Technical memorandum

To: [redacted]
From:
Date: 05/08/2024
Subject: Targeted survey for Golden Bandicoot at the Napier Downs Irrigation Project

This memo presents the results of a targeted survey conducted for Golden Bandicoot for the Napier Downs Irrigation Project in June 2024.

Background

The Napier Downs Irrigation Project (the Project) will entail the development of centre irrigation pivots which will be used to produce fodder crops for cattle stocked on Napier Downs and nearby stations. The Project is located on Napier Downs Station, approximately 77 km east of Derby, Western Australia (LPL N049855; **Error! Reference source not found.**). Water will be sourced from the Grant Group Aquifer. A groundwater application licence has been submitted for 3 GL / annum (for 4 pivots), with the Project to be developed in stages to limit, and monitor for, environmental impacts. A native vegetation clearing permit application has been submitted for the Project for 200 ha of clearing within a 586.5 ha footprint (project area in Figure 1) and is currently under assessment (CPS 10427/1).

The Threatened species Golden Bandicoot (*Isoodon auratus auratus*) was potentially recorded during a baseline fauna survey for the Project in June-July 2022 (Phoenix 2024). The species was identified from size comparison with Northern Brown Bandicoot (*Isoodon macrourus macrourus*) specimens which were also captured during the survey. One *I. a. auratus* male in breeding condition and one female with 2 juvenile offspring were recorded at a single trapping site (site 08) on the southern boundary of the project area (Figure 2). Both adult specimens had a head-body length of approximately 22 cm which was considerably smaller than that of trapped *I. m. macrourus* (head-body length of likely >30 cm). No additional morphometric data was collected during the survey. Additional *Isoodon* sp. diggings were recorded in and outside of the project area (Figure 2); it is uncertain whether these were from *I. a. auratus*, *I. m. macrourus* or a combination of both species.

As no additional morphometric data was collected from the Golden Bandicoot specimens, nor genetic analysis conducted, the Department of Biodiversity, Conservation and Attractions (DBCA) considers the identification tentative, also taking into account that the records are ~65 km outside of the known distribution and typical habitat of the species (advice via Department of Water and Environmental Regulation request for further information, 18 April 2024).

An Environmental Assessment and Management Plan (EAMP) has been developed for the Project to manage environmental impacts other than those associated with groundwater abstraction (the latter covered under a Water Resource Operating Strategy). This includes measures to protect and monitor the Threatened species Golden Bandicoot (*Isoodon auratus auratus*), assuming the species is present in/around the project area. The draft EAMP specifies 'annual monitoring of the local Golden Bandicoot population and feral animals will be undertaken to assess population persistence for a sufficient period to demonstrate no significant impact to Golden Bandicoot'.

The EAMP also identifies risk of introduction or promotion of introduced fauna (cats, dogs and cane toads) from the Project as a threat to terrestrial fauna. Cats are listed as a current threat to the Golden Bandicoot (Threatened Species Scientific Committee 2015).

Aims / scope of survey

The aims of the survey were as follows:

- determine if Golden Bandicoot is present in the project area and surrounds
- if present, collect additional information on the local distribution of Golden Bandicoot
- collect additional information on the presence of feral animals (especially Cat, Dog and Cane Toad) in the project area and surrounds
- inform impact assessment and mitigation measures for the Golden Bandicoot
- if present, establish baseline data for ongoing monitoring of Golden Bandicoot.

Consultation was undertaken with DBCA staff on the survey approach and methods prior to the survey (meeting on 2 May 2024).

Methods

The survey was undertaken in accordance with:

- DBCA SOP Permanent marking of vertebrates using PITs (DBCA 2022)
- DBCA SOP Aluminium box traps for capture and of terrestrial vertebrates (DBCA 2018a)
- DBCA SOP Cage traps for capture of terrestrial vertebrates (DBCA 2018b)
- DBCA SOP SC22-16 Care of ejected pouch young (DBCA 2023a)
- DBCA SOP SC23-08 First aid for animals (DBCA 2023b).

