EPBC 2021/9133 Offset Area Pest Animal Management Plan

Document Control

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Revision History

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1.0	Draft	5 August 2024
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Executive Summary

Kleinfelder was engaged by Townsville City Council to develop a Pest Animal Management Plan for the Haughton Pipeline Stage 2 project Offset Area, located 2.7km south-east of Lake Ross in southern Townsville in the Lake Ross Storage Area. Pest animal control, management and survey efforts will be undertaken in accordance with this plan, and any future revisions, over the life of the Haughton Pipeline Stage 2 project *Environment Protection and Biodiversity Conservation Act 1999* approval (EPBC ref 2021/9133) as part of the implementation of the Offset Area Management Plan (GHD, 2023).

Baseline studies in the Offset Area and previous control efforts in the wider Lake Ross Storage Area have identified two pest animal species as the key contributors to impacts to threatened fauna and habitat, which will be the target species for this plan. The wild dog (*Canis familiaris*) and feral pig (*Sus scrofa*) are regularly sighted in the offset area and were identified as requiring management in the Offset Area Management Plan. The wild dog control has been detailed in the Offset Area Management Plan as a key requirement due to the predation risk of Koala's and is also listed under Townsville Biosecurity Plan 2020-2024 as a priority species for control Local Government Area wide. Feral pigs are linked to extensive degradation of habitats, in particular for the Southern Black-throated Finch in the Offset Area. Non-target pest animals that will be subject to monitoring and potential control if sighted in the Offset Area are:

- Feral cat (*Felis catus*) due to the predation risk of the threatened species on site,
- Feral chital deer (*Axis axis*) due to the habitat degradation and competition for foraging grasses for the Southern Black-throated Finch,
- European Rabbit (*Oryctolagus cuniculus*) due to the habitat degradation and competition for foraging grasses for the Southern Black-throated Finch, and
- Yellow Crazy Ants (*Anoplolepis gracilipes*) due to biodiversity impacts, potential competition of hollows and mortality of small fauna species.

The implementation of this plan is to achieve ecological outcomes and completion criteria for the Matters of National Environmental Significance in the Offset Area, in particular for the Koala (*Phascolarctos cinereus*) and Southern Black-throated Finch (*Poephila cincta cincta*). The ecological outcomes outlined in Table ES 1.1 of the Offset Area Management Plan include a reduction in feral dog densities to reduce predation pressures on Koala and a reduction in feral animal densities to prevent degradation of Southern Black-throated Finch habitat.

This plan recommends one annual pest animal control event for targeted species utilising one of the three recommended control strategies detailed in Section 4.2.1. One annual survey event will also be undertaken prior to the control event to allow a collective annual report on pest animal densities within the Offset Area. If the combined data from the control and survey event indicate pest animal densities are above baseline levels within the Offset Area, a second control event will be triggered and actioned as a contingency with the aim of reducing pest animal numbers below baseline for the reporting year.

Pig-proof exclusion fencing will be installed around areas of active revegetation and installed permanent water sources on site.

Plan review and monitoring reporting is required for and by this plan detailed in Section 5 which aligns with the requirements of the Offset Area Management Plan, as well as inadvertently with the Commonwealth Approval (EPBC ref 2021/9133).

Table of Contents

Contents

Tables

Figures

1. Introduction

1.1. Purpose Statement and Objectives

The purpose of this Pest Animal Management Plan (PAMP) is to describe the management action for control of feral animals at Haughton Pipeline Stage Two Offset Area (Offset Area), as required, as part of the implementation of the approved Offset Area Management Plan (OAMP), as well as a key management measure to meeting the ecological outcomes and completion criteria under the OAMP. The OAMP is conditioned and monitored for implementation under the Haughton Pipeline Stage 2 (HPS2) Project *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval (2021/9133). This requirement is included under condition 7 and condition 9 of the HPS2 EPBC Act Approval as follows:

> *Condition 7: To compensate for residual significant impacts to protected matters, up to the limits specified in condition 2, the approval holder must commence implementing the Offset Area Management Plan (OAMP) prior to the commencement of the action and continue to implement it for the remainder of the life of the approval. The approval holder must notify the department in writing of the date of commencing the OAMP implementation within 20 business days of the date of commencing OAMP implementation.*
> *Condition 9 (excerpt): Within 60 business days following each 5-year anniversary of the date of commencing OAMP implementation, until the expiry of this approval, the approval holder must submit to the department and publish on the website for the remainder of the period of the approval, an OAMP Report which assesses progress towards achieving and maintaining each of the completion criteria.*
> *Cont.… Once the completion criteria are achieved, the approval holder must ensure the completion criteria for the offset area are maintained for the remainder of the life of the approval.*

This plan will align with Local and State legislative requirements and priorities as required by the Townsville Biosecurity Plan 2020-2024 (Townsville Biosecurity Plan) and the *Biosecurity Act 2014* (Biosecurity Act).
The objectives of this plan are to achieve ecological outcomes and meet the completion criteria relevant to pest animals under the OAMP, which are detailed in Table 1.

Table 1: Plan Objectives Relevant to OAMP

OAMP Reference	Objectives relevant to this Plan
Table ES 1.1: Ecological Outcomes for the relevant MNES	*Southern Black-throated Finch:* Reduction in densities of feral animals (i.e. wild pigs) to prevent degradation of habitat.
	Koala: Reduce densities of wild dogs to reduce the predation pressures on the local koala population.
Table 7.5: Interim milestones, completion criteria and corrective actions	Feral animal densities have been reduced to prevent the degradation of habitat by pigs and precent koala injury by dogs.

1.2. Legislation

The Queensland Biosecurity Act commenced in July 2016, replacing the *Lands Protection (Pest and Stock Route Management) Act 2002* as the overarching legislation guiding pest management in the state. The Act establishes a system to minimise biosecurity risks and facilitate a coordinated response to biosecurity events.
Wild dogs, feral pigs, rabbits, feral cats and feral chital deer are categorised as restricted matter (all under category 3, 4 or 6) under the Act, which means they must not be moved, fed, given away, sold or released

into the environment without a permit. Yellow Crazy Ants are a category restricted tramp ant meaning it cannot be given away, sold or released into the environment. Classification as restricted matter also means that all stakeholders including private landholders, local, state, and federal governments have a responsibility (general biosecurity obligation; GBO) under the Biosecurity Act to take all reasonable and practical steps to prevent or minimise associated risks (e.g. health and safety, amenity, social, economic, and environmental risks).
The Queensland *Animal Care and Protection Act 2001* imposes a duty of care on persons in charge of animals to ensure animal welfare is upheld, and this legislation applies to controls implemented as part of this control plan.
Implementation of this Plan will also be in accordance with the *Weapons Act 1990* and best practice guidelines e.g. PestSmart Standard Operation Procedures (SOPs) for humane control of pest animal species.

1.3. Consultation and Collaboration

Pest animal management in the Offset Area has historically been undertaken as part of management of the wider Lake Ross Storage Area (LRSA) and Townville Local Government Area (LGA). Management has been collaborated across various internal Townsville City Council (TCC) teams as well as with external land managers/holders where appropriate. Townsville City Council participate annually in Regional Pest Management Group forums to allow consultation and collaboration of pest animal initiatives which will benefit the Offset Area pest animal management.

Ergon and/or Powerlink will require negotiations with respect to any management or control to occur across their respective easements.

2. Management Area

2.1. Offset Area

The Offset Area encompasses a series of adjoining land parcels located immediately south of Lake Ross (Ross River Dam) in southern Townsville, encompassing an extent of 640.35 ha, of which 625.58 ha is actively managed as the offset (Figure 1, Appendix A). The Offset Area provides suitable habitat for three Matters of National Environmental Significance (MNES) and occurs in an area where all three species have been historically recorded. It supports a combination of remnant woodland vegetation, regrowth and non-remnant areas that have been historically cleared and subject to cattle grazing.

The Offset Area exists south of Ross River Dam in the LRSA, the primary reservoir for Townsville, owned and managed by Townsville City Council (Figure 1, Appendix A). The dam has a catchment area of approximately 75 km^2 and a maximum capacity of 233,187 ML.

3. Offset Area Pest Animal Species

The target species for this plan and in accordance with the OAMP ecological outcomes and completion criteria are the wild dog and feral pig. Baseline data indicates these two species occur in the highest abundances throughout the Offset Area and wider LRSA, and as such will be subject to annual control, management and survey efforts. Other pest animal species that have records or a high likelihood of occurrence are considered non-target species within this plan and include:

- Feral cat (*Felis catus*) due to the predation risk of the threatened species on site,
- Feral chital deer (*Axis axis*) due to the habitat degradation and competition for foraging grasses for the Southern Black-throated Finch,
- European Rabbit (*Oryctolagus cuniculus*) due to the habitat degradation and competition for foraging grasses for the Southern Black-throated Finch, and
- Yellow Crazy Ants (*Anoplolepis gracilipes*) due to potential competition of hollows and mortality of small fauna species.

