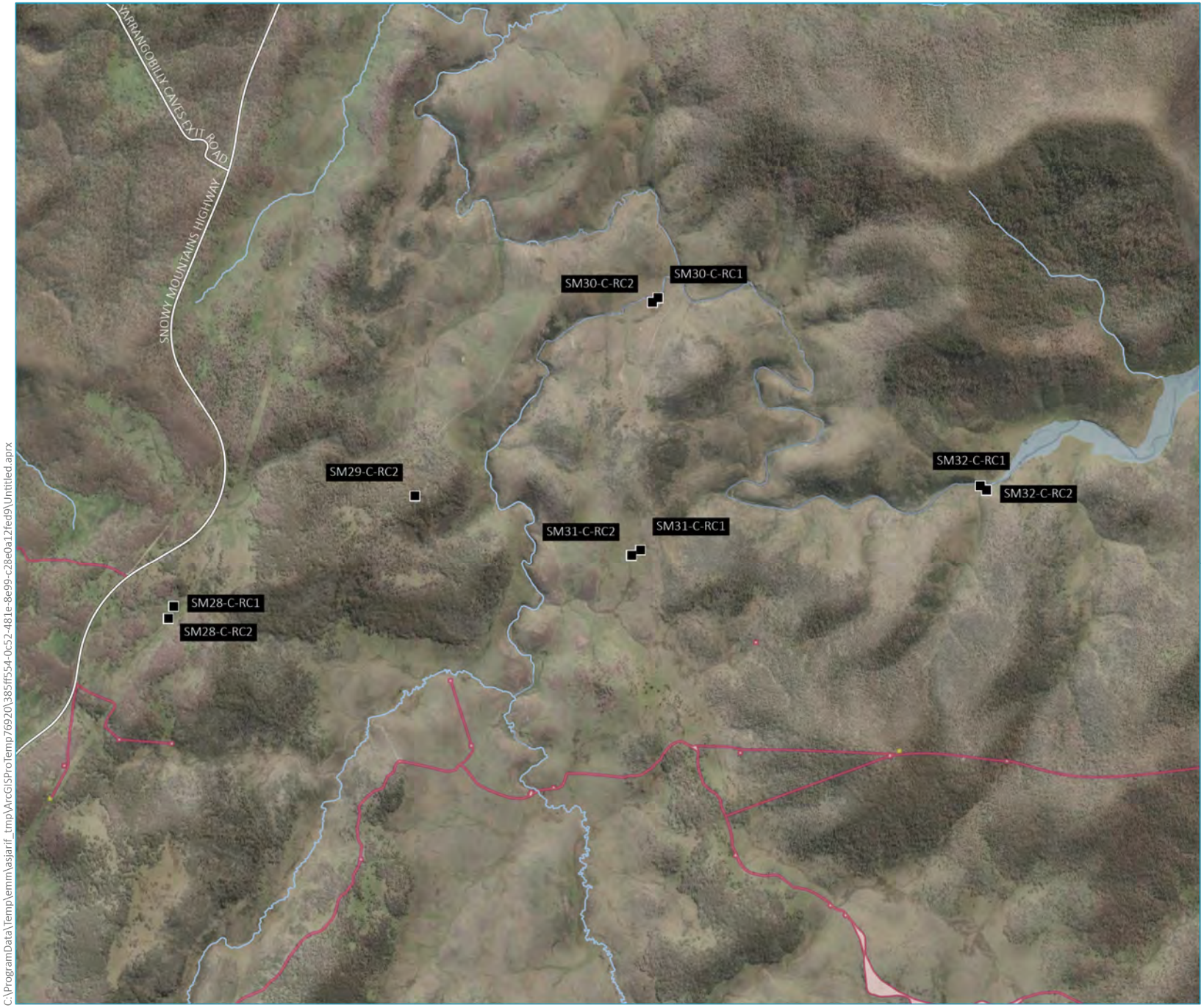
N

Smoky Mouse presence/absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.2c

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Camera records - Smoky Mouse

- Presence
- Absence

Existing environment

- Major road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp76920\385ff554-0c52-481e-8e99-c28e0a12fed9\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

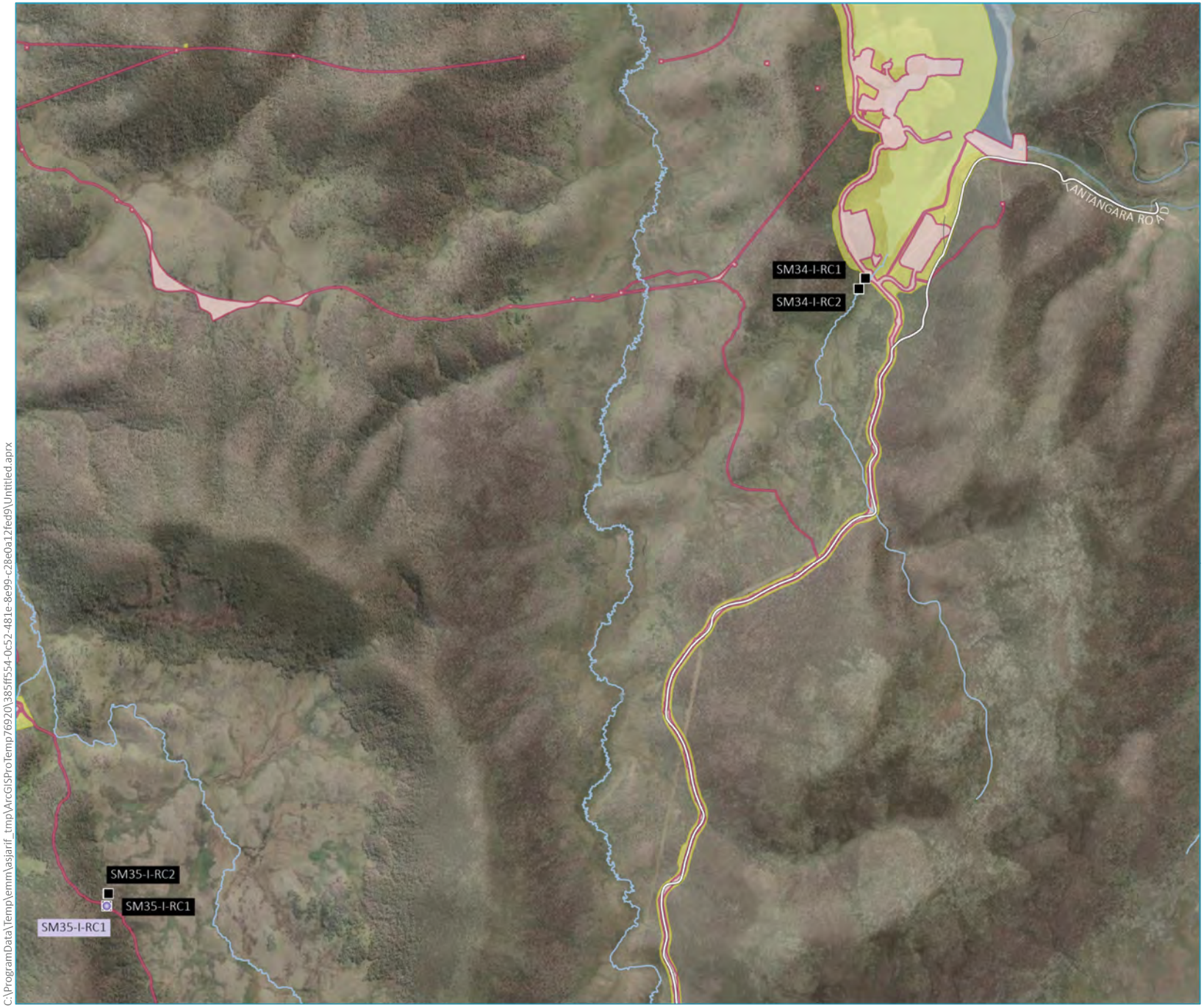
N

Smoky Mouse presence/absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.2d

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Camera records- Smoky Mouse

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp76920\385ff554-0c52-481e-8e99-c28e0a12fed9\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

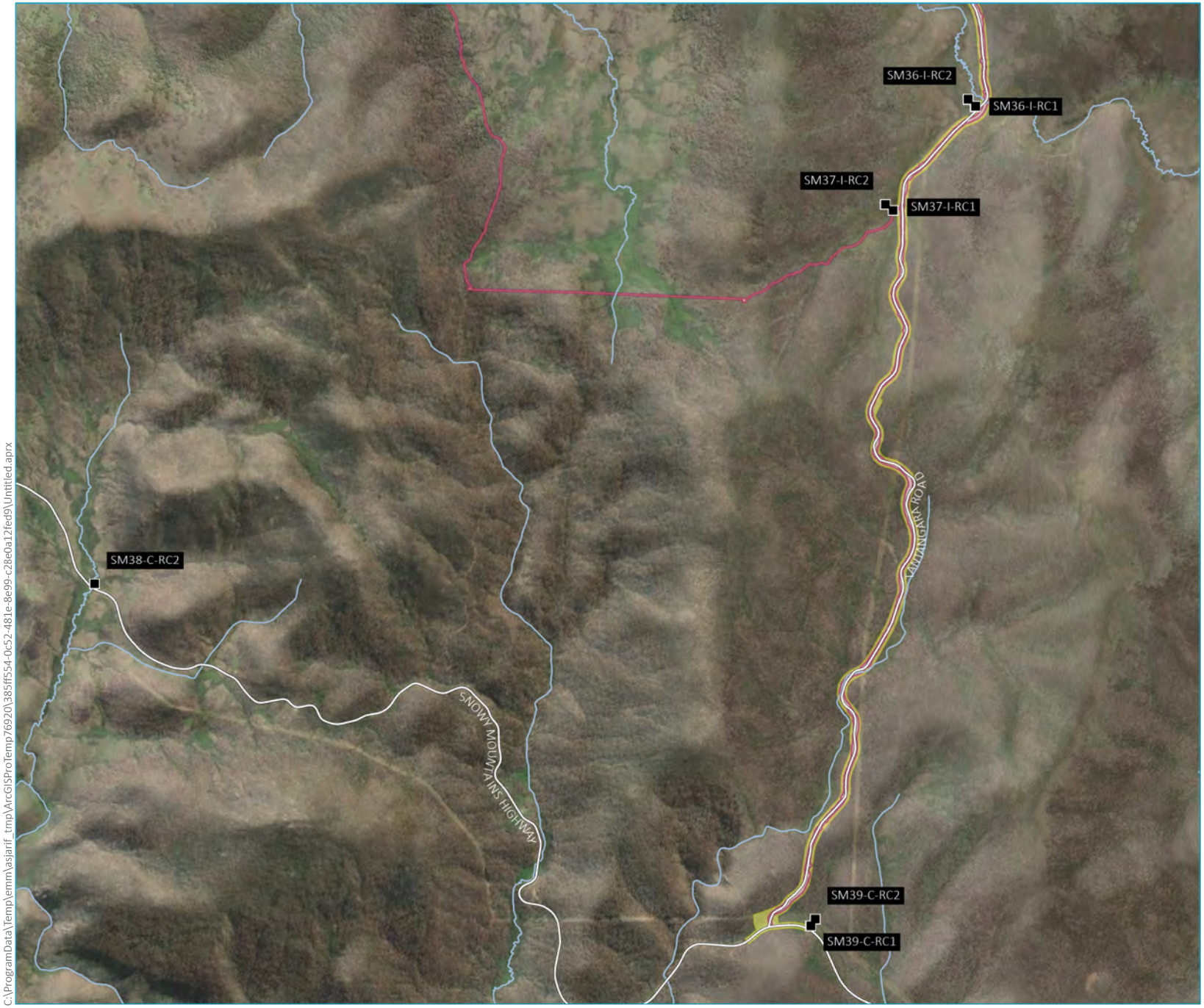
N

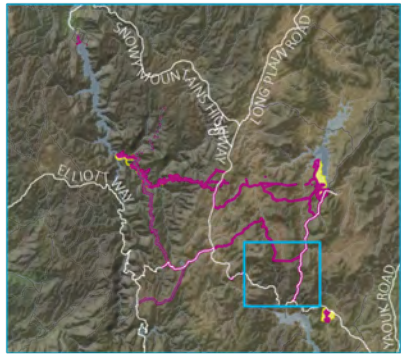
Smoky Mouse presence/absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.2e

snowy 2.0

EMM creating opportunities





KEY

- Approved disturbance
- Approved construction envelope

Camera records - Smoky Mouse

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp76920\385ff554-0c52-481e-8e99-c28e0a12fed9\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Smoky Mouse presence/absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.2f

snowy 2.0

EMM creating opportunities

ii Eastern Pygmy-possum

The Eastern Pygmy-possum (Photograph 3.2) was recorded at 21 sites during Year 1 including 13 impact sites (SM03-I, SM05-I, SM07-I, SM10-I, SM14-I, SM15-I, SM16-I, SM18-I, SM20-I, SM21-I, SM22-I, SM23-I and SM24-I) and eight control sites (SM02-C, SM04-C, SM06-C, SM08-C, SM09-C, SM11-C, SM17-C and SM40-C), representing 54% of all small terrestrial mammal monitoring sites, and 75% of sites supporting suitable habitat for the Eastern Pygmy Possum.

Photograph 3.2 Eastern Pygmy-possum recorded from site SM21-I-RC2 (A) and SM22-C-RC1 (B).

Eastern Pygmy-possum presence/absence at each monitoring site is summarised in Table 3.3 and presence at sites is graphically presented in Plate 3.4. Further detailed information including monitoring dates and presence/absence at each camera is provided in Appendix C.2.

Table 3.3 Eastern Pygmy-possum remote camera records

Site	Q1 (Summer)	Q2 (Autumn)	Q3 (Winter)	Q4 (Spring)
Impact				
SM01-I	-	-	-	-
SM03-I	Present	Present	-	-
SM05-I	-	Present	Present	-
SM07-I	-	Present	-	-
SM10-I	Present	-	-	-
SM14-I	Present	-	-	Present
SM15-I	-	Present	-	-
SM16-I	Present	Present	-	-
SM18-I	Present	-	-	-
SM19-I	-	-	-	-
SM20-I	Present	Present	-	-
SM21-I	Present	Present	-	Present
SM22-I	-	Present	-	-

Table 3.3 Eastern Pygmy-possum remote camera records

Site	Q1 (Summer)	Q2 (Autumn)	Q3 (Winter)	Q4 (Spring)
SM23-I	-	Present	-	Present
SM24-I	-	Present	-	-
SM25-I	-	-	-	-
SM27-I				
SM34-I				
SM35-I	-	-	-	-
SM36-I				
SM37-I				
Control				
SM02-C	Present	-	Present	Present
SM04-C	Present	Present	-	-
SM06-C	Present	Present	-	-
SM08-C	Present	-	-	-
SM09-C	Present	Present	-	Present
SM11-C	Present	-	-	-
SM12-C	-	-	-	-
SM13-C	-	-	-	-
SM17-C	Present	Present	-	-
SM26-C	-	-	-	-
SM28-C				
SM29-C	-	-	-	-
SM30-C				
SM31-C				
SM32-C				
SM33-C				
SM38-C				
SM39-C				
SM40-C	NA	-	-	Present
SM41-C	NA	-	-	-

Notes: Highlighted cells represent sites with unsuitable habitat for the Eastern Pygmy-possum. Blank cells represent absence of species. NA indicates sites not present during that monitoring period.

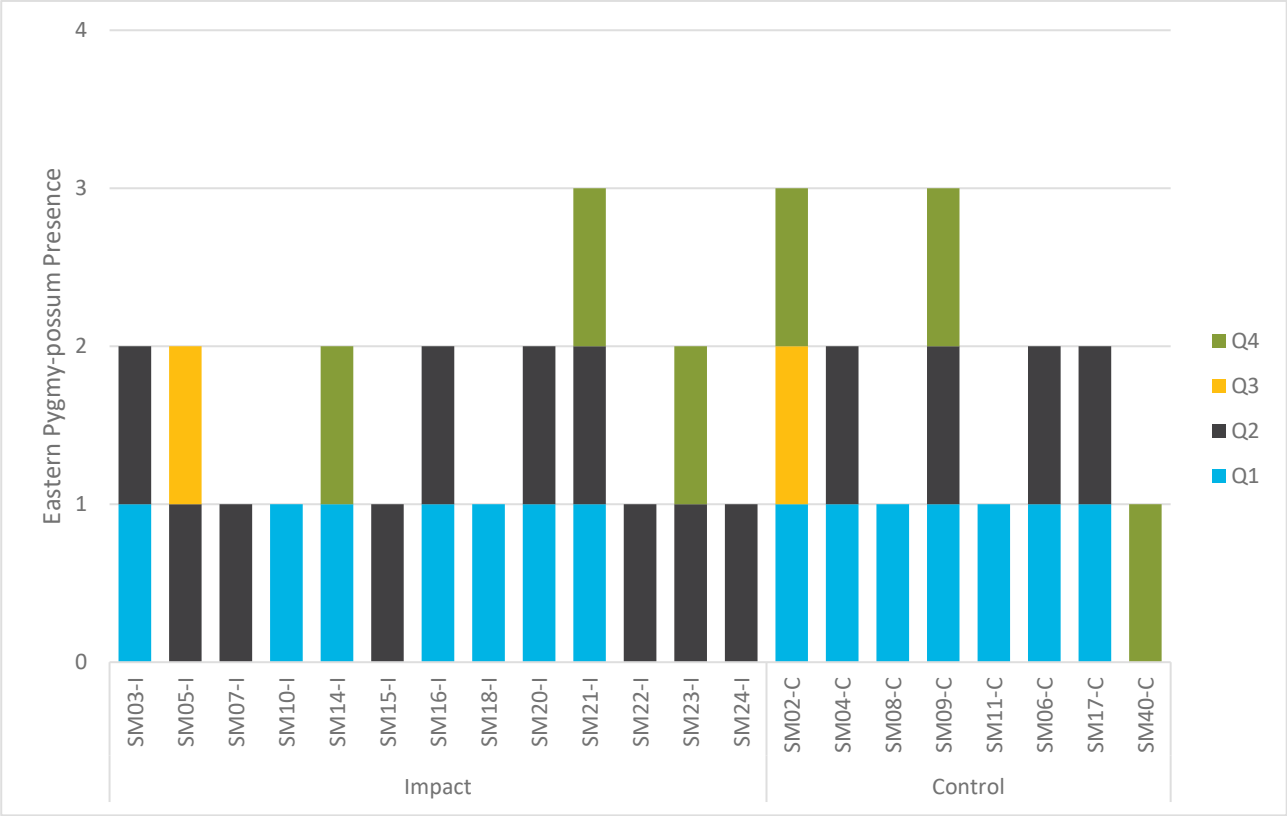
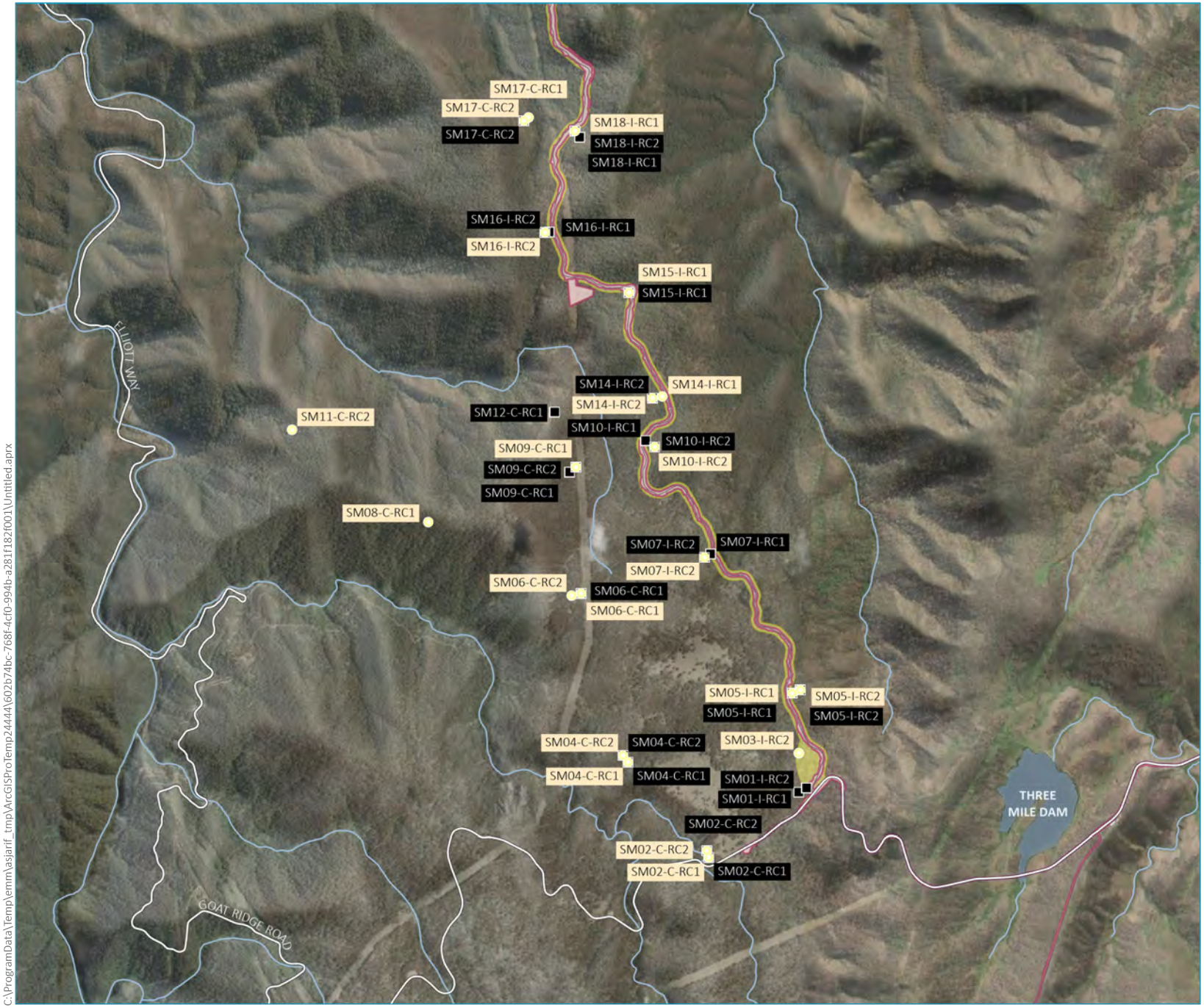


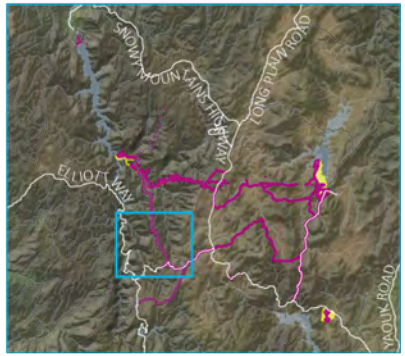
Plate 3.4 Eastern Pygmy-possum presence across monitoring periods.

During Q1 the Eastern Pygmy-possum was recorded at seven impact sites (SM03-I, SM10-I, SM14-I, SM16-I, SM18-I, SM20-I, SM21-I) and seven control sites (SM02-C, SM04-C, SM06-C, SM08-C, SM09-C, SM11-C, SM17-C-RC1), representing 47% of the species sites. During Q2 the Eastern Pygmy-possum was recorded at ten impact sites (SM03-I, SM05-I, SM07-I, SM15-I, SM16-I, SM20-I, SM21-I, SM22-I, SM23-I, SM24-I) and four control sites (SM04-C, SM06-C, SM09-C, SM17-C), representing 47% of the species sites. During Q3 the Eastern Pygmy-possum was recorded at one impact site (SM05-I) and one control site (SM02-C), representing 7% of the species sites. During Q4 the Eastern Pygmy-possum was recorded at three impact sites (SM14-I, SM21-I, SM23-I) and three control sites (SM02-C, SM09-C, SM40-C), representing 20% of the species sites.

Changes in occupancy records between monitoring periods may be a result of various factors such as post-fire recovery, seasonal variation, individual movement within and between sites, predation, and/or relative efficacy of camera placement. Reduced numbers during Q3 are likely to be the result of animal being in torpor over the winter period.

The Eastern Pygmy-possum was recorded at seven impact sites during Q1. The species was not recorded at one impact site during operational monitoring (Q2-Q4) where it was recorded during baseline surveys (SM18-I). Similar trends were observed at control sites with the species not recorded at two control sites during operational monitoring (Q2-Q4) where it was recorded during baseline surveys (SM08-C, SM11-C). Based on this, adaptive management is not required. Further monitoring will determine if these absences occur for greater than one year.





KEY

- Approved disturbance
- Approved construction envelope

Camera records- Eastern Pygmy-possum

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmpArcGISProTemp24444\602b74bc-768f-4cf0-994b-a281f182f001\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Eastern Pygmy-possum presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.3a

snowy 2.0

EMM creating opportunities

KEY

- Approved disturbance
- Approved construction envelope

Camera records- Eastern Pygmy-possum

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp24444\602b74bc-768f-4cf0-994b-a281f182f001\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

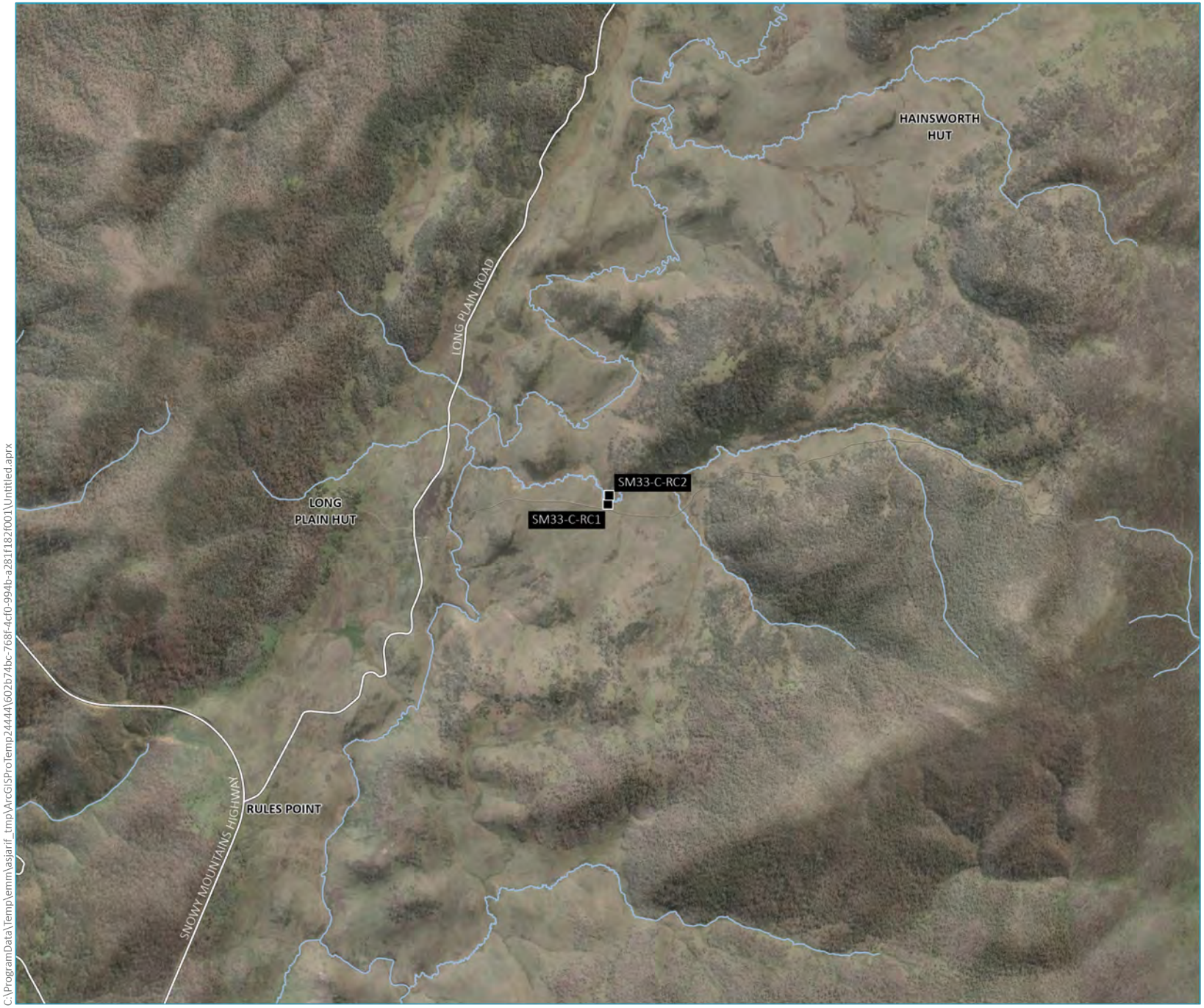
N

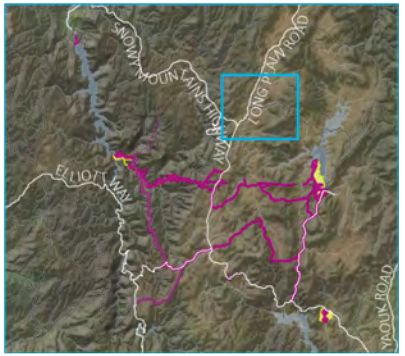
Eastern Pygmy-possum presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.3b

snowy 2.0

EMM creating opportunities





KEY

Approved disturbance

Approved construction envelope

Camera records- Eastern Pygmy-possum

Presence

Absence

Existing environment

Major road

Minor road

Vehicular track

Named watercourse

Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp24444\602b74bc-768f-4cf0-994b-a281f182f001\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

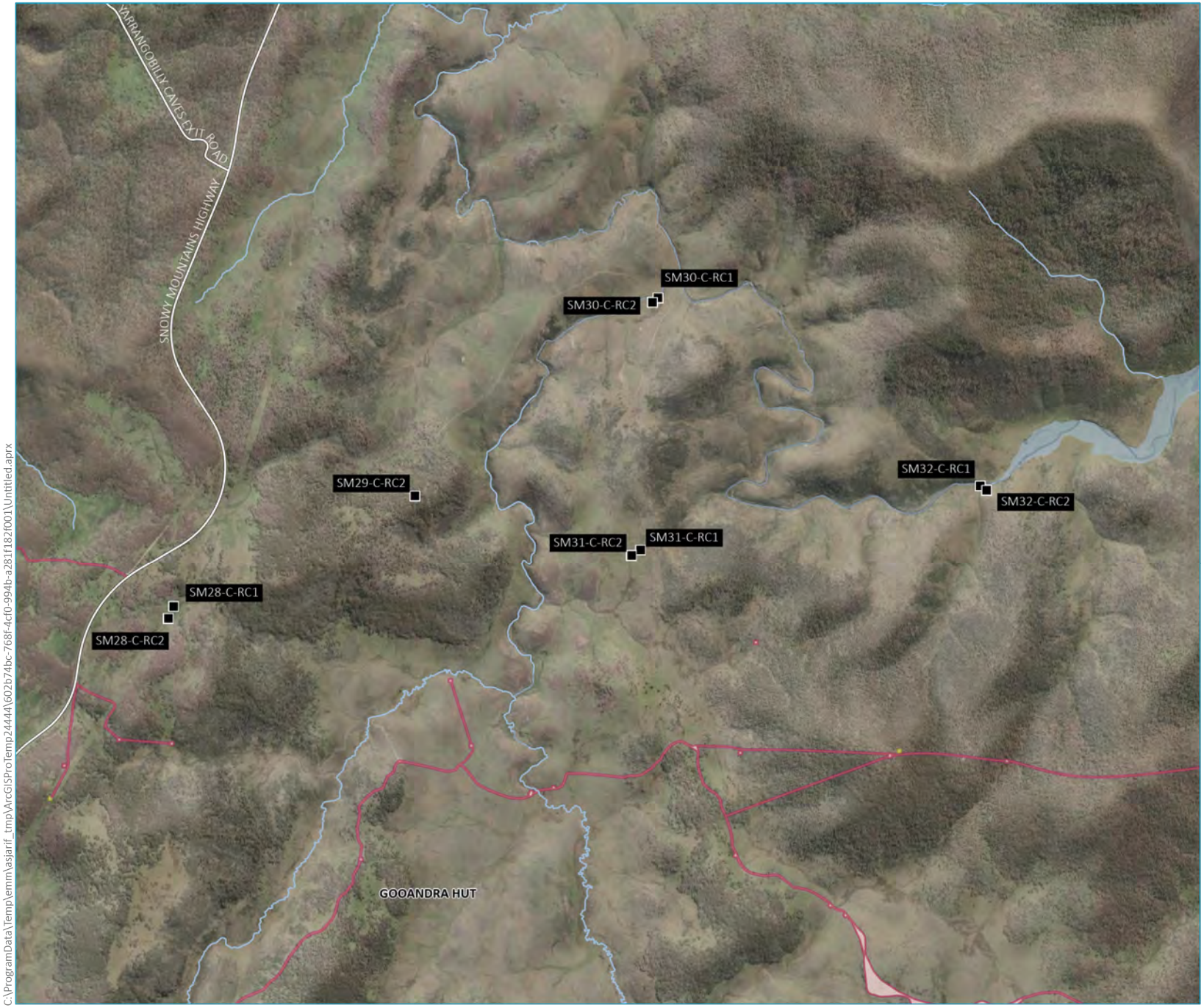
N

Eastern Pygmy-possum presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.3c

snowy 2.0

EMM creating opportunities



KEY

Approved disturbance

Approved construction envelope

Camera records- Eastern Pygmy-possum

Presence

Absence

Existing environment

Major road

Vehicular track

Named watercourse

Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp24444\602b74bc-768f-4cf0-994b-a281f182f001\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

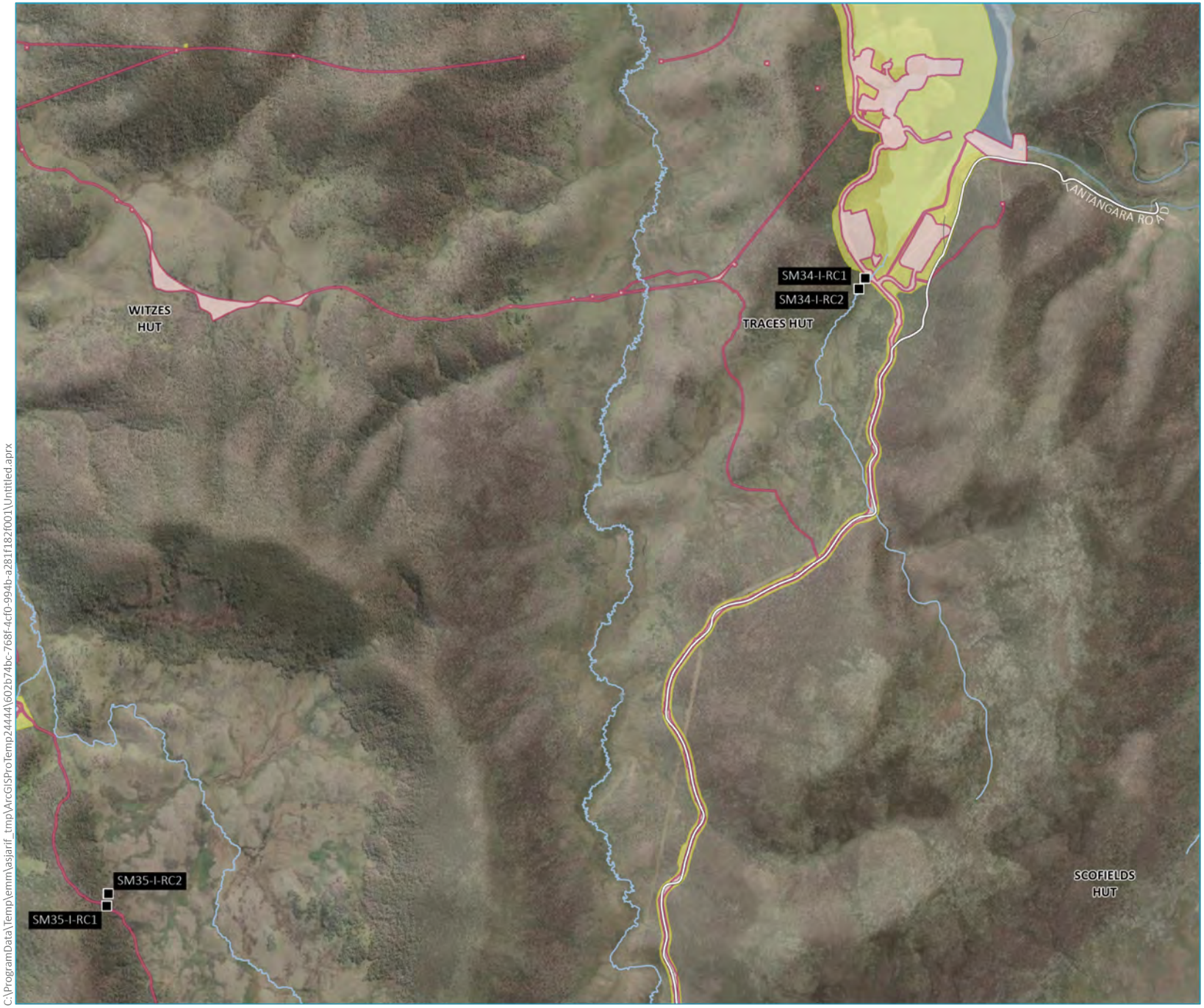
N

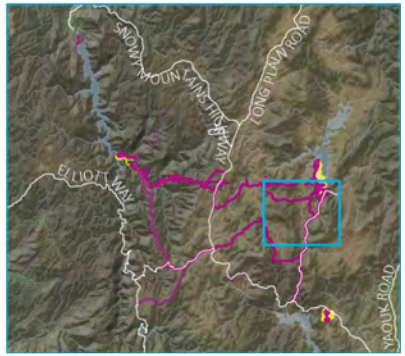
Eastern Pygmy-possum presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.3d

snowy 2.0

EMM creating opportunities





KEY

Approved disturbance

Approved construction envelope

Camera records- Eastern Pygmy-possum

Presence

Absence

Existing environment

Major road

Minor road

Vehicular track

Named watercourse

Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp24444\602b74bc-768f-4cf0-994b-a281f182f001\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

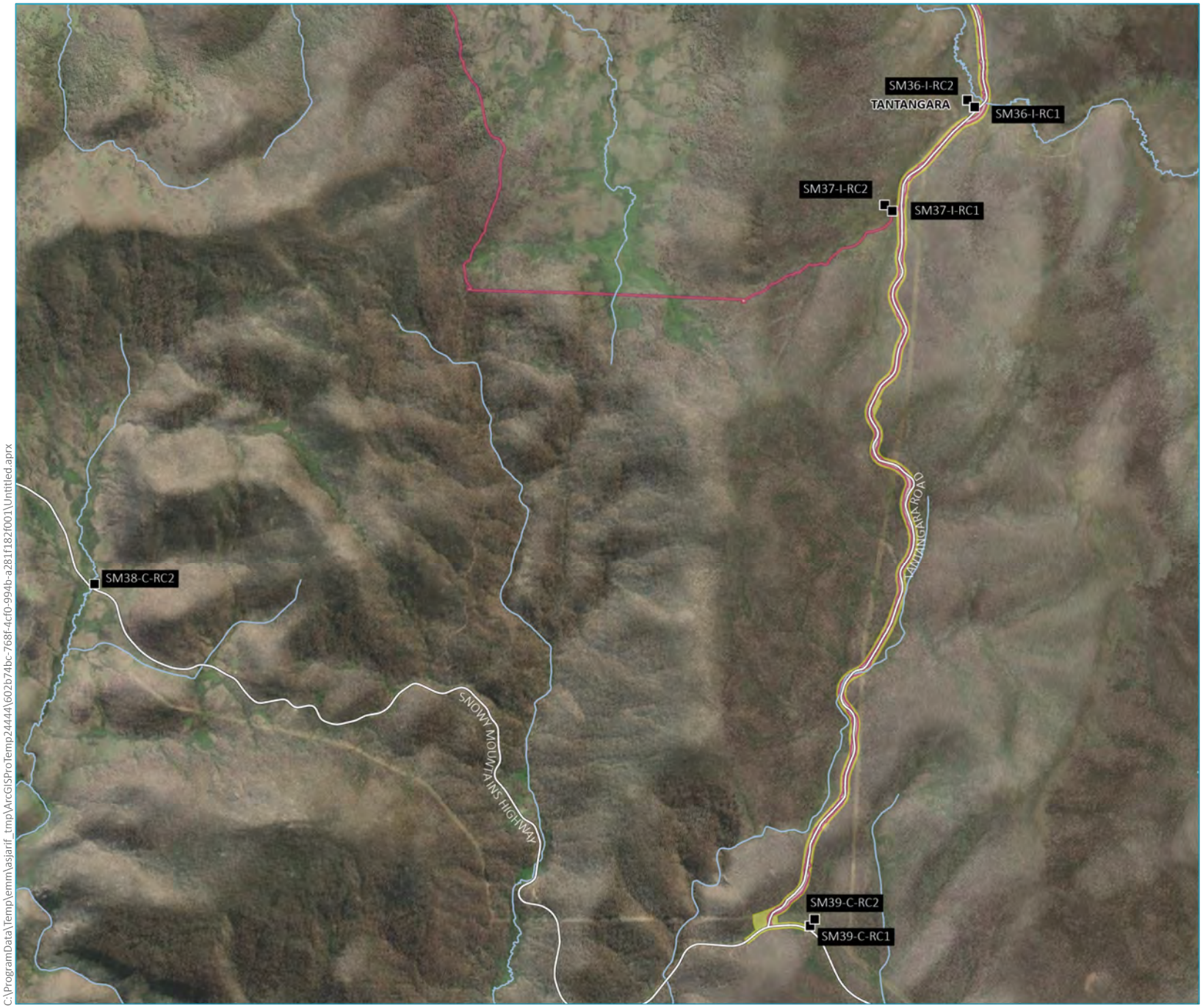
N

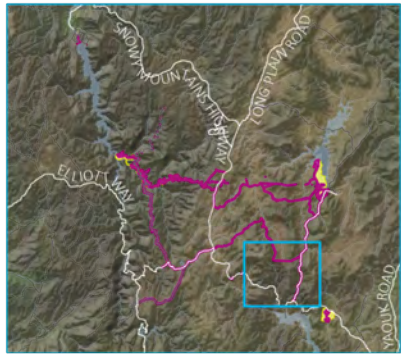
Eastern Pygmy-possum presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.3e

snowy 2.0

EMM creating opportunities





KEY

Approved disturbance

Approved construction envelope

Camera records- Eastern Pygmy-possum

Presence

Absence

Existing environment

Major road

Minor road

Vehicular track

Named watercourse

Waterbody

C:\ProgramData\Temp\emm\asjarif_tmpArcGISProTemp24444\602b74bc-768f-4cf0-994b-a281f182f001\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Eastern Pygmy-possum presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.3f

snowy 2.0

EMM creating opportunities

iii Broad-toothed Rat

a Camera traps

The Broad-toothed Rat (Photograph 3.3) was recorded at six control monitoring sites during Year 1 (SM28-C, SM30-C, SM32-C, SM33-C, SM38-C, SM39-C) and no impact monitoring sites, representing 15 % of all small mammal sites and 54% of sites supporting suitable habitat for Broad-toothed Rat.