Systematic trapping sites

Some preliminary selection of sites was conducted prior to the field survey using aerial imagery, habitat data and records of past activity (diggings) that were recorded during the initial survey in 2022. A total of 8 sites were selected for systematic trapping sites, comprising 4 sites inside and 4 sites outside the project area (Figure 3; Table 1), the latter to provide broader context for local bandicoot occurrence and enable establishment of control sites, if required.

Control sites were selected in comparable habitat to that of sites inside the project area. Trap lines consisted of alternating small and large size Sheffield traps baited with universal bait (mixture of rolled oats, peanut butter and sardines). A total of 5 small and 5 large traps were used at each site.

Traps were spaced 25 m apart, and where possible used existing tracks to maximise survey coverage. Each trap line was open for 7 consecutive nights. All traps were marked with flagging tape and a GPS coordinate was recorded. Traps were placed in shady areas and covered with shade cloth to provide additional protection to captured animals. Traps were checked and closed within 3 hrs of sunrise each morning, and then re-opened within 3 hrs of sunset each afternoon. If a bandicoot was captured, the animals were to be processed immediately and released. Traps were re-baited after the 3rd night of trapping, or after capturing an animal.

Sand pads

In addition to the systematic trapping sites, 2 sand pads were established along access tracks (Figure 3; Table 1). Each sand pad was cleared using hand tools to prepare discrete plots along the track. Each plot was then checked once per day, and all cat and dog tracks were to be recorded and removed.

Motion sensitive camera trapping

Motion sensitive cameras (Reconyx Hyperfire 600) baited with non-edible lures were installed at 4 systematic camera trapping site (Figure 3; Table 1). Between 5 and 10 cameras were deployed at each site and left in

place for the duration of the survey. Camera traps were deployed to target feral predators (cats and dogs) but could also detect significant species. Camera placement was designed to suit the habitat values at each site. For linear habitat (e.g. access tracks) camera traps were placed along the track at approximately 100 m intervals.

Traverses through project area

Foot traverses were also conducted in the project area searching for signs of bandicoot presence (see tracks in Figure 3). During the traverses through the project area, any noteworthy observations were recorded as opportunistic records.

Table 1 Survey effort

Site	Site type	Large Sheffield trap (trap nights)	Small Sheffield trap (trap nights)	Sand pad (trap nights	Motion camera trap (Number of units x trap nights)
Cage trap site 01	Systematic trap site	35	35		
Cage trap site 02	Systematic trap site	35	35		
Cage trap site 03	Systematic trap site	35	35		
Cage trap site 04	Systematic trap site	35	35		
Cage trap site 05	Systematic trap site	35	35		
Cage trap site 06	Systematic trap site	35	35		
Cage trap site 07	Systematic trap site	35	35		
Cage trap site 08	Systematic trap site	35	35		
Sand pad site 01	Systematic trap site			7	
Sand pad site 02	Systematic trap site			7	
Camera trap site 01	Systematic trap site				35
Camera trap site 02	Systematic trap site				35
Camera trap site 03	Systematic trap site				35
Opportunistic site 01	Opportunistic record				
Opportunistic site 02	Opportunistic record				
Opportunistic site 03	Opportunistic record				
Opportunistic site 04	Opportunistic record				
Opportunistic site 05	Opportunistic record				
Opportunistic site 06	Opportunistic record				

Results and discussion

Bandicoot results

No evidence of any bandicoot (*Isoodon*) presence was recorded during the targeted survey, either inside or outside the project area. This includes both direct evidence (captured in traps or photographs) or secondary evidence (scats, tracks and diggings).

A likely explanation for the absence of records is that the survey was completed following an average wet season and the bandicoot population has contracted (presumably to its core habitat further north). In contrast, the original baseline survey was conducted following an extreme wet season with well above average rainfall and it is likely that the population expanded from its core habitat further south than normal in response to highly favourable conditions.