3.1. Offset Area Pest Animal Presence and Ecology

Introduced animals including feral pigs (*Sus scrofa*) and wild dogs (*Canis familiaris*) are considered common within the LSRA and Offset Area. Feral pigs are known to degrade ground-level habitats and water sources, and thus have the potential to impact on potential southern black-throated finch (SBTF) habitat at the Offset Area. Each year TCC conduct an aerial shooting program where they control approximately 20-30 wild dogs and on average 220 wild pigs per year (pers. comm. Bradley Drinkwater (Ross River Dam Ranger)). While rabbits (*Oryctolagus cuniculus*) are considered uncommon within the LSRA (NRA 2018; pers comm. Bradley Drinkwater (Ross River Dam Ranger)), the species can substantially degrade habitats for the southern black-throated finch (GHD, 2023) and has the potential for adverse impact on habitats at the Offset Area.

Baseline data for the target pest animal densities in the Offset Area considered the data collected from the preceding five years of pest animal control programs and the area of occupation to get a reasonable baseline number. The baseline number calculated considered the following key points:

- The total LRSA is approximately 128km^2, with Lake Ross taking up approximately 45km^2 of the LRSA. The area of occupation for these species was considered as 83km^2, as the entire Lake Ross would not be utilised by these species.
- The typical home ranges for wild dogs and feral pigs as discussed in the subsequent sections, and the LRSA surrounds being per-urban and urban. For the purpose of calculating the baseline density, 20km^2 home range was utilised for both species.
- The average of the total preceding five years of pest animal control count data for the LRSA.

The baseline number considered the wider LRSA data due to the widespread daily dispersal behaviour of the two target species, the feral pig and wild dog and value of long- term data, reducing seasonal and climatic variability. Baseline number was derived by averaging the long- term data and multiplying by 24% (percentage of typical home range for both species occurring within the LRSA area of occupation) to achieve an indicative density for each species home range (2,000ha). Although the home range is larger than the Offset Area, both species are highly mobile and need to be managed as if the populations of the home ranges are occurring in the Offset Area at any one time. This data is summarised in Table 2 and detailed further in the 2021/9133 Offset Area Baseline Pest Animal Monitoring report (Appendix B).

The key locations or hotspots for pest animal activity in the Offset Area are characterised by riparian habitat and dense canopy cover in the form of woody weeds, which is primarily within the eastern extent of the site (Figure 2, Appendix A). In the wider LRSA, pest animal presence is also closely associated with creek lines and dense vegetation (Figure 2, Appendix A).

Table 2: Feral Pigs and Wild Dogs Controlled in the wider LRSA

Species	2019 (LRSA)	2020 (LRSA)	2021 (LRSA)	2022 (LRSA)	2023 (LRSA)	Baseline Number per home range (2,000ha)
Feral Pig	164	274	178	291	217	54
Wild Dog	17	13	31	20	38	6

The OAMP requires specific monitoring and management for feral cats and rabbits due to their heightened risk to the SBTF. No more than 10 Rabbits are sighted every 1-2 years (pers. comm. Bradley Drinkwater (Ross River Dam Ranger)) and feral cats have been sighted in very low numbers, no more than 5 annually, in the Offset Area over previous five years by the main area manager (pers. comm. Bradley Drinkwater (Ross River Dam Ranger)). Two feral cats were sighted and controlled as part of the pest animal management program in 2020. Due to these numbers, no specific control or management has been recommended in this plan. This plan sets a requirement to monitor for elevated feral cat and rabbit population numbers in the Offset Area as part of the annual pest animal survey, in which higher densities would trigger targeted control techniques in line with current TCC control strategies and best practice guidelines.

The feral chital deer and yellow crazy ant have a high likelihood of occurring in the Offset Area and subsequently potentially directly or indirectly impacting the three MNES species and their habitats, as noted by public database records and the Townsville Biosecurity Plan. However, these species are currently not in high enough abundances to require active control or formal surveying. Feral chital deer and feral horses have not been seen in the Offset Area.

3.1.1. Wild Dog

Wild dogs are recognized as a key predator to Koala's (Department of Agriculture and Fisheries, 2024). They are widespread throughout Queensland in a variety of habitats, using roads, creeks and fence lines as travel ways (DAF, 2024). Wild dogs are social animals that often form packs to travel and hunt together and occupy territorial home ranges that vary between 10 and 300 square kilometres (Sharp T, 2012). These home ranges tend to be large, can overlap with other territorial ranges, and are highly dependent on food availability (DAF, 2024). Individual wild dogs that are not associated with a pack tend to have even larger ranges and are generally dispersing to find new territory or to leave their birth group.

They typically breed once a year from April to June, with 4-6 pups per litter and a 9-week gestation period as noted in Table 3 (DAF, 2024). Females reach sexual maturity at two years of age, while males reach sexual maturity at three years of age (Sharp T, 2012).

Table 3: Wild Dog Breeding Season Queensland

Summer			Autumn			Winter			Spring		
Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
				Breeding							
				Gestation							

3.1.2. Feral Pig

Feral pigs pose a threat to Southern Black-throated Finch due to the extensive habitat degradation and spread of weeds. In 2021, it was estimated that Queensland had up to 2.3 million feral pigs (DAF, 2024). They are known to be highly concentrated in large drainage basins, which is characteristic of the Offset Area. Female (sows) and juvenile pigs generally persist in small family groups while adult males are typically solitary. Feral pig home ranges can vary between 2 to 20 square kilometres for family groups and 8 to 50 square kilometres for boars (Centre for Invasive Species Solutions, 2011).

Feral pigs do not have a defined breeding season and can breed several times a year if the environmental conditions are favourable. Litters of 4-10 are produced and weaned after 2-3 months, typically in conjunction with food and water availability (wet season) which is typically from November to March in North Queensland.

3.1.3. Non-target Pest Species

Feral Cats

Feral cats have the potential to cause predation pressure for the Southern Black-throated Finch, and less likely the Koala. They are often thought of as solitary animals, though studies show that this is generally only limited to hunting (DAF 2023). Cats will often live in social groups comprising several related females and an adult male. Their home ranges can vary depending on resource availability (including food and den sites) and sex, with males having a larger home range of up to 10 km^2 (DAF, 2023).

Female feral cats generally have two litters per year in spring and late summer/early Autumn, comprised of two to seven kittens. However, the 'breeding season' is less well-defined than wild dogs as breeding is generally dictated by environmental conditions and resource availability (DAF, 2023). As such, they do not have a particular peak activity season/month and are renowned for being highly elusive and difficult to monitor. Young males raised in their natal group generally disperse or are driven from the group once their reach sexual maturity.

Feral Chital Deer

Feral chital deer can damage native vegetation and compete with the SBTF for foraging grass seed. They also spread invasive weed species with their widespread dispersal habits. The species' current distribution is north and northwest Queensland and are known to concentrate around permanent water sources (DAF, 2023). This species forms large herds predominately of female deer with several stags.

Breeding season is undefined for the species, with feral chital deer producing between one and three calves after a 234-day gestation.

European Rabbit

Rabbits are considered as a key contributing factor in the degradation of SBTF habitats, due to the competition for native foraging grasses and soil erosion. In particular, rabbits can lead to complete removal of native grasses species and alterations to fuel load (Black-throated Finch Recovery Team, 2007). The species are widespread across Queensland and correlated with soil types that are suitable for burrowing (DAF, 2023).

Female rabbits can have up to five to six litters of about three to four kittens per litter in one breeding season, which can commence in females four months of age. Gestation is 28 to 30 days (DAF, 2023).

Yellow Crazy Ant

The yellow crazy ant can impact on birds and bats through competition of hollows and in rarer cases lead to mortality of small fauna by overwhelming them. Whilst this species is not listed as a direct threat to the three MNES species on site, it can potentially indirectly or eventually directly impact them if they occur in increasing abundances in the Offset Area. They are known to colonise moist, shady and disturbed habitats and nest in areas with access to water or moisture such as creek beds, service pits, under logs or in debris/leaf litter (DAF, 2023).

Queens survive for several years, with work ants having a 76–84-day lifecycle and being produced throughout the year. Sexual offspring can be produced any time of the year but generally one to two months prior to the wet season, which is between Autumn and October in North Queensland (DAF, 2023).

4. Pest Animal Control, Property Management and Survey in Offset Area

4.1. Consultation and Collaboration

Table 4 below details the relevant stakeholders in which pest animal control, management and survey in the Offset Area will be consulted and collaborated with.

Table 4: Offset Area Pest Animal Consultation and Collaboration

Consultation	Collaboration
Biosecurity Queensland	Townsville City Council Dams and Catchments team
Burdekin Shire Council	Townsville City Council Environment team
Charters Towers Regional Council	Townsville City Council Environmental Restoration Biosecurity Team, Construction Maintenance and Operations section.
Queensland Parks and Wildlife Service	Townsville City Council Sustainability Team
Queensland Department of Transport and Main Roads	Townsville City Council Land Tenure
Queensland Rail	Department of Resources
North Queensland Dry Tropics	All adjoining private landholder/s to Offset Area
Ergon and/or Powerlink	High Pressure Gas Pipeline Easement (Enertrade (NQ) Pipeline No.1 and No.2)

4.2. Control Options for Target Species

A summary of control options that may be utilized as part of the annual pest control plan in the Offset Area is provided in Section 4.2.2. An adaptive management approach is critical to the success of any control program, and as such there will be some flexibility around the selection of control options. Control methods will follow best practice to ensure animal welfare is upheld, and to avoid ineffective control resulting in pest animals becoming warier and harder to manage.

