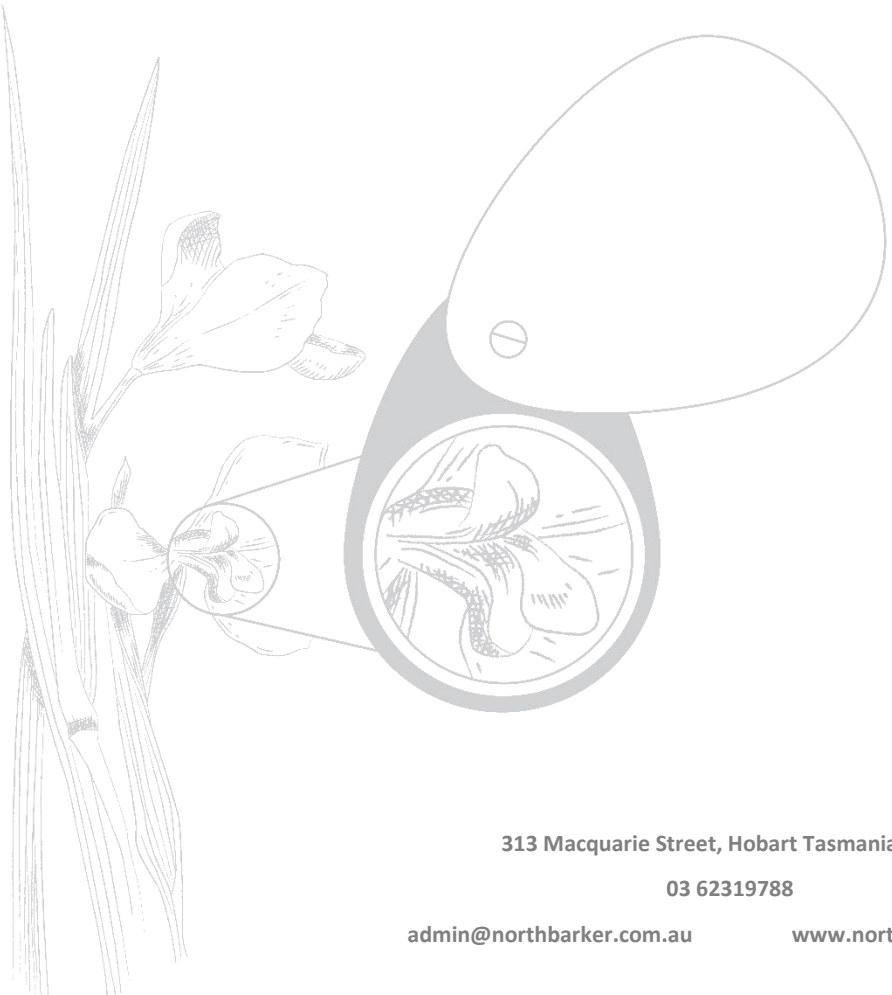
EPBC Act Ref: 2022/09295

Northern Midlands Irrigation Scheme
Offset Strategy

Tasmanian Irrigation

2 May 2024



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1. BACKGROUND

The Northern Midlands Irrigation Scheme (NMIS) is part of the Pipeline to Prosperity (Tranche 3) suite of schemes proposed by Tasmanian Irrigation Pty Ltd (TI). The scheme covers the regions of Cressy, Powranna, Barton, Conara, Epping Forest, the Lower Macquarie and Isis Rivers, Campbell Town, and Ross.

The NMIS is proposed to be gravity fed from the Poatina Tailrace, with an offtake channel to a small buffer dam adjacent to the tailrace. Water will be pumped from here to a balance tank located at a localised high point. The balance tank then gravity feeds the ring main distribution network. Two additional pump stations (Valleyfield and Epping Forest) and several branch lines will further disperse water through the region. An additional balance tank will be constructed near Kirklands. The pipeline network consists of approximately 138 km of large diameter (predominantly 1,000 mm) high-density polyethylene pipeline, with a design peak flow of 170 ML/day. The NMIS is proposed to distribute 25,500 ML of water annually to 40 landholders in the NMIS project area. The infrastructure has a design lifespan of 100 years. The proposed scheme will enable TI to service the majority of properties that submitted an EOI. The scheme will allow for irrigation water to be provided to the NMIS district, which covers an estimated area of 128,400 ha, noting that not all of this district area is irrigable land.

Although approximately 94 % of the proposed impact area (both permanent and temporary) is within agricultural or other modified lands, habitat modelling for the Tasmanian devil and the eastern and spotted-tail quoll determined that there may be disturbance to 17.47 ha of optimal denning (and foraging) habitat. Of this 17.47 ha, only 0.66 ha is expected to be permanent loss of habitat, the remainder will be rehabilitated post-works and will remain viable for denning and foraging after the completion of construction. It is expected that disturbed areas will be rehabilitated within 12 months, with areas of agricultural land expected to be returned to viable habitat in as little as 2 months.

On August 1st, 2023, the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) environmental assessment branch advised Tasmania Irrigation that they consider the loss of 17.47 ha of optimal denning habitat will result in a significant residual impact on the following:

- Tasmanian devil *Sarcophilus harrisii* (EPCBA Endangered) - *The department considers the proposed action is likely to reduce the area of occupancy of the species and modify or remove the availability and quality of habitat to the extent the species is likely to decline.*
- Eastern quoll *Dasyurus viverrinus* (EPCBA Endangered) - *The department considers the proposed action is likely to reduce the area of occupancy of the species and modify or remove the availability and quality of habitat to the extent the species is likely to decline.*
- Spotted-tail quoll *Dasyurus maculatus maculatus (EPCBA Vulnerable) - The department considers the proposed action is likely to reduce the area of occupancy of an important population and modify or remove the availability and quality of habitat to the extent the species is likely to decline.*

DCCEEW require an offset for this significant residual impact. The purpose of this document is to provide an offset strategy for a proposed offset site located at [redacted] (herein referred to as the Site). An Offset Management Plan will be developed upon approval of this strategy.

2. EPBCA ENVIRONMENTAL OFFSETS POLICY

This section describes how the proposed offset Site meets the relevant requirements of the EPBCA Environmental Offsets Policy[1].

2.1 POLICY PRINCIPLES

The EPBCA Environmental Offsets Policy details eight overarching principles to determine the suitability of an offset. Table 1 outlines these principles and how they have been considered against the proposed offset Site.

Table 1: EPBCA environmental offset policy principles and proposed offset Site

Policy Principle	Proposed Offset Site
Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter.	The proposed offset will deliver an overall conservation outcome through the reservation of optimal quoll and devil foraging and denning habitat, of which is higher quality than is to be impacted by the NMIS project. It is the intention of the offset to improve on the existing habitat value of the offset Site.
Suitable offsets must be built around direct offsets but may include other compensatory measures.	100 % of the NMIS projects MNES offset requirements will be from a direct offset.
Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter.	The status of the impacted MNES has been taken into account by the EPBCA *Offsets Assessment Guide*[2] (the Guide), which has been used to calculate the offset area requirements. The Tasmanian devil and eastern quoll are listed as endangered, and the spotted-tail quoll is listed as vulnerable.
Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter.	The extent of the required offset has been calculated using the impacts outlined in the preliminary documentation and natural values assessment documents[3]. This assessment of impact informs the inputs in the habitat quality determination and is used in the guide. The inputs to the guide for the impacted MNES are detailed in Section 4.
Suitable offsets must effectively account for and manage the risks of the offset not succeeding.	The risks associated with the offset are detailed in Section 4.1. Without an offset, the proposed Site is at risk of land clearance and conversion due to being within private timber reserves, and illegal activities conducted on the property such as unregulated timber removal, hunting, and vandalism. Securing the proposed Site with a conservation covenant will remove the risk of clearance and conversion (and secure management practices to maintain/improve condition) and will improve security of the Site to deter/prevent further illegal activity. A negligible risk of catastrophic environmental change would remain as the values that

[1] Department of Sustainability, Environment, Water, Population and Communities. (2012a)
[2] Department of Sustainability, Environment, Water, Population and Communities. (2012b)
[3] EPBC Act Ref: 2022/09295 Northern Midlands Irrigation Scheme Preliminary Documentation. 24 January 2024; North Barker Ecosystem Services (2024)

Policy Principle	Proposed Offset Site
	maintain denning habitat quality are relatively robust to stochastic effects.
Suitable offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs.	The proposed offset Site is within a private timber reserve (PTR), which is exempt from EPBCA assessment through the application of a Forest Practices Plan under the Tasmanian *Forest Practices Act 1985* and the Tasmanian Regional Forest Agreement. The offset Site is zoned as rural under the Tasmanian Planning Scheme. The rural zone does not contain provisions that protect the land from clearance and conversion. The proposed offset Site contains areas of Priority Vegetation and Waterways and Coastal Protection Area code overlays, which provide some formal protection of the values; however, under a PTR, clearance of these areas would be exempt from the planning scheme provisions through the application of a Forest Practices Plan.
Suitable offsets must be efficient, effective, timely, transparent, scientifically robust, and reasonable.	The proposed offset mechanism of a conservation covenant will be efficient and timely, with the expectation that once approved, the conservation covenant will be in place within 8 months. The offsets are based on ecological reports, and the proposed offset Site will be subject to detailed natural values assessments as part of the conservation covenant process. It is anticipated that measurable environmental outcomes can be delivered within 5 years, with conservation gains occurring immediately upon the purchase of the offset property.
Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited, and enforced.	The proposed offset Site will be protected from land clearance and other risks through the application of a conservation covenant, which is administered through the Tasmanian Department of Natural Resources and Environment (NRE). The conditions of the covenant are yet to be confirmed; however, monitoring, auditing and enforcement components will be included within this agreement.

3. OFFSET STRATEGY

The proposed offset pathway is the application of a conservation covenant on a property that has been shown to exhibit equivalent or higher quality devil and quoll habitat than what will be impacted by the NMIS.

This section describes the proposed offset process and the expected conservation gains to be achieved through the offset.

3.1 PROPOSED OFFSET SITE

A property, consisting of a single parcel, at [redacted], has been identified by Tasmanian Irrigation as the preferred offset Site. The offset area is identified as all areas of forest dominated by either *Eucalyptus amygdalina* or *E. obliqua* east of the internal road easement (Figure 1).

3.1.1 SITE DESCRIPTION

The property [redacted] covers 209.66 ha. The proposed offset Site covers an area of 143.83 ha within the property (Figure 1). [redacted]. Several conservation covenants and conservation areas and nature reserves are present within the broader region (Figure 1).

An indicative area of 0.59 ha has been excluded from offset area calculations to accommodate a building envelope (required if the property is sold in the future). This building envelope is currently indicative at this stage as it is subject to further planning and bushfire assessment. Any further amendments to the building envelope location and area will not impact the offset calculations. A 10 m wide easement (1.60 ha) on an existing internal road has been excluded from the offset area to accommodate an existing private right-of-way to the property immediately north of Lot 2 (Lot 3 Stonehenge Road).

[redacted] is largely native forest vegetation (Figure 2, Figure 3), with 78.34 ha of *Eucalyptus amygdalina* forest and woodland on dolerite (TASVEG DAD), 34.76 ha of *Eucalyptus globulus* dry forest and woodland (TASVEG DGL), 27.63 ha of *Eucalyptus pulchella* forest an woodland (TASVEG DPU), 30.34 ha of *Eucalyptus obliqua* forest with broad leaf shrubs (TASVEG WOB), and 8.31 ha of *Eucalyptus obliqua* forest (TASVEG DOB). A small patch of lowland grassy sedgeland (TASVEG GSL) is present along [redacted] Small areas of hardwood plantation (TASVEG FPH) ,an old quarry and regenerating cleared land (TASVEG FRG) are also present on the Site.

The DGL vegetation community is listed as threatened under the Tasmanian *Nature Conservation Act 2002*. If condition thresholds are met, GSL may qualify for listing as the lowland native grasslands of Tasmania ecological community under the EPBCA. These communities have been excluded from the offset Site. These communities have been excluded from the offset calculation as they would require an offset if they were to be impacted in the future, rendering these areas as having a risk of loss of 0 %.

The offset Site includes vegetation types that are most at risk of future clearance. Vegetation types present within the Site are DAD, DOB, DPU, and WOB. A summary of the extent of vegetation types is presented in Table 2.