The years 2020-2023 were all classified as La Niña, which for the Kimberley and Pilbara means wetter weather, increased humidity, and increased likelihood of flooding and cyclones. In 2022 when the original baseline survey was completed, the project area and surrounding region had experienced so much rain/flooding that the area was inaccessible for several months later than expected, hence the survey was completed in late June and early July.

To better understand the variation in rainfall conditions between the baseline survey conducted in 2022 and the follow up targeted survey in 2024, rainfall data recorded at the three closest weather stations (shown in Figure 4) with rainfall data has been graphed in Figure 5. Rainfall data for Derby, which is the closest weather station to the west of the project area, as well as the Doongan Aerodrome and Fitzroy Crossing Aerodrome to the northeast and southeast, respectively, provide context for the rainfall that likely occurred at the project area.

The 2020 – 2021 wet season began early with 436.8 mm of rainfall recorded at Derby in December 2020. This was more than double the maximum rainfall for any month in either 2021 or 2024. The 2020-2021 wet season then continued through to April 2021 and ended with 3 of the 4 wettest months of the past 42 months.

The following wet season (2021-2022) which preceded the original baseline survey recorded 3 months (December-March) of moderate rainfall (100-200 mm) at Derby. This is less than the total rainfall during the wet seasons before and after; however, Doongan to the north recorded the 4-year maximum amount of rainfall (>600 mm) and Fitzroy to the south received over 400 mm, indicating that a lot of rain fell across the region during this time.

It is well documented that bandicoot breeding success is strongly correlated with rainfall, especially in the northern Australian tropics. Vernes and Pope (2009) found that higher numbers of days of rainfall was a significant explanatory variable for predicting higher rates of females carrying pouch young. Short *et al.* (1998) found that rainfall over the 2 previous months could be used to predict body condition. Bradshaw *et al.* (1994) found that increased rainfall was correlated with much higher field metabolism rate (FMR), which is likely a result of improved prey availability (invertebrates, grasses and fungi).

The high detection rate of bandicoot diggings and captures during the baseline survey appears to have been a result of the 2 consecutive extensive wet seasons the area had experienced, resulting in improved FMR, body condition and reproductive rates which may have both increased the number of Northern Brown Bandicoots present, and potentially allowed the Golden Bandicoot to temporarily expand its distribution further south than their known range.

The following wet season (2022-2023) appears to have been another wet La Niña year with >400 mm of rain being recorded at both Derby near the coast and inland at Fitzroy Crossing. Additionally, it was a relatively long wet season with >200 mm falling as early as November 2022 and rainfall continuing to come through until April with Derby recording 165 mm as late as April 2023.

The next wet season (2023-2024) which was the season that preceded this survey was both late and less widespread. To the north at Doongan there was the second highest recorded rainfall in the last 42 months; however, this didn't arrive until March 2024 and the rainfall data from Derby and Fitzroy are both well below that of the previous 3 wet seasons. Derby only received a fraction of the rain it normally receives, which was also very late into the season in March.

Given the bandicoot's reliance on favourable rainfall for maintaining a high FMR, body condition, and reproductive success, the long dry spell between May 2023 and March 2024 may have caused the population to return to a more normal spatial distribution it was after 3 consecutive La Niña years.

The targeted survey results indicate a different utilisation of the project area and surrounds by Golden Bandicoot than was inferred from the 2022 baseline fauna survey (Phoenix 2024). Based on numerous bandicoot diggings observed in and out of the study area in the baseline survey, it was surmised that Golden Bandicoot were likely resident in the area, using the available habitats for foraging and breeding, although it was also noted that the diggings could belong to either the threatened species or the common Northern Brown Bandicoot (*Isoodon macrourus*), which was also recorded.