These control options have been selected from best practice guidelines according to the target pest animal species but also due to the time and cost efficiencies associated with utilising these control methods which have been successfully employed by Townsville City Council in the Offset Area and wider LRSA in previous years as part of the wider LGA pest management plan.

Pest management in the Offset Area beyond the commitments required by this plan will likely be undertaken from time to time as part of collaborative LGA wide pest management initiatives and has previously, indicating all control options suggested in Section 4.2.2 are successful in controlling pest animal densities for the program year.

4.2.1. Control Strategy

Feral pigs and wild dogs are typically concentrated in the Offset Area in the dry season, due to the closer proximity to water and food resources offered by the Ross River Dam foreshore. Pest species are also easier to detect at this time due to the dense woody weed and ground cover having a reduced biomass. North Queensland wet season typically commences from late November to early December extending until March, which results in accessibility issues on site for a large portion of the year and provides wider spread availability of water and food sources for pest animals.

With these considerations, pest control is recommended on the site once annually between May and October, allowing the timing to coincide with the breeding season of wild dogs and easy detection and

higher density of feral pigs in the Offset Area. The Offset Area land manager will consult and collaborate with stakeholders as detailed in Table 4 annually in the selection of the most suitable control method for that year, which will be dependent on pest species density estimates, funding and resource availability, as well as any LGA or external stakeholder initiatives for pest control that can be implemented in the Offset Area.

Data for pest animals controlled and 'missed' will be collected to allow accurate reporting as part of the annual monitoring and compliance reporting. The template in Table 5 can be utilized during the annual control for consistent data collection.

Table 5: Data Collection Template for Annual Pest Control

Reporting Mechanism	Details	Attachments
Control Strategy	EG. Aerial Shooting	
Duration (dates, times, number of days).		
Environmental and weather conditions.	EG. Unseasonal wet weather, higher % canopy cover than normal.	
Locations of control activity.	EG. Lot on Plans or named watercourses.	KMZ attached separately as part of annual monitoring report.
Number of target species culled and missed. Age class and sex if available.	EG. Feral pig/ wild dog	KMZ attached separately as part of annual monitoring report.
Number of non-target species culled and missed. Age class and sex if available.	EG. Feral cat/ feral deer.	KMZ attached separately as part of annual monitoring report.

4.2.2. Control Options

Shooting

Wild dogs and feral pigs can be targeted through ground and aerial shooting programs (the latter more suitable for feral pigs). Aerial shooting has been successfully used for wide-scale feral pig and wild dog management in the LRSA and will likely be the preferred shooting method if selected as part of the annual pest control program in the Offset Area. Ground shooting can be effective if carried out by experienced, licenced marksmen, especially in combination with other control methods, for example integrated with trapping to target trap-shy individuals. During ground shooting, two experienced personnel will traverse relevant roads and tracks in a vehicle or on foot, locating target animals with a thermal imaging scope or spotlight. If it is assessed to be safe and appropriate to use firearms in that location, the animal will be humanely euthanised.

Shooting is a humane method of control provided it is performed by experienced, skilled marksmen using a species-appropriate firearm, ammunition and shot placement. Shooting will be undertaken in strict accordance with legislation, SOPs and Townsville City Council safety procedures.

Baiting

Baiting programs can be used to target wild dogs (1080), and feral pigs (1080 and HogGone®).

TCC undertake HogGone® baiting programs throughout the LGA several times per year. When assessing areas of suitability of the use of HogGone®, council determines the distances from any road, dwellings, boundary fences and whether or not stock is present or can be excluded. Council will not administer HogGone® baiting within 350m of any road or 150m from any dwelling. Council notifies all neighbouring

properties in adherence to the product label. HogGone® is considered the most humane baiting method for wide-scale feral pig control. The active toxin (sodium nitrite) acts quickly to cause death in feral pigs, which occurs within 2 hours of bait consumption, compared to 6-8 hours for 1080 baits.

Non-target animals are unlikely to be attracted to HogGone® baits, and the baits are placed into HogGone® bait boxes to reduce the risk of non-target species consumption.

Council undertakes biannual baiting programs for wild dogs, these programs occur in April/May and October/November. The baiting programs are targeted at larger rural properties which are eligible to bait to aid in the reduction of wild dogs in peri-urban and urban areas where they can have negative interactions with people and pets. Council encourages landholders to bait in a safe, responsible and strategic manner. Council determines each property's eligibility, bait supply and additional conditions based on the risk of off-target impacts, and in compliance with the Queensland Health Departmental Standard: Dealing with restricted S7 poisons for invasive animal control - version 1. This is a maximum of 1 bait per 10ha for wild dogs/dingoes, and additional conditions may be imposed if the authorising officer considers an action is necessary to reduce the risk to off-target species. Proximity to other properties, dwellings and roaming domestic animals are also considered.

If baiting is undertaken, a risk/benefit analysis will be completed to determine the best baiting rate to use for feral pigs and wild dogs according to the Offset Area size and proximity to waterways, roads and dwellings.

Trapping

TCC currently procures a contractor to undertake a bi-annual pest vertebrate trapping program in the peri-urban areas of the LGA which has previously included areas of the LRSA. Typically, TCC use soft-jaw traps as part of this control program.

Trapping using soft-jaw traps and panel and box traps can be used to capture wild dogs and feral pigs. Soft-jaw traps are more commonly used and consist of small metal traps with rubber on the jaws which are buried slightly below the ground. The aim of this technique is to trap the animals' paw as it steps onto the trap and hold it there until a vertebrate pest management specialist can attend to the location and humanely euthanise the animal.
Panel and box traps, which will be the likely trapping technique employed, are fully enclosed panel and box traps that are usually baited to attract pest animals. Once an animal enters the trap, it triggers a weight sensor, and the door closes behind them, thus trapping them until a specialist can attend the location.
All traps have the potential to cause injury and distress, though welfare impacts can be minimised by: ensuring adequate cover.

- checking traps at least once per day (early in the morning).
- approaching traps calmly and quietly.
- using sensor-hub traps that alert specialists when an animal has been trapped, allowing for a rapid response (within two hours).
- placing traps away from fences to prevent captured animals from incurring lacerations or broken limbs from the fence while trying to escape.

There is also a risk of non-target animals becoming trapped. This risk can be minimised by:

- strategically placing traps to target pest animals (e.g. track junctions)
- avoiding areas of likely non-target activity (e.g. the base of trees, under fences, macropod tracks)
- pre-control monitoring so areas of high non-target activity can be avoided.

A contractor with their own SWMS and Operating Procedures, vetted and approved by the TCC Safety Team, are procured to humanely euthanise the captured pest animals.

4.2.3. Contingency Plan

The annual control and prescribed methods for the Offset Area has been recommended to achieve the OAMP ecological outcome and completion criteria relating to the reduction in pest animal densities from baseline level.

Alongside the annual survey that will be conducted, which is discussed below in Section 4.4, is the data collected during the annual control program providing a total pest animal control count for the year and better understand of the Offset Area density findings of annual survey. If this collective data demonstrates pest animal densities in the Offset Area are higher than the baseline level, being 54 feral pigs and 6 wild dogs, a second control event will be triggered and actioned in the Offset Area.

Separately, if the annual survey and annual control program do not report pest animal densities over the baseline level, but the Offset Area land manager anecdotally reports an increase in abundance or impacts during regular site visits requiring action, a second control event shall be triggered at the land managers discretion.

4.3. Property Management

4.3.1. Exclusion Fencing

The main management measure being recommended in this plan for the Offset Area is exclusion fencing, which will be installed around active revegetation sites (tube stock plantings), regeneration sites (grass seeding) and installed permanent water sources. The exclusion fencing has potential to also exclude wild dogs and neighboring cattle if installed and maintained appropriately, however it is aimed at excluding actively managed areas offering MNES habitat improvements from degradation by feral pigs in line with the OAMP ecological outcomes and performance measures.

The locations for fencing around revegetation and regeneration will be selected and illustrated separately in the 2021/9133 Offset Area Revegetation and Rehabilitation Management Plan.

During the install of permanent water points, the exclusion fencing will also be included as part of the design and construction of the water points.

Exclusion Fencing Design

A study conducted in 1983 assessed the ability of various fence designs in preventing feral pigs crossing from one paddock to the next (Mitchell, J, 2011). The results indicated electrified fences were the superior fences, with the most highly effective pig-proof fence consisting of a combination of fabricated mesh held close to the ground by plain or barbed wire and supported on steel posts with electrified outrigger wire (Mitchell, J, 2011).

The disadvantages of electrifying fences are the high establishment and maintenance cost, ongoing vegetation control next to the fence to avoid potential sparking and shorting out due to flooding or adverse wet weather (Mitchell, J, 2011). Removing the electrified component of pig-proof fencing still provides an effective design however when installed and maintained appropriately and with the following key features:

- Standard commercially available pig or sheep mesh/netting (recommendation of 850/5/1.6 wire size to target pig exclusion),
- Barbed wire along the bottom approximately 10cm off the ground to prevent pigs lifting it,
- Plain belly and top wire to maintain tension, and avoid injury to non-target animals potentially crossing through or over it,
- Post spacing approximately 3m to 5m apart, and
- Long-life mesh/netting and galvanized steel posts.