The Site is located [redacted]. The underlying geology is Jurassic dolerite. Two small headwaters drain into [redacted] to the south, and a further two drain into [redacted] to the north. The [redacted] tributaries are flanked by wet *Eucalyptus obliqua* forests, on steep slopes. Across the Site, the dominant tree species is *Eucalyptus amygdalina*, interspersed with small stands of *E. globulus*, *E. pulchella*, and *E. obliqua*. The understorey within the DAD vegetation is very open and at times rocky (Plate 2), with a sparse shrubs and tussock grasses (Plate 3). There are numerous rocky and bare patches, as well as numerous logs, many of which contain hollowed out sections suitable for sheltering mammals. Mature trees suitable for nesting fauna are present, but very sparse, with the largest trees having previously been logged, large stumps providing evidence of this.

[redacted]

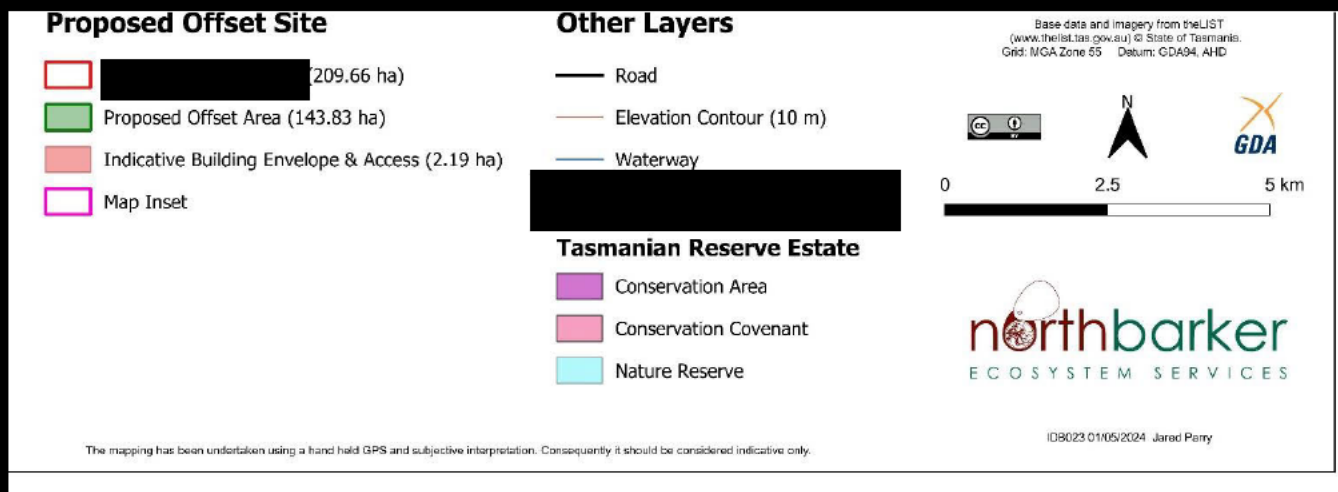

Figure 1: Location of the proposed offset Site

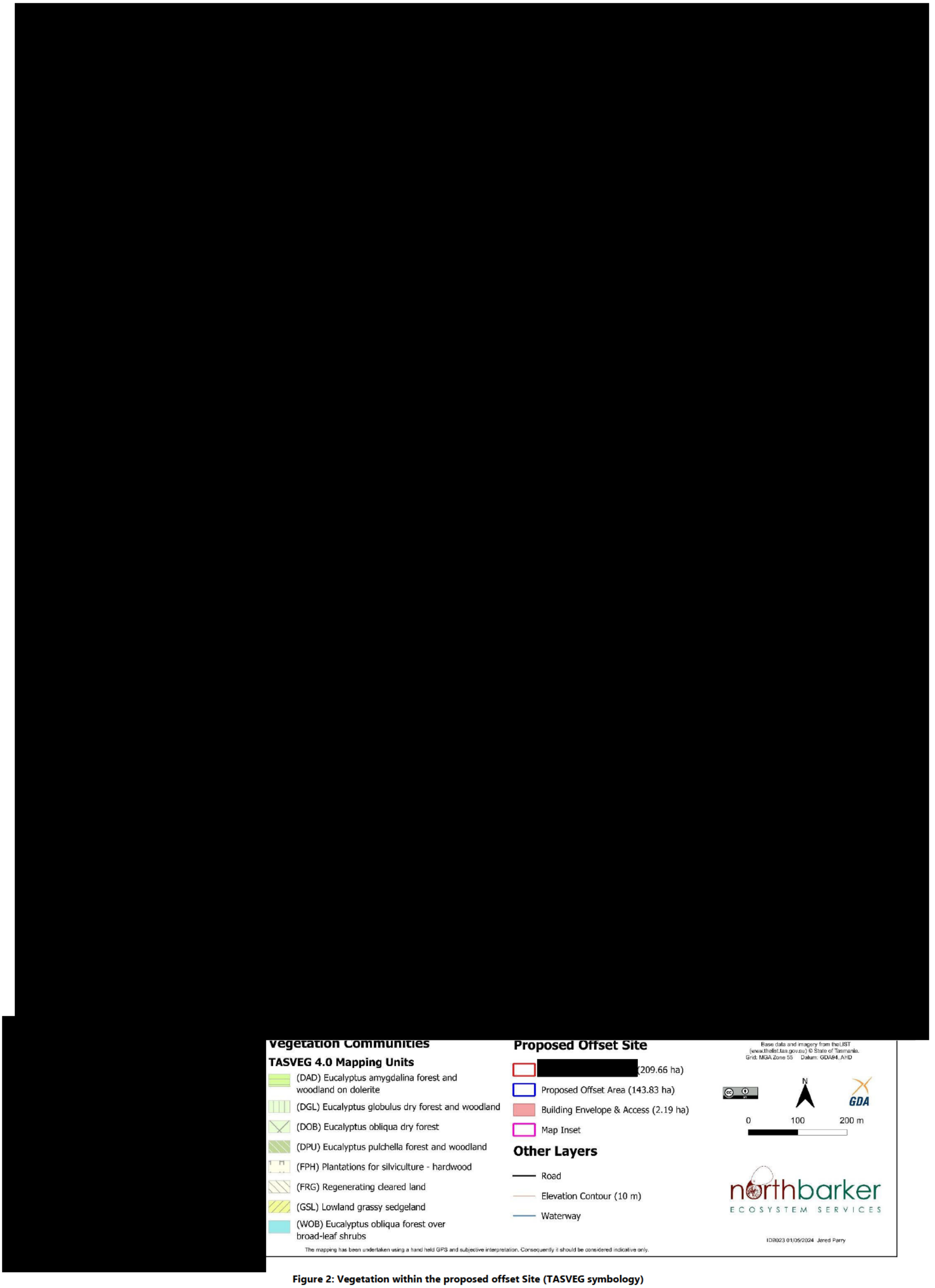

Figure 2: Vegetation within the proposed offset Site (TASVEG symbology)

[redacted]

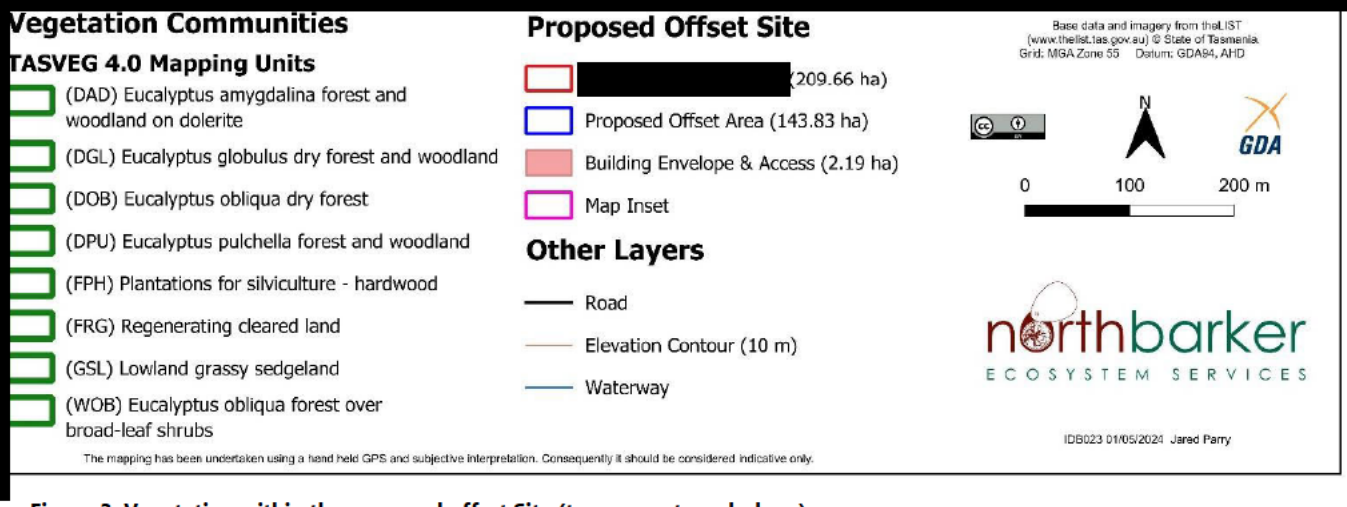

Figure 3: Vegetation within the proposed offset Site (transparent symbology)

Steep gullies contain *Eucalyptus obliqua* forest with broad leaf shrubs. The understorey is dense (Plate 4) with *Olearia viscosa* dominant in the understorey on slopes. In the slightly broader upper headwaters, a dense sedge layer dominated by *Lepidosperma longitudinale* and *Gahnia grandis* is present.

Within these communities there is a spectrum of open and dense understorey, with decaying logs, woody debris and thick sedges providing resting, refuge, and denning habitat for devils, quolls, and other native (and non-native) fauna species. The Site is predominantly shallow, rocky, poorly drained soil with some boulder piles remnant from historical land clearing. Open understorey with refuge structures in dry forest offers foraging areas and allows ease of movement of devils and quolls across the property. Wet gullies provide cover of dense shrubs and sedges along creek lines, which may provide further foraging and dispersal routes across the Site.

There are several vehicular tracks across the Site including a well-graded gravel road that provides the main access to the site, as well as acting as a private right-of-way to [redacted]. An unmaintained gravel road traverses across the top of [redacted]. Evidence of logging spur roads was noted in several locations; however, these are now very overgrown and not accessible to vehicular traffic. These tracks enable ease of movement for devils, quolls, and their food sources throughout the landscape, as can be seen by the presence of devil tracks and scats along the roads.

Table 2: Extent of vegetation communities within [redacted]

Vegetation Community	[redacted] (ha)	Extent within Access & Building Parcel (ha)	Extent within Offset Site (ha)	Balance (ha)
DAD – *Eucalyptus amygdalina* forest and woodland on dolerite	78.34	0.51	77.84	-
DGL – *Eucalyptus globulus* dry forest and woodland	34.76	-	-	34.76
DOB – *Eucalyptus obliqua* dry forest	8.31	-	8.31	-
DPU - *Eucalyptus pulchella* forest and woodland	27.63	0.08	27.55	-
GSL – Lowland grassy sedgeland	1.67	0.08	-	1.59
WOB – *Eucalyptus obliqua* forest with broad leaf shrubs	30.34	0.20	30.13	-
FPH – Plantations for silviculture – hardwood	3.00	-	-	3.00
FRG – Regenerating cleared land	25.61	1.32	-	24.29
Total	**209.66**	**2.19**	**143.83**	**63.64**

Plate 1: Sedgy grassland along [redacted] in the south of property

Plate 2: Open, rocky woodland with the Site

Plate 3: Grassy woodland vegetation within the Site

Plate 4: Dense vegetation within steep gullies

3.1.2 SITE SURVEYS

This section details the surveys conducted on Site to date.

- April 6, 2024 – Tasmanian Irrigation (Amy Madsen)
    - Landowner liaison and initial site reconnaissance
- April 9-10, 2024 – North Barker Ecosystem Services (Jared Parry & Morgan Humphrey) & Tasmanian Irrigation (Jesse Lewis)
    - Vegetation mapping conducted in accordance with the *Guidelines for Natural Values Surveys – Terrestrial Development Proposals*[4] to inform offset calculator inputs and to determine the extent of threatened vegetation on the Site.
    - Establishment of camera traps
- April 25, 2024 – Tasmanian Irrigation (Jesse Lewis)
    - Collection of camera traps for analysis
- April 26, 30, 2024 - North Barker Ecosystem Services (Morgan Humphrey)
    - Camera trap analysis

3.1.3 QUALITY OF THE OFFSET SITE

The intention of the proposed offset is to secure a parcel of land that contains equal or higher quality habitat values than will be impacted by the NMIS project. The proposed offset Site is largely forested, with areas of open, grassy vegetation in more exposed areas. Denning opportunities are present on the Site, however, there is scope to improve the quality of habitat.