The current survey results, however, suggest that the habitat of the project area and surrounds is only utilised by bandicoots in highly favourable years, which likely explains their presence in what is considered atypical habitat. Based on this assessment, the fauna habitat in the project area is not considered core habitat for Golden Bandicoot.

Introduced fauna

Limited evidence of introduced animals was recorded during the survey. Cat tracks were observed at cage trap site 2, outside the project area. Dog tracks were observed at cage trap site 3 inside the project area and the species was caught on camera at Camera site 01, a cattle trough, outside the project area (Figure 6).

Recommendations

It is recommended that the EAMP is updated to:

- Remove monitoring of Golden Bandicoot as no resident population of Golden Bandicoot is present in the project area and the project area does not contain core habitat for the species, therefore risk of impact to the species from the Project is low.
- Remove introduced feral cat/dog control and monitoring as this management commitment was included in the EAMP specifically to manage risk Golden Bandicoots (particularly from cats) on the assumption a resident population was present in the study area and surrounds.

Given the current absence of Golden Bandicoot in the project area, the current dry season (2024) would be an optimal time to undertake clearing as there is low risk of displacement or direct mortality from clearing machinery, though it is acknowledged.

Yours Sincerely,

[redacted]

Manager – Vertebrate Zoology

[redacted]

602800
691600
8176000
8092000
Lalang-garram / Horizontal Falls Marine Park
Wilinggin Indigenous Protected Area
Miluwindi Conservation Park (Sthn Bunuba part only)
Wilinggin Indigenous Protected Area
HAWKSTONE CREEK
NGOODEROODYNE SPRING
Wilinggin Indigenous Protected Area
LENNARD RIVER
Windjana Airstrip
Bandilngan (Windjana Gorge) National Park
DERBY GIBB RIVER RD
GREAT NORTHERN HWY
0
1.5
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Kilometers
Western Australia
PERTH
Napier Corporation Ltd
Napier Downs Irrigation Project
Project No 1669
Date 1/08/2024
Drawn by BK
Map author FH
0
10
20
Kilometers
1:480,000 (at A3)
GDA 1994 MGA Zone 51