Photograph 3.3 Broad-toothed Rat recorded from SM28-C-RC1 (A & B).

Broad-toothed Rat presence/absence at each monitoring site is summarised in Table 3.4 and presence at sites is graphically presented in Plate 3.5. Further detailed information including monitoring dates and presence/absence at each camera is provided in Appendix C.2.

Table 3.4 Broad-toothed Rat remote camera records

Site	Q1 (Summer)	Q2 (Autumn)	Q3 (Winter)	Q4 (Spring)
Impact				
SM01-I				
SM03-I				
SM05-I				
SM07-I				
SM10-I				
SM14-I				
SM15-I				
SM16-I				
SM18-I				
SM19-I				
SM20-I				
SM21-I				

Table 3.4 Broad-toothed Rat remote camera records

Site	Q1 (Summer)	Q2 (Autumn)	Q3 (Winter)	Q4 (Spring)
SM22-I				
SM23-I				
SM24-I				
SM25-I				
SM27-I	-	-	-	-
SM34-I	-	-	-	-
SM35-I				
SM36-I	-	-	-	-
SM37-I	-	-	-	-
Control				
SM02-C				
SM04-C				
SM06-C				
SM08-C				
SM09-C				
SM11-C				
SM12-C				
SM13-C				
SM17-C				
SM26-C				
SM28-C	Present	Present	Present	-
SM29-C				
SM30-C	Present	Present	Present	Present
SM31-C	-	-	-	-
SM32-C	-	Present	Present	Present
SM33-C	Present	Present	-	-
SM38-C	-	Present	-	-
SM39-C	-	-	-	Present
SM40-C				
SM41-C				

Notes: Highlighted cells represent sites with unsuitable habitat for the Broad-toothed Rat. Blank cells represent absence of species.

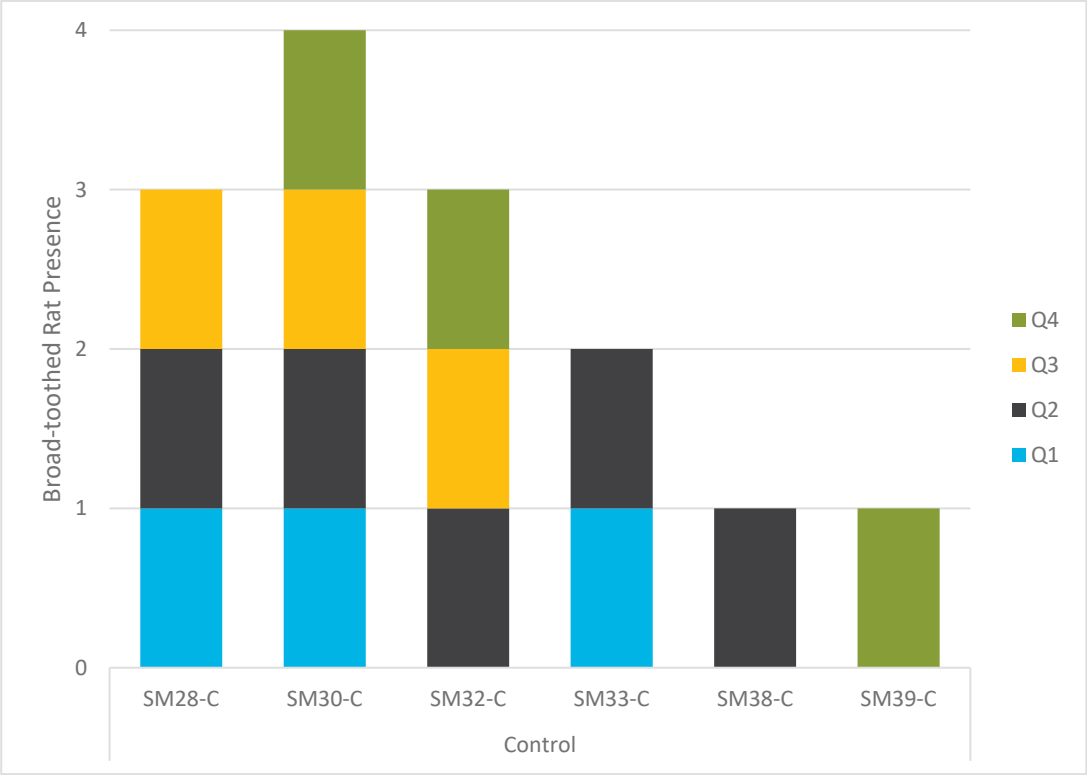


Plate 3.5 Broad-toothed Rat presence across monitoring periods.

During Q1 the Broad-toothed Rat was recorded at three control sites (SM28-C, SM30-C, SM33-C) and no impact sites, representing 27% of the species sites. During Q2 the Broad-toothed Rat was recorded at five control sites (SM28-C, SM30-C, SM32-C SM33-C, SM38-C) and no impact sites, representing 45% of the species sites. During Q3 the Broad-toothed Rat was recorded at three control sites (SM28-C, SM30-C, SM32-C) and no impact sites, representing 27% of the species sites. During Q4 the Broad-toothed Rat was recorded at three control sites (SM30-C, SM32-C, SM39-C) and no impact sites, representing 27% of the species sites.

Changes in occupancy records between monitoring periods may be a result of various factors such as seasonal variation, Broad-toothed Rat movement within and between sites, predation, and / or relative efficacy of camera placement. Continued monitoring in Year 2 will provide better identification of any changes occurring in Broad-toothed Rat occupancy.

All sites with recorded presence in Q1 recorded presence in Q2, along with an additional three sites. The species was recorded at fewer sites during Q3, with one additional site. In Q4, presence was recorded in three existing sites and one new site.

Adaptive management was not triggered as the Broad-toothed Rat was not recorded within any impact sites. Given this, it is recommended that if the species is not recorded during Year 2 Q1 or Q2, Broad-toothed Rat impact sites be moved to new locations where the species is present.

b Faecal Pellet Searches

Broad-toothed Rat faecal pellet searches give an additional measure of occupancy (presence/absence) at monitoring sites (Figure 2.2) where the species has been previously recorded.

Broad-toothed Rat (Photograph 3.3) faecal pellets were recorded at four control sites (FP26, FP30, FP32, FP33) and one impact site (FP17) during Year 1, representing 36% of all faecal pellet monitoring sites.

The species was not detected during baseline surveys (Q1). During the second monitoring event (Q2), rare (<50) old scats were present at control site FP32 and rare (<50) intermediate scats were present at FP32. Two monitoring events were conducted during Q4 due to weather constraints during Q3. During the third monitoring event (Q4), rare (<50) old scats were present at one impact sites (FP17) and two control sites (FP26, FP33), and uncommon (50-100) old scats were present at one control site (FP32). During the fourth monitoring event (Q4), rare (<50) old scats were present at two control sites (FP26, FP32).

Broad-toothed Rat faecal pellet presence/absence at each monitoring site is summarised in Table 3.5 and presence at sites is graphically presented in Plate 3.6. Further detailed information including monitoring dates is provided in Appendix C.

Table 3.5 Broad-toothed Rat faecal pellet presence, including abundance and scat age

	Monitoring event			
Site	**First (Q1)**	**Second (Q2)**	**Third (Q4)**	**Fourth (Q4)**
Impact				
FP17	-	-	Rare (old)	-
FP18	-	-	-	-
FP19	-	-	-	-
FP20	-	-	-	-
Control				
FP24	-	-	-	-
FP26	-	-	Rare (old)	Rare (old)
FP27	-	-	-	-
FP30	-	Rare (old)	-	-
FP31	-	-	-	-
FP32	-	Rare (intermediate)	Uncommon (old)	Rare (old)
FP33	-	-	Rare (old)	-

Notes: 1. Abundance: Abundant >200 scats, common = 100-200 scats, uncommon = 50-100 scats, rare <50 scats and not present = no scats recorded.
2. Age: Old = completely dry, fresh = bright olive green, 3 = intermediate.

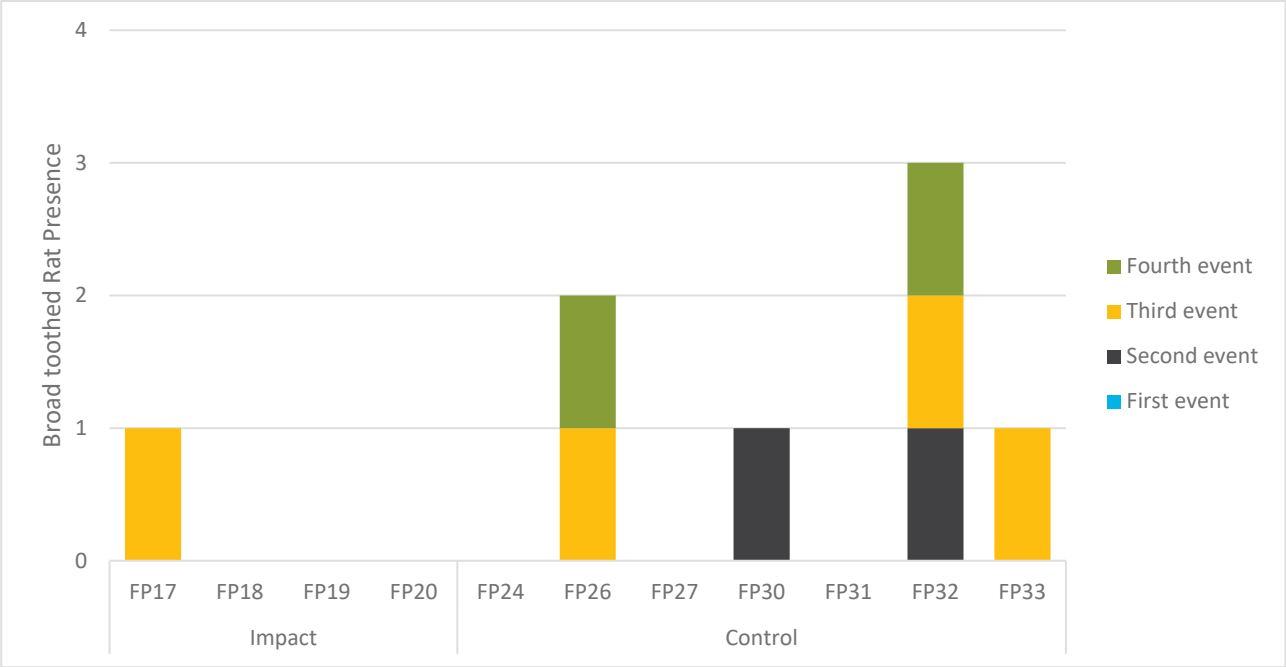
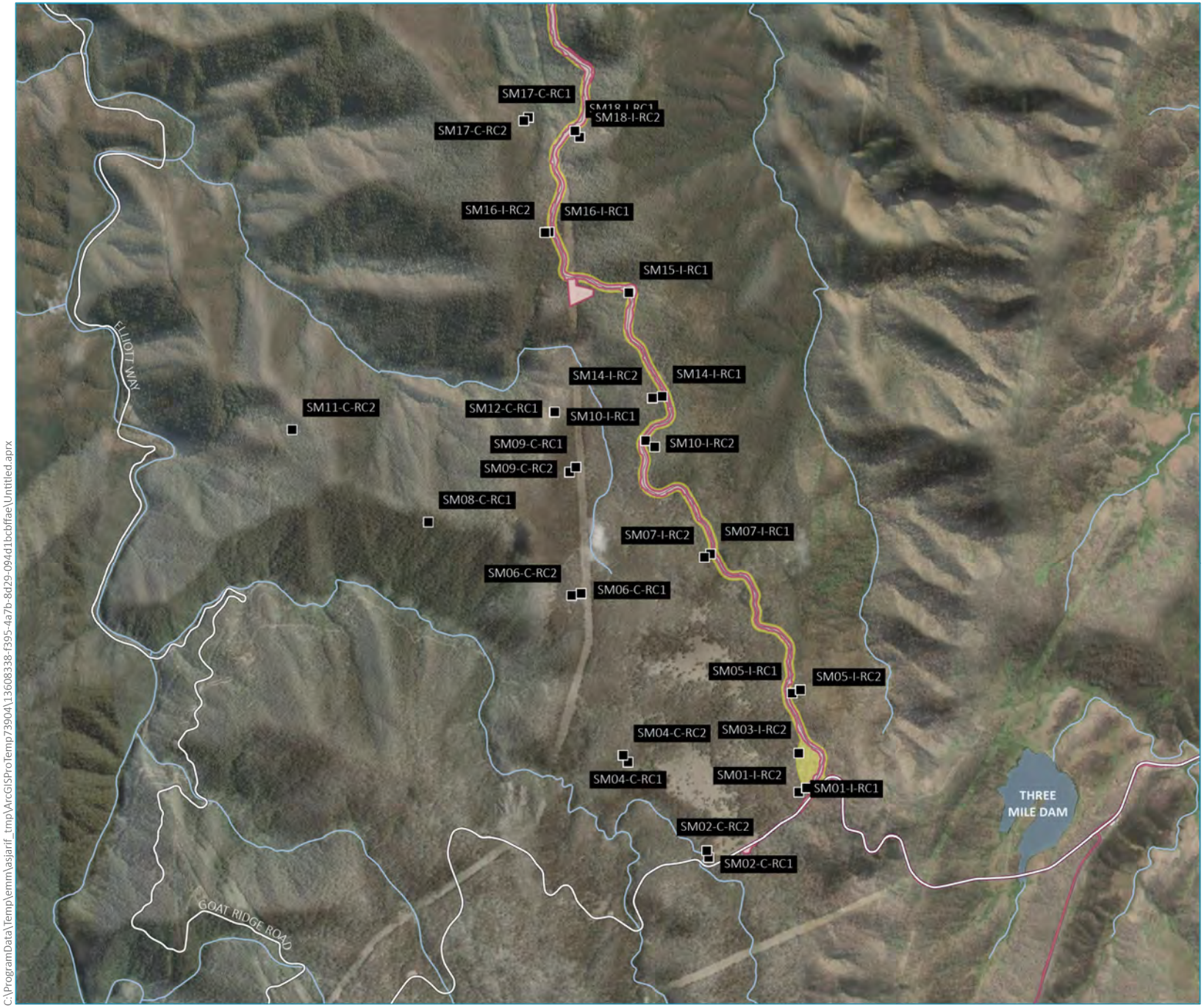
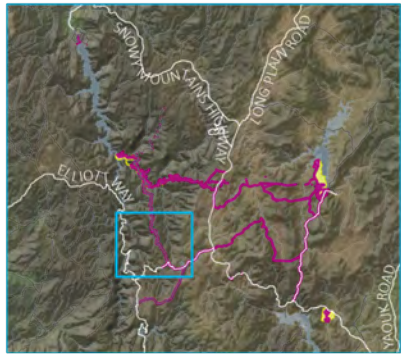


Plate 3.6 Broad-toothed Rat scat presence across monitoring period.

Once detected at a site, scats were detected in all subsequent monitoring periods except for at control sites FP30 and FP33. FP30 recorded presence during the second event but not the third or fourth and FP33 recorded presence during the third event but not the fourth. Therefore, adaptive management has not been triggered. If Broad-toothed Rat scats are not recorded at more than five sites during Year 2, it is recommended that the survey sites are modified to locations where more reliable scat results can be obtained to allow effective monitoring and comparison between impact and control sites.





KEY

- Approved disturbance
- Approved construction envelope

Camera records- Broad-toothed Rat

- Presence
- Absence

Faecal records- Broad-toothed Rat

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp73904\13608338-f395-4a7b-8d29-094d1bcbffae\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

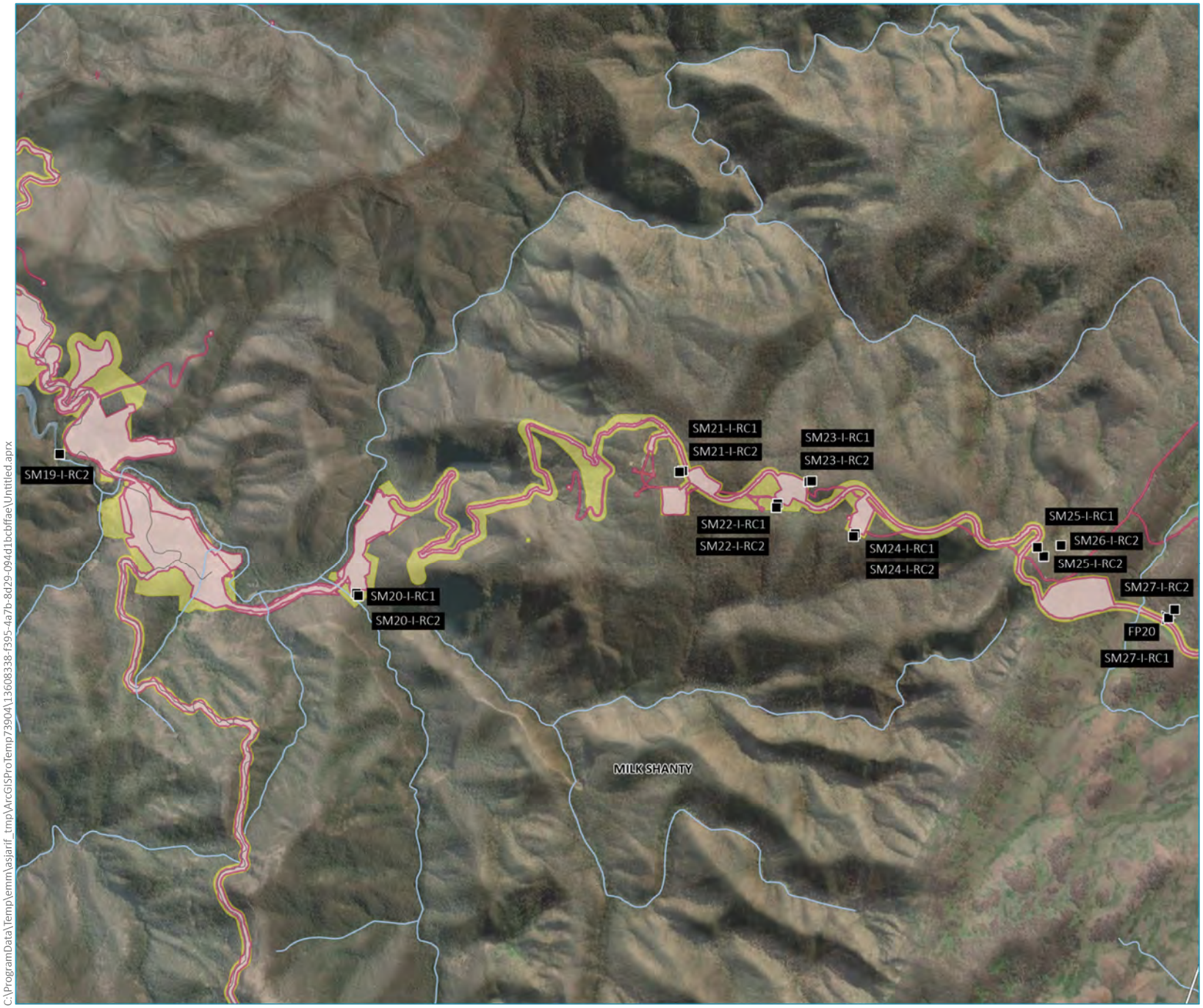
N

Broad-toothed Rat presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.4a

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Camera records- Broad-toothed Rat

- Presence
- Absence

Faecal records- Broad-toothed Rat

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp73904\13608338-f395-4a7b-8d29-094d1bcbffae\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

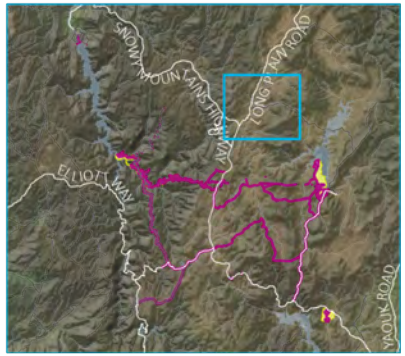
N

Broad-toothed Rat presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.4b

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Camera records- Broad-toothed Rat

- Presence
- Absence

Faecal records- Broad-toothed Rat

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp73904\13608338-f395-4a7b-8d29-094d1bcbffae\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

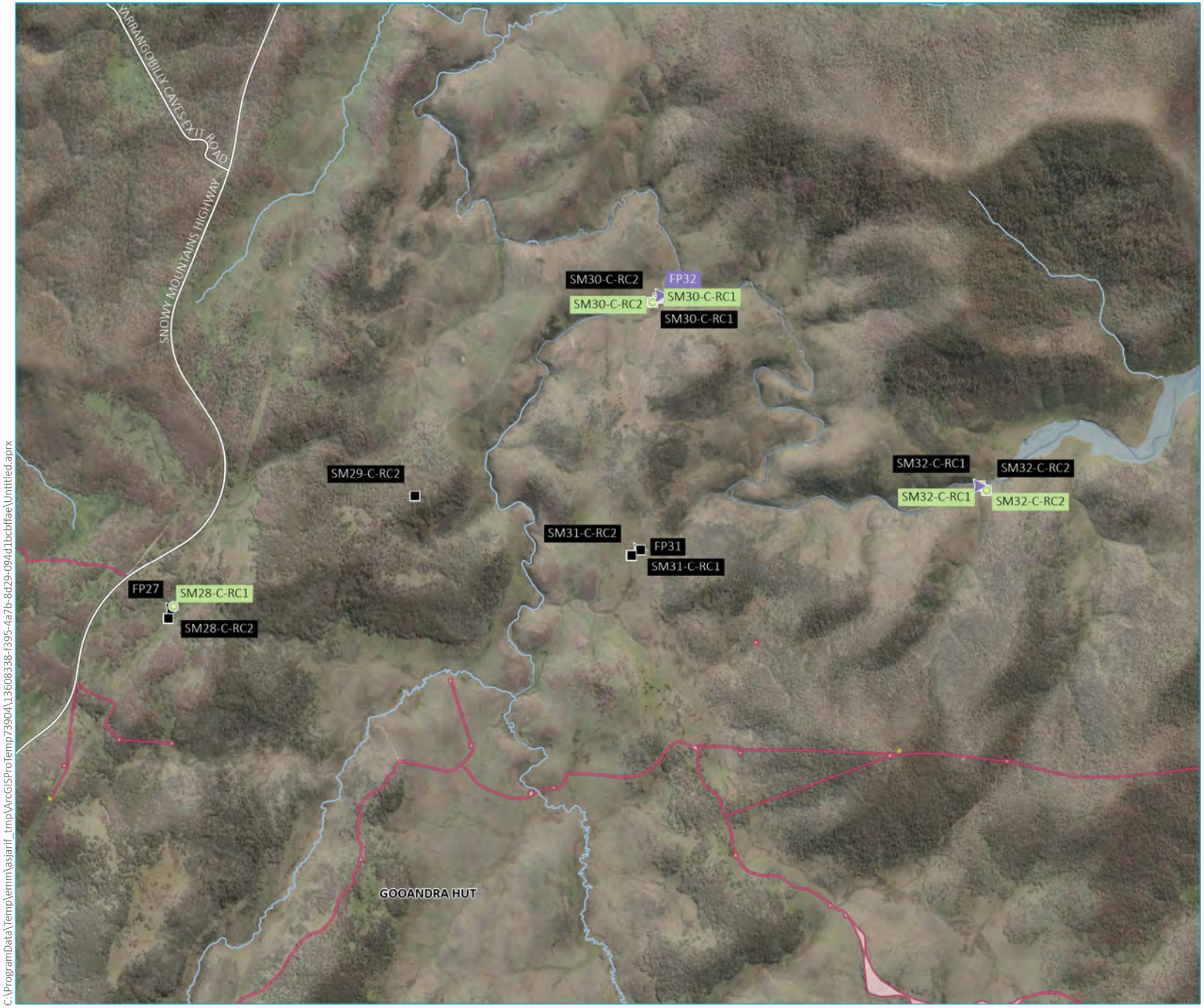
N

Broad-toothed Rat presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.4c

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Camera records- Broad-toothed Rat

- Presence
- Absence

Faecal records- Broad-toothed Rat

- Presence
- Absence

Existing environment

- Major road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp73904\13608338-f395-4a7b-8d29-094d1bcbffae\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

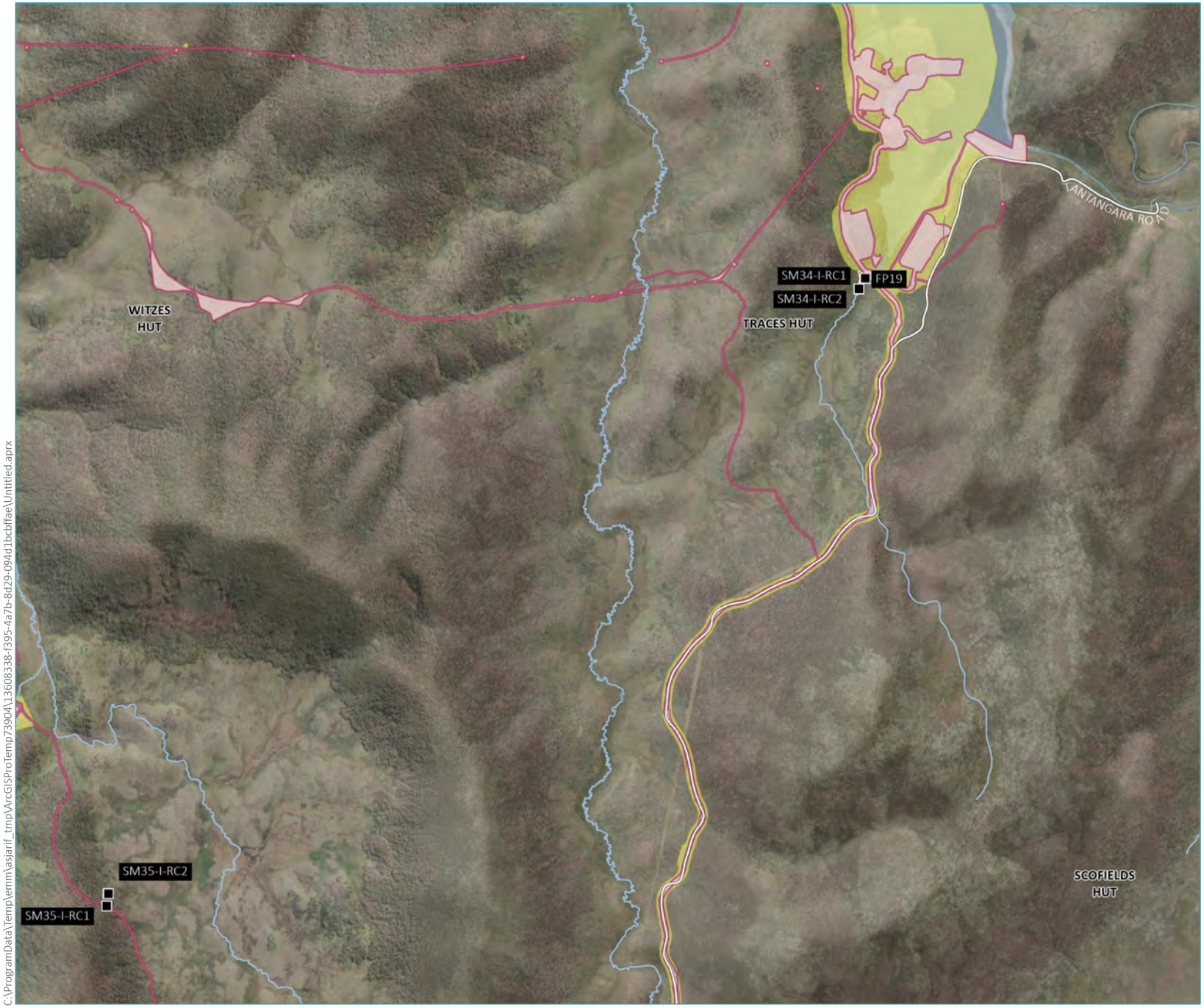
N

Broad-toothed Rat presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.4d

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Camera records- Broad-toothed Rat

- Presence
- Absence

Faecal records- Broad-toothed Rat

- Presence
- Absence

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp73904\13608338-f395-4a7b-8d29-094d1bcbffae\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

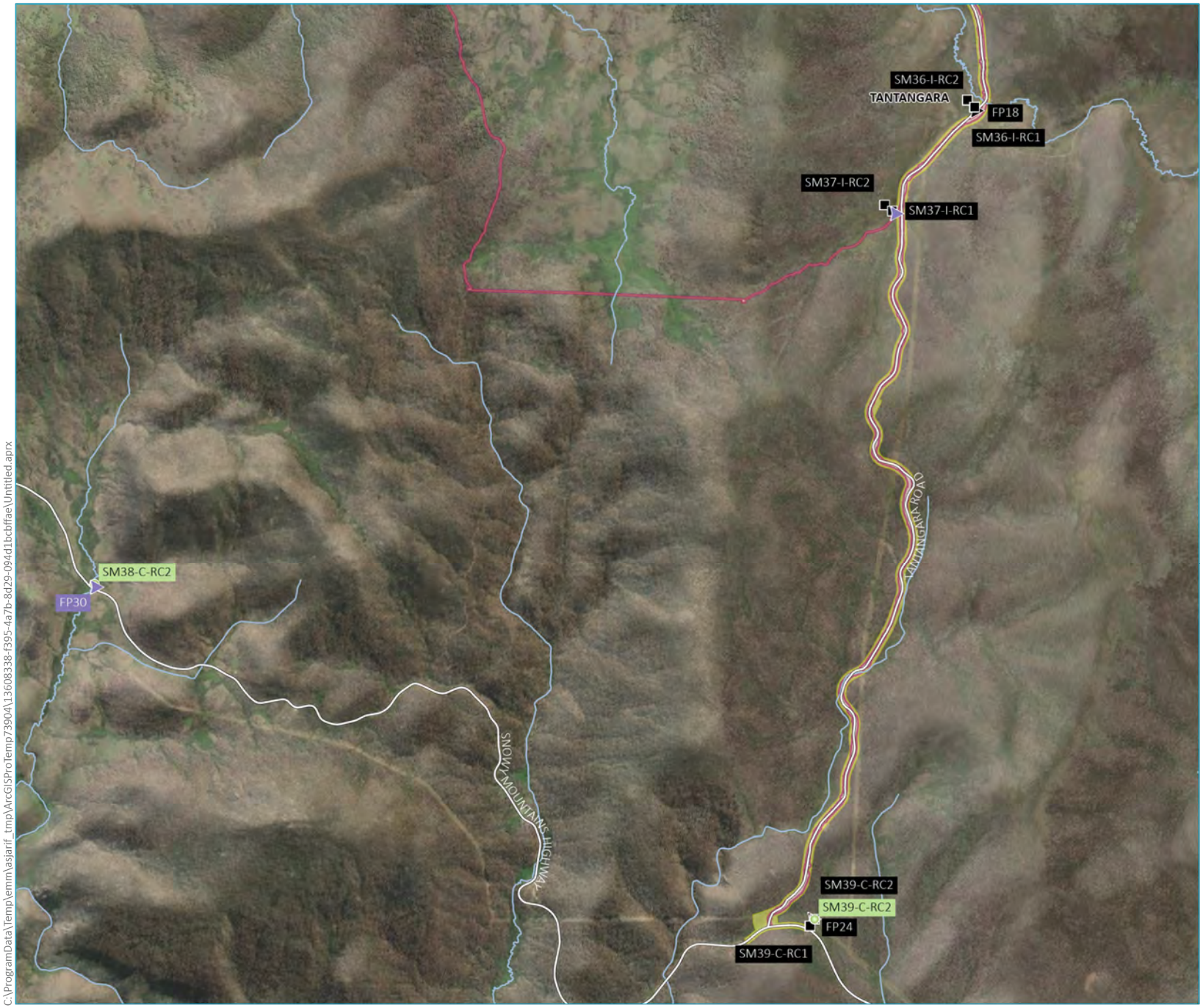
N

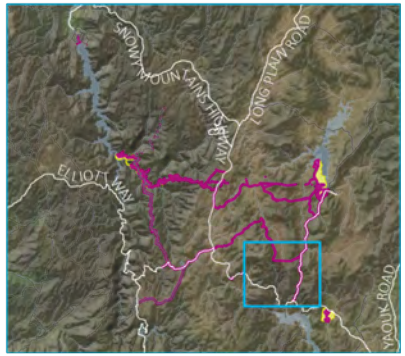
Broad-toothed Rat presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.4e

snowy 2.0

EMM creating opportunities





KEY

- Approved disturbance
- Approved construction envelope

Camera records- Broad-toothed Rat

- Presence
- Absence

Faecal records- Broad-toothed Rat

- Presence
- Absence

Existing environment

- Major road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp73904\13608338-f395-4a7b-8d29-094d1bcbffae\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Broad-toothed Rat presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.4f

snowy 2.0

EMM creating opportunities

3.2.2 Habitat characteristic monitoring

The objective of the small terrestrial mammal habitat characteristic monitoring is to determine the habitat characteristics of occupied Smoky Mouse, Eastern Pygmy-possum and Broad-toothed Rat habitat, within proximity to the Main Works project and document any changes to the habitat arising from the Main Works project.

Cover was split into three categories (native, exotic and habitat structure) and percentage recorded at three height intervals (<0.5 m, 1 – 1.5 m, 1 – 1.5 m).

Vegetation structure by component (native, exotic and habitat structure) is comparable between control and impact sites. Control and impacts sites showed similar minimum, maximum and average cover scores by component. Data is presented in Table 3.6 and graphically presented in Plate 3.8 and Plate 3.7. Data is provided for each site in Appendix C.2.

Table 3.6 Minimum, maximum and average cover scores by height class for native vegetation, exotic vegetation and habitat structure at control and impact sites

Component		<0.5 m		0.5 – 1 m		1 – 1.5 m	
		Control	Impact	Control	Impact	Control	Impact
Native	Minimum	25%	34%	0%	0%	0%	0%
	Maximum	98%	99%	51%	61%	10%	22%
	Average	74%	74%	14%	17%	2%	3%
Exotic	Minimum	0%	0%	0%	0%	0%	0%
	Maximum	79%	66%	20%	14%	0%	3%
	Average	19%	14%	2%	2%	0%	0%
Habitat structure	Minimum	0%	0%	0%	0%	0%	0%
	Maximum	78%	44%	3%	6%	2%	2%
	Average	20%	17%	0%	1%	0%	0%

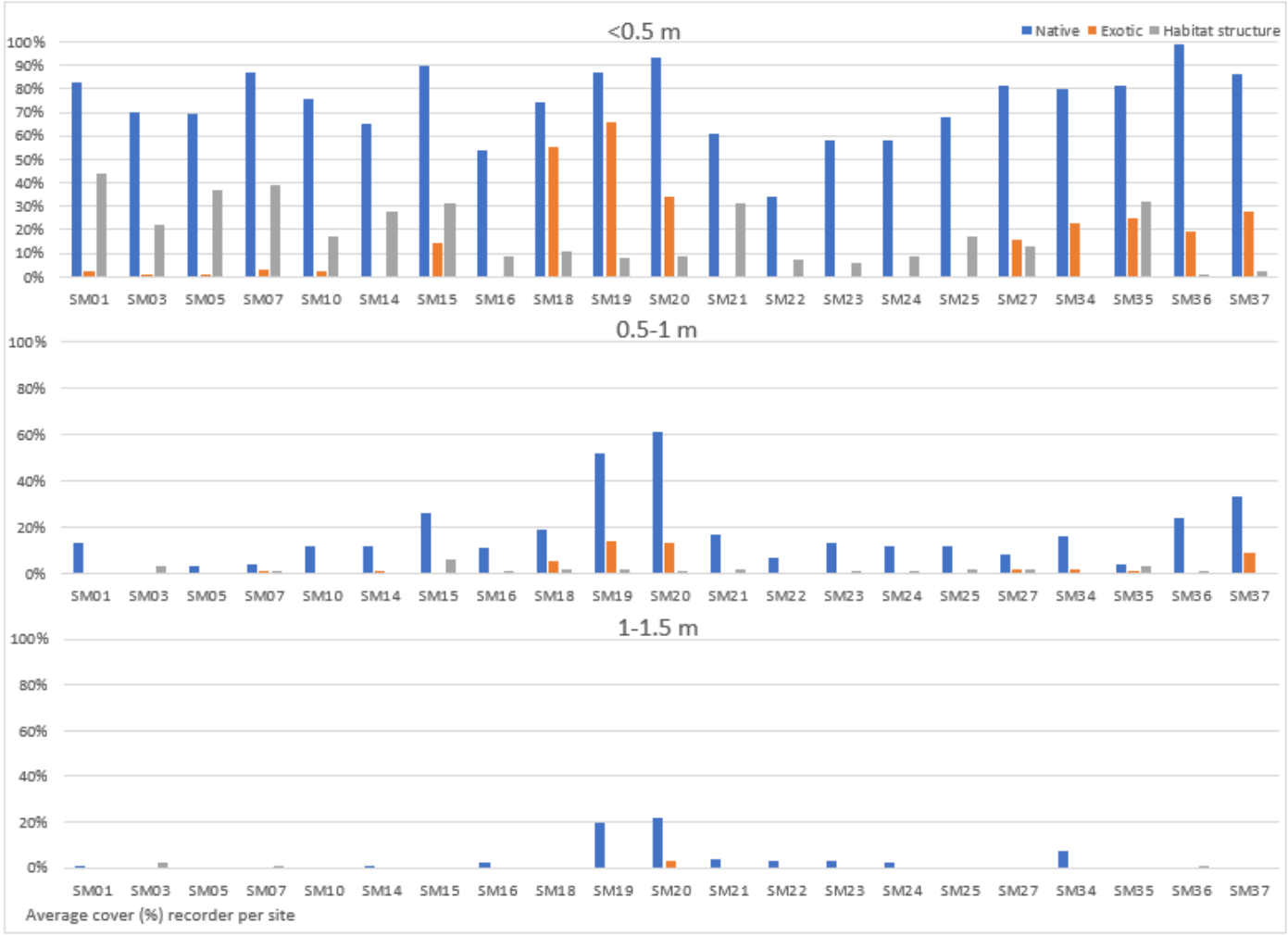


Plate 3.7 Average percentage cover (native, exotic and habitat structure) recorded at impact sites during Year 1

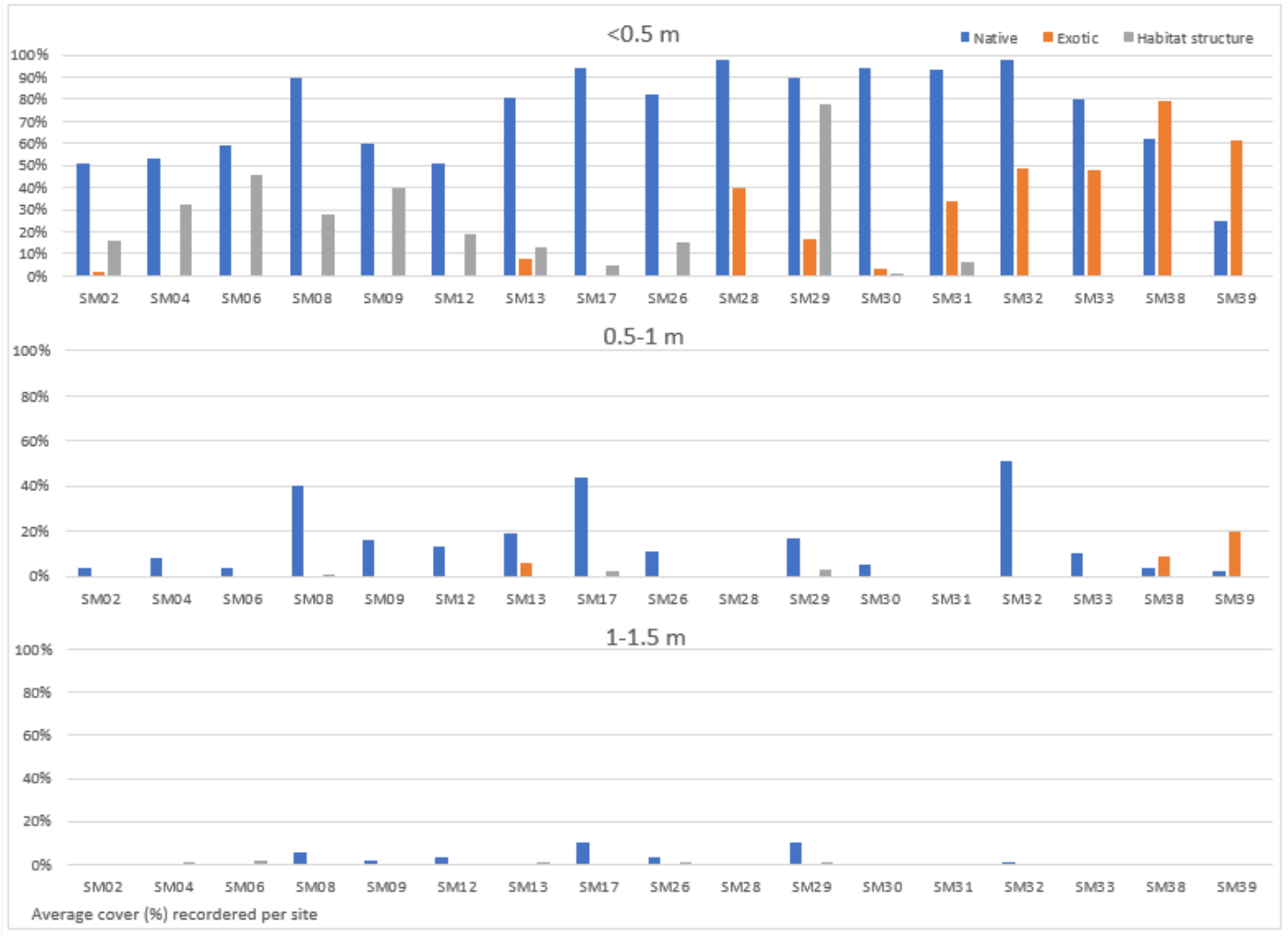


Plate 3.8 **Average percentage cover (native, exotic and habitat structure) recorded at control sites during Year 1**

Year 1 involved the capture of baseline data only. In Year 2, changes in percentages of native, exotic and habitat structure cover within transects will be compared between control and impact sites to assess any potential impacts arising from the project.

3.3 Frog monitoring

3.3.1 Occupancy (presence/absence) monitoring

The objective of the frog occupancy monitoring is to determine occupancy distribution of the threatened frog target species (Alpine Tree Frog and Booroolong Frog), and document any changes arising from Main Works.

i Alpine Tree Frog occupancy

The Alpine Tree Frog (Photograph 3.4) was recorded at seven sites during Year 1 including three impact sites (TC02, NC01, KPC01) and four control sites (TC03, ER02, MR01, NC03). A total of 16 sightings were recorded within impact sites and 144 within control sites. The species was not recorded from impact site TR01.

Photograph 3.4 Alpine Tree Frog recorded at control site NC03 during Q1 (January) monitoring period.

