



2021 Camera Fauna Monitoring Program Report

2021 Camera Fauna Monitoring Program

Summary Report

GEMCO/South32

15 February 2023

Final



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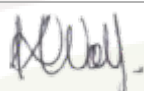
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Glossary

Term / Abbreviation	Definition
2016 DEPWS Study	Previous 2016 camera study undertaken by the then NT Department of Natural Resources (now DEPWS) as reported in Heiniger et al. (2020)
ALC	Anindilyakwa Land Council
Capture night	A capture night represents a single night that an individual camera was deployed and working (e.g. one camera left for seven nights represents seven capture nights)
DEPWS	Northern Territory Department of Environment, Parks and Water Security
GEMCO	Groote Eylandt Mining Company Pty Ltd
Naïve occupancy	The ratio of the number of sites where a species is detected to total number of sites surveyed, without correcting for imperfect detection
Northern Grid	The monitoring grid in an area of the northern portion of Groote Eylandt undisturbed by exploration activities, as shown in Figure 4
NT	Northern Territory
Program	The 2021 Camera Monitoring Program
SD Card	Secure digital card
Southern Grid	The monitoring grid in an area of the Southern Lease previously subject to exploration activities, as shown in Figure 3
Southern Lease	Exploration Licence EL2455, as shown in Figure 1
Study Area	Area subject to the Program, including the Southern Grid and Northern Grid, as shown in Figure 1
Target species	Feral cats and the Northern Quoll
TSMP	The <i>Groote Archipelago Threatened Species Management Plan 2019-2028</i>

Executive Summary

Introduction

Cumberland Ecology was commissioned by the Groote Eylandt Mining Company Pty Ltd (GEMCO) to undertake the 2021 Camera Monitoring Program (the 'Program') on Groote Eylandt to gather data to support an assessment of the impacts of exploration activities on feral cats (*Felis catus*) and the Northern Quoll (*Dasyurus hallucatus*). GEMCO has undertaken exploration in Exploration Licence (EL2455), known as the Southern Lease, since 2016. The Program was undertaken to provide data to assist with understanding the impacts of exploration.

The Northern Territory (NT) Department of Environment, Parks and Water Security (DEPWS) recommended that GEMCO undertake the Program and assisted in scoping it. In 2016, DEPWS undertook a research program on Groote Eylandt (termed the 2016 DEPWS Study), focussed on feral cats, and the Program builds upon the research undertaken by DEPWS in 2016.

This report presents the results of the Program, which was undertaken to provide the information requested by DEPWS on feral cats and the Northern Quoll in relation to exploration activities. This report also documents incidental findings on other threatened mammals.

Methodology

The Program involved the establishment of two monitoring grids, the Southern Grid and the Northern Grid, collectively referred to as the Study Area. The Southern Grid is located within GEMCO's Southern Lease where exploration activities have been undertaken, and the Northern Grid is located on the northern side of Groote Eylandt in an undisturbed area where no exploration activities have occurred and acted as a control site. The Southern Grid was positioned to include areas impacted by exploration activities in 2016, 2017, 2019 and 2020, whilst being in close proximity to the location established by the 2016 DEPWS Study.

Field surveys were undertaken between late April and early September 2021. Surveys involved the deployment of 150 motion-sensor cameras, including 75 within the Southern Grid and 75 within the Northern Grid. Baits and lures were used to attract predators and mammals to the camera sites. Baits and lures were alternated between camera sites, with cameras set to focus on either soiled cat litter or standard mammal bait. Each grid contained 38 sites with soiled cat litter and 37 sites with standard mammal baits. Camera sites were cleared of vegetation, to minimise false triggers, maximise identification of animals and to reduce fire risk to equipment. Cameras were collected after approximately 15-17 weeks following deployment.

Following the completion of field surveys, the collected data was collated and entered into a tabular format. Images were downloaded from the cameras and imported into a CPW Photo Warehouse database (Newkirk 2016) for identification. Queries within the CPW Photo Warehouse database were subsequently utilised to export the data into tabular format. The data was analysed to determine species presence at each camera site and the frequency of detection of the target species (feral cats and the Northern Quoll). This enabled a comparison between grids and the results of the 2016 DEPWS Study to be assessed.

Results and Discussion

Over 1.61 million images were captured on cameras during the Program, and approximately 16% of images collected were associated with fauna triggers on the cameras. Detections of the targeted species were as follows:

- Feral cats: Total of four locations, including two within the Southern Grid and two within the Northern Grid; and
- Northern Quoll: Total of 145 locations, including 74 within the Southern Grid and 71 within the Northern Grid.

The Brush-tailed Rabbit-rat was also recorded at a total of 54 locations, all of which occurred within the Northern Grid.

Due to the low number of feral cat detections, an estimate of density could not be undertaken. Based on the findings of the Program, it is likely that the density of feral cats does not differ between areas that have been subject to clearing for exploration (i.e. Southern Grid) compared to areas in which exploration has not been undertaken (i.e. Northern Grid). Feral cat occupancy within the Southern Lease is comparable, and lower than previous studies in 2016 (Heiniger et al. 2020) and 2017-2018 (Cumberland Ecology 2019b).

Northern Quoll detections for the Program were widespread within both the Southern Grid and Northern Grid. The Southern Grid had a higher average number of detection days per camera site than the Northern Grid. Based on the findings of the Program, it is concluded that exploration activities within the Southern Lease have not resulted in a decrease in the naïve occupancy or frequency of detection of the Northern Quoll when comparing the disturbed area (Southern Grid) to the undisturbed area (Northern Grid). Northern Quoll occupancy within the Southern Lease following exploration activities between 2016-2020 is higher than that of previous studies in 2016 (Heiniger et al. 2020) and 2017-2018 (Cumberland Ecology 2019b).

Brush-tailed Rabbit-rat detections for the Program were widespread within the Northern Grid. The lack of records of the Brush-tailed Rabbit-rat from the Southern Grid suggests that the species is not present in the area sampled. This is further supported by the findings of the 2016 DEPWS Study, as well as the Small Mammal Research Project (Cumberland Ecology 2019b), which did not detect the Brush-tailed Rabbit-rat within a study area focussed on the Southern Lease.

No other threatened mammals were detected within the Study Area.

Conclusion

Based on the findings of the Program, it is concluded that:

- Exploration activities within the Southern Lease have not resulted in an increase in the naïve occupancy of feral cats; and
- Exploration activities within the Southern Lease have not resulted in a decrease in the naïve occupancy of the Northern Quoll.

1. Introduction

Cumberland Ecology was commissioned by the Groote Eylandt Mining Company Pty Ltd (GEMCO) to undertake the 2021 Camera Fauna Monitoring Program (the 'Program') on Groote Eylandt to gather data to support an assessment of the impacts of exploration activities on feral cats (*Felis catus*) and the Northern Quoll (*Dasyurus hallucatus*). GEMCO has undertaken exploration in Exploration Licence (EL2455), known as the Southern Lease, since 2016. The Program was undertaken to provide data to assist with understanding the impacts of exploration. It was important to understand the impacts of exploration activities, so that GEMCO's future exploration activities could be planned in a manner that minimised impacts on threatened species. The data gathered from the Program will be used to guide the assessment of impacts of any future exploration programs on Groote Eylandt.

The Northern Territory (NT) Department of Environment, Parks and Water Security (DEPWS) recommended that GEMCO undertake the Program and assisted in scoping it. In 2016, DEPWS undertook a research program on Groote Eylandt (termed the 2016 DEPWS Study), focussed on feral cats, and the Program builds upon the research undertaken by DEPWS in 2016.

The Program included the establishment of two camera monitoring grids, one within an area of the Southern Lease disturbed by exploration activities, and the other within an area in the northern portion of Groote Eylandt that has not been disturbed by exploration. The two monitoring grids form the Study Area for the Program (see **Figure 1**).

The Program was undertaken by Cumberland Ecology and included collection of survey data between late April and early September 2021.

1.1. Aim and Objectives

The aim of the Program is to provide quantitative data to assist in understanding the impacts of vegetation disturbance associated with exploration on the density of feral cats and the occurrence of the Northern Quoll. Feral cats and the Northern Quoll are referred to as the target species within this report.

The objectives are as follows:

- To determine whether there is a change in feral cat density between the 2016 DEPWS Study and the Program;
- To determine whether the density of feral cats differs between areas that have been subject to clearing for exploration compared to areas in which exploration has not been undertaken; and
- To determine whether the occupancy of Northern Quolls differs between areas that have been subject to clearing for exploration compared to areas in which exploration has not been undertaken.

In addition to these objectives, this report also documents observations of other threatened species, including the Brush-tailed Rabbit-rat (*Conilurus penicillatus*).

1.2. Background to the Program

1.2.1. Groote Eylandt

The Study Area is located on Groote Eylandt in the NT, the third largest island off the Australian mainland. It is part of an archipelago to the east of Arnhem Land that has international significance because of the integrity of its flora and fauna. According to the NT Government (NRETAS 2009), Groote Eylandt and other islands in the archipelago have conservation values including:

- Nationally and internationally significant sites for nesting seabirds and turtles;
- Approximately 900 species of vascular plants and 330 vertebrates; and
- Known occurrences of a suite of threatened species including the nationally listed Northern Hopping-mouse (*Notomys aquilo*), Brush-tailed Rabbit-rat (*Conilurus penicillatus*) and Northern Quoll (*Dasyurus hallucatus*).

The main reason for the conservation significance of the island is thought to be the absence or near absence of key threatening processes that occur on the Australian mainland (NRETAS 2009). Of particular note, many of the feral animals that have impacted native flora and fauna on the mainland are absent from Groote Eylandt. In particular, feral cattle (*Bos taurus*), horses (*Equus caballus*), donkeys (*Equus asinus*), Water Buffalo (*Bubalus bubalis*), the Cane Toad (*Rhinella marina*), Rusa Deer (*Cervus timorensis*), Feral Pig (*Sus scrofa*), and the European Red Fox (*Vulpes vulpes*) are not established on the island.

The *Groote Archipelago Threatened Species Management Plan 2019-2028* (TSMP) was developed to manage existing and emerging threats to terrestrial fauna and their habitats across the Groote archipelago. The TSMP maps out management, research and monitoring actions over a 10-year period. The TSMP was developed with assistance from the NT and Federal Governments, and other stakeholders including the Anindiyakwa Land Council (ALC) and GEMCO. The TSMP lists numerous threats on Groote Eylandt, including predation by feral cats and habitat clearing.

1.2.2. Exploration

GEMCO has been undertaking exploration on Groote Eylandt since the 1960s and in the Southern Lease since 2016. Exploration involves clearing vegetation within drill pads and along associated access tracks. Exploration is undertaken in distinct campaigns, with each one designed to progressively gather more information about the geology of the area. Each campaign lasts approximately six months. At the end of the drilling campaign, the tracks and pads that were cleared are allowed to regenerate, although some tracks may be reused for subsequent exploration campaigns.

Monitoring of the quality of regeneration was undertaken in areas subject to GEMCO's previous exploration drilling on Groote Eylandt (Cumberland Ecology 2019a), including within the Eastern Leases (Mineral Lease (ML) 31219 and ML 31220), Southern Lease and existing GEMCO mine. Regeneration monitoring shows woody species composition appears to rapidly regenerate (within 1 to 2 years) following rehabilitation, although vegetation structure (basal area, mean tree height and canopy cover) returns more slowly. Overall, the

monitoring indicated that the rehabilitation process and techniques employed by GEMCO allow exploration areas to be successfully revegetated over time.

Previous environmental impact assessments have been undertaken on the basis that exploration has a limited impact on fauna because of the short-term nature of the activity and the fact that areas subject to clearing from exploration are allowed to regenerate soon after being disturbed. However, no targeted fauna studies have been specifically completed for the purposes of confirming this assumption. This Program is designed to gather data on feral cats and the Northern Quoll from an area that had been subject to clearing for exploration and from a control site.

1.2.3. Feral Cats

Feral cats have been identified as a threat within the Groote archipelago within the TSMP. Predation by feral cats is assessed within the TSMP as having a very high level of threat on the Brush-tailed Rabbit-rat and Northern Hopping-mouse. Feral cats were selected as a subject of this Program because predators such as feral cats are known to use landscape features such as 'pathways', open areas or edges to move around (DotE 2015, Stokeld and Gillespie 2020). This can include dry creek beds, gullies, ecotones, edges of rock ledges, animal tracks or vehicle tracks (Stokeld and Gillespie 2020). In light of this, DEPWS raised a concern that the development of exploration tracks may facilitate the movement of feral cats and hence increase their success in hunting prey and lead to an increase in the size of the feral cat population in areas that have been cleared as part of exploration. Therefore, one of the aims of the Program is to determine whether the density of feral cats differs between areas that have been subject to clearing for exploration compared to areas in which exploration has not been undertaken. The Program is consistent with Action 2.6 of the TSMP which requires improvement of the understanding of relationships between cat population density, predation impact on threatened species, and other environmental factors, such as fire and habitat disturbance.

1.2.4. Northern Quoll

Groote Eylandt supports the largest remaining population of the Northern Quoll in the NT (DENR and ALC 2019). The population of the Northern Quoll on Groote Eylandt is known to be substantial and widespread across the island. The species has persisted in part due to cane toads not having established on the island (DENR and ALC 2019). As such, the population of Northern Quoll on Groote Eylandt is considered to have high conservation significance (NRETAS 2009). The TSMP identifies the Northern Quoll as having a very high threat rating based on the scope, severity, and irreversibility of threats relevant to the species. Very high and high risk threats identified for the species includes poisoning by cane toads, weed invasion and inappropriate fire regimes.

Northern Quolls were assessed in this Program because:

- They are listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* and Critically Endangered under the *Territory Parks and Wildlife Conservation Act 1976*, and hence it is critical to understand the impacts of exploration on this species.
- Notwithstanding the Northern Quoll's conservation status, the species is present in high densities on Groote Eylandt and is readily detected in camera surveys (e.g. Cumberland Ecology 2019b and Heiniger et

al. 2020). This means that it is feasible to gather sufficient data from areas subject to different disturbance regimes to understand the impacts of the disturbance. This is not the case for the other threatened species that occur in the Southern Lease, given that they are difficult to detect, with few records existing from the Southern Lease or elsewhere on the island.

The Program involved undertaking camera surveys in an area in the Southern Lease that had been subject to clearing for exploration and at a control site, in the north of Groote Eylandt, where no exploration has been undertaken. In addition, DEPWS undertook camera surveys in the Southern Lease in 2016, prior to any substantive exploration being undertaken, and in an area in the north of Groote Eylandt. The data from these prior surveys also served as a point of comparison with data gathered during the Program. The DEPWS surveys are discussed in **Section 1.4**.

1.3. Description of the Study Area

The Study Area for the Program is comprised of the Southern Grid and the Northern Grid (see **Figure 1**). The Southern Grid is located in the south-western portion of Groote Eylandt, within the Southern Lease EL (EL2455). The Northern Grid is located in the northern portion of Groote Eylandt. Both the Southern Grid and Northern Grid are each approximately 1,400 ha in area. The Northern Grid and Southern Grid were positioned so as to overlap with the 2016 DEPWS Study (see **Figure 2**). A description of each of the grids is provided below.

1.3.1. Southern Grid

The Southern Grid is located within the Southern Lease Exploration Licence, and overlaps with areas previously subject to exploration activities (as discussed below). Other forms of anthropogenic disturbance include the Yenbakwa Road and other 4WD access tracks. The Southern Grid includes the catchments of the Yenbakwa and Amagula Rivers, as well as Salt Creek (see **Figure 3**). It is characterised by areas of flat to undulating lateritic plains, with a low hill of outcropping quartzitic rock to the north east.

The vegetation and habitats within the Southern Grid are strongly influenced by topography and drainage. Eucalypt open forests and woodlands (with *Eucalyptus tetradonta*) dominate the well-drained areas of the Southern Grid with Melaleuca-dominated vegetation (*Melaleuca viridiflora* and *Melaleuca cajaputi*) occurring in swampy and riparian areas. Overall, the vegetation is characterised by a high species and structural diversity, although the structure of the understorey and the condition of the ground layer has been modified by a regime of frequent fires.

Prior to the commencement of the Program, exploration was undertaken in the Southern Grid in 2016, 2017, 2019 and 2020. **Figure 3** shows the location of drill tracks in the Southern Grid. The drill tracks were developed to provide access to drill pads. For each exploration campaign, vegetation was cleared within the footprint of drill pads (generally 10 m x 18 m, or 18 m x 17 m) and along associated access tracks (3 m wide). Clearing of vegetation was undertaken with a D6 scrub dozer using the "blade up" method, whereby the blade of the dozer is lifted to reduce soil disturbance and to avoid disturbing the topsoil horizon. Topsoil was not stripped. Drilling (reverse circulation, aircore and/or diamond drilling methods) was undertaken on the drill pads. The extent of exploration activity disturbance in the Southern Grid prior to the commencement of the Program, as reported by GEMCO, is summarised in **Table 1**.

Table 1 Extent of exploration activity disturbance in the Southern Grid prior to commencement of the Program

Year	Number of Drill Pads	Total Length of Tracks (km)	Extent of Disturbance (ha)
2016	58	10.89	7.53
2017	55	10.55	8.21
2019	153	17.71	13.61
2020	78	9.63	5.17

Following the completion of each season of exploration activities, and before the onset of the next wet season, drill pads and tracks were subject to rehabilitation. This included plugging and capping exploration drill holes, removing and disposing of any rubbish and replacing surface materials (e.g. logs, vegetation cover and leaf litter) on disturbed areas, as far as practicable. Felled timber and logs were placed across the entrance to access tracks and along a sufficient distance of track to prevent ongoing access (to prevent the access tracks from becoming permanent tracks). The area was then allowed to naturally revegetate from seeds contained in the soil seed bank and from adjacent vegetation.

The exploration programs were designed to ensure that exploration was not undertaken within 100 m of waterways, wetlands, monsoonal vine thicket or white rock areas.

1.3.2. Northern Grid

As the Program aims to determine whether exploration activities have resulted in a change to feral cat density and Northern Quoll occupancy, a control site which is represented by an area not subject to exploration activities is required. The Northern Grid has been selected as a control site for the Program.

The Northern Grid is located within the northern part of Groote Eylandt, in an area that is relatively undisturbed with only a few 4WD access tracks present, and comprises an area that has not been disturbed by exploration. The Northern Grid includes several small drainage lines that flow into Ayarina Bay to the west or Hempel Bay to the east (see **Figure 4**). It is characterised by areas of undulating lateritic plains, with a hill of outcropping sandstone rock to the north west.

The vegetation and habitats within the Northern Grid are strongly influenced by topography and drainage. Eucalypt open forests and woodlands (with *Eucalyptus tetradonta* and *Eucalyptus miniata*) dominate the well-drained areas, and rocky outcropping areas of the Northern Grid with Melaleuca-dominated vegetation (with *Melaleuca leucadendra*, *Melaleuca cajaputi* and *Melaleuca viridiflora*) occurring in swampy and riparian areas. Riparian areas are predominantly located in the southern portion of the Northern Grid. Overall, the vegetation is characterised by a high species richness and structural diversity, although the structure of the understorey and the condition of the ground layer has been modified by a regime of frequent fires.

1.4. 2016 DEPWS Study

The then NT Department of the Environment and Natural Resources (now DEPWS) undertook fieldwork in 2016 for the Groote Island Biodiversity Initiative, which was funded by the NT and Federal governments, and included

research on the relationships between feral cats and native mammals on Groote Eylandt. Heiniger et al. (2020) formally reports on this research, which is hereafter referred to as the 2016 DEPWS Study.

The 2016 DEPWS Study was designed to study feral cat population density in two areas, a northern grid with high Brush-tailed Rabbit-rat occupancy, and a southern grid with no previous detections of the Brush-tailed Rabbit-rat. The location of the 2016 DEPWS Study in relation to the Program's Study Area is shown on **Figure 2**. The 2016 DEPWS Study included the survey of 70 sites per grid. Each grid comprised 70 camera traps arranged in five rows of 14 sites spaced approximately 400-600 m apart. The location of cameras for the 2016 DEPWS Study in the Southern Grid and Northern Grid are shown in **Figure 3** and **Figure 4**, respectively.

Each grid contained the same combination of three white flash camera models (PC850, modified PC850 and HC550), which were assigned randomly to sites. Cameras were positioned locally to maximise feral cat detections, for example along dry creek-lines, bush tracks or naturally open areas. Cameras were deployed at a consistent height of 45 cm to the top of the casing, facing south and focused on a bait located 2.5 m away. Cameras were baited with a non-toxic feral cat bait (kangaroo and chicken meat sausage) and a stick soaked in cat urine. Cameras were established for a minimum of eight weeks between mid-September and mid-November 2016. Photographs recorded on the cameras were analysed and all fauna species identified. Feral cats were infrequently detected, precluding both an estimate of feral cat density and an evaluation of the relationship between feral cats and native mammals (Heiniger et al. 2020).

Although not reported by Heiniger et al. (2020), the 2016 DEPWS Study also collected observations of other threatened species, including the Northern Quoll and Brush-tailed Rabbit-rat.

During consultation with DEPWS (see **Section 2.4**) it was determined that the Program would generally follow the 2016 DEPWS Study, with some modifications as determined by DEPWS. An overview comparison of the Program to the 2016 DEPWS Study is provided in **Appendix A**. Differences between the two studies include slightly different locations of the Southern Grid, different bait types and different duration of camera deployment. Despite the differences between the two studies, the methods utilised are sufficiently similar to enable comparison of the data.

2. Methodology

2.1. Survey Locations

The Program involved the establishment of two monitoring grids, the Southern Grid and the Northern Grid. The Southern Grid is located within GEMCO's Southern Lease where exploration activities have been undertaken since 2016, and the Northern Grid is located on the northern side of Groote Eylandt in an undisturbed area which acted as a control site. The Southern Grid was positioned to include areas impacted by exploration activities in 2016, 2017, 2019 and 2020 (**Figure 3**), whilst being in close proximity to the location established by the 2016 DEPWS Study (see **Figure 5**). The location of the Northern Grid largely aligned with the location established by the 2016 DEPWS Study (see **Figure 6**).

Each survey grid consisted of 75 grid points, in rows of five, spaced approximately 500 m apart. Computer-generated grid points were determined for each grid to use for navigation, with the final locations of camera sites determined in the field, based upon local habitat conditions. Due to feral cats being one of the target species, the final camera sites were selected so that cameras were positioned facing across suitable features, where possible, to maximise detections of cats passing by. Feral cats are known to utilise 'pathways', open areas or edges to move around, therefore suitable features included dry creek beds, gullies, ecotones, edges of rock ledges, animal tracks, or vehicle tracks which were targeted during final placement of camera sites. Final camera site selection occurred within 50 m of the computer-generated grid point.

The locations of the camera sites within the Southern Grid and Northern Grid are shown in **Figure 5** and **Figure 6**, respectively. A table with the coordinates of all camera sites is provided in **Appendix B**.

2.2. Field Surveys

2.2.1. Timing

As part of consultation with DEPWS (see **Section 2.4**) it was determined that the field surveys should commence from May-June to avoid the wet season, and also be timed to avoid, where possible, overlap with the exploration activities proposed for the Southern Lease in 2021.