It is recommended non-electrified exclusion fencing with the above key design features are installed around revegetation, regeneration and permanent water point sites when these activities occur. Monthly monitoring of the fencing will occur which will include consistent vegetation control to ensure effectiveness.

Image 1 displays a similar design as detailed above, with the exception of a barbed top wire and no belly wire for tension.

Fencing of this design, including materials and construction, can cost between $7,000 (Rotech Rural, 2024) and $18,000 per kilometer (Reef Catchments, 2023) without the consideration of ongoing maintenance and can have negative impacts on non-target native species, which is why it is not feasible to extensively fence the Offset Area.

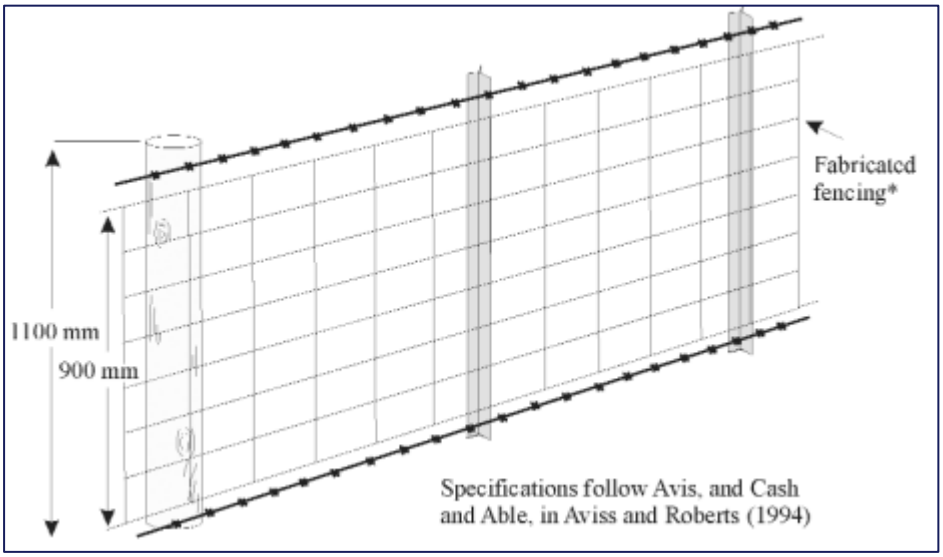

Image 1: Example Exclusion Fence Design

4.3.2. Environmental Management

Planned burns recommended in the 2021/9133 Offset Area Bushfire Management Plan will potentially reduce density and emergence of woody weeds in existing and new areas of woody weeds on site. This will reduce the cover preferred by feral pigs for foraging, dispersal and breeding allowing for easier control and potential lower occurrence due to the reduction in valuable resources for the species. Lower abundances in feral pigs have positive flow on effects in the form of less habitat degradation and potentially lower wild dog numbers in the Offset Area due the reduced prey numbers.

Equally, Offset Area weed management measures will result in the same benefits as bushfire management on site with the reduction of woody weed densities. Reducing woody weeds would remove the safety of cover and potentially reduce the availability foraging resources in the form of roots and fruit.

4.4. Survey

4.4.1. Timing

One pest monitoring survey will be conducted in the Offset Area annually, with the timing to occur prior to the annual pest control event. The annual survey data along with the annual control data are key triggers for the contingent secondary control event, pending the pest animal densities recorded. The timeframe indicated in Table 6 is recommended as they complement the data collected for the annual pest control and are the likely suitable timeframes for site accessibility post-wet season.

Table 6: Annual Pest Animal Survey Recommended Timeframes Coinciding with Annual Pest Control

Summer			Autumn			Winter			Spring		
Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
				Annual Control Period							
			Annual Survey								

4.4.2. Methodology and Locations

The surveys for pest animal presence will be conducted and/or organized internally through Townsville City Council employing standardized methodology to ensure consistent and accurate yearly reporting. One or more of the following surveys measures may be utilized annually:

- Deployment of camera traps site wide. Locations and numbers will aim to remain the same each year, with key deployment occurring within hotspot areas for past pest animal records, SBTF waterpoints and 'animal highways' such as crossroads or fence lines.
- Diurnal ground surveys. These surveys would ideally target hotspot locations for pest animal presence data (scat and tracks) and generally site-wide observations for any new areas of habitat degradation. Total effort (hours/person) will be provided as part of the annual survey reporting.

Figure 3 in (Appendix A) provides indicative locations for the monitoring recommended above.

During the annual survey for pest animal presence, the following data will also be recorded:

- Site-wide field assessment for areas of existing and/or new areas of habitat degradation.
    - Existing areas of degradation will be monitored for an increase in the area and groundcover species richness.
    - New areas of degradation will be measured and recorded in a database to be monitored during future surveys.

Annual pest animal surveys will reduce to every 2 years following the year 5 of the implementation of OAMP if pest animal densities are below baseline and no new extensive habitat degradation is identified in the past two years.

A template for the annual pest animal presence, exclusion fencing effectiveness and habitat degradation survey data collection is included in Table 7.

Table 7: Data Collection Template for Annual Pest Animal Survey

Reporting Mechanism	Details	Attachments
Timing		
Presence survey methodology including effort and locations.	EG. 18 camera traps deployed for 5 weeks.	KMZ of locations attached as part of annual monitoring report.
Number of target pest animal species identified.		KMZ of locations attached as part of annual monitoring report.
Number of non-target pest animal species identified. If action is required to formally survey, control or manage non-target species.	EG. Increased abundance of feral cats (density of >5 per 100ha). Action required to conduct formal survey for baseline abundance data.	KMZ of locations attached as part of annual monitoring report. Geo-referenced images.
Change in features of existing sites of MNES habitat degradation (resulting from pest animals). Corrective actions such as exclusion fencing or remediation if	EG. Wider spread ground disturbance than previous year. Percentage of native vs invasive groundcover growth.	Geo-referenced images and KMZ displaying polygons of disturbed areas.

degradation extending beyond 0.5ha in size.		
New sites of MNES habitat degradation (resulting from pest animals). Recommendations to exclude accessibility or remediate site to prevent further disturbance.		Geo-referenced images and KMZ displaying polygons of disturbed areas.

4.4.3. Non-target Pest Animal Species

Non-target pest animal species detailed in Section 3.3 are either on site in very low and inconsequential numbers, or not on site but highly likely to occur due to proximity of public records or presence of suitable habitat. These species are not currently recommended to be specifically targeted for control or management; however, evidence or sightings will be recorded during the annual pest animal surveys.

If any of the species are recorded in higher abundances than any occurrences in years preceding the implementation of the OAMP, survey and management in line with the TCC Biosecurity Plan will be required. During the plan review events detailed in Section 5.1, TCC will also review the non-target species for potential inclusion for specific control and management under this plan.

5. Review, Monitoring and Reporting

5.1. Plan Review

This plan will be scheduled for review at the monitoring events detailed in Table 8, to assess performance against the objectives outlined in Table 1 of this plan and performance indicators detailed in Table 7.5 of the OAMP. The objectives are also subject to compliance auditing and review against conditions 7 to 11 under the *Environmental Offset Requirements* in the HPS2 Project EPBC Approval (ref 2021/9133).

Table 8: Pest Animal Management Plan Review

Timing	Approval Requirement	Management Plan Review Trigger
Year 3	Condition 8 of the HPS2 Project EPBC Approval (ref 2021/9133) requires a report to be produced and provided to the department within 20 business days of the 3-year anniversary of the date of implementing the OAMP detailing: • A detailed description of survey method, timing and effort undertaken to detect the SBTF in the Offset Area, • An assessment of likelihood of SBTF being present in the Offset Area, including analysis of likely cause(s) for failure to detect species, and • Additional action approval holder to undertake to increase likelihood of detecting SBTF in Offset Area.	In Section 7.6.1 of the OAMP, a commitment to the review of the OAMP is made and scheduled to occur following the reporting event required by Condition 8 of the EPBC Approval. This review will include the review of the implementation and success of this plan.
Year 5, 10 and 15	Condition 9 of the HPS2 Project EPBC Approval (ref 2021/9133) requires a report to be produced and provided to the department within 60 business days of each 5-year anniversary of the date of implementing the OAMP, assessing progress towards achieving and maintaining the completion criteria. The report must also detail if the SBTF have not been detected in the Offset Area in 5 years. Details to be included are: • Detail performance achieved against all interim performance indicators in the period since approval decision with more detail in respect of the period since the previous OAMP report, • Describe results and effectiveness of all management actions implemented during period subject of current OAMP report, • Include monitoring results including all confirmed sightings of protected matters, and • Detail any interim performance indicators not met and describe all corrective actions taken and evaluate their effectiveness.	As per Section 7.6.1 of the OAMP, the corrective action for pest animals detailed in Table 7.5 of the OAMP and Condition 9 of the HPS2 project EPBC Approval summarized above, a review of this plan will be undertaken at each 5-year anniversary of the implementation of the OAMP.

5.2. Monitoring and Reporting

As detailed in Table 7.7 of the OAMP, monitoring will occur at years 1, 3 and 5 after the baseline survey, which occurred in 2024.