Alpine Tree Frog presence/absence at each monitoring site is summarised in Table 3.7 and presence at sites is graphically presented in Plate 3.9. Further detailed information including monitoring dates is provided in Appendix D.

Table 3.7 Number of Alpine Tree Frog individuals recorded

Site	Monitoring event	
	First (December 2020)	Second (January 2021)
Impact		
TR01	-	-
TC02	4	1
NC01	7	-
KPC01	4	-
Control		
TC03	13	-
ER02	12	31
MR01	27	9
NC03	38	14

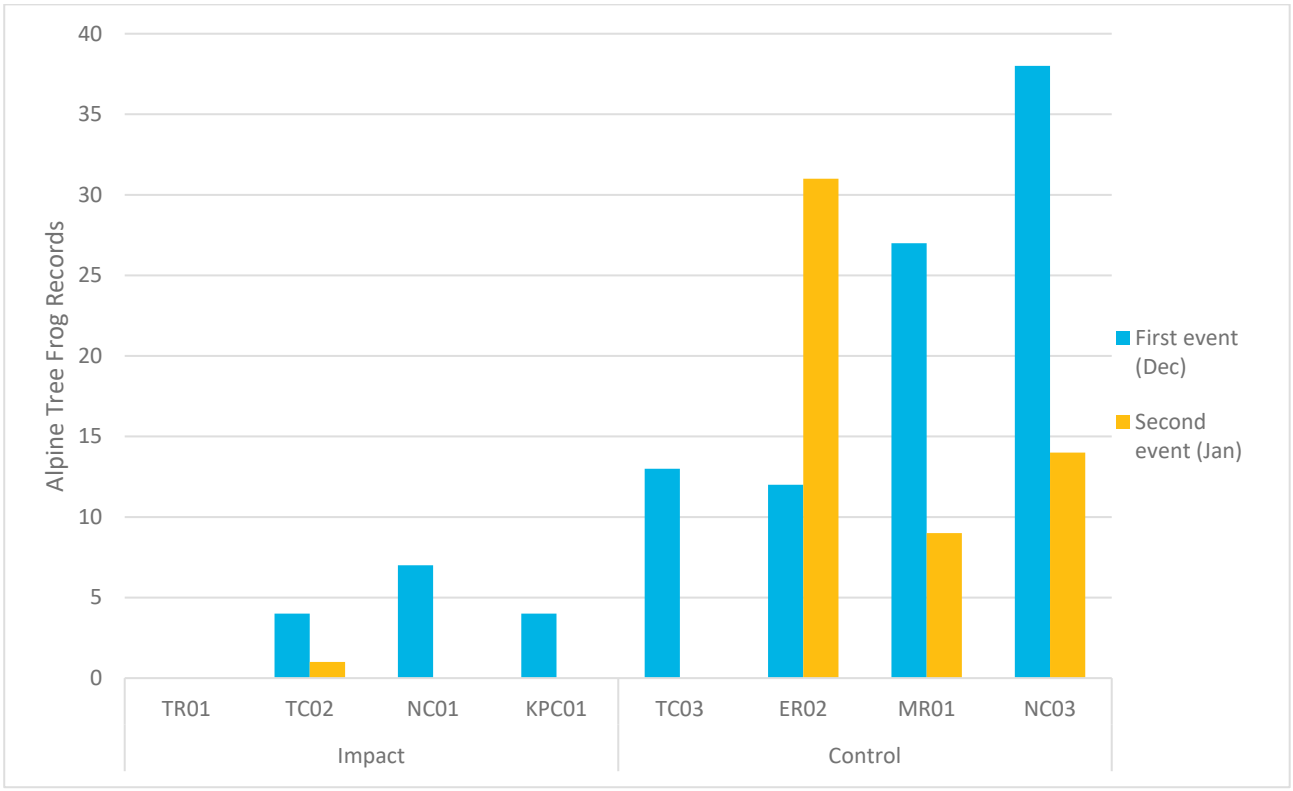
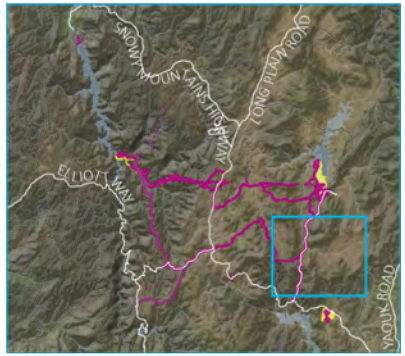


Plate 3.9 Alpine Tree Frog records during Year 1

The control sites had the highest number of sightings, with NC03 recording the highest (38 records) in the first monitoring event (December) and ER02 recording the highest (31 records) in the second monitoring event (January). Three sites that recorded Alpine Tree Frog in the first monitoring period (NC01, KPC01, TC03) did not record any in the second monitoring period. No Alpine Tree Frogs were recorded at TR01 in either monitoring event.

If the Alpine Tree Frog is not recorded at TR01 in Year 2, it is recommended that this site is moved, and an additional monitoring location established, in order to effectively monitor changes in occupancy within the impact area.

Baseline data was collected during Q1 and will be used as a comparison to determine trends in occupancy across sites and breeding seasons throughout the BMP. Requirement for adaptive management will be assessed following further monitoring.



KEY

- Approved disturbance
- Approved construction envelope
- Alpine Tree Frog records

Alpine Tree Frog monitoring location

- Control
- Impact

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp50292\4dfc9367-1d53-486f-a5c1-da10ff140a84\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Alpine Tree Frog records during Year 1

Snowy 2.0
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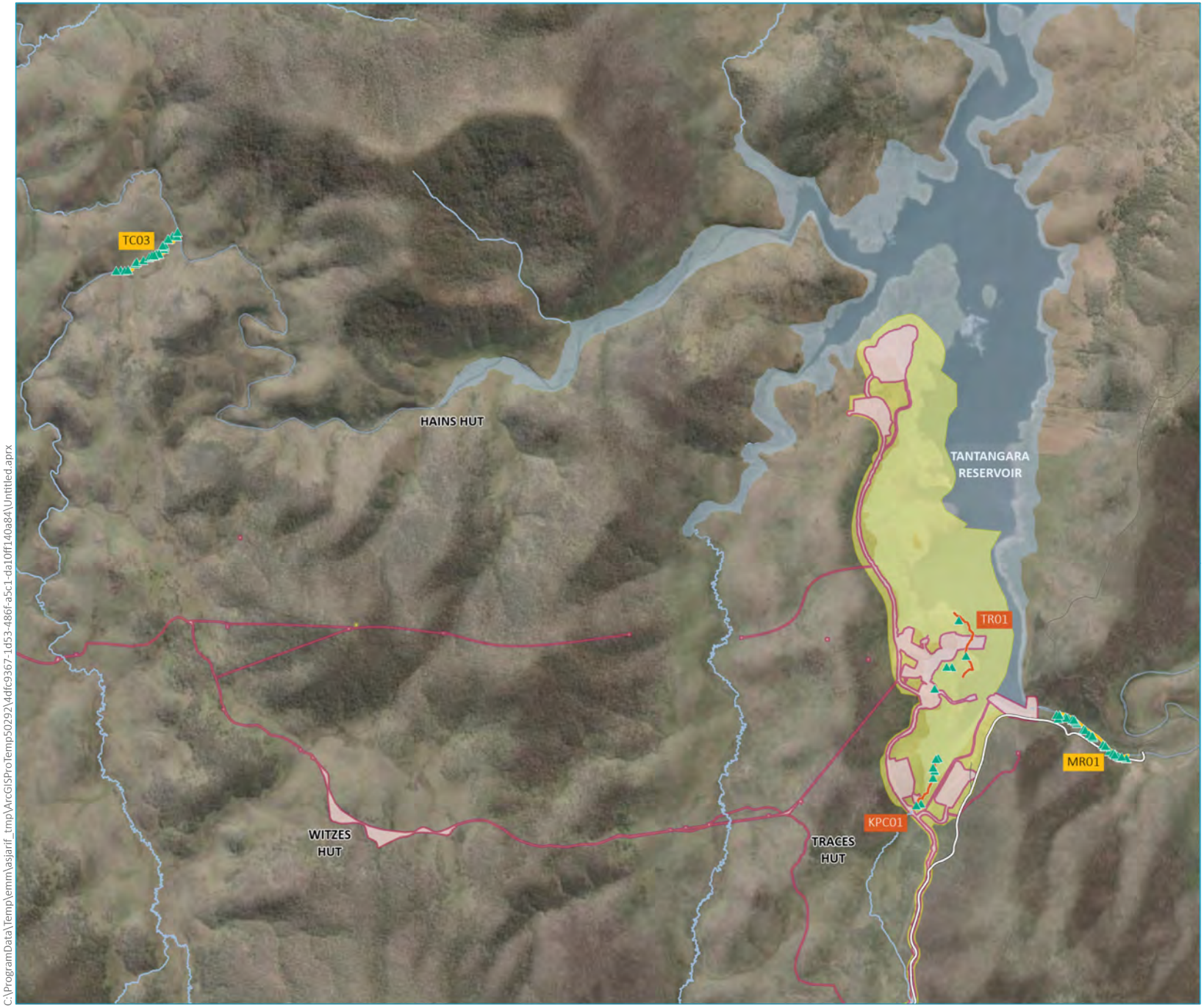
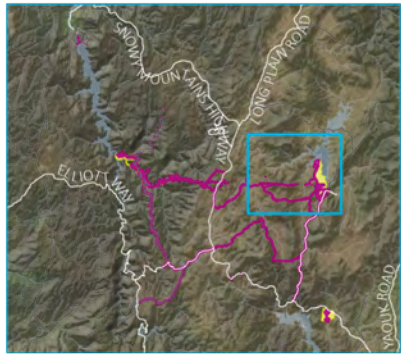
Annual report
Figure 3.5a

snowy 2.0

EMM creating opportunities





KEY

- Approved disturbance
- Approved construction envelope
- Alpine Tree Frog records

Alpine Tree Frog monitoring location

- Control
- Impact

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp50292\4dfc9367-1d53-486f-a5c1-da10ff140a84\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

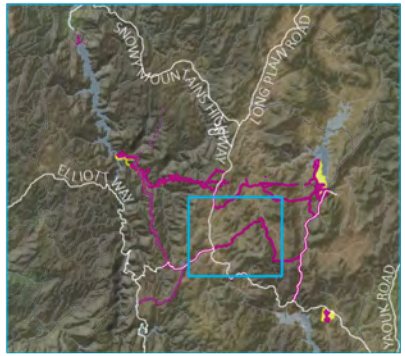
N

Alpine Tree Frog records during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.5b

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope
- Alpine Tree Frog records

Alpine Tree Frog monitoring location

- Control
- Impact

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp50292\4dfc9367-1d53-486f-a5c1-da10ff140a84\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Alpine Tree Frog records during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.5c

snowy 2.0

EMM creating opportunities

ii Booroolong Frog occupancy

The Booroolong Frog (Photograph 3.5) was recorded at all impact and control sites. A total of 20 sightings were recorded within impact sites and 5 within control sites.

Photograph 3.5 Booroolong Frog Recorded at impact site YR06 during Q1 (November) monitoring period.

Booroolong Frog presence/absence at each monitoring site is summarised in Table 3.8 and presence at sites is graphically presented in Plate 3.10. Further detailed information including monitoring dates is provided in Appendix D.

Table 3.8 Number of Booroolong Frog individuals recorded

	Monitoring event	
Site	**First (November 2020)**	**Second (December 2020)**
Impact		
WC01	1	-
YR02	1	1
YR05	2	12
YR06	3	-
Control		
YR08	-	4
YR09	-	1

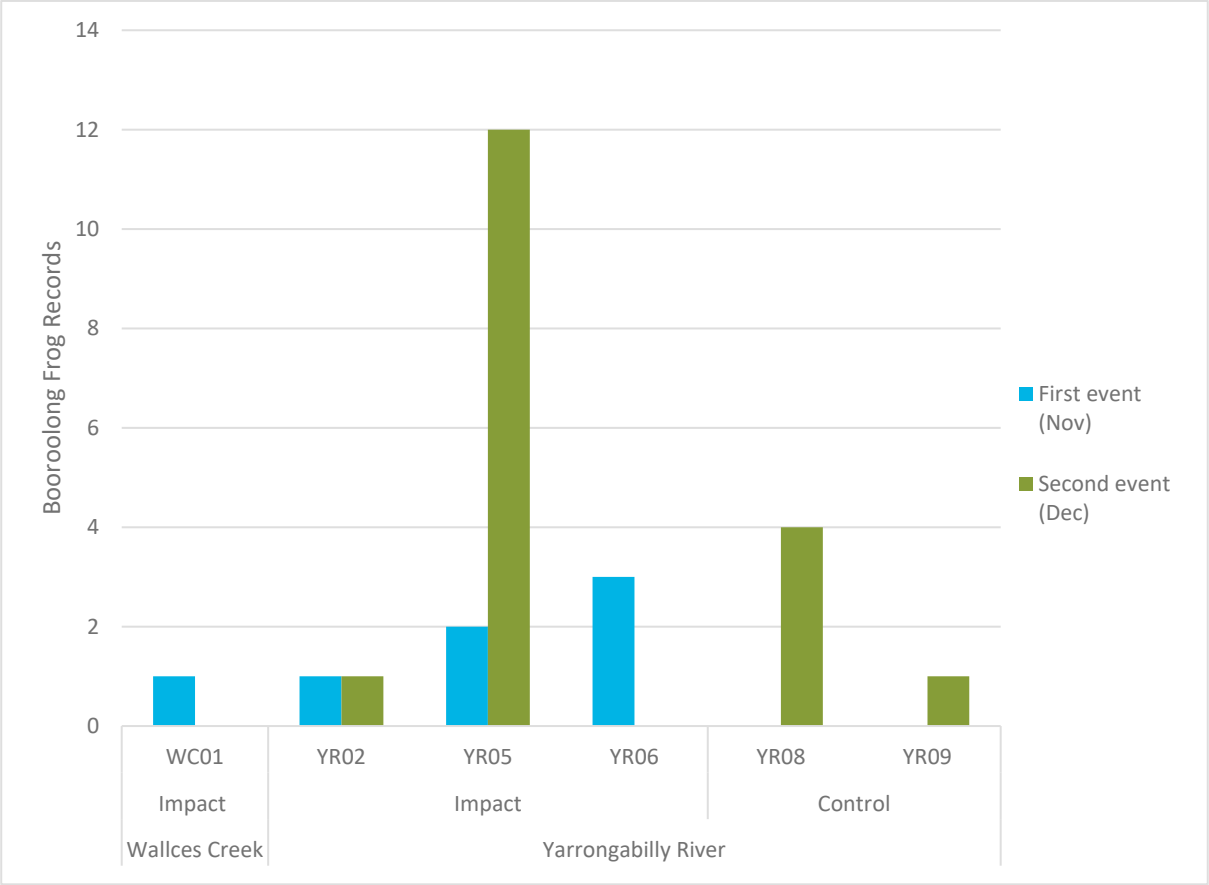
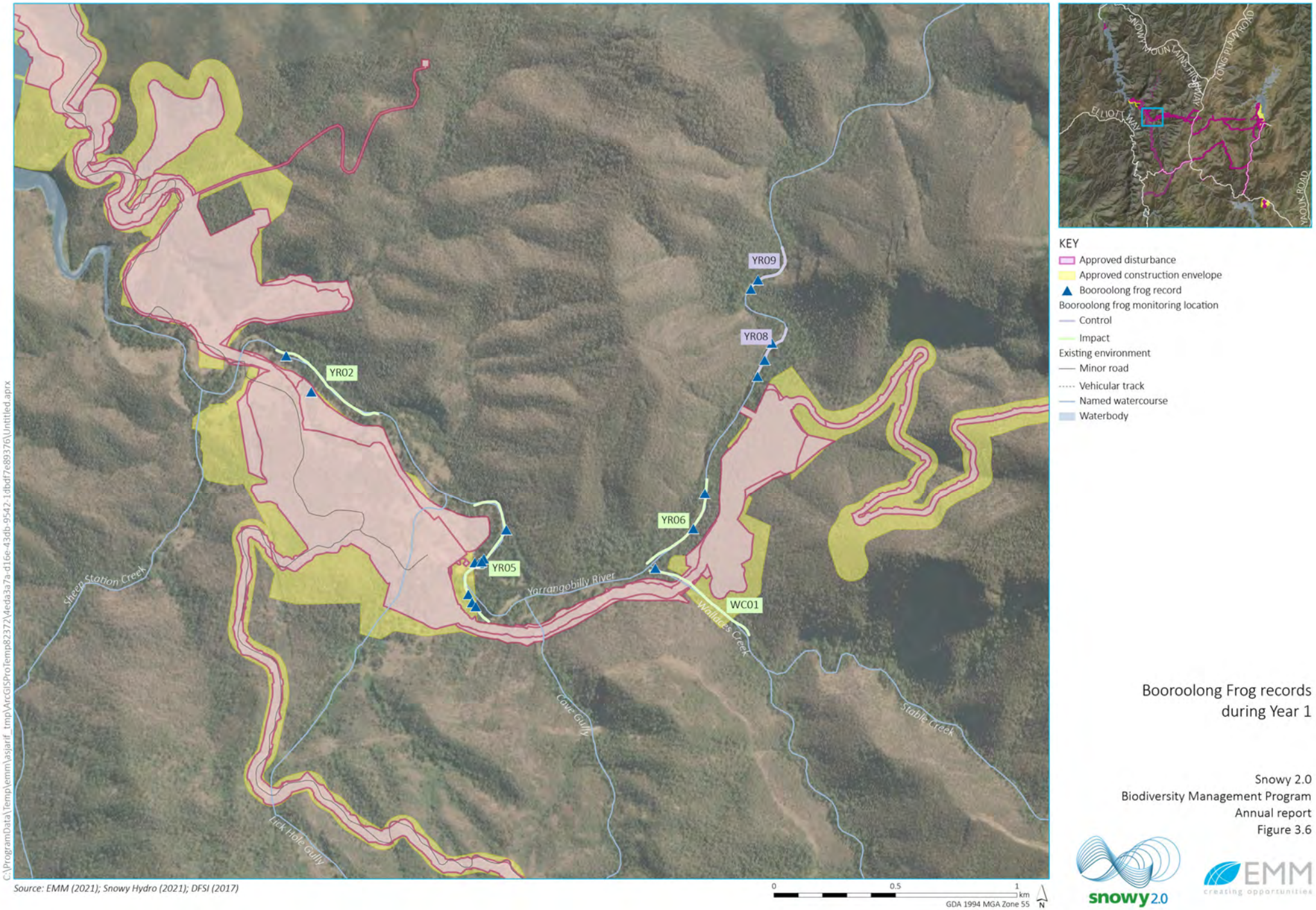


Plate 3.10 Booroolong Frog records during Year 1

Impact transect YR06 had the highest number of records during the first monitoring event (November), with a total of three individuals recorded; while impact transect YR05 had the highest number of records for the second monitoring event (December), with a total of 12 individuals recorded.

Baseline data was collected during Q1 and will be used as a comparison to determine trends in occupancy across sites and breeding seasons throughout the BMP. Requirement for adaptive management will be assessed following further monitoring.



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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Booroolong Frog records during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.6

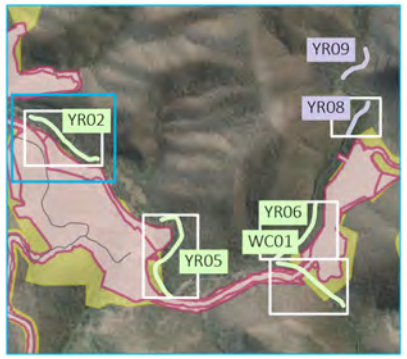
3.3.2 Booroolong Frog habitat characteristic monitoring

The objective of the Booroolong Frog habitat characteristic monitoring is to monitor rocky breeding habitat and depth of pools within sections of the Yarrangobilly River and Wallaces Creek that occur within and adjacent to the project area, and document and changes arising from the project. Specific objectives are:

- to compare shifts in distribution and abundance of rocky breeding habitat between impact (Yarrangobilly River and Wallaces Creek in the project area) and reference sections of the Yarrangobilly River (upstream of the project area).

Stream features mapped during Year 1 included bedrock bank, cobble bank, riparian vegetation, pool, riffle, run, mud bank, and rocky banks (Figure 3.7 to Figure 3.11). Stream features captured during Year 1 baseline surveys will be compared to future monitoring events to determine any potential changes in habitat features and /or population declines.

It is recommended that data collection in Year 2 be undertaken across all sites under similar water level and flow conditions (between November and February) to compare year on year. By surveying during similar conditions this allows construction monitoring data captured to be compared to baseline data captured this year to determine whether the project is resulting in an increase of sedimentation within Booroolong Habitat. If data is captured under vastly different conditions, eg high flows, the BMP can only conclude there is an increase in pool, riffle and run habitat and the benefit of monitoring will be lost.



KEY

- Approved disturbance
- Approved construction envelope

Booroolong frog monitoring location

- Control
- Impact

Stream feature classification

- Bedrock bank
- Cobble bank
- Riparian vegetation
- Pool
- Riffle
- Run
- Mud bank
- Rocky bank

Existing environment

- Minor road
- Vehicular track
- Named watercourse

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp11660412a14e44-a811-4497-864f-d5e34b5005e5\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 50 100 m

GDA 1994 MGA Zone 55

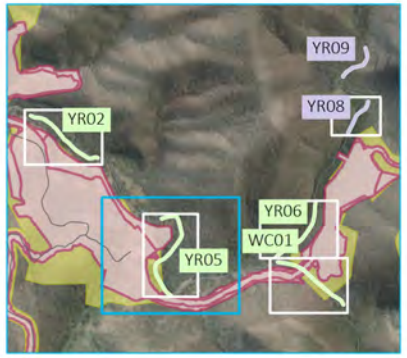
N

Stream feature classification during Year 1 – YR02

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.7

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Booroolong frog monitoring location

- Control
- Impact

Stream feature classification

- Bedrock bank
- Cobble bank
- Riparian vegetation
- Pool
- Riffle
- Run
- Mud bank
- Rocky bank

Existing environment

- Minor road
- Vehicular track
- Named watercourse

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 50 100 m

GDA 1994 MGA Zone 55

N

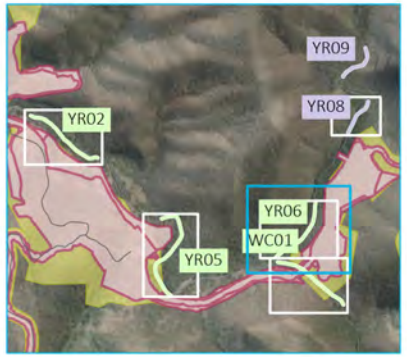
C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp11660d\22a14e44-a811-4497-864f-d5e34b5005e5\Untitled.aprx

Stream feature classification during Year 1 – YR05

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.8

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Booroolong frog monitoring location

- Control
- Impact

Stream feature classification

- Bedrock bank
- Cobble bank
- Riparian vegetation
- Pool
- Riffle
- Run
- Mud bank
- Rocky bank

Existing environment

- Vehicular track
- Named watercourse

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp11660412a14e44-a811-4497-864f-d5e34b5005e5\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 50 100 m

GDA 1994 MGA Zone 55

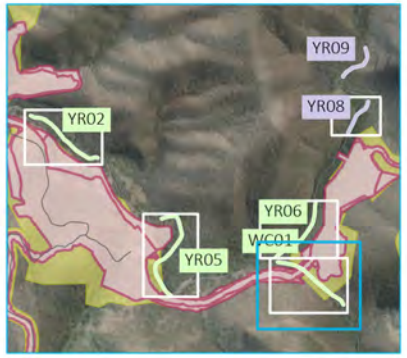
N

Stream feature classification during Year 1 – YR06

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.9

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope

Booroolong frog monitoring location

- Control
- Impact

Stream feature classification

- Bedrock bank
- Cobble bank
- Riparian vegetation
- Pool
- Riffle
- Run
- Mud bank
- Rocky bank

Existing environment

- Vehicular track
- Named watercourse

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp11660d\22a14e44-a811-4497-864f-d5e34b5005e5\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 50 100 m

GDA 1994 MGA Zone 55

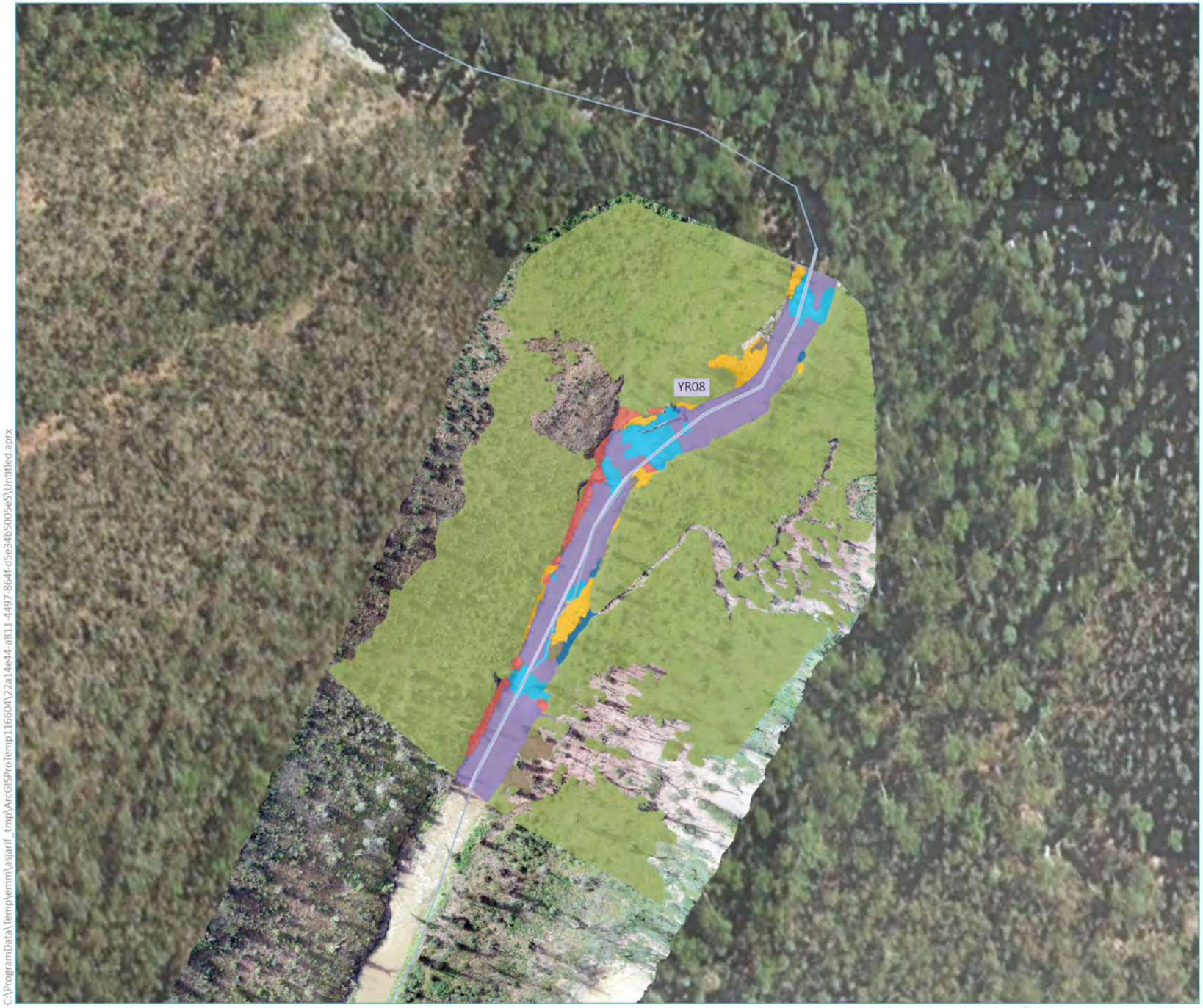
N

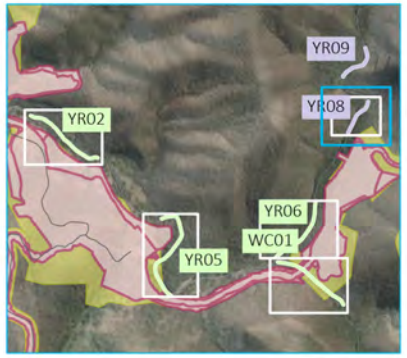
Stream feature classification during Year 1 – WC01

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.10

snowy 2.0

EMM
creating opportunities





KEY

- Approved disturbance
- Approved construction envelope

Booroolong frog monitoring location

- Control
- Impact

Stream feature classification

- Bedrock bank
- Cobble bank
- Riparian vegetation
- Pool
- Riffle
- Run
- Mud bank
- Rocky bank
- Named watercourse

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp11660d\22a14e44-a811-4497-864f-d5e34b5005e5\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 50 100 m

GDA 1994 MGA Zone 55

N

Stream feature classification during Year 1 – YR08

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.11

snowy 2.0

EMM
creating opportunities

3.4 Alpine She-oak Skink monitoring

The objective of the Alpine She-oak Skink (Photograph 3.6) monitoring is to determine the occupancy (presence/absence) of the species at potential habitat sites within proximity to the project and document any changes attributable to the Main Works.

Photograph 3.6 Alpine She-oak Skink recorded from site TG08 during the Q1 monitoring period.

The Alpine She-oak Skink was recorded at five monitoring sites during Year 1 including two impact sites (TG02, TG03) and three control sites (TG06, TG07, TG08), representing 56% of Alpine She-oak Skink sites. A total of 5 sightings were recorded within impact sites and 11 within control sites. The species was not recorded from impact sites TG01, TG04, and TG05 and control site TG09.

Alpine She-oak Skink presence/absence at each monitoring site is summarised in Table 3.9 and presence at sites is graphically presented in Plate 3.11. Further detailed information including monitoring dates is provided in Appendix E.

Table 3.9 **Alpine She-oak Skinks recorded at each monitoring site during the 2020/21 monitoring period**

	Monitoring events				
	Q1		Q2		Q4
Site	December 2020	January 2021	February 2021	March 2021	October 2021
Impact					
TG01	-	-	-	-	-
TG02	1	1	-	-	-
TG03	-	-	-	-	3
TG04					-
TG05	-	-	-	-	-
Control					
TG06	1	-	-	-	-
TG07	1	2	1	1	-
TG08	-	1	2	-	2
TG09	-	-	-	-	-

Notes: TG04 was not established until Winter 2021. Highlighted cells indicate no checks were completed over Q1 and Q2 due to the tile grid not being established at this stage.

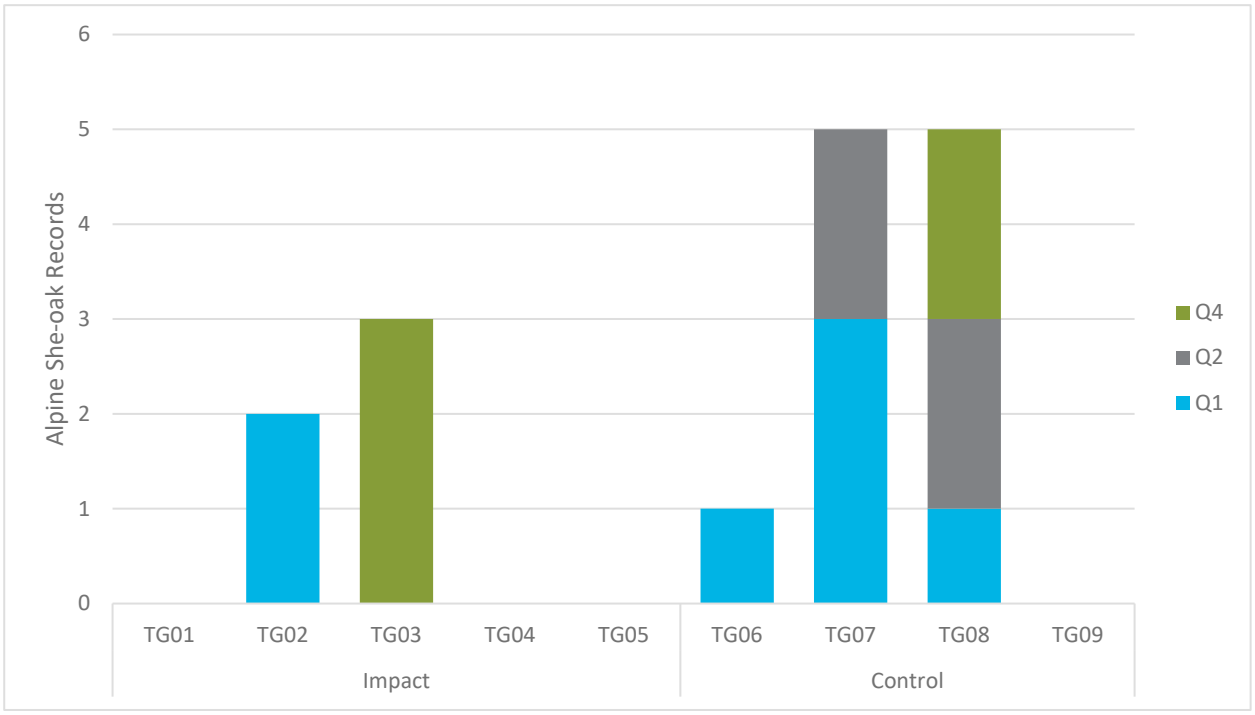
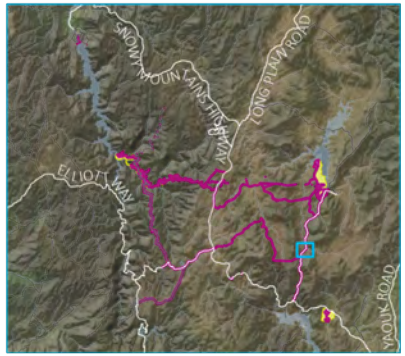


Plate 3.11 **Total number of Alpine She-Oak Skink records per site and monitoring period.**

During Q1 baseline surveys the Alpine She-oak Skink was recorded at four sites (TG02, TG06, TG07, TG08). Only TG08 recorded presence in all subsequent monitoring periods after first being detected in Q1. Changes in presence were recorded in both impact and control sites. The species was not recorded at one impact site (TG01) and one control sites (TG06) during operational monitoring (Q2-Q4) where the species was recorded during baseline surveys. Given this trend was observed in an impact and control site further monitoring will determine if these absences occur for greater than one year.

Changes in occupancy records between monitoring periods may be a result of various factors such as seasonal variation and Alpine She-oak Skink movement. The small number of sites with records and limited monitoring periods makes statistical analysis of results unreliable; additional monitoring will provide better identification of any changes occurring in Alpine She-oak Skink occupancy going into Year 2.

Alpine She-oak Skink was not detected at TG01, TG04, TG05 and TG09 (Plate 3.11). If there are no records of Alpine She-oak Skink at these sites during Year 2 consideration will be made to move sites to new locations where the species has previously been recorded to ensure effective monitoring of changes between impact and control sites.



KEY

- Approved disturbance
- Approved construction envelope
- Alpine She-oak Skink record (2)

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp114508\2c9b110f-3772-48ab-b558-b0e18b477082\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 250 500 m

GDA 1994 MGA Zone 55

N

Alpine She-oak Skink presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.12a

snowy 2.0

EMM creating opportunities

KEY

- Approved disturbance
- Approved construction envelope
- Alpine She-oak Skink record (1)

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp114508\2c9b110f-3772-48ab-b558-b0e18b477082\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 250 500 m

GDA 1994 MGA Zone 55

N

Alpine She-oak Skink presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.12b

snowy 2.0

EMM creating opportunities

KEY

- Approved disturbance
- Approved construction envelope
- Alpine She-oak Skink record (4)

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp114508\2c9b110f-3772-48ab-b558-b0e18b477082\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 250 500 m

GDA 1994 MGA Zone 55

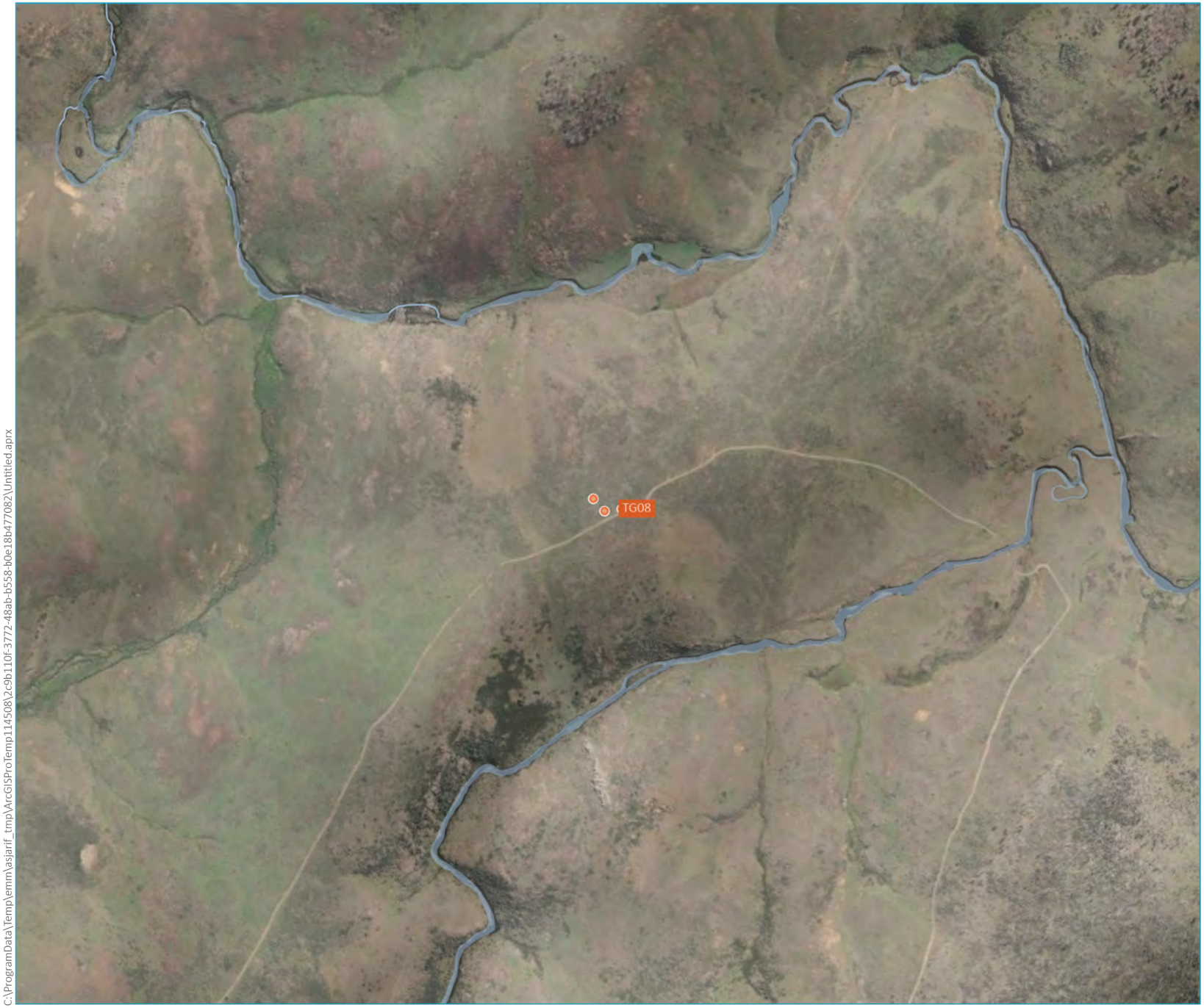
N

Alpine She-oak Skink presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.12c

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope
- Alpine She-oak Skink record (4)

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp114508\2c9b110f-3772-48ab-b558-b0e18b477082\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 250 500 m

GDA 1994 MGA Zone 55

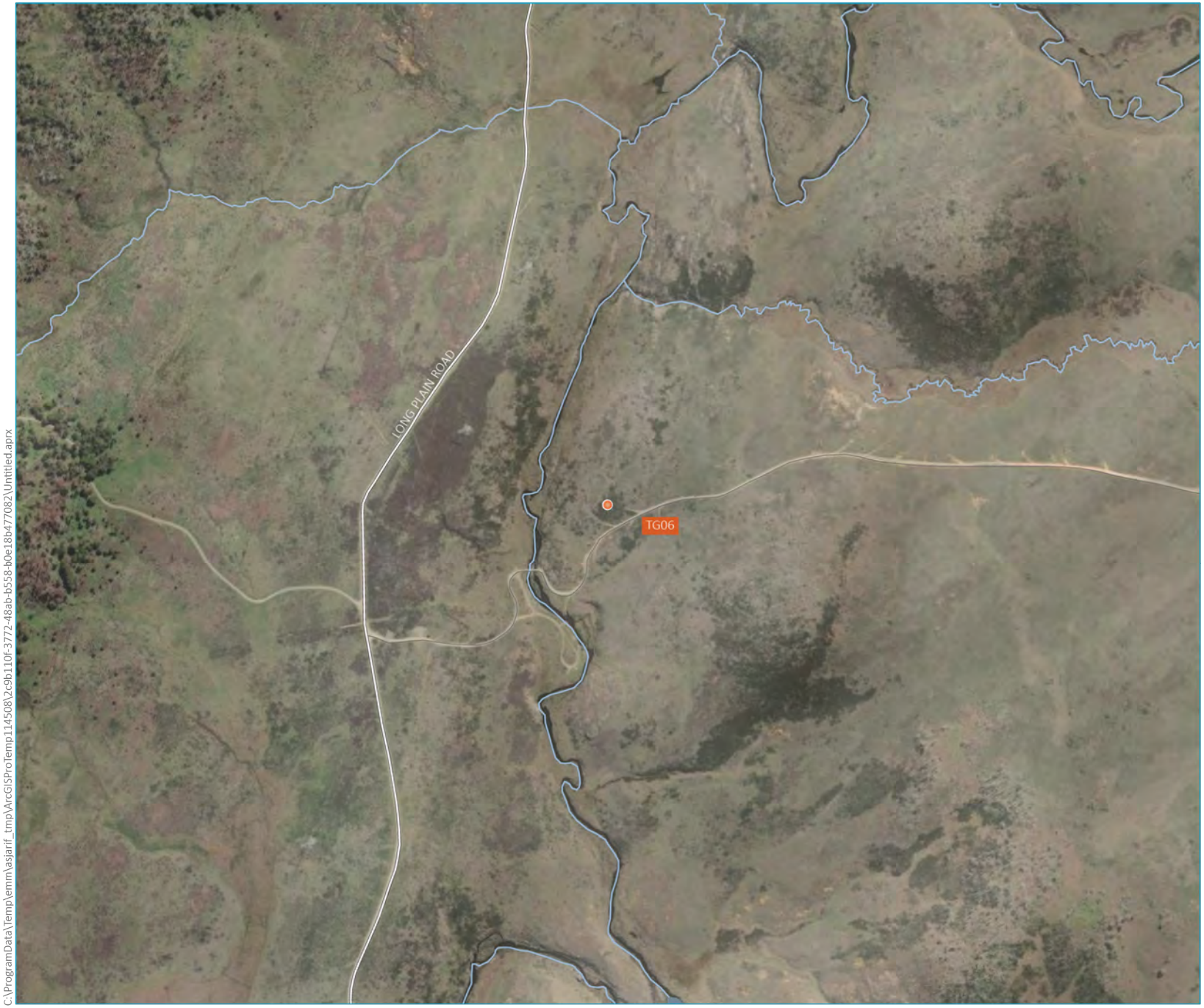
N

Alpine She-oak Skink presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.12d

snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope
- Alpine She-oak Skink record (1)

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp114508\2c9b110f-3772-48ab-b558-b0e18b477082\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 250 500 m

GDA 1994 MGA Zone 55

N

Alpine She-oak Skink presence/ absence during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.12e

snowy 2.0

EMM creating opportunities

3.5 Feral animal monitoring

3.5.1 Occupancy (presence/absence) monitoring

The objective of the feral animal occupancy monitoring is to determine presence/absence of feral animals within proximity to the project for control.