The cameras were required to be deployed for a minimum of 10 weeks, and if exploration activities were to occur within the Southern Lease prior to the collection of cameras, then exploration could not commence for a minimum of eight weeks following deployment of cameras.

Field surveys were undertaken over the following periods:

- 29 April – 8 May 2021 (10 days): Deployment of 75 cameras in the Southern Grid and 75 cameras in the Northern Grid; and
- 25 August – 1 September 2021 (8 days): Collection of 75 cameras in the Southern Grid and 75 cameras in the Northern Grid.

Due to Covid-19 restrictions, the cameras were deployed for longer than the minimum 10 weeks. Cameras were collected after 111-119 days (approximately 15-17 weeks) following deployment.

Exploration activities within the Southern Lease commenced in mid-August 2021. Therefore, exploration did not commence until the cameras had been deployed for at least 14 weeks, which is six weeks more than the minimum eight weeks identified by DEPWS.

2.2.2. Methods

The methods used for the Program were developed in consultation with DEPWS and were based off those used successfully in the NT to estimate feral cat densities. The following sections outline the methodology used for the Program, which is derived from the methodology detailed in Stokeld and Gillespie (2020) with some minor modifications. In order to achieve a high level of rigour and sensitivity, these methods were applied with precision and consistency throughout the Program.

2.2.2.1. Site Preparation

The following steps were undertaken when preparing camera sites to minimise false triggers, maximise identification of animals and to reduce fire risk to equipment:

1. All vegetation up to 4 m in front of the camera and 1 m surrounding the camera was cleared (see **Plate 1** and **Plate 2**). A shovel, rake and secateurs were used to remove any low hanging vegetation, grass, sticks, leaves etc. Time was taken to remove any spindly blades of grass or other small bits of vegetation in the field of view that might wave in the breeze and cause false triggers.
2. The field of view of the sensor was considered, with vegetation cleared at least 1.5 m to either side of the focal point/bait station.
3. Any other vegetation outside the clearing area that may cause false triggers, such as over-hanging branches, or plants that may grow into the sensor field during the deployment period was removed.
4. Perennial grass and shrub bases were dug out within the cleared area.
5. Piling of cleared material immediately next to the camera station area was avoided, as this may have blown across the field of vision, triggering false images or impeding animal access.
6. The camera field of view was checked to verify effective vegetation clearing by triggering the camera and checking photos on the secure digital card (SD card) with a digital camera.

2.2.2.2. Baits and Lures

Baits and lures were used to attract predators and mammals to the cameras. Baits were alternated between sites, consisting of either soiled cat litter (**Plate 1**) or standard mammal baits (**Plate 2**). Due to an uneven number of sites on each grid, each grid contained 38 sites with soiled cat litter and 37 sites with standard mammal baits. The requirement to alternate baits between sites was determined in consultation with DEPWS (see **Section 2.4**). DEPWS considered it appropriate to target both feral cats and the Northern Quoll, which were targeted using soiled cat litter and standard mammal baits, respectively.

Where soiled cat litter was used, a handful was spread on the ground approximately 2.5 m in front of the camera. Where standard mammal baits were used, they were installed as follows:

1. Bait stations were comprised of an 80 mm PVC pipe, with a ventilated cap on each end to prevent fauna eating the bait ball whilst allowing the scent of a bait ball to escape. The ventilated cap on the top of the bait station had an overhanging cover to reduce dilution of the bait ball during rainfall. Bait balls were made using a mixture of peanut butter, oats and honey (to a wet and oily consistency) and placed within the bait container. Bait balls were at least the size of a golf ball.
2. Each bait station was secured to a metal star picket with a cable tie and cloth tape. The metal star picket was 45 cm in length. The metal star picket was hammered into the ground, 2.5 m in front of the camera, so that the top of the bait station was approximately 30 cm above the ground.
3. Ant granules were sprinkled around the base of the metal star picket.

Plate 1 Layout of the camera site (soiled cat litter)

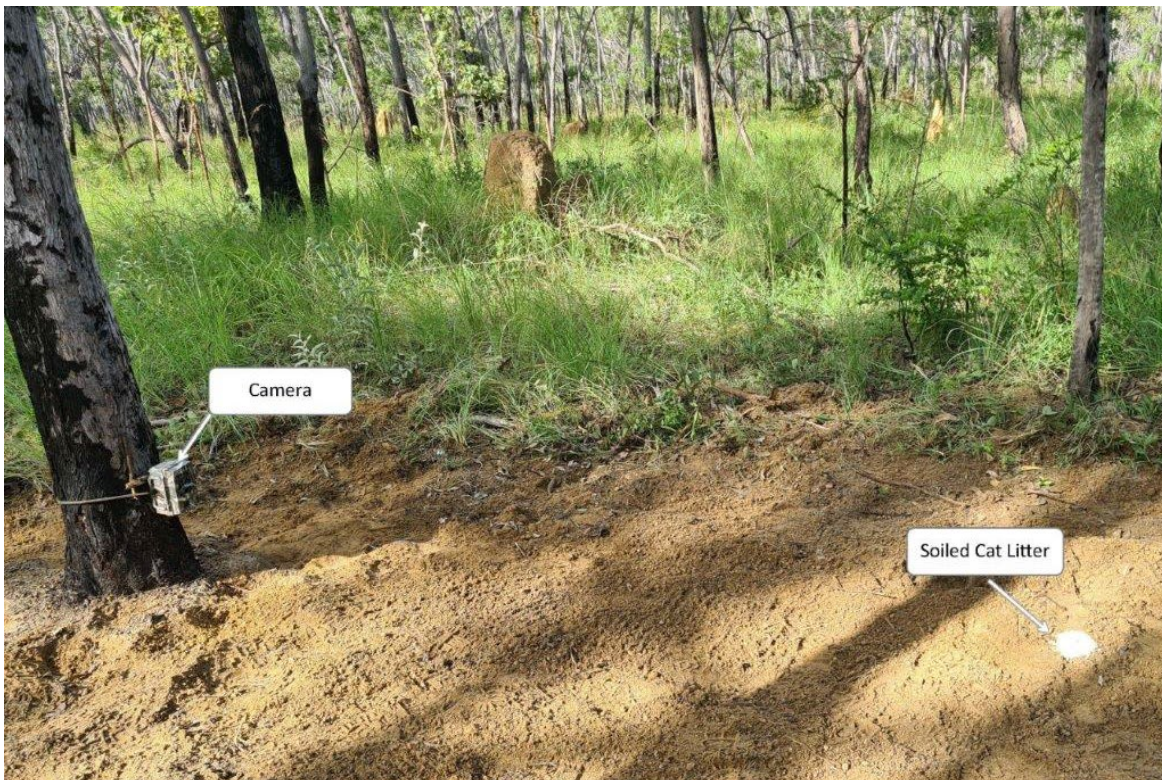
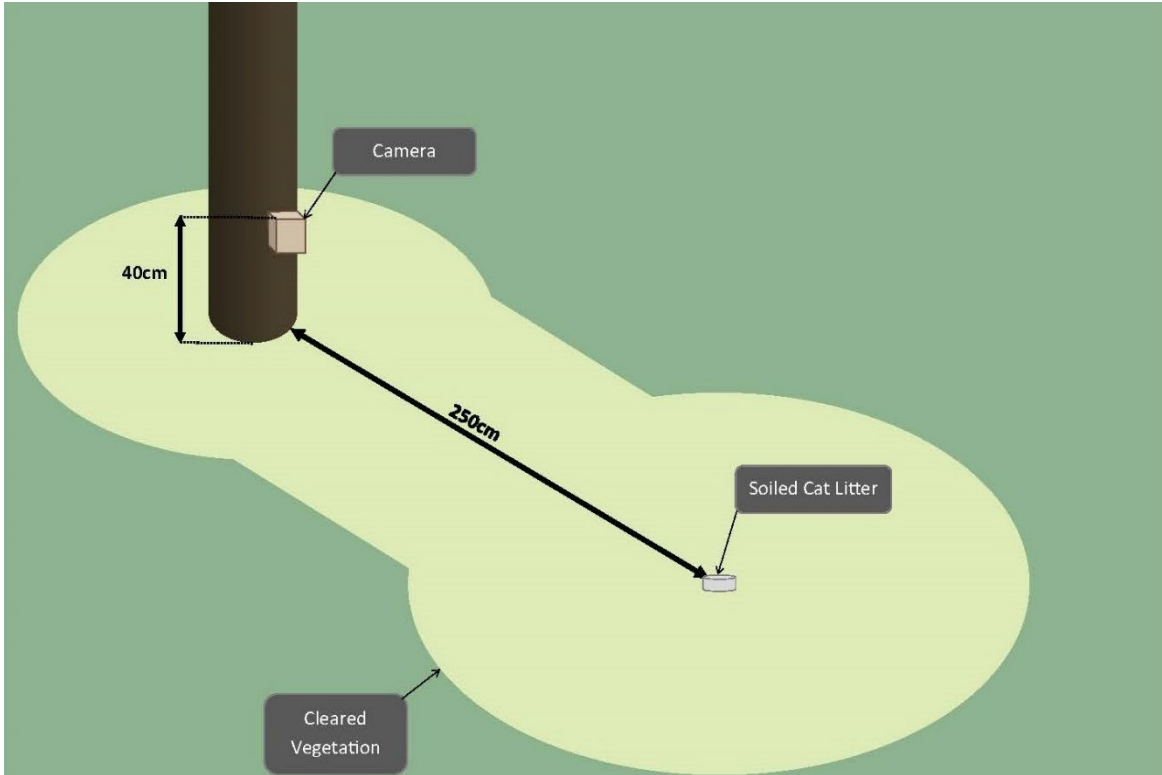
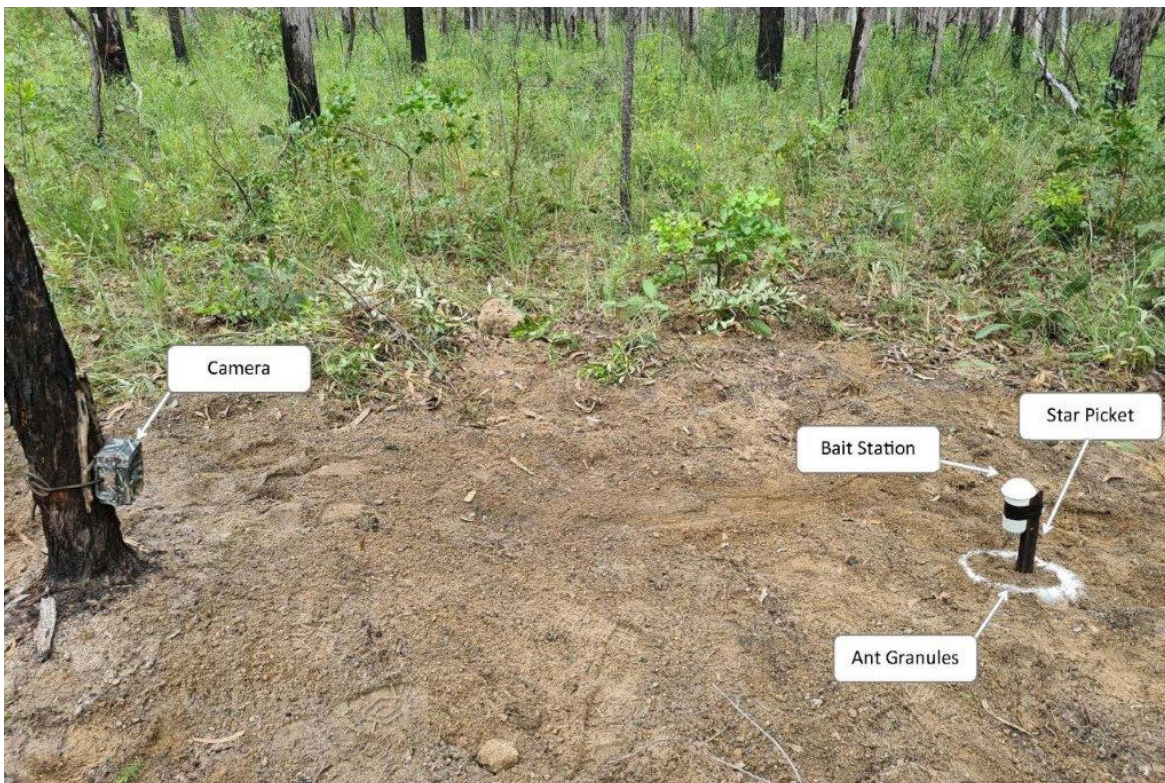
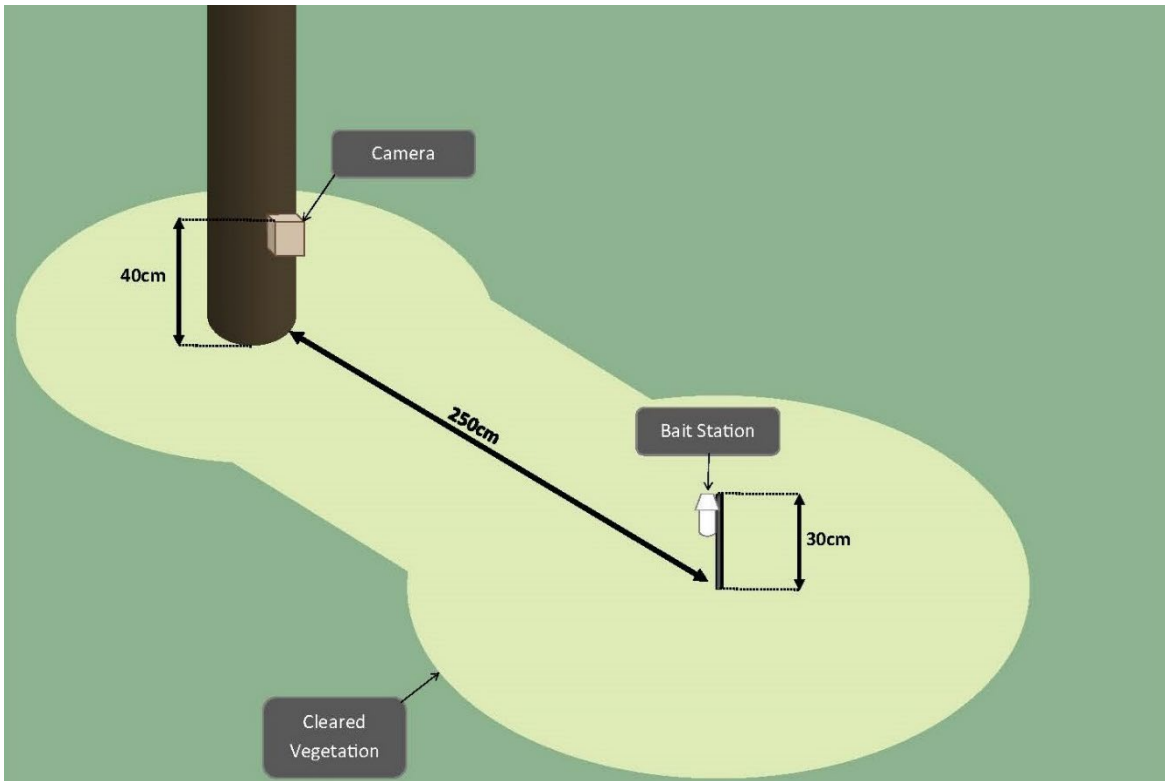


Plate 2 Layout of the camera site (standard mammal bait)



2.2.2.3. Camera Deployment

At each of the 75 camera sites within each grid, a motion-sensor camera was deployed. All cameras were Reconyx PC850 Hyperfire Professional White Flash Camera units. All cameras used were previously modified by Reconyx to have high sensitivity and a focal length of 90 cm.

The following steps were undertaken when setting up each camera:

- Fresh batteries were installed, along with an empty SD card, and silica desiccant.
- The camera was configured with the following settings in the Advanced setup mode:
 - Motion sensor: ON
 - Sensitivity: HIGH
 - Pictures per trigger: 3
 - Picture interval: RAPIDFIRE
 - Quiet period: NO DELAY
 - Image resolution: 3.1 MEGA PIXELS
 - Night Mode: FAST SHUTTER
- The camera number and SD card number were recorded on a datasheet.
- The date and time that the camera was set was determined during data analysis.
- The location of the camera was entered into a hand-held Global Positioning System unit by selecting 'Mark' and entering the grid code, site number and bait code (e.g. 'S01C' is equal to the Southern Grid, camera sequence number 1 and soiled cat litter bait, 'N02M' is equal to the Northern Grid, camera sequence number 2 and standard mammal bait). Once these details were added, the waypoint was saved.
- The coordinates of each camera site were recorded on a datasheet.
- The camera was set 2.5 m from the bait station and 40 cm from the ground to the top of the camera casing (see **Plate 1** and **Plate 2**). A tape measure was used to precisely measure these distances.
- The camera was attached to a tree with an 'octopus strap'. Where possible, dead trees, or trees with a diameter less than 20 cm were avoided, to minimise the likelihood of false triggers should these trees move in windy conditions.
- The camera was checked to ensure it was facing south and the correct way up.
- The camera was angled slightly downward, so it captured the base of the bait station or soiled cat litter in the middle of the frame, to ensure a consistent field of 'detection'.

- The sensor screen and camera lens were checked to ensure they were clean. The field of view of the camera was also checked to ensure there were no obstacles, such as branches, straps or flagging tape, in front of the sensor.
- The camera was tested to ensure the camera was working and that the image was centred on the base of the bait station or soiled cat litter. This was done by inserting an SD card into the camera, then triggering image capture by moving across the motion detection zones. The SD card was then inserted into a digital camera which had its viewing screen marked with a circular label showing the centre of the image.
- The camera was repositioned and tested until the image was centred on the base of the bait station or soiled cat litter and then all test images were deleted from the camera.
- Flagging tape was secured above the camera, ensuring it was long enough to see from a distance but not positioned to trigger the camera.
- The camera was armed following completion of site setup. This involved:
 - Opening the remote camera unit.
 - Flipping the on/off switch to the 'on' position. The screen was checked to ensure that the batteries were charged, that the battery type was correct, and that the SD card was empty, prior to waiting for 'ARM CAMERA' to be displayed.
 - Pressing the 'OK' button.
 - Before closing the camera, the rubber seal was checked to ensure it was clean.
 - The unit was then closed.

2.2.2.4. Camera Collection

Camera collection was undertaken as follows:

- The camera was approached from the front to trigger a 'capture' sequence. This sequence was used to indicate the end of the sampling period.
- The camera was opened, and the 'OK' button was pressed to view and record capture data.
- The following data was recorded:
 - Date of collection;
 - Whether the camera was still working;
 - Number of images;
 - Percentage of SD card filled;
 - Percentage of battery remaining;

- Unique camera identifier (e.g. G001, G002), including cross check with deployment data;
- Unique SD card identifier (e.g. G001, G002), including cross check with deployment data;
- Additional notes regarding the site, including evidence of recent disturbance such as fire.
- The camera was switched off.
- All equipment, including camera and bait station were removed.

The date of when the SD card became full was determined during data analysis.

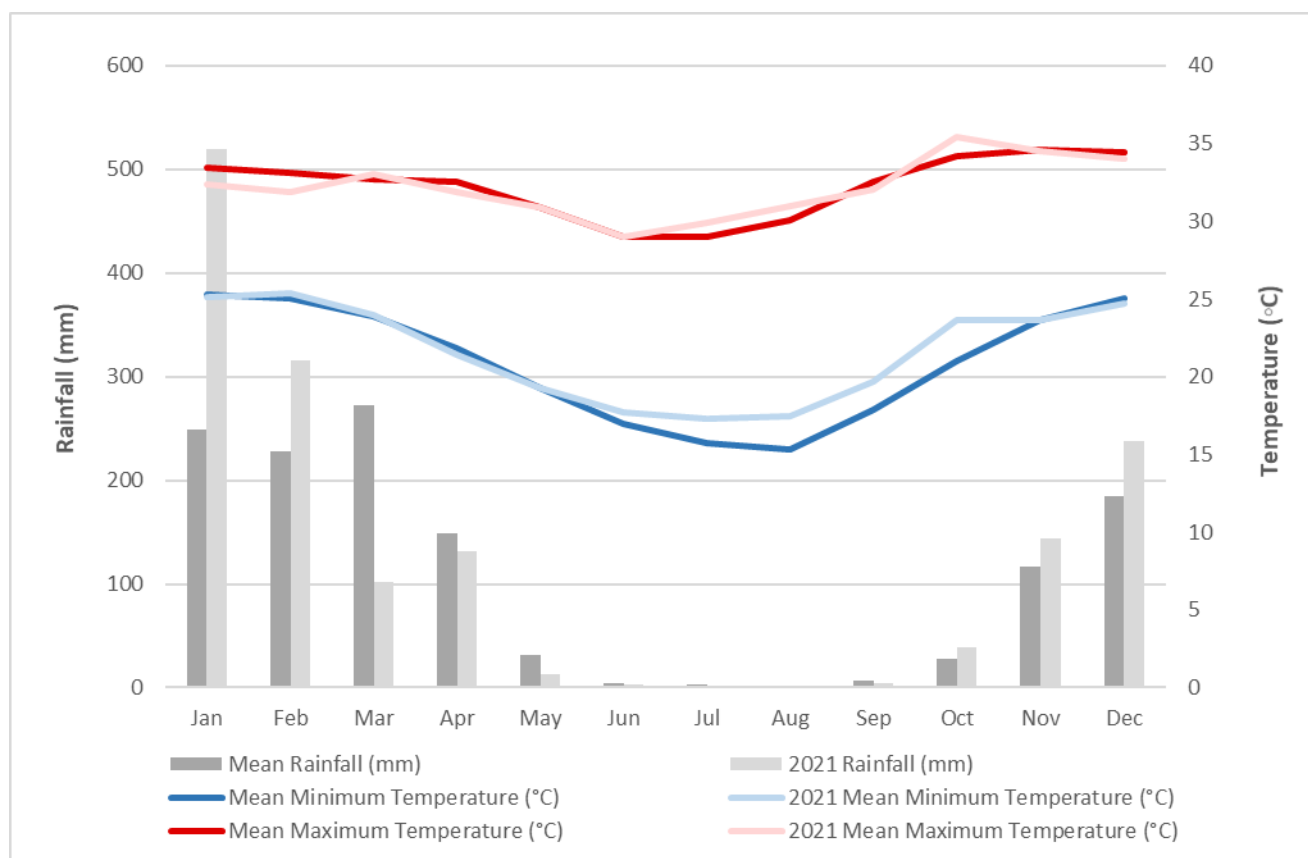
2.2.3. Weather Conditions

Average monthly rainfall and temperature data from 2021 recorded at the Bureau of Meteorology (BoM) weather station at Groote Eylandt Airport is presented within **Graph 1**. The data from this weather station is considered to be broadly representative of the conditions in the Study Area.

As can be seen from **Graph 1**, minimum and maximum temperatures during the 2021 field survey dates (April to September) were similar to the historic averages. The three months preceding the commencement of surveys in 2021 comprised the tail end of the wet season.

The weather conditions at the time of the surveys were generally favourable for surveys. Commencement of the surveys in April 2021 resulted in some sites occurring in proximity to standing water, however this quickly dissipated in the following weeks.