A monitoring report will be produced following the monitoring events in years 1, 3 and 5. The monitoring report will include:

- Consolidation of all data collected on pest animal control, management and survey during the year. Comparison against baseline data and previous years of data.
- Details if second control event was triggered, and corrective actions or maintenance required due to adverse presence of pest animal species or extensive habitat degradation identified.
- Success of exclusion fencing around revegetation, regeneration and installed permanent water sources from excluding pest animals.
- Evidence of increased abundances of non-target pest animal species on site. To include recommendations on control or management actions pending the increase in abundance and potential notable impacts on the three MNES species in the Offset Area.
- Yearly brief assessment of progress against objectives detailed in Table 1 of this plan and performance indicators in Table 7.5 of the OAMP.

Annual surveys and monitoring reports will change to every 2-years following the year 5 of the implementation of OAMP if pest animal densities are below baseline and no new extensive habitat degradation is identified.

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Appendix A: Figures

0 500 1,000 2,000 3,000 4,000 Metres

Scale: 1:100,000 @ A4

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DATA SOURCE:	ESRI Online - 2024

HPS2 Offset Area and Lake Ross Storage Area

Haughton Pipeline
Stage 2 EPBC
Offset Site
Lake Ross Storage Area

FIGURE:

1

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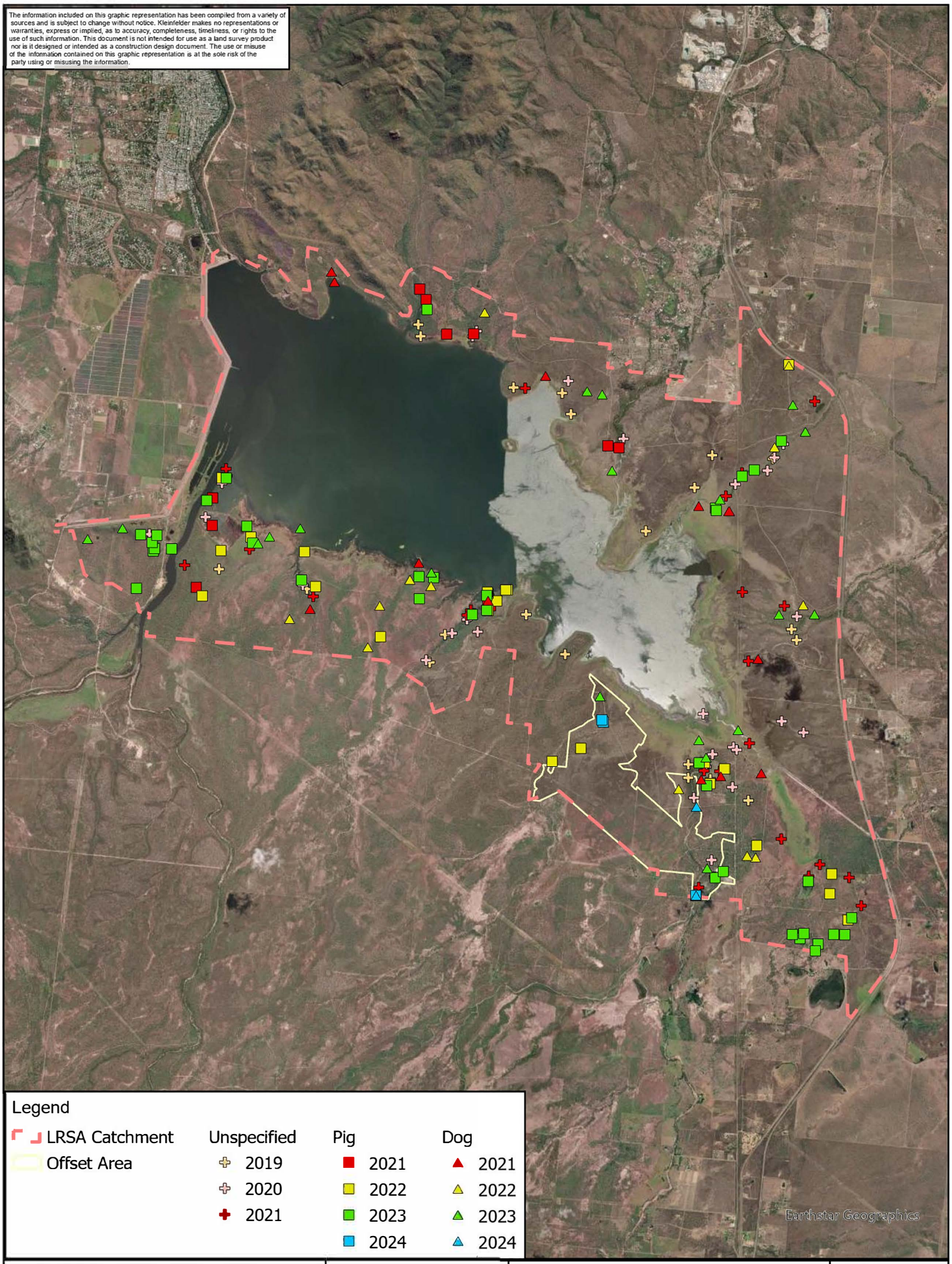

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Baseline Pest Animal Data

Haughton Pipeline
Stage 2 EPBC
Offset Site
Lake Ross Storage Area

FIGURE:

2

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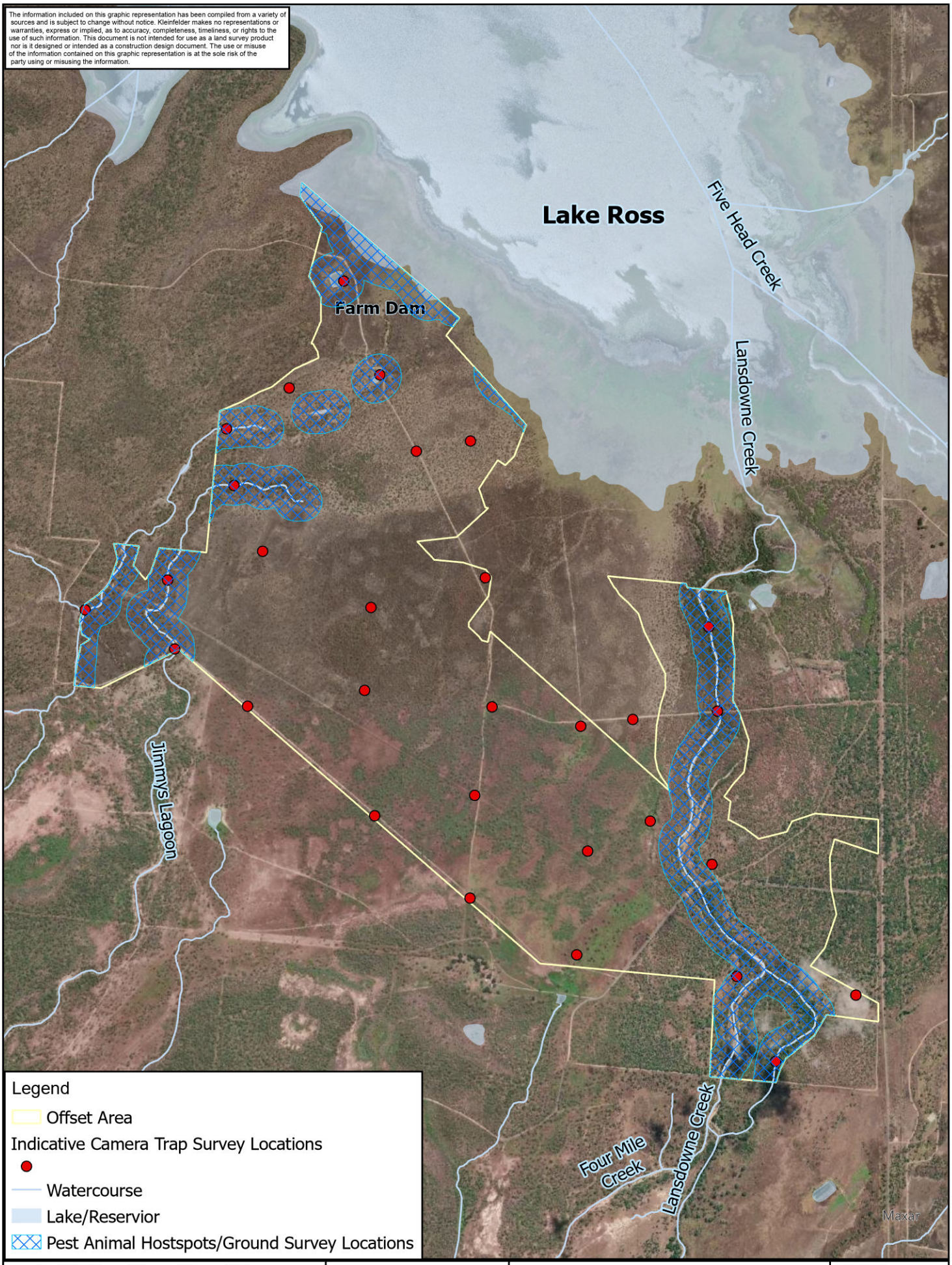

Legend

- Offset Area
- Indicative Camera Trap Survey Locations
- Watercourse
- Lake/Reservior
- Pest Animal Hostspots/Ground Survey Locations

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Scale: 1:25,000 @ A4

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Indicative Annual Pest Animal Survey Locations

Haughton Pipeline
Stage 2 EPBC
Offset Site
Lake Ross Storage Area

FIGURE:

3

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Appendix B: Offset Area Baseline Pest Animal Monitoring Report

Offset Area Baseline Pest Animal Monitoring Report

Haughton Pipeline Stage 2

24005427

29 August 2024

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Offset Area Baseline Pest Animal Monitoring Report

Haughton Pipeline Stage 2

Kleinfelder Project: 24005427

Kleinfelder Document: NCA24R170362

Prepared for:
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Prepared	Reviewed	Endorsed
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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 PROJECT BACKGROUND AND SCOPE

Construction and operation of the Haughton Pipeline Stage 2 (HPS2) Project resulted in significant impacts to three Matters of National Environmental Significance (MNES), requiring a land-based offset. The three species included:

- Southern Black-throated Finch (*Poephila cincta cincta*) (SBTF).
- Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus*) (BRSB).
- Koala (*Phascolarctos cinereus*)

An Offset Area Management Plan (OAMP) was developed and commenced implementation in 2023, with several management actions designated to improve the MNES habitat and protect populations of MNES on site. Control of feral animals was identified as one of the seven management actions, and required:

- Baseline pest monitoring to identify evidence of feral or unwanted pests.
- Development of property wide feral animal management program specifying techniques. Monitoring and management for cats, rabbits, wild dogs and pigs.
- Annual pest monitoring. Targeted control programs for pest animals identified during annual pest monitoring.
- Collaborative pest management planning and implementation with local land managers.