A broader description of the Site and justification for offset calculator inputs regarding Site quality is detailed in **Section 4.1.7**.

3.1.4 ONGOING THREATS

Ongoing threats to the habitat present on the Site include:

- Logging under a Forest Practice Plan (under the regulations of the private timber reserve system);
- Illegal land clearance, including firewood collection ("wood hooking");
- Feral animals, including rabbits, cats, and deer;
- Weed invasion; and
- Trespass, hunting, and vandalism.

These threats are discussed in greater detail in **Section 4.1.10**.

3.1.5 CONSULTATION SUMMARY

This document has been prepared through consultation with various parties, including:

- Existing property owner (in relation to land acquisition and site access for preliminary surveys); and
- Private Forests Tasmania (in relation to Private Timber Reserve and Forest Practices Plan queries).

[4] Department of Primary Industries, Parks, Water, and Environment (2019)

4. OFFSET CALCULATION SUMMARY

Table 3 provides the offset calculation summary in relation to the proposed Site. The inputs for each variable are justified in **Section 4.1**.

Table 3: Results of offset calculations for the impacted MNES

Species	Status	IUCN criteria	Quality of habitat	Time over which loss is averted	Time until ecological benefit	Start area	Start quality	Future quality without offset	Future quality with offset	Risk of loss without offset	Risk of loss with offset	Confidence in result – risk of loss	Confidence in result – change in quality	Percentage of impact offset
Tasmanian devil	Endangered	1.2 %	7	20 Years	5 Years	**143.83 ha**	8	8	9	10 %	0 %	55 %	60 %	**105.70 %**
Eastern quoll	Endangered	1.2 %	7	20 Years	5 Years	**143.83 ha**	8	8	9	10 %	0 %	55 %	60 %	**105.70 %**
Spotted-tail quoll	Vulnerable	0.2 %	7	20 Years	5 Years	**143.83 ha**	8	8	9	10 %	0 %	55 %	60 %	**118.82 %**

4.1 JUSTIFICATION OF OFFSET CALCULATION SCORES

4.1.1 IUCN CRITERIA

The IUCN criteria for the value being impacted.

Tasmanian Devil & Eastern Quoll - 1.2 %
Spotted-tail Quoll – 0.2 %

Afforded to the Tasmanian devil and eastern quoll as these species are listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, and 0.2 % afforded to spotted-tail quoll as this species is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

4.1.2 AREA OF IMPACT

The area of habitat/community impacted, or number of features/individuals impacted.

17.47 ha

The proposed construction corridor, which is the limit of impacts, contains 74.62 ha of potential denning habitat (Table 4) for the Tasmanian devil, eastern quoll, and spotted-tail quoll (consisting of 17.47 ha of optimal habitat and 57.15 ha of sub-optimal habitat). In contrast, a total of 370.19 ha of unsuitable denning habitat (potential foraging only) is present within the construction corridor (Table 5). The majority of impacts proposed are within land determined to be unsuitable for denning and suitable for foraging only.

In addition, 95.50 % of the impact footprint within the construction corridor (424.78 ha), from the long-term perspective of devil and quoll habitat use, will merely be habitat disturbance, with the extent of the pipeline post-works once more becoming viable habitat for foraging, dispersal (and potentially denning but still less likely than foraging/dispersal based on pre-existing landscape attributes such as the extent of cleared land) (*i.e.* it will still meet the criteria defined in Table 4) – even during construction there will be scope for devils to move through areas in a relatively unfettered fashion and for the works area to still provide habitat value in that sense. It is expected that all disturbed areas will be rehabilitated within 12 months post-construction, with areas containing agricultural land expected to rehabilitate in as little as 2 months. Areas that currently support woody vegetation (11.94 ha, or 2.69 % of the construction corridor area) are expected to be the most altered, in that woody vegetation may be the slowest to recover and/or be rehabilitated, and the fact that forest will not return to forest, which is incompatible with the pipeline. However, as per the habitat criteria, an area does not need to remain as forest to remain as viable habitat, and these areas will remain adjacent to larger forested patches with all the inherent habitat values such as prey and shelter opportunities.

The limited nature of the permanent works is such that permanent habitat loss is extremely minor in the context of the broader area (20.03 ha of total habitat loss). Only areas proposed to contain balance tanks, pump stations, and a dam will constitute permanent habitat loss in that viable habitat will be converted to inviable habitat – these areas comprise 0.66 ha of optimal denning habitat, 0.67 ha of sub-optimal denning habitat, and 18.70 ha of unsuitable denning habitat – all of which constitute potential foraging habitat - as per the definitions in Table 4 and with the habitat loss outlined in Table 6).

Areas of impact within forest units will be rehabilitated with grassy and shrubby vegetation present in the local area under rehabilitation commitments (**Section 2.1.1.1 of the preliminary documentation**[5]).

[5] EPBC Act Ref: 2022/09295 Northern Midlands Irrigation Scheme Preliminary Documentation. 24 January 2024

For the habitats that already lack woody vegetation, the installation of the pipeline will result in no habitat change post works and/or have a very rapid return to equivalent habitat value (e.g. less than 6 months) facilitated by revegetation commitments. During this period of rehabilitation, the recovering ground will still meet the viable habitat definitions, as the temporary absence of vegetation will not preclude devils and quolls from using the area at a local or landscape scale, even if it is just for dispersal or opportunistic foraging on bare ground.

Table 4: Tasmanian devil and quoll denning habitat suitability classes

Suitability class for devil maternal natal den	Rationale
Optimal (Denning and Foraging)	This category contains areas deemed optimal for denning opportunities based on field observations and site attributes. Characteristics include: • All areas of dry forest TASVEG units (ideal soil and sheltering conditions)[6]. • Grasslands within 100 m of native forest units and/or with a dense layer of shrubs (ideal soil and sheltering conditions)[7]. • Silvicultural forest (FPH/FPS) areas (ideal soil and sheltering conditions, including the presence of windrows)[8]. • Regenerating cleared land (FRG) within a native mosaic and with optimal soil and sheltering characteristics (including the presence of log piles)[9].
Sub-optimal (Denning and Foraging)	This category includes remaining areas of intermediate habitat, including (but not limited to) those with the following traits: • Seasonally inundated lagoons and other wetland habitats not classified as unsuitable (*i.e.* those that dry out in summer)[10]. • Scrub, heathland, and swamp forest vegetation. • Exposed grassland (lacking shrub cover) distant (>100 m) from native forest[11]. • FAC vegetation (good shelter at canopy level, but less suitable at ground level)[12].
Unsuitable (Foraging Only)	This class captures all areas that are deemed unsuitable for denning opportunities, based on field observations and Site attributes. Characteristics include: • Permanently inundated areas denoted by OAQ and ASF on vegetation mapping[13]. • Areas of FAG or FUM > 100 m from native vegetation. These areas are likely too far separated from high prey densities for energetically efficient maternal denning. In addition to this, exposed Sites make young devils vulnerable around their dens and are thus not selected by adults[14]. **Note -** FAG and FUM within 100 m of native forest considered suitable but sub-optimal; and noting that micro-siting during a den management protocol should overrule the classification of unsuitable if micro-habitats suitable for denning are present within the FAG and/or FUM > 100 m from native forest, including the presence of rock and log piles, or thickets of suitable vegetation within the broader cleared area – these areas should be elevated to consideration as suitable in such scenarios.

[6] Pemberton (1990); Thalmann *et al.* (2015); Jones & Barmuta (2000); Jones *et al.* (2023)
[7] Thalmann *et al.* (2015); Jones & Barmuta (2000); Lyall (2017)
[8] Jones *et al.* (2023); Lyall (2017)
[9] Pemberton (1990); Thalmann *et al.* (2015)
[10] Thalmann *et al.* (2015); Environment Strategic Business Unit (2023)
[11] Thalmann *et al.* (2015); Jones & Barmuta (2000); Lyall (2017); Andersen *et al.* (2017); Guiler (1970)
[12] Thalmann *et al.* (2015); Lyall (2017)
[13] Environment Strategic Business Unit (2023)
[14] Jones *et al.* (2023); Andersen *et al.* (2017)

Table 5: Impacts to devil and quoll denning (and foraging) habitat prior to construction in context of the availability within 5 km (all areas in hectares)

	Potential Impact Area			Avoidance Area	
Denning Habitat Class (Note all classes are potential foraging habitat)	**Total Permanent Impacts {% of class within construction corridor} [% of class within design corridor] (% of class within 5 km)**	**Temporary Impacts {% of class within construction corridor} [% of class within design corridor] (% of class within 5 km)**	**Total Within Construction Corridor [% of class within design corridor] (% of class within 5 km)**	**Total Within Design Corridor (Excluding Construction Corridor)**	**Total Within 5 km**
Optimal	0.66 {3.78 %} [0.60 %] (0.002 %)	16.81 {96.22 %} [15.35 %] (0.05 %)	17.47 [15.95 %] (0.05 %)	109.51 (92.04)	32,144.20
Sub-optimal	0.67 {1.18 %} [0.22 %] (0.004 %)	56.48 {98.82 %} [18.39 %] (0.35 %)	57.15 [18.61 %] (0.35 %)	307.17 (250.02)	16,306.84
Unsuitable	18.70 {5.05 %} [0.84 %] (0.03 %)	351.49 {94.95 %} [15.82 %] (0.51 %)	370.19 [16.66 %] (0.53 %)	2,222.31 (1,852.13)	69,385.64
Total	**20.03**	**424.78**	**444.81**	**2,194.19**	**117,836.68**

Table 6: Summary of impacts to devil and quoll denning habitat suitability classes (all areas in hectares)

	Infrastructure Description			Impact Summary		
Habitat Class (Note all classes are potential foraging habitat)	**Pump Stations [% of Permanent Impacts] (% of Total Impacts)**	**Balance Tanks [% of Permanent Impacts] (% of Total Impacts)**	**Dam [% of Permanent Impacts] (% of Total Impacts)**	**Total Permanent Impacts (% of Total Impacts)**	**Temporary Impacts (% of Total Impacts)**	**Total**
Optimal	-	0.66 [100 %] (3.78 %)	-	0.66 (3.78 %)	16.81 (96.22 %)	**17.47 (3.93 %)**
Sub-optimal	0.21 [30.72 %] (0.36 %)	0.47 [69.28 %] (0.81 %)	-	0.67 (1.17 %)	56.48 (98.83 %)	**57.15 (12.85 %)**
Unsuitable	1.08 [5.77 %] (0.29 %)	0.31 [1.68 %] (0.08 %)	17.30 [92.55 %] (4.92 %)	18.70 (5.05 %)	351.49 (94.95 %)	**370.19 (83.22 %)**
Total	**1.28**	**1.44**	**17.30**	**20.03**	**424.78**	**444.81**

4.1.3 QUALITY OF IMPACTED AREA

The quality score for area of habitat/community being impacted - a measure of how well a particular Site supports a particular threatened species or ecological community and contributes to its ongoing viability.

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Potential denning habitat suitability for the assessment has been stratified into optimal, sub-optimal and unsuitable based on local and landscape characteristics of soil, vegetation, and structure. We treat this potential for denning habitat as the most influential aspect of Site condition as per the Guide[15]. For a baseline score out of a range from 0-10 on this factor alone, we consider unsuitable to represent the range from 0-2, sub-optimal from 3-6, and optimal from 7-10. The overall quality score can then be further considered to vary based on: if potential dens are known to be present/absent (additional key measure of site condition), potential prey opportunities and landscape positioning (site context), and density of the target species (stocking rate), consistent with the Guide.

Site Condition

Condition of optimal habitat varies throughout the NMIS project area. Of the 17.47 ha of optimal denning habitat, 12.46 ha (71.31 % of the construction corridor) is forested vegetation, 2.58 ha (14.76 %) is non-forest vegetation, and the remaining 2.43 ha (13.93 %) is softwood plantation.

The forested areas provide the most opportunity for denning, however the generally open nature of the forests within the construction corridor (Plate 5) place these areas on the lower end of the optimal scale. Areas containing log and rock piles are generally absent from the impact areas, and in some cases from the entire forest remnant (the *Eucalyptus amygdalina* forest on Cainozoic deposits along the Barton Road section of the pipeline alignment is very open and complex features suitable for denning were not recorded throughout the entire remnant).

Although lacking complex features such as log and rock piles, grassy areas adjacent to forests (Plate 6) can provide optimal denning opportunities. These areas tend to have friable soils suitable for burrowing, and may provide additional prey opportunities (i.e. rabbits, lambs).