Graph 1 Comparison of the historic mean and 2021 data for rainfall and temperature



2.3. Data Analysis

2.3.1. Data Entry

Following completion of field surveys, the collected data was collated and entered into a tabular format. This included the data from the camera deployment (including deployment date, camera/SD numbers etc) and collection (including collection date, camera/SD numbers, whether the camera was working etc).

2.3.2. Image Identification

Images were downloaded from the cameras following completion of the field survey and imported into a CPW Photo Warehouse database (Newkirk 2016). Due to the quantum of images, the data was split into two databases, one for the Southern Grid and one for the Northern Grid. The database requires data to be labelled using a study area name and a location name. The databases were therefore set up to have each grid representing a 'study area' within the database, with the individual cameras each representing a 'location' within the 'study area'. The naming of each 'location' (e.g. S01C, N02M) utilised the following codes for grid, camera sequence number, and bait type:

- Grid:
 - S = Southern Grid;
 - N = Northern Grid;
- Camera sequence number (01-75);
- Bait type:
 - C = soiled cat litter;
 - M = standard mammal bait.

Images were imported into a CPW Photo Warehouse database and files were renamed to include the location name (e.g. S01C, S02M, N01C, N02M), date and time of image capture and sequential image number.

Images were identified using the following two-stage process:

- Initial identification of images not containing any fauna species; and
- Identification of individual species within the fauna images.

As part of quality control, a re-check of the data was undertaken by the initial ecologist or second ecologist at a later point in time to ensure all fauna images were identified.

2.3.3. Analysis

A number of queries within the CPW Photo Warehouse database were utilised to export the data into tabular format. Geographic Information System was utilised to determine proximity of each camera location to exploration tracks (Southern Grid only) and public access tracks.

A number of sources of information were consulted during the analysis of data, and included:

- The NT Natural Resource Maps (NR Maps) search facility (DNRM 2020) – to obtain records of existing occurrences on Groote Eylandt;
- GEMCO/South32 Small Mammal Research Project – Report (Cumberland Ecology 2019b) – to obtain details of naïve occupancy of species within this previous study;
- Status of mammals on Groote Eylandt: Safe haven or slow burn (Heiniger et al. 2020) – to obtain details of survey methodology of the 2016 DEPWS Study, and naïve occupancy of species within this and other previous studies; and
- Excel data provided by DEPWS for the 2016 DEPWS Study – to enable comparisons of results from the Program to the 2016 DEPWS Study.

Key data analyses that were conducted included:

- Determination of presence of fauna, including target species, at each camera location;

- Identification of naïve occupancy of each target species and comparison to the 2016 DEPWS Study, and previous studies reported in Heiniger et al. (2020). Naïve occupancy is the ratio of number of sites where a species is detected to total number of sites surveyed, without corrections to the data. This type of analysis allows for the measurement of changes in naïve occupancy based on presence/absence data from previous studies.
- Identification of detection frequency of the target species at each camera location (i.e. number of calendar days recorded);
- Determination of proximity of detection of target species to exploration tracks (Southern Grid only);
- Determination of proximity of detection of target species to public access tracks;
- Comparison of the presence/absence of target species between the Southern Grid (disturbed by exploration) and the Northern Grid (undisturbed by exploration); and
- Comparison of the presence/absence of target species between the results of the 2016 DEPWS Study and the Program.

2.4. DEPWS Consultation

Consultation for the Program was undertaken with DEPWS (Dr Graeme Gillespie [Director Terrestrial Ecosystems] and Danielle Stokeld [Project Manager, Biodiversity]). This included initial consultation to discuss the requirements of the Program, including location, timing, duration and bait selection. DEPWS subsequently reviewed the Survey Design Plan (Cumberland Ecology 2021) prepared for the Program. The Survey Design Plan outlined the survey locations and the proposed methods for field survey and data analysis. DEPWS was also consulted following the completion of field surveys to discuss the preliminary findings.

2.5. Personnel

The Program was led by a team of ecologists from Cumberland Ecology, with support during field surveys provided by Traditional Owners and GEMCO/South32 staff. A full list of personnel involved in the Program is provided in **Appendix C**.

2.6. Limitations

The following specific limitations are relevant to the Program:

- Camera malfunction or filling of SD cards resulting from false triggers resulted in 41 cameras not capturing images for the entire duration of the deployment. This is in part due to the extended duration that the cameras were deployed. Approximately 92% of cameras were working after 10 weeks (which was initially intended to be the duration that cameras were deployed), 81% were working after 15 weeks and 73% were working until the cameras were collected. On average, cameras were working for 107 days.
- Fauna disturbance resulted in the alteration of camera positions at a small number (<10) of sites. This meant that some cameras were not able to capture images that were centred on the baits and lures for the entire duration of the deployment.

- One site could not be positioned within 50m of the computer-generated grid point, due to the presence of an inundated wetland. This site was positioned 60m from the grid point.

None of the above limitations are considered to be significant. The field surveys were successful in detecting a wide range of vertebrate fauna, particularly small mammals, with over 16,136 capture nights¹ of data collected.

¹ A capture night represents a single night that an individual camera was deployed and working (e.g. one camera left for seven nights represents seven capture nights).

3. Results and Discussion

3.1. Overview

3.1.1. Images

Over 1.61 million images were captured on cameras during the Program, over 16,136 capture nights. The total number of images captured in each of the grids is as follows:

- Southern Grid: ~913,900 total of which ~131,100 (equivalent to 14% of images) assigned to fauna triggers; and
- Northern Grid: ~698,700 of which ~134,400 (equivalent to 19% of images) assigned to fauna triggers.

Overall, approximately 16% of images collected were associated with fauna triggers.

3.1.2. Fauna Species

Fifty-three (53) fauna species were identified to species level on images captured on cameras during the Program, including 34 birds, 13 mammals and 6 reptiles. A number of other species were unable to be identified to species level. A breakdown of species recorded at each camera site in the Southern Grid and Northern Grid is provided in **Appendix D** and **Appendix E**, respectively.

The most commonly recorded species across the Study Area included:

- Northern Brown Bandicoot (*Isodon macrourus*) – 150 camera sites;
- Agile Wallaby (*Macropus agilis*) – 146 camera sites.
- Northern Quoll (*Dasyurus hallucatus*) – 145 camera sites;
- Australian Magpie (*Gymnorhina tibicen*) – 111 camera sites;
- Delicate Mouse (*Pseudomys delicatulus*) – 94 camera sites; and
- Australian Owlet-nightjar (*Aegotheles cristatus*) – 72 camera sites.

Example photographs of these species are provided in **Appendix F**.

3.2. Feral Cat

3.2.1. Previous Records on Groote Eylandt

The NR Maps database holds 22 records of feral cats on Groote Eylandt, including the records from the 2016 DEPWS Study. These records are located at 15 locations (see **Figure 7**). Most of these locations are in proximity to public access tracks. Six of these locations are along the road from Angurugu to Umbakumba, two are along the road to the Northern Grid, five are within the Southern Lease and two are in close proximity to the Eastern Leases. All records within the NR Maps database are from 2014-2016.

3.2.2. Comparison between the Southern and Northern Grid Data

Feral cats were recorded at a total of four camera sites, including two within the Southern Grid (see **Figure 8**) and two within the Northern Grid (see **Figure 9**). Photographs of the feral cats at each camera site are provided in **Photographs 1-4**. Details of the detections, including closest distances to public access tracks and exploration tracks (Southern Grid only) are provided in **Table 2**. As shown in this table, there was only one date of detection at each camera site.

Table 2 Summary of feral cat detections

Grid	Site Name	First Date Recorded	Last Date Recorded	# Calendar Days Detected	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Southern Grid	S06M	10/07/2021	10/07/2021	1	226	173 (2020)
Southern Grid	S71C	25/08/2021	25/08/2021	1	64	838 (2019)
Northern Grid	N40M	26/06/2021	26/06/2021	1	244	n/a
Northern Grid	N55C	8/07/2021	8/07/2021	1	715	n/a

Due to the limited number of detections, few conclusions can be made regarding the occurrence of feral cats, including the number of individuals detected. However, the following is noted:

- The naïve occupancy of feral cats for the Program is 0.03 (n=150);
- The naïve occupancy of feral cats in the Southern Grid and Northern Grid is identical, being 0.03 (n=75);
- Detections occurred at camera sites baited with soiled cat litter (total of two sites) and standard mammal bait (total of two sites);
- One of the detections occurred more than 10 weeks post camera site establishment, which was initially intended to be the duration that cameras were deployed. Detections were recorded at the following time periods, post camera site establishment:
 - Southern Grid:
 - S06M: 9.7 weeks;
 - S71C: 16.3 weeks;
 - Northern Grid
 - N40M: 6.4 weeks; and
 - N55C: 8.9 weeks.

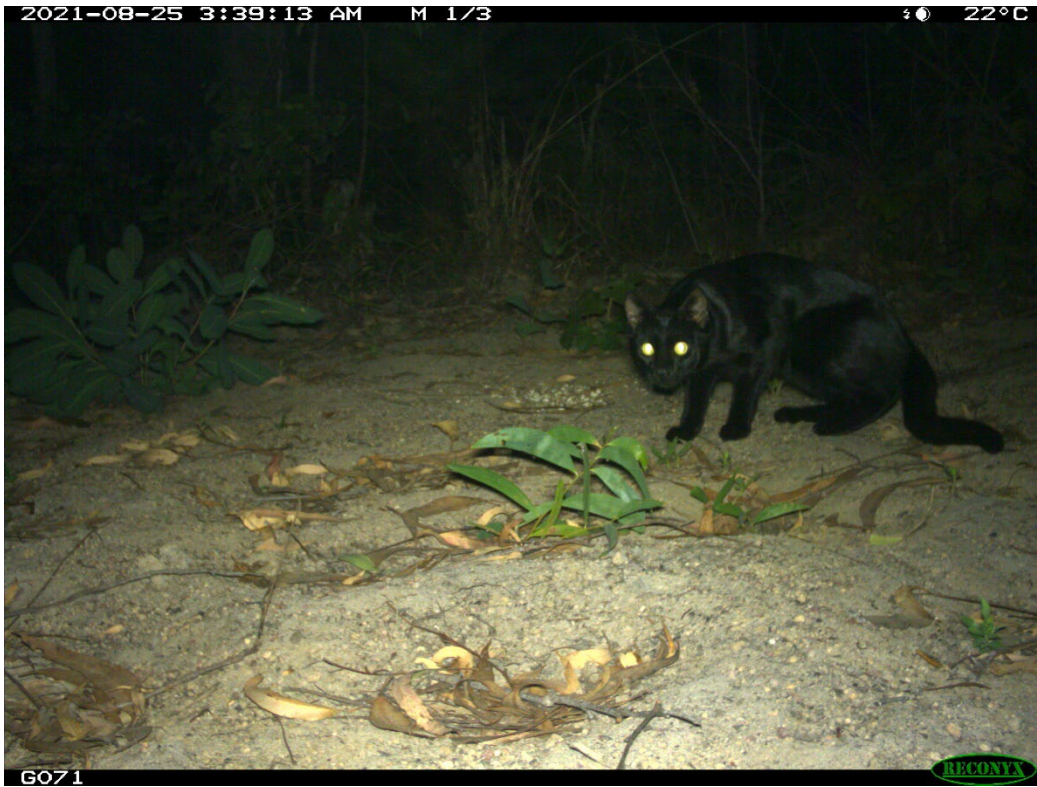
- All of the detections per camera sites occurred on a single calendar day. At camera site N55C, the individual was recorded at approximately 6am and again at approximately 9am; and
- At least two individual cats were detected (one black and one mottled). Due to the limited number of photographs, and obscured image at N40M, a review of pelage patterns could not determine with a high degree of confidence if each site represented a different individual.

Due to the low number of detections, an estimate of density could not be undertaken. Based on the findings outlined above, it is likely that the density of feral cats does not differ between areas that have been subject to clearing for exploration (i.e. Southern Grid) compared to areas in which exploration has not been undertaken (i.e. Northern Grid).

Photograph 1 Feral cat at camera site S06M



Photograph 2 Feral cat at camera site S71C



Photograph 3 Feral cat at camera site N40M



Photograph 4 Feral cat at camera site N55C



3.2.3. Comparison to 2016 DEPWS Study

During the 2016 DEPWS Study, feral cats were recorded at a total of four camera sites, all of which were within the respective southern grid (see **Figure 10**). This included a total of seven detections. Based upon distinct pelage patterns, the detections were assessed as comprising four individual cats (Heiniger et al. 2020). Due to the low number of detections, an estimate of density could not be undertaken.

As a result of low detections during both the Program and 2016 DEPWS Study, a comparison of feral cat densities between the two studies could not be undertaken. However, a review of the naïve occupancy of the species was undertaken. This data indicates the following:

- The Program shows lower naïve occupancy in the Southern Grid when compared to the 2016 DEPWS Study;
- The Program shows higher naïve occupancy in the Northern Grid when compared to the 2016 DEPWS Study, with the latter not detecting any feral cats; and
- The overall naïve occupancy for the Program and the 2016 DEPWS Study is identical.

Based on the findings of the Program, it is concluded that exploration activities within the Southern Lease have not resulted in an increase in the naïve occupancy of feral cats in the time between the 2016 DEPWS Study and the Program.

3.2.4. Comparison to Existing Data

Table 3 provides a summary of the naïve occupancy of feral cats for the Program, the 2016 DEPWS Study, the Small Mammal Research Project (Cumberland Ecology 2019b) and other studies as reported in Heiniger et al. (2020). Naïve occupancy does not correct for imperfect detections and allows for comparison of data from different studies, despite the use of different survey methods. The review of this data indicates the following:

- The Program shows lower naïve occupancy in both the grids and overall, when compared to other studies undertaken on Groote Eylandt.
- The Program shows significantly lower naïve occupancy in both the grids and overall, when compared to studies on the Tiwi Islands and mainland NT.

Based on the findings of the Program, it is concluded that exploration activities within the Southern Lease have not resulted in an increase in the naïve occupancy of feral cats. Occupancy within the Southern Lease is comparable, and lower than previous studies in 2016 (Heiniger et al. 2020) and 2017-2018 (Cumberland Ecology 2019b).

Table 3 Comparison of naïve occupancy of feral cats

Location	Number of Locations Detected	Number of Sites Surveyed (n)	Naïve Occupancy
Program			
Southern Grid	2	75	0.03
Northern Grid	2	75	0.03
Total	4	150	0.03
2016 DEPWS Study			
Southern Grid	4	70	0.06
Northern Grid	0	70	0.00
Total	4	140	0.03
Small Mammal Research Project¹			
Groote Eylandt ²	8	112	0.07
Tiwi Islands ²	26	110	0.24
Mainland ²	30	131	0.23
All Groote Island Locations			
	25	554	0.05

1. Derived from data contained within Cumberland Ecology (2019b).

2. Derived from data contained within Heiniger et al. (2020). Number of locations detected is inferred from the number of sites surveyed and naïve occupancy.

3.3. Northern Quoll

3.3.1. Previous Records on Groote Eylandt

The NR Maps database holds over 4,500 records of the Northern Quoll across Groote Eylandt, including the records from the 2016 DEPWS Study. The location of these records is shown on **Figure 11**. A further 146 records are shown on this figure from Cumberland Ecology that are not currently held within the NR Maps database. The Northern Quoll is widespread on the island.

3.3.2. Comparison between the Southern and Northern Grid Data

3.3.2.1. Overview

The Northern Quoll was recorded at a total of 145 camera sites, including 74 within the Southern Grid and 71 within the Northern Grid. Due to the high number of detections in both the Southern Grid and Northern Grid, there is a high degree of confidence that if the species was present at a camera site, it would have been recorded. Therefore, the methods used for the Program are considered to be highly suitable for the detection of the Northern Quoll.

3.3.2.2. Southern Grid

As noted above, the Northern Quoll was detected at 74 camera sites within the Southern Grid, equal to 99% of camera sites. The locations of camera sites where the Northern Quoll was recorded in the Southern Grid are shown in **Figure 12**. Example photographs of the Northern Quoll in the Southern Grid are provided in **Photographs 5-6**. A summary of the Northern Quoll detections in the Southern Grid, including closest distances to exploration tracks and public access tracks, is provided in **Appendix G**.

The following general observations of the data were made:

- The naïve occupancy of the Northern Quoll for the Southern Grid is 0.99 (n=75);
- Detections occurred at camera sites baited with soiled cat litter (total of 38 sites) and standard mammal bait (total of 36 sites); and
- Northern Quolls appeared for the first time at camera sites between 0-115 days post camera deployment.

The number of calendar days detected at a camera site ranged between 1-25 days. The number of detection days for each camera site is provided in **Appendix G**. The following ranges were assessed, and are shown in **Figure 13**:

- 1-10 days: 46 camera sites;
- 11-20 days: 24 camera sites; and
- 21-30 days: 4 camera sites.

A higher number of detection days is considered likely to correlate to a core home range of resident individuals of the species. It is likely that the same individuals would have been detected over multiple nights and cameras. Lower detection days may represent dispersal or larger foraging ranges.

The highest number of days of detection occurred at the following camera sites:

- S04M: 21 detection days, with detections occurring over a period of 95 days;
- S15C: 24 detection days, with detections occurring over a period of 69 days;
- S31C: 25 detection days, with detections occurring over a period of 95 days;
- S57C: 24 detection days, with detections occurring over a period of 118 days.

Camera sites S04M and S15C are located in the north eastern portion of the Southern Grid. Camera sites S31C and S57C are located in close proximity to Yenbakwa Road, and existing exploration tracks.

Photograph 5 Northern Quoll at camera site S04M



Photograph 6 Northern Quoll at camera site S31C



3.3.2.3. Northern Grid

As noted above, the Northern Quoll was detected at 71 camera sites within the Northern Grid, equal to 95% of camera sites. The locations of camera sites where the Northern Quoll was recorded in the Northern Grid are shown in **Figure 14**. Example photographs of the Northern Quoll in the Northern Grid are provided in **Photographs 7-8**. A summary of the Northern Quoll detections in the Northern Grid, including closest distances to public access tracks, is provided in **Appendix G**.

The following general observations of the data were made:

- The naïve occupancy of the Northern Quoll for the Northern Grid is 0.95 (n=75);
- Detections occurred at camera sites baited with soiled cat litter (total of 36 sites) and standard mammal bait (total of 35 sites);
- Northern Quolls appeared for the first time at cameras sites between 0 -104 days post camera deployment; and
- A pair of Northern Quolls were recorded mating on 20 July 2021 at camera site N12M.

The number of calendar days detected at a camera site ranged between 1-16 days. The number of detection days for each camera site is provided in **Appendix G**. The following ranges were assessed, and are shown in **Figure 15**:

- 1-10 days: 68 camera sites; and
- 11-20 days: 3 camera sites.

Photograph 7 Northern Quoll at camera site N01C



Photograph 8 Northern Quoll at camera site N18M



3.3.2.4. Comparison of Grids

Table 4 provides a summary of the Northern Quoll detections between the Southern Grid and Northern Grid. This data indicates the following:

- The Program shows slightly higher naïve occupancy in the Southern Grid when compared to the Northern Grid; and
- The Program shows a higher average number of detection days per camera site in the Southern Grid when compared to the Northern Grid.

Based on the findings of the Program, it is concluded that exploration activities within the Southern Lease have not resulted in a decrease in the naïve occupancy or frequency of detection of the Northern Quoll when comparing the disturbed area (Southern Grid) to the undisturbed area (Northern Grid).

Table 4 Summary of Northern Quoll detections between the Southern Grid and Northern Grid

Parameter	Southern Grid	Northern Grid
Camera Sites Detected	74	71
Naïve Occupancy	0.99 (n=75)	0.95 (n=75)
Average # Detection Days / Camera Site	9	5

Parameter	Southern Grid	Northern Grid
# Camera Sites in each Detection Frequency Range		
1-10	46	68
11-20	24	3
21-30	4	-
Average Distance to Closest Public Access Track (m)	342	554
Average Distance to Closest Exploration Track (m)	139	n/a

3.3.3. Comparison to 2016 DEPWS Study

During the 2016 DEPWS Study, the Northern Quoll was recorded at a total of 62 camera sites, including 37 within the Southern Grid (see **Figure 16**) and 25 within the Northern Grid (see **Figure 17**).

A review of the naïve occupancy of the species between the Program and the 2016 DEPWS Study was undertaken. This data indicates the following:

- The Program shows a significantly higher naïve occupancy in the Southern Grid when compared to the southern grid surveyed in the 2016 DEPWS Study;
- The Program shows a significantly higher naïve occupancy in the Northern Grid when compared to the northern grid surveyed in the 2016 DEPWS Study; and
- The Program shows a significantly higher naïve occupancy overall when compared to the 2016 DEPWS Study.

One key observation between the 2016 DEPWS Study and the Program is that the percentage of camera sites that the Northern Quoll was detected at has increased between 2016 and 2021. Although the duration of camera deployment differed between the two studies (2016 DEPWS Study: 62-69 days, Program: 111-119 days), only five of the camera sites in the Program (two in the Southern Grid and three in the Northern Grid) had the first detections after 69 days, which is the maximum number of days for the 2016 DEPWS Study.

All detections of the Northern Quoll are within the distribution of previous records of the species across the island (see **Figure 11**).

Based on the findings of the Program, it is concluded that exploration activities within the Southern Lease have not resulted in a decrease in the naïve occupancy of the Northern Quoll. Occupancy within the Southern Lease following exploration activities between 2016-2020 is higher than that of previous studies in 2016 (Heiniger et al. 2020) and 2017-2018 (Cumberland Ecology 2019b).

3.3.4. Comparison to Existing Data

Table 5 provides a summary of the naïve occupancy of the Northern Quoll for the Program, the 2016 DEPWS Study, the Small Mammal Research Project (Cumberland Ecology 2019b) and other studies as reported in Heiniger et al. (2020). Naïve occupancy does not correct for imperfect detections and allows for comparison

of data from different studies, despite the use of different survey methods. The review of this data indicates the Program shows a significantly higher naïve occupancy when compared to the previous studies on Groote Eylandt reported in Heiniger et al. (2020).

Table 5 Comparison of naïve occupancy of the Northern Quoll

Location	Number of Locations Detected	Number of Sites Surveyed (n)	Naïve Occupancy
Program			
Southern Grid	74	75	0.99
Northern Grid	71	75	0.95
Total	145	150	0.97
2016 DEPWS Study			
Southern Grid	37	70	0.53
Northern Grid	25	70	0.36
Total	62	140	0.44
Small Mammal Research Project¹			
	128	152	0.84
Groote Eylandt²			
	110	112	0.98
Mainland²			
	2	131	0.015
All Groote Island Locations			
	354	554	0.64

1. Derived from data contained within Cumberland Ecology (2019b).

2. Derived from data contained within Heiniger et al. (2020). Number of locations detected is inferred from the number of sites surveyed and naïve occupancy.

3.4. Incidental Records

3.4.1. Brush-tailed Rabbit-rat

The Brush-tailed Rabbit-rat was recorded at a total of 54 camera sites, all of which occurred within the Northern Grid. The locations of these records are shown in **Figure 18**. Example photographs of the Brush-tailed Rabbit-rat are provided in **Photographs 9-10**. A summary of the Brush-tailed Rabbit-rat detections in the Northern Grid is provided in **Appendix H**.