By delivering the above feral animal related actions throughout the life of the HPS2 Project and its *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval (ref 2021/9133), Townsville City Council (TCC) aims to achieve the pest animal related MNES ecological outcomes and completion criteria identified in the OAMP, which is required by the HPS2 Project EPBC Approval *Environmental Offset Requirements* conditions. Table 1 details the OAMP ecological outcomes and completion criteria specific to pest animal management on site.

Table 1: OAMP Pest Animal Outcomes and Completion Criteria

OAMP Reference	Details relevant to Pest Animal Management
Table ES 1.1: Ecological Outcomes for the relevant MNES	*Southern Black-throated Finch:* Reduction in densities of feral animals (i.e. wild pigs) to prevent degradation of habitat.
	Koala: Reduce densities of wild dogs to reduce the predation pressures on the local koala population.
Table 7.5: Interim milestones, completion criteria and corrective actions	*Year 5 Performance Indicators:* Feral animal density is lower than that of baseline. No areas of notable habitat damage by feral animals recorded. *Year 10 and 15 Performance Indicators:* No net increase in feral animal density is recorded. No areas of notable habitat damage by feral animals recorded.
	Completion Criteria: Feral animal densities have been reduced to prevent the degradation of habitat by pigs and precent koala injury by dogs.

Kleinfelder Australia (Kleinfelder) were commissioned by TCC to begin delivering the pest animal related tasks required by the OAMP management action. Kleinfelder completed a pest animal survey in April 2024 to confirm pest animal species present within the Offset Area.

1.2 SITE DESCRIPTION AND KNOWN PEST SPECIES

The HPS2 Offset Area is located south of Ross River Dam in the Lake Ross Storage Area (LRSA), the primary reservoir for Townsville (Figure 1). The dam has a catchment area of approximately 75 km2 and a maximum

capacity of 233,187 ML. The Offset Area encompasses approximately 640ha of which 625ha is actively managed as part of the OAMP.

The offset area comprises a mix of open eucalypt woodlands and forests, shrublands or low woodlands of *Melaleuca viridiflora* (broad-leaf tea-tree) and/or *Petalostigma* spp. (quinine bush) and/or *Ziziphus mauritiana* (chinee apple), riparian forests and open grasslands dominated by exotic grass species. The area has been historically subject to cattle grazing and cattle are still present in low densities. Given the primary role of providing safe water quality for the Townsville population, public access to the area is restricted.

Introduced animals including feral pigs (*Sus scrofa*) and wild dogs (*Canis familiaris*) are considered common within the LSRA and Offset Area. Feral pigs are known to degrade ground-level habitats and water sources, and thus have the potential to impact on potential SBTF habitat at the offset area. Each year TCC conduct an aerial shooting program where they control approximately 30 wild dogs and 220 wild pigs per year (pers. comm. Bradley Drinkwater (Ross River Dam Ranger)). While rabbits (*Oryctolagus cuniculus*) are considered uncommon within the LSRA (pers comm. Bradley Drinkwater), the species can substantially degrade habitats for the SBTF (GHD, 2023) and has the potential for adverse impact on habitats at the offset area.

Legend
- LRSA
- HPS2 Offset Area
- Lake/Reservior

0 500 1,000 2,000 3,000 4,000 Metres

Scale: 1:100,000 @ A4

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HPS2 Offset Area and LRSA

Haughton Pipeline
Stage 2 EPBC
Offset Site
Lake Ross Storage Area

FIGURE:

1

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2 METHODOLOGY

2.1 DESKTOP ASSESSMENT

A desktop assessment was undertaken for previous pest animal species record in the Offset Area and wider LRSA utilising the following sources:

- Queensland Government WildNet database.
- Atlas of Living Australia (ALA)

For specific TCC Local Government Area (LGA) pest animal species data the following sources were consulted/provided by the TCC Offset Area land manager:

- TCC website (pests and weeds page).
- Count data from LRSA pest control programs from 2019 to 2023.
- Anecdotal data from land manager observations.
- Townsville Biosecurity Plan 2020-2024 (TSC Biosecurity Plan).

Table 2 demonstrates the pest animal data received from the sources above.

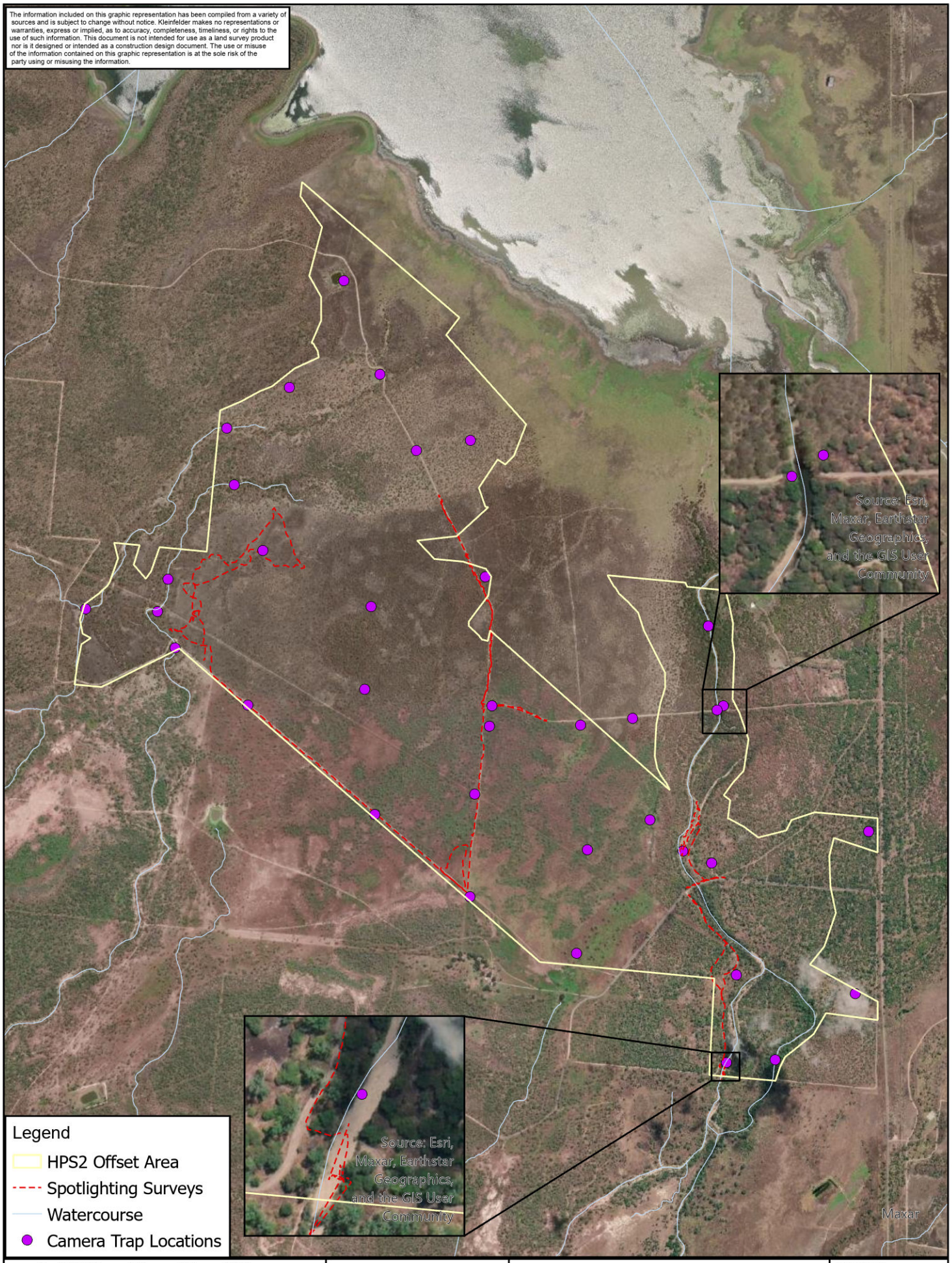
Table 2: Pest Animal Species Records

Common Name	Species Name	Location	Category
Feral Pig	*Sus scrofa*	Offset Area and LRSA	3, 4 and 6 Restricted Invasive
Wild Dog	*Canis familiaris*	Offset Area and LRSA	3, 4 and 6 Restricted Invasive
Yellow Crazy Ant	*Anoplolepis gracilipes*	Suburbs adjacent Offset Area (Oak Valley, Brookhill, Stuart)	3 Restricted Tramp Ant
Feral Cat	*Felis catus*	LRSA outside of the Offset	3, 4 and 6 Restricted Invasive
Rabbit	*Oryctolagus cuniculus*	Offset Area	3, 4, 5 and 6 Restricted Invasive
Feral Chital Deer	*Axis axis*	LRSA outside of the Offset	3, 4 and 6 Restricted Invasive
Feral Horse	*Equus caballus*	LRSA. Areas adjacent Offset Area (Brookhill, Mount Elliot)	Not listed
Indian Myna	*Acridotheres tristis*	Offset Area and LRSA	Not listed
Cane Toad	*Rhinella marina*	Offset Area and LRSA	Not listed