Dense thickets of weeds such as gorse are also prevalent along the edges of many forest remnants. These thickets may provide shelter opportunities for devils and quolls, and do not detract from the habitat suitability score.

[15] Department of Sustainability, Environment, Water, Population and Communities. (2012b)

Plate 5: Optimal denning habitat in *Eucalyptus amygdalina* forest on gravels

Plate 6: Optimal denning habitat in grassy vegetation adjacent to forest

Site Context

Due to the linear nature of the proposed action, impacts to optimal devil and quoll denning and foraging habitat largely occurs on the edge of forest remnants. The nature of the proposed works will not lead to fragmentation of habitat areas, nor will it permanently remove potential habitat (with the exception of 0.66 ha impacted by permanent infrastructure). One area of optimal habitat that may be impacted occurs along a shelter belt (~90 m wide) along Barton Road (Plate 5). The preferred option for installing the pipeline at this location is to under bore the remnant and roadway to avoid impact, however this is not a guaranteed avoidance measure as it is currently unknown whether there are geotechnical constraints to this method. The impact area assumes total impact to these areas.

Areas of impact within forest units will be rehabilitated with grassy and shrubby vegetation present in the local area under rehabilitation commitments (**Section 2.1.1.1 of the preliminary documentation**[16]). For the habitats that already lack woody vegetation, the installation of the pipeline will result in no habitat change post works and/or have a very rapid return to equivalent habitat value (e.g. less than 6 months) facilitated by revegetation commitments. During this period of rehabilitation, the recovering ground will still meet the viable habitat definitions, as the temporary absence of vegetation will not preclude devils and quolls from using the area at a local or landscape scale, even if it is just for dispersal or opportunistic foraging on bare ground.

Species Stocking Rate

Tasmanian devil

No evidence in the form of scats, carcasses, footprints, or other identifiable features were recorded during surveys, and no burrows suitable for denning were recorded within the project area over the duration of field surveys (40 person days, >250 hours targeted search effort within stratified habitat), noting ground level visibility was very high and visual search effort in excess of the NRE guidelines for devil den management[17]. Survey effort also exceeded the minimum survey requirement for indirect searches for diurnal mammals defined in the *Survey guidelines for Australia's threatened mammals*[18].

Despite the lack of direct evidence of Tasmanian devils in the project area, its presence is not discounted simply due to the species being effectively ubiquitous across Tasmania and varying locationally by frequency of occurrence and population density associated with habitat variables (including land use), environmental traits, and the distribution of DFTD[19]. In areas with frequent occurrences and/or high densities of devils, indicators of presence are readily encountered (tracks, scats, etc), which is why these are an accepted survey detection technique[20]; the absence of these indicators during surveys would thus indicate the project area is sparsely/infrequently utilised, consistent with nearby standardised searches[21]. Nonetheless, with the species having very broad habitat use and no factors ruling out its presence entirely, it can be expected that devils traverse through the project area and may use parts of it while foraging or simply moving within their range, which is consistent with observations recorded on the Tasmanian Natural Values Atlas. Denning opportunities (which are important in habitat quality and for consideration of avoiding and mitigating impacts) are limited based on survey findings, with none being detected during ground surveys and the majority of the project area being modelled as unsuitable (84.21 %) or sub-optimal (11.64 %) for the potential presence of dens and/or burrows (Table 5).

The potential impact from the project applies to a greater extent to local individuals. At the scale of an individual, the proposal's area of impact is less than half the area of an individual devil's home range,

[16] EPBC Act Ref: 2022/09295 Northern Midlands Irrigation Scheme Preliminary Documentation. 24 January 2024
[17] Environment Strategic Business Unit (2023)
[18] Department of Sustainability, Environment, Water, Population and Communities (2011)
[19] Cunningham *et al.* (2021)
[20] Department of Sustainability, Environment, Water, Population and Communities (2011)
[21] Cunningham *et al.* (2021)

with the permanent loss of habitat representing the loss of 0.007 % of a single devil's range (based on a home range of 27 km^2)[22]. Given the measured density of devils in the broader area is extremely low[23], this scale of loss is extremely unlikely to lead to a significant decrease in population size nor result in any population fragmentation.

Within the modelled area (a 5 km buffer of the proposed alignment), 49 % of Tasmanian devils recorded on the Tasmanian Natural Values Atlas occur within areas modelled as optimal denning habitat (118 out of 243 records). Across the modelled area, this represents a record density of 0.002 per ha, noting that this is based off modelling and recorded observations only, and actual stocking rates are likely to be slightly higher than this. Regardless, this indicates that the stocking rate across the broader area is very low.

Eastern Quoll

No evidence in the form of scats, carcasses, footprints, or other identifiable features were recorded during surveys, and no burrows suitable for denning were recorded within the project area over the duration of field surveys (40 person days, >250 hours targeted search effort within stratified habitat). This survey effort exceeded the minimum survey requirement for indirect searches for diurnal mammals defined in the *Survey guidelines for Australia's threatened mammals*[24].

Potential den sites are likely widespread in the broader area and may extend into the vicinity of the of the development footprint. Rocky outcrops occur along the alignment which may be utilised by eastern quolls. Denning sites for this species, especially natal dens, are located in well concealed locations to provide protection from predators.

Despite the lack of direct evidence of eastern quolls in the project area, its presence is not discounted simply due to the species occurring throughout eastern Tasmania and varying locationally by frequency of occurrence and population density associated with habitat variables (including land use), and environmental traits. In areas with frequent occurrences and/or high densities of quolls, indicators of presence are readily encountered (tracks, scats, etc), which is why these are an accepted survey detection technique[25]; the absence of these indicators during surveys would thus indicate the project area is sparsely/infrequently utilised. Nonetheless, with the species having very broad habitat use and no factors ruling out its presence entirely, it can be expected that quolls traverse through the project area and may use parts of it while foraging or simply moving within their range, which is consistent with observations recorded on the Tasmanian Natural Values Atlas. Denning opportunities (which are important in habitat quality and for consideration of avoiding and mitigating impacts) are limited based on survey findings, with none being detected during ground surveys and the majority of the project area being modelled as unsuitable (84.21 %) or suboptimal (11.64 %) for the potential presence of dens and/or burrows (Table 5).

Given the species is relatively non-specific in relation to terrestrial habitat use, the entire design corridor is potential habitat for general foraging/dispersal (noting key aspects such as prey density and local use may vary within the area overall, favouring native vegetation, but this doesn't make other areas inherently unsuitable to the degree where they can be said to have no value)[26]. This is an important distinction as it relates to quality of habitat within the impact corridor following works (and to a lesser extent during).

Within the modelled area (a 5 km buffer of the proposed alignment), 51 % of eastern quolls recorded on the Tasmanian Natural Values Atlas occur within areas modelled as optimal denning habitat (21 out

[22] Andersen *et al.* (2020)
[23] Cunningham *et al.* (2021)
[24] Department of Sustainability, Environment, Water, Population and Communities (2011)
[25] Department of Sustainability, Environment, Water, Population and Communities (2011)
[26] Jones & Barmuta (2000); Jones *et al.* (2023)

of 41 records). Across the modelled area, this represents a record density of 0.0003 individuals per ha, noting that this is based off modelling and recorded observations only, and actual stocking rates are likely to be slightly higher than this. Regardless, this indicates that the stocking rate across the broader area is very low.

Spotted-tail Quoll

No evidence in the form of scats, carcasses, footprints, or other identifiable features were recorded during surveys, and no burrows suitable for denning were recorded within the project area over the duration of field surveys (40 person days, >250 hours targeted search effort within stratified habitat), noting ground level visibility was very high and visual search effort in excess of the NRE guidelines for devil den management[27]. Survey effort also exceeded the minimum survey requirement for indirect searches for diurnal mammals defined in the *Survey guidelines for Australia's threatened mammals*[28].

The project area is not within the core range for this species according to NVA ranges; however, the eastern extent of the project area is within an area identified as an important population area, and thus is considered as part of the core range. Hundreds of hectares of equally suitable (or better) habitat for this species is present in the local area, with areas of mosaic habitats becoming more suitable further east and west of the project area as human occupation decreases. These areas to the east and west are considered to have 'important populations' of this species (Figure 4). Given that the habitat present within the important population areas is largely modified, the likelihood of the design corridor containing habitat critical for an important population is very low.

Potential den sites are likely widespread in the broader area and may extend into the vicinity of the of the development footprint. Denning sites for this species, especially natal dens, are located in well concealed locations to provide protection from predators.

Despite the lack of direct evidence of spotted-tail quolls in the project area, its presence is not discounted simply due to the species occurring throughout Tasmania and varying locationally by frequency of occurrence and population density associated with habitat variables (including land use), and environmental traits. In areas with frequent occurrences and/or high densities of quolls, indicators of presence are readily encountered (tracks, scats, etc), which is why these are an accepted survey detection technique[29]; the absence of these indicators during surveys would thus indicate the project area is sparsely/infrequently utilised. Nonetheless, with the species having very broad habitat use and no factors ruling out its presence entirely, it can be expected that quolls traverse through the project area and may use parts of it while foraging or simply moving within their range, which is consistent with observations recorded on the Tasmanian Natural Values Atlas. Denning opportunities (which are important in habitat quality and for consideration of avoiding and mitigating impacts) are limited based on survey findings, with none being detected during ground surveys and the majority of the project area being modelled as unsuitable (84.21 %) or suboptimal (11.64 %) for the potential presence of dens and/or burrows (Table 5).

[27] Environment Strategic Business Unit (2023)
[28] Department of Sustainability, Environment, Water, Population and Communities (2011)
[29] Department of Sustainability, Environment, Water, Population and Communities (2011)

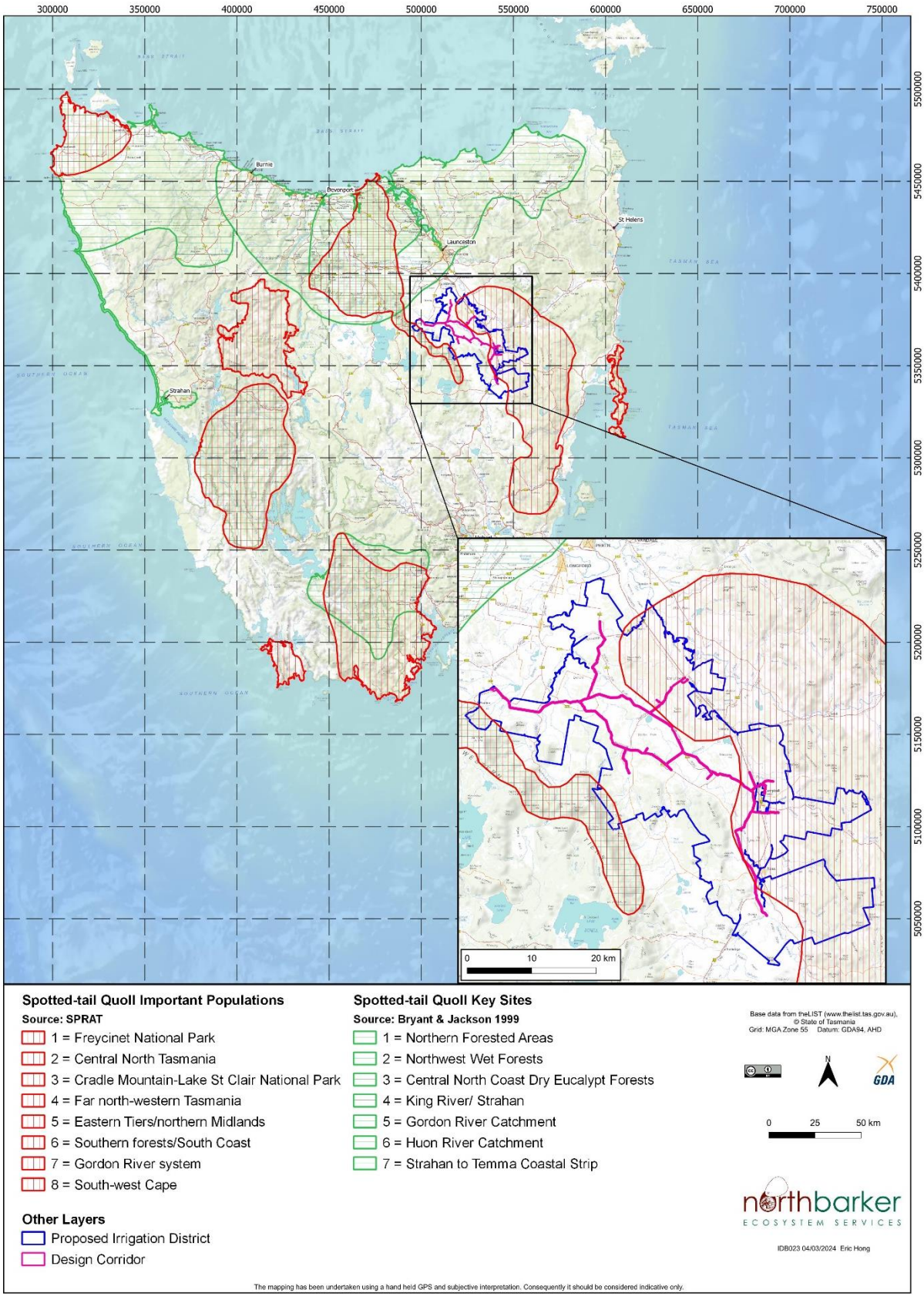


Figure 4: Spotted-tail quoll important populations and key sites in relation to the project area

Within the modelled area (a 5 km buffer of the proposed alignment), 72 % of spotted-tail quolls recorded on the Tasmanian Natural Values Atlas occur within areas modelled as optimal denning habitat (107 out of 148 records). Across the modelled area, this represents a record density of 0.001 individuals per ha, noting that this is based off modelling and recorded observations only, and actual stocking rates are likely to be slightly higher than this. Regardless, this indicates that the stocking rate across the broader area is very low.