Due to the high number of detections in the Northern Grid, within an area that the species is known to occur, there is a high degree of confidence that if the species was present at a camera site, it would have been recorded. Therefore, the methods used for the Program are considered to be highly suitable for the detection of the Brush-tailed Rabbit-rat.

The lack of records from the Southern Grid suggests that the species is not present within this area. Given high survey intensity, and duration of the survey, it is concluded that there is a low probability of occurrence for the species in the Southern Grid. This is further supported by the findings of the 2016 DEPWS Study, as well as the Small Mammal Research Project (Cumberland Ecology 2019b), which did not detect the Brush-tailed Rabbit-rat within a study area focussed on the Southern Lease.

Heiniger et al. (2020) noted that the Brush-tailed Rabbit-rat was absent from a large proportion of studied sites despite being positioned within seemingly suitable habitat. A positive association with shrub density was reported, however it was noted that further research is required to ascertain what factors may be limiting the distribution of this species on Groote Eylandt.

Photograph 9 Brush-tailed Rabbit-rat at camera site N63C



Photograph 10 Brush-tailed Rabbit-rat at camera site N64M



3.4.2. Other Threatened Mammals

No images of the Northern Hopping-mouse or Northern Brush-tailed Possum were captured by the cameras within the Study Area.

The lack of records from the Study Area suggests that these species are not present in the areas sampled. Given high survey intensity, and duration of the survey, it is concluded that there is a low probability of occurrence for these species in the Study Area. This is further supported by the findings of the 2016 DEPWS Study, as well as the Small Mammal Research Project (Cumberland Ecology 2019b), which did not detect these species within a study area focussed on the Southern Lease.

4. Conclusion

The Program aimed to investigate the impacts of exploration activities on feral cats and the Northern Quoll. As part of the Program, incidental records were collected for other species, including the Brush-tailed Rabbit-rat. It was important to understand the impacts of exploration activities, so that GEMCO's future exploration activities could be planned in a manner that minimised impacts on threatened mammals. The Program built upon existing research that was undertaken by DEPWS in 2016.

The Program comprised camera surveys at 150 locations within the Study Area, including 75 locations within the Southern Grid, which had been subject to disturbance from exploration activities, and 75 locations within a control site, the undisturbed Northern Grid. Cameras were deployed between late April and early September 2021. The Program represents a rigorous assessment that is supported by a robust data set.

The following target species were recorded within the Study Area:

- Feral cats: Total of four locations, including two within the Southern Grid and two within the Northern Grid; and
- Northern Quoll: Total of 145 locations, including 74 within the Southern Grid and 71 within the Northern Grid.

Based on the findings of the Program, it is concluded that exploration activities within the Southern Lease have not resulted in an increase in the naïve occupancy of feral cats. Occupancy within the Southern Lease is comparable, and lower than previous studies in 2016 (Heiniger et al. 2020) and 2017-2018 (Cumberland Ecology 2019b). The occupancy within the Southern Lease has remained lower than previous studies of feral cats on the Tiwi Islands and mainland NT reported in Heiniger et al. (2020).

Based on the findings of the Program, it is concluded that exploration activities within the Southern Lease have not resulted in a decrease in the naïve occupancy of the Northern Quoll. Occupancy within the Southern Lease following exploration activities between 2016-2020 is higher than that of previous studies in 2016 and 2017-2018. The Program shows a significantly higher naïve occupancy of Northern Quolls when compared to previous studies of the Northern Quoll on Groote Eylandt reported in Heiniger et al. (2020) and Cumberland Ecology (2019b).

5. References

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APPENDIX A :

Method Comparison to 2016 DEPWS Study

Heiniger et al. (2020) formally reports on the 2016 DEPWS Study. **Table 6** provides a comparison of available information on survey methods between the 2016 DEPWS Study and the Program. Differences between the two studies include slightly different locations of the Southern Grid, different bait types and different duration of camera deployment. As the data analysis between the 2016 DEPWS Study and the Program was limited to naïve occupancy, which accounts for imperfect data, the differences in methods between the two studies has not affected the analysis. Despite the differences between the two studies, the methods utilised are sufficiently similar to enable comparison of the data.

Table 6 Comparison of 2016 DEPWS Study and Project survey methods

Parameter	2016 DEPWS Study	Program
Southern Grid location	<ul style="list-style-type: none"> Located in the Southern Lease, in an area with no Brush-tailed Rabbit-rat occupancy Overlaid on a vehicle track See Figure 2 and Figure 5 	<ul style="list-style-type: none"> Located in the Southern Lease, in an area with no Brush-tailed Rabbit-rat occupancy Overlaid on exploration tracks See Figure 2 and Figure 5
Northern Grid location	<ul style="list-style-type: none"> Located in northern area of Groote Eylandt, with high Brush-tailed Rabbit-rat occupancy Overlaid on a vehicle track See Figure 2 and Figure 6 	<ul style="list-style-type: none"> Located in northern areas of Groote Eylandt, with high Brush-tailed Rabbit-rat occupancy Overlaid on a vehicle track See Figure 2 and Figure 6
Number of camera sites	<ul style="list-style-type: none"> 140, including 70 per grid 5 rows of 14 sites per grid, spaced between 400-600m apart 	<ul style="list-style-type: none"> 150, including 75 per grid 5 rows of 15 sites per grid, spaced 500m apart
Positioning of camera sites	<ul style="list-style-type: none"> Positioned locally to maximise feral cat detections, including along dry creek lines, bush tracks, naturally open areas 	<ul style="list-style-type: none"> Positioned facing across features suitable for detecting feral cats, including dry creek beds, gullies, ecotones, edges of rock ledges, animal tracks, or vehicle tracks
Survey dates	<ul style="list-style-type: none"> Mid-September 2016 – mid-November 2016 	<ul style="list-style-type: none"> Late-April 2021 – Early September 2021
Duration of camera deployment	<ul style="list-style-type: none"> 62-69 days 	<ul style="list-style-type: none"> 111-119 days
Baits and lures	<ul style="list-style-type: none"> Non-toxic feral cat bait (kangaroo and chicken meat sausage) and a stick soaked in cat urine Same bait/lure at all camera sites 	<ul style="list-style-type: none"> Soiled cat litter and standard mammal bait Within each grid, 38 camera sites within soiled cat litter and 37 camera sites with standard mammal bait

Parameter	2016 DEPWS Study	Program
Camera types	<ul style="list-style-type: none"> • Combination of PC850, modified PC850 and HC550, randomly assigned 	<ul style="list-style-type: none"> • Modified PC850
Camera settings	<ul style="list-style-type: none"> • Pictures per trigger: 3 • Picture interval: 1 second • Sensitivity: High • Quiet period: No delay 	<ul style="list-style-type: none"> • Pictures per trigger: 3 • Picture interval: Rapidfire • Sensitivity: High • Quiet period: No delay
Camera height	<ul style="list-style-type: none"> • 45 cm 	<ul style="list-style-type: none"> • 40 cm
Distance between camera and bait/lure	<ul style="list-style-type: none"> • 2.5 m 	<ul style="list-style-type: none"> • 2.5 m

APPENDIX B :

Coordinates of Camera Locations

Table 7 Coordinates of camera locations

Grid	Site #	Bait Type	Site Name	Zone	Easting	Northing	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Southern Grid	01	Cat Litter	S01C	53	658925	8438309	329	315 (2020)
Southern Grid	02	Mammal	S02M	53	659403	8438396	148	83 (2016)
Southern Grid	03	Cat Litter	S03C	53	659899	8438467	339	146 (2016)
Southern Grid	04	Mammal	S04M	53	660412	8438584	762	668 (2016)
Southern Grid	05	Cat Litter	S05C	53	660895	8438636	1,170	914 (2020)
Southern Grid	06	Mammal	S06M	53	659026	8437821	226	173 (2020)
Southern Grid	07	Cat Litter	S07C	53	659488	8437894	236	100 (2016)
Southern Grid	08	Mammal	S08M	53	659987	8437998	62	230 (2016)
Southern Grid	09	Cat Litter	S09C	53	660446	8438049	496	530 (2016)
Southern Grid	10	Mammal	S10M	53	660984	8438157	1,043	639 (2016)
Southern Grid	11	Cat Litter	S11C	53	659122	8437350	130	148 (2017)
Southern Grid	12	Mammal	S12M	53	659557	8437434	305	86 (2016)
Southern Grid	13	Cat Litter	S13C	53	660069	8437493	153	25 (2016)
Southern Grid	14	Mammal	S14M	53	660564	8437571	621	52 (2016)
Southern Grid	15	Cat Litter	S15C	53	661049	8437685	1,084	167 (2016)
Southern Grid	16	Mammal	S16M	53	659213	8436822	38	30 (2019)
Southern Grid	17	Cat Litter	S17C	53	659656	8436905	84	114 (2016)
Southern Grid	18	Mammal	S18M	53	660143	8437000	325	38 (2016)
Southern Grid	19	Cat Litter	S19C	53	660655	8437073	800	34 (2016)
Southern Grid	20	Mammal	S20M	53	661130	8437174	1,253	103 (2017)

Grid	Site #	Bait Type	Site Name	Zone	Easting	Northing	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Southern Grid	21	Cat Litter	S21C	53	659283	8436344	32	47 (2017)
Southern Grid	22	Mammal	S22M	53	659737	8436419	120	22 (2019)
Southern Grid	23	Cat Litter	S23C	53	660239	8436478	380	38 (2020)
Southern Grid	24	Mammal	S24M	53	660735	8436598	886	44 (2016)
Southern Grid	25	Cat Litter	S25C	53	661268	8436688	958	103 (2017)
Southern Grid	26	Mammal	S26M	53	659340	8435851	90	10 (2017)
Southern Grid	27	Cat Litter	S27C	53	659857	8435966	149	9 (2019)
Southern Grid	28	Mammal	S28M	53	660320	8436014	310	62 (2020)
Southern Grid	29	Cat Litter	S29C	53	660845	8436108	397	33 (2017)
Southern Grid	30	Mammal	S30M	53	661311	8436184	453	16 (2020)
Southern Grid	31	Cat Litter	S31C	53	659483	8435352	40	4 (2017)
Southern Grid	32	Mammal	S32M	53	659929	8435427	162	46 (2019)
Southern Grid	33	Cat Litter	S33C	53	660447	8435535	18	66 (2016)
Southern Grid	34	Mammal	S34M	53	660927	8435642	59	37 (2016)
Southern Grid	35	Cat Litter	S35C	53	661410	8435704	30	109 (2016)
Southern Grid	36	Mammal	S36M	53	659530	8434868	162	9 (2017)
Southern Grid	37	Cat Litter	S37C	53	660017	8434938	186	64 (2019)
Southern Grid	38	Mammal	S38M	53	660467	8435021	6	96 (2016)
Southern Grid	39	Cat Litter	S39C	53	660981	8435120	520	2 (2016)
Southern Grid	40	Mammal	S40M	53	661497	8435241	498	5 (2019)
Southern Grid	41	Cat Litter	S41C	53	659628	8434367	63	30 (2017)

Grid	Site #	Bait Type	Site Name	Zone	Easting	Northing	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Southern Grid	42	Mammal	S42M	53	660086	8434425	12	40 (2017)
Southern Grid	43	Cat Litter	S43C	53	660617	8434554	162	85 (2016)
Southern Grid	44	Mammal	S44M	53	661094	8434632	638	5 (2016)
Southern Grid	45	Cat Litter	S45C	53	661568	8434716	1,025	43 (2019)
Southern Grid	46	Mammal	S46M	53	659720	8433892	23	24 (2017)
Southern Grid	47	Cat Litter	S47C	53	660165	8433959	40	44 (2016)
Southern Grid	48	Mammal	S48M	53	660706	8434032	253	6 (2020)
Southern Grid	49	Cat Litter	S49C	53	661168	8434118	441	42 (2016)
Southern Grid	50	Mammal	S50M	53	661662	8434209	528	48 (2016)
Southern Grid	51	Cat Litter	S51C	53	659778	8433381	535	215 (2019)
Southern Grid	52	Mammal	S52M	53	660295	8433432	158	2 (2019)
Southern Grid	53	Cat Litter	S53C	53	660790	8433549	125	117 (2019)
Southern Grid	54	Mammal	S54M	53	661296	8433655	23	24 (2016)
Southern Grid	55	Cat Litter	S55C	53	661759	8433738	106	54 (2020)
Southern Grid	56	Mammal	S56M	53	659868	8432898	576	137 (2019)
Southern Grid	57	Cat Litter	S57C	53	660342	8432953	102	1 (2019)
Southern Grid	58	Mammal	S58M	53	660838	8433064	392	112 (2019)
Southern Grid	59	Cat Litter	S59C	53	661331	8433149	529	43 (2019)
Southern Grid	60	Mammal	S60M	53	661836	8433240	471	48 (2019)
Southern Grid	61	Cat Litter	S61C	53	659980	8432393	461	81 (2019)
Southern Grid	62	Mammal	S62M	53	660435	8432477	7	14 (2019)

Grid	Site #	Bait Type	Site Name	Zone	Easting	Northing	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Southern Grid	63	Cat Litter	S63C	53	660931	8432558	488	72 (2019)
Southern Grid	64	Mammal	S64M	53	661421	8432636	816	63 (2019)
Southern Grid	65	Cat Litter	S65C	53	661944	8432736	838	83 (2019)
Southern Grid	66	Mammal	S66M	53	660049	8431950	390	283 (2019)
Southern Grid	67	Cat Litter	S67C	53	660532	8431978	93	255 (2019)
Southern Grid	68	Mammal	S68M	53	661040	8432085	270	81 (2019)
Southern Grid	69	Cat Litter	S69C	53	661523	8432166	353	106 (2019)
Southern Grid	70	Mammal	S70M	53	662012	8432276	377	22 (2019)
Southern Grid	71	Cat Litter	S71C	53	660118	8431393	64	838 (2019)
Southern Grid	72	Mammal	S72M	53	660606	8431523	69	593 (2019)
Southern Grid	73	Cat Litter	S73C	53	661122	8431619	199	378 (2019)
Southern Grid	74	Mammal	S74M	53	661635	8431673	4	438 (2019)
Southern Grid	75	Cat Litter	S75C	53	662040	8431741	53	491 (2019)
Northern Grid	01	Cat Litter	N01C	53	677759	8482224	693	-
Northern Grid	02	Mammal	N02M	53	678251	8482338	500	-
Northern Grid	03	Cat Litter	N03C	53	678703	8482403	285	-
Northern Grid	04	Mammal	N04M	53	679224	8482508	63	-
Northern Grid	05	Cat Litter	N05C	53	679729	8482596	167	-
Northern Grid	06	Mammal	N06M	53	677821	8481744	376	-
Northern Grid	07	Cat Litter	N07C	53	678344	8481818	17	-
Northern Grid	08	Mammal	N08M	53	678812	8481931	161	-

Grid	Site #	Bait Type	Site Name	Zone	Easting	Northing	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Northern Grid	09	Cat Litter	N09C	53	679306	8482000	395	-
Northern Grid	10	Mammal	N10M	53	679804	8482109	599	-
Northern Grid	11	Cat Litter	N11C	53	677938	8481270	148	-
Northern Grid	12	Mammal	N12M	53	678442	8481345	312	-
Northern Grid	13	Cat Litter	N13C	53	678911	8481426	617	-
Northern Grid	14	Mammal	N14M	53	679423	8481519	854	-
Northern Grid	15	Cat Litter	N15C	53	679877	8481637	1,023	-
Northern Grid	16	Mammal	N16M	53	678019	8480757	273	-
Northern Grid	17	Cat Litter	N17C	53	678485	8480838	33	-
Northern Grid	18	Mammal	N18M	53	679006	8480952	510	-
Northern Grid	19	Cat Litter	N19C	53	679487	8481031	935	-
Northern Grid	20	Mammal	N20M	53	679981	8481106	1,367	-
Northern Grid	21	Cat Litter	N21C	53	678091	8480301	611	-
Northern Grid	22	Mammal	N22M	53	678607	8480400	146	-
Northern Grid	23	Cat Litter	N23C	53	679077	8480419	232	-
Northern Grid	24	Mammal	N24M	53	679575	8480540	701	-
Northern Grid	25	Cat Litter	N25C	53	680094	8480631	1,167	-
Northern Grid	26	Mammal	N26M	53	678191	8479784	857	-
Northern Grid	27	Cat Litter	N27C	53	678660	8479857	440	-
Northern Grid	28	Mammal	N28M	53	679189	8479965	44	-
Northern Grid	29	Cat Litter	N29C	53	679666	8480052	476	-

Grid	Site #	Bait Type	Site Name	Zone	Easting	Northing	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Northern Grid	30	Mammal	N30M	53	680119	8480122	700	-
Northern Grid	31	Cat Litter	N31C	53	678299	8479266	1,087	-
Northern Grid	32	Mammal	N32M	53	678774	8479373	645	-
Northern Grid	33	Cat Litter	N33C	53	679270	8479458	199	-
Northern Grid	34	Mammal	N34M	53	679752	8479526	286	-
Northern Grid	35	Cat Litter	N35C	53	680232	8479615	191	-
Northern Grid	36	Mammal	N36M	53	678359	8478823	1,224	-
Northern Grid	37	Cat Litter	N37C	53	678830	8478885	750	-
Northern Grid	38	Mammal	N38M	53	679343	8478971	231	-
Northern Grid	39	Cat Litter	N39C	53	679831	8479068	55	-
Northern Grid	40	Mammal	N40M	53	680326	8479145	244	-
Northern Grid	41	Cat Litter	N41C	53	678441	8478320	1,245	-
Northern Grid	42	Mammal	N42M	53	678952	8478390	731	-
Northern Grid	43	Cat Litter	N43C	53	679404	8478477	271	-
Northern Grid	44	Mammal	N44M	53	679921	8478576	251	-
Northern Grid	45	Cat Litter	N45C	53	680408	8478665	636	-
Northern Grid	46	Mammal	N46M	53	678545	8477805	1,250	-
Northern Grid	47	Cat Litter	N47C	53	679034	8477908	750	-
Northern Grid	48	Mammal	N48M	53	679532	8477975	250	-
Northern Grid	49	Cat Litter	N49C	53	680012	8478067	234	-
Northern Grid	50	Mammal	N50M	53	680489	8478154	718	-

Grid	Site #	Bait Type	Site Name	Zone	Easting	Northing	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Northern Grid	51	Cat Litter	N51C	53	678620	8477332	1,273	-
Northern Grid	52	Mammal	N52M	53	679143	8477406	747	-
Northern Grid	53	Cat Litter	N53C	53	679622	8477502	258	-
Northern Grid	54	Mammal	N54M	53	680080	8477590	205	-
Northern Grid	55	Cat Litter	N55C	53	680584	8477674	715	-
Northern Grid	56	Mammal	N56M	53	678728	8476851	1,236	-
Northern Grid	57	Cat Litter	N57C	53	679196	8476894	774	-
Northern Grid	58	Mammal	N58M	53	679689	8477000	274	-
Northern Grid	59	Cat Litter	N59C	53	680179	8477086	200	-
Northern Grid	60	Mammal	N60M	53	680668	8477184	699	-
Northern Grid	61	Cat Litter	N61C	53	678774	8476326	1,323	-
Northern Grid	62	Mammal	N62M	53	679301	8476426	787	-
Northern Grid	63	Cat Litter	N63C	53	679769	8476501	314	-
Northern Grid	64	Mammal	N64M	53	680273	8476575	190	-
Northern Grid	65	Cat Litter	N65C	53	680754	8476679	679	-
Northern Grid	66	Mammal	N66M	53	678881	8475843	1,313	-
Northern Grid	67	Cat Litter	N67C	53	679374	8475931	812	-
Northern Grid	68	Mammal	N68M	53	679845	8476031	331	-
Northern Grid	69	Cat Litter	N69C	53	680340	8476099	161	-
Northern Grid	70	Mammal	N70M	53	680826	8476182	653	-
Northern Grid	71	Cat Litter	N71C	53	678964	8475369	1,326	-

Grid	Site #	Bait Type	Site Name	Zone	Easting	Northing	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Northern Grid	72	Mammal	N72M	53	679454	8475440	832	-
Northern Grid	73	Cat Litter	N73C	53	679936	8475538	340	-
Northern Grid	74	Mammal	N74M	53	680443	8475592	159	-
Northern Grid	75	Cat Litter	N75C	53	680947	8475714	677	-

APPENDIX C :

Personnel

C.1. Cumberland Ecology

Table 8 Cumberland Ecology personnel

Name	Tasks	Qualifications
Katrina Wolf	Project management, field surveys, data analysis, DEPWS consultation, report preparation	Bachelor of Science (Environmental). The University of Sydney, 2007
Matthew Freeman	Project management, field surveys, data analysis, DEPWS consultation, report preparation	Bachelor of Natural Science (Nature Conservation). University of Western Sydney, 2012
Jesse Luscombe	GIS	Bachelor of Marine Science. Macquarie University, 2013 Certificate III: Conservation and Land Management, TAFE NSW Ryde, 2016
Brooke Crismale	Data analysis	Bachelor of Science (Zoology) and Bachelor of Natural Science (Animal Science), Western Sydney University, 2020

C.2. Other Personnel

Table 9 Other personnel

Company/ Personnel	Tasks
GEMCO/South32	
Mike Chapman	Project management, document review, DEPWS consultation
Nikki Kuper	Project management, document review, DEPWS consultation, field assistance
Melinda Mead	Project management, document review, DEPWS consultation
Ben Neale	Field assistance
Traditional Owners	
Archie Jaragba	Field assistance
Hansen Environmental Consulting	
Laura Knowles	Project management, document review, DEPWS consultation
Jesse Scherer	Project management, document review, DEPWS consultation

APPENDIX D :

Fauna Species Recorded at each Camera Site within the Southern Grid

Table 10 Fauna species recorded at each camera site in the Southern Grid (Camera sites S01C-S38M)