Project area
Indigenous Protected Areas
Napier Downs Station
Environmentally sensitive areas
DBCA managed land
Lakes
Rivers
Figure 1
Project location
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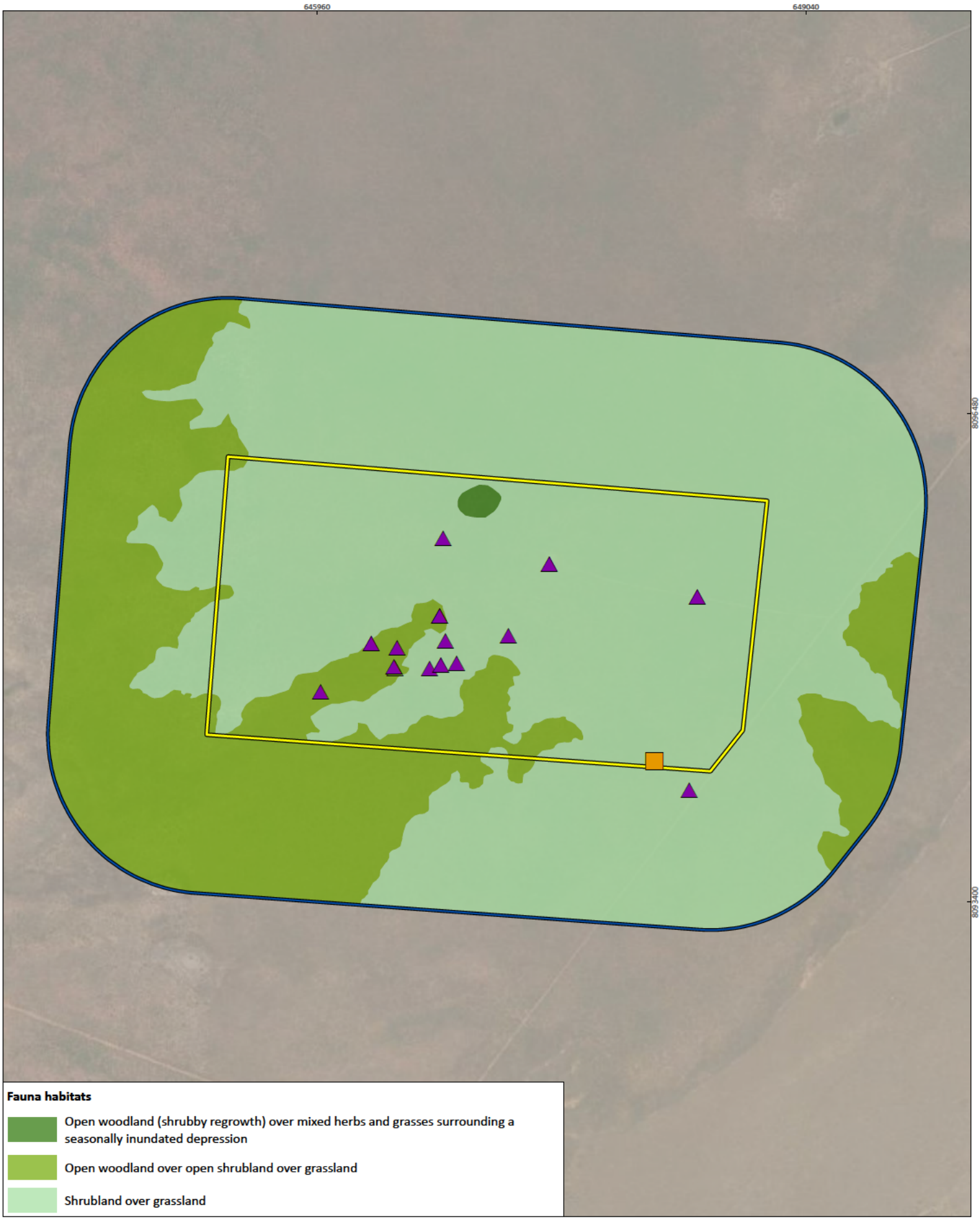

Fauna habitats

- Open woodland (shrubby regrowth) over mixed herbs and grasses surrounding a seasonally inundated depression
- Open woodland over open shrubland over grassland
- Shrubland over grassland

Napier Corporation Ltd.
Napier Downs Irrigation Project

Project No	1669
Date	2/08/2024
Drawn by	BK
Map author	FH

0 0.5 1
Kilometers

1:30,800 (at A4) GDA 1994 MGA Zone 51

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- Project area
- Project area plus 1km buffer

Species, status

- *Isoodon auratus auratus* Golden Bandicoot, (VU)
- *Isoodon auratus auratus* or *macrourus*