Conclusion

Based on the site condition, habitat location and lack of evidence, and low modelled stocking rates of devils and quolls in the action area, we consider the quality of the impacted area to be on the lower end of the optimal habitat scale, scoring it at 7. This score would be higher if evidence of existing dens/burrows, and signs of use were recorded during numerous site assessments.

4.1.4 TIME OVER WHICH LOSS IS AVERTED

This describes the timeframe over which changes in the level of risk to the proposed offset Site can be considered and quantified.

20 Years

The proposed offset includes the application of a conservation covenant, which will protect the offset Site from risk in perpetuity.

4.1.5 TIME UNTIL ECOLOGICAL BENEFIT

This describes the estimated time (in years) that it will take for the main benefit of the quality (habitat/community) or value (features/individuals) improvement of the proposed offset to be realized.

5 Years

The process for incorporating a land parcel into a conservation covenant is expected to occur within 8 months. Conservation gains will occur immediately upon purchasing the offset property through the elimination of the risk of clearance and conversion.

Conservation gains through the implementation of a habitat improvement strategy are likely to take some time, but it is expected that through a monitoring program, results of this strategy will be available within 5 years. The results of the habitat improvement monitoring program will be reported annually. The methodology and desired outcomes will be detailed within an Offset Management Plan.

4.1.6 START AREA

The area of habitat/community or number of features/individuals proposed to offset the impacts.

143.83 ha

In relation to Tasmanian devils and eastern quolls an offset of 143.83 ha is proposed which is 105.70 % of the required offset. In relation to spotted-tail quolls, 143.83 ha is proposed which is 118.82 % of the required offset.

4.1.7 START QUALITY

The quality score for the area of habitat/community proposed as an offset - a measure of how well a particular Site supports a particular threatened species or ecological community and contributes to its ongoing viability.

8

The intention of the proposed offset is to secure a parcel of land that contains equal or higher quality habitat values to that which is to be impacted by the NMIS project. The proposed offset Site is entirely forested, with areas of open vegetation, and identified denning opportunities, as well as recorded devils within the broader property during preliminary investigations.

As the intention is to secure an offset of equal or higher value than the impact area, we propose a starting quality score of 8, for the reasons that will be detailed below. We note that the base quality score is higher than that of the impact area due to the presence of existing denning opportunities (as opposed to just habitat suitability) within the Site.

Site Condition

The proposed offset area at [redacted] contains a range of habitat types including open forest (Plate 2, Plate 3), shrubby forest (Plate 4) and areas of dense sedgy forest. The offset site is predominantly open forest with minimal understorey containing numerous piles of large hollow logs and large rocks (Plate 7, Plate 8), with the substrate throughout consisting of shallow rocky soils. Smaller areas within gully and creek lines consist of dense wet forest with high shrub and sedge cover, with signs of animal paths (Plate 9). The broader property also includes areas of native grassland, eucalypt plantation and cleared land. Mosaic landscapes such as those surrounding the [redacted] property are known to contain foraging and denning opportunities for native carnivore species including Tasmanian devils, eastern quolls, and spotted-tail quolls.

Denning opportunities for threatened mammals (devils and quolls) were identified across the property; predominantly beneath large piles of fallen trees, in hollow logs and within boulder piles. Some underground wombat burrows were identified (within the proposed covenanted area, but outside of the offset Site due to being within threatened vegetation) which may be utilised by devils and quolls, although the rocky substrate and shallow soils throughout most of the Site likely presents limited burrowing opportunity. Presence of wombat scat at entrances (and devil scat on nearby tracks) to log dens indicates these log piles represent suitable shelter sites for large mammals. Eastern quolls and spotted-tail quolls commonly shelter in log piles and hollow logs[30], of which many suitable sites were identified. Spotted-tail quolls also commonly utilise rock dens as maternal den sites[31], with multiple large boulder piles (Plate 8) in the offset Site providing potentially suitable shelter for the species.

[30] Jones *et al.* (2023); Belcher & Darrant (2006); Henderson *et al.* (2023)
[31] Belcher & Darrant (2006)

Plate 7: Hollow logs were frequently observed throughout the Site

Plate 8: Rock piles were observed, predominantly on slopes within wet forest in the south of the Site

Plate 9: Tunnels through sedgy vegetation potentially utilised by mammals

Site Context

The denning habitat suitability model (Figure 5) has been applied to the [redacted] property as well a 5 km buffer of the Site. The model indicates the entire offset Site is optimal habitat (99.89 %) as is 99.13 % of the broader property (based upon the same criteria detailed in Table 4). A summary of denning habitat within the region is in Table 7.

Broad-scale den modelling estimates the likelihood of suitable dens based on vegetation and soil structure, though microhabitat features within these areas will influence the actual suitability of dens within the area. For example, small sections of the hardwood plantation in the south of the site consisted of steep rocky slopes with minimal ground cover and small boulders, likely unsuitable denning habitat for devils and quolls, but highly suitable for smaller mammals and other prey species. Due to the relatively large home ranges of devils and quolls (35 – 300 ha)[32], small inclusions of unsuitable denning habitat are unlikely to negatively influence population sizes of these species, as alternative dens will be available elsewhere within the home range of any individual.

Within the larger region, only 871.68 ha (7.95 %) of habitat within 5 km of the Site is considered to be unsuitable for denning, though these agricultural mosaics surrounded by forest may still provide suitable foraging areas due to the presence of prey species within forest ecotones and cleared land.

Table 7: Devil and quoll denning (and foraging) habitat within the offset Site and broader area (all areas in hectares)

Denning Habitat Class (Note all classes are potential foraging habitat)	Within Offset Site	[redacted] (covenanted area)	Within 5 km of [redacted]
Optimal	143.83	209.46	8,985.79
Suboptimal	-	0.20	1,104.76
Unsuitable	-	-	871.59
Total	**143.83**	**209.66**	**10,962.14**

Species Stocking Rate

Tasmanian devil

Within a 5 km buffer of the [redacted] property, 339 occurrences of the Tasmanian devil have been recorded on the Natural Values Atlas. Of these 339 occurrences, 234 are sightings, 97 live captures, 7 scat records and one den record. Twelve records are observations within 500 m of the offset Site. This equates to a record density of 0.03 devils per hectare within the 5 km radius of the property, which is far greater than the record density of the NMIS region (0.002 per ha) using the same metrics.

Devil scats and suitable denning opportunities were identified within the proposed offset area, as well as numerous scats and prints observed on intersecting roads and tracks (Plate 10, Plate 11) during preliminary site investigations. Den opportunities in the form of log piles and underground burrows represent potential shelter and maternal dens for devils across the site, although signs of active devil usage at these dens were limited. While signs were generally concentrated along roads and tracks, devils are relatively non-selective in their habitat use and the entire property represents suitable foraging habitat for the species.

[32] Long & Nelson (2010); Threatened Species Scientific Committee (2015); Jones *et al.* (2004)

Camera surveys detected devils on 36 occasions over 146 total trap nights (0.25 detections per trap night). Tasmanian devils were detected across a total of 7 cameras (70 %) and were most frequently detected in the southwest of the site. Of the 36 observations, there is at least 11 individuals possibly more with about half of them likely juveniles (born in 2023). Although there were no detections on cameras in the northwest of the site, ground surveys detected fresh scat and prints along the western and northern access roads and at the quarry in the northwest, indicating that devils are still utilising this area. Variability in detection is less likely attributed to differences in presence across the site and more to microsite features at each camera location. The species was more readily detected by cameras set on tracks and roads (Plate 12, Plate 13), demonstrating these are important features for devil dispersal throughout the site. Excepting small areas of steep, wet gullies assumed to be inaccessible for devils, the species is likely utilising the entirety of the site for foraging and dispersal.

Table 8: Camera trapping survey results

		Trap Nights Observed			Number of Observations			Mean Observations Per Trap Night		
Camera Number	**Trap Nights**	**TD**	**EQ**	**STQ**	**TD**	**EQ**	**STQ**	**TD**	**EQ**	**STQ**
TC01	16	0	0	0	0	0	0	0.00	0.00	0.00
TC02	16	0	0	0	0	0	0	0.00	0.00	0.00
TC03	16	12	0	0	20	0	0	1.25	0.00	0.00
TC04	16	0	0	0	0	0	0	0	0.00	0.00
TC05	14	2	0	0	2	0	0	0.14	0.00	0.00
TC06	16	1	0	0	2	0	0	0.13	0.00	0.00
TC07	13	4	0	0	4	0	0	0.31	0.00	0.00
TC08	13	4	0	0	4	0	0	0.31	0.00	0.00
TC09	13	2	0	0	3	0	0	0.23	0.00	0.00
TC10	13	1	0	0	1	0	0	0.08	0.00	0.00
Total		**26**	**0**	**0**	**36**	**0**	**0**	**0.25**	**0.00**	**0.00**

Plate 10: Bleached Tasmanian devil scat recorded on an internal road

Plate 11: Tasmanian devil footprint observed on the main access road

Plate 12: Tasmanian devil recorded on a camera trap in the southwest of the property

Plate 13: Tasmanian devil recorded on a camera trap near the existing shack on the property

[redacted]

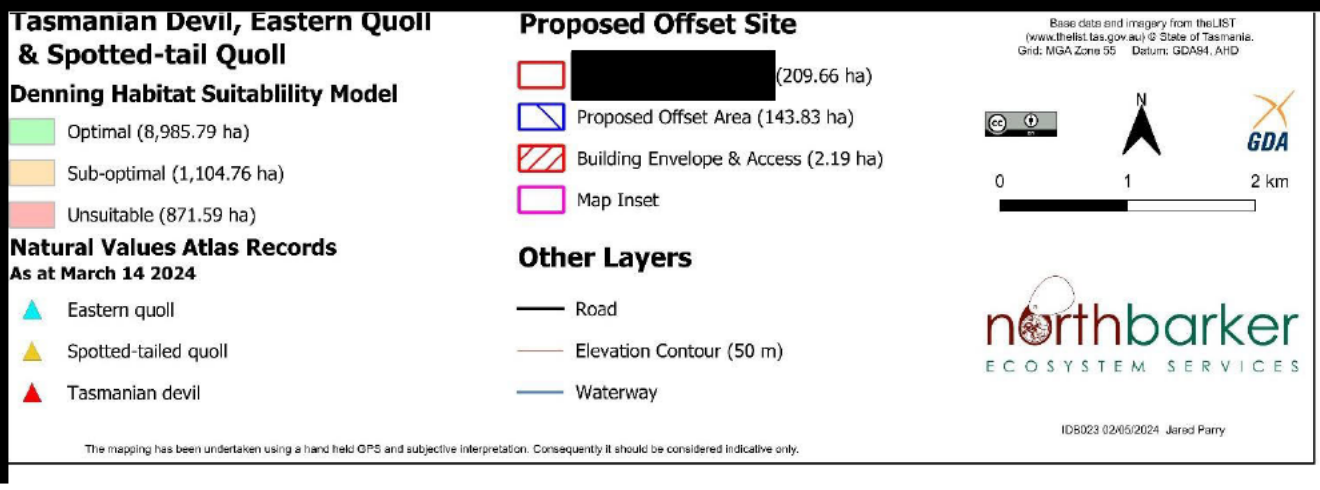


Figure 5: Denning habitat model for the Tasmanian devil, eastern quoll, and spotted-tail quoll

Eastern quoll

Three eastern quolls have been recorded from within 5 km of the [redacted] property according to the Natural Values Atlas, with the most recent observation from 1996. This equates to a record density of 0.0003 quolls per hectare within the 5 km radius of the property, which is equal to the record density of the NMIS region (0.0003 per ha) using the same metrics.