Scientific Name	Common Name	S01C	S02M	S03C	S04M	S05C	S06M	S07C	S08M	S09C	S10M	S11C	S12M	S13C	S14M	S15C	S16M	S17C	S18M	S19C	S20M	S21C	S22M	S23C	S24M	S25C	S26M	S27C	S28M	S29C	S30M	S31C	S32M	S33C	S34M	S35C	S36M	S37C	S38M	
Birds																																								
<i>Gymnorhina tibicen</i>	Australian Magpie	X					X				X	X	X		X		X	X	X		X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	
<i>Aegothales cristatus</i>	Australian Owllet-nightjar			X	X		X		X			X	X	X			X	X	X	X	X							X	X	X			X	X	X	X	X	X	X	
<i>Geopelia humeralis</i>	Bar-shouldered Dove	X		X									X								X														X			X		
<i>Dacelo leachii</i>	Blue-winged Kookaburra																	X							X													X		
<i>Lichmera indistincta</i>	Brown Honeyeater									X																														
<i>Burhinus grallarius</i>	Bush Stone-curlew																																							
<i>Turnix castanotus</i>	Chestnut-backed Button-quail																																							
<i>Phaps chalcoptera</i>	Common Bronzewing			X	X	X	X	X	X	X	X				X	X										X		X										X		
<i>Taeniopygia bichenovii</i>	Double-barred Finch			X																							X													
<i>Chalcophaps indica</i>	Emerald Dove			X																																				
<i>Todiramphus macleayii</i>	Forest Kingfisher								X																															
<i>Chlamydera nuchalis</i>	Great Bowerbird	X	X	X		X	X	X									X		X																	X				
<i>Colluricincla harmonica</i>	Grey Shrike-thrush							X		X	X			X														X		X								X		
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler					X														X					X															
<i>Microeca flavigaster</i>	Lemon-bellied Flycatcher																		X	X						X		X												
<i>Myiagra sp.</i>	-																																							
<i>Rhipidura rufiventris</i>	Northern Fantail				X													X																	X					
<i>Geopelia placida</i>	Peaceful Dove	X			X		X	X				X	X							X		X	X	X	X		X	X	X			X	X	X			X	X		
<i>Centropus phasianinus</i>	Pheasant Coucal																																							
<i>Cracticus nigrogularis</i>	Pied Butcherbird			X	X					X	X							X			X																X			
<i>Merops ornatus</i>	Rainbow Bee-eater																																							
<i>Malurus melanocephalus</i>	Red-backed Fairy-wren							X																																
<i>Aprosmictus erythropterus</i>	Red-winged Parrot																X									X														
<i>Pachycephala rufiventris</i>	Rufous Whistler																																							
<i>Myiagra alecto</i>	Shining Flycatcher																																							
<i>Philemon argenticeps</i>	Silver-crowned Friarbird																																							
<i>Pardalotus striatus</i>	Striated Pardalote			X		X		X													X		X																	
<i>Podargus strigoides</i>	Tawny Frogmouth																								X	X														
<i>Corvus arru</i>	Torresian Crow	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X		X	X				X	X	X	X							X	X	X	
<i>Aquila audax</i>	Wedge-tailed Eagle																																							
-	Unknown Bird				X										X							X														X	X	X		
Mammals																																								
<i>Notamacropus agilis</i>	Agile Wallaby	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Felis catus</i>	Cat						X																																	
<i>Planigale maculata</i>	Common Planigale																																							
<i>Zyomys argurus</i>	Common Rock-rat				X						X																													
<i>Pseudomys delicatulus</i>	Delicate Mouse	X					X					X					X	X	X	X	X	X					X	X				X	X	X	X	X	X	X	X	
<i>Canis familiaris dingo</i>	Dingo/Wild Dog	X		X	X	X	X	X		X					X	X					X	X	X				X	X											X	
<i>Melomys burtoni</i>	Grassland Melomys													X																										
<i>Isodon macrourus</i>	Northern Brown Bandicoot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Dasyurus hallucatus</i>	Northern Quoll	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	X			X									X																										
<i>Petrogale brachyotis</i>	Short-eared Rock-wallaby				X	X				X																														
<i>Petaurus ariel</i>	Sugar Glider																																							
-	Unknown Mammal	X	X	X	X	X	X																				X	X											X	
Reptiles																																								
<i>Varanus tristis</i>	Black-tailed Monitor				X																																			
<i>Chlamydosaurus kingii</i>	Friilled Lizard					X	X				X																X	X											X	
<i>Varanus gouldii</i>	Sand Goanna														X																									
<i>Varanus scalaris</i>	Spotted Tree Monitor																																							
-	Unknown Agamidae		X	X	X			X																															X	
-	Unknown Scincidae										X			X													X													
-	Unknown Reptile																																							
Unknown																																								
-	Unknown									X					X		X		X																	X		X		
Total</																																								

APPENDIX E :

Fauna Species Recorded at each Camera Site within the Northern Grid

Table 12 Fauna species recorded at each camera site in the Northern Grid (Camera sites N01C-N38M)

Scientific Name	Common Name	N01C	N02M	N03C	N04M	N05C	N06M	N07C	N08M	N09C	N10M	N11C	N12M	N13C	N14M	N15C	N16M	N17C	N18M	N19C	N20M	N21C	N22M	N23C	N24M	N25C	N26M	N27C	N28M	N29C	N30M	N31C	N32M	N33C	N34M	N35C	N36M	N37C	N38M		
Birds																																									
<i>Accipiter sp.</i>	-						X																																		
<i>Gymnorhina tibicen</i>	Australian Magpie	X					X	X	X	X		X	X			X	X	X	X			X	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	
<i>Aegothales cristatus</i>	Australian Owllet-nightjar	X			X	X				X				X																							X			X	
<i>Geopelia humeralis</i>	Bar-shouldered Dove																																								
<i>Dacelo leachii</i>	Blue-winged Kookaburra		X			X				X																			X	X											
<i>Lichmera indistincta</i>	Brown Honeyeater						X											X																							
<i>Coturnix ypsilophora</i>	Brown Quail																																								
<i>Gallirallus philippensis</i>	Buff-banded Rail																																								
<i>Burhinus grallarius</i>	Bush Stone-curlew																																								
<i>Eulabeornis castaneoventris</i>	Chestnut Rail						X																																		
<i>Turnix castanotus</i>	Chestnut-backed Button-quail														X																										
<i>Phaps chalcoptera</i>	Common Bronzewing	X	X					X																						X						X					
<i>Taeniopygia bichenovii</i>	Double-barred Finch																																								
<i>Todiramphus macleayi</i>	Forest Kingfisher					X					X																														
<i>Chlamydera nuchalis</i>	Great Bowerbird																																								
<i>Colluricincla harmonica</i>	Grey Shrike-thrush					X																																			
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler																																								
<i>Myiagra rubecula</i>	Leadon Flycatcher									X																															
<i>Microeca flavigaster</i>	Lemon-bellied Flycatcher																																								
<i>Myiagra sp.</i>	-																																								
<i>Rhipidura rufiventris</i>	Northern Fantail					X															X	X						X										X			
<i>Geopelia placida</i>	Peaceful Dove	X	X				X								X						X							X									X				
<i>Centropus phasianinus</i>	Pheasant Coucal																		X																						
<i>Cracticus nigrogularis</i>	Pied Butcherbird					X					X	X																											X		
<i>Malurus melanocephalus</i>	Red-backed Fairy-wren					X													X																						
<i>Pachycephala rufiventris</i>	Rufous Whistler																																								
<i>Eurostopodus argus</i>	Spotted Nightjar						X																																		
<i>Pardalotus striatus</i>	Striated Pardalote	X																			X			X					X							X					
<i>Podargus strigoides</i>	Tawny Frogmouth									X																															
<i>Corvus orru</i>	Torresian Crow																		X	X																					
-	Unknown Bird	X		X		X	X				X															X	X											X			
Mammals																																									
<i>Notamacropus agilis</i>	Agile Wallaby	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Conilurus penicillatus</i>	Brush-tailed Rabbit-rat	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Felis catus</i>	Cat																																								
<i>Pseudomys delicatulus</i>	Delicate Mouse	X		X		X	X		X	X	X		X	X	X	X	X	X	X	X		X				X	X	X		X	X										
<i>Canis familiaris dingo</i>	Dingo/Wild Dog	X				X				X												X																			
<i>Melomys burtoni</i>	Grassland Melomys																																								
<i>Isodon macrourus</i>	Northern Brown Bandicoot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Dasyurus hallucatus</i>	Northern Quoll	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna		X	X		X	X			X	X																														
<i>Petrogale brachyotis</i>	Short-eared Rock-wallaby						X																																		
<i>Petaurus ariel</i>	Sugar Glider																																								
-	Unknown Mammal	X	X				X	X	X		X													X		X		X												X	
Reptiles																																									
<i>Varanus tristis</i>	Black-tailed Monitor																	X																						X	
<i>Lialis burtonis</i>	Burton's Legless Lizard																																								
<i>Chlamydosaurus kingii</i>	Frilled Lizard								X												X	X																		X	
<i>Tiliqua scincoides intermedia</i>	Northern Blue-tongue Lizard																																								
<i>Varanus gouldii</i>	Sand Goanna	X																										X	X												
<i>Varanus scalaris</i>	Spotted Tree Monitor																																								
<i>Varanus sp.</i>	-																																								
-	Unknown Agamidae	X		X											X	X																						X	X	X	
-	Unknown Elapidae																																							X	
-	Unknown Scincidae										X																														
Unknown																																									
-	Unknown			X					X																														X		
Total		15	9	9	4	13	16	6	11	10	10	7	8	8	9	6	7	14	8	12	6	7	9	5	8	12	10	9	10	13	12	5	12	9	8	11	7	9	12		

APPENDIX F :

Sample Photographs



Photograph 11 Northern Brown Bandicoot at camera site N75C



Photograph 12 Agile Wallaby at camera site N75C



Photograph 13 Northern Quoll at camera site N01C



Photograph 14 Australian Magpie at camera site S11C



Photograph 15 Delicate Mouse at camera site S33C



Photograph 16 Australian Owlet-nightjar at camera site S17C



APPENDIX G :

Summary of Northern Quoll Detections

Table 14 Summary of Northern Quoll detections

Grid	Site Name	First Date Recorded	Last Date Recorded	# Calendar Days Detected	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Southern Grid	S01C	21/05/2021	25/08/2021	11	329	315 (2020)
Southern Grid	S02M	4/05/2021	31/05/2021	4	148	83 (2016)
Southern Grid	S03C	2/05/2021	24/08/2021	14	339	146 (2016)
Southern Grid	S04M	19/05/2021	21/08/2021	21	762	668 (2016)
Southern Grid	S05C	4/05/2021	2/08/2021	9	1,170	914 (2020)
Southern Grid	S06M	12/05/2021	23/08/2021	13	226	173 (2020)
Southern Grid	S07C	3/05/2021	18/08/2021	8	236	100 (2016)
Southern Grid	S08M	29/04/2021	10/06/2021	12	62	230 (2016)
Southern Grid	S09C	30/04/2021	14/08/2021	9	496	530 (2016)
Southern Grid	S10M	7/05/2021	4/07/2021	5	1,043	639 (2016)
Southern Grid	S11C	4/05/2021	2/07/2021	5	130	148 (2017)
Southern Grid	S12M	19/05/2021	22/08/2021	11	305	86 (2016)
Southern Grid	S13C	17/05/2021	5/08/2021	11	153	25 (2016)
Southern Grid	S14M	7/05/2021	31/07/2021	16	621	52 (2016)
Southern Grid	S15C	28/05/2021	4/08/2021	24	1,084	167 (2016)
Southern Grid	S16M	23/05/2021	15/07/2021	5	38	30 (2019)
Southern Grid	S17C	2/05/2021	25/08/2021	8	84	114 (2016)
Southern Grid	S18M	12/05/2021	20/08/2021	12	325	38 (2016)
Southern Grid	S19C	29/05/2021	22/07/2021	7	800	34 (2016)
Southern Grid	S20M	1/05/2021	10/07/2021	7	1,253	103 (2017)
Southern Grid	S21C	14/05/2021	23/06/2021	3	32	47 (2017)
Southern Grid	S22M	12/05/2021	24/08/2021	15	120	22 (2019)
Southern Grid	S23C	9/06/2021	26/08/2021	7	380	38 (2020)
Southern Grid	S24M	26/05/2021	24/08/2021	13	886	44 (2016)
Southern Grid	S25C	16/05/2021	5/08/2021	8	958	103 (2017)
Southern Grid	S26M	22/06/2021	20/08/2021	4	90	10 (2017)
Southern Grid	S27C	23/05/2021	25/08/2021	10	149	9 (2019)
Southern Grid	S28M	4/05/2021	23/08/2021	13	310	62 (2020)
Southern Grid	S29C	23/05/2021	13/08/2021	11	397	33 (2017)

Grid	Site Name	First Date Recorded	Last Date Recorded	# Calendar Days Detected	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Southern Grid	S31C	23/05/2021	25/08/2021	25	40	4 (2017)
Southern Grid	S32M	14/05/2021	26/08/2021	13	162	46 (2019)
Southern Grid	S33C	11/06/2021	11/06/2021	1	18	66 (2016)
Southern Grid	S34M	29/05/2021	15/08/2021	8	59	37 (2016)
Southern Grid	S35C	15/05/2021	25/08/2021	4	30	109 (2016)
Southern Grid	S36M	10/06/2021	1/08/2021	5	162	9 (2017)
Southern Grid	S37C	1/05/2021	7/08/2021	4	186	64 (2019)
Southern Grid	S38M	13/05/2021	18/07/2021	6	6	96 (2016)
Southern Grid	S39C	18/05/2021	22/07/2021	5	520	2 (2016)
Southern Grid	S40M	15/05/2021	24/07/2021	3	498	5 (2019)
Southern Grid	S41C	12/05/2021	12/05/2021	1	63	30 (2017)
Southern Grid	S42M	3/05/2021	20/07/2021	2	12	40 (2017)
Southern Grid	S43C	3/06/2021	21/07/2021	6	162	85 (2016)
Southern Grid	S44M	24/05/2021	18/08/2021	14	638	5 (2016)
Southern Grid	S45C	1/06/2021	26/07/2021	7	1,025	43 (2019)
Southern Grid	S46M	3/05/2021	28/07/2021	10	23	24 (2017)
Southern Grid	S47C	22/05/2021	17/08/2021	13	40	44 (2016)
Southern Grid	S48M	8/05/2021	29/06/2021	8	253	6 (2020)
Southern Grid	S49C	4/05/2021	24/08/2021	10	441	42 (2016)
Southern Grid	S50M	23/05/2021	13/08/2021	7	528	48 (2016)
Southern Grid	S51C	1/06/2021	13/08/2021	13	535	215 (2019)
Southern Grid	S52M	20/05/2021	4/08/2021	5	158	2 (2019)
Southern Grid	S53C	4/06/2021	23/08/2021	9	125	117 (2019)
Southern Grid	S54M	25/08/2021	25/08/2021	1	23	24 (2016)
Southern Grid	S55C	3/05/2021	7/06/2021	2	106	54 (2020)
Southern Grid	S56M	2/06/2021	25/08/2021	8	576	137 (2019)
Southern Grid	S57C	3/05/2021	28/08/2021	24	102	1 (2019)
Southern Grid	S58M	2/05/2021	11/07/2021	17	392	112 (2019)
Southern Grid	S59C	4/05/2021	25/07/2021	14	529	43 (2019)
Southern Grid	S60M	23/05/2021	13/06/2021	3	471	48 (2019)

Grid	Site Name	First Date Recorded	Last Date Recorded	# Calendar Days Detected	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Southern Grid	S61C	31/05/2021	27/08/2021	14	461	81 (2019)
Southern Grid	S62M	5/07/2021	5/07/2021	1	7	14 (2019)
Southern Grid	S63C	16/05/2021	4/07/2021	13	488	72 (2019)
Southern Grid	S64M	2/06/2021	10/08/2021	2	816	63 (2019)
Southern Grid	S65C	10/05/2021	25/06/2021	4	838	83 (2019)
Southern Grid	S66M	6/06/2021	12/08/2021	13	390	283 (2019)
Southern Grid	S67C	15/05/2021	27/08/2021	4	93	255 (2019)
Southern Grid	S68M	16/07/2021	20/08/2021	2	270	81 (2019)
Southern Grid	S69C	31/05/2021	24/08/2021	10	353	106 (2019)
Southern Grid	S70M	25/05/2021	7/06/2021	2	377	22 (2019)
Southern Grid	S71C	16/05/2021	16/07/2021	11	64	838 (2019)
Southern Grid	S72M	18/05/2021	30/07/2021	8	69	593 (2019)
Southern Grid	S73C	9/05/2021	21/07/2021	13	199	378 (2019)
Southern Grid	S74M	6/07/2021	6/07/2021	1	4	438 (2019)
Southern Grid	S75C	18/05/2021	9/08/2021	11	53	491 (2019)
Northern Grid	N01C	15/06/2021	25/08/2021	3	693	-
Northern Grid	N02M	5/07/2021	18/08/2021	4	500	-
Northern Grid	N03C	6/05/2021	18/08/2021	3	285	-
Northern Grid	N04M	23/05/2021	5/06/2021	4	63	-
Northern Grid	N05C	14/05/2021	23/07/2021	4	167	-
Northern Grid	N06M	23/06/2021	28/08/2021	5	376	-
Northern Grid	N07C	6/05/2021	15/08/2021	6	17	-
Northern Grid	N08M	9/07/2021	29/08/2021	10	161	-
Northern Grid	N09C	4/05/2021	27/08/2021	10	395	-
Northern Grid	N10M	12/05/2021	5/07/2021	3	599	-
Northern Grid	N11C	22/05/2021	25/07/2021	7	148	-
Northern Grid	N12M	22/05/2021	21/07/2021	8	312	-
Northern Grid	N14M	22/06/2021	22/06/2021	1	854	-
Northern Grid	N15C	5/05/2021	25/08/2021	7	1,023	-
Northern Grid	N16M	9/06/2021	10/08/2021	7	273	-

Grid	Site Name	First Date Recorded	Last Date Recorded	# Calendar Days Detected	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Northern Grid	N17C	17/05/2021	19/07/2021	7	33	-
Northern Grid	N18M	7/05/2021	27/08/2021	16	510	-
Northern Grid	N19C	17/08/2021	17/08/2021	1	935	-
Northern Grid	N20M	9/06/2021	14/06/2021	2	1,367	-
Northern Grid	N21C	6/05/2021	29/08/2021	12	611	-
Northern Grid	N22M	25/05/2021	25/05/2021	1	146	-
Northern Grid	N23C	7/06/2021	7/06/2021	1	232	-
Northern Grid	N24M	6/05/2021	17/06/2021	4	701	-
Northern Grid	N25C	10/06/2021	17/08/2021	5	1,167	-
Northern Grid	N26M	7/05/2021	25/08/2021	9	857	-
Northern Grid	N27C	5/05/2021	26/08/2021	16	440	-
Northern Grid	N28M	8/05/2021	24/08/2021	9	44	-
Northern Grid	N29C	17/05/2021	31/08/2021	3	476	-
Northern Grid	N30M	6/07/2021	17/08/2021	6	700	-
Northern Grid	N31C	10/06/2021	29/08/2021	6	1,087	-
Northern Grid	N32M	10/07/2021	25/08/2021	9	645	-
Northern Grid	N33C	18/06/2021	10/07/2021	2	199	-
Northern Grid	N34M	23/06/2021	25/08/2021	6	286	-
Northern Grid	N35C	15/07/2021	7/08/2021	3	191	-
Northern Grid	N36M	14/06/2021	31/08/2021	10	1,224	-
Northern Grid	N37C	12/05/2021	14/07/2021	4	750	-
Northern Grid	N38M	22/05/2021	14/08/2021	6	231	-
Northern Grid	N39C	12/05/2021	31/08/2021	8	55	-
Northern Grid	N40M	9/05/2021	8/08/2021	4	244	-
Northern Grid	N41C	22/05/2021	13/08/2021	5	1,245	-
Northern Grid	N42M	12/05/2021	21/06/2021	3	731	-
Northern Grid	N43C	13/07/2021	15/08/2021	6	271	-
Northern Grid	N44M	26/05/2021	21/08/2021	7	251	-
Northern Grid	N45C	24/06/2021	27/07/2021	3	636	-
Northern Grid	N47C	3/07/2021	8/08/2021	3	750	-

Grid	Site Name	First Date Recorded	Last Date Recorded	# Calendar Days Detected	Distance to Closest Public Access Track (m)	Distance to Closest Exploration Track (m) and Year Track Established
Northern Grid	N48M	10/05/2021	13/07/2021	3	250	-
Northern Grid	N49C	5/06/2021	30/07/2021	3	234	-
Northern Grid	N51C	15/06/2021	13/08/2021	6	1,273	-
Northern Grid	N52M	5/08/2021	23/08/2021	2	747	-
Northern Grid	N53C	29/05/2021	13/07/2021	3	258	-
Northern Grid	N54M	23/05/2021	3/07/2021	5	205	-
Northern Grid	N55C	18/05/2021	19/07/2021	5	715	-
Northern Grid	N56M	14/06/2021	3/08/2021	3	1,236	-
Northern Grid	N57C	5/07/2021	24/07/2021	3	774	-
Northern Grid	N58M	2/06/2021	12/08/2021	7	274	-
Northern Grid	N59C	20/05/2021	1/07/2021	3	200	-
Northern Grid	N60M	7/05/2021	8/05/2021	2	699	-
Northern Grid	N61C	26/05/2021	26/05/2021	2	1,323	-
Northern Grid	N62M	19/05/2021	26/06/2021	1	787	-
Northern Grid	N64M	6/06/2021	11/06/2021	2	190	-
Northern Grid	N65C	21/05/2021	17/08/2021	8	679	-
Northern Grid	N66M	3/06/2021	26/06/2021	2	1,313	-
Northern Grid	N67C	2/06/2021	16/07/2021	3	812	-
Northern Grid	N68M	14/07/2021	14/07/2021	1	331	-
Northern Grid	N69C	25/05/2021	23/08/2021	4	161	-
Northern Grid	N70M	18/05/2021	10/06/2021	2	653	-
Northern Grid	N71C	25/05/2021	6/08/2021	2	1,326	-
Northern Grid	N72M	25/06/2021	3/07/2021	2	832	-
Northern Grid	N73C	17/05/2021	3/08/2021	6	340	-
Northern Grid	N74M	23/05/2021	19/07/2021	4	159	-
Northern Grid	N75C	29/05/2021	8/06/2021	2	677	-

APPENDIX H :

Summary of Brush-tailed Rabbit-rat Detections

Table 15 Summary of Brush-tailed Rabbit-rat detections

Grid	Site Name	First Date Recorded	Last Date Recorded	Number of Days Between First Date and Last Date	# Calendar Days Detected
Northern Grid	N01C	5/05/2021	26/08/2021	114	51
Northern Grid	N02M	6/05/2021	27/08/2021	114	17
Northern Grid	N03C	3/06/2021	11/08/2021	70	7
Northern Grid	N05C	13/06/2021	14/06/2021	2	2
Northern Grid	N06M	16/06/2021	8/08/2021	54	4
Northern Grid	N07C	25/05/2021	11/08/2021	79	17
Northern Grid	N08M	5/05/2021	24/08/2021	112	12
Northern Grid	N09C	14/08/2021	14/08/2021	1	1
Northern Grid	N10M	5/05/2021	9/07/2021	66	5
Northern Grid	N11C	22/07/2021	7/08/2021	17	2
Northern Grid	N12M	20/06/2021	29/07/2021	40	4
Northern Grid	N14M	10/05/2021	17/08/2021	100	2
Northern Grid	N15C	8/05/2021	23/08/2021	108	20
Northern Grid	N16M	21/05/2021	30/08/2021	102	7
Northern Grid	N17C	9/06/2021	17/07/2021	39	8
Northern Grid	N18M	10/05/2021	13/08/2021	96	15
Northern Grid	N19C	7/05/2021	19/08/2021	105	22
Northern Grid	N21C	6/05/2021	17/08/2021	104	33
Northern Grid	N22M	6/05/2021	30/08/2021	117	25
Northern Grid	N23C	29/06/2021	29/06/2021	1	1
Northern Grid	N25C	8/05/2021	31/08/2021	116	35
Northern Grid	N26M	8/05/2021	28/08/2021	113	22
Northern Grid	N27C	20/05/2021	1/09/2021	105	12
Northern Grid	N28M	7/06/2021	6/08/2021	61	15
Northern Grid	N29C	11/05/2021	28/08/2021	110	21
Northern Grid	N30M	29/05/2021	25/08/2021	89	28
Northern Grid	N31C	29/05/2021	10/08/2021	74	10
Northern Grid	N32M	15/05/2021	26/08/2021	104	33
Northern Grid	N33C	2/06/2021	30/07/2021	59	3