Figure 2

Bandicoot records from 2022 fauna survey

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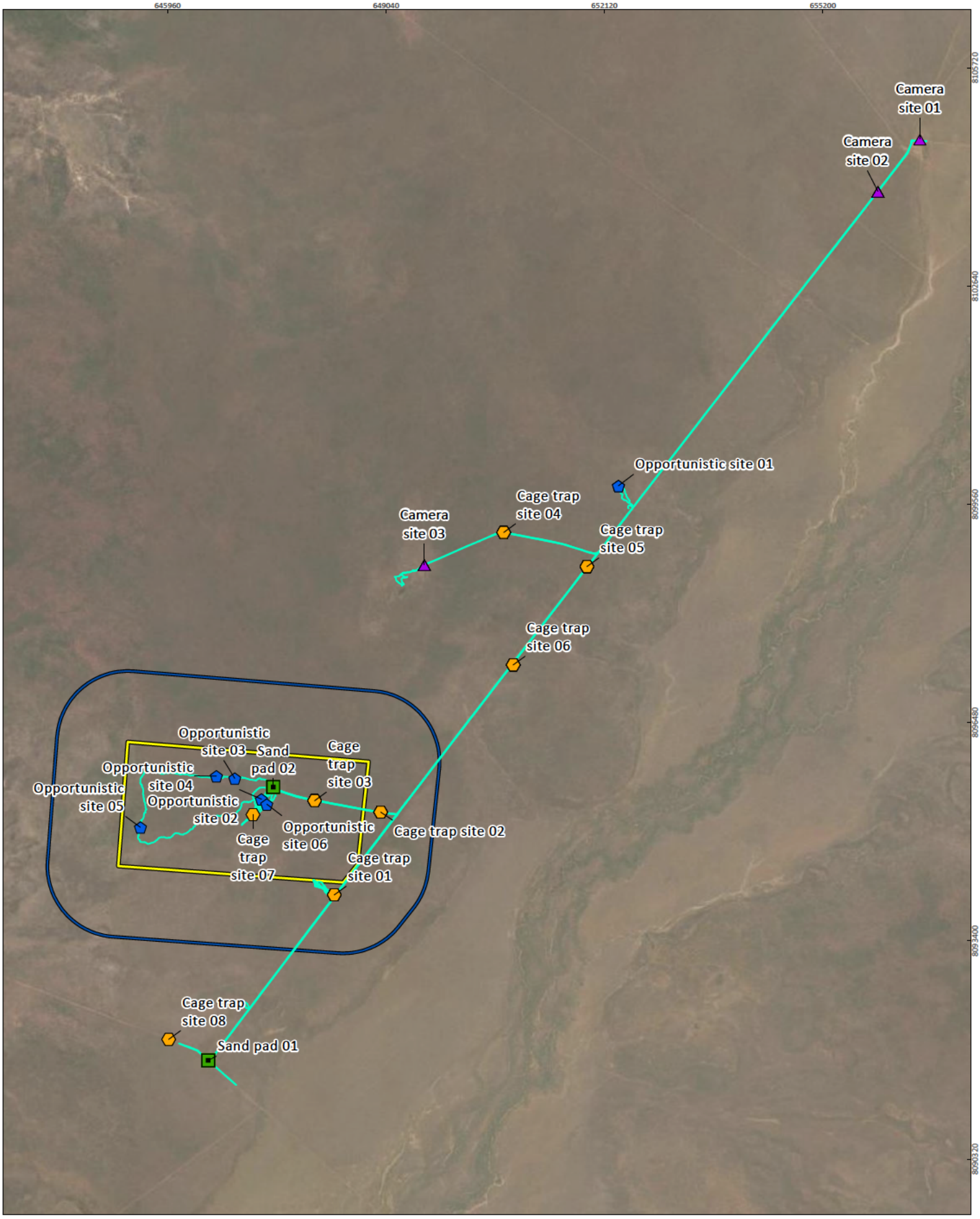

Napier Corporation Ltd.
Napier Downs Irrigation Project

Project No	1669
Date	2/08/2024
Drawn by	BK
Map author	FH

0 1 2
Kilometers

1:68,967 (at A4) GDA 1994 MGA Zone 51

- Project Area
- Project Area plus 1km buffer
- Tracks
- Camera sites
- Opportunistic sites
- Sand pad sites
- Cage trap

Figure 3
Survey sites

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Napier Downs Irrigation Project