Ten species of feral animals were recorded across 55 monitoring sites (small terrestrial mammal remote cameras and feral animal cameras), representing 92% of all monitoring sites. During Year 1, the species detected at the most sites were Rabbit (*Oryctolagus cuniculus*) (96%), Red Fox (*Vulpes vulpes*, Photograph 3.7) (57%), and Feral Cat (*Felis catus*) (52%) (Plate 3.12). Other feral animals recorded included Wild Dog (*Canis lupus*, Photograph 3.7) (40%), European Hare (*Lepus europaeus*) (34%), Feral Horse (*Equus caballus*) (33%), Sambar Deer (*Cervus unicolor*) (24%), Red Deer (*Cervus elaphus*) (16%), Rusa Deer (*Cervus timorensis*) (9%) and Feral Pig (*Sus scrofa*) (2%) (Plate 3.12).

Photograph 3.7 A) Red Fox; B) Wild Dog

Feral animal presence/absence at each monitoring site is summarised in Table 3.10. Percentage of feral animals at remote camera sites during Year 1 is graphically presented in Plate 3.12 and percentage of feral animals at remote camera sites across monitoring events is graphically presented in Plate 3.13. Further detailed information including monitoring dates and presence/absence at each camera is provided in Appendix F.1.

Table 3.10 Feral animal remote camera presence/absence

Site name	European Hare				Feral Cat				Feral Horse				Feral Pig				Rabbit				Red Deer				Red Fox				Rusa Deer				Sambar Deer				Wild Dog			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
FC03		1	1	1		1	1	1										1	1	1		1				1	1					1			1	1				
FC04																	1	1									1					1			1	1				
FC05						1	1	1									1	1	1	1													1		1	1				
FC06					1	1	1											1									1													
FC07	1	1			1	1	1										1	1	1	1						1	1	1								1				1
FC08		1				1											1	1	1	1						1	1	1												
FC09					1	1											1	1	1	1		1														1				
FC10				1	1		1	1									1	1	1	1							1	1								1	1	1	1
FC11				1	1	1	1	1										1	1	1							1	1								1	2	1	2
FC12	1	1	1	1		1			1	1	1	1					1	1	1						1	1	1	1								1	2	2	2
FC13		1	1	1	1	1	1										1	1									1						1				1	1		
FC14	1				1	1	1	1			1															1		1								1				
FC15	1				1	1	1		1	1	1	1					1								1											1				
FC16					1			1	1	1	1						1			1					1	1										1	1			
FC17	1				1			1	1	1							1	1	1	1					1	1	1	1	1	1					1	1	2	2	2
FC18	1								1	1		1					1	1	1	1		1				1								1	1	1				
FC19	1		1		1	1	1	1	1	1		1					1	1	1	1		1			1	1	1	1							1	1	1	1	1
FC20					1				1	1	1	1					1	1	1	1		1			1	1		1					1	1	1				1
FC21			1	1															1	1																			

Table 3.10 Feral animal remote camera presence/absence

Site name	European Hare				Feral Cat				Feral Horse				Feral Pig				Rabbit				Red Deer				Red Fox				Rusa Deer				Sambar Deer				Wild Dog			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SM01							1																			1	1	1													
SM02						1																1					1														
SM03																																								
SM04																																					1			
SM05						1	1										1		1																					
SM06																			1		1																	1		
SM07	1										1						1										1						1							
SM08																																								
SM09																		1							1														1	
SM10						1		1																																
SM11																																								
SM12	1				1												1	1	1	1	1						1	1												
SM13																																								
SM14																	1	1																						
SM15							1															1												1						
SM16																	1										1				1		1				1			
SM17																											1													
SM18	1				1	1											1		1	1							1													
SM19	1						1	1									1										1	1					1							

Table 3.10 Feral animal remote camera presence/absence

Site name	European Hare				Feral Cat				Feral Horse				Feral Pig				Rabbit				Red Deer				Red Fox				Rusa Deer				Sambar Deer				Wild Dog			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SM20							1																											1						
SM21					1															1																				
SM22					1	1												1																						
SM23					1												1																							
SM24								1											1																				1		
SM25																		1		1								1												
SM26													1																											
SM27												1																1												
SM28																										1	1	1												
SM29									1																1																
SM30	1								1								1	1	1	1																				
SM31									1	1	1	1													1	1	1													
SM32	1								1	1							1	1	1																					
SM33									1	1							1																							
SM34									1	1		1					1	1							1	1	1	1											1		
SM35									1	1	1	1													1		1								1						
SM36						1			1	1	1						1	1		1							1														
SM37									1								1																							
SM38																																								

Table 3.10 Feral animal remote camera presence/absence

Site name	European Hare				Feral Cat				Feral Horse				Feral Pig				Rabbit				Red Deer				Red Fox				Rusa Deer				Sambar Deer				Wild Dog			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SM39		1																1												1								1		
SM40						1												1	1	1																				
SM41																										1														

Notes: NA – cameras were not established during this monitoring event

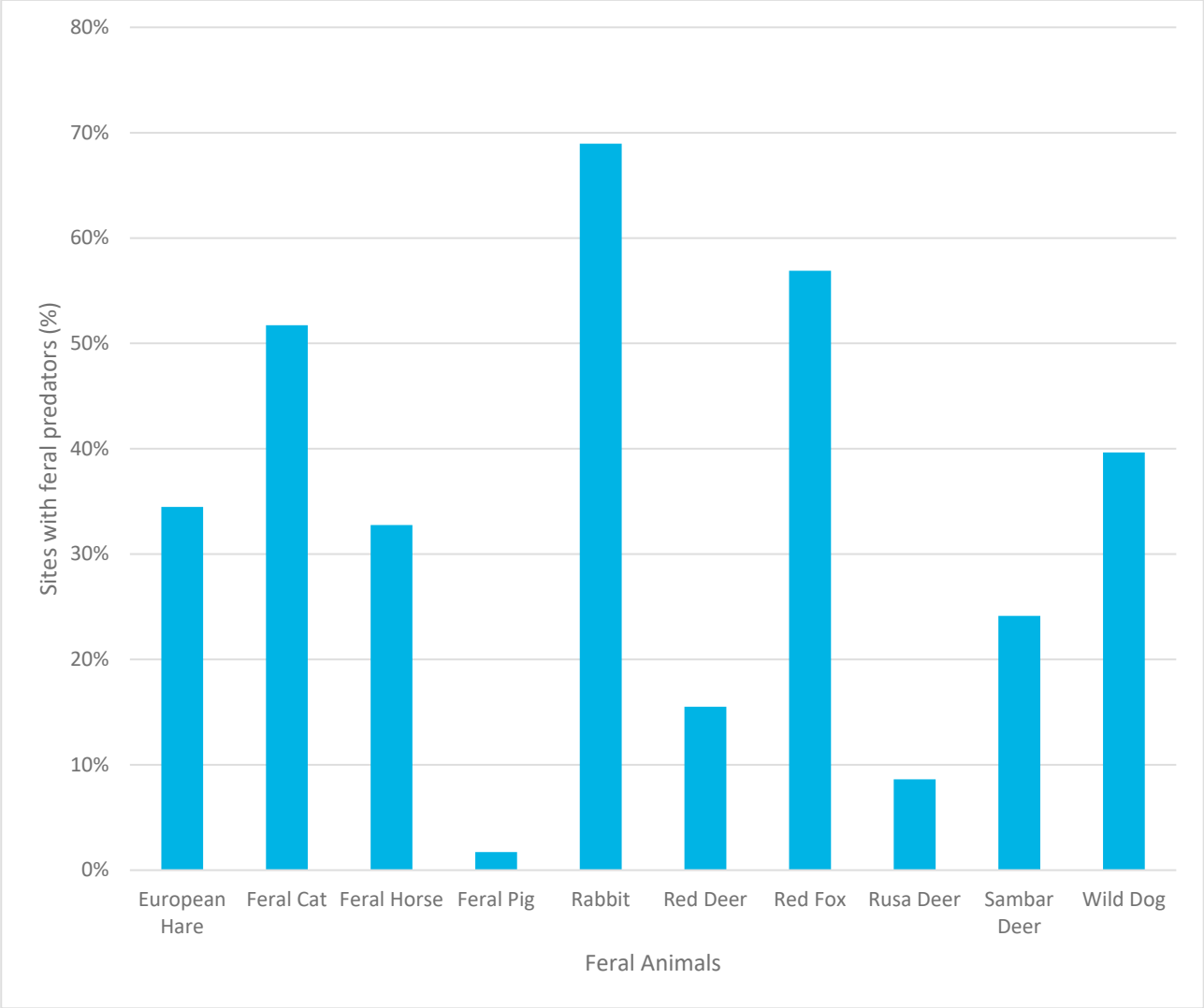


Plate 3.12 Percentage of feral animals at remote camera sites during Year 1

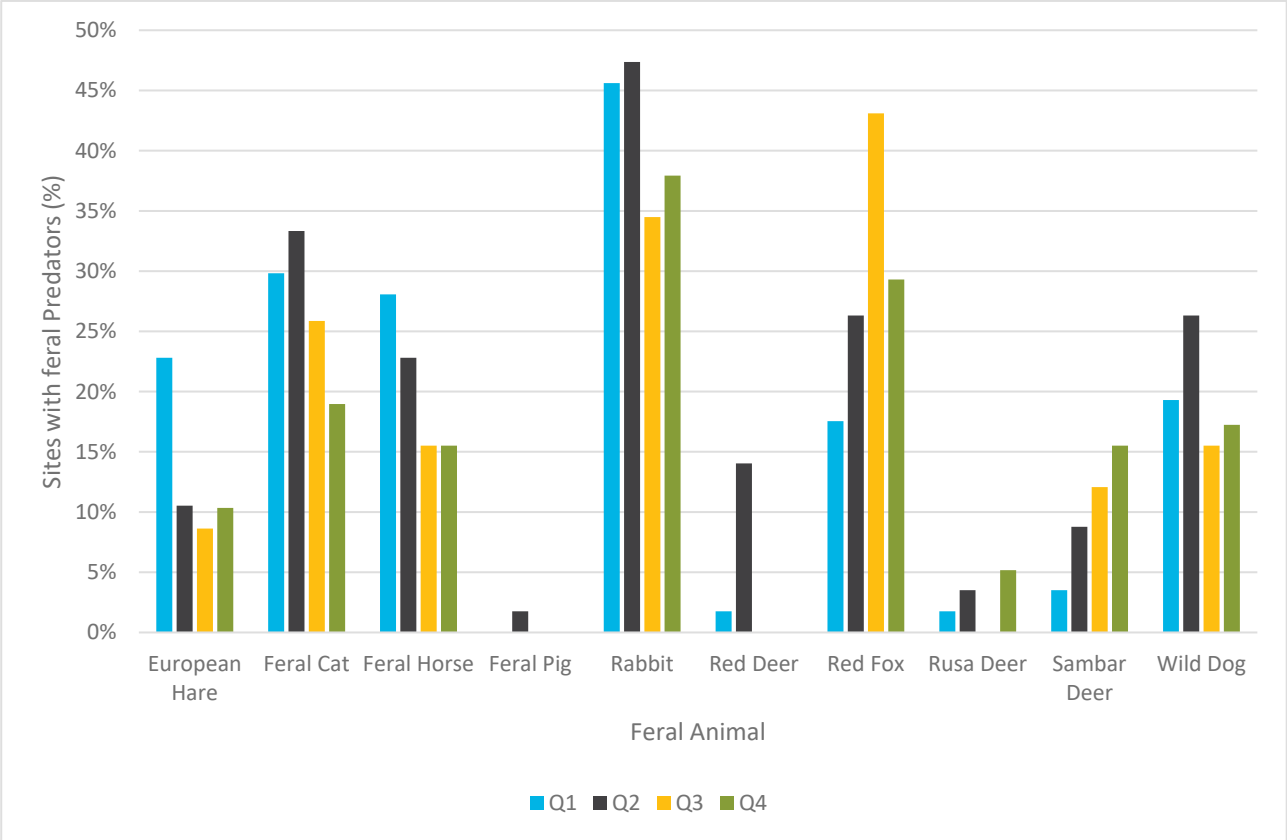


Plate 3.13 Percentage of feral animals at remote camera sites within each monitoring event

Nine feral animals were recorded during the first monitoring event across 36 sites, representing 63% of remote camera monitoring sites. Ten feral animals were recorded during the second monitoring event across 46 sites, representing 81% of remote camera monitoring sites. Seven feral animals were recorded during the third monitoring event across 41 sites, representing 71% of remote camera monitoring sites. Eight feral animals were recorded during the fourth monitoring event across 37 sites, representing 64% of remote camera monitoring sites.

Whilst percentage of sites with each feral predator varied across monitoring periods, Feral Cat, Rabbit, Red Fox and Feral Horse were consistently the four most common species recorded during Year 1. The highest diversity of feral animals and highest number of presences at sites was recorded during Q2.

The sighting of feral animals within proximity to known Smoky Mouse habitat or project infrastructure is a trigger for adaptive management. Feral animals were recorded within proximity to project roads and infrastructure within Lobs Hole, Marica, Tantangara Dam, Tantangara Road and Rock Forest. Therefore, Snowy Hydro/FGJV are required to control feral animals in accordance with the Weed, Pest and Pathogen Management Plan (FGJV, 2020). All areas within proximity to project infrastructure are required to have feral animal control undertaken. Priority areas for control include Marica and upper Lobs Hole within proximity to Smoky Mouse habitat, with particular attention on the Feral Cat, Red Fox and Wild Dog which are known threats to the Smoky Mouse, Eastern Pygmy-possum and Broad-toothed Rat.

3.5.2 Abundance monitoring

The objective of the feral animal abundance monitoring is to determine feral animal abundance within proximity to the project for control.

Five species of feral animals were recorded during Year 1, Feral Cat, Rabbit, European Hare, Feral Horse and Red Fox. The Rabbit was the most common animal recorded overall, representing 69% of records.

Feral animal abundance at monitoring sites is summarised in Table 3.11. The overall percentage of feral animals recorded during Year 1 abundance monitoring is graphically presented in Plate 3.14 and abundance of feral animals per km is graphically presented in Plate 3.15. Further detailed information including monitoring dates is provided in Appendix F.2.

Table 3.11 Total number of individuals and abundance of feral animals per km recorded within each monitoring location

	LHRR Bottom		LHRR North		LHRR South		Marica		Rock Forest		Tantangara Dam		Tantangara Road	
Monitoring event	Total	Abundance	Total	Abundance	Total	Abundance	Total	Abundance	Total	Abundance	Total	Abundance	Total	Abundance
Feral Cat														
First (Q2)	-	-	-	-	1	0.07	-	-	NA	NA	-	-	1	0.07
Second (Q3)	-	-	-	-	-	-	-	-	NA	NA	-	-	-	-
Third (Q4)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fourth (Q4)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rabbit														
First (Q2)	2	0.20	2	0.28	3	0.21	2	0.15	NA	NA	36	4.34	12	0.79
Second (Q3)	6	0.45	1	0.23	-	-	-	-	NA	NA	8	0.96	1	0.06
Third (Q4)	16	1.56	5	0.69	2	0.14	7	0.67	-	-	16	2.11	10	0.65
Fourth (Q4)	9	0.73	-	-	3	0.21	3	0.21	1	0.77	18	2.00	3	0.19
European Hare														
First (Q2)	-	-	-	-	-	-	-	-	NA	NA	-	-	-	-
Second (Q3)	1	0.07	-	-	-	-	-	-	NA	NA	-	-	-	-
Third (Q4)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fourth (Q4)	-	-	-	-	-	-	-	-	-	-	-	-	1	0.06
Feral Horse														
First (Q2)	-	-	-	-	-	-	-	-	NA	NA	-	-	25	1.64
Second (Q3)	-	-	-	-	-	-	-	-	NA	NA	-	-	-	-
Third (Q4)	-	-	-	-	-	-	31	2.98	-	-	-	-	3	0.19
Fourth (Q4)	-	-	-	-	-	-	3	0.21	-	-	4	0.44	4	0.26

Table 3.11 Total number of individuals and abundance of feral animals per km recorded within each monitoring location

	LHRR Bottom		LHRR North		LHRR South		Marica		Rock Forest		Tantangara Dam		Tantangara Road	
Monitoring event	Total	Abundance	Total	Abundance	Total	Abundance	Total	Abundance	Total	Abundance	Total	Abundance	Total	Abundance
Red Fox														
First (Q2)	-	-	-	-	-	-	-	-	NA	NA	-	-	-	-
Second (Q3)	-	-	-	-	-	-	-	-	NA	NA	-	-	-	-
Third (Q4)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fourth (Q4)	-	-	-	-	-	-	1	0.07	-	-	-	-	-	-

Notes: NA – Site was not established during that monitoring event; therefore, spotlighting did not occur.

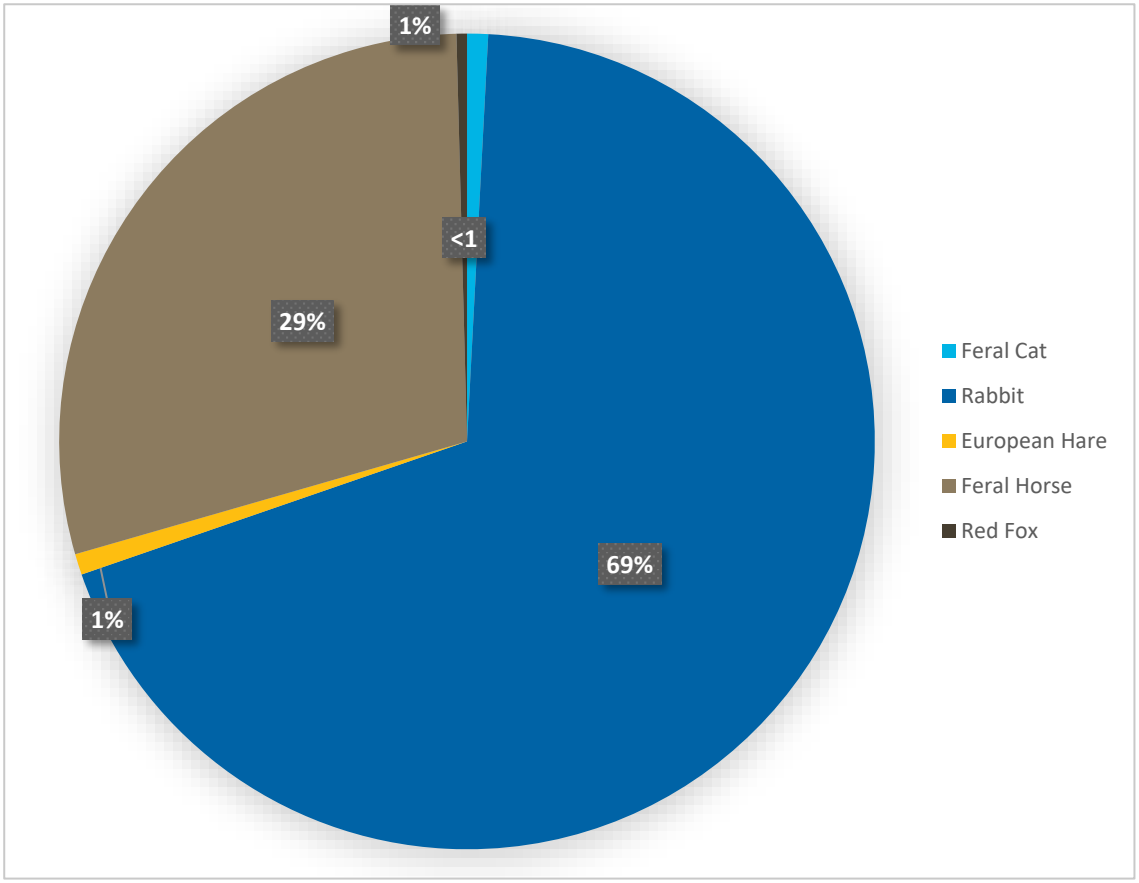


Plate 3.14 Percentage of feral animals recorded during spotlighting in Year 1

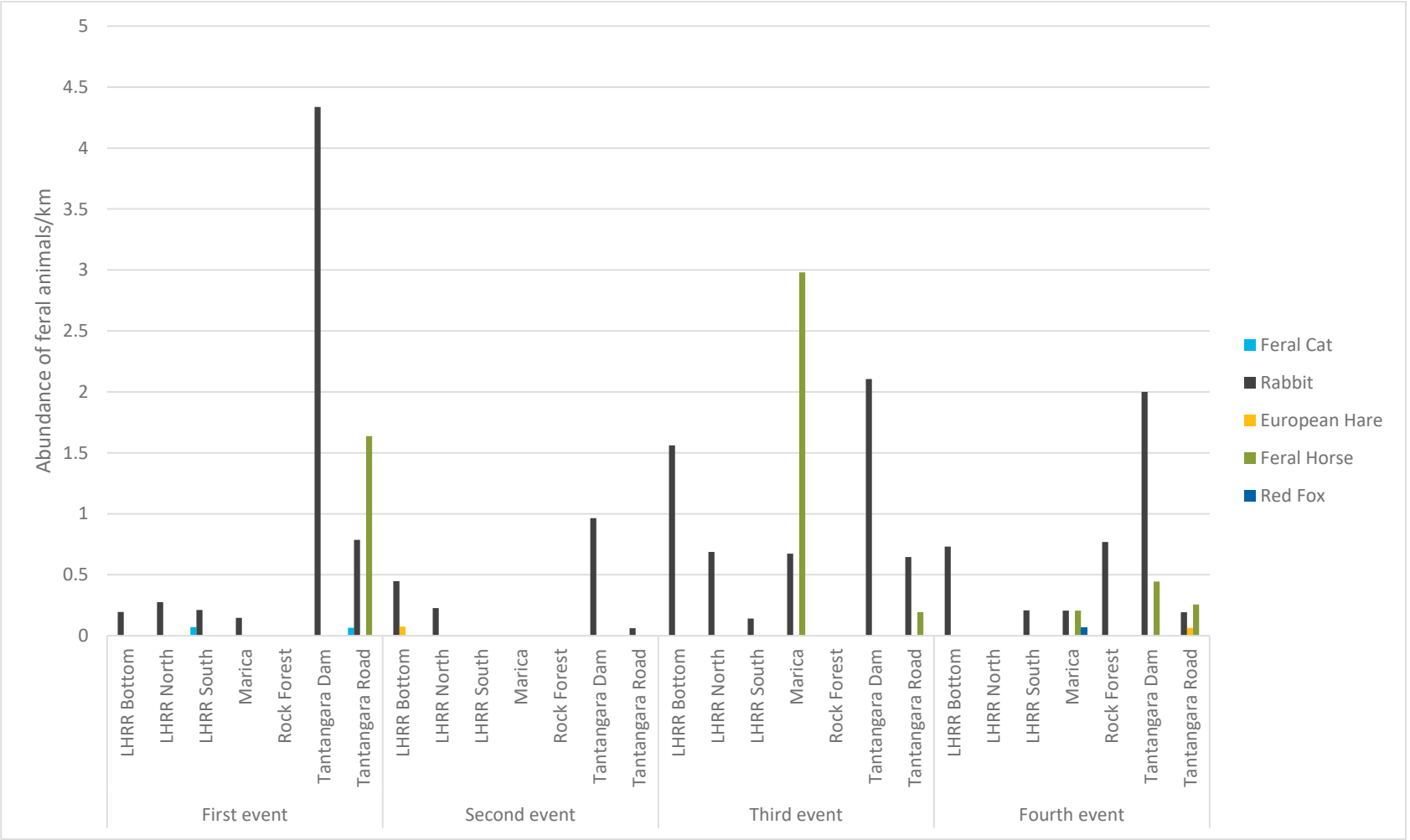


Plate 3.15 **Abundance of feral animals per km at each location during each monitoring event**

During the first monitoring event (Q2), 84 feral animals comprising three species were recorded within all locations excluding Rock Forest which was not yet established. The Rabbit was the most common species recorded, representing 68% of records; with other species including the Feral Horse (30%) and the Feral Cat (2%).

During the second monitoring event (Q3), 17 feral animals comprising two species were recorded within four locations, LHRR Bottom, LHRR North, Tantangara Dam and Tantangara Road. The Rabbit was the most common species recorded, representing 91% of records; with other species including the European Hare (6%).

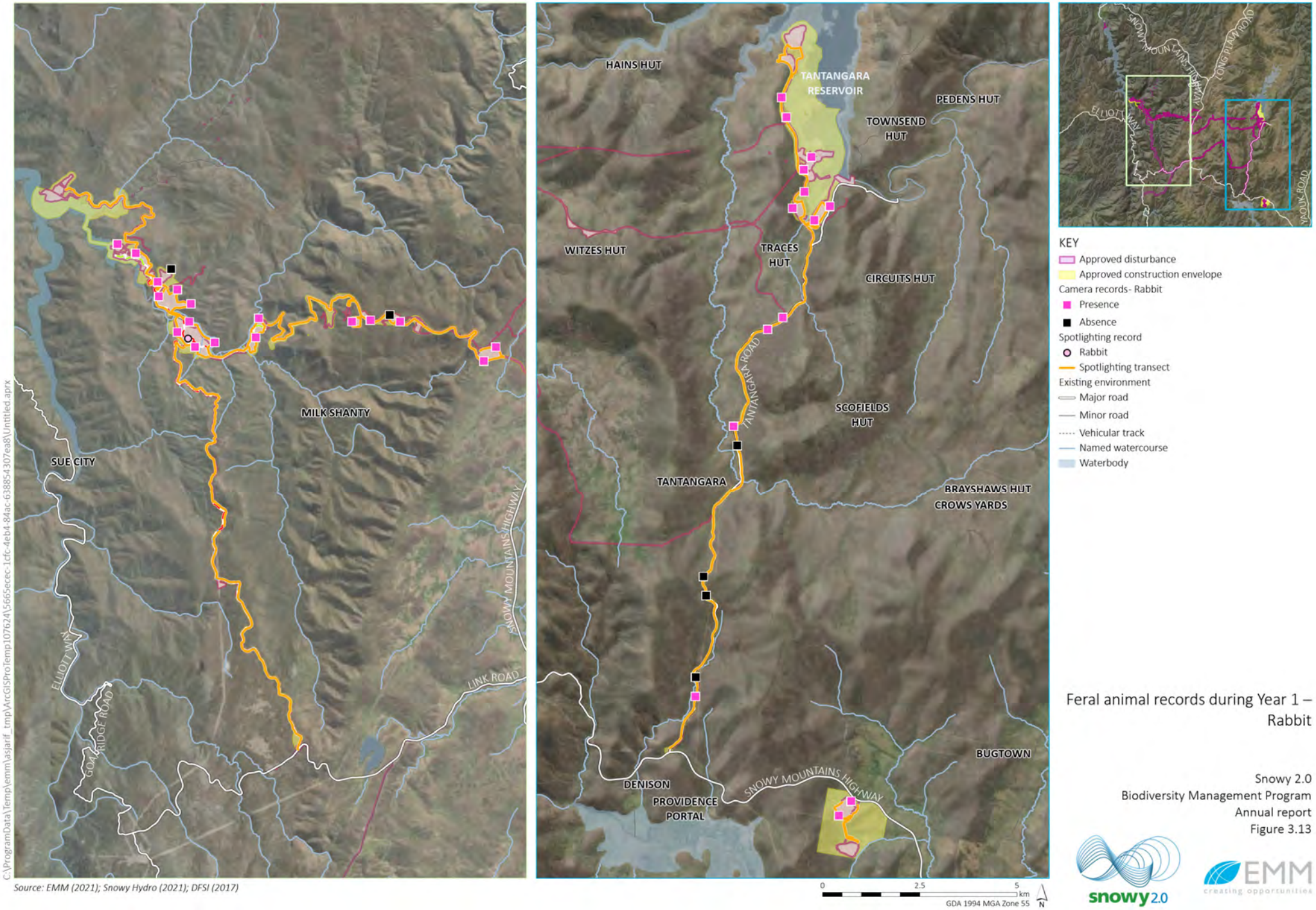
During the third monitoring event (Q4), 90 feral animals comprising two species were recorded within all locations excluding Rock Forest where no feral animals were recorded. The Rabbit was the most common species recorded, representing 62% of records; with other species including the Feral Horse (38%).

During the fourth monitoring event (Q4), 50 feral animals comprising four species were recorded within all locations excluding LHRR North where no feral animals were recorded. Similarly, to all other monitoring events, the Rabbit was the most common species recorded, representing 74% of records; with other species including the Feral Horse (22%), the European Hare (2%) and the Red Fox (2%).

In Year 1, Tantangara Dam recorded the highest number of feral animals, with a total of 22 individuals recorded during spotlighting.

Reliable statistical comparison between monitoring periods should be treated with caution due to the low number of records, differences in the number of survey nights between monitoring periods, low number of monitoring periods, possible seasonal variation, and differing weather conditions. Feral animal abundance surveys to be undertaken during Year 2 are required to reliably identify trends in feral animal abundances between seasons.

The sighting of feral animals within proximity to known Smoky Mouse habitat or project infrastructure is a trigger for adaptive management. Feral animals were recorded within proximity to project roads and infrastructure within Lobs Hole, Marica, Tantangara Dam, Tantangara Road and Rock Forest. Therefore, Snowy Hydro/FGJV are required to control feral animals in accordance with the Weed, Pest and Pathogen Management Plan (FGJV, 2020). Priority areas for control include Marica and upper Lobs Hole within proximity to Smoky Mouse habitat, with particular attention on the Feral Cat and Red Fox which are known threats to the Smoky Mouse, Eastern Pygmy-possum and Broad-toothed Rat.



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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Feral animal records during Year 1 – Rabbit

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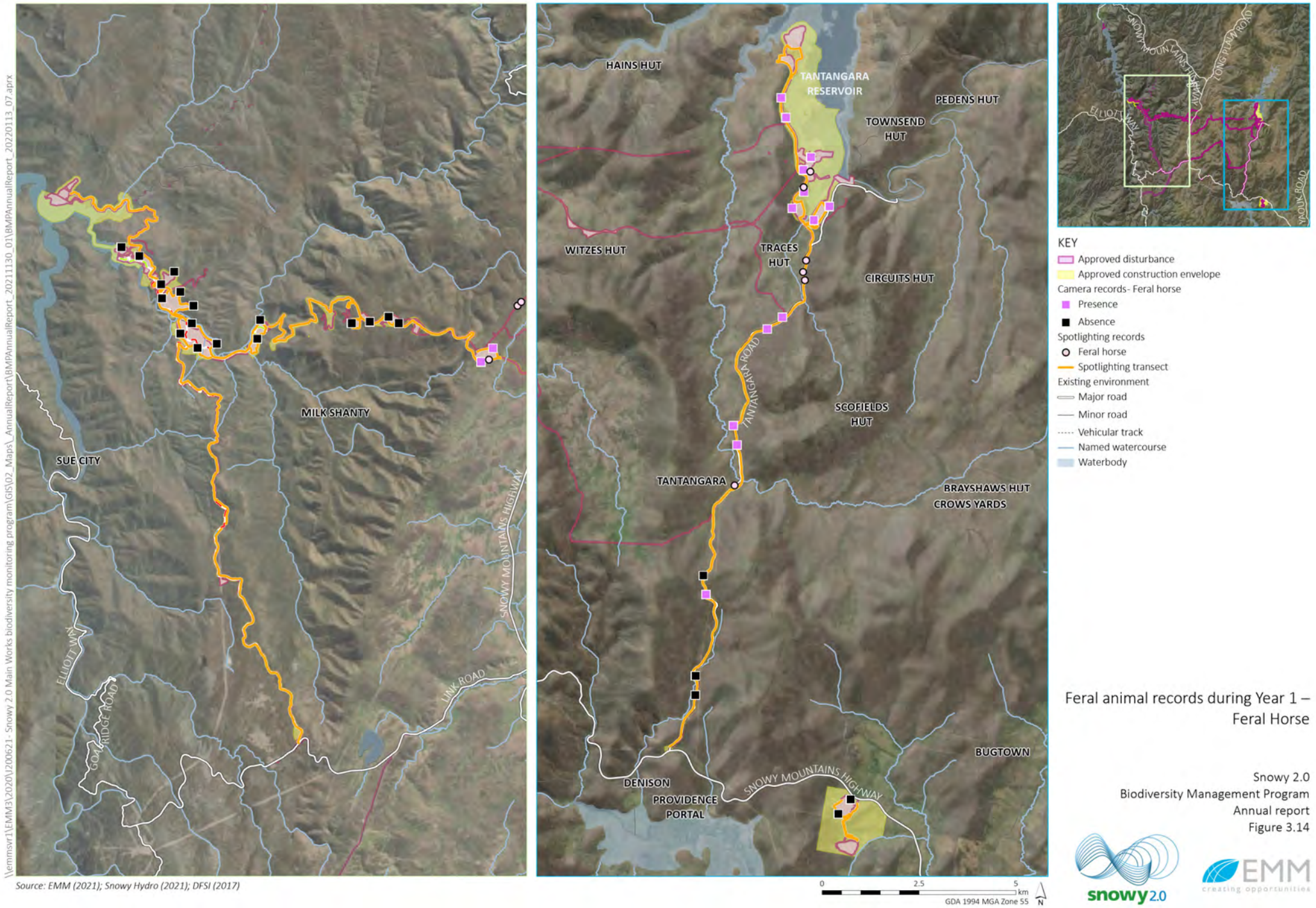
Annual report
Figure 3.13



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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Feral animal records during Year 1 – Feral Horse

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Annual report
Figure 3.14

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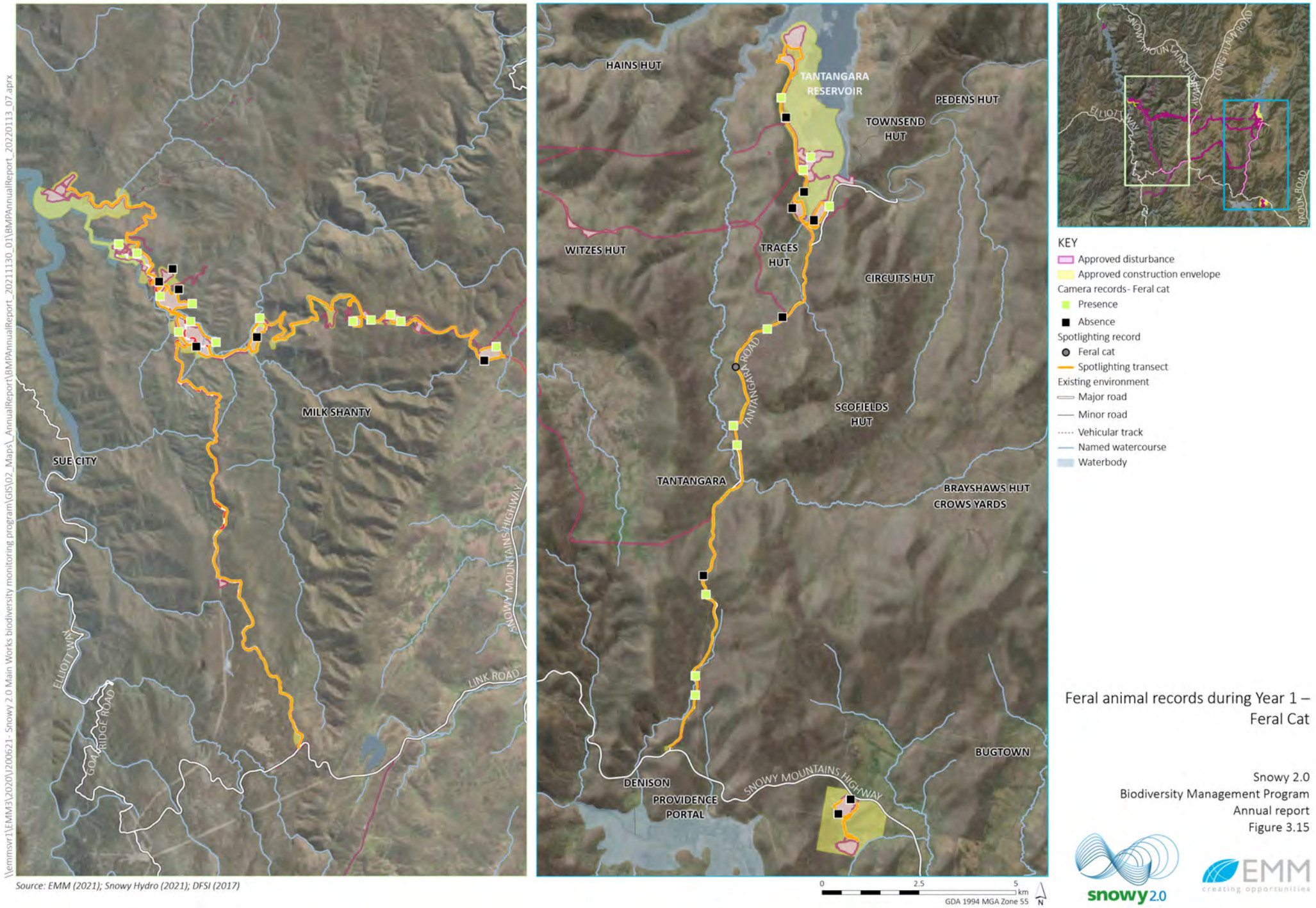

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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Feral animal records during Year 1 – Feral Cat

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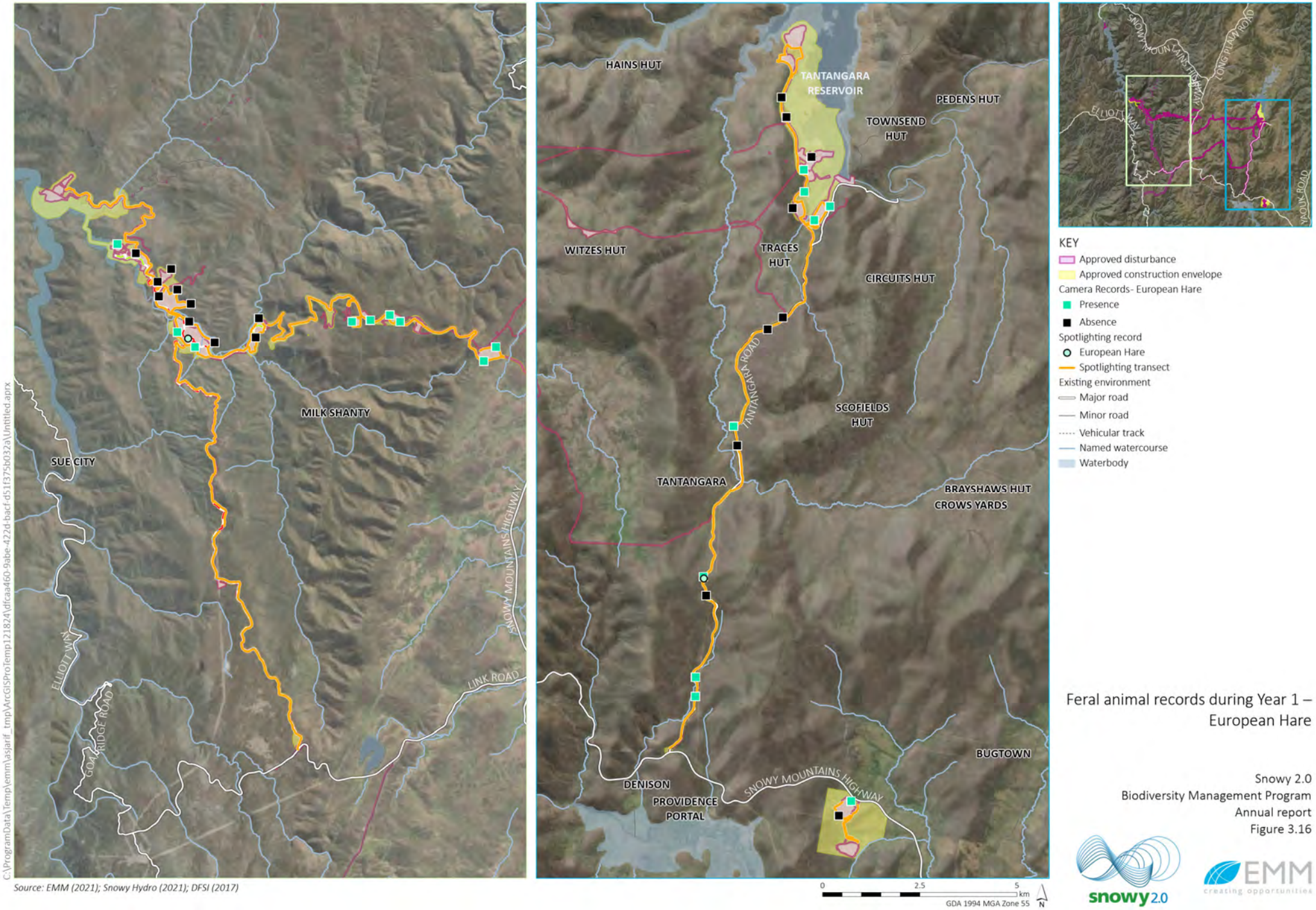
Figure 3.15



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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Feral animal records during Year 1 – European Hare