The property it is located within the published core range for this species[33] and eastern quolls are known to occur in conservation areas within 20 km of the Site, indicating that the limited recent records from the immediate vicinity does not necessarily rule out their presence. The history of the site as a selectively logged native forest may increase the suitability for the species, as eastern quolls demonstrate a positive association with log cover and open ground cover of cleared forests[34]. Given the area is well connected to nearby forest and includes suitable foraging habitat within the mosaic of forest and native grassland, the property represents potential denning and foraging habitat for eastern quolls.

Remote camera surveys for eastern quolls did not detect the species within the site, although this lack of detection does not necessarily prove their absence. Low population density in the region may have led to undetected individuals, despite the comprehensive coverage at the site. Eastern quoll populations are highly susceptible to changes in climate, with large fluctuations in populations between years, and a single season survey may not determine suitability of the region for the species. Even so the lack of detection of eastern quolls, indicates that if the species is present in the area, it likely persists at low density.

Spotted-tail quoll

The Site is located within the Eastern Tiers / Northern Midlands important population area[35]. Within a 5 km buffer of the [redacted] property, 30 occurrences of the spotted-tail quoll have been recorded on the Natural Values Atlas. Of these 30 occurrences, 2 are attributed to captures, 27 to general sightings and one scat record. Two records are observations within 500 m of the offset Site. This equates to a record density of 0.003 spotted-tail quolls per hectare within the 5 km radius of the property, which is greater than the record density of the NMIS region using the same metrics (0.001 per ha).

Spotted-tail quolls commonly utilise both open forest and dense wet forest, with their presence being associated with occurrence of denning opportunities and prey species[36]. The high number of log piles and large hollow logs throughout the site, signs of prey species (European rabbits) in grasslands, combined with nearby records, indicate the site is highly suitable for spotted-tail quolls.

Remote camera surveys for spotted-tailed quolls did not detect the species within the site, although this lack of detection does not necessarily prove their absence. Low population density in the region may have led to undetected individuals, despite the comprehensive coverage at the site. Spotted-tailed quolls generally persist in low densities and have very large home ranges[37], and as such may require an extended survey time to capture usage of the area. Even so the lack of detection of spotted-tailed quolls indicates that if the species is present in the area, it likely persists at low density. Presence is correlated with availability of suitable denning habitat, prey availability and structural connectivity of matrix habitat (mixture of dense ground cover and open foraging spaces)[38]. Although all forest areas are suitable foraging habitat for spotted-tailed quolls, lack of ground cover in dry forest areas may limit the suitability of log dens throughout the site. Given the presence of dense sedge cover in wet gullies, and

[33] Forest Practices Authority Biodiversity Values Database - https://fpa.tas.gov.au/BVD/BVD_NVA.html
[34] Jones *et al.* (2023)
[35] Department of Climate Change, Energy, the Environment and Water (2024)
[36] Troy (2014), Henderson *et al.* (2023)
[37] Long & Nelson (2010)
[38] Henderson *et al.* (2023); Troy (2014)

records of the species nearby, it can be assumed that spotted-tailed quolls would utilise the area for foraging and dispersal and as such would benefit from the improvement of den habitat.

4.1.8 FUTURE QUALITY WITHOUT OFFSET

The predicted future quality score (habitat/community) or value (features/individuals) of the proposed offset Site without the offset.

8

The quality of the offset Site as Tasmanian devil, eastern quoll, and spotted-tail quoll habitat is unlikely to be meaningfully altered without an offset mechanism such as a conservation covenant, as the denning suitability traits are relatively robust traits relating to substrate and vegetation. Clearance of parts of the proposed offset Site could detrimentally impact habitat quality through the removal of shelter for devils/quolls and their prey, however depending on the nature of clearance (and conversion) it could offset the change of quality in those traits with increased ease of foraging opportunities in cleared land. As such the quality score for the offset area without an offset is considered likely to remain the same.

4.1.9 FUTURE QUALITY WITH OFFSET

The predicted future quality score (habitat/community) or value (features/individuals) of the proposed offset Site with the offset.

9

Without intervention, the quality of the offset Site as Tasmanian devil and quoll habitat is likely to be maintained at its current condition, but not likely to meaningfully improve for the species given their relatively broad niche. Management measures may act to limit occasional disturbance from anthropogenic influences such as livestock grazing and habitat change through weed invasion, however these are relatively low threats and thus controls on these factors will not meaningfully improve the quality of the Site for this species.

It is the intention of Tasmanian Irrigation to improve the quality of the offset area through the implementation of several management and monitoring measures, with improvements to be noticeable within 5 years of the commencement of the offset.

Creation of artificial refuges within the offset Site using piles of coarse woody debris and logs can improve the future quality score. Given the shallow, rocky soils present within the Site, burrowing opportunities are limited. At present, denning opportunities are present predominantly in hollow logs and rock piles. The presence of additional denning opportunities will then provide immediate conservation benefit and potentially raise the habitat quality 1 point above the starting level (to a score of 9).

Tasmanian Irrigation are committed to improving the habitat quality within the offset area through the creation of additional denning habitat. This will be achieved through measures detailed in the NRE guidelines for devil den management[39]. This will be achieved through pushing several 3-5 m logs (>50 cm DBH) into a pile at least 25 m long, 10 m wide, and 4 m high, which will ideally include pushed topsoil. A layer of branches, bark, and off-cuts will be put around all sides of the pile. No native trees will be felled to achieve this, and only naturally fallen features will be used, ensuring that the fallen trees

[39] Environment Strategic Business Unit (2023)

are not providing habitat for any other species prior to moving. No plastic tubing will be used for the creation of denning habitat. There are numerous logs present within the Site to achieve this objective.

A monitoring program will be established to determine the efficacy of denning creation, as well as monitoring devil and quoll usage across the offset area.

Other measures to improve the quality of the Site will include security measures to prevent trespass and unregulated activities on the Site, restriction of potentially impactful activities (including, but not limited to hunting, fire, dumping of rubbish, recreational driving, horse riding, stock grazing, and resource extraction), feral predator management, and vehicle collision risk mitigation.

Details of these measures will be presented in an Offset Management Plan.

4.1.10 Risk of loss (%) without offset

This describes the chance that the habitat/community on the proposed offset Site will be completely lost (i.e. no longer hold any value for the protected matter of concern) over the foreseeable future without an offset.

10 %

Presence of formal protection mechanisms

The proposed offset property is zoned as Rural under the Tasmanian Planning Scheme and is privately owned. This zoning provides no formal protection for threatened natural values, including Tasmanian devil and quoll habitat. Additionally, Section 38 of the EPBCA provides that forestry operations conducted in relation to land covered by the Tasmanian Regional Forest Agreement (RFA) (and not prohibited by the RFA) are exempt from the assessment and approval requirements of Part 3 of the EPBCA (except for any forestry operations in World Heritage properties or Ramsar wetland Sites). With this in mind, land clearing for forestry under this scenario would be exempt from assessment under the EPBCA, thus placing any potential property at a high risk due to a lack of legislative protections. As the property is within a PTR, any forestry activity is regulated entirely by the Forest Practices Authority.

Presence of pending mechanisms that indicate development intent

The proposed offset Site is within a private timber reserve area, which may put the property at risk of future land clearance due to logging activities. The property at [redacted] covers 209.66 ha, which has been selectively logged. A single FPP has been issued for the Site [redacted] which issued to [redacted] (Figure 6). A further 25 FPP's have been issued within 5 km of the Site, with one of these active, and 2 expired within the last 3 years. The remaining 22 expired more than 3 years ago. The volume of FPPs in the region provides an indication of the level of forestry activity in the [redacted] region.

The adjacent land [redacted] is designated as a Future Potential Production Forest. There are also numerous Permanent Timber Production Zones in the broader area (Figure 6).

The process of PTR revocation will begin immediately after the purchase of the offset Site and will immediately reduce the risk of logging within this area.

Average risk of loss for similar Sites

As a result of being within a PTR, numerous similar Sites are subject to a similar and/or higher risk of loss. Across the Tasmanian Southeast bioregion, there is 79,741 ha of land within a PTR, and 208 current certified FPPs (Table 9), compared to 14,815 ha and 43 current FPPs in the northern Midlands bioregion. This is in part a reflection of the high levels of agricultural activity in the northern Midlands region,

however it is also a reflection of the productive land in the southeast region, and the high levels of forestry activity in this region, particularly in the Eastern Tiers region.

Table 9: Number of Forest Practices Plans and currency in relation to the NMIS and proposed offset (current as at 29/01/2024)

FPP Status	Within Tasmania	Within Tasmania Southeast Bioregion* (Percentage of Total)	Within Southern Midlands Council (Percentage of Total)
Current Certified FPP	2,020	208 (10.81 %)	59 (11.55 %)
Expired within last 3 years	1,571	139 (7.22 %)	44 (8.61 %)
Expired >3 years	15,481	1,577 (81.97 %)	408 (79.84 %)
Total	**19,072**	**1,924 (10.09 %)**	**511 (2.68 %)**

*** IBRA 6 Bioregions**

Additional risks

- Clearance and conversion

Over recent years, there has been a level of concern from Private Forests Tasmania (PFT) regarding the number of PTR revocations, with anecdotal reports indicating that most common conversion post-revocation was to pasture/agricultural land (pers comm. Rob Smith – PFT). In the 2015-2020 period, approximately 23,000 ha of PTR were revoked across Tasmania (Figure 7), with 67 % of this land converted to pasture/agricultural land[40]. The total area of PTRs revoked in the 2022-23 period is 2,944 ha, and the progressive total since 1988-89 is 91,215 ha[41].

Recent industry trends show that timber harvests yield from private reserves fluctuates annually, with current figures likely in a state of recovery since 2020-21, which due to the global pandemic, are much lower than previous years (Table 10). Predicting future yield is entirely dependent on market influences. If yield were to increase, it is likely that an increase in the number of PTRs with certified FPPs will also increase. There has been a steady decline in native forest logging since 1999-2000, however overall, timber production has increased due to an increase in hardwood logging (Figure 8).

In 2022-23, the FPA certified 481 FPPs, covering a total of 29,120 ha on both public and private land, with 134 of these for harvesting and reforestation of native forest. Additionally, 2,124 ha of plantations were converted to non-forest uses (primarily agricultural uses) under an FPP[42].

- Trespassing, hunting and vandalism
    - Tasmanian Irrigation will establish security measures to manage any threats posed by potential trespassers. This may include measures such as security cameras, fencing, gates across access points, monitoring program and signage indicating that trespass is not permitted. Security measures will be tailored and appropriate to the security risks of the offset property. Activities that are conducted illegally in the area include firewood and other resource collection, hunting, and general vandalism. These activities are considered a threat to the efficacy of the offset.

[40] Private Forests Tasmania (2020)
[41] Forest Practices Authority (2023)
[42] Forest Practices Authority (2023)

  - Illegal hunting in the area is considered to be a threat to the offset site. The most common hunting target species in Tasmania include fallow deer, wallaby, and duck, all of which require a hunting permit and firearms licence, as well as landowner permission. The most likely target species in the vicinity of the offset property are wallabies and deer.
- Illegal timber collection
  - Illegal firewood collection (often referred to as 'wood-hooking') is a recognized problem in Tasmania[43]. This activity can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions.

To fully mitigate these risks may be a costly exercise, however there are measures that can be put in place to reduce this risk. This will include measures such as (but not limited to) fencing, gates/boulders across potential access points, monitoring programs and signage indicating that trespass is not permitted. Security measures will be tailored and appropriate to the security risks of the offset Site.