2.2 FIELD SURVEYS

Kleinfelder completed ground surveys including spotlighting and daily random meandering over a four-day period from 29th of April till the 2nd of May in 2024 (Figure 2). Six camera traps were also deployed for the duration of a week in locations with evidence of feral animals or suitable habitat (Figure 2).

Follow up monitoring was conducted by TCC internal teams in July 2024 which involved deployment of 30 camera traps across the Offset Area and random meandering searching for pest animals or evidence of occupation (EG. scats, tracks) (Figure 2). The cameras were set to target watercourses, cattle tracks, access tracks and fence lines which are the most likely locations feral pigs and wild dogs may be captured at. As per recommendations provided by Meek and Verbeek (2018), cameras were set to capture images with the following settings: rapidfire, no delay, 10 images per trigger, 3.1-megapixel resolution, high-medium sensitivity, night mode: fast shutter or high quality.



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Offset Area Pest Animal Survey 2024

Haughton Pipeline
Stage 2 EPBC
Offset Site
Lake Ross Storage Area

FIGURE:

2

Path: J:\00 CLIENT FILES\132297_Townsville City Council\24005427_HaughtonPipelineStage2\240510_HautenPipeline_V1\240510_HaughtonPipeline_V1.aprx (Pest_Report_Fig2_Offset Area Pest Animal Survey 2024)

3 RESULTS AND DISCUSSION

3.1 PEST CONTROL DATA

The two pest animal species identified on site during the 2024 surveys were the feral pig (*Sus scrofa*) and wild dog (*Canis familiaris*). These two species are subject to TCC pest control programs conducted yearly in the LRSA, including the Offset Area. Data from the last five years of the control programs are detailed in Table 3.

Table 3: Pest Animal Data from previous Annual Control Programs in LRSA

Year	Feral Pig Count	Wild Dog Count
2019	164 (including 3 'missed')	17
2020	274 (including 21 'missed')	13 (including 2 'missed')
2021	178	31
2022	291	20
2023	217	38

3.2 PEST SPECIES AND THEIR POTENTIAL IMPACT

3.2.1 Feral Pigs

Feral pigs were sighted by camera traps (Figure 3) across the entire Offset Area as well as during ground surveys in the Offset Area. Plate 1 illustrates a capture during the April surveys on Camera 1 (Figure 3). Evidence in the form of scat, tracks, diggings and wallows (Plate 2) were identified across the entire offset site. There were various areas over 1 hectare in size of habitat degradation by feral pigs. Table 4 details the number of feral pigs captured at each camera location during the 2024 pest animal surveys, with the camera ID's corresponding with camera locations displayed in Figure 3.

Table 4: Feral Pigs captured in 2024 Pest Animal Surveys

Camera ID	Number of feral pigs captured	Camera ID	Number of feral pigs captured
Camera 1	1	C21	3 Adults
Camera 3	13 (2 Adult, 11 Juvenile)	C25	1 Adult
C1	10 (2 Adult, 8 Juvenile)	C26	1 Adult
C8	18 (6 Adult, 12 Juvenile)	C30	1 Adult, 2 Juveniles
C18	3 Adults		

Plate 1: Feral Pig Sighted on Camera Trap during April Surveys

Plate 2: Evidence of Feral Pig Occupation in the form of Wallows

Inhabiting around 40% of Australia, including most areas of Queensland, feral pigs are found in diverse habitats such as subalpine grasslands to monsoonal floodplains, with high concentrations in larger drainage basins and swamp areas (DAF, 2024). Females and juveniles live in small family groups, while adult males are usually solitary. Under good conditions, they can produce two litters of 4–10 piglets a year, leading to rapid population growth (DAF, 2024).

Feral pigs cause significant environmental impacts by spreading invasive plants, degrading waterholes and wetlands, and causing soil erosion. They are of particular concern in the Offset Area due to the risk of degradation to SBTF habitat on site. Degradation was identified in the eastern extent of the site and along the riparian zones, however the damage is not currently extensive nor is it currently adversely impacting available habitat for the SBTF. Even with annual and sometimes twice annual control programs conducted by TCC, feral pig kill numbers continue to remain at similar occurrence rates each year (Table 3).

3.2.2 Wild Dogs

Evidence of dogs in the form of tracks and scats were identified in various locations along Landsdowne Creek in the Offset Area. Two wild dogs were sighted during the July survey effort alongside extensive evidence of occurrence in the form of prints at key watering points and six were captured on cameras C5, C8 and C30 (Figure 3).

Wild dogs, significantly impact the environment by competing with dingoes for food and habitat, preying on small populations of native species like wallabies, koalas, and other smaller macropod species, and threatening biodiversity. The species is listed as a critical priority in the TCC Biosecurity Plan, which requires an individual plan and methods for eradication. Wild dogs are targeted throughout the LGA in yearly baiting and trapping programs that have previously been conducted in the Offset Area. Annual aerial shooting events are conducted in the Offset Area and LRSA to control wild dog numbers, which are also at a similar density each year (Table 3).

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2024 Pest Animal Survey Results

Haughton Pipeline
Stage 2 EPBC
Offset Site
Lake Ross Storage Area

FIGURE:

3

Path: J:\00 CLIENT FILES\132297_Townsville City Council\24005427_HaughtonPipelineStage2\240510_HautenPipeline_V1\240510_HaughtonPipeline_V1.aprx (Offset_Report_Fig4_V2_Camera_Surveys)

3.3 General Observations

As a result of damaged or missing areas of fence line, domestic cows were identified on various camera traps as well as during ground surveys in the April and July efforts in the Offset Area.

Whilst desktop records and anecdotal evidence identifies various other pest animal species as occurring within or adjacent to the Offset Area, or in the LRSA, only 2 feral cats were identified via camera traps during July survey efforts in 2024. The potential occurrences of the species identified in Table 2, excluding the feral pig and wild dog, are not considered of concern to the three Matters of National Environmental Significance (MNES) or their habitat on site currently.

3.4 Offset Area Pest Animal Baseline

This report has been drafted to document the baseline target pest animal population estimates and associated impacts observed within the Offset Area. Target pest animals are feral pigs and wild dogs, due to their continual occurrence on site and correlation with impacts to the MNES on site.

Baseline data for the target pest animal densities in the Offset Area considered the data collected from the preceding five years of pest animal control programs and the area of occupation to get a reasonable baseline number. The baseline number calculated considered the following key points:

- The total LRSA is approximately 128km^2, with Lake Ross taking up approximately 45km^2 of the LRSA. The area of occupation for these species was considered as 83km^2, as the entire Lake Ross would not be utilised by these species.
- The typical home ranges for wild dogs and feral pigs as discussed in the subsequent sections, and the LRSA surrounds being per-urban and urban. For the purpose of calculating the baseline density, 20km^2 home range was utilised for both species.
- The average of the total preceding five years of pest animal control count data for the LRSA.

The baseline number considered the wider LRSA data due to the widespread daily dispersal behaviour of the two target species, the feral pig and wild dog and value of long- term data, reducing seasonal and climatic variability. Baseline number was derived by averaging the long- term data and multiplying by 24% (percentage of typical home range for both species occurring within the LRSA area of occupation) to achieve an indicative density for each species home range (2,000ha). Although the home range is larger than the Offset Area, both species are highly mobile and need to be managed as if the populations of the home ranges are occurring in the Offset Area at any one time. This data is summarised in Table 5 below.

Table 5: Pest Animal Presence in Offset Area and wider LRSA

Species	2019	2020	2021	2022	2023	2024	Baseline Number per home range (2,000ha)
	LRSA	LRSA	LRSA	LRSA	LRSA	Offset Area Survey Results	
Feral Pig	164	274	178	291	217	>60	54
Wild Dog	17	13	31	20	38	7	6

The findings of the 2024 pest animal monitoring surveys discussed in Section 3.2 and displayed in Figure 3 somewhat align with this baseline number, however there was notably more occurrences of feral pigs as identified by captures on over 15 cameras and visual sightings during ground surveys. Noting this and aspects such as species behaviour and seasonality, the holding capacity of the Offset Area is highly likely to change each year which would have implications on the ability to control species below baseline as required by the OAMP performance indicators and completion criteria.