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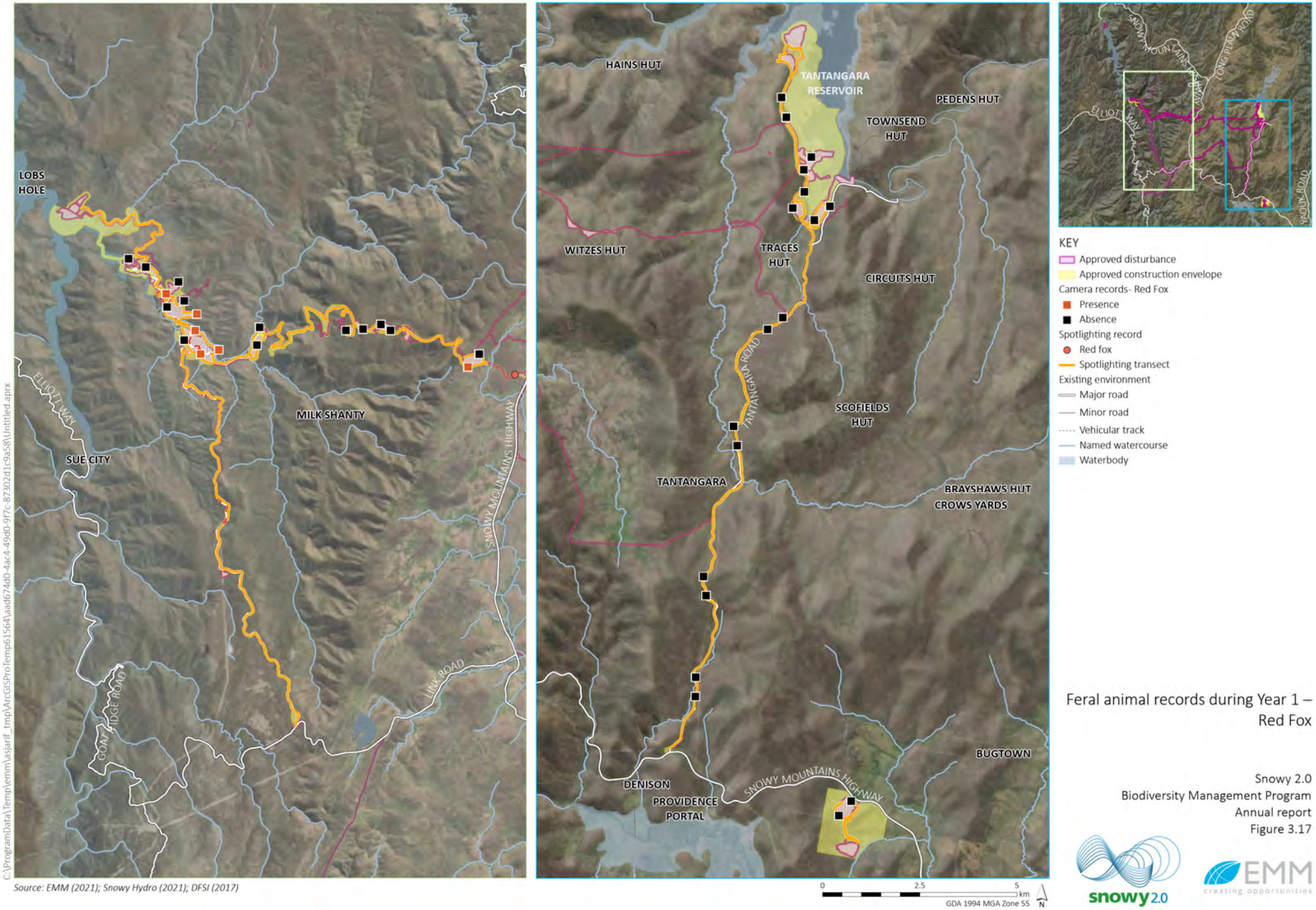
Biodiversity Management Program
Annual report
Figure 3.16



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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Feral animal records during Year 1 – Red Fox

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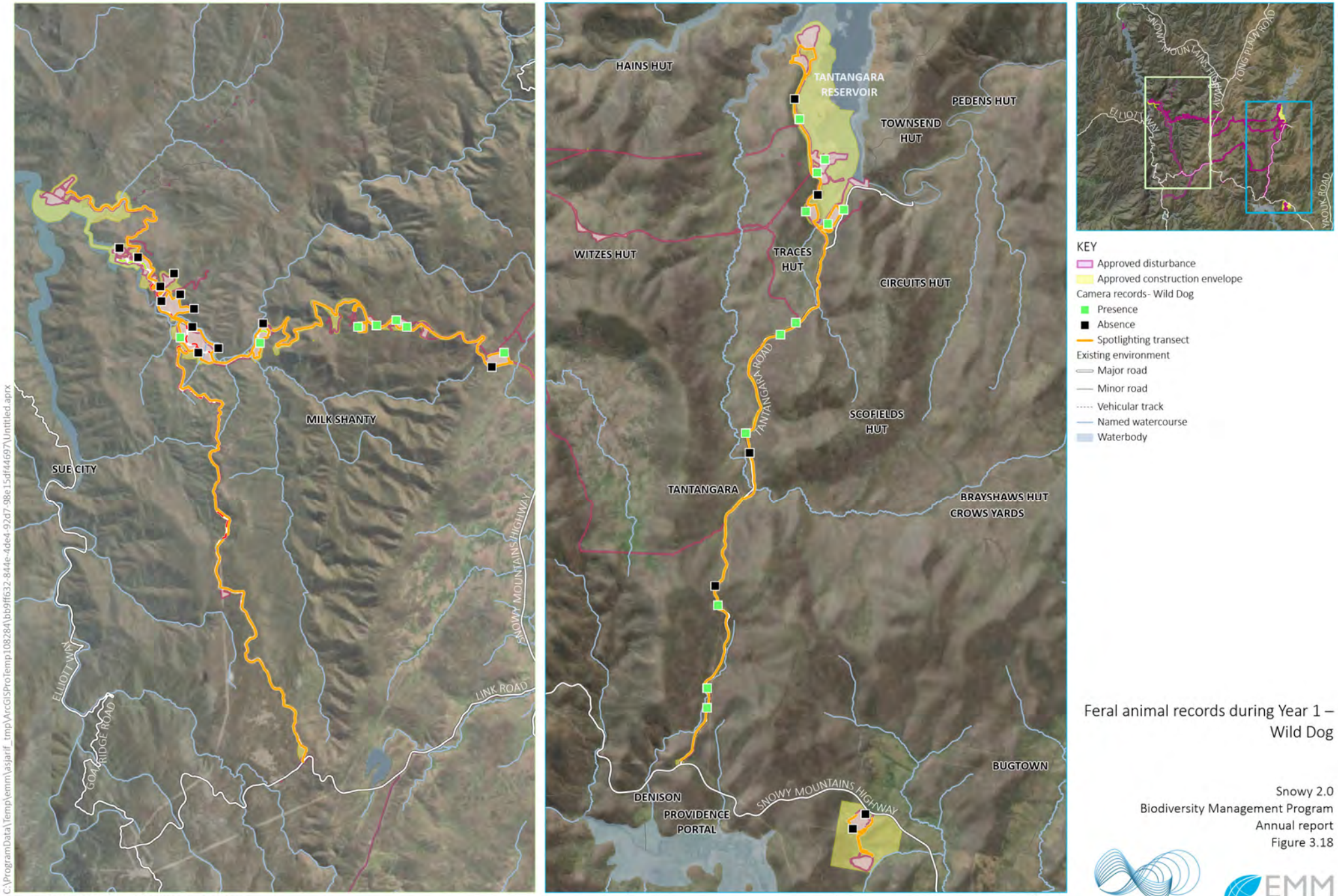
Biodiversity Management Program
Annual report
Figure 3.17



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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Feral animal records during Year 1 – Wild Dog

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Biodiversity Management Program
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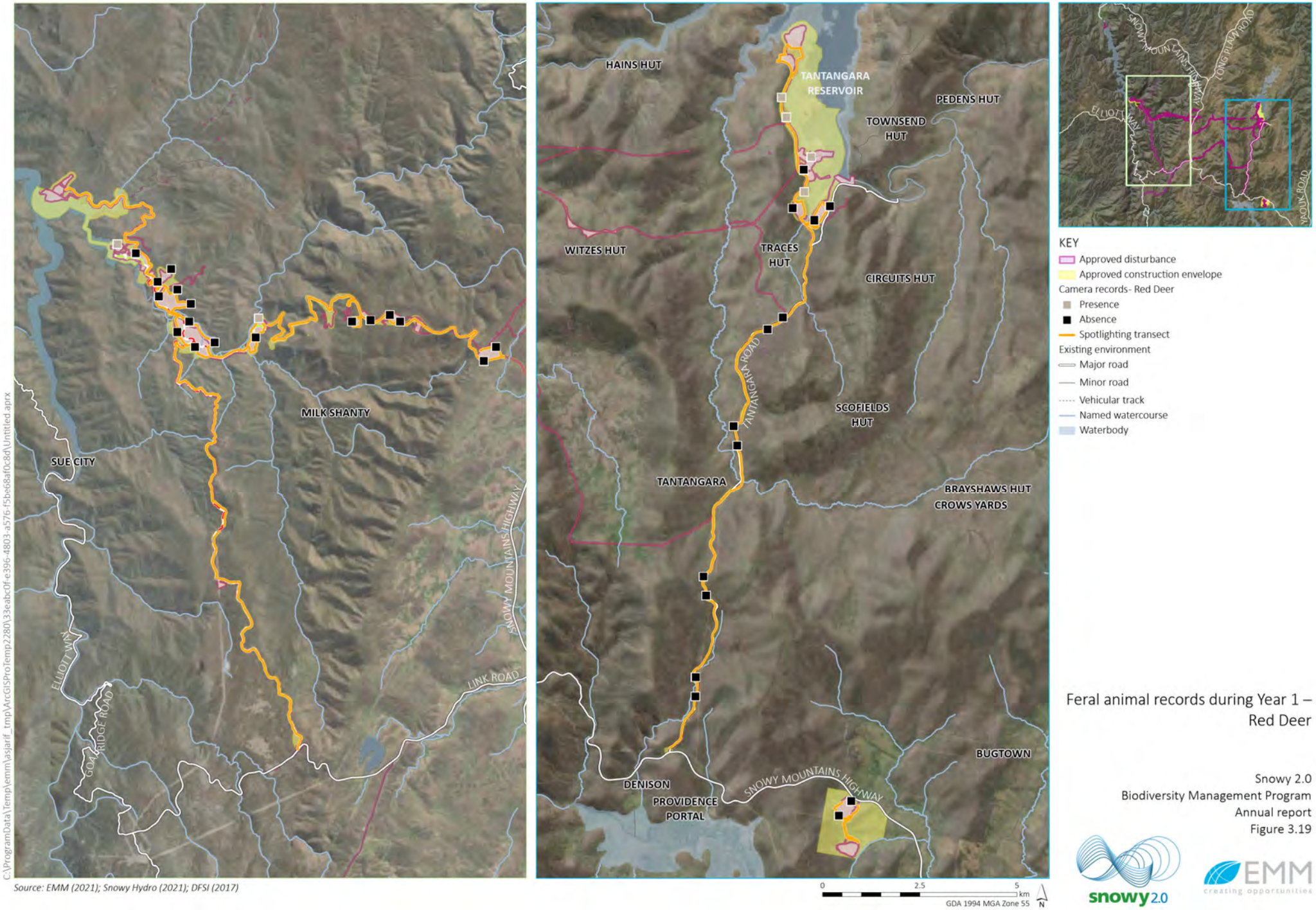
Figure 3.18



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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Feral animal records during Year 1 – Red Deer

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Figure 3.19

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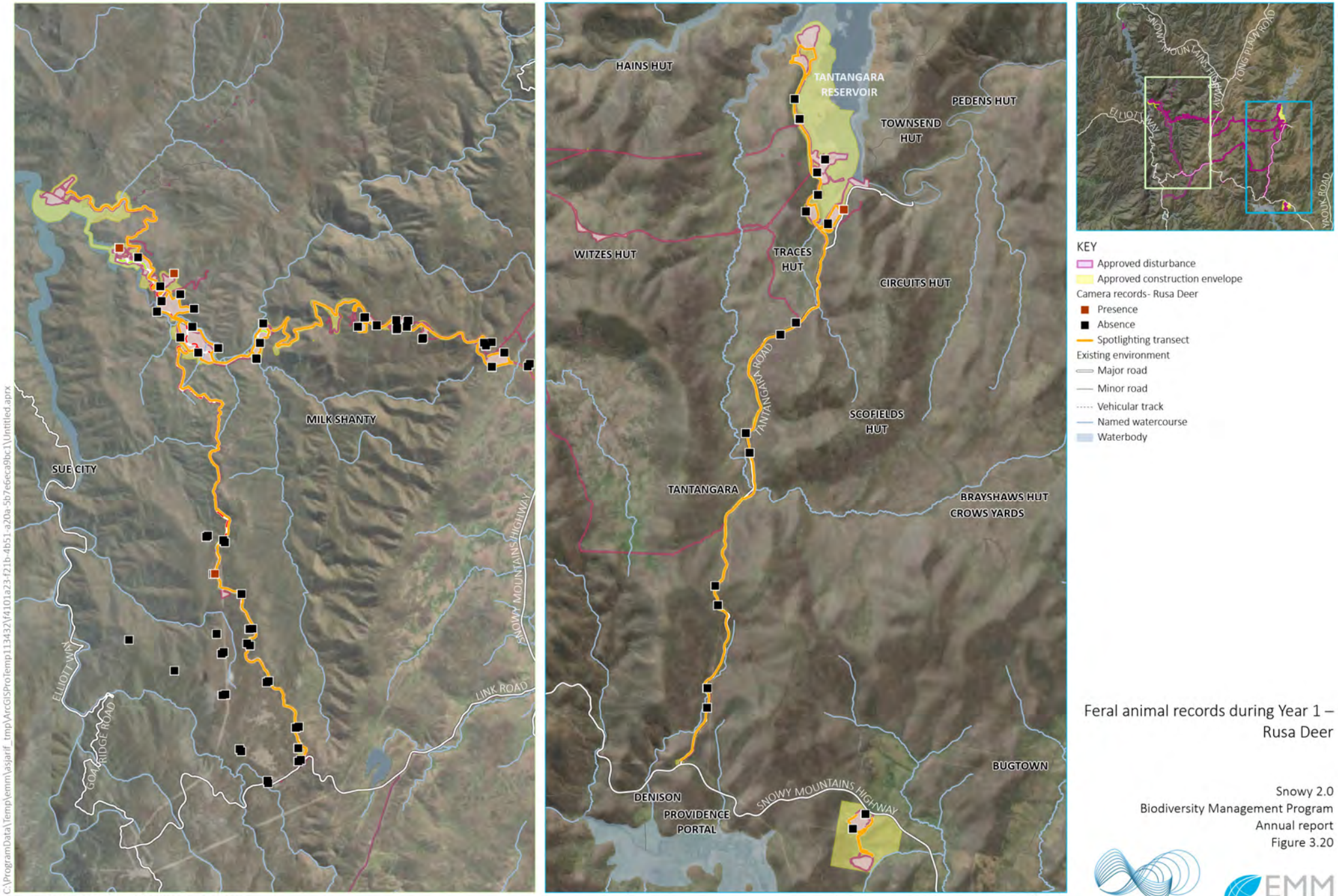

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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Feral animal records during Year 1 – Rusa Deer

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Annual report
Figure 3.20

snowy 2.0

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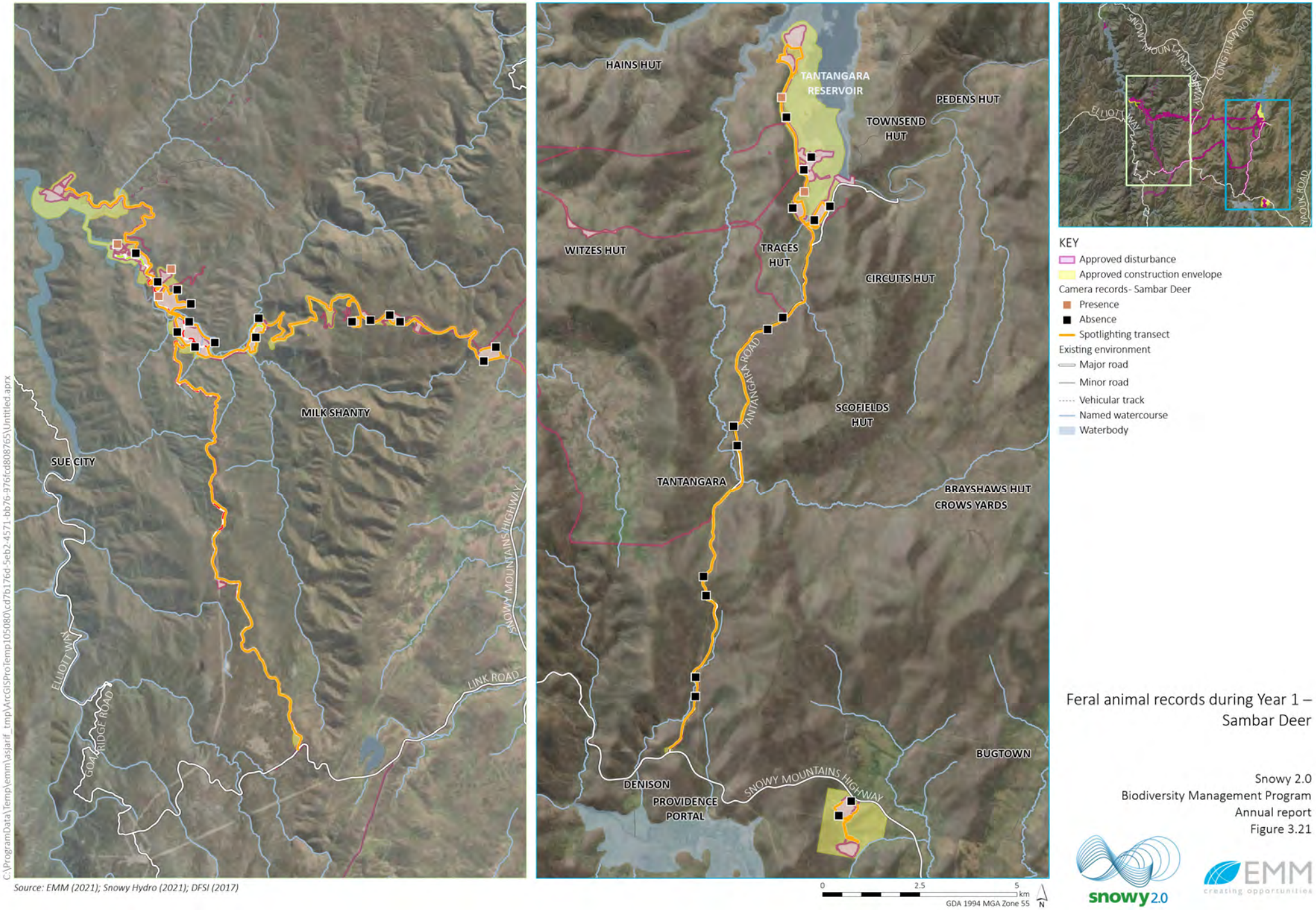

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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Feral animal records during Year 1 – Sambar Deer

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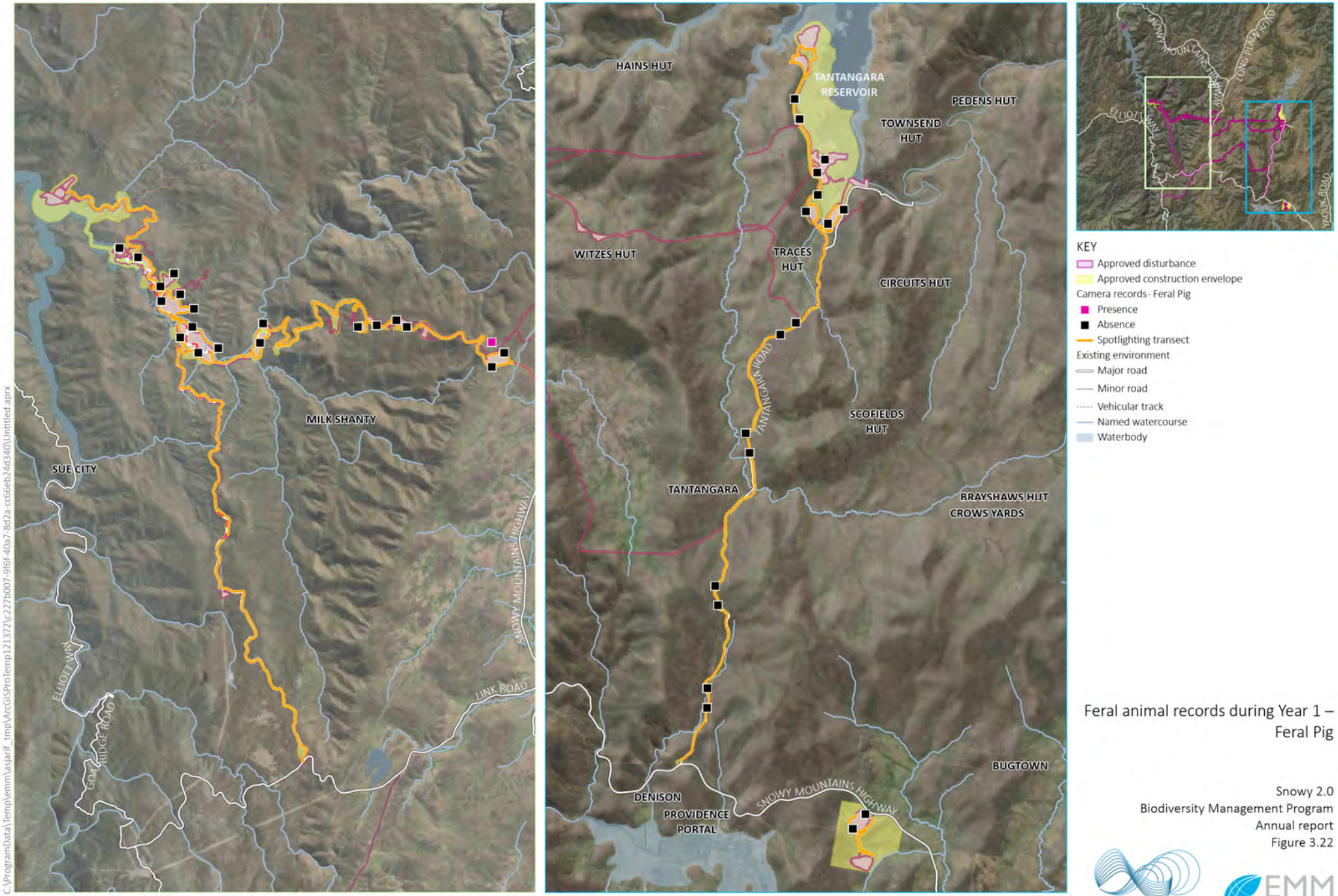
Biodiversity Management Program
Annual report
Figure 3.21



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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Feral animal records during Year 1 – Feral Pig

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Biodiversity Management Program
Annual report
Figure 3.22

3.6 Weed and pathogen monitoring

3.6.1 Weed presence/absence

The objective of the weed presence/absence monitoring is to determine presence/absence and abundance of weeds within proximity to the project (roads and key project infrastructure) for routine control in accordance with the Weed, Pest and Pathogen Management Plan (FGJV, 2020).

A total of 16 priority weed species were recorded within 50 m of the main project roads, accommodation camps and key construction compounds and nine priority weed species were recorded within 50 m of the threatened flora monitoring locations.

Weed presence/absence within management zones is summarised in Table 3.12. Monitoring events and weed records are provided in Appendix G.1.

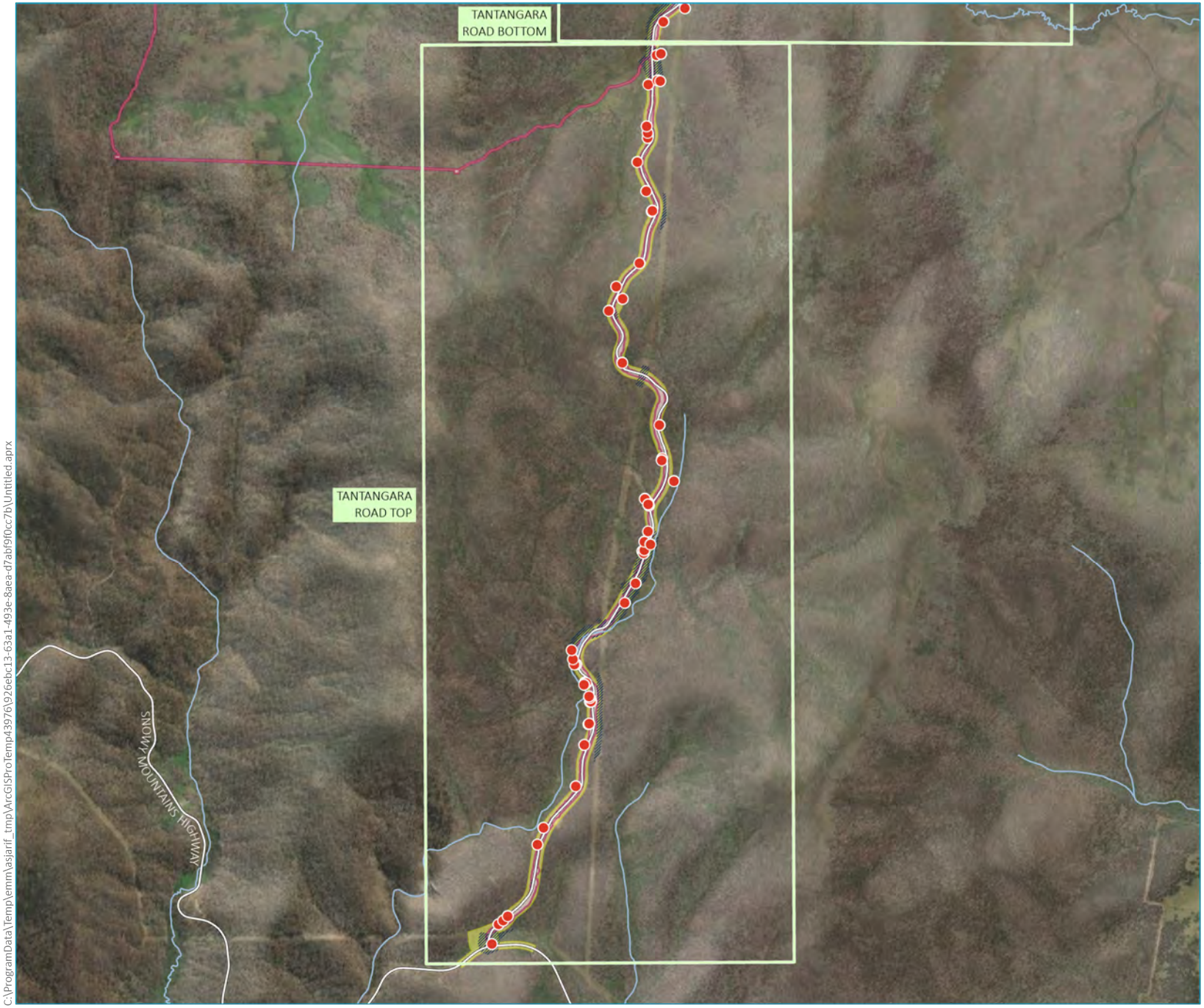
Table 3.12 Priority weed species recorded – Year 1

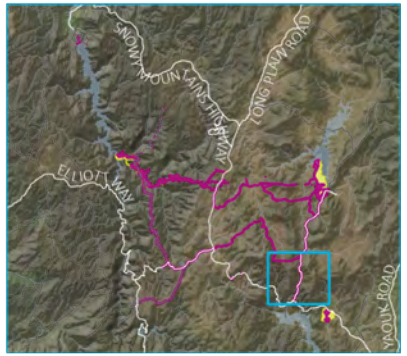
		Management Zone						
Species Name	**Common Name**	**Bottom of Lobs Hole**	**Lobs Hole Ravine Road Bottom**	**Lobs Hole Ravine Road Top**	**Marica**	**Tantangara Dam**	**Tantangara Road Bottom**	**Tantangara Road Top**
*Achillea millefolium**	Milfoil/Yarrow				✓			
*Agrostis capillaris**	Browntop Bent	✓		✓	✓	✓		
*Anthoxanthum odoratum**	Sweet Vernal Grass				✓	✓	✓	✓
*Cirsium vulgare**	Spear Thistle	✓	✓	✓	✓	✓	✓	✓
Dactylis glomerata	Cocksfoot				✓			
*Echium plantagineum**	Patterson's Curse					✓		
Echium vulgare	Vipers Bugloss				✓			✓
*Holcus lanatus**	Yorkshire Fog Grass				✓	✓	✓	✓
*Hypericum perforatum**	St John's Wort	✓		✓	✓	✓		✓
*Leucanthemum vulgare**	Ox-eye Daisy					✓	✓	✓
Lotus spp.	Bird's-foot Trefoil	✓					✓	✓
*Mimulus moschatus**	Musk Monkey Flower			✓				
Onopordium acanthium	Scotch Thistle					✓	✓	✓
Rosa rubiginosa	Sweet Briar	✓	✓			✓		
Rubus spp.	Blackberry	✓	✓	✓	✓	✓		
Verbascum spp.	Mullein	✓	✓		✓	✓	✓	✓

Notes: * Weed species was recorded within 50 m of a threatened flora monitoring plot.

The most common weeds across management zones were Spear Thistle (*Cirsium vulgare*) and Mullein (*Verbascum* spp.). Blackberry (*Rubus* spp.) and St John's Wort (*Hypericum perforatum)* had the most records classified as 'Dense'. The priority species with the largest infestation areas were Yorkshire Fog Grass (*Holcus lanatus*), Sweet Vernal Grass (*Anthoxanthum odoratum*), and Scotch Thistle (*Onopordum acanthium*) and these occurred in the Tantangara Dam management zone (Appendix G.1 Figure 3.23).

Triggers for adaptive management include new occurrence of priority weeds within proximity to project infrastructure and increases in density of high priority weeds (Annexure A of the BMP, (EMM, 2020). However, EMM recommends identifying high priority weeds for each management zone area using the list provided in the BMP (EMM 2020) and key weed species for threatened flora and fauna species. Priority weeds identified for each management zone would then be monitored each year over the construction period, with new occurrences of these priority weeds within each management zone mapped for control.





KEY

Approved disturbance
Approved construction envelope
Weed record
Weed record
Weed management zone

Existing environment

Major road
Vehicular track
Named watercourse
Waterbody

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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Weed records during Year 1

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Figure 3.23

snowy 2.0

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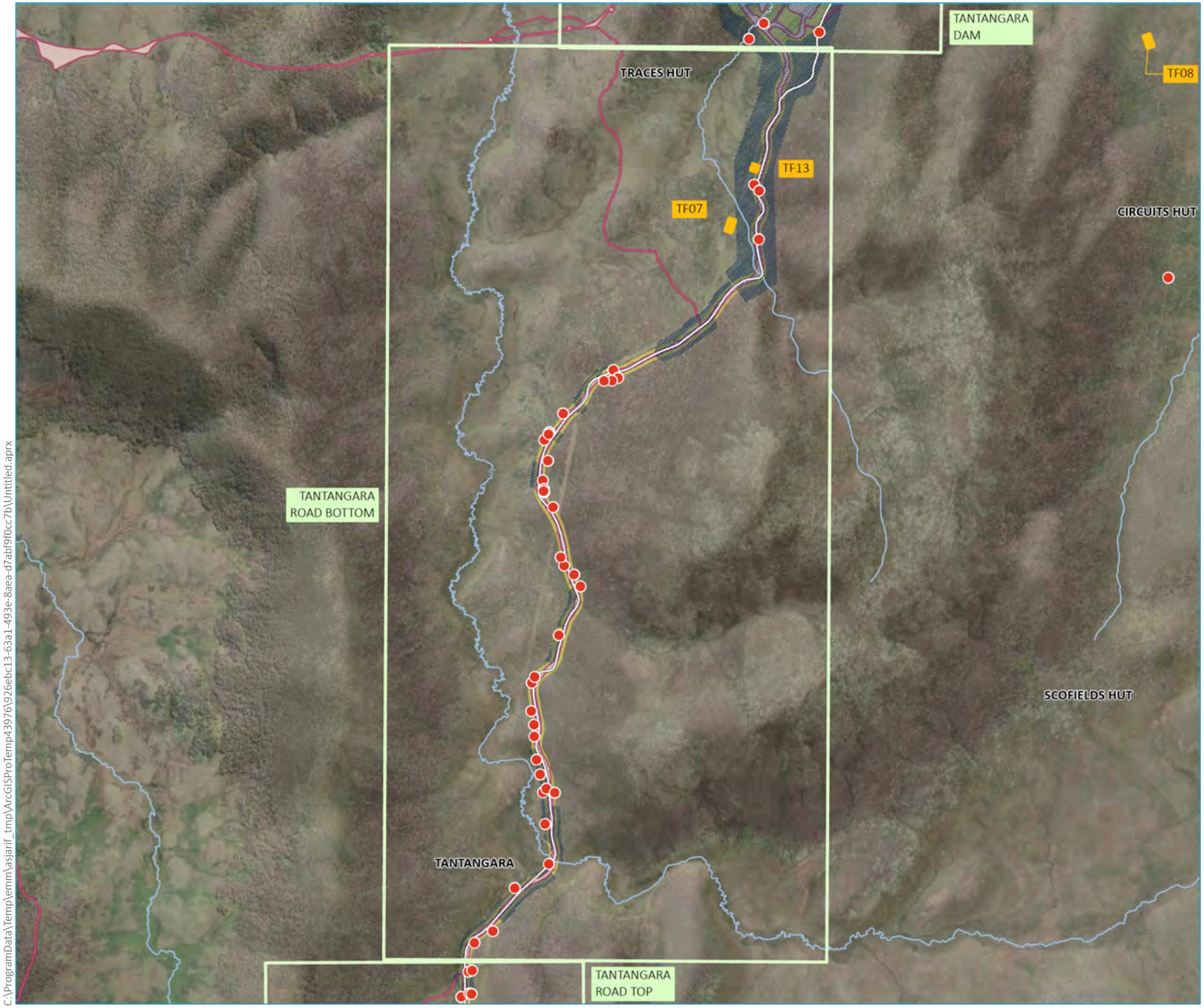

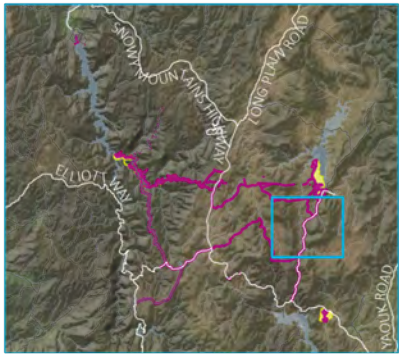

KEY

- Approved disturbance
- Approved construction envelope
- Threatened flora monitoring location
- Weed record
- Weed record
- Weed management zone

Existing environment

- Major road
- Vehicular track
- Named watercourse
- Waterbody

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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Weed records during Year 1

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Figure 3.23

snowy 2.0

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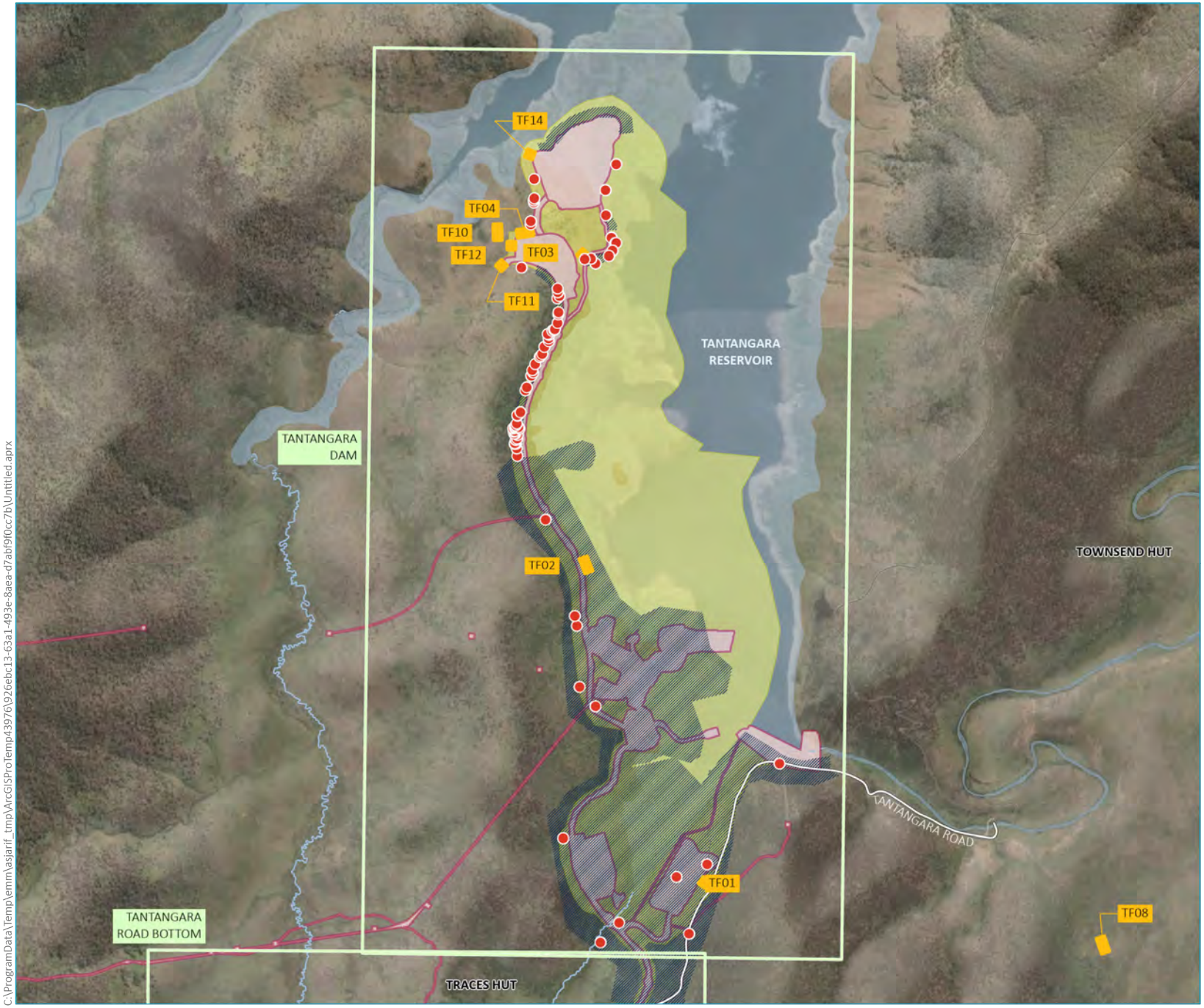

KEY

- Approved disturbance
- Approved construction envelope
- Threatened flora monitoring location
- Weed record
- Weed record
- Weed management zone

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

Weed records during Year 1

Snowy 2.0
Biodiversity Management Program
Annual report
Figure 3.23

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km
GDA 1994 MGA Zone 55

N

snowy 2.0

EMM creating opportunities

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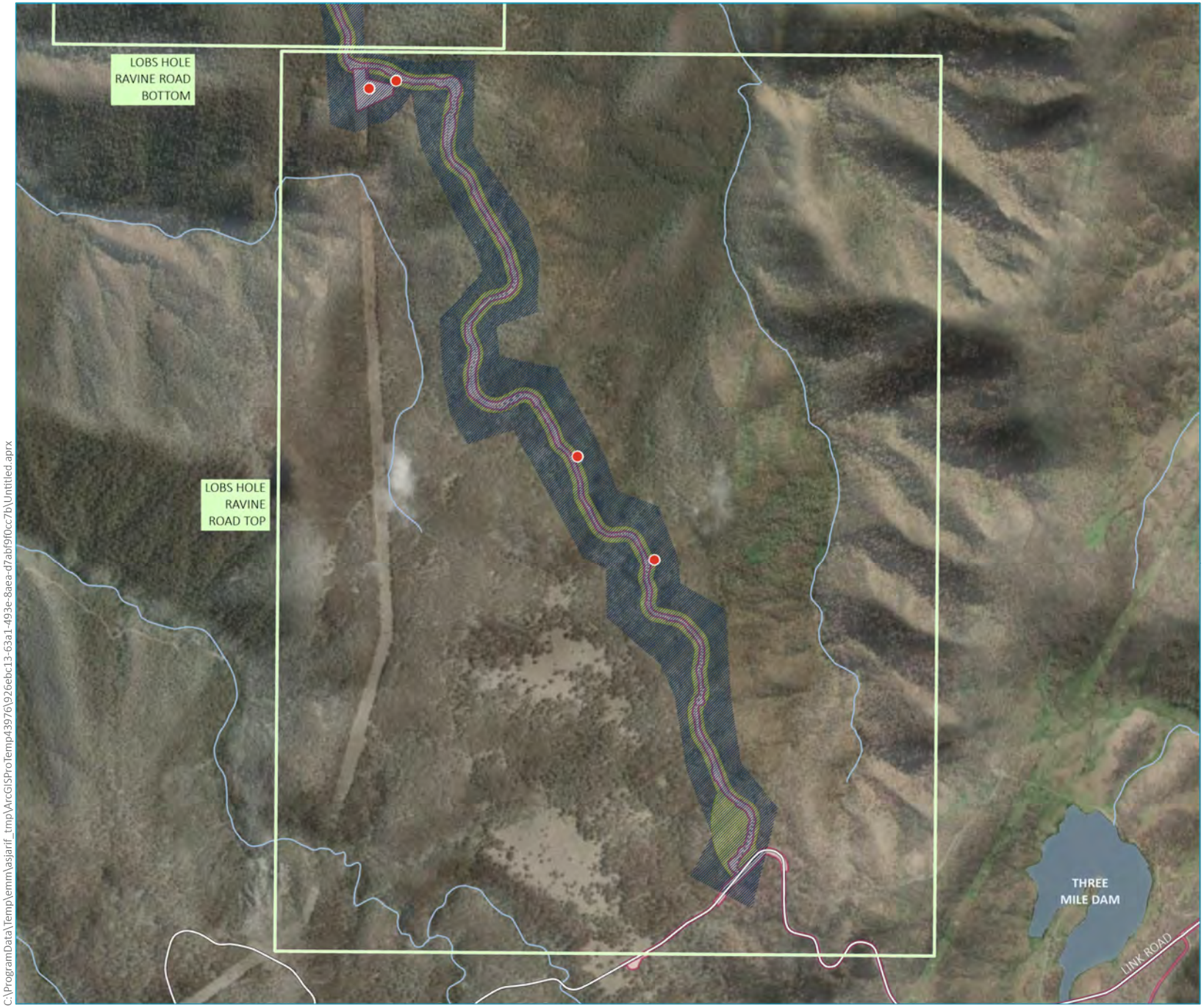

KEY

- Approved disturbance
- Approved construction envelope
- Weed record
- Weed record
- Weed management zone

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp43976\926ebc13-63a1-493e-8aea-d7abf9f0cc7b\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Weed records during Year 1