Additional risks to devils and quolls

Additional listed threats to Tasmanian devils and quolls include:

- Devil Facial Tumour Disease (Tasmanian devils only)
  - The establishment of the offset will not introduce further disease that may cause any of the target species to decline, nor is there any possibility that the offset establishment could further spread DFTD amongst devils.
- Roadkill
  - Tasmanian Irrigation will undertake measures to mitigate the risk of roadkill upon target species as it relates to boundary roads and roads internal to the Site. These measures will be in place during Site preparation, as well as in place during the duration of the offset.
- Foxes and cats
  - Introduced predators such as foxes and cats are listed threats to Tasmanian devils, spotted tailed quolls and eastern quolls, through competition or direct predation[44]. Predation by foxes, although not currently present in Tasmania, is a significant potential threat to devils and quolls, having been implicated in the extinction of the eastern quoll and suppression of spotted-tailed quoll populations on mainland Australia[45]. More relevantly, feral cats in Tasmania both compete for resources with, and directly predate upon quolls[46], particularly where devil populations are low. Studies in disease affected populations of Tasmanian devils show that devil declines influence both abundance of feral cats[47], as well as feral cat activity times, with cats being more active at night when devil populations are low[48]. This increase in abundance and shift toward nocturnal hunting strategies has been implicated in the suppression of eastern quoll populations, with temporal overlaps in quoll and cat activity increasing potential of predation of juvenile quolls by feral cats[49]. Maintenance of healthy devil populations, or management of feral cats is therefore likely to reduce negative interactions between native carnivores and feral cats[50].

[43] Abdu *et al.* (2022)
[44] Threatened Species Scientific Committee (2015); Department of Climate Change, Energy, the Environment and Water (2024); Threatened Species Section (2023)
[45] Glen & Dickman (2008); Peacock & Abbott (2014)
[46] Glen & Dickman (2008); Fancourt et al. (2015); Cunningham et al. (2022)
[47] Cunningham et al. (2020)
[48] Fancourt et al. (2015)
[49] Fancourt et al. (2015); Cunningham et al. (2022)
[50] Cunningham et al. (2020); Department of the Environment. (2015)

  - With these threats present, Tasmanian Irrigation will develop and implement measures to manage feral animals across the offset Site. Although it is unlikely that ongoing management within the offset Site can entirely eradicate feral cats (and dogs) from the property, an annual feral predator program will provide important conservation gains for the target species in the broader area. This program will aid in managing prey availability within the landscape, as well as reducing a key threat, particularly to quolls.
- Fragmentation
  - As no vegetation clearance will occur within the offset Site, there will be no fragmentation of populations of devils or quolls.
- Persecution
  - Hunting and shooting will not be permitted on the offset Site unless as approved in accordance an approved feral animal management plan. Introduced pets and other animals will not be permitted on the offset Site.
- Secondary poisoning
  - No baiting of feral animals using toxic baits will occur within the offset Site. Any weed management will be conducted in accordance with an approved weed and hygiene management plan and will not utilize any chemicals for treatment that may be toxic to native fauna.

Threat mitigation commitments will be detailed thoroughly in an Offset Management Plan.

Summary of risks

- The only formal protection/regulation is administered through the Forest Practices Authority.
- The property is within a PTR, which may be subject to future forestry activities.
- Recent data suggests that a high proportion of PTR revocations are for conversion to agricultural land.
- Illegal activities such as trespassing, hunting, vandalism, and wood hooking pose a threat to the efficacy of the offset.
- Threats such as feral animals, and vehicle collision present a minor risk to devils and quolls in the region. The offset will manage these risks appropriately to the scale required based upon the relevant threats.

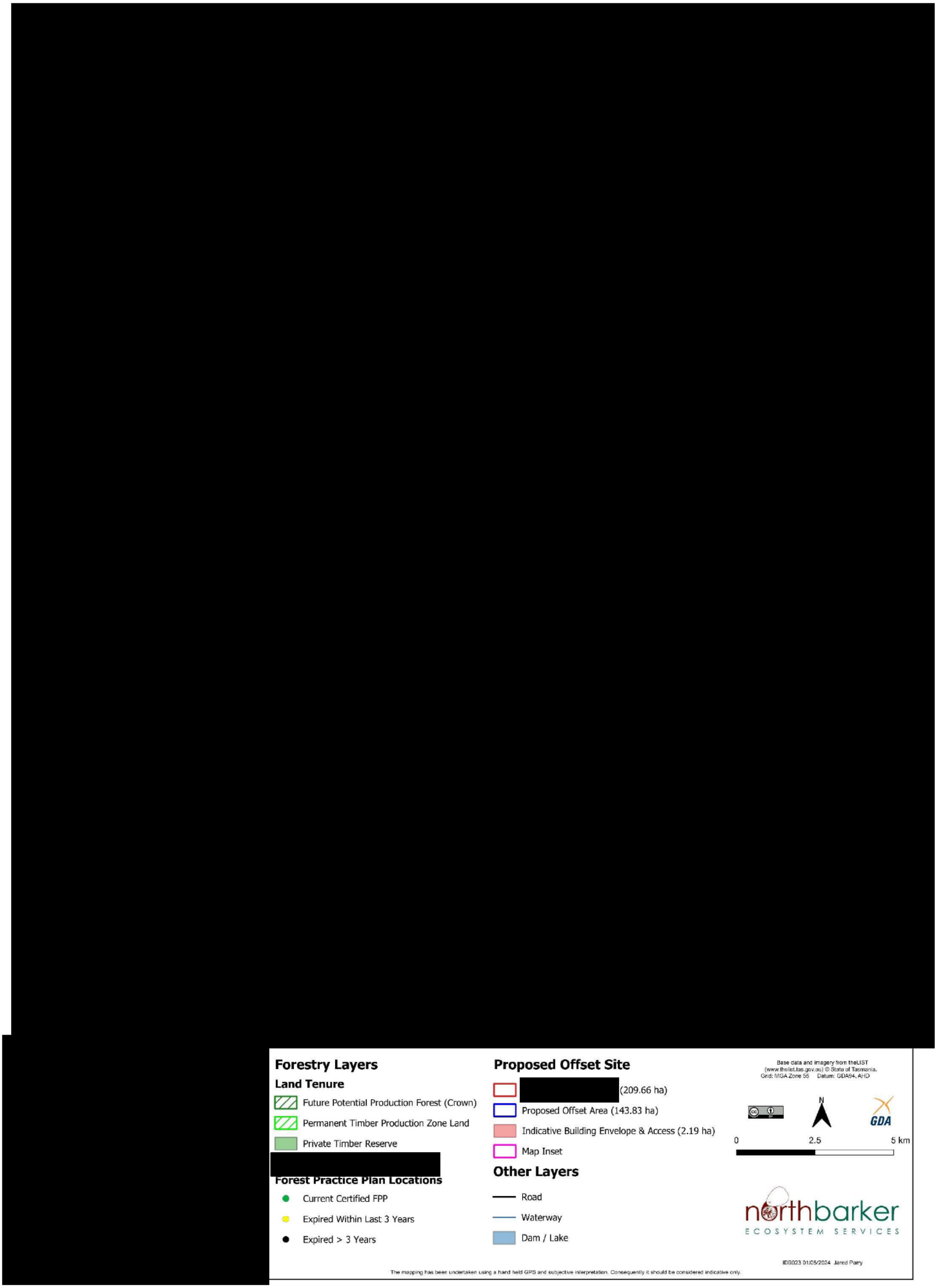
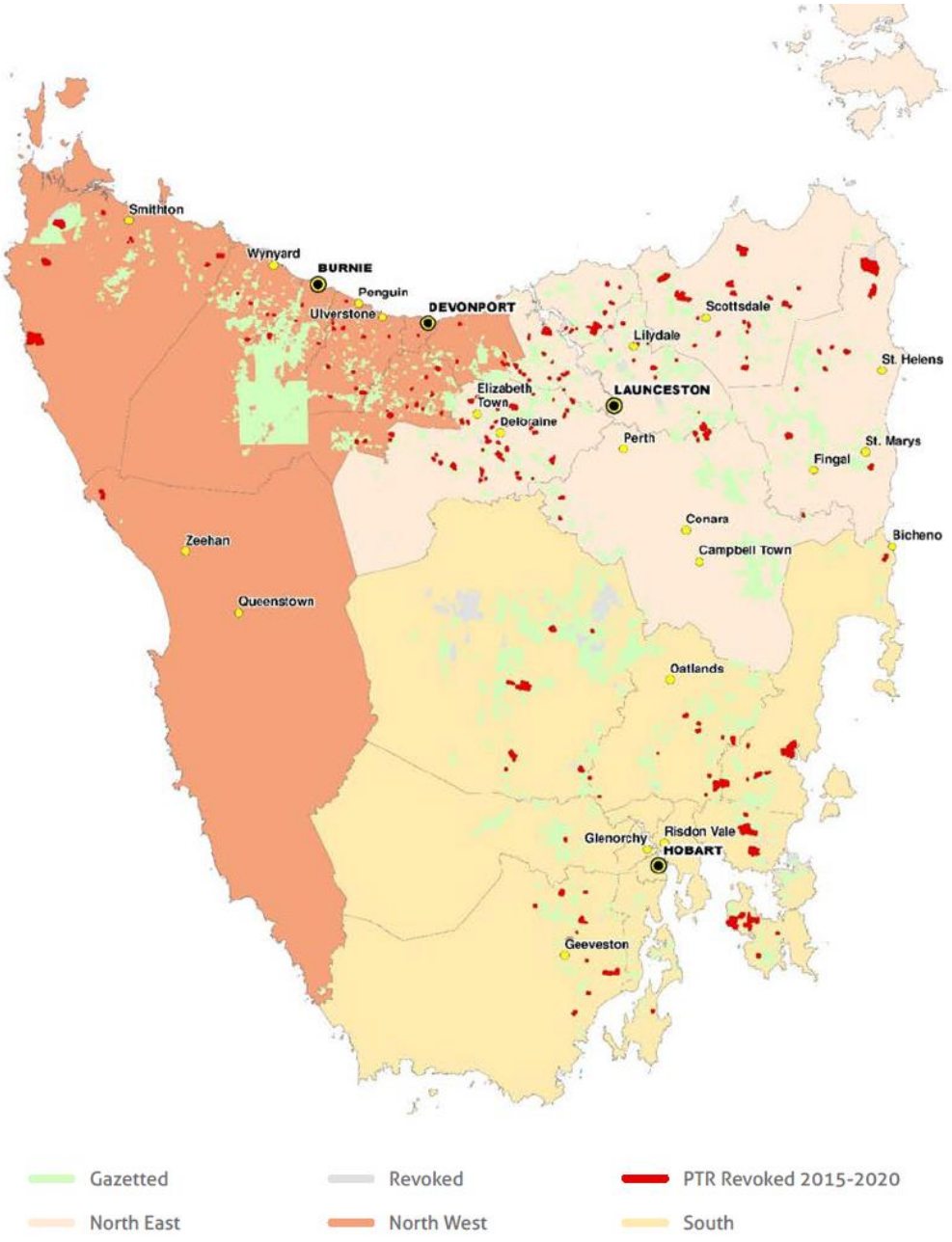


Figure 6: Forest Practice Plan coupe locations and private timber reserves in the vicinity of the offset Site

Table 10: Private forests harvest quantity 2018-19 to 2022-23 (tonnes)
Source: Private Forests Tasmanian Annual Report 2022-23[51]

	2018-19	2019-20	2020-21	2021-22	2022-2023
NATIVE HARDWOOD					
Native Sawlog, Veneer & Ply	46,899	25,528	63,789	18,634	20,767
Hardwood Pulpwood	94,899	246,423	211,999	194,599	72,117
Minor Log Products	59	25	23	23	160
Fuel Wood	12,513	22,204	7,909	12,928	11,324
Total NF including fuel wood	**154,370**	**294,179**	**283,720**	**226,184**	**104,367**
Total NF excluding fuel wood	**141,857**	**271,976**	**275,811**	**213,256**	**93,043**
PLANTATION HARDWOOD					
Hardwood, Sawlog, Veneer & Ply	617,739	259,696	467,927	426,546	284,975
Hardwood Pulpwood	2,337,202	2,099,427	1,559,854	1,949,862	2,002,870
Minor Log Products	476	0	0	0	0
Fuel Wood	0	450	7,029	1,967	29,153
Total HW including fuel wood	**2,955,416**	**2,359,572**	**2,034,810**	**2,378,375**	**2,316,998**
Total HW excluding fuel wood	**2,955,416**	**2,359,122**	**2,027,781**	**2,376,408**	**2,287,845**
PLANTATION SOFTWOOD					
Softwood Sawlog, Veneer & Ply	649,761	736,432	630,936	556,230	590,442
Pulpwood	592,190	672,822	512,699	719,073	682,798
Minor Log Products	1,956	3,555	7,503	4,491	4,518
Fuel Wood	0	50	180	300	480
Total SW including fuel wood	**1,243,906**	**1,412,859**	**1,151,318**	**1,280,094**	**1,278,238**
Total SW excluding fuel wood	**1,243,906**	**1,412,809**	**1,151,138**	**1,279,794**	**1,277,758**
GRAND TOTAL including fuel wood	**4,353,693**	**4,066,611**	**3,469,848**	**3,884,653**	**3,699,603**
GRAND TOTAL excluding fuel wood	**4,341,180**	**4,043,907**	**3,454,730**	**3,869,458**	**3,658,646**