Project No	1669
Date	2/08/2024
Drawn by	BK
Map author	FH

0 25 50
Kilometers

1:1,604,200(at A4) GDA 1994 MGA Zone 51

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Project area

Weather stations

- DERBY AERO
- DOONGAN ASA
- FITZROY CROSSING AERO

Figure 4

Weather Stations

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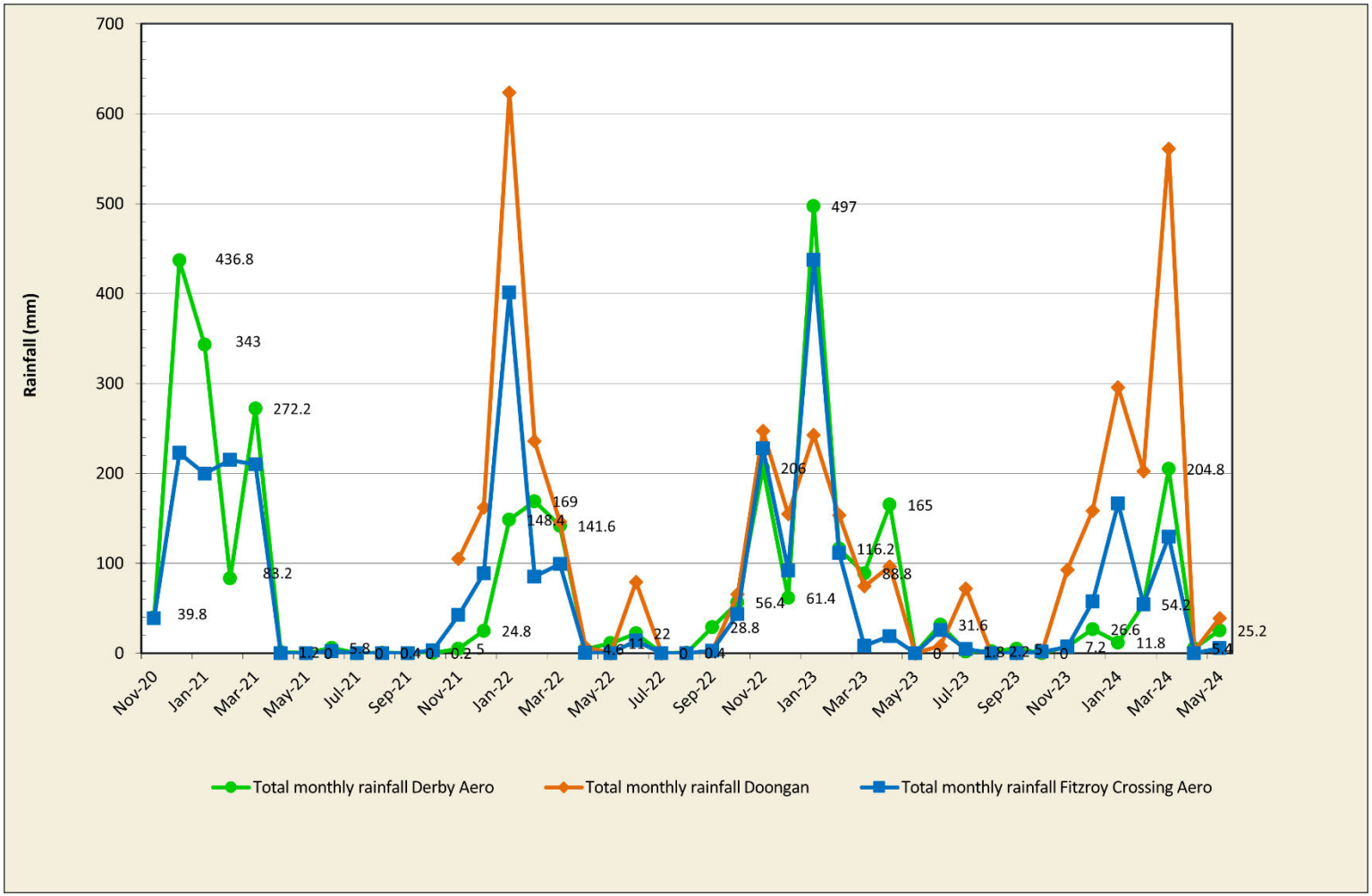

Figure 5 **Mean monthly rainfall data for Derby Aero, Doongan, and Fitzroy Crossing Aero weather stations, November 2020 – May 2024 (BoM 2022)**

Figure 6 **Dog caught on camera trap at Camera site 01**

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