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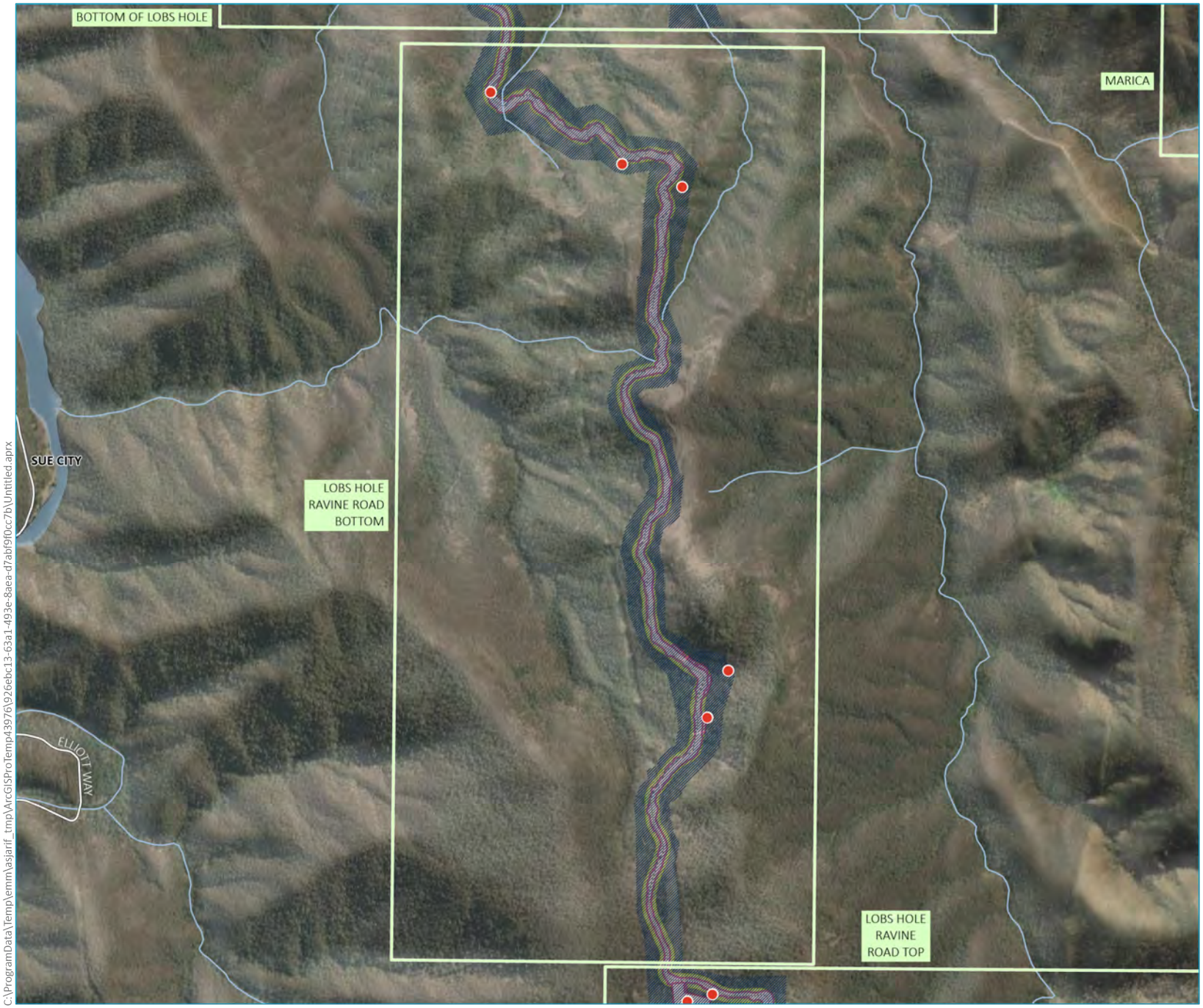
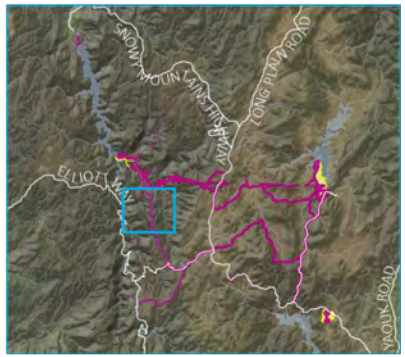
snowy 2.0

EMM creating opportunities





KEY

Approved disturbance
Approved construction envelope
Weed record
Weed record
Weed management zone

Existing environment

Major road
Minor road
Vehicular track
Named watercourse
Waterbody

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp43976\926ebc13-63a1-493e-8aea-d7abf9f0cc7b\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Weed records during Year 1

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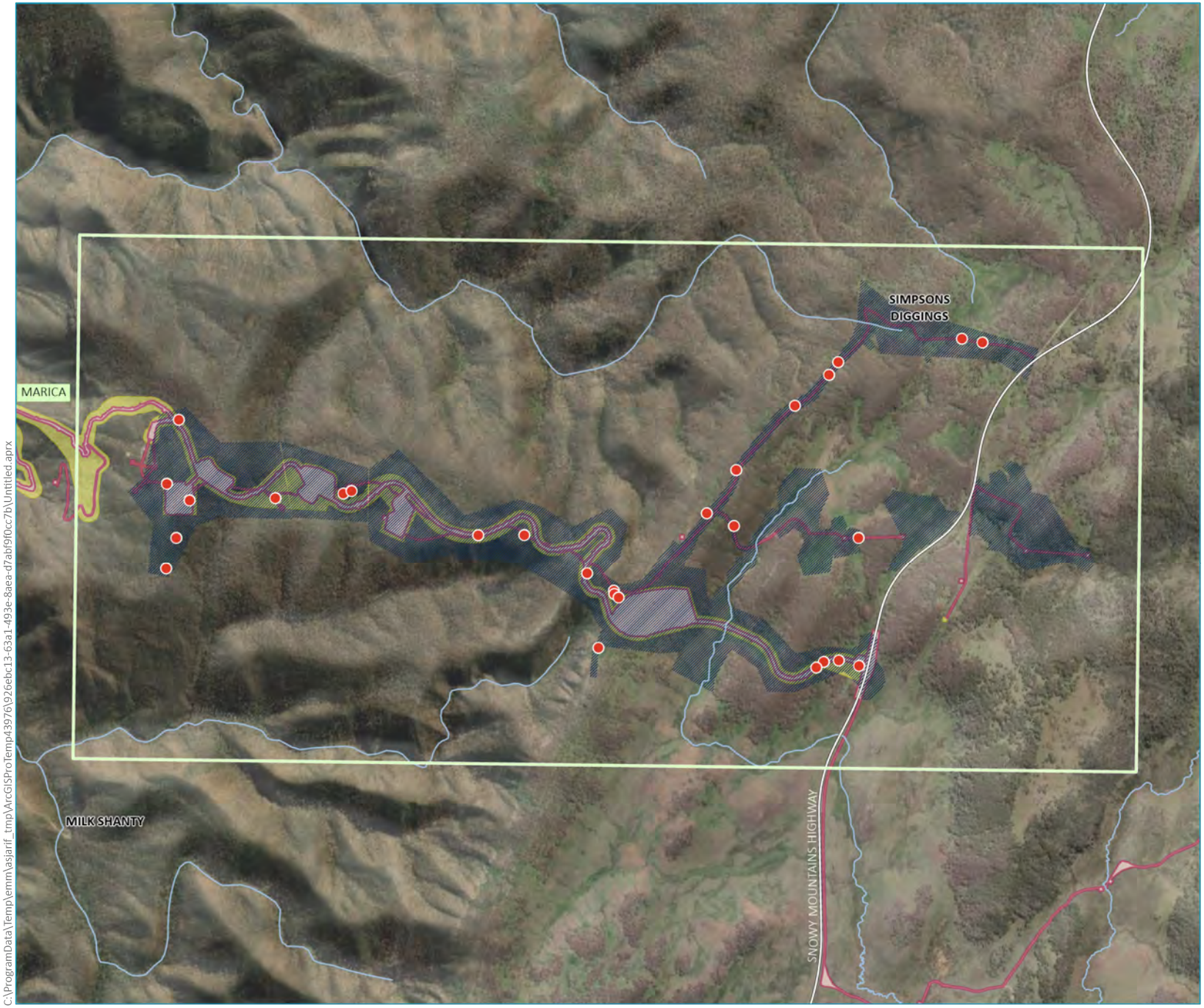
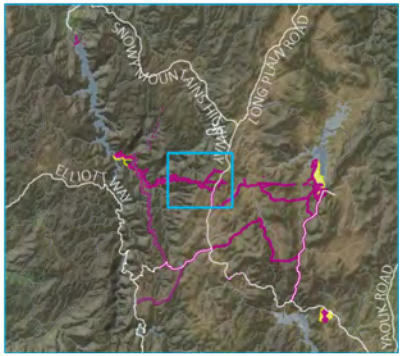
snowy 2.0

EMM creating opportunities





KEY

Approved disturbance
Approved construction envelope
Weed record
Weed record
Weed management zone

Existing environment

Major road
Vehicular track
Named watercourse

C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp43976\926ebc13-63a1-493e-8aea-d7abf9f0cc7b\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

Weed records during Year 1

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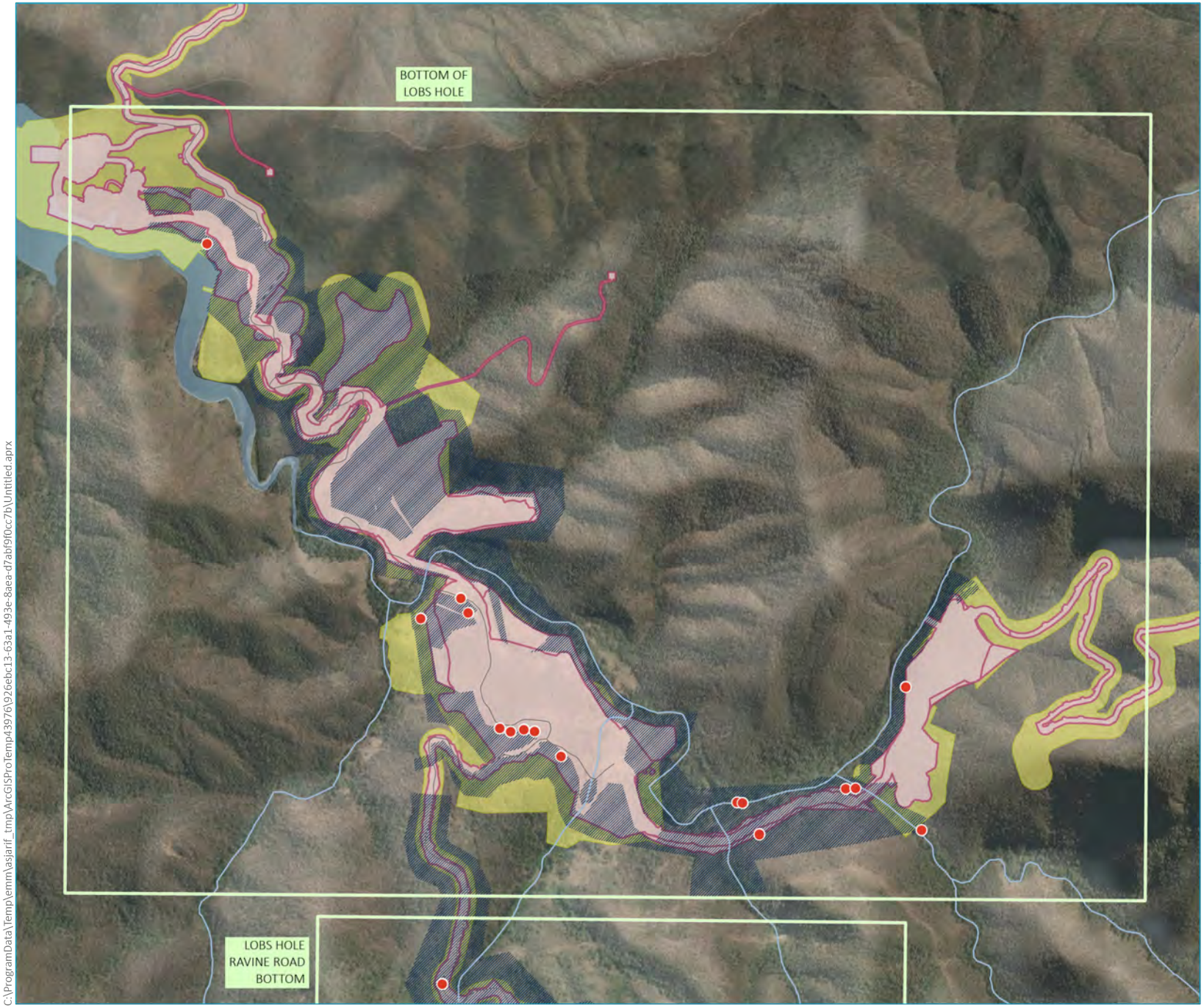
snowy 2.0

EMM creating opportunities



KEY

- Approved disturbance
- Approved construction envelope
- Weed record
- Weed record
- Weed management zone

Existing environment

- Minor road
- Vehicular track
- Named watercourse
- Waterbody

Weed records during Year 1

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C:\ProgramData\Temp\emm\asjarif_tmp\ArcGISProTemp43976\926ebc13-63a1-493e-8aea-d7abf9f0cc7b\Untitled.aprx

Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

snowy 2.0

EMM creating opportunities

3.6.2 *Phytophthora* presence/absence

The objective of the *Phythopthora* presence/absence monitoring is to monitor pathogens within proximity to project roads and key project infrastructure, to inform the location and extent of controls.

Eight sites were established during year 1 across the project area: three sites at Lobs Hole, two sites at Marica and three sites at Tantangara (Figure 3.24). Of the eight samples taken during baseline surveys (conducted during Q2), *Phytophthora* spp. was detected in one soil sample from Lobs Hole (Lobs01). No dieback was observed during surveys. Further tests confirmed the species to be *Phytophthora cryptogea/psueudocryptogea.* The species is known to occur within the Kosciuszko National Park and is suspected to be implicated in the decline of threatened species such as *Pimeala bracteata*.

As per the BMP (FGJV, 2020), additional soil sampling was required within the suspected infection area to document the extent. The original location (Lobs01) was resampled (PMS5), and an additional four sites surrounding the infected area (PMS1, PMS2, PMS3 and PMS4). *Phytophthora cryptogea/psueudocryptogea* was detected in PMS1 and PMS5, confirming presence within the bottoms of Lobs Hole (Figure 3.24). Site PMS1 is located within undisturbed vegetation upslope of Lobs 01 and PMS5. *Phytophthora* spp. was not detected at the other three additional sites.

Given the results of the additional testing, soil samples were taken from an additional 20 locations across the Snowy 2.0 project area, as shown in Figure 3.24. This included the following:

- three sites within Lobs Hole and two sites along Ravine Road;
- two sites within the disturbance footprint at Rock Forest;
- three sites within the disturbance footprint at the Plateau prior to works commencing; and
- surrounding the works area at Tantangara (five sites), and Marica (five sites) to identify the potential of *Phytophthora* outside the disturbance footprint.

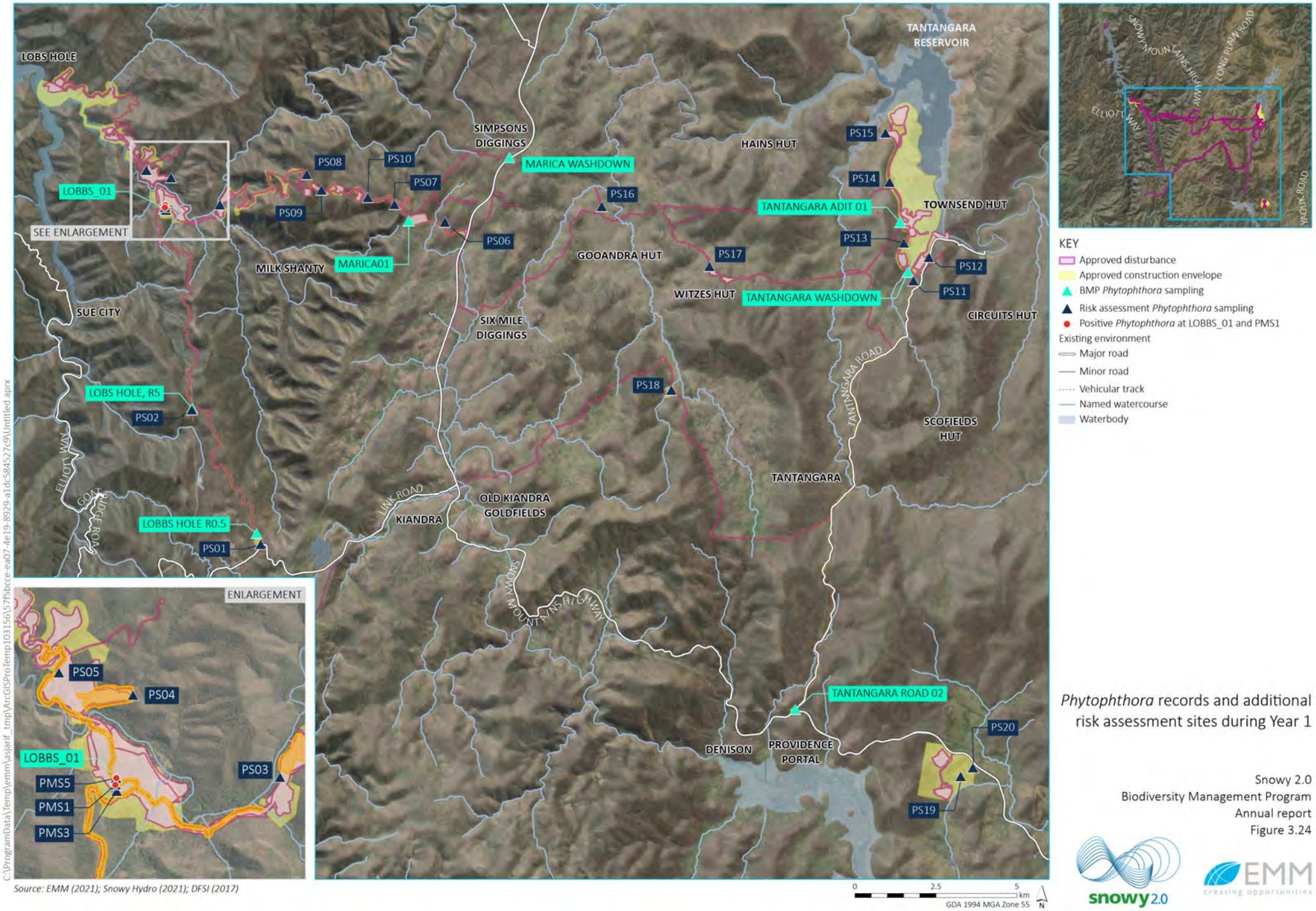
The additional 20 samples tested negative for *Phytophthora* spp. Given *Phytophthora* sp. was not recorded in any other areas besides one location in Lobs Hole, no further testing was conducted. All pathogen sample sites and results are summarised in Table 3.13.

Table 3.13 Phytophthora presence/absence during Year 1 monitoring period

Site	Positive/negative	*Phytophthora* species
Lobs Hole Ravine Road bottom		
Lobs01	Positive	*Phytophthora cryptogea/psueudocryptogea*
PMS1	Positive	*Phytophthora cryptogea/psueudocryptogea*
PMS2	Negative	-
PMS3	Negative	-
PMS4	Negative	-
PMS5	Positive	*Phytophthora cryptogea/psueudocryptogea*
PS03	Negative	-
PS04	Negative	-
PS05	Negative	-

Table 3.13 Phytophthora presence/absence during Year 1 monitoring period

Site	Positive/negative	*Phytophthora* species
Lobs Hole Ravine Road South		
Lobbs hole R0.5	Negative	-
Lobs Hole, R5	Negative	-
PS01	Negative	-
PS02	Negative	-
Marica		
Marica Washdown	Negative	-
Marica01	Negative	-
PS06	Negative	-
PS07	Negative	-
PS08	Negative	-
PS09	Negative	-
PS10	Negative	-
Plateau		
PS16	Negative	-
PS17	Negative	-
PS18	Negative	-
Rock Forest		
PS19	Negative	-
PS20	Negative	-
Tantangara Dam		
PS11	Negative	-
PS12	Negative	-
PS13	Negative	-
PS14	Negative	-
PS15	Negative	-
Tantangara Adit 01	Negative	-
Tantangara Washdown	Negative	-
Tantangara Road		
Tantangara Road 02	Negative	-



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Source: EMM (2021); Snowy Hydro (2021); DFSI (2017)

Phytophthora records and additional risk assessment sites during Year 1

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Figure 3.24

4 Recommendations

Following the completion of the first year of the Main Works BMP, the following recommendations (Table 4.1) are made for consideration by Snowy Hydro, and for the program more broadly, for incorporation into the next year of monitoring (2021/22).

Table 4.1 Recommended amendments to the BMP

Monitoring component	Recommendation
Threatened Flora monitoring	• Control and impact sites where target species have not been recorded during Year 1 will be monitored during the Year 2 monitoring period (2021/22). If the species are not recorded during Year 2, it is recommended the sites are moved, during the Year 2 monitoring period, to new locations where the species are present.
Small mammal habitat characteristic monitoring	• n/a
Small mammal occupancy monitoring	• Smoky Mouse was not recorded at control sites during baseline monitoring. Based on this, adaptive management is unlikely to be triggered as no change at control sites can be detected. Further monitoring should review presence/absence of the species at all impact sites as compared to control sites to look at overall declines. • If the Broad-toothed Rat is not recorded on remote cameras within impact areas during Year 2 Q1 or Q2 it is recommended the impact sites are modified, during winter, to locations where the species is present. • If Broad-toothed Rat scats are not recorded at more than five sites during Year 2 it is recommended the survey sites are modified, during the Year 2 monitoring period, to locations where more reliable scat results can be obtained. • It is recommended that the two stolen small mammal cameras be replaced as soon as possible to ensure adequate data be collected from control locations.
Alpine Tree Frog occupancy monitoring	• The impact site where the Alpine Tree Frog was not recorded (TR01) will be monitored during the Year 2 monitoring period (2021/22). If the species is not recorded during Year 2, it is recommended the site is moved, during the Year 2 monitoring period, and an additional monitoring location established.
Booroolong Frog occupancy monitoring	• It is recommended that the Blackberry infestation near Yarrangobilly Creek transects is controlled to allow safe access to all monitoring transects.
Booroolong Frog habitat characteristic monitoring	• Data collection in Year 2 is recommended to be undertaken across all sites under similar water levels and flows to that captured during baseline. This would include surveys to be completed between November to February during similar water level conditions as those captured during baseline. • Ground control points and drone calibration are recommended to verify datasets. • Drone flights should occur during the optimal capture window (10am – 2pm, closest to 12 pm possible) to minimise shadowing impacts. • A height of 30 m or less is recommended for drone flight with greater overlap to produce higher resolution imagery.
Alpine She-oak Skink occupancy monitoring	• Control and impact sites where the Alpine She-oak Skink was not recorded will be monitored during Year 2. If the species is not recorded during Year 2, it is recommended the sites are moved, during the Year 2 monitoring period, to a new location where the species is present.

Table 4.1 Recommended amendments to the BMP

Monitoring component	Recommendation
Feral animal occupancy monitoring	• Based on a number of cameras being stolen along Tantangara Road (see Section 2.2), and the danger of white flash on drivers at night, it is recommended that feral animal cameras on Tantangara Road are replaced with infrared cameras. • Feral animal control is limited to those animals that are most likely to be attracted to increased human occupation and have the greatest impact, such as the Feral Cat, Red Fox, Wild Dog and Feral Horse.
Feral animal abundance monitoring	• Feral animal surveys could not be completed during Winter in Year 1 due to weather conditions. Next years' surveys should be undertaken during the Winter period, where possible. • Feral animal control is limited to those animals that are most likely to be attracted to increased human occupation and have the greatest impact, such as the Feral Cat, Red Fox, Wild Dog and Feral Horse.
Weed presence / absence monitoring	• Rock Forest should be added to areas for weed presence/absence monitoring in Year 2. • Priority weeds within each weed management zone should be restricted to a concise list of weeds of concern within that area, and those which impact threatened species. It is recommended weed monitoring is amended to target these species which are of particular threat to each area.
Phytophthora spp. presence / absence monitoring	• Mitigation measures in accordance with the Weed, Pest and Pathogen Management Plan should continue to be followed.

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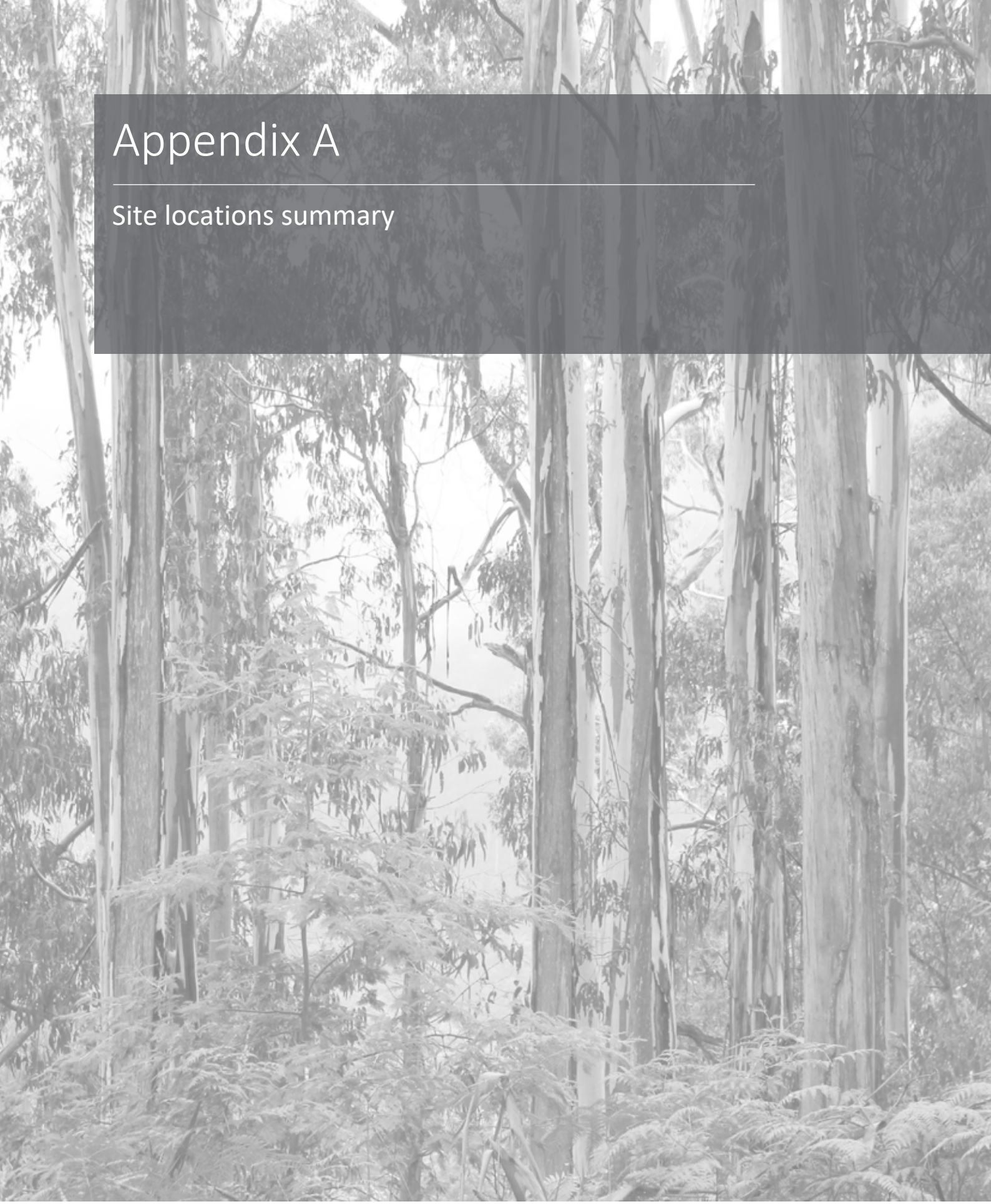


Appendix A

Site locations summary

Table A.1 Monitoring site locations

			Threatened flora		Small Mammals		Alpine She-oak Skink	Frogs			Feral Animal	Pathogens
			Monitoring plots	Habitat Characteristic Transects*	Motion Camera	Faecal Pellet Search	Tile Grid	Alpine Tree Frog Transect	Booroolong Frog Transect	Booroolong Drone Survey	Camera	Soil sampling
Location	**Site**	**GPS coordinates**										
Circuits Trail	NC03	E653086 N6029900						✓				
	TF05	E653562 N6030119	✓									
	TF08	E652134 N6036239	✓									
	TF09	E652604 N6034294	✓									
Dead Mans	SM04-C-RC1	E627513 N6028084		✓	✓							
	SM04-C-RC2	E627488 N6028175		✓	✓							
	SM06-C-RC1	E627084 N6029494		✓	✓							
	SM06-C-RC2	E627005 N6029469		✓	✓							
	SM09-C-RC1	E627054 N6030585		✓	✓							
	SM09-C-RC2	E626973 N6030598		✓	✓							
	SM12-C-RC1	E626863 N6031047		✓	✓							
	SM12-C-RC2	E626949 N6030991		✓	✓							
	SM13-C-RC1	E627190 N6031165		✓	✓							
	SM13-C-RC2	E627280 N6031156		✓	✓							
	SM40-C-RC1	E626870 N6028263		✓	✓							
	SM40-C-RC2	E626771 N6028286		✓	✓							
LHRR Bottom	FC05 A	E625954 N6039637									✓	
	FC05 B	E625476 N6039465									✓	
	FC06 A	E626304 N6039273									✓	
	FC06 B	E625818 N6039058									✓	
	FC07 A	E625910 N6038584									✓	
	FC07 B	E626243 N6038815									✓	
	FC08 A	E626410 N6038267									✓	
	FC08 B	E626044 N6038209									✓	
	FC09 A	E627425 N6038082									✓	
	FC09 B	E627839 N6038435									✓	
	Lobs01	E626169 N6038412										✓
	PMS1	E626160 N6038341										✓
	PMS2	E626134 N6038307										✓
	PMS3	E626171 N6038275										✓
	PMS4	E626187 N6038255										✓
	PMS5	E626166 N6038409										✓
	PS03	E627852 N6038421										✓

Table A.1 Monitoring site locations

			Threatened flora		Small Mammals		Alpine She-oak Skink	Frogs			Feral Animal	Pathogens
Location	Site	GPS coordinates	Monitoring plots	Habitat Characteristic Transects*	Motion Camera	Faecal Pellet Search	Tile Grid	Alpine Tree Frog Transect	Booroolong Frog Transect	Booroolong Drone Survey	Camera	Soil sampling
	PS04	E626340 N6039260										✓
	PS05	E625578 N6039489										✓
	SM19-I-RC1	E625424 N6039246		✓	✓							
	SM19-I-RC2	E625396 N6039202		✓	✓							
	SM20-I-RC1	E627814 N6038071		✓	✓							
	SM20-I-RC2	E627887 N6038000		✓	✓							
	WC01	E627781 N6038027							✓	✓		
	YR02	E626236 N6038909							✓	✓		
	YR05	E626886 N6038200							✓	✓		
	YR06	E627711 N6038318							✓	✓		
	YR08	E628062 N6039040							✓	✓		
	YR09	E628064 N6039368							✓	✓		
LHRR North	FC03 A	E624757 N6041147									✓	
	FC03 B	E624854 N6040718									✓	
	FC04 A	E625424 N6039813									✓	
	FC04 B	E625779 N6040158									✓	
LHRR South	Lobbs hole R0.5	E628985 N6028294										✓
	Lobs Hole, R5	E626999 N6032166										✓
	PS01	E629107 N6027958										✓
	PS02	E626985 N6032115										✓
	SM01-I-RC1	E629002 N6027853		✓	✓							
	SM01-I-RC2	E628957 N6027805		✓	✓							
	SM03-I-RC1	E629013 N6028188		✓	✓							
	SM03-I-RC2	E628934 N6028144		✓	✓							
	SM05-I-RC1	E628889 N6028648		✓	✓							
	SM05-I-RC2	E628957 N6028685		✓	✓							
	SM07-I-RC1	E628205 N6029818		✓	✓							
	SM07-I-RC2	E628113 N6029804		✓	✓							
	SM10-I-RC1	E627642 N6030795		✓	✓							
	SM10-I-RC2	E627729 N6030742		✓	✓							
	SM14-I-RC1	E627783 N6031169		✓	✓							
	SM14-I-RC2	E627675 N6031155		✓	✓							
	SM15-I-RC1	E627492 N6032042		✓	✓							

Table A.1 Monitoring site locations

			Threatened flora		Small Mammals		Alpine She-oak Skink	Frogs			Feral Animal	Pathogens
Location	Site	GPS coordinates	Monitoring plots	Habitat Characteristic Transects*	Motion Camera	Faecal Pellet Search	Tile Grid	Alpine Tree Frog Transect	Booroolong Frog Transect	Booroolong Drone Survey	Camera	Soil sampling
	SM15-I-RC2	E627422 N6031971		✓	✓							
	SM16-I-RC1	E626828 N6032555		✓	✓							
	SM16-I-RC2	E626716 N6032542		✓	✓							
	SM17-C-RC1	E626639 N6033514		✓	✓							
	SM17-C-RC2	E626591 N6033477		✓	✓							
	SM18-I-RC1	E627032 N6033393		✓	✓							
	SM18-I-RC2	E627079 N6033341		✓	✓							
Link Road	SM02-C-RC1	E628187 N6027266		✓	✓							
	SM02-C-RC2	E628156 N6027339		✓	✓							
	SM41-C-RC1	E625604 N6026619		✓	✓							
	SM41-C-RC2	E625533 N6026657		✓	✓							
Marica	FC10 A	E630446 N6038925									✓	
	FC10 B	E630950 N6038880									✓	
	FC11 A	E631414 N6038842									✓	
	FC11 B	E631880 N6038926									✓	
	FC12 A	E634047 N6038305									✓	
	FC12 B	E633816 N6037796									✓	
	Marica Washdown	E636787 N6039884										✓
	Marica01	E633684 N6037938										✓
	PS06	E634797 N6037898										✓
	PS07	E633241 N6038437										✓
	PS08	E630531 N6039358										✓
	PS09	E630983 N6038878										✓
	PS10	E632420 N6038653										✓
	SM21-I-RC1	E630622 N6039053		✓	✓							
	SM21-I-RC2	E630517 N6039030		✓	✓							
	SM22-I-RC1	E631437 N6038798		✓	✓							
	SM22-I-RC2	E631388 N6038695		✓	✓							
	SM23-I-RC1	E631707 N6038968		✓	✓							
	SM23-I-RC2	E631825 N6038988		✓	✓							
	SM24-I-RC1	E632106 N6038509		✓	✓							
	SM24-I-RC2	E632076 N6038398		✓	✓							
	SM25-I-RC1	E633267 N6038464		✓	✓							

Table A.1 Monitoring site locations

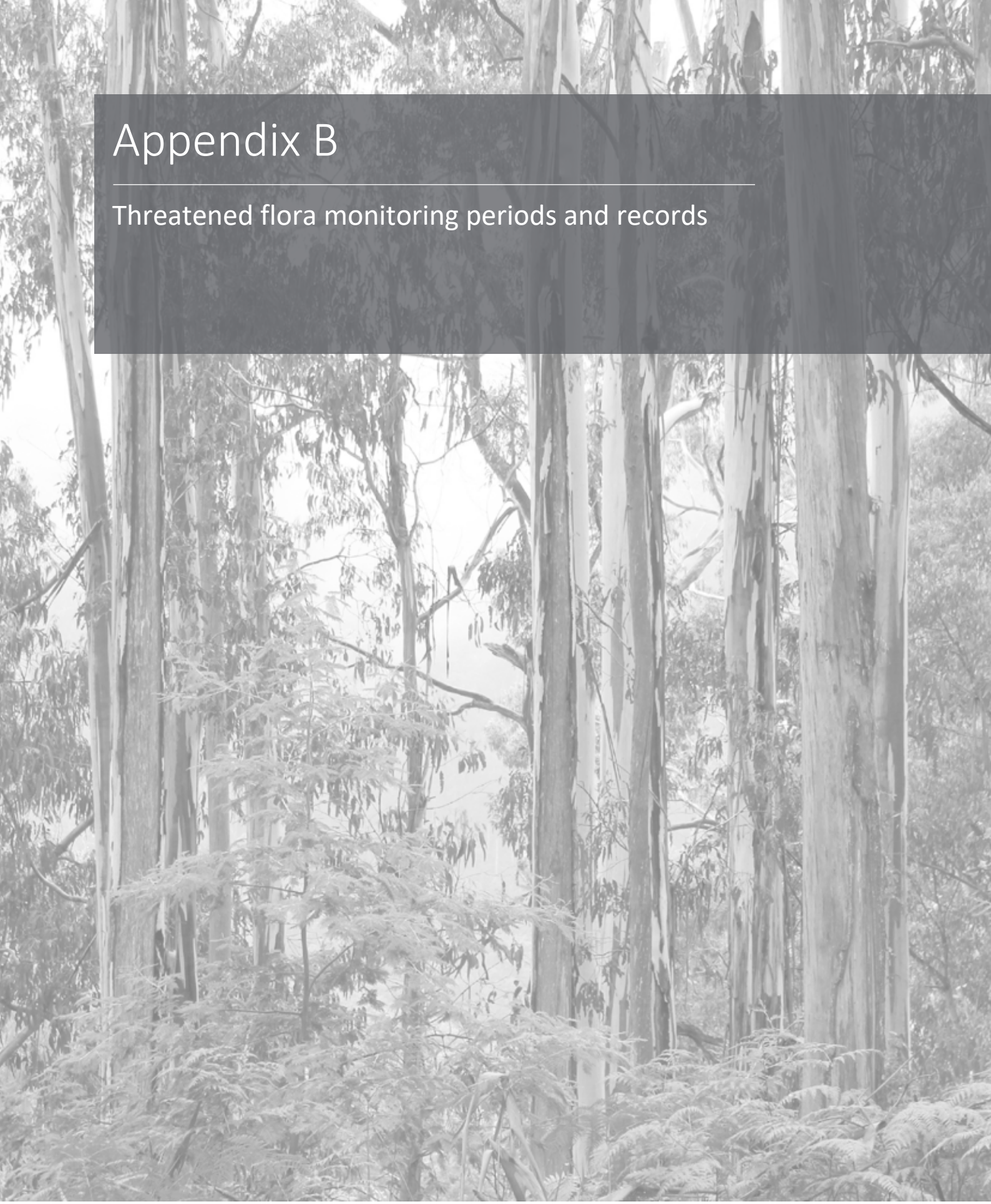
			Threatened flora		Small Mammals		Alpine She-oak Skink	Frogs			Feral Animal	Pathogens
Location	Site	GPS coordinates	Monitoring plots	Habitat Characteristic Transects*	Motion Camera	Faecal Pellet Search	Tile Grid	Alpine Tree Frog Transect	Booroolong Frog Transect	Booroolong Drone Survey	Camera	Soil sampling
	SM25-I-RC2	E633291 N6038553		✓	✓							
	SM26-I-RC1	E633937 N6038389		✓	✓							
	SM26-I-RC2	E633825 N6038391		✓	✓							
	SM27-I-RC1	E634736 N6037814		✓	✓	✓ FP20						
	SM27-I-RC2	E634796 N6037889		✓	✓							
Plateau	PS16	E639636 N6038371										✓
	PS17	E642962 N6036535										✓
	PS18	E641780 N6032723										✓
	SM28-C-RC1	E637149 N6039490		✓	✓							
	SM28-C-RC2	E637048 N6039567		✓	✓	✓ FP27						
	SM29-C-RC1	E639235 N6040472		✓	✓							
	SM29-C-RC2	E639130 N6040449		✓	✓							
	SM30-C-RC1	E641243 N6042194		✓	✓	✓ FP32						
	SM30-C-RC2	E641108 N6042164		✓	✓							
	SM31-C-RC1	E641023 N6040021		✓	✓							
	SM31-C-RC2	E640974 N6039933		✓	✓	✓ FP31						
	SM32-C-RC1	E643931 N6040579		✓	✓	✓ FP26						
	SM32-C-RC2	E643829 N6040582		✓	✓							
	SM33-C-RC1	E641583 N6048457		✓	✓	✓ FP33						
	SM33-C-RC2	E641675 N6048502		✓	✓							
	SM35-I-RC1	E642590 N6031051		✓	✓							
	SM35-I-RC2	E642579 N6031152		✓	✓							
	TC02	E641967 N6033078						✓				
	TC03	E641113 N6042194						✓				
	TG06	E640403 N6048376					✓					
	TG07	E637664 N6039759					✓					
	TG08	E640520 N6042278					✓					
Rock Forest	FC21 A	E650261 N6021525									✓	
	FC21 B	E649945 N6021155									✓	
	PS19	E650712 N6020805										✓
	PS20	E651092 N6021074										✓

Table A.1 Monitoring site locations

			Threatened flora		Small Mammals		Alpine She-oak Skink	Frogs			Feral Animal	Pathogens
Location	Site	GPS coordinates	Monitoring plots	Habitat Characteristic Transects*	Motion Camera	Faecal Pellet Search	Tile Grid	Alpine Tree Frog Transect	Booroolong Frog Transect	Booroolong Drone Survey	Camera	Soil sampling
Snowy Mountains Highway	ER02	E636682 N6027218						✓				
	SM38-C-RC1	E639865 N6025701		✓	✓	✓ FP30						
	SM38-C-RC2	E639926 N6025774		✓	✓							
	TF06	E637158 N6027887	✓									
	TG09	E637448 N6027921					✓					
Tantangara Dam	FC17 A	E649735 N6036813									✓	
	FC17 B	E649325 N6036515									✓	
	FC18 A	E648789 N6036772									✓	
	FC18 B	E649036 N6037217									✓	
	FC19 A	E649088 N6037712									✓	
	FC19 B	E649211 N6038123									✓	
	FC20 A	E648577 N6039095									✓	
	FC20 B	E648479 N6039596									✓	
	KPC01	E649204 N6036660						✓				
	MR01	E650944 N6037180						✓				
	PS11	E649248 N6036091										✓
	PS12	E649732 N6036815										✓
	PS13	E648960 N6037255										✓
	PS14	E648517 N6039121										✓
	PS15	E648386 N6040640										✓
	SM34-I-RC1	E649008 N6036345		✓	✓	✓ FP19						
	SM34-I-RC2	E648968 N6036254		✓	✓							
	Tantangara Adit 01	E648848 N6037892										✓
	Tantangara Washdown	E649087 N6036362										✓
	TF01	E649623 N6036633	✓									
	TF02	E648880 N6038633	✓									
	TF03	E648860 N6040585	✓									
	TF04	E648496 N6040723	✓									
	TF10	E648323 N6040726	✓									
	TF11	E648348 N6040518	✓									
	TF12	E648410 N6040641	✓									
	TF14	E648527 N6041215	✓									
	TG03	E649050 N6036311					✓					

Table A.1 Monitoring site locations

			Threatened flora		Small Mammals		Alpine She-oak Skink	Frogs			Feral Animal	Pathogens
Location	Site	GPS coordinates	Monitoring plots	Habitat Characteristic Transects*	Motion Camera	Faecal Pellet Search	Tile Grid	Alpine Tree Frog Transect	Booroolong Frog Transect	Booroolong Drone Survey	Camera	Soil sampling
	TG04	E648382 N6040584					✓				✓	
	TG05	E649190 N6037463					✓				✓	
Tantangara Road	FC13 A	E646294 N6024195									✓	
	FC13 B	E646308 N6024598									✓	
	FC14 A	E646533 N6026805									✓	
	FC14 B	E646510 N6027314									✓	
	FC15 A	E647297 N6030683									✓	
	FC15 B	E647266 N6031168									✓	
	FC16 A	E648102 N6033700									✓	
	FC16 B	E648503 N6033965									✓	
	NC01	E647317 N6029902						✓				
	SM36-I-RC1	E647364 N6029737		✓	✓	✓ FP18						
	SM36-I-RC2	E647294 N6029806		✓	✓							
	SM37-I-RC1	E646622 N6028813		✓	✓	✓ FP17						
	SM37-I-RC2	E646539 N6028870		✓	✓							
	SM39-C-RC1	E645970 N6022761		✓	✓	✓ FP24						
	SM39-C-RC2	E646038 N6022838		✓	✓							
	Tantangara Road 02	E645605 N6022864										✓
	TF07	E648824 N6034781	✓									
	TF13	E649017 N6035235	✓									
	TG01	E646591 N6025193					✓					
	TG02	E647238 N6029571					✓					



Appendix B

Threatened flora monitoring periods and records

B.1 Monitoring periods

Table B.1 Threatened flora monitoring periods summary – Year 1

Monitoring period	Monitoring event	Monitoring dates
Q1 (Baseline)	First	10 December 2020 – 13 December 2020
	Second	5 January 2021 – 12 January 2021

B.2 Records

Table B.2 Threatened flora records – Year 1

Monitoring Site	Scientific Name	Common Name	Number of Individuals	Easting*	Northing*
TF02	*Glycine latrobeana*	Clover Glycine	2	648847	6038658
			25	648887	6038608
			1	648893	6038594
			1	648874	6038582
			3	648849	6038663
			1	648888	6038595
			13	648884	6038612
			6	648887	6038610
			7	648878	6038609
			8	648876	6038617
TF03	*Glycine latrobeana*	Clover Glycine	1	648854	6040605
			1	648852	6040602
			1	648854	6040603
			1	648855	6040604
			1	648855	6040603
			1	648855	6040604
			1	648855	6040602
			1	648857	6040601
			1	648853	6040605
			1	648856	6040592
			1	648855	6040596
			1	648855	6040595
			1	648855	6040596
			1	648855	6040596

Table B.2 Threatened flora records – Year 1

Monitoring Site	Scientific Name	Common Name	Number of Individuals	Easting*	Northing*
			1	648850	6040576
			5	648848	6040577
			2	648838	6040590
			1	648858	6040586
			1	648857	6040582
			7	648856	6040593
			15	648850	6040600
			4	648848	6040596
TF04	*Glycine latrobeana*	Clover Glycine	3	648528	6040725
			1	648448	6040738
			2	648494	6040748
			1	648493	6040746
			6	648499	6040734
			9	648496	6040742
			1	648447	6040737
			1	648493	6040747
			1	648494.9	6040737
			1	648498	6040735
			1	648499.1	6040739
			1	648499.4	6040733
			1	648501.6	6040735
	Prasophyllum retroflexum	Kiandra Leek Orchid	1	648446	6040734
TF06	*Prasophyllum retroflexum*	Kiandra Leek Orchid	2	637110	6027850
			1	637132	6027877
			1	637121	6027883
			1	637140	6027884
			1	637196	6027899
			1	637142	6027890
TF07	*Glycine latrobeana*	Clover Glycine	9	648840	6034731
			3	648845	6034785
			12	648840	6034742
			1	648819	6034767
			3	648832	6034798
			1	648831	6034804

Table B.2 Threatened flora records – Year 1

Monitoring Site	Scientific Name	Common Name	Number of Individuals	Easting*	Northing*
			4	648822	6034822
			1	648822	6034798
			5	648830	6034788
			3	648832	6034802
			1	648831	6034799
			2	648833	6034800
			4	648818	6034789
			3	648821	6034817
			2	648807	6034797
TF08	*Glycine latrobeana*	Clover Glycine	4	652114	6036260
			1	652112	6036252
			4	652121	6036246
			6	652138	6036203
			5	652126	6036198
			5	652118	6036224
			10	652122	6036201
			10	652130	6036195
			10	652119	6036219
			4	652115	6036225
			8	652115	6036264
			1	652114	6036251
			3	652130	6036223
			1	652136	6036217
			3	652136	6036214
			9	652128	6036194
			3	652108	6036228
TF09	*Glycine latrobeana*	Clover Glycine	30	652564	6034305
			94	652571	6034299
			6	652584	6034280
			2	652595	6034277
			9	652590	6034288
			9	652588	6034297
			13	652589	6034309
			4	652591	6034306

Table B.2 Threatened flora records – Year 1

Monitoring Site	Scientific Name	Common Name	Number of Individuals	Easting*	Northing*
			1	652596	6034299
			3	652602	6034290
			2	652598	6034285
			1	652604	6034312
			8	652600	6034317
			7	652613	6034313
			4	652586	6034313
			3	652610	6034307
			3	652595	6034300
			3	652597	6034308
			3	652592	6034291
			7	652595	6034279
			4	652580	6034305
			18	652571	6034301
			4	652572	6034305
			1	652569	6034302
			3	652569	6034300
	Prasophyllum retroflexum	Kiandra Leek Orchid	1	652601	6034294
TF10	*Glycine latrobeana*	Clover Glycine	2	648347	6040700
			1	648335	6040721
			1	648317	6040690
			1	648312	6040701
			4	648308	6040676
			4	648337	6040700
			8	648331	6040724
			2	648332	6040731
			4	648332	6040730
			3	648335	6040762
			1	648333	6040763
			4	648327	6040732
			9	648327	6040729
			1	648314	6040727
			7	648328	6040726
			4	648306	6040681

Table B.2 Threatened flora records – Year 1

Monitoring Site	Scientific Name	Common Name	Number of Individuals	Easting*	Northing*
			1	648320	6040695
			1	648305	6040772
			5	648330.8	6040721
			3	648321.8	6040728
			1	648328.1	6040738
			2	648331.3	6040761
TF14	*Glycine latrobeana*	Clover Glycine	1	648524	6041205
			3	648513	6041202
			8	648514	6041199
			3	648519	6041198
			3	648523	6041201
			1	648524	6041215
			4	648519	6041198
			6	648517	6041198
			2	648518	6041202
			9	648516	6041203
			4	648515	6041200
			4	648524	6041209
			1	648524	6041209
			4	648522	6041216

Notes: *Datum GDA Zone 55.