Grid	Site Name	First Date Recorded	Last Date Recorded	Number of Days Between First Date and Last Date	# Calendar Days Detected
Northern Grid	N34M	7/06/2021	19/07/2021	43	3
Northern Grid	N36M	9/07/2021	13/08/2021	36	4
Northern Grid	N37C	11/05/2021	26/08/2021	108	24
Northern Grid	N38M	24/05/2021	16/08/2021	85	14
Northern Grid	N39C	17/05/2021	16/08/2021	92	11
Northern Grid	N41C	27/06/2021	27/08/2021	62	14
Northern Grid	N42M	11/08/2021	11/08/2021	1	1
Northern Grid	N43C	19/05/2021	8/08/2021	82	9
Northern Grid	N44M	8/05/2021	28/08/2021	113	23
Northern Grid	N45C	7/05/2021	31/07/2021	86	11
Northern Grid	N49C	12/05/2021	14/08/2021	95	14
Northern Grid	N50M	8/05/2021	28/08/2021	113	30
Northern Grid	N52M	31/05/2021	9/07/2021	40	3
Northern Grid	N53C	2/06/2021	27/07/2021	56	5
Northern Grid	N55C	7/05/2021	9/08/2021	95	17
Northern Grid	N58M	8/07/2021	8/07/2021	1	1
Northern Grid	N59C	29/05/2021	12/08/2021	76	10
Northern Grid	N60M	8/05/2021	23/05/2021	16	12
Northern Grid	N61C	10/07/2021	18/08/2021	40	3
Northern Grid	N62M	16/06/2021	16/06/2021	1	1
Northern Grid	N63C	4/06/2021	26/07/2021	53	17
Northern Grid	N64M	10/05/2021	2/08/2021	85	19
Northern Grid	N65C	25/08/2021	25/08/2021	1	1
Northern Grid	N66M	26/06/2021	21/07/2021	26	6
Northern Grid	N75C	22/05/2021	26/08/2021	97	15

FIGURES

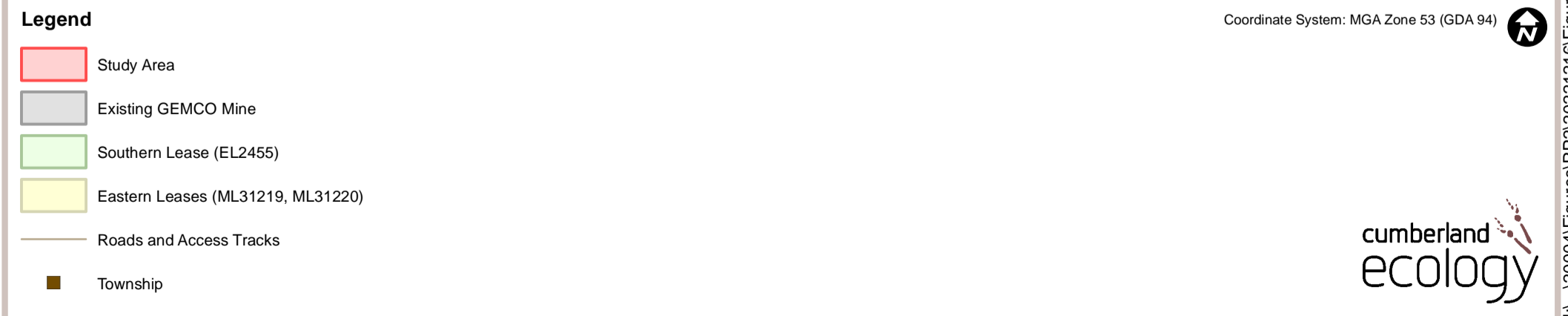
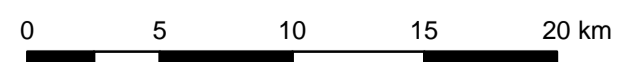


Figure 1. Location of the Study Area





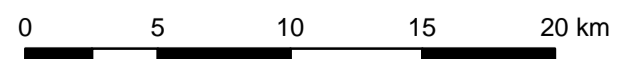
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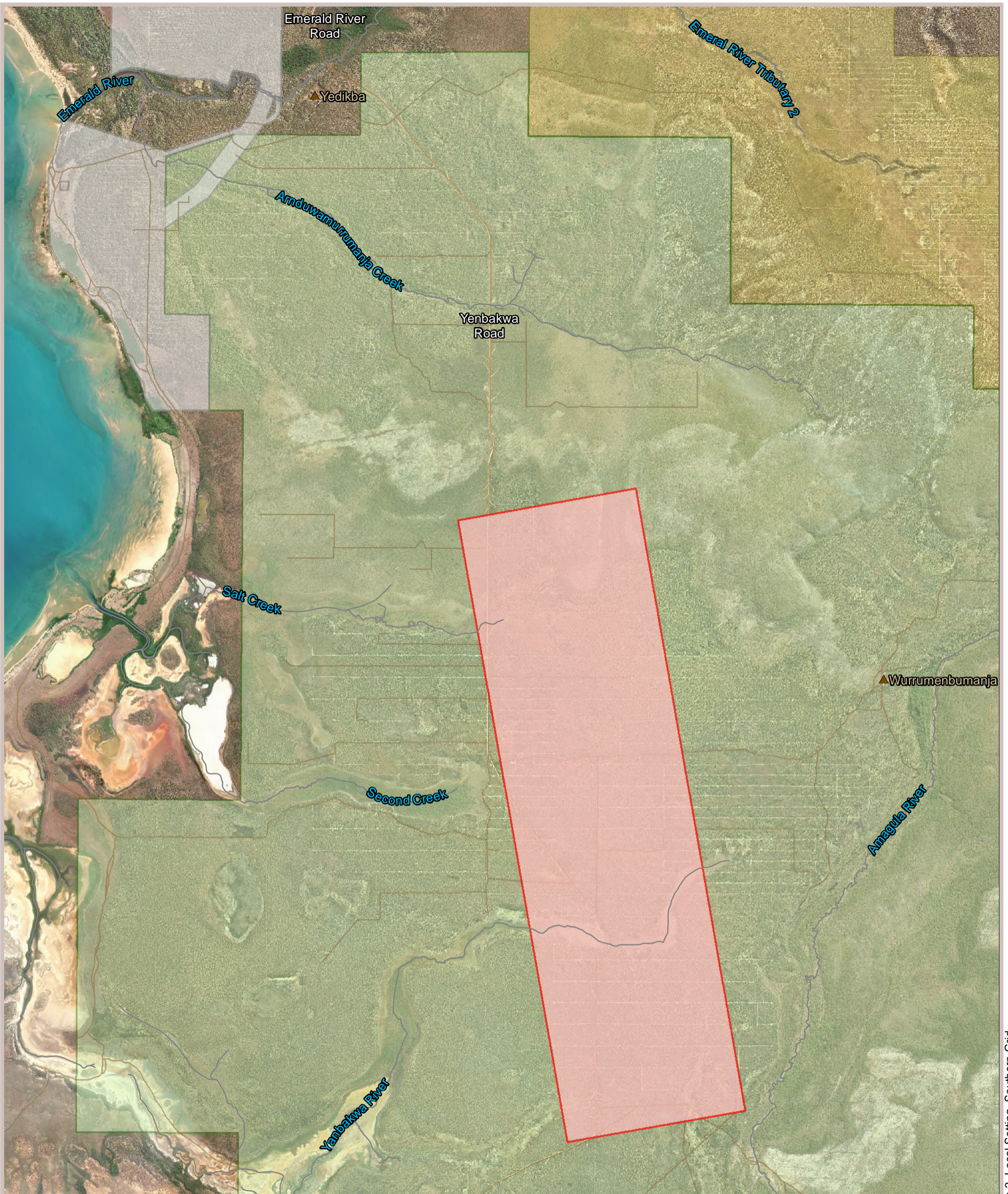
- Study Area (Program)
- Study Area (2016 DEPWS Study)
- Existing GEMCO Mine
- Southern Lease (EL2455)
- Eastern Leases (ML31219, ML31220)
- Roads and Access Tracks
- Township

Coordinate System: MGA Zone 53 (GDA 94)




Figure 2. Location of the Study Area relative to the 2016 DEPWS Study Area





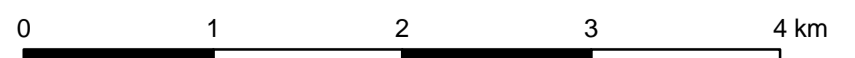
Legend

- | | | | |
|--|--------------------------|---|-------------------------|
|  | Southern Grid |  | Roads and Access Tracks |
|  | Existing GEMCO Mine |  | Waterways |
|  | Southern Lease (EL2455) |  | Outstation |
|  | Eastern Leases (ML31220) | | |

Coordinate System: MGA Zone 53 (GDA 94)



Figure 3. Local setting of the Southern Grid





Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

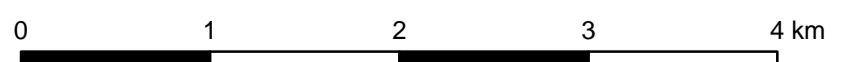
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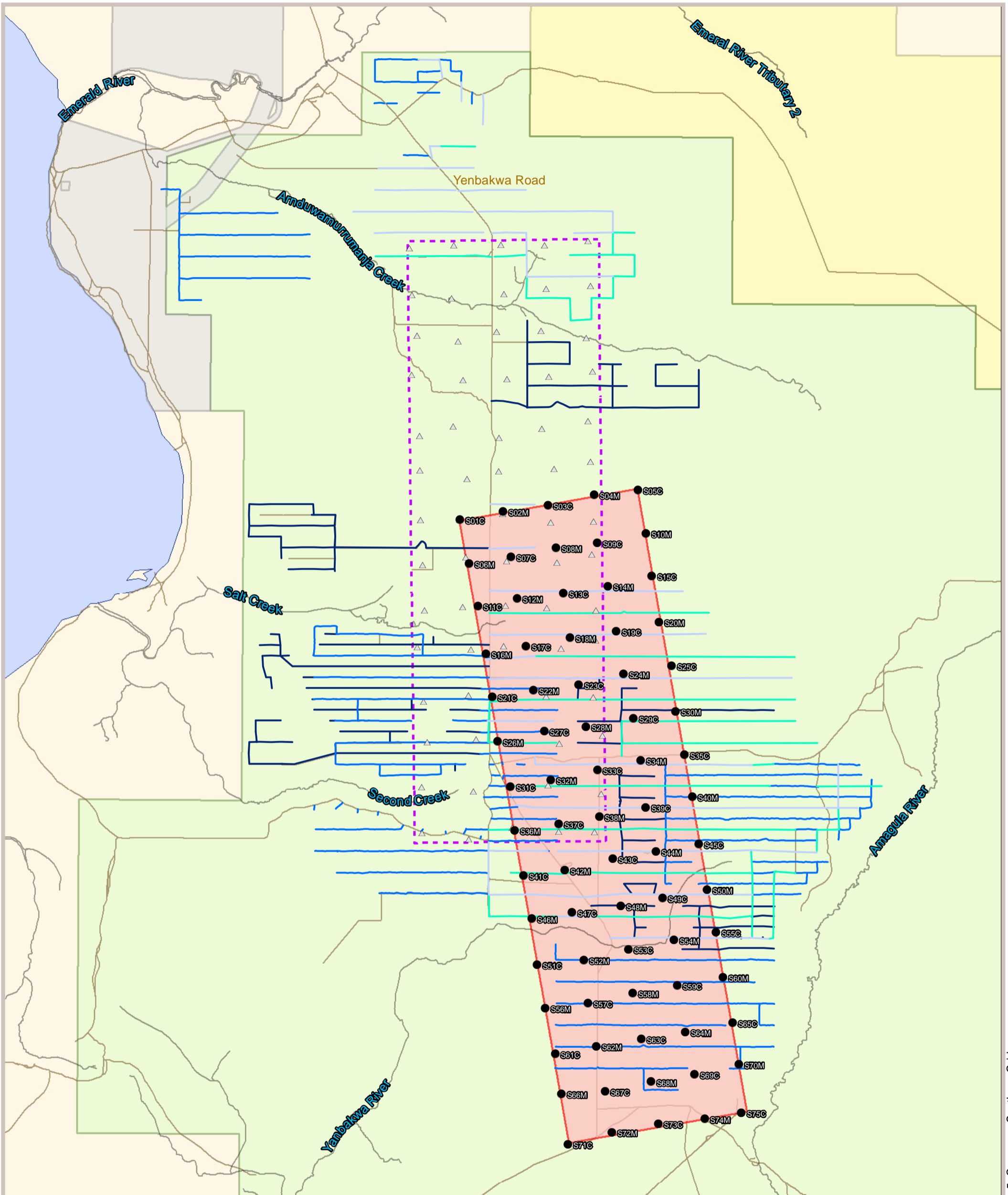
- Northern Grid
- Roads and Access Tracks
- Waterways

Coordinate System: MGA Zone 53 (GDA 94)
















Figure 4. Local setting of the Northern Grid





Legend

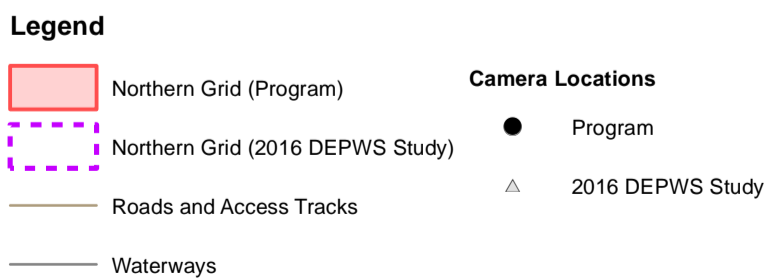
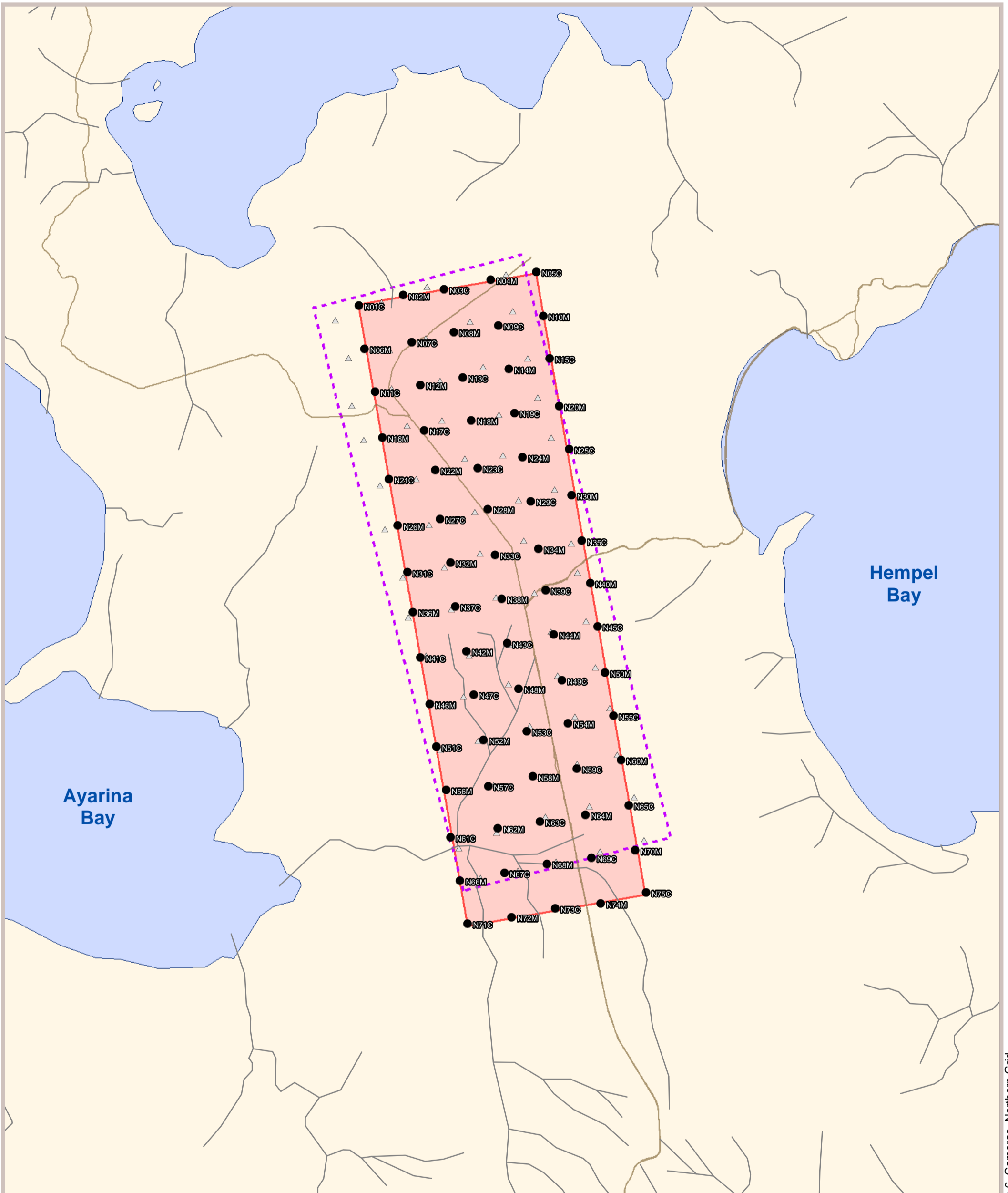
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|--|----------------------------------|---|-------------------------|--|------|---|------------------|
|  | Southern Grid (Program) |  | Roads and Access Tracks |  | 2016 |  | Program |
|  | Southern Grid (2016 DEPWS Study) |  | Waterways |  | 2017 |  | 2016 DEPWS Study |
|  | Existing GEMCO Mine | | |  | 2019 | | |
|  | Southern Lease (EL2455) | | |  | 2020 | | |
|  | Eastern Leases (ML31220) | | | | | | |

Coordinate System: MGA Zone 53 (GDA 94)



Figure 5. Location of cameras within the Southern Grid






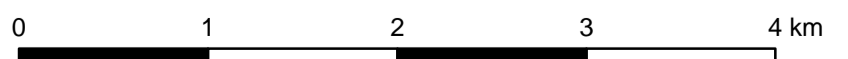
Coordinate System: MGA Zone 53 (GDA 94) 

Figure 6. Location of cameras within the Northern Grid



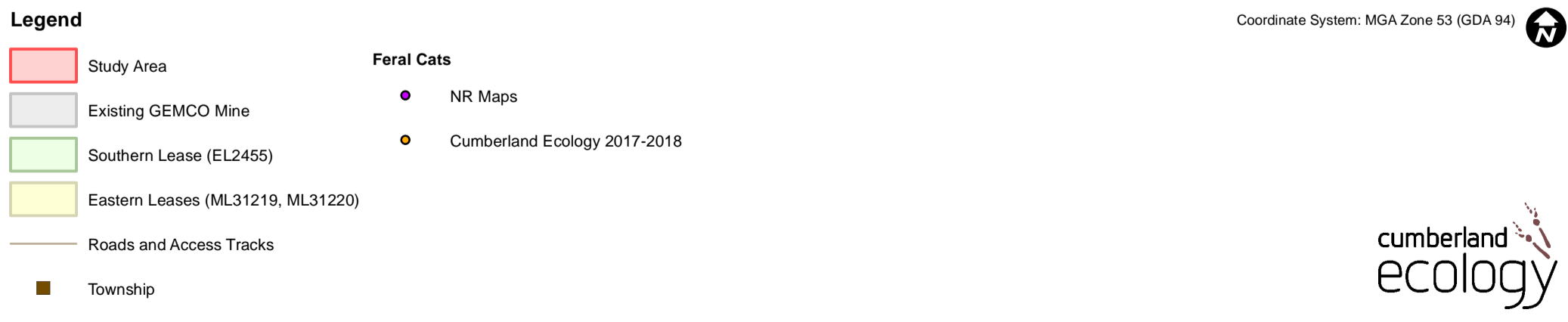
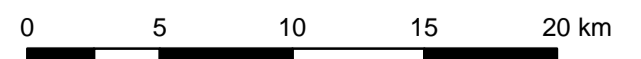
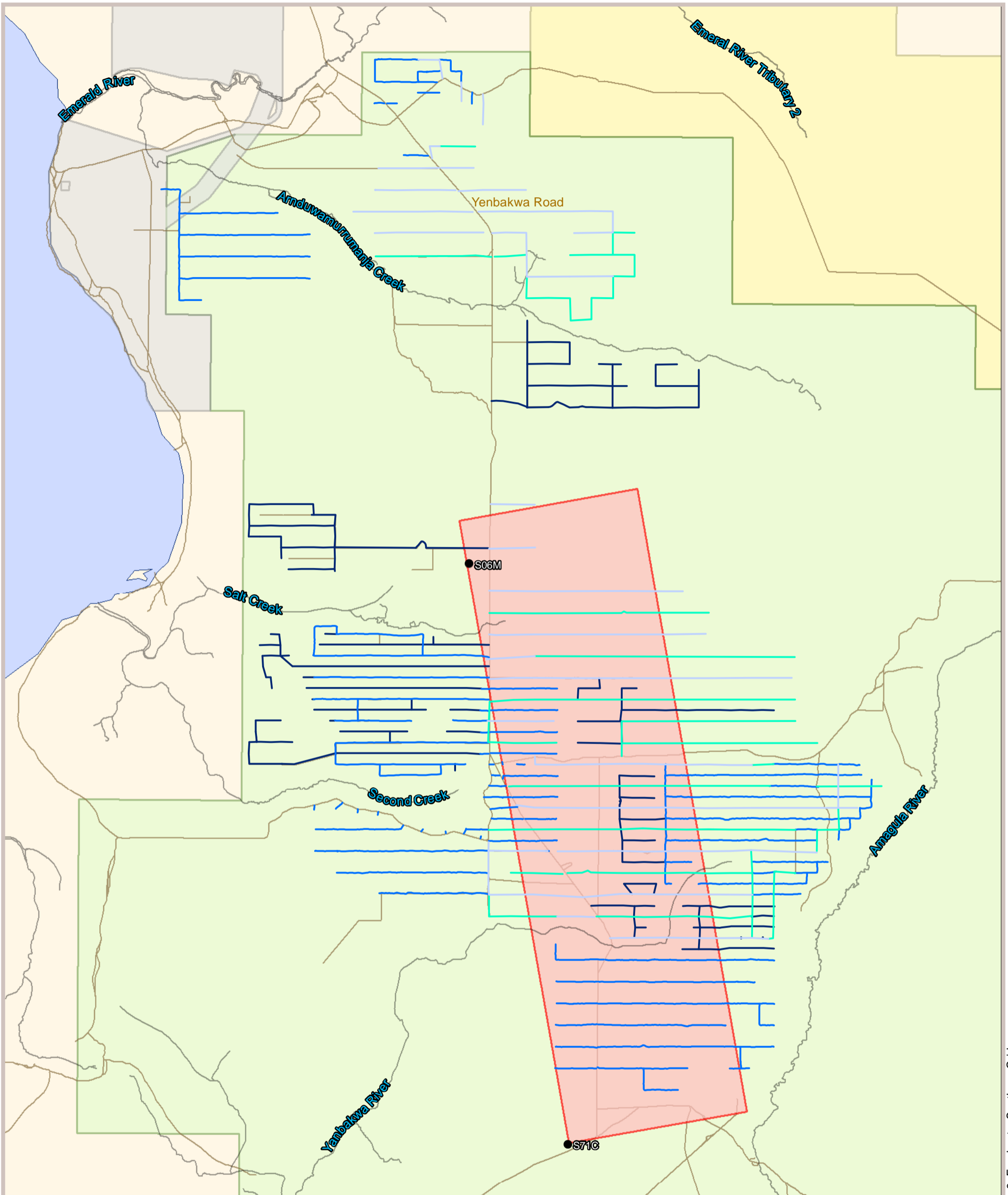