4 RECOMMENDATIONS

The implementation of the OAMP, including feral animal management, is governed and audited via conditions of the HPS2 project EPBC Approval (ref 2021/9133). The pest animal related performance indicators detailed in Table 1 have been set for the life of the HPS2 EPBC Approval, in order to achieve the desired ecological outcomes and completion criteria. These outcomes and criteria have been established to improve the habitat of and protect the MNES on site in the following manner:

- Koala (*Phascolarctos cinereus*). Reduction of wild dog densities will reduce the risk of predation on koalas.
- SBTF (*Poephila cincta cincta*). Reduction of feral pig densities to reduce degradation of important SBTF habitat in the Offset Area.

The following recommendations have been provided in consideration of achieving the ecological outcomes and completion criteria, and to allow review against performance indicators at the designated intervals:

1. Conduct annual pest animal surveys in the Offset Area. This will allow assessment of densities against the baseline densities detailed in Section 3, as well as to identify notable habitat degradation requiring action. During the survey, it is recommended some effort be dedicated to monitoring for the other pest animal species listed in Table 2, to ensure action is taken if elevated densities are likely to have an impact on the three MNES.

   As illustrated by the inflated numbers of the 2024 survey above the calculated baseline, annual control and survey data for the species should have more focus on the reduction of habitat impacts over the reduction of species densities given the difficulty in population control of these prolific species.

   As detailed in the OAMP, annual pest animal surveys can potentially reduce to every 2 years if previous survey densities are consistently below baseline. This should be considered for review at year 5 to align with the year 5 performance indicators review.

2. Conduct annual pest animal control. Aerial shooting is conducted 1-2 times per year in the Offset Area as part of the wider LRSA pest management program. It is recommended this continue with contingencies in place triggering follow up control events if densities are above baseline. Table 3 demonstrates annual control somewhat maintains the pest animal densities, ensuring substantial and uncontrollable exceedances in population are not occurring. Other control options such as targeted baiting and trapping in line with TCC pest management initiatives should be considered.

3. Align monitoring and reporting of pest animal surveys and control with the OAMP and relevant HPS2 EPBC approval conditions to ensure consistency and efficiency in data collection.

5 REFERENCES

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APPENDIX A DESKTOP ASSESSMENT

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			482/5
animals	birds	Anatidae	*Anas platyrhynchos*	northern mallard	Y			1
animals	birds	Cacatuidae	*Cacatua tenuirostris*	long-billed corella	Y	C		6
animals	birds	Columbidae	*Columba livia*	rock dove	Y			473
animals	birds	Columbidae	*Spilopelia chinensis*	spotted dove	Y			113
animals	birds	Estrildidae	*Lonchura punctulata*	nutmeg mannikin	Y			710
animals	birds	Passeridae	*Passer domesticus*	house sparrow	Y			798
animals	birds	Phasianidae	*Gallus gallus*	red junglefowl	Y			1
animals	birds	Phasianidae	*Pavo cristatus*	Indian peafowl	Y			12
animals	birds	Sturnidae	*Acridotheres tristis*	common myna	Y			796
animals	birds	Sturnidae	*Sturnus vulgaris*	common starling	Y			5
animals	mammals	Bovidae	*Bos sp.*	cattle	Y			2
animals	mammals	Bovidae	*Bos taurus*	European cattle	Y			5
animals	mammals	Bovidae	*Capra hircus*	goat	Y			3
animals	mammals	Canidae	*Canis familiaris*	dog	Y			12
animals	mammals	Canidae	*Canis sp.*		Y			2
animals	mammals	Canidae	*Vulpes vulpes*	red fox	Y			5
animals	mammals	Equidae	*Equus caballus*	horse	Y			23
animals	mammals	Felidae	*Felis catus*	cat	Y			19
animals	mammals	Leporidae	*Lepus europaeus*	European brown hare	Y			3
animals	mammals	Leporidae	*Oryctolagus cuniculus*	rabbit	Y			13
animals	mammals	Muridae	*Mus musculus*	house mouse	Y			80/7
animals	mammals	Muridae	*Rattus norvegicus*	brown rat	Y			1
animals	mammals	Muridae	*Rattus rattus*	black rat	Y			13
animals	mammals	Suidae	*Sus scrofa*	pig	Y			48
animals	ray-finned fishes	Cichlidae	*Amatitlania nigrofasciata*	convict cichlid	Y			5
animals	ray-finned fishes	Cichlidae	*Amphilophus labiatus*	red devil	Y			18
animals	ray-finned fishes	Cichlidae	*Oreochromis mossambica*	Mozambique mouthbrooder	Y			439
animals	ray-finned fishes	Cichlidae	*Tilapia mariae*	spotted tilapia	Y			2
animals	ray-finned fishes	Poeciliidae	*Gambusia holbrooki*	mosquitofish	Y			15
animals	ray-finned fishes	Poeciliidae	*Poecilia reticulata*	guppy	Y			7
animals	reptiles	Gekkonidae	*Hemidactylus frenatus*	house gecko	Y			45/6
animals	reptiles	Typhlopidae	*Indotyphlops braminus*	flowerpot blind snake	Y			4/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*.
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*.
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Page 1 of 1
Queensland Government Species lists (WildNet database) - Extract Date 22/07/2024 at 15:40:02

Figure 1 and 2 provide an outline of the Townsville area and catchments including the impact zones of critical species.

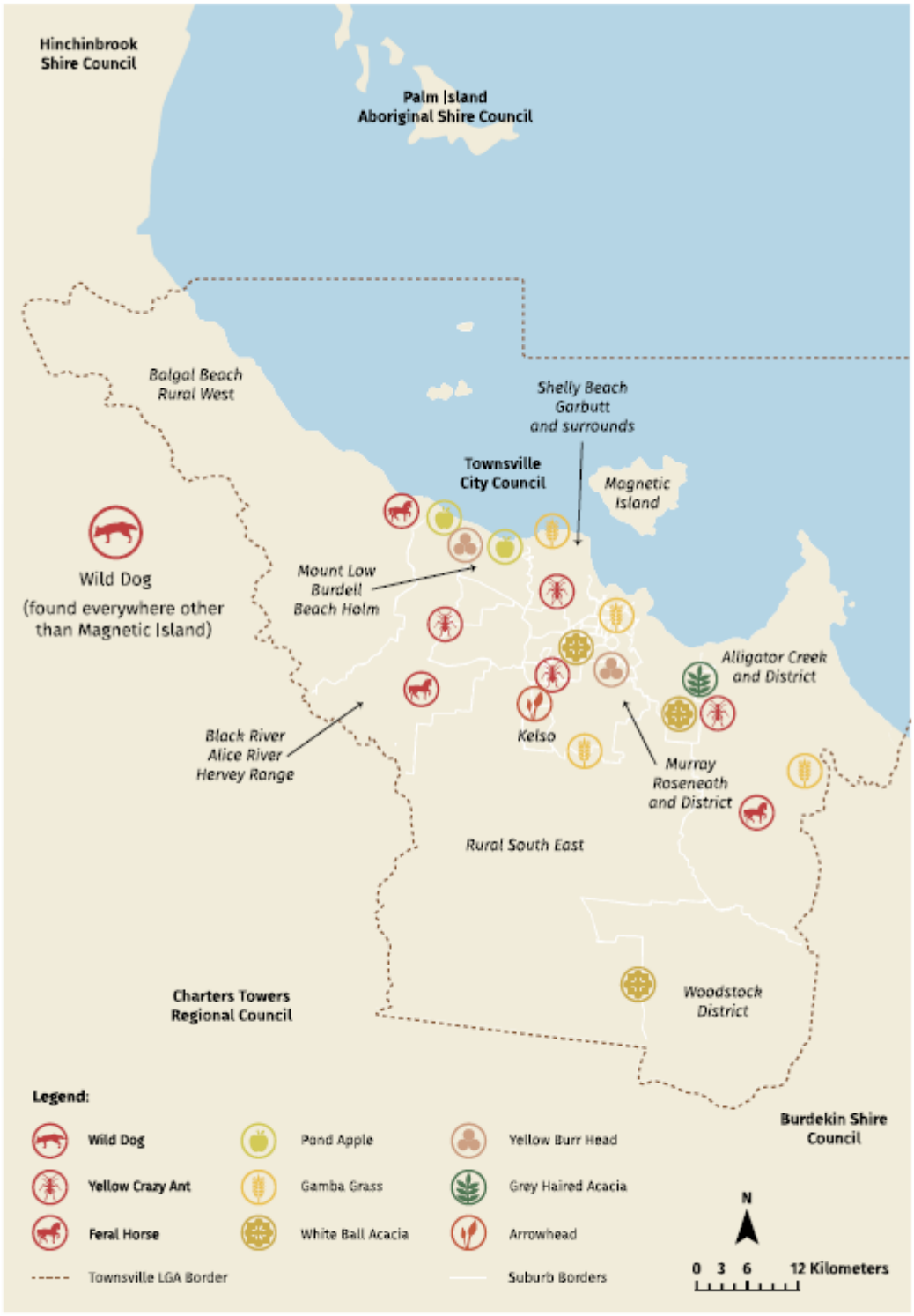

Figure 1. Townsville LGA including divisions and impact zones of critical species.

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