B.3 Photo points

Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF01		

Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF02	NA	

Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF03	NA	

Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF04		

Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF05	NA	

Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF06		

Table B.3 Threatened flora photo points – Year 1

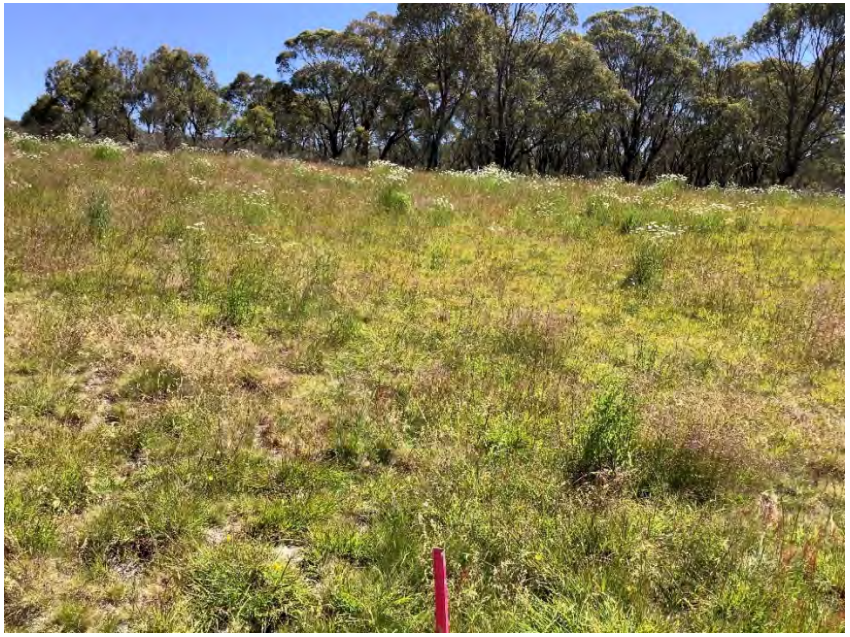
	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF07		

Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF08		NA

Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF09		

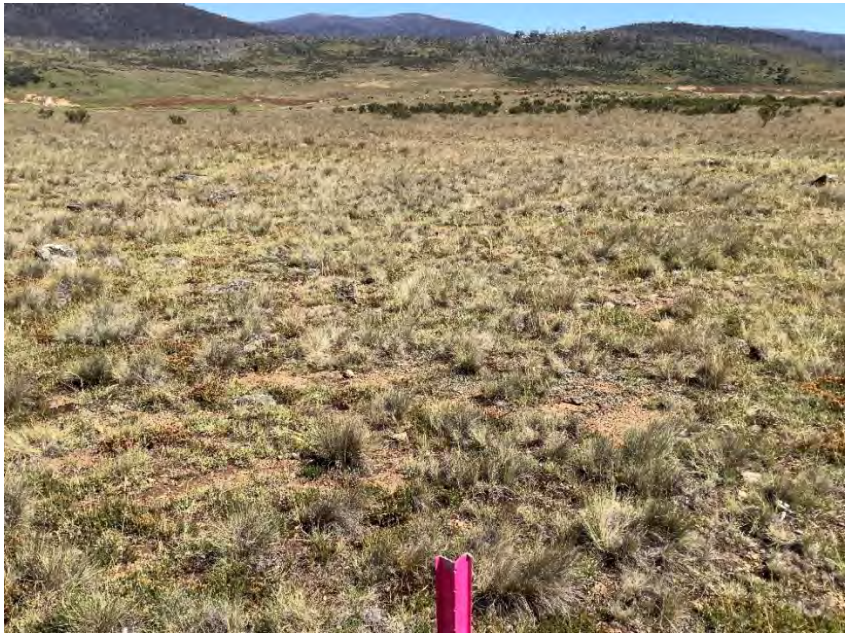
Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF10		

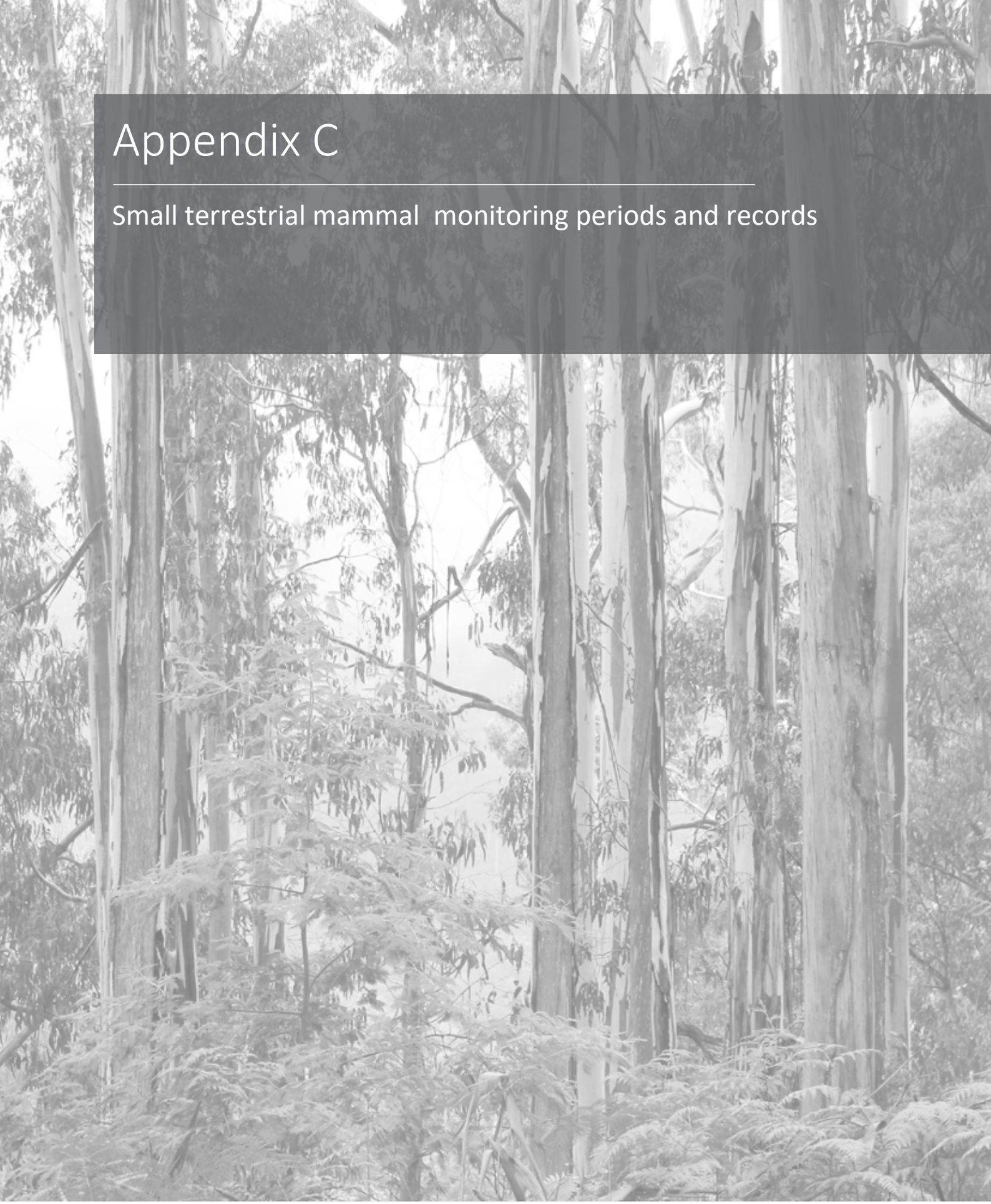
Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF11	NA	

Table B.3 Threatened flora photo points – Year 1

	Monitoring event	
Monitoring site	**First: December 2020**	**Second: January 2021**
TF12		

Notes: NA – data was incorrectly captured and photo point is missing.



Appendix C

Small terrestrial mammal monitoring periods and records

C.1 Occupancy

C.1.1 Monitoring periods

Table C.1 Small mammal occupancy monitoring periods summary – Year 1

Monitoring period	Monitoring event	Monitoring dates*
Q1 (Baseline)	First	21 October 2020 – 20 January 2021
Q2 (Construction)	Second	21 January 2021 – 20 April 2021
Q3 (Construction)	Third	21 April 2021 – 20 July 2021
Q4 (Construction)	Fourth	21 July 2021 – 20 October 2021

Notes: *Dates are based on the 30 day period of camera data processed and tagged.

C.1.2 Remote camera records

Table C.2 Small terrestrial mammal remote camera records – Year 1

	Smoky Mouse				Eastern Pygmy Possum				Broad-toothed Rat			
Camera ID	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SM01-I-RC1												
SM01-I-RC2												
SM02-C-RC1					1		1					
SM02-C-RC2					1			1				
SM03-I-RC1												
SM03-I-RC2					1	1						
SM04-C-RC1					1	1						
SM04-C-RC2						1						
SM05-I-RC1	1	1					1					
SM05-I-RC2		1	1	1		1						
SM06-C-RC1					1	1						
SM06-C-RC2				NA	1			NA				NA
SM07-I-RC1												
SM07-I-RC2						1						
SM08-C-RC1		NA	NA	NA	1	NA	NA	NA		NA	NA	NA
SM08-C-RC2		NA	NA	NA		NA	NA	NA		NA	NA	NA
SM09-C-RC1		1		1	1	1		1				
SM09-C-RC2												
SM10-I-RC1												
SM10-I-RC2					1							

Table C.2 Small terrestrial mammal remote camera records – Year 1

	Smoky Mouse				Eastern Pygmy Possum				Broad-toothed Rat			
Camera ID	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
SM11-C-RC1		NA	NA	NA		NA	NA	NA		NA	NA	NA
SM11-C-RC2		NA	NA	NA	1	NA	NA	NA		NA	NA	NA
SM12-C-RC1												
SM12-C-RC2												
SM13-C-RC1												
SM13-C-RC2												
SM14-I-RC1					1							
SM14-I-RC2								1				
SM15-I-RC1						1						
SM15-I-RC2			NA				NA				NA	
SM16-I-RC1												
SM16-I-RC2					1	1						
SM17-C-RC1					1	1						
SM17-C-RC2				1		1						
SM18-I-RC1					1							
SM18-I-RC2												
SM19-I-RC1												
SM19-I-RC2												
SM20-I-RC1												
SM20-I-RC2					1	1						
SM21-I-RC1					1			1				
SM21-I-RC2					1	1		1				
SM22-I-RC1		1	1	1		1						
SM22-I-RC2		1	1	1								
SM23-I-RC1								1				
SM23-I-RC2				1		1		1				
SM24-I-RC1						1						
SM24-I-RC2			1			1						
SM25-I-RC1												
SM25-I-RC2												
SM26-C-RC1			NA				NA				NA	
SM26-C-RC2												
SM27-I-RC1			NA				NA				NA	

Table C.2 Small terrestrial mammal remote camera records – Year 1

	Smoky Mouse				Eastern Pygmy Possum				Broad-toothed Rat			
Camera ID	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
SM27-I-RC2			NA				NA				NA	
SM28-C-RC1									1	1	1	
SM28-C-RC2												
SM29-C-RC1												
SM29-C-RC2												
SM30-C-RC1											1	
SM30-C-RC2									1	1	1	1
SM31-C-RC1												
SM31-C-RC2												
SM32-C-RC1										1	1	1
SM32-C-RC2										1	1	1
SM33-C-RC1									1	1		
SM33-C-RC2			NA	NA			NA	NA	1	1	NA	NA
SM34-I-RC1												
SM34-I-RC2												
SM35-I-RC1			1									
SM35-I-RC2												
SM36-I-RC1												
SM36-I-RC2												
SM37-I-RC1												
SM37-I-RC2												
SM38-C-RC1			NA	NA			NA	NA			NA	NA
SM38-C-RC2										1		
SM39-C-RC1			NA				NA				NA	
SM39-C-RC2												1
SM40-C-RC1												
SM40-C-RC2								1				
SM41-C-RC1												
SM41-C-RC2												

Notes:

1. I – impact site.
2. C – control site.
3. Highlighted cells represent sites with unsuitable habitat for that species.
4. Blank cells represent absence of species.
5. NA – data missing due to camera moved, stolen or lost data.

C.2 Habitat characteristic

C.2.1 Monitoring period

Table C.3 Small mammal habitat characteristics monitoring period summary – Year 1

Monitoring Period	Monitoring event	Monitoring dates
Q1 (Baseline)	First	24 November 2020 – 29 November2020

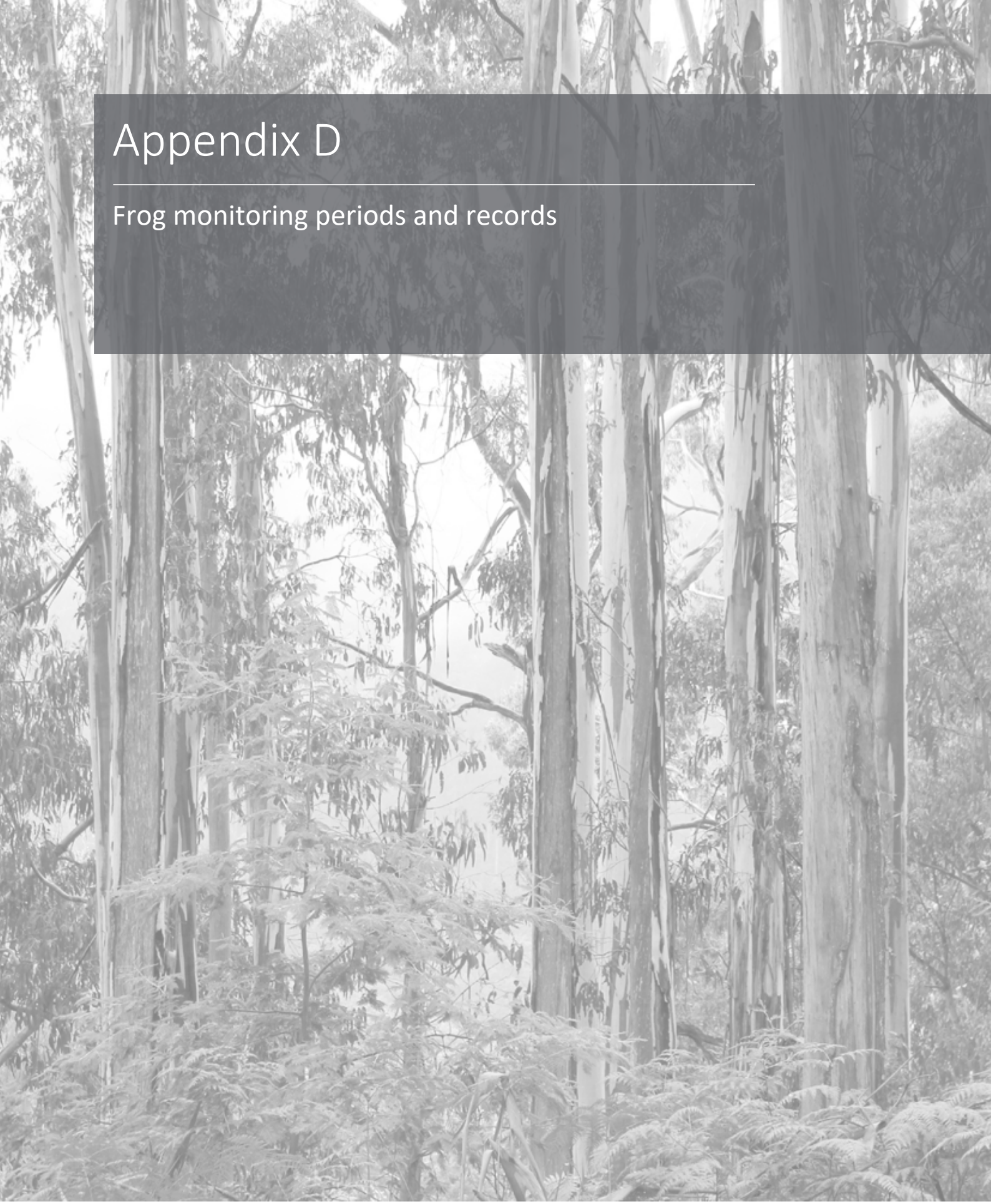
C.2.2 Records

Table C.4 Average percentage cover (native, exotic, and habitat structure) at three height intervals (<0.5 m, 0.5-1 m, 1-1.5 m) – Year 1

	Site	<0.5 m			0.5-1 m			1-1.5 m		
Site type		Native	Exotic	Habitat structure	Native	Exotic	Habitat structure	Native	Exotic	Habitat structure
Control	SM02	51%	2%	16%	4%	0%	0%	0%	0%	0%
	SM04	53%	0%	32%	8%	0%	0%	0%	0%	1%
	SM05	68%	2%	56%	0%	0%	0%	0%	0%	0%
	SM06	59%	0%	46%	4%	0%	0%	0%	0%	2%
	SM08	90%	0%	28%	40%	0%	1%	6%	0%	0%
	SM09	60%	0%	40%	16%	0%	0%	2%	0%	0%
	SM12	51%	0%	19%	13%	0%	0%	3%	0%	0%
	SM13	81%	8%	13%	19%	6%	0%	0%	0%	1%
	SM17	94%	0%	5%	44%	0%	2%	10%	0%	0%
	SM26	82%	0%	15%	11%	0%	0%	3%	0%	1%
	SM28	98%	40%	0%	0%	0%	0%	0%	0%	0%
	SM29	90%	17%	78%	17%	0%	3%	10%	0%	1%
	SM30	94%	3%	1%	5%	0%	0%	0%	0%	0%
	SM31	93%	34%	6%	0%	0%	0%	0%	0%	0%
	SM32	98%	49%	0%	51%	0%	0%	1%	0%	0%
	SM33	80%	48%	0%	10%	0%	0%	0%	0%	0%
	SM38	62%	79%	0%	4%	9%	0%	0%	0%	0%
	SM39	25%	61%	0%	2%	20%	0%	0%	0%	0%

Table C.4 Average percentage cover (native, exotic, and habitat structure) at three height intervals (<0.5 m, 0.5-1 m, 1-1.5 m) – Year 1

Site type	Site	<0.5 m			0.5-1 m			1-1.5 m		
		Native	Exotic	Habitat structure	Native	Exotic	Habitat structure	Native	Exotic	Habitat structure
Impact	SM01	83%	2%	44%	13%	0%	0%	1%	0%	0%
	SM03	70%	1%	22%	0%	0%	3%	0%	0%	2%
	SM05	70%	0%	18%	6%	0%	0%	0%	0%	0%
	SM07	87%	3%	39%	4%	1%	1%	0%	0%	1%
	SM10	76%	2%	17%	12%	0%	0%	0%	0%	0%
	SM14	65%	0%	28%	12%	1%	0%	1%	0%	0%
	SM15	90%	14%	31%	26%	0%	6%	0%	0%	0%
	SM16	54%	0%	9%	11%	0%	1%	2%	0%	0%
	SM18	74%	55%	11%	19%	5%	2%	0%	0%	0%
	SM19	87%	66%	8%	52%	14%	2%	20%	0%	0%
	SM20	93%	34%	9%	61%	13%	1%	22%	3%	0%
	SM21	61%	0%	31%	17%	0%	2%	4%	0%	0%
	SM22	34%	0%	7%	7%	0%	0%	3%	0%	0%
	SM23	58%	0%	6%	13%	0%	1%	3%	0%	0%
	SM24	58%	0%	9%	12%	0%	1%	2%	0%	0%
	SM25	68%	0%	17%	12%	0%	2%	0%	0%	0%
	SM27	81%	16%	13%	8%	2%	2%	0%	0%	0%
	SM34	80%	23%	0%	16%	2%	0%	7%	0%	0%
	SM35	81%	25%	32%	4%	1%	3%	0%	0%	0%
	SM36	99%	19%	1%	24%	0%	1%	0%	0%	1%
	SM37	86%	28%	2%	33%	9%	0%	0%	0%	0%



Appendix D

Frog monitoring periods and records

D.1 Monitoring periods

Table D.1 Frog occupancy monitoring period summary – Year 1

Monitoring period	Monitoring event	Monitoring dates
Alpine Tree Frog		
Q1 (Baseline)	First	17 December 2020 – 19 December 2020
	Second	26 January 2021 – 28 January 2021
Booroolong Frog		
Q1 (Baseline)	First	23 November 2020 – 25 November 2020
	Second	15 December 2020 – 16 December 2020

D.2 Records

Table D.2 Frog records – Year 1

Scientific Name	Common Name	Monitoring Site	Count of Individuals	Easting*	Northing*
Litoria verreauxii alpina	Alpine Tree Frog	ER02	2	636722	6027675
			1	636772	6027526
			2	636814	6027296
			4	636470	6027000
			3	636355	6026832
			2	636429	6026972
			1	636580	6027023
			1	636616	6027000
			3	636674	6027750
			1	636692	6027014
			3	636768	6027103
			4	636796	6027153
			8	636807	6027179
			4	636795	6027236
			3	636811	6027442
			1	636809	6027364
		KPC01	2	649265	6036842
			2	649293	6036934
		MR01	5	650550	6037394
			1	650655	6037363

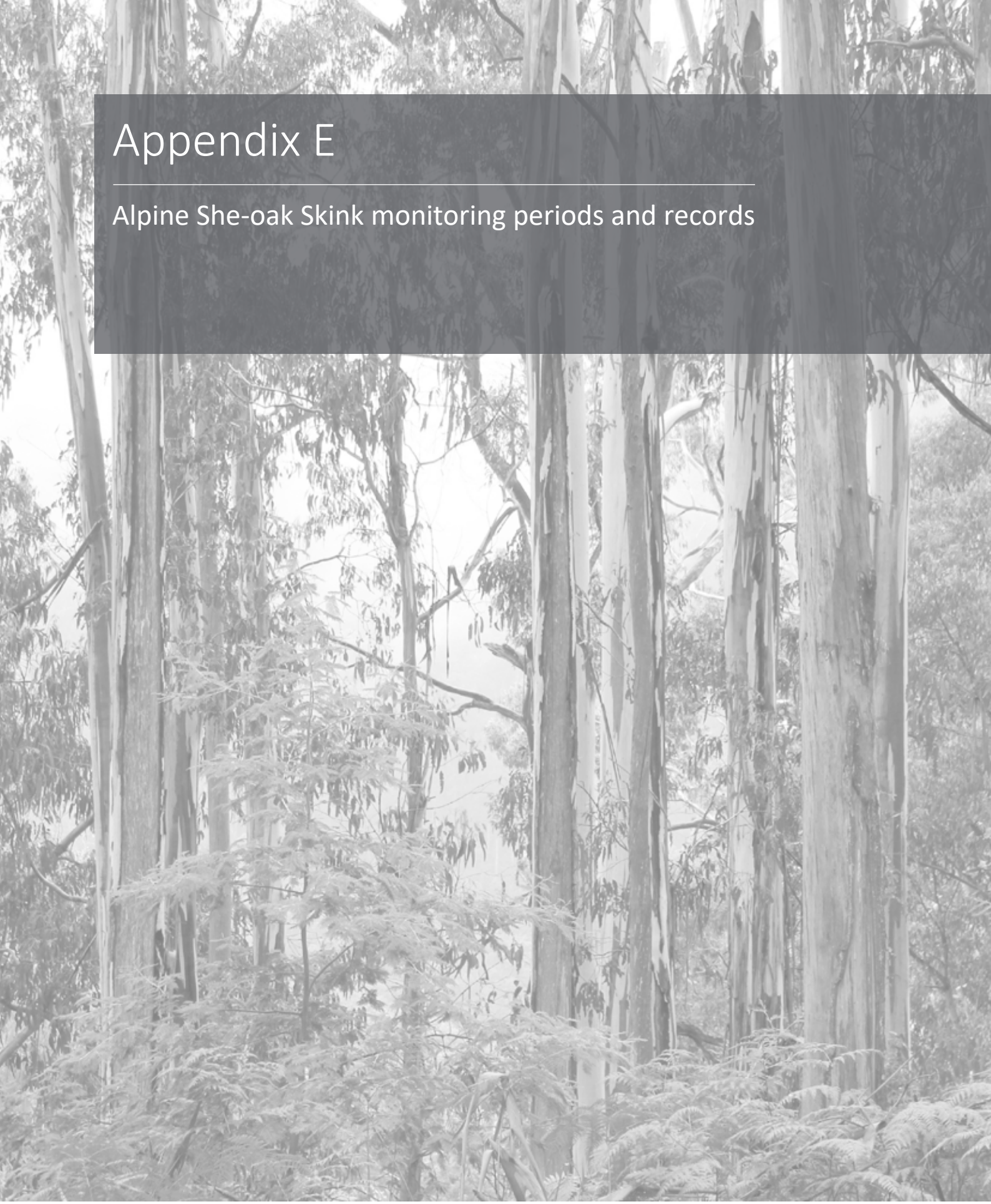
Table D.2 Frog records – Year 1

Scientific Name	Common Name	Monitoring Site	Count of Individuals	Easting*	Northing*
			1	650714	6037346
			1	650746	6037328
			4	650917	6037174
			5	651064	6037061
			7	651159	6036978
			3	651280	6036941
			2	650567	6037355
			2	650581	6037393
			1	650732	6037343
			1	650929	6037172
			1	651059	6037071
			2	651229	6036955
		NC01	3	647392	6029800
			1	647303	6030006
			3	647281	6030050
		NC03	4	653341	6030141
			2	653321	6030081
			2	653303	6030068
			1	653245	6030009
			1	653240	6029988
			4	653200	6029939
			3	653190	6029860
			3	653153	6029831
			2	653111	6029823
			2	653045	6029815
			1	653010	6029812
			3	652915	6029806
			4	652856	6029818
			3	652816	6029821
			3	652767	6029790
			2	653199	6029944
			1	653102	6029824
			1	652822	6029820
			1	652783	6029796

Table D.2 Frog records – Year 1

Scientific Name	Common Name	Monitoring Site	Count of Individuals	Easting*	Northing*
			1	652816	6029828
			1	652907	6029807
			1	652927	6029797
			1	653076	6029822
			3	653191	6029893
			1	653331	6030095
			1	647281	6030050
		TC02	4	642018	6033198
			1	642013	6033209
		TC03	2	641286	6042358
			2	641382	6042432
			3	641227	6042290
			2	641189	6042208
			2	641141	6042191
			2	640740	6042034
Litoria booroolongensis	Booroolong Frog	WC01	1	627585	6038147
		YR02	1	626171	6038873
			1	626066	6039023
		YR05	1	626881	6038185
			1	626860	6038166
			5	626847	6037988
			1	626842	6038169
			4	626871	6038172
			2	626973	6038304
		YR06	1	627743	6038310
			2	627789	6038455
		YR08	2	628066	6039074
			2	628007	6038938
		YR09	1	628008	6039334

Notes: *Datum GDA Zone 55.



Appendix E

Alpine She-oak Skink monitoring periods and records

E.1 Monitoring periods

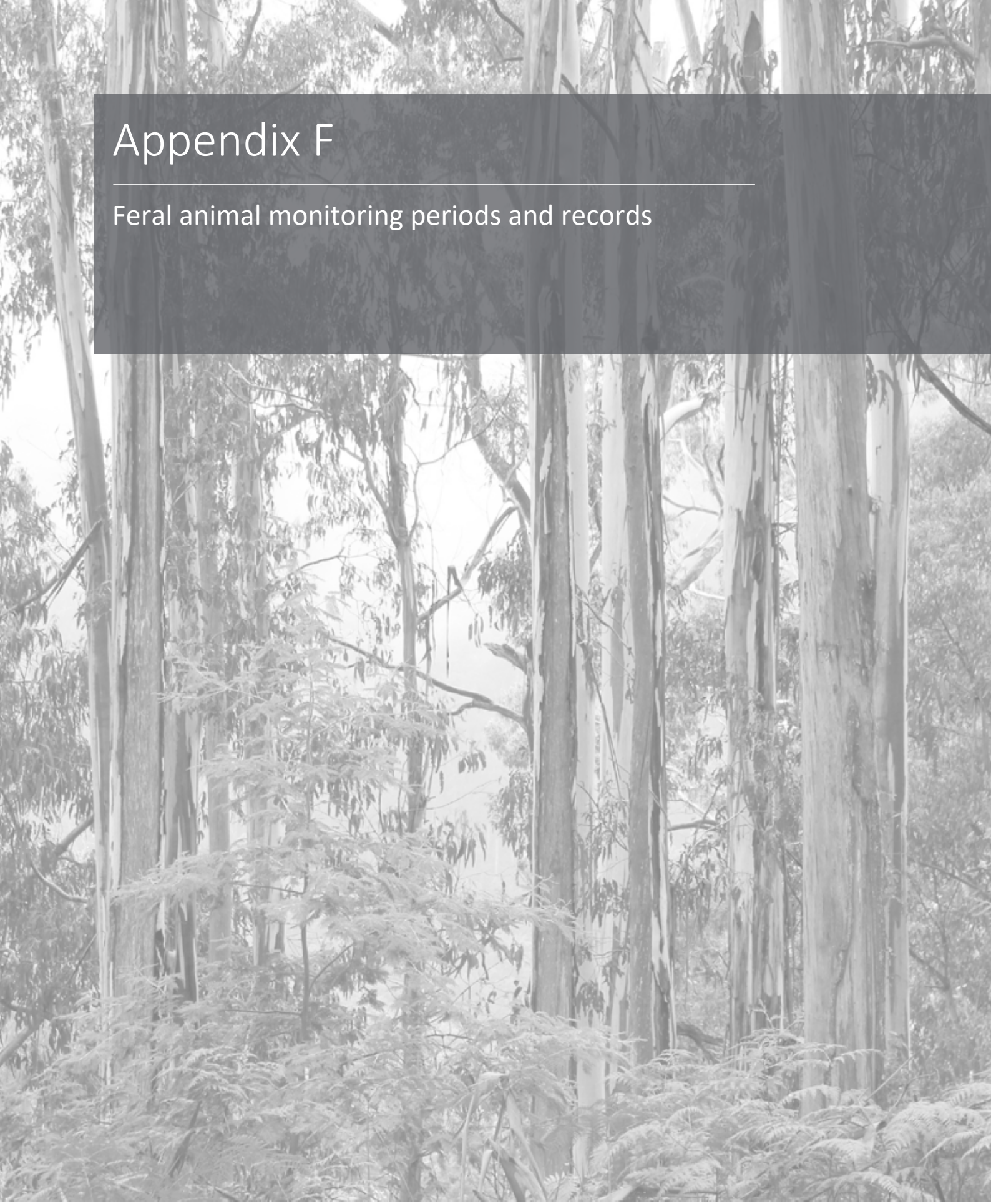
Table E.1 Alpine She-oak Skink occupancy monitoring periods summary – Year 1

Monitoring period	Monitoring event	Monitoring dates
Q1 (Baseline)	December	10 – 17 December 2020
	January	13 – 15 January 2021
Q2 (Construction)	February	18 – 21 February 2021
	March	11 – 14 March 2021
Q4 (Construction)	October	6 – 8 October 2021

E.2 Records

Table E.2 Alpine She-oak Skink records – Year 1

Monitoring Site	Count of Individuals	Easting*	Northing*
TG02	1	647265	6029549
TG02	1	647272	6029586
TG03	1	649096	6036316
TG03	1	649093	6036312
TG03	1	649096	6036319
TG06	1	640376	6048406
TG07	1	637664	6039815
TG07	2	637637	6039805
TG07	1	637640	6039796
TG07	1	637663	6039758
TG08	2	640488	6042273
TG08	1	640468	6042295
TG08	1	640520	6042277
TG08	1	640520	6042277



Appendix F

Feral animal monitoring periods and records

F.1 Occupancy

F.1.1 Monitoring periods

Table F.1 Feral animal occupancy monitoring periods summary – Year 1

Monitoring period	Monitoring event	Monitoring dates*
Q1 (Baseline)	First	21 October 2020 – 20 January 2021
Q2 (Construction)	Second	21 January 2021 – 20 April 2021
Q3 (Construction)	Third	21 April 2021 – 20 July 2021
Q4 (Construction)	Fourth	21 July 2021 – 20 October 2021

Notes: *Dates are based on the 30 day period of camera data processed and tagged.

F.1.2 Remote camera records

Table F.2 Feral animal remote camera records – Year 1

	European Hare				Feral Cat				Feral Horse				Feral Pig				Rabbit				Red Deer				Red Fox				Rusa Deer				Sambar Deer				Wild Dog			
Camera ID	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**
FC01 A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FC01 B	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FC02 A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FC02 B	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FC03 A		1	1	1		1	1	1											1	1		1				1	1					1			1	1				
FC03 B							1											1																						
FC04 A																	1	1									1	1													
FC04 B																																	1			1	1				
FC05 A																	1	1	1	1																					
FC05 B						1	1	1									1	1	1	1														1		1	1				
FC06 A					1	1	1											1									1														
FC06 B																																									
FC07 A	1	1				1	1										1	1	1	1							1	1							1					1
FC07 B					1	1	1										1			1						1	1													
FC08 A		1																1		1							1	1												
FC08 B						1											1	1	1	1						1														
FC09 A					1	1												1			1																			
FC09 B																	1		1	1																1				
FC10 A				1	1		1	1									1	1									1	1								1		1	1	
FC10 B				1			1	1											1	1							1	1								1	1	1	1	
FC11 A				1	1		1																				1	1								1	1	1	1	
FC11 B				1	1	1	1	1										1	1	1							1										1	1	1	1	
FC12 A	1	1	1	1		1			1	1	1	1					1	1							1	1	1	1								1	1	1	1	
FC12 B		1		1					1	1		1					1	1	1							1														
FC13 A		1		1	1	1											1	1									1							1		1		1	1	
FC13 B			1	1			1																				1										1	1		
FC14 A					1	1	1	1			1															1		1									1				
FC14 B	1	NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA
FC15 A					1	1	1			1	1	1																												
FC15 B	1			NA	1			NA	1	1		NA				NA	1			NA				NA	1			NA				NA				NA	1			NA
FC16 A					1			1	1		1									1					1												1	1		
FC16 B			NA	NA			NA	NA	1	1	NA	NA			NA	NA	1		NA	NA		NA	NA	1	1	NA	NA			NA	NA			NA	NA	1		NA	NA
FC17 A	1				1			1		1							1	1	1	1				1	1	1	1	1	1						1	1	1	1	1	
FC17 B	1								1								1	1	1	1				1	1	1	1									1				

Table F.2 Feral animal remote camera records – Year 1

	European Hare				Feral Cat				Feral Horse				Feral Pig				Rabbit				Red Deer				Red Fox				Rusa Deer				Sambar Deer				Wild Dog			
Camera ID	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**
FC18 A									1	1		1					1	1	1	1						1											1			
FC18 B	1								1	1		1						1	1	1		1													1	1				
FC19 A	1		1		1	1	1		1	1							1	1	1	1					1	1	1	1								1	1			1
FC19 B					1	1		1	1	1		1					1	1	1	1		1			1	1		1									1	1	1	
FC20 A									1		1	1					1	1	1	1		1			1	1									1	1				1
FC20 B					1				1	1	1	1					1	1	1	1		1			1	1		1					1							
FC21 A	NA	NA	1	1	NA	NA			NA	NA			NA	NA			NA	NA	1	1	NA	NA			NA	NA			NA	NA			NA	NA			NA	NA		
FC21 B	NA	NA			NA	NA			NA	NA			NA	NA			NA	NA	1	1	NA	NA			NA	NA			NA	NA			NA	NA			NA	NA		
SM01-I-RC1																									1	1	1													
SM01-I-RC2							1																																	
SM02-C-RC1																						1																		
SM02-C-RC2						1																				1														
SM03-I-RC1																																								
SM03-I-RC2																																								
SM04-C-RC1																																						1		
SM04-C-RC2																																						1		
SM05-I-RC1																	1		1																					
SM05-I-RC2						1	1										1																							
SM06-C-RC1																			1		1																	1		
SM06-C-RC2				NA				NA				NA				NA			NA				NA				NA				NA				NA				NA		
SM07-I-RC1											1						1								1															
SM07-I-RC2	1																																1							
SM08-C-RC1		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA
SM08-C-RC2		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA
SM09-C-RC1																									1															
SM09-C-RC2																		1																					1		
SM10-I-RC1						1		1																																
SM10-I-RC2								1																																
SM11-C-RC1		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA
SM11-C-RC2		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA
SM12-C-RC1					1												1	1	1	1	1					1													
SM12-C-RC2	1																1	1									1													
SM13-C-RC1																																								
SM13-C-RC2																																								
SM14-I-RC1																																								
SM14-I-RC2																	1	1																						

Table F.2 Feral animal remote camera records – Year 1

	European Hare				Feral Cat				Feral Horse				Feral Pig				Rabbit				Red Deer				Red Fox				Rusa Deer				Sambar Deer				Wild Dog			
Camera ID	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**
SM15-I-RC1							1															1													1						
SM15-I-RC2			NA				NA				NA				NA				NA				NA				NA				NA				NA				NA		
SM16-I-RC1																																1		1						
SM16-I-RC2																	1									1											1			
SM17-C-RC1																																								
SM17-C-RC2																										1														
SM18-I-RC1	1				1	1											1		1	1						1														
SM18-I-RC2						1													1							1														
SM19-I-RC1																																								
SM19-I-RC2	1						1	1									1									1	1								1						
SM20-I-RC1							1																																	
SM20-I-RC2																																		1						
SM21-I-RC1					1															1																				
SM21-I-RC2																																								
SM22-I-RC1					1	1																																		
SM22-I-RC2						1												1																							
SM23-I-RC1																																								
SM23-I-RC2					1												1																								
SM24-I-RC1								1											1																				1			
SM24-I-RC2																																								
SM25-I-RC1																				1							1														
SM25-I-RC2																		1		1																					
SM26-C-RC1		NA				NA				NA				NA				NA				NA				NA				NA				NA				NA			
SM26-C-RC2													1																												
SM27-I-RC1		NA				NA				NA				NA				NA				NA				NA	1			NA				NA				NA			
SM27-I-RC2		NA				NA				NA	1			NA				NA				NA				NA	1			NA				NA				NA			
SM28-C-RC1																																								
SM28-C-RC2																										1	1	1														
SM29-C-RC1																																								
SM29-C-RC2										1																			1												
SM30-C-RC1										1								1	1																						
SM30-C-RC2	1																1	1		1																					
SM31-C-RC1											1																														
SM31-C-RC2										1	1	1	1																1	1	1										
SM32-C-RC1											1						1	1	1																						
SM32-C-RC2	1									1	1						1	1																							

Table F.2 Feral animal remote camera records – Year 1

	European Hare				Feral Cat				Feral Horse				Feral Pig				Rabbit				Red Deer				Red Fox				Rusa Deer				Sambar Deer				Wild Dog			
Camera ID	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**	**E1**	**E2**	**E3**	**E4**
SM33-C-RC1									1	1							1																							
SM33-C-RC2			NA	NA			NA	NA			NA	NA			NA	NA			NA	NA			NA	NA			NA	NA			NA	NA					NA	NA
SM34-I-RC1									1	1		1													1		1	1									1			
SM34-I-RC2										1		1					1	1								1														
SM35-I-RC1									1	1	1	1															1								1					
SM35-I-RC2											1														1		1													
SM36-I-RC1									1	1	1						1			1							1													
SM36-I-RC2					1						1						1	1																						
SM37-I-RC1									1																															
SM37-I-RC2																	1																							
SM38-C-RC1			NA	NA			NA	NA			NA	NA			NA	NA			NA	NA			NA	NA			NA	NA			NA	NA					NA	NA
SM38-C-RC2																																								
SM39-C-RC1			NA				NA				NA				NA			1	NA				NA				NA			1	NA				NA			1	NA	
SM39-C-RC2		1																																						
SM40-C-RC1						1												1	1	1																				
SM40-C-RC2																			1																						
SM41-C-RC1																																								
SM41-C-RC2																																								

Notes:
1. I – impact site.
2. C – control sites.
3. NA – data missing due to camera moved, stolen or lost data.
4. Blank cells represent absence of species.