Figure 7. Previous records of feral cats on Groote Eylandt





Coordinate System: MGA Zone 53 (GDA 94) 

Legend

 Southern Grid	 Roads and Access Tracks	Exploration Tracks	Feral Cats
 Existing GEMCO Mine	 Waterways	 2016	 Program
 Southern Lease (EL2455)		 2017	
 Eastern Leases (ML31220)		 2019	
		 2020	


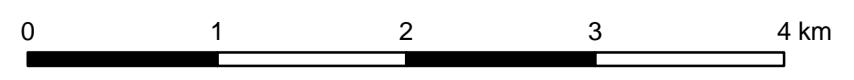
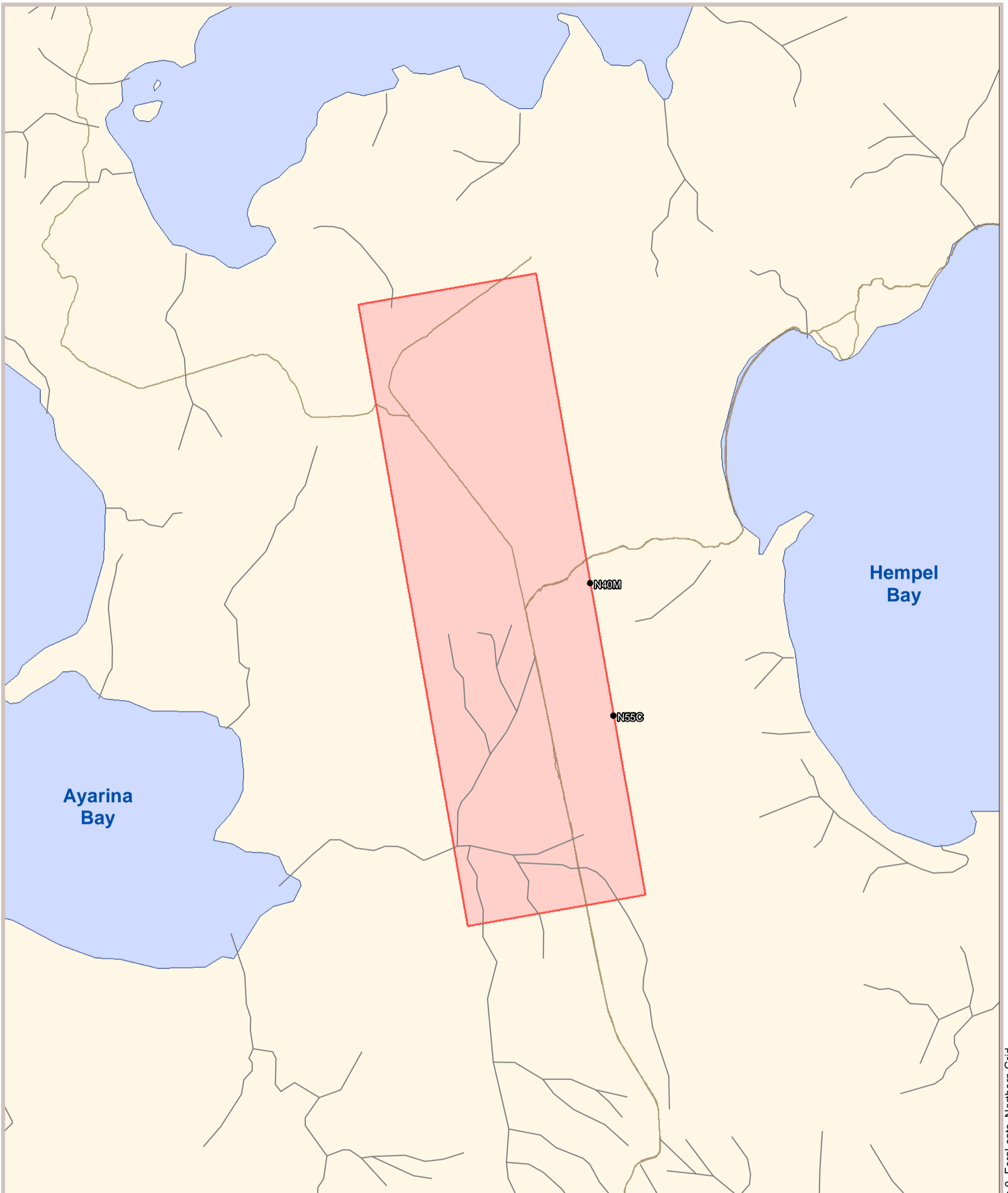


Figure 8. Location of feral cats within the Southern Grid



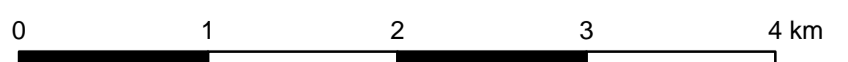


- Legend**
- Northern Grid
 - Roads and Access Tracks
 - Waterways
 - Feral Cats**
 - Program

Coordinate System: MGA Zone 53 (GDA 94)



Figure 9. Location of feral cats within the Northern Grid



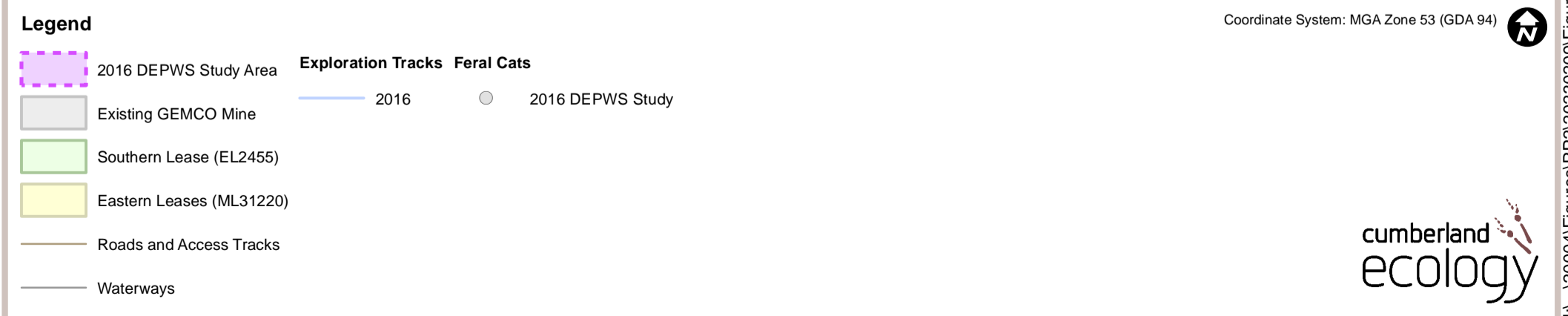
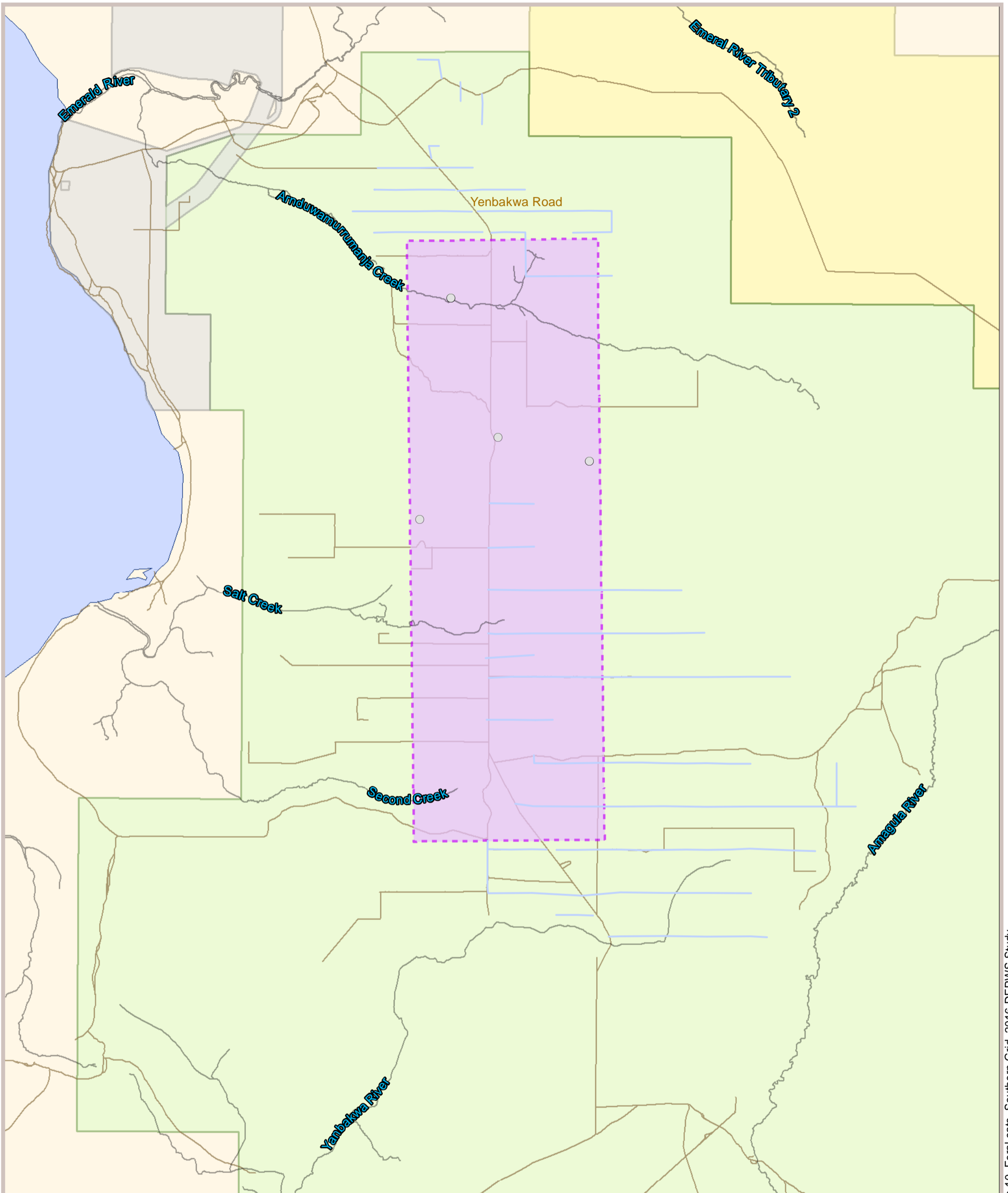
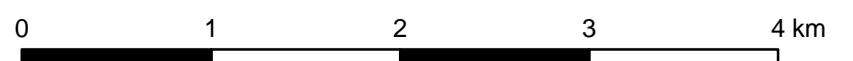


Figure 10. Location of feral cats within the Southern Grid (2016 DEPWS Study)



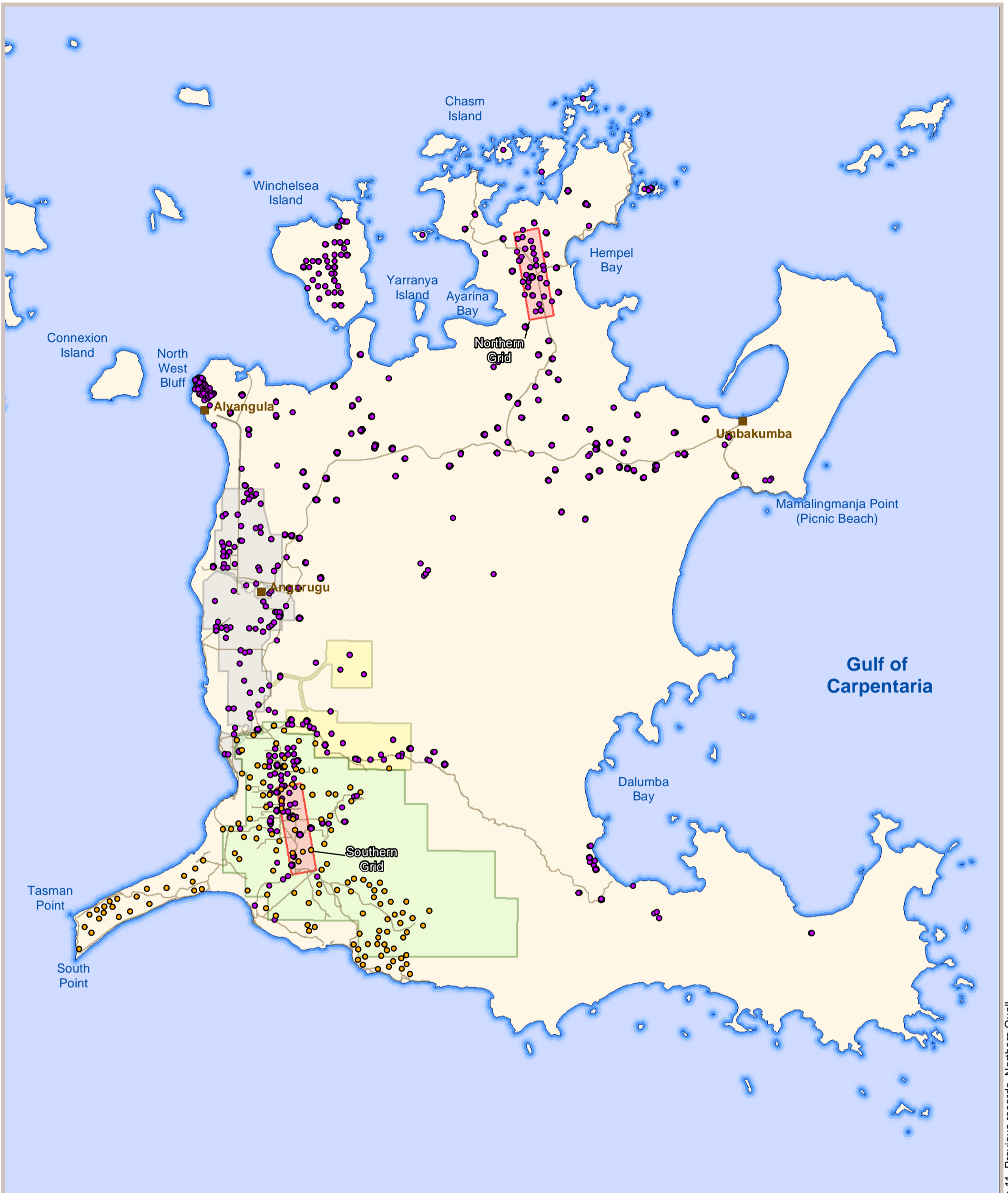
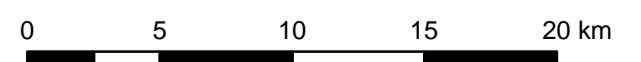
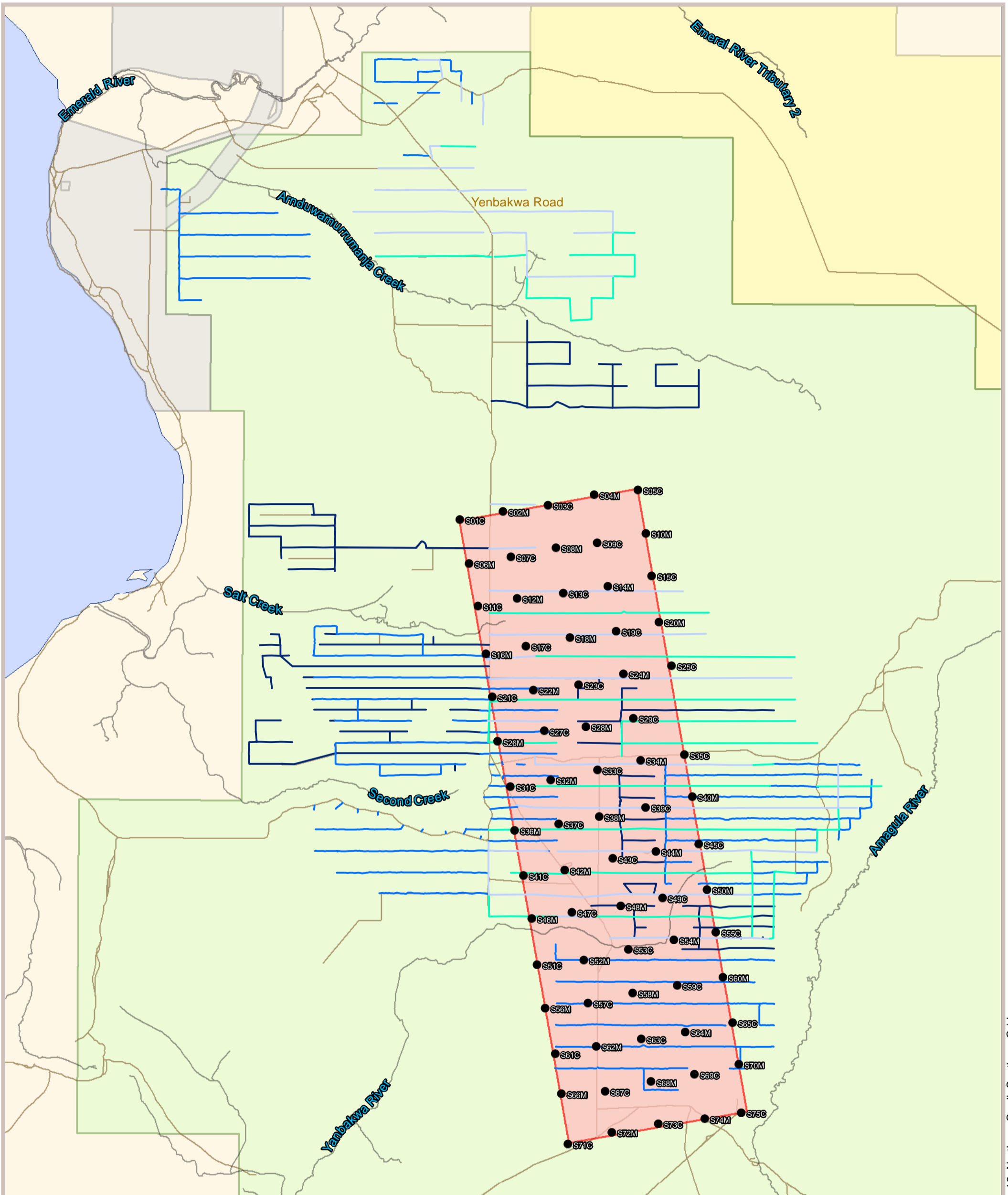

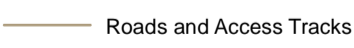

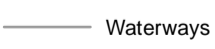



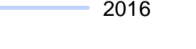


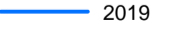


Figure 11. Previous records of the Northern Quoll on Groote Eylandt





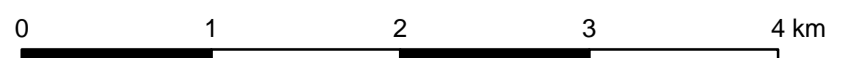
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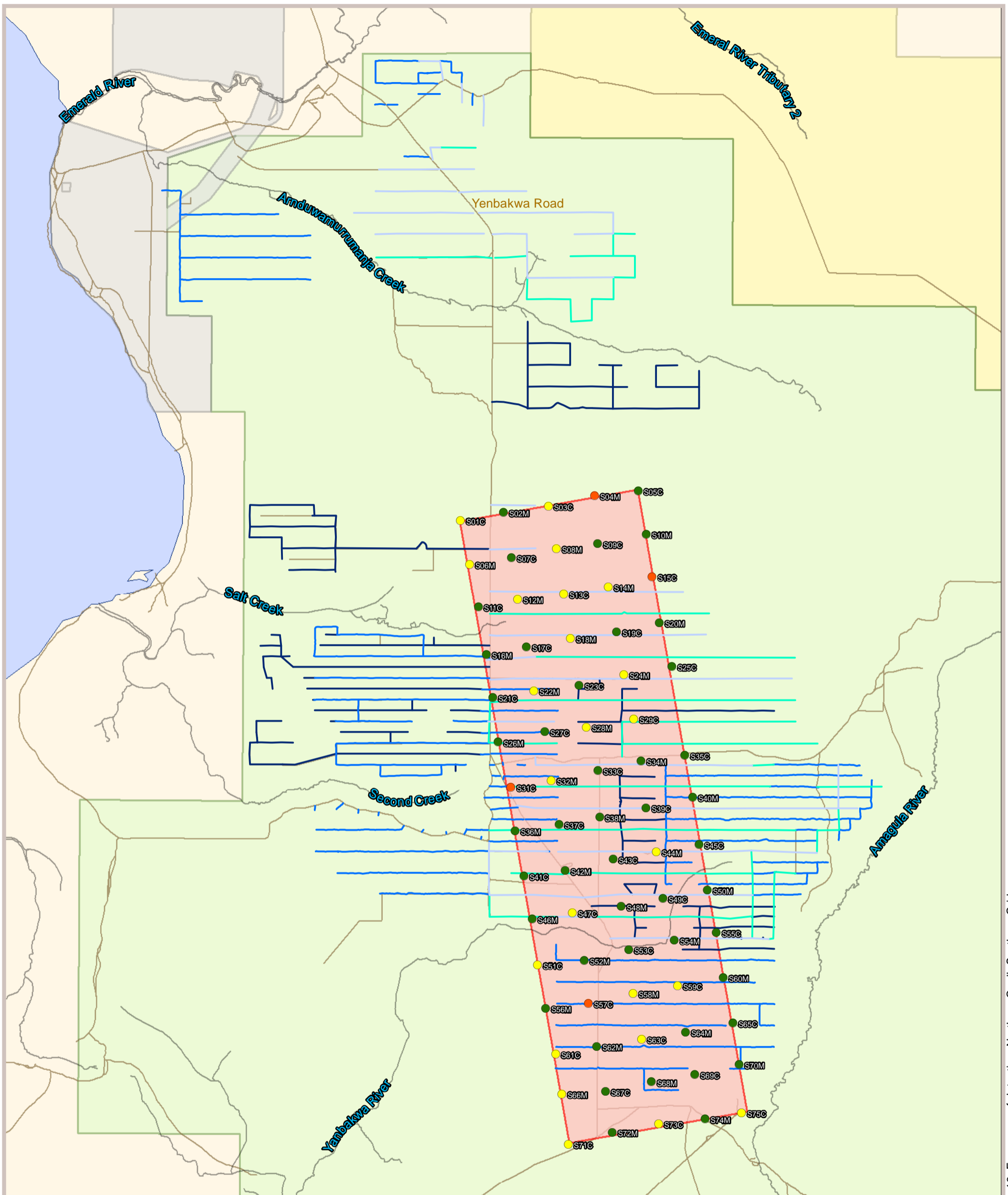
- | | | | |
|---|---|--|---|
|  Southern Grid |  Roads and Access Tracks | Exploration Tracks | Northern Quoll Records |
|  Existing GEMCO Mine |  Waterways |  2016 |  Program |
|  Southern Lease (EL2455) | |  2017 | |
|  Eastern Leases (ML31220) | |  2019 | |
| | |  2020 | |