[51] Private Forests Tasmania (2023)



REGION	PTRs REVOKED	NO OF TITLES	PTR AREA (HA)
North East	119	167	9,908
North West	57	110	3,781
South	59	131	9,286
GRAND TOTAL	235	408	22,974

Figure 7: PTR revocations statewide overview 2015-2020. Source: Private Forests Tasmanian Annual Report 2019-20[52]

[52] Private Forests Tasmania (2020)

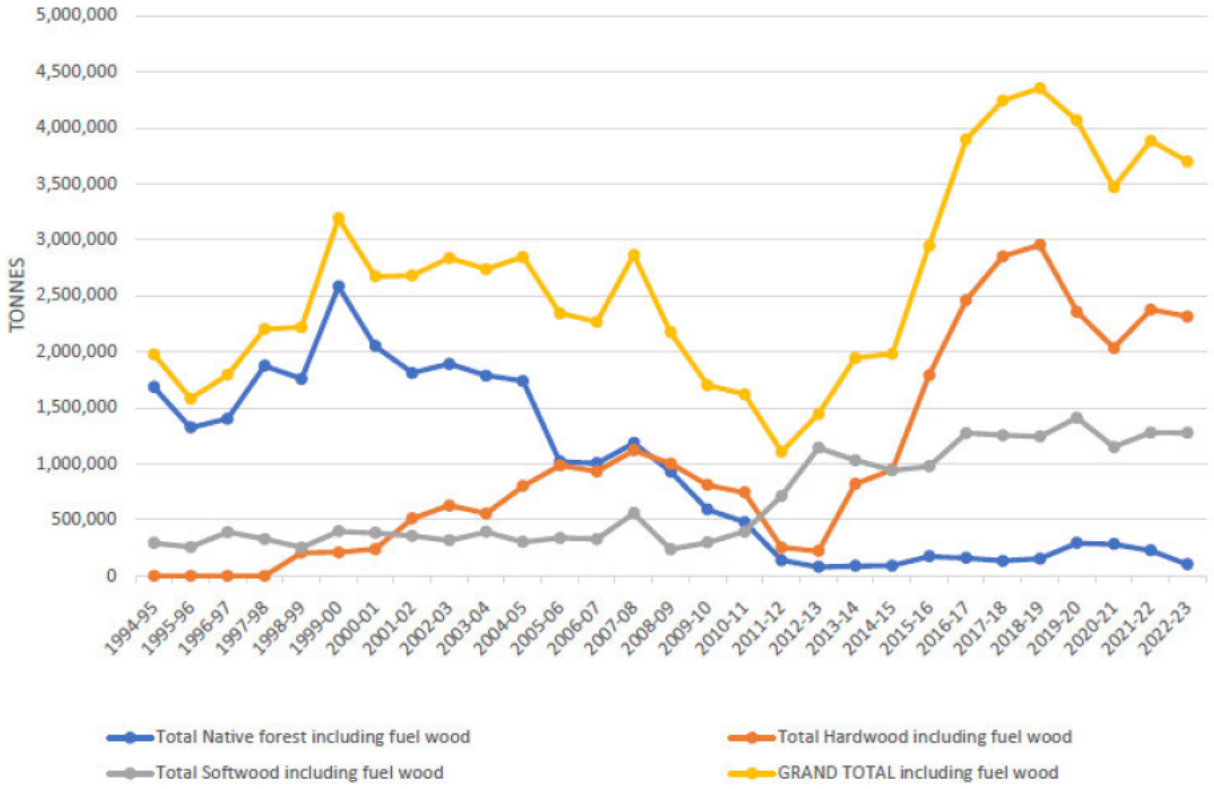


Figure 8: Private forest harvest volumes 1994-95 to 2022-23. Private Forests Tasmanian Annual Report 2022-23[53]

4.1.11 Risk of loss (%) with offset

This describes the chance that the habitat/community on the proposed offset Site will be completely lost (i.e. no longer hold any value for the protected matter of concern) over the foreseeable future with an offset.

0 %

Securing the land parcel within a conservation covenant will remove the risk of clearance and conversion (and secure management practices to maintain/improve condition). A negligible risk of catastrophic environmental change would remain as the values that maintain denning habitat quality are relatively robust to stochastic effects.

4.1.12 Confidence in result (%) – risk of loss

The capacity of measures to mitigate risk of loss of the proposed offset Site.

55 %

The conservation covenant, with a high degree of certainty, will avert the risk of unregulated incremental clearance, and the provision of log piles as additional potential denning refuges will provide with a high degree of certainty Site suitability for denning potential. The proposed offset covenanting of land and transfer to conservation estate with protections through NRE's private land conservation program, together with ongoing management, thus provides complete confidence that the measure will be successful in mitigating the future risk of loss of the Site from the perspective of the key habitat variable and indeed in increasing this value.

[53] Private Forests Tasmania (2023)

4.1.13 CONFIDENCE IN RESULT (%) – CHANGE IN QUALITY

The level of certainty about the successful achievement of the proposed change in quality (habitat/community) or value (features/individuals).

60 %

There is a high level of confidence that the offset Site will remain in its current quality if entered into conservation estate, based on the technical information available of the conservation methods, the implementation of covenants, monitoring programs, funding and the time required to implement and offset.

4.1.14 PERCENTAGE OF IMPACT OFFSET

Percentage of the significant residual impact that would be offset by the proposed offset (note: the offset calculations combined should equate to 100% for each residual impact).

Tasmanian Devil & Eastern Quoll – 105.70 %
Spotted-tail Quoll – 118.82 %

These values have been obtained through the input of variables explained above.

5. CONCLUSION

A property, consisting of a single parcel, at [redacted], has been identified by Tasmanian Irrigation as their preferred offset Site. The proposed offset Site covers an area of 143.83 ha within the property (Figure 1). The property is [redacted] Several conservation covenants, conservation areas and nature reserves are present within the broader region (Figure 1).

The proposed offset pathway is the application of a conservation covenant on this property as it exhibits Tasmanian devil and quoll habitat greater than what will be impacted by the NMIS, with scope to conduct habitat improvements across the Site.

Site investigations concluded that the site contains habitat suitable for the Tasmanian devil, eastern quoll, and spotted-tail quoll, with evidence of Tasmanian devils recorded in the form of scats. Camera trap surveys established the presence of Tasmanian devils on the site, and although quolls were not recorded, lack of detection does not necessarily prove their absence, particularly given the relatively short survey period. Denning opportunities are present within the Site; however, the shallow soils and rocky nature of the site limit the potential for below-ground burrows. Hollow logs and rock piles provide the best shelter across the Site. With this limitation, there is scope to improve the denning habitat across the site through the provision of additional denning structures, which is proposed to be conducted prior to the application of a conservation covenant. This is the key desired outcome of the offset in order to provide a net conservation gain to these three target species. Tasmanian Irrigation are committed to improving the habitat quality within the offset area through the creation of additional denning habitat and other land management measures. This will be achieved through measures detailed in the NRE guidelines for devil den management[54]. A monitoring program will be established to determine the efficacy of denning creation, as well as monitoring devil and quoll usage across the offset area. Specific details surrounding the implementation of this program will be addressed in a separate Offset Management Plan.

[54] Environment Strategic Business Unit (2023)

The Site is located within a private timber reserve and has been selectively logged in the past. It is at risk of future logging with this reserve in place. Tasmanian Irrigation will submit an application to revoke the PTR immediately upon the purchase of the property, which will provide immediate protection from logging to the Site.

Additional risks to the Site and the target species include:

- Clearance and conversion;
- Illegal activities such as trespassing, hunting, and vandalism;
- Unregulated tree clearance (wood hooking); and
- Feral animals.

These risks will be managed and mitigated to the degree necessary, the provisions of which will be detailed in an Offset Management Plan.

To fulfill the offset requirements for impacts arising from the NMIS project, Tasmanian Irrigation will:

- Purchase the property at [redacted] for the purpose of offsetting impacts;
- Act to revoke the private timber reserve present on the offset Site;
- Enter into a Conservation Covenant in perpetuity to manage the offset Site specifically for nature conservation;
- Undertake works to establish and maintain denning opportunities across the Site in order to improve the overall site quality. This will include baseline monitoring surveys to establish the frequency of use across the Site.
- Undertake ongoing monitoring to demonstrate the efficacy of habitat improvement on the offset Site.
- Develop and implement measures to manage feral animals across the offset Site;
- Actively manage illegal access to the property, minimising risk to threatened species and their habitat from wood cutting, track making, recreational driving, camping and other deleterious activities;
- Undertake measures to mitigate the risk of roadkill upon target species;
- Manage activities on the Site which may have an adverse impact on the species and denning opportunity, which may include (but not limited to) inappropriate use of herbicides and chemicals, use of effluent or irrigation water, stock grazing, hunting, dumping of rubbish, removal of soil, gravel or other resources, recreational driving, and horse riding;
- Actively manage vegetation on the Site to support improvement in habitat quality and support denning habitat; and
- Take all reasonable steps to reduce risks to habitat from fire.

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APPENDIX A – CONSERVATION COVENANT MECHANISM

LEGISLATIVE MECHANISM

Under Section 34 of the Tasmanian *Nature Conservation Act 2002*, the Minister on behalf of the Crown may enter into a conservation covenant with a landowner if the Minister considers it necessary or desirable to do so for a conservation purpose. A conservation covenant may contain such covenants and other provisions as the Minister and landowner agree.

Covenants made under the Tasmanian *Nature Conservation Act 2002* may be a restrictive covenant or a positive covenant. Such a covenant

a) Runs with the servient land as if it were a covenant to which Section 102(2) of the Tasmanian *Lands Titles Act 1980* applies; and
b) Is enforceable between the parties to it, and any person deriving the title under any such party, as if the covenant were entered into by a fee simple owner of land for the benefit of adjacent land held by the Crown in fee simple that was capable of being benefited by the covenant and as if that adjacent land continued to be so held by the Crown.

The policy specifies principles and criteria under which the Minister may wish to enter into a covenant under the Tasmanian *Nature Conservation Act 2002* for a conservation purpose.

The policy applies for all covenant under the Tasmanian *Nature Conservation Act 2002* excluding covenants required under Divisions 3 or 4 of this Act which relate to covenants arising from refused private timber reserves and forest practices plan applications.

CONSERVATION COVENANT POLICY

Properties will be considered for covenanting where the Minister is satisfied that the following principles are met:

- The target natural features are viable to the extent that they are likely to persist without significant management intervention;
- The shape and size of a proposed covenant is adequate and practicable to protect and maintain the target natural feature(s); and
- Natural features within a proposed covenant contribute to the comprehensiveness, adequacy, representativeness, and/or resilience of the Tasmanian reserve estate.

In determining whether these principles are met for a particular covenant proposal, consideration will be given to the following criteria:

a) The condition of the natural values, including their long-term viability;
b) The practicality of any management requirements necessary to maintain the natural features;
c) The area of the covenant is of an acceptable size. The minimum acceptable size for a conservation covenant is 10 hectares, or any area of target natural features that is deemed by the Minister to be of a size that is viable for those features, and can be practicably protected by a conservation covenant;
d) The context of the covenant such as shape, connectivity, adjacent land tenures, land uses and edge effects; and
e) The contribution to the comprehensiveness, adequacy, representativeness, and/or resilience of the Tasmanian reserve estate.

Natural features may include the following:

- Populations of threatened flora and/or fauna species listed under the Tasmanian *Threatened Species Protection Act 1995* or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*;
- Habitat for flora and fauna species where the habitat is either critical to the survival of a species or is threatened itself, contains important habitat features for the survival of a species, or the protection of additional habitat has been identified as a priority for that species (e.g. within a listing statement or recovery plan);
- Vegetation communities listed as threatened under Schedule 3 A of the Tasmanian *Nature Conservation Act 2002*;
- Old growth or mature forest;
- Vegetation communities that are poorly reserved at the bioregional level;
- Sites listed on the Tasmanian Geoconservation Database or identified as having national, State, or regional geoconservation significance;
- Other natural features identified as a priority for conservation or considered MNES under the EPBCA;
- Geographically or otherwise distinct groups or locations of species of flora and fauna;
- Sites important for the protection of landscape connectivity;
- Sites of evolutionary significance;
- Sites that display unusually high biodiversity values;
- Sites identified as focal landscapes under the NRE Conservation Information System; and
- Sites important for the protection of past or contemporary refugia.