F.2 Abundance

F.2.1 Monitoring periods

Table F.3 Feral animal abundance monitoring periods summary – Year 1

Monitoring period	Monitoring event	Monitoring dates
Q2 (Baseline)	First	23 February – 17 March 2021
Q3 (Construction)	Second	18 – 19 May 2021
Q4 (Construction)	Third	9 – 19 September 2021
Q4 (Construction)	Fourth	11 – 13 October 2021

F.2.2 Abundance data

Table F.4 Feral animal abundance (animals/km) – Year 1

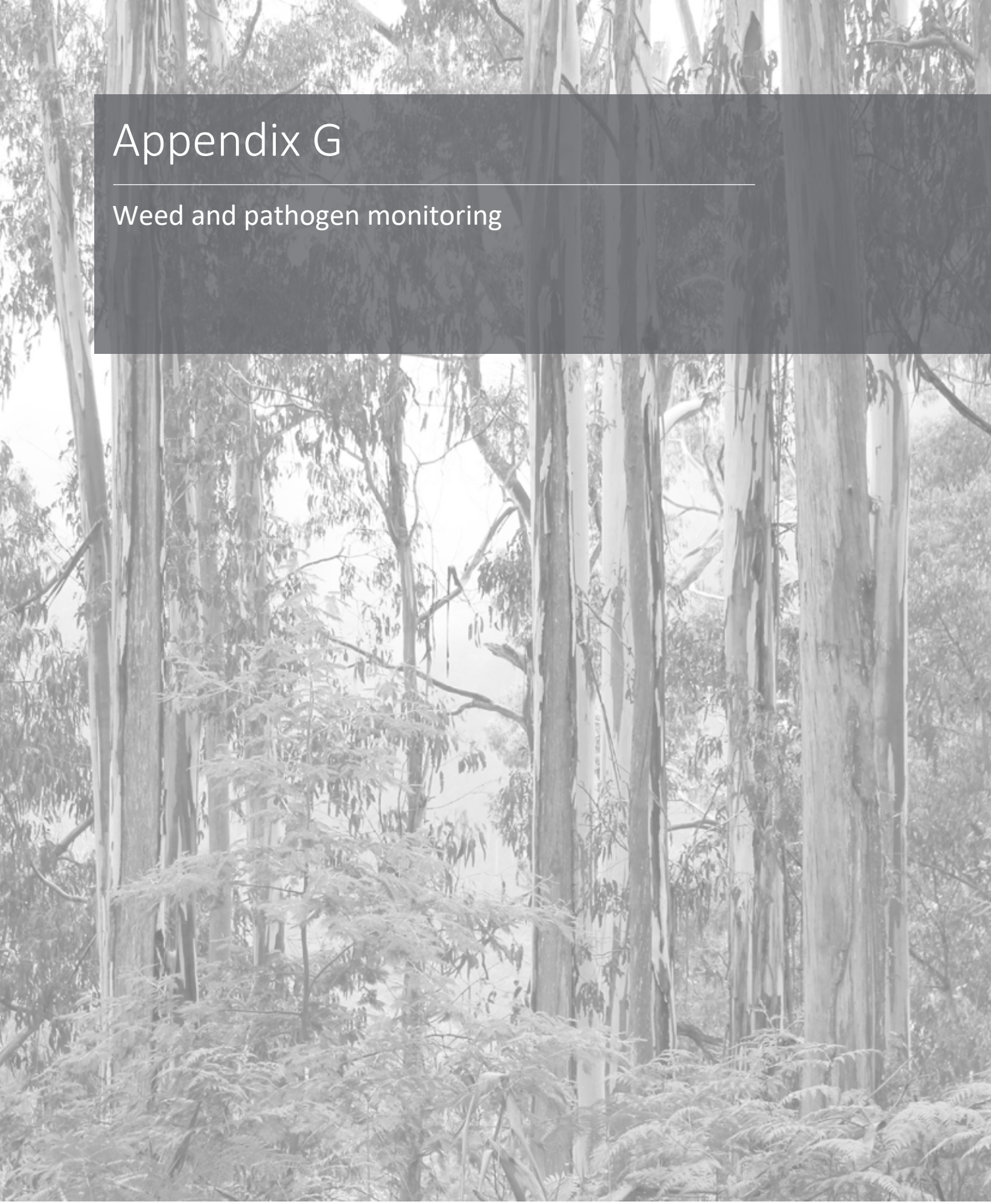
Feral animal total and abundance	LHRR Bottom	LHRR North	LHRR South	Marica	Rock Forest	Tantangara Dam	Tantangara Road
First monitoring event (Q2)							
Distance (km)	10.25	7.27	14.21	13.61	NA	8.30	15.27
Feral Cat (total)	-	-	1.00	-	NA	-	1.00
Feral Cat (abundance)	-	-	0.07	-	NA	-	0.07
Rabbit (total)	2.00	2.00	3.00	2.00	NA	36.00	12.00
Rabbit (abundance)	0.20	0.28	0.21	0.15	NA	4.34	0.79
European Hare (total)	-	-	-	-	NA	-	-
European Hare (abundance)	-	-	-	-	NA	-	-
Feral Horse (total)	-	-	-	-	NA	-	25.00
Feral Horse (abundance)	-	-	-	-	NA	-	1.64
Red Fox (total)	-	-	-	-	NA	-	-
Red Fox (abundance)	-	-	-	-	NA	-	-
Second Monitoring event (Q3)							
Distance (km)	13.40	4.40	14.00	19.30	NA	8.30	16.10
Feral Cat (total)	-	-	-	-	NA	-	-
Feral Cat (abundance)	-	-	-	-	NA	-	-
Rabbit (total)	6.00	1.00	-	-	NA	8.00	1.00
Rabbit (abundance)	0.45	0.23	-	-	NA	0.96	0.06
European Hare (total)	1.00	-	-	-	NA	-	-

Table F.4 Feral animal abundance (animals/km) – Year 1

Feral animal total and abundance	LHRR Bottom	LHRR North	LHRR South	Marica	Rock Forest	Tantangara Dam	Tantangara Road
European Hare (abundance)	0.07	-	-	-	NA	-	-
Feral Horse (total)	-	-	-	-	NA	-	-
Feral Horse (abundance)	-	-	-	-	NA	-	-
Red Fox (total)	-	-	-	-	NA	-	-
Red Fox (abundance)	-	-	-	-	NA	-	-
Third monitoring event (Q4)							
Distance (km)	10.25	7.27	14.21	10.40	3.26	7.60	15.50
Feral Cat (total)	-	-	-	-	-	-	-
Feral Cat (abundance)	-	-	-	-	-	-	-
Rabbit (total)	16.00	5.00	2.00	7.00	-	16.00	10.00
Rabbit (abundance)	1.56	0.69	0.14	0.67	-	2.11	0.65
European Hare (total)	-	-	-	-	-	-	-
European Hare (abundance)	-	-	-	-	-	-	-
Feral Horse (total)	-	-	-	31.00	-	-	3.00
Feral Horse (abundance)	-	-	-	2.98	-	-	0.19
Red Fox (total)	-	-	-	-	-	-	-
Red Fox (abundance)	-	-	-	-	-	-	-

Table F.4 Feral animal abundance (animals/km) – Year 1

Feral animal total and abundance	LHRR Bottom	LHRR North	LHRR South	Marica	Rock Forest	Tantangara Dam	Tantangara Road
Fourth monitoring event (Q4)							
Distance (km)	12.30	4.90	14.40	14.60	1.30	9.00	15.60
Feral Cat (total)	-	-	-	-	-	-	-
Feral Cat (abundance)	-	-	-	-	-	-	-
Rabbit (total)	9.00	-	3.00	3.00	1.00	18.00	3.00
Rabbit (abundance)	0.73	-	0.21	0.21	0.77	2.00	0.19
European Hare (total)	-	-	-	-	-	-	1.00
European Hare (abundance)	-	-	-	-	-	-	0.06
Feral Horse (total)	-	-	-	3.00	-	4.00	4.00
Feral Horse (abundance)	-	-	-	0.21	-	0.44	0.26
Red Fox (total)	-	-	-	1.00	-	-	-
Red Fox (abundance)	-	-	-	0.07	-	-	-



Appendix G

Weed and pathogen monitoring

G.1 Weeds

G.1.1 Monitoring periods

Table G.1 Weed monitoring periods summary – Year 1

Monitoring period	Monitoring event	Monitoring dates
Q1 (Baseline)	First	9 December 2020 – 12 January 2021

G.1.2 Weed records

Table G.2 Weed records (polygons) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Bottom of Lobs Hole					
Potentilla recta, Hypericum perforatum, Rubus sp., Rosa rubiginosa	-	-	-	625913.1	6038854
Hypericum perforatum	-	-	Light	626238.5	6038187
Hypericum perforatum	-	-	Trace	626087.4	6038128
Hypericum perforatum, Rubus sp.	-	-	Medium	625987.3	6038199
Hypericum perforatum	-	-	Trace	625901.8	6038237
Hypericum perforatum	-	-	Trace	625892.4	6038031
Rubus sp., Hypericum perforatum, Verbascum virgatum, Acetosella vulgaris, Cirsium vulgare, Rosa rubiginosa	-	-		624928.2	6040510
Hypericum perforatum, Rubus sp., Verbascum virgatum, Acetosella vulgaris, Cirsium vulgare	-	-	Dense	625140.8	6040372
Hypericum perforatum, Rubus sp., Verbascum virgatum, Cirsium vulgare, Conyza sp., Rosa rubiginosa	-	-	Medium	625682.4	6039761
Rubus sp., Verbascum virgatum, Conyza bonariensis	-	-	Medium	625470.1	6039395
Hypericum perforatum	-	-	Dense	625719.6	6039232
Euphorbia sp.	-	-	Dense	625572.7	6039151
Rubus sp., Verbascum virgatum, Conyza bonariensis	-	-	Medium	626853.9	6038304
Hypericum perforatum	-	-	Dense	625948.4	6038781
Hypericum perforatum	-	-	Dense	625931.8	6039358
Hypericum perforatum	-	-	trace	626083.5	6038375
Hypericum perforatum	-	-	Medium	626410.9	6038256
Hypericum perforatum	-	-	trace	626351.2	6038202
Rubus sp.	-	-	Dense	626430.8	6038234
Hypericum perforatum	-	-	Dense	626545	6038090

Table G.2 Weed records (polygons) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Rubus sp., Hypericum perforatum, Phalaris aquatica, Silybum sp., Lotus corniculatus, Populus sp.	-	-	-	626177	6038935
Hypericum perforatum, Rubus sp., Verbascum virgatum, Conyza sp., Corsium vulgare, Hypochaeris radicata, Agrostis capillaris	-	-	Medium	627841.4	6037968
Hypericum perforatum, Rubus sp., Verbascum virgatum, Conyza sp., Cirsium vulgare, hypochaeris radicata, Agrostis capillaris, Rosa rubiginosa	-	-	Dense	627470.3	6037935
Hypericum perforatum, Rubus sp.	-	-	trace	627108.1	6037749
Hypericum perforatum, Corsium sp., Verbascum sp., Conyza sp.	-	-	Dense	627133.6	6037822
Rubus sp., Conyza sp., Cirsium sp., Hypericum perforatum	-	-	Dense	627312.9	6038045
Hypericum perforatum	-	-	Dense	627835.4	6038501
Rubus sp.	-	-	Dense	627872.4	6038653
Rubus sp., Hypericum perforatum, Conyza sp.	-	-	Medium	628011.4	6038879
Lobs Hole Ravine Road Bottom					
Hypericum perforatum, Rubus sp.	-	-	Medium	625935.5	6037815
Hypericum perforatum, Rubus sp., Cirsium vulgare, Rosa rubiginosa	-	-	Dense	626178.5	6037241
Rubus sp.	-	-	Dense	626035.3	6037315
Rubus sp., Hypericum perforatum, Cirsium vulgare, Rosa rubiginosa	-	-	Dense	626874.6	6036869
Rubus sp., Hypericum perforatum, Verbascum virgatum, Cirsium vulgare	-	-	Medium	626933.2	6036488
Hypericum perforatum	-	-	trace	626890.1	6036173
Hypericum perforatum	-	-	Medium	626844.4	6036210
Hypericum perforatum	-	-	Medium	626906.9	6035895
Hypericum perforatum	-	-	Dense	626896.1	6035690
Hypericum perforatum	-	-	trace	626715.9	6035628
Hypericum perforatum	-	-	Dense	626725.6	6035459
Hypericum perforatum	-	-	trace	626882.3	6035249
Hypericum perforatum	-	-	Medium	626855.7	6034668
Rubus sp.	-	-	Dense	626809.9	6034349
Rubus sp.	-	-	Light	626813	6034234
Rubus sp., Rosa rubiginosa	-	-	light	626837.8	6034188
Hypericum perforatum	-	-	trace	626848.5	6034168
Rubus sp.	-	-	Medium	626838.9	6034130
Hypericum perforatum	-	-	Medium	626889.5	6034126

Table G.2 Weed records (polygons) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Hypericum perforatum, Rubus sp.	-	-	Light	626983.4	6034067
Hypericum perforatum, Rubus sp.	-	-	Medium	627152.9	6033886
Hypericum perforatum, Rubus sp.	-	-	Light	627143.7	6033665
Rubus sp.	-	-	Dense	627127.3	6033539
Hypericum perforatum	-	-	Medium	627060.2	6033426
Hypericum perforatum	-	-	Light	626976.4	6033320
Hypericum perforatum	-	-	Medium	626968.4	6032632
Hypericum perforatum	-	-	Light	626872.7	6032525
Hypericum perforatum	-	-	Light	626963.3	6033120
Lobs Hole Ravine Road Top					
Hypericum perforatum, Mimulus mostratus	-	-	Light	627152	6032016
Hypericum perforatum	-	-	Light	627529.3	6031767
Hypericum perforatum	-	-	Light	627730.9	6030919
Hypericum perforatum, Agrostis cappilaris	-	-	trace	628506.5	6029314
Hypericum perforatum	-	-	Medium	628591.3	6029275
Hypericum perforatum	-	-	Medium	628835.7	6029095
Hypericum perforatum	-	-	Medium	628841.1	6028736
Hypericum perforatum	-	-	Medium	629037.3	6028170
Marica					
Conyza sp.	-	-	trace	631610.9	6038895
Conyza sp., Rubus sp.	-	-	trace	630742.5	6038905
Hypericum perforatum	-	-	Medium	630644.1	6039130
Anthoxanthum odoratum, Holcus lanatus, Hypochaeris sp.	-	-	Light	635946.8	6039968
Conyza sp., Rubus sp.	-	-	Light	632229.6	6038704
Conyza sp.	-	-	trace	633253.8	6038419
Acetosella vulgaris, Conyza sp., Hypericum perforatum, Hypochaeris radicata, Crepis capillaris, Lactuca serriola	-	-	Dense	633585.5	6038264
Hypochaeris sp., Acetosella vulgaris	-	-	Medium	633969.5	6038216
Agrostis cappillaris, Acetosella vulgaris, Hypochaeris sp., Polygonum plebium, Anthoxanthum ordoratum	-	-	Dense	633640.2	6037841
Acetosella vulgaris, Hypochaeris, Hypericum perforatum	-	-	Medium	633815.4	6038148
Hypochaeris sp., Acetosella vulgaris	-	-	Light	634403.8	6038722
Hypochaeris sp., Acetosella vulgaris	-	-	Medium	634514.8	6038622
Hypochaeris radicata	-	-	Medium	634765.7	6038256

Table G.2 Weed records (polygons) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Hypochaeris radicata, Acetosella vulgaris	-	-	Light	634606.9	6038452
Hypochaeris radicata	-	-	Medium	635869.7	6038632
Hypochaeris radicata	-	-	Medium	635366.8	6038482
Anthoxanthum odoratum	-	-	trace	634920.9	6039395
Hypochaeris radicata, Holcus lanatus, Dactyls glomeratus, Cirsium sp.	-	-	Medium	635485.5	6039949
Anthoxanthum odoratum, Holcus lanatus, Hypochaeris sp,	-	-	Dense	636031.7	6039998
Anthoxanthum odoratum, Holcus lanatus, Hypochaeris sp., Acetosella, Taraxacum sp., Cirsium sp.	-	-	Dense	635945.2	6039947
Hypochaeris radicata, Acetosella vulgaris, Anthoxanthum sp.	-	-	Medium	636491.3	6038753
Hypochaeris sp.	-	-	Light	636618	6038607
Hypochaeris radicata, Acetosella vulgaris, Anthoxanthum sp.	-	-	Dense	637064.7	6038373
Anthoxanthum sp., Hypochaeris radicata	-	-	Dense	636318.1	6038895
Hypochaeris radicata, Acetosella vulgaris, Anthoxanthum sp.	-	-	Dense	635520	6037579
Anthoxanthum odoratum, Hypochaeris radicata, Acetosella vilgaris	-	-	Medium	635383.6	6037627
Holcus lanatus, Hypochaeris radicata, Anthosachne odoratum	-	-	Medium	635287.9	6037648
Hypochaeris sp., Anthoxanthum odoratum, Acetosella vulgaris	-	-	Medium	634393.6	6037851
Hypochaeris radicata	-	-	Dense	635184.9	6037600
Hypochaeris radicata	-	-	Medium	635072.2	6037584
Tantangara Road Top					
Anthoxanthum odoratum, Holcus lanatus, Onoprdium acanthium, Leucanthemum vulgare, Echium vulgare, Hypericum perforatum	-	-	Medium	645618.3	6022820
Anthoxanthum odoratum, Holcus lanatus, Lotus, Hypochaeris radicata	-	-	Medium	645833.5	6023102
Anthoxanthum odoratum, Leucanthemum vulgare	-	-	Medium	646257.2	6024915
Anthoxanthum odoratum, Lucanthemum vulgare	-	-	Dense	646591.5	6025344
Anthoxanthum odoratum, Hypericum perforatum	-	-	Dense	646656.8	6026688
Anthoxanthum odoratum, Leucanthemum vulgare	-	-	Dense	646801.3	6027800
Anthoxanthum odoratum	-	-	Dense	646472.9	6027110
Anthoxanthum odoratum, Lucanthemum vulgare, Holcus lanatus, Corsium vulgare	-	-	Dense	646608.4	6025264

Table G.2 Weed records (polygons) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Anthoxanthum odoratum	-	-	Medium	646360.1	6024359
Tantangara Road Bottom					
Anthoxanthum odoratum, Holcus lanatus, Leucanthemum vulgare, Lotus spp, Verbascum thapsis	-	-	Dense	646722.6	6029009
Anthoxanthum odoratum	-	-	Dense	647078.8	6029462
Anthoxanthum odoratum, Holcus lanatus	-	-	Dense	647347.3	6030261
Anthoxanthum odoratum	-	-	Dense	647427.4	6031425
Anthoxanthum odoratum, Leucanthemum vulgare	-	-	Light	647543	6031755
Anthoxanthum odoratum, Holcus lanatus, Leucanthemum vulgare	-	-	Light	647276.1	6032812
Anthoxanthum odoratum, Leucanthemum vulgare, Thapsis spp.,	-	-	Light	647696.3	6033518
Leucanthemum vulgare, Holcus lanatus	-	-	Light	649044.6	6035051
Anthoxanthum odoratum, Leucanthemum vulgare, Thapsis spp.	-	-	Light	647651.3	6033329
Holcus lanatus	-	-	Light	647465.6	6033108
Anthoxanthum odoratum, Holcus lanatus	-	-	Dense	647455.9	6029975
Anthoxanthum odoratum	-	-	Dense	647208.7	6029476
Anthoxanthum odoratum	-	-	Dense	646944	6029206
Anthoxanthum odoratum , Holcus lanatus	-	-	Dense	646758.9	6028818
Leucanthemum vulgare	650	-	Medium	649000.1	6034369
Anthoxanthum odoratum, Cirsium vulgare	-	-	Light	649302.2	6036007
Anthoxanthum odoratum, Cirsium vulgare	-	-	Medium	649392.4	6035845
Cirsium vulgare	-	-	Medium	649518.1	6036068
Holcus sp., Cirsium vulgare 30%	-	-	Medium	649188.1	6035749
Cirsium vulgare	30	-	Medium	649134.4	6035375
Cirsium vulgare	50	-	Medium	649055	6034905
Anthoxanthum odoratum	2500	-	Medium	648525.3	6033967
Cirsium vulgare	40	-	Medium	648308.2	6033830
Tantangara Dam					
Holcus lanatus, Anthoxanthum odoratum, Onopordum acanthium, Rosa rubiginosa, Hypericum perforatum, Rubus sp., Leucanthemum vulgare	10000	7000	Dense	648571.7	6039916
Holcus lanatus	10000	1000	Medium	648633.4	6041270
Holcus lanatus, Onopordum acanthium	10000	1000	Light	648919.5	6041423
Thapsis sp.	500	200	Light	649036.8	6040782
Holcus lanatus, Anthoxanthum odoratum	10000	1000	Light	648942.6	6040556

Table G.2 Weed records (polygons) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Anthoxanthum odoratum, Holcus sp., Cirsium vulgare, Acetosella vulgaris, Echium plantagineum, Taraxacum officinale, Hypericum perforatum, Agrostis sp.	-	-	Medium	649119.8	6037623
Agrostis cappillaris	-	-	Medium	648774.8	6038744
Holcus lanatus	-	250	Dense	648521.4	6038950
Leucanthemum vulgare, Verbascum virgatum	-	-	Dense	648822.1	6039323
Anthoxanthum odoratum, Holcus lanatus, Leucanthemum vulgare	-	-	Medium	648961.1	6037248
Anthoxanthum odoratum, Holcus lanatus, Leucanthemum vulgare	-	-	Medium	648773	6036705
Anthoxanthum odoratum, Holcus lanatus, Leucanthemum vulgare	-	-	Medium	648843.6	6036522
Anthoxanthum odoratum, Holcus lanatus, Agrostis capillaris	-	-	Medium	649016.6	6036474
Anthoxanthum odoratum, Holcus lanatus, Cirsium vulgare	-	-	Medium	649213.8	6036283
Anthoxanthum odoratum, Holcus lanatus, Agrostis capillaris	-	-	Medium	649102	6036414
Anthoxanthum odoratum, Cirsium vulgare, Verbascum virgatum, Leucanthemum vilgare, Hypericum perforatum, Echium plantagineum	-	-	Medium	649347.8	6036570
Hypericum perforatum, Agrostis capillaris, Holcus lanatus, Anthoxanthum odoratum, Tragopogon sp., Cirsium vulgare	-	-	Light	649706.5	6037037
Hypericum perforatum, Verbascum thapsus, Holcus lanatus, Anthoxanthum odoratum, Tragopogon sp., Agrostis capillaris	-	-	Light	649834.8	6037373
Echium plantagineum	-	-	Light	649819.4	6037329

Table G.3 Weed records (points) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Bottom of Lobs Hole					
Ulmus sp.	-	-		626016.1	6038889
Potentilla recta	-	-		625850.9	6038805
Rubus sp.	-	-	Dense	626046.9	6038829
Rubus sp., Hypericum perforatum	-	-	Dense	624966.8	6040355
Hypericum perforatum, Hypochaeris radicata	-	-	Light	626177.5	6038351
Hypericum perforatum, Conyza sp.	-	-	Light	626222.8	6038336

Table G.3 Weed records (points) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Hypericum perforatum, Conyza sp., Hypochaeris radicata	-	-	Trace	626277.4	6038345
Hypericum perforatum, Conyza sp.	-	-	Trace	626321.5	6038338
Rubus sp.	-	-	Dense	626431	6038235
Rubus sp., Conyza sp., Cirsium vulgare, Hypericum perforatum	-	-	Dense	627922.1	6037929
Rubus sp., Hypericum perforatum	-	-	Dense	627251.4	6037913
Robinia pseudoacacia	-	-	-	627159.6	6038044
Robinia pseudoacacia	-	-	-	627181.7	6038041
Agrostis cappillaris	-	-	Dense	627608.9	6038100
Agrostis cappillaris	-	-	Dense	627648.7	6038102
Rubus sp., Corsium	-	-	Dense	627856.6	6038522
Lobs Hole Ravine Road Bottom					
Rubus sp.	-	-	-	625939.6	6037294
Rubus sp.	-	-	-	626696.2	6036880
Rubus sp.	-	-	-	627042.1	6036748
Rubus sp.	-	-	-	627307.4	6033961
Rubus sp.	-	-	-	627186.6	6033691
Lobs Hole Ravine Road Top					
Cirsium vulgare, Rubus sp.	-	-	-	627071.7	6032057
Rubus sp.	-	-	Light	627216.8	6032098
Hypericum perforatum	-	-	Dense	628195.6	6030074
Hypericum perforatum	-	-	Dense	628610.6	6029515
Marica					
Cirsium vulgare	-	-	-	630558.4	6039372
Conyza sp.	-	-	Dense	630473.3	6038911
Cirsium vulgare	-	-	Trace	630540.9	6038522
Echium vulgare	-	-	Trace	630467.5	6038300
Circium vulgare	-	-	Trace	630636.3	6038792
Rubus sp.	-	-	-	631253.6	6038809
Anthoxanthum sp.	-	-	-	631743	6038841
Agrostic sp., verbascum virgatrum	-	-	-	631801.5	6038860
Lactuca serriola	-	-	Trace	632712	6038541
Acetosella vulgaris	-	-	-	633496.6	6038264
Acetosella vulgaris	-	-	-	633689.1	6038139
Hypocchaeris radicata	-	-	Trace	633692.8	6038116

Table G.3 Weed records (points) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Acetosella vulgaris	-	-	-	633722.5	6038090
Holcus lanatus	-	-	Dense	633577.7	6037728
Acetosella vulgaris, Hypochaeris radicata	-	-	Medium	634357.6	6038699
Crepis cappilaris, Taracum officinale, Acetosella vulgaris, Hypochaeris radicata	-	-	-	634552.7	6038608
Cirsium vulgare	-	-	Medium	635448.6	6038522
Acetosella vulgaris, Hypochaeris radicata	-	-	Dense	634568.9	6039010
Holcus lanatus, Cirsium sp., Anthoxanthum sp., Hypochaeris sp.	-	-	-	634990.5	6039473
Anthoxanthum sp.	-	-	Light	635236.3	6039695
Hypericum perforatum	-	-	Trace	635302.5	6039787
Hypericum perforatum	-	-	Trace	636192.5	6039955
Hypericum perforatum	-	-	Trace	636340.2	6039928
Achillea millefloruм	-	-	Light	635452.6	6037598
Acetosella sp.	-	-	Dense	635306.8	6037636
Cirsium vulgare, Rubus sp.	-	-	Medium	635198.5	6037626
Cirsium vulgare, Acetosella vulgare, Hypochaeris radicata	-	-	Dense	635144.8	6037586
Tantangara Road Top					
Lotus sp.	10	0	Trace	645671.7	6022938
Anthoxanthum odoratum	500	0	Trace	645703.5	6022963
Lotus sp.	10	0	Trace	645734.5	6022994
Anthoxanthum odoratum	200	0	Trace	645938.2	6023484
Anthoxanthum odoratum	200	0	Trace	645979	6023595
Lotus sp.	500	0	Trace	646199.7	6023879
Anthoxanthum odoratum	200	0	Trace	646257.8	6024163
Anthoxanthum odoratum	200	0	Trace	646286.8	6024305
Leucanthemum vulgare	10	0	Trace	646291.4	6024308
Leucanthemum vulgare	100	0	Trace	646295.8	6024459
Lotus sp.	1000	0	Trace	646304	6024459
Anthoxanthum odoratum	2000	0	Medium	646295.1	6024482
Verbascum thapsis	50	0	Trace	646290.7	6024494
Anthoxanthum odoratum	2000	0	Medium	646262	6024588
Holcus lanatus	200	0	Trace	646271.3	6024586
Anthoxanthum odoratum	2000	0	Medium	646201.3	6024713
Leucanthemum vulgare	200	0	Trace	646256.8	6024574

Table G.3 Weed records (points) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Leucanthemum vulgare	200	0	Trace	646189.9	6024713
Leucanthemum vulgare	200	0	Trace	646180.5	6024749
Anthoxanthum odoratum	2000	0	Medium	646172.2	6024810
Leucanthemum vulgare	200	0	Trace	646655.6	6025491
Holcus lanatus	200	0	Trace	646667.1	6025491
Hypericum perforatum	20	0	Trace	646663.6	6025477
Onoprdium acanthium	20	0	Trace	646667.4	6025498
Anthoxanthum odoratum	5000	0	Trace	646668.8	6025556
Anthoxanthum odoratum	5000	0	Trace	646693.2	6025625
Anthoxanthum odoratum	5000	0	Trace	646698.9	6025803
Anthoxanthum odoratum	5000	0	Trace	646695.1	6025822
Anthoxanthum odoratum	5000	0	Trace	646671.9	6025849
Holcus lanatus	200	0	Trace	646694.4	6025811
Holcus lanatus	200	0	Trace	646790	6026125
Anthoxanthum odoratum	1000	0	Trace	646787.4	6026112
Anthoxanthum odoratum	1000	0	Trace	646425.6	6027133
Anthoxanthum odoratum	5000	0	Medium	646476.3	6027298
Echium vulgare	4	0	Trace	646635.1	6027459
Anthoxanthum odoratum	1000	0	Trace	646719.8	6027810
Leucanthemum vulgare	10	0	Trace	646722.9	6027814
Anthoxanthum odoratum	3000	0	Trace	646681.1	6027948
Anthoxanthum odoratum	1000	0	Trace	646620.1	6028147
Anthoxanthum odoratum	1000	0	Trace	646691.1	6028312
Anthoxanthum odoratum	5000	0	Trace	646691.5	6028347
Anthoxanthum odoratum	5000	0	Trace	646684	6028391
Anthoxanthum odoratum	2000	0	Trace	646695.5	6028677
Hypericum perforatum	100	10	Trace	646759.4	6028705
Hypericum perforatum	100	10	Trace	646776.3	6028700
Anthoxanthum odoratum	500	10	Medium	646520.5	6027215
Anthoxanthum odoratum	500	10	Medium	646517.5	6026779
Anthoxanthum odoratum	500	10	Medium	646772.3	6026353
Lotus sp.	1000	50	Trace	646871.2	6025970
Echium vulgare	20	10	Light	646710	6025538
Echium vulgare	100	10	Light	646608.4	6025268

Table G.3 Weed records (points) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Echium vulgare, Verbascum thapsis, Onopordum acanthium	100	10	Light	646534.9	6025135
Echium vulgare, Thapsis sp	50	0	Trace	645626.5	6022803
Tantangara Road Bottom					
Leucanthemum vulgare	50	0	Trace	647118.4	6029539
Holcus lanatus	1000	0	Trace	647388.6	6029730
Leucanthemum vulgare	100	0	Trace	647359	6030042
Leucanthemum vulgare	300	0	Trace	647342.2	6030293
Onopordum acanthium	30	0	Trace	647368.4	6030323
Leucanthemum vulgare	1000	0	Trace	647319.2	6030435
Leucanthemum vulgare	100	0	Trace	647290.4	6030553
Anthoxanthum odoratum	1000	0	Trace	647273.7	6030736
Anthoxanthum odoratum	1000	0	Trace	647270.1	6030829
Anthoxanthum odoratum	1000	0	Trace	647249.3	6030937
Anthoxanthum odoratum	1000	0	Trace	647252.8	6031161
Anthoxanthum odoratum	1000	0	Trace	647276.5	6031208
Leucanthemum vulgare	10	0	Trace	647467.3	6031539
Anthoxanthum odoratum	1000	0	Trace	647509.4	6032090
Onopordum acanthium	10	0	Trace	647482.5	6032160
Leucanthemum vulgare	50	0	Trace	647352.5	6033088
Holcus lanatus	5000	0	Trace	647391.5	6033149
Anthoxanthum odoratum	5000	0	Medium	647385.3	6033134
Leucanthemum vulgare	50	0	Trace	647501	6033297
Lotus sp.	50	0	Trace	647899	6033641
Onopordum acanthium	50	0	Trace	649013.2	6035103
Leucanthemum vulgare	15	0	Trace	649052.7	6035057
Leucanthemum vulgare	10	0	Trace	649049.8	6034672
Leucanthemum vulgare	100	0	Trace	647934.8	6033579
Leucanthemum vulgare	100	0	Trace	647887.5	6033557
Anthoxanthum odoratum	3000	0	Trace	647824.5	6033557
Leucanthemum vulgare	50	0	Trace	647381.3	6032924
Holcus lanatus	1000	20	Trace	647340	6032769
Holcus lanatus	1000	20	Trace	647349.3	6032700
Anthoxanthum odoratum	10000	30	Dense	647351.3	6032674
Leucanthemum vulgare	50	0	Trace	647347.5	6032683

Table G.3 Weed records (points) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Holcus lanatus	1000	50	Light	647422.3	6032556
Anthoxanthum odoratum	1000	50	Medium	647588.1	6032018
Holcus lanatus	1000	0	Medium	647638.4	6031925
Anthoxanthum odoratum	5000	0	Medium	647435.3	6030291
Leucanthemum vulgare	50	0	Trace	646945.5	6029198
Verbascum virgatum	10	10	Trace	646798.7	6029106
Leucanthemum vulgare	100	20	Trace	646752.6	6028877
Leucanthemum vulgare	100	20	Trace	646782.3	6028887
Tantangara Dam					
Rubus sp.	1	2	Trace	648448.2	6039321
Leucanthemum vulgare	2	1	Trace	648444.9	6039368
Rubus sp.	3	5	Trace	648439.3	6039398
Rosa rubiginosa	1	1	Trace	648430.8	6039397
Rubus sp.	1	5	Trace	648432.9	6039401
Leucanthemum vulgare	1	1	Trace	648438.8	6039422
Rubus sp.	1	1	Trace	648438.8	6039424
Rubus sp.	1	1	Trace	648446.8	6039432
Rosa rubiginosa	1	1	Trace	648448.6	6039453
Rosa rubiginosa	1	1	Trace	648436.1	6039460
Rosa rubiginosa	1	1	Trace	648428	6039462
Rubus spp	1	5	Trace	648424.5	6039474
Rosa rubiginosa	1	1	Trace	648431.3	6039478
Rosa rubiginosa	1	1	Trace	648432.6	6039478
Rubus sp.	5	10	Trace	648421.8	6039495
Rubus sp.	5	10	Trace	648432.7	6039499
Leucanthemum vulgare	1	0	Trace	648437.9	6039499
Rubus sp.	5	20	Dense	648450.3	6039496
Rubus sp.	5	20	Dense	648461	6039494
Rubus sp.	5	20	Dense	648455.4	6039501
Rosa rubiginosa	4	10	Dense	648438.1	6039513
Rosa rubiginosa	2	5	Dense	648445.2	6039525
Leucanthemum vulgare	500	40	Medium	648449.3	6039574
Verbascum thapsus	1	1	Trace	648447.7	6039577
Leucanthemum vulgare	300	10	Medium	648468	6039597

Table G.3 Weed records (points) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Rubus sp.	2	0	Trace	648498.7	6039734
Rubus sp.	2	0	Trace	648507.6	6039753
Rubus sp.	1	1	Medium	648535.6	6039826
Rubus sp.	1	1	Medium	648547.6	6039846
Rubus sp.	1	1	Medium	648542.6	6039861
Leucanthemum vulgare	1000	30	Medium	648560.6	6039899
Rubus sp.	1	1	Medium	648588.9	6039943
Rubus sp.	1	1	Medium	648595.8	6039952
Rubus sp.	3	10	Dense	648605.3	6039963
Leucanthemum vulgare	0	10	Medium	648617.8	6040008
Rubus sp.	3	10	Dense	648646.6	6040044
Rubus sp.	3	10	Dense	648644.3	6040061
Rubus sp.	3	10	Dense	648648.6	6040084
Hypericum perforatum	300	20	Light	648639.9	6040088
Rubus sp.	3	10	Dense	648667.8	6040108
Hypericum perforatum	300	20	Light	648678.8	6040115
Rubus sp.	1	1	Dense	648683.8	6040119
Rubus sp.	3	5	Dense	648701.5	6040158
Rubus sp.	3	5	Dense	648705.5	6040212
Hypericum perforatum	10000	100	Medium	648707	6040225
Rubus sp.	3	5	Dense	648699.6	6040313
Rubus sp.	5	15	Dense	648713.7	6040328
Rubus sp.	5	15	Dense	648702.9	6040351
Leucanthemum vulgare	300	5	Dense	648701.2	6040375
Onopordum acanthium	15	5	Trace	648474.7	6040507
Hypericum perforatum	500	10	Dense	648532	6040775
Onopordum acanthium	4	1	Trace	648532	6040795
Hypericum perforatum	1000	30	Dense	648551.9	6040913
Onopordum acanthium	4	1	Trace	648551	6040927
Leucanthemum vulgare	1	1	Trace	648555	6040940
Leucanthemum vulgare	30	4	Trace	648554.6	6041061
Onopordum acanthium	15	40	Trace	649003.9	6040990
Verbascum virgatum	100	100	Light	649002.8	6040991
Hypericum perforatum	2000	80	Dense	649006.5	6040833

Table G.3 Weed records (points) – Year 1

Species	Count	Area (m^2)	Cover	Easting	Northing
Onopordum acanthium	25	20	Light	649040.5	6040692
Hypericum perforatum	200	5	Dense	649064.7	6040658
Thapsis sp	500	100	Light	649070.2	6040659
Hypericum perforatum	1500	300	Medium	649047.6	6040611
Hypericum perforatum	6000	1000	Dense	649024.7	6040579
Hypericum perforatum	200	50	Dense	648941.3	6040532
Mimulus moschatus	10	5	Dense	648912.6	6040562
Leucantheumum vulgare, Echium plantagineum	3	25	Trace	648940.5	6037741
Hypericum perforatum	1	1	Trace	648839.8	6037863
Hypericum perforatum	15	100	Trace	648823.1	6038249
Leucanthemum vulgare	15	100	Trace	648809.6	6038310
Silybum marianum, Leucanthemum vulgare	30	100	Light	648626	6038920
Leucanthemum vulgare	1	1	Trace	648737	6036911
Echium plantagineum	10	25	Trace	649088.9	6036381
Acetosella vulgaris and Echium plantagineum	5	12	Trace	649449.9	6036670
Hypochaeris radicata	20	15	Trace	649529.2	6036311
Hypochaeris radicata	20	15	Trace	649642.5	6036748
Hypochaeris radicata	15	10	Light	650099	6037380
Agrostis capillaris	0	0		649070.5	6041154
Leucanthemum vulgare	0	0		648872.2	6040559

G.2 Pathogens

G.2.1 Monitoring periods

Table G.4 Pathogen monitoring periods summary – Year 1

Monitoring period	Monitoring event	Monitoring dates
Q1 & Q2 (Baseline)	First	9 January – 16 March 2021
Additional phytophthora testing (April)	First	13 April 2021
Additional phytophthora testing (October)	Second	8 – 11 October 2021

G.2.2 Records

Table G.5 *Phytophthora* testing records

Monitoring Site	Positive/negative	*Phytophthora* species	Easting	Northing
Lobbs hole R0.5	Negative	-	628985	6028294
Lobs Hole, R5	Negative	-	626169	6038412
Lobs01	Positive	Phytophthora cryptogea/psueudocryptogea	626999	6032166
Marica Washdown	Negative	-	636787	6039884
Marica01	Negative	-	633684	6037938
PMS1	Positive	Phytophthora cryptogea/psueudocryptogea	626160	6038341
PMS2	Negative	-	626134	6038307
PMS3	Negative	-	626171	6038275
PMS4	Negative	-	626187	6038255
PMS5	Positive	Phytophthora cryptogea/psueudocryptogea	626166	6038409
PS01	Negative	-	629107	6027958
PS02	Negative	-	626985	6032115
PS03	Negative	-	627852	6038421
PS04	Negative	-	626340	6039260
PS05	Negative	-	625578	6039489
PS06	Negative	-	634797	6037898
PS07	Negative	-	633241	6038437
PS08	Negative	-	630531	6039358
PS09	Negative	-	630983	6038878
PS10	Negative	-	632420	6038653
PS11	Negative	-	649248	6036091
PS12	Negative	-	649732	6036815
PS13	Negative	-	648960	6037255
PS14	Negative	-	648517	6039121
PS15	Negative	-	648386	6040640
PS16	Negative	-	639636	6038371
PS17	Negative	-	642962	6036535
PS18	Negative	-	641780	6032723
PS19	Negative	-	650712	6020805
PS20	Negative	-	651092	6021074
Tantangara Adit 01	Negative	-	648848	6037892
Tantangara Road 02	Negative	-	645605	6022864
Tantangara Washdown	Negative	-	649087	6036362