Coordinate System: MGA Zone 53 (GDA 94)


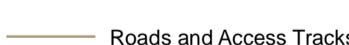

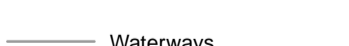






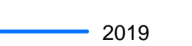




Figure 12. Location of the Northern Quoll within the Southern Grid





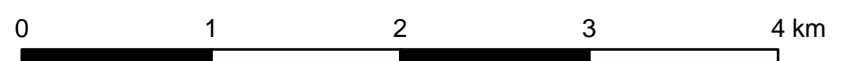
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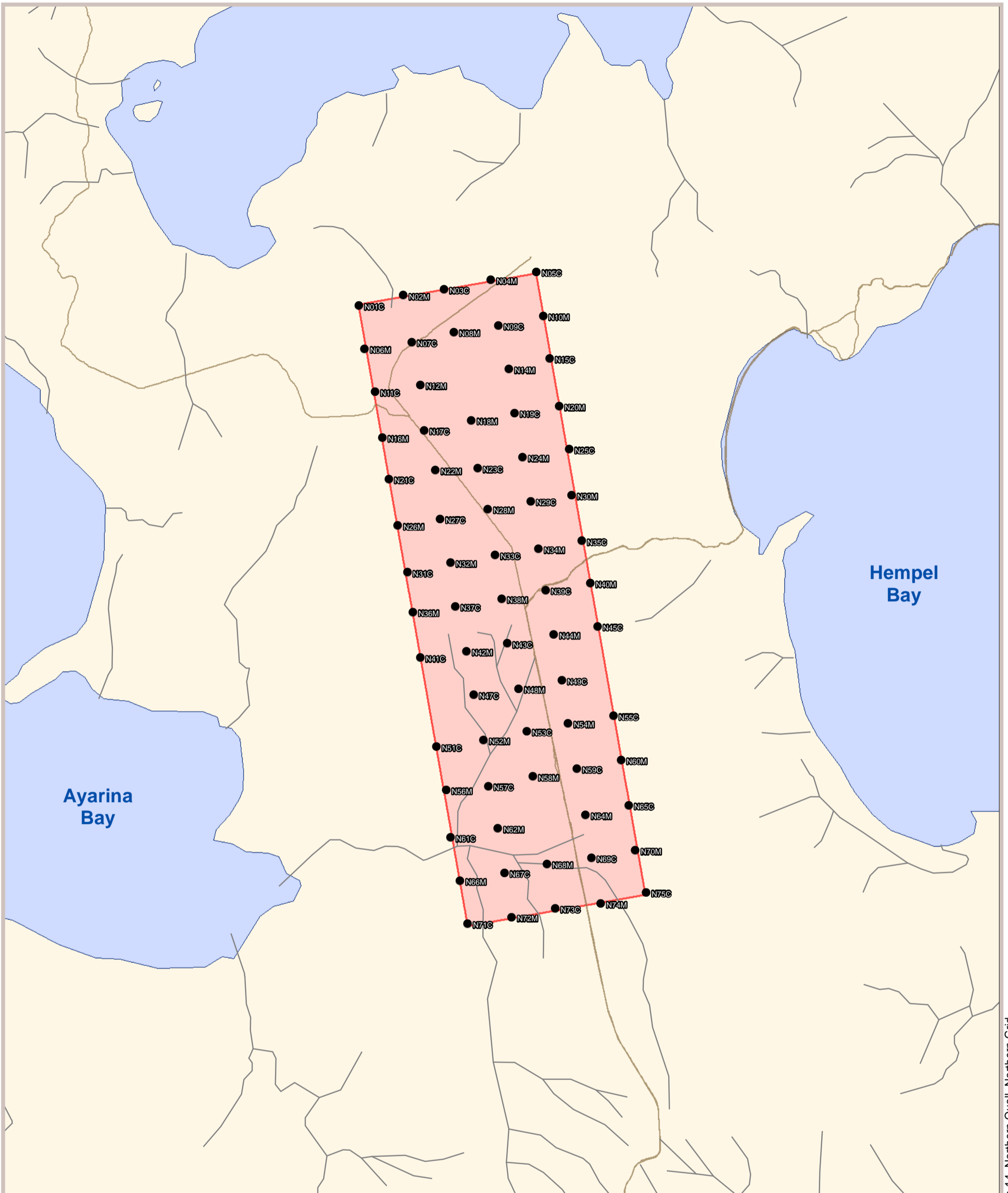
- | | | | |
|---|---|--|---|
|  Southern Grid |  Roads and Access Tracks | Exploration Tracks | Northern Quoll Detection Frequency (# Days) |
|  Existing GEMCO Mine |  Waterways |  2016 |  1-10 |
|  Southern Lease (EL2455) | |  2017 |  11-20 |
|  Eastern Leases (ML31220) | |  2019 |  21-30 |
| | |  2020 | |

Coordinate System: MGA Zone 53 (GDA 94)



Figure 13. Frequency of detection of the Northern Quoll within the Southern Grid



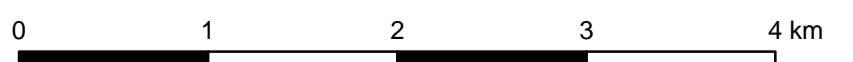


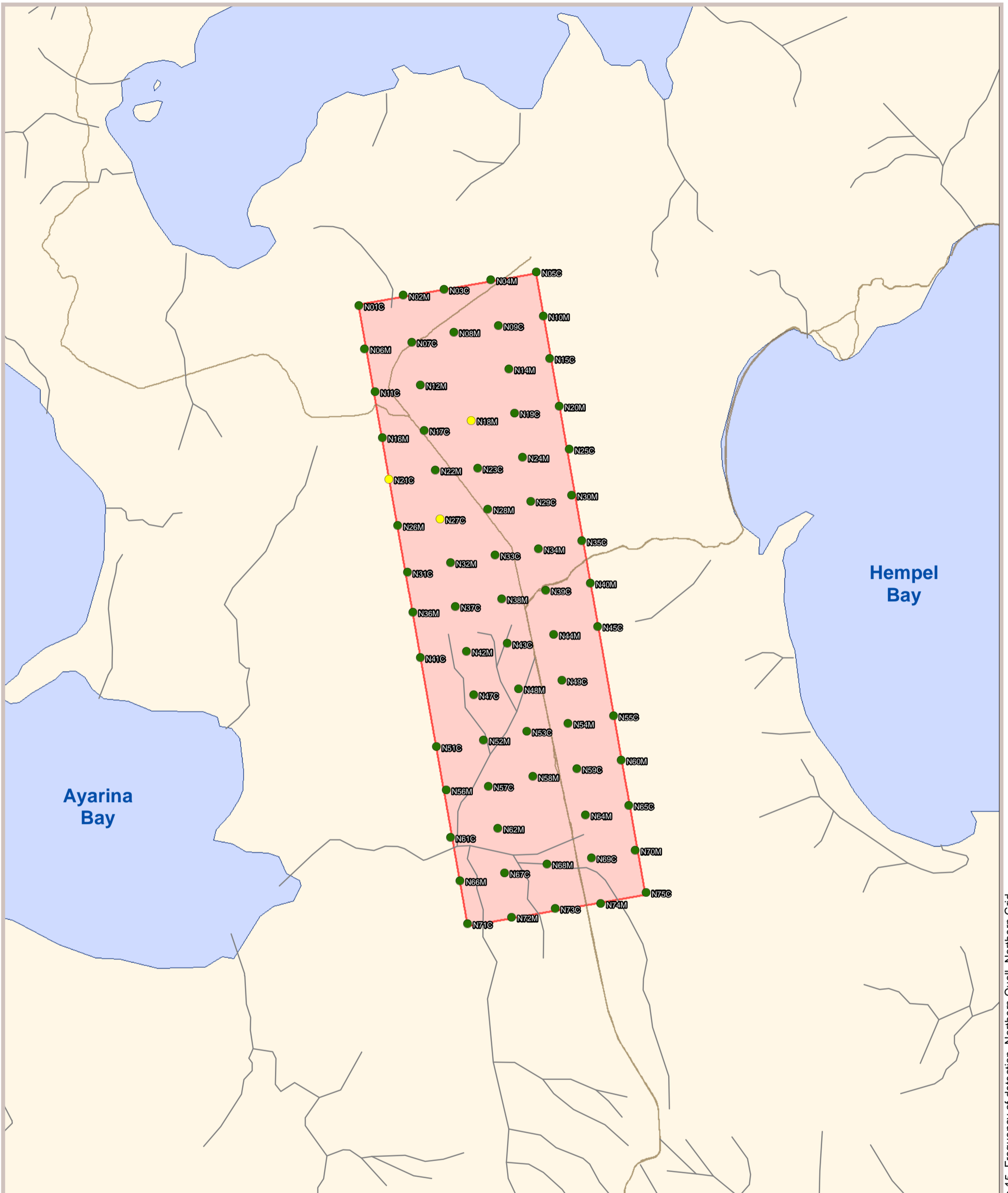
- Legend**
- Northern Grid
 - Roads and Access Tracks
 - Waterways
 - Northern Quoll Records**
 - Program

Coordinate System: MGA Zone 53 (GDA 94)



Figure 14. Location of the Northern Quoll within the Northern Grid






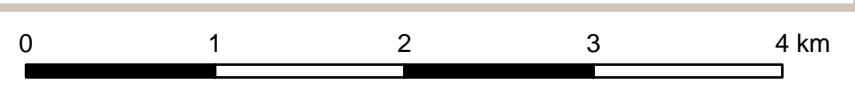
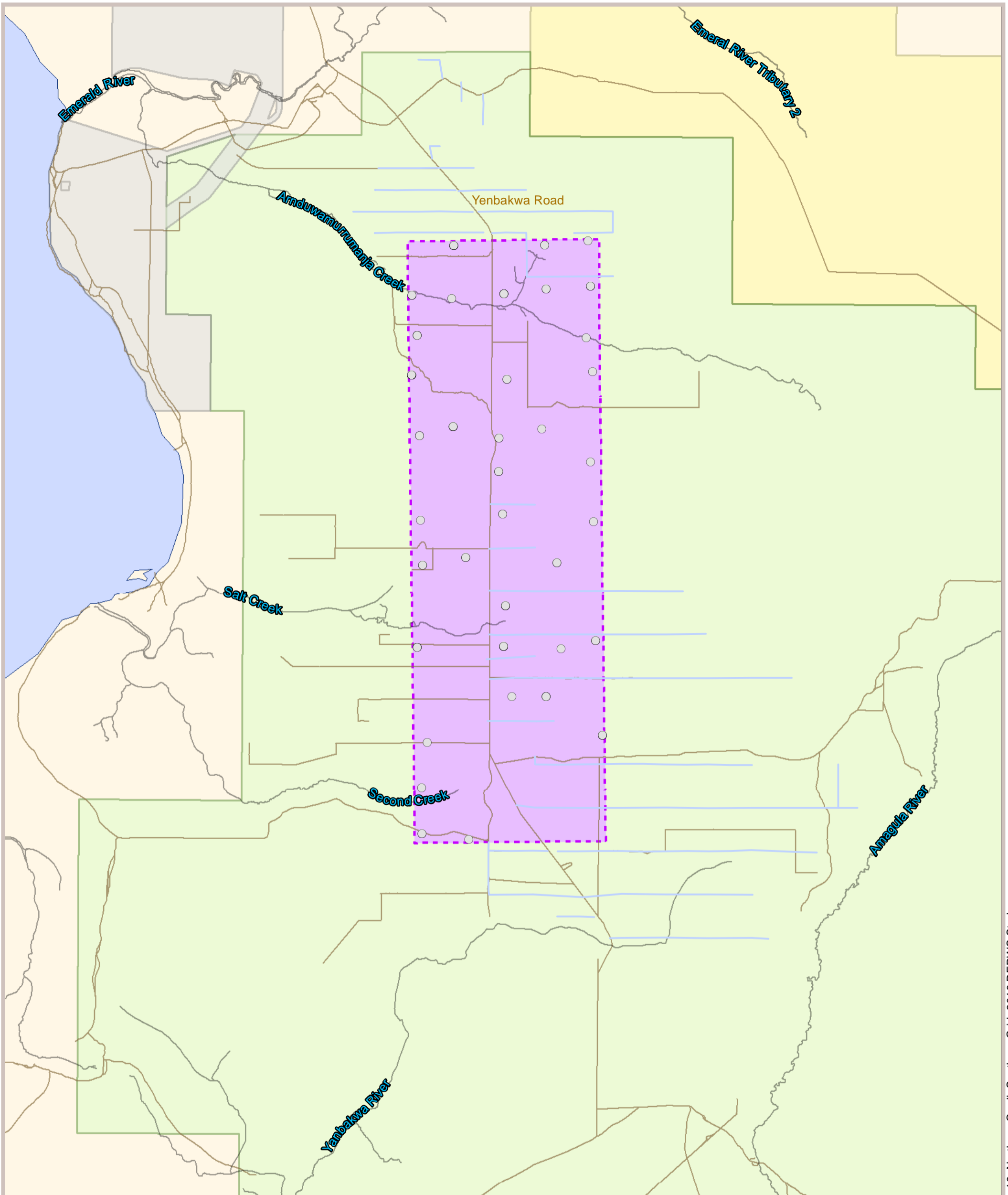

Coordinate System: MGA Zone 53 (GDA 94) 

Figure 15. Frequency of detection of the Northern Quoll within the Northern Grid



I:\...20004\Figures\RP2120220923\Figure 15. Frequency of detection_Northern Quoll_Northern Grid



Coordinate System: MGA Zone 53 (GDA 94) 

Legend









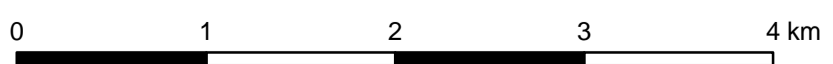
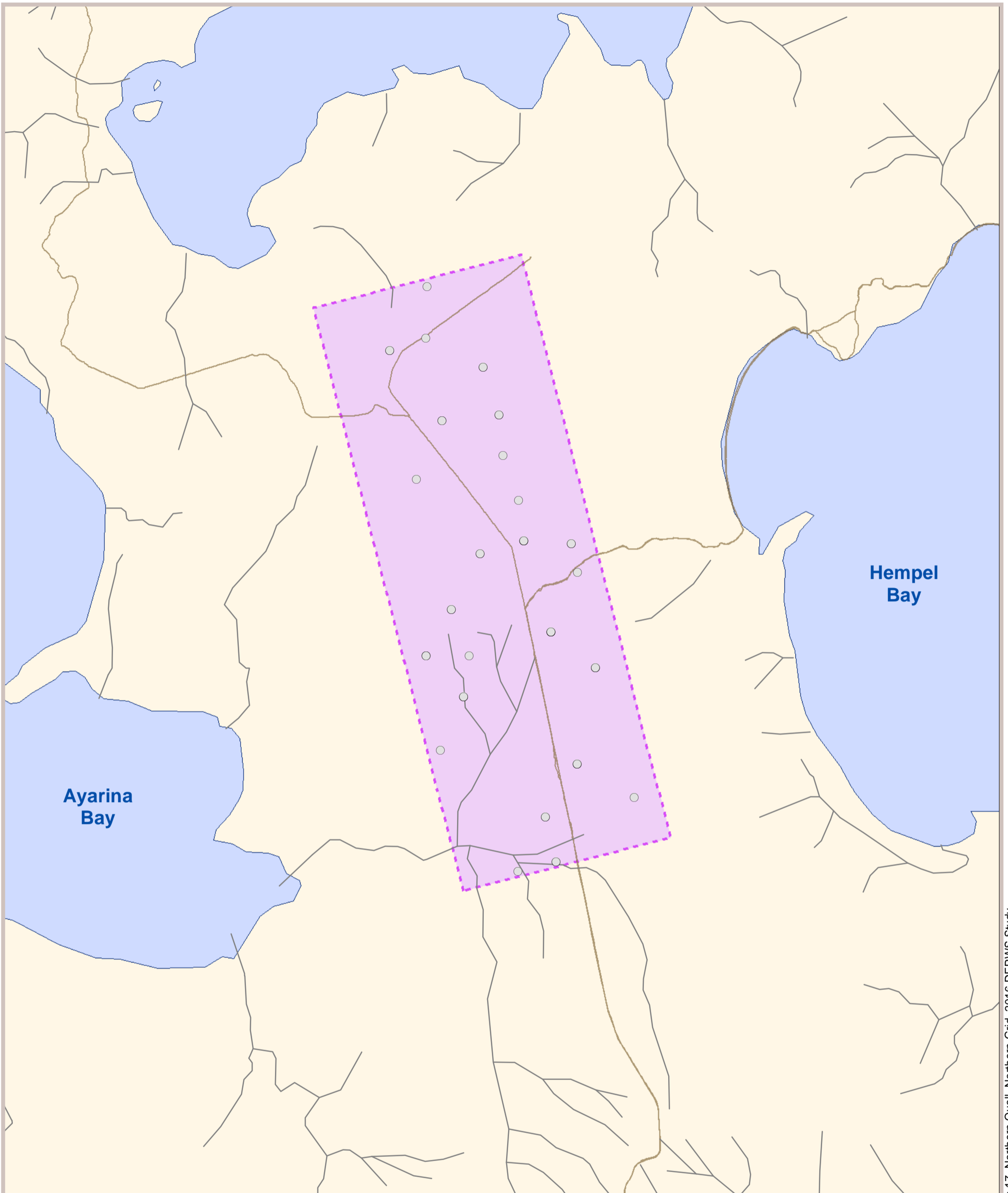




	Southern Grid (2016 DEPWS Study)		Roads and Access Tracks	Exploration Tracks	Northern Quoll Records
	Existing GEMCO Mine		Waterways		2016
	Southern Lease (EL2455)				2016 DEPWS Study
	Eastern Leases (ML31220)				

Figure 16. Location of the Northern Quoll within the Southern Grid (2016 DEPWS Study)





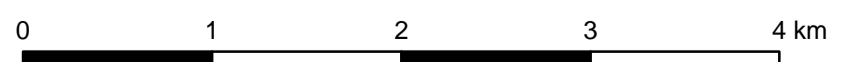
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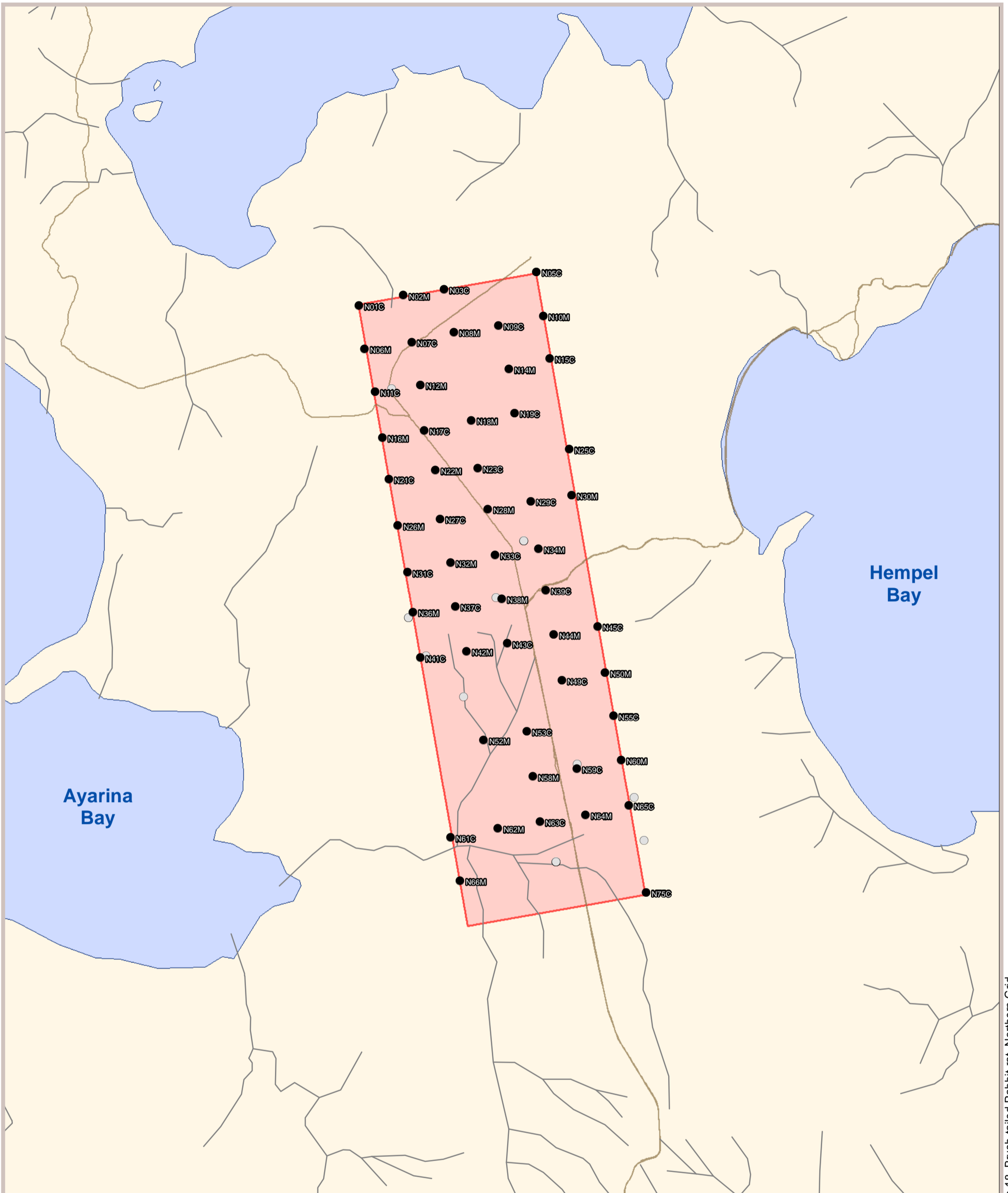
- | | | |
|--|----------------------------------|--|
|  | Northern Grid (2016 DEPWS Study) | Northern Quoll Records |
|  | Roads and Access Tracks |  2016 DEPWS Study |
|  | Waterways | |

Coordinate System: MGA Zone 53 (GDA 94)



Figure 17. Location of the Northern Quoll within the Northern Grid (2016 DEPWS Study)





- Legend**
- Northern Grid
 - Roads and Access Tracks
 - Waterways
 - Brush-tailed Rabbit-rat Records**
 - Program
 - 2016 DEPWS Study

Coordinate System: MGA Zone 53 (GDA 94)

Figure 18. Location of the Brush-tailed Rabbit-rat within the Northern Grid

