Annex D [redacted] Tasmanian Devil Species Impact Assessment

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Tasmanian devil impact assessment, Sassafras Wesley Vale Irrigation Scheme Augmentation, Latrobe.

December 2024, v1.1

Client: Tasmanian Irrigation
Prepared by: Andy Welling
Date: December 2024 (v2.0)

Executive Summary

This impact assessment, commissioned by Tasmanian Irrigation (TI), evaluates the potential effects of upgrades to a section of the Sassafras Wesley Vale Irrigation Scheme Augmentation (SWISA) on the endangered Tasmanian devil (*Sarcophilus harrisii*).

The irrigation scheme has been deemed a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) as it is likely to have a significant impact on listed threatened species and communities protected under Part 3 of the EPBC Act. This report forms part of preliminary documentation required under the EPBCA specifically regarding the upgrade of the [redacted] on [redacted]. It provides an assessment against significant impact criteria and outlines avoidance and mitigation measures to minimise impacts.

Habitat and den assessments were conducted in the [redacted] nearby to the [redacted] Several potential dens sites were identified during on ground surveys with camera monitoring revealing that two [redacted] are being used as maternal dens. The proposed works to upgrade the [redacted] and install a new supply pipeline pose potential risks to the devils utilising the den sites from noise disturbances, vibration impacts, and interactions with humans, dogs and vehicles.

The implementation of the following key avoidance and mitigation measures will reduce the potential impacts on devils posed by the works:

- Undertake works that generate noise levels greater than ambient level at site (36dBH) outside the Devil Management Constraint Period between February and end of August to minimise impacts on breeding devils
- Implement noise reductions measures for works nearby to [redacted] such as installing sound attenuation screens in front of [redacted] and around machinery
- Undertake all works during daylight hours and restricting speed limits on access road to 20km/h
- Prohibit dogs on-site and secure open trenches and holes to avoid accidental trapping
- Restrict visits to [redacted] by all but essential personnel to reduce disturbance.

The effectiveness of mitigation measures will be assessed through a monitoring regime. If any behavioural changes are identified during the monitoring period a stop work notice will be issued to the Contractor immediately, and a review will be undertaken to determine impacts and review

safeguards and mitigation measures. Works will only recommence if a significant impact will not occur on the species habitat.

By implementing avoidance and mitigation measures, the risks posed by the upgrades are unlikely to result in a significant impact to the local devil population, as defined against significant impact criteria under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBCA).

Contents

Document preparation information

Project	Tasmanian Devil Impact Assessment
Site Address	[redacted] Road, [redacted]
Project Manager	Dr Josephine (Josie) Kelman – Managing Director and Principal Ecologist
Other Enviro-dynamics Staff	Andy Welling – Senior ecologist Nick Mooney – Consultant biologist and wildlife expert Dr Dean Heinze – Casual senior ecologist
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Client	Tasmanian Irrigation
Local Government Area	Latrobe Council

Version control table

Version	Date	Person responsible	Revisions
V1.0	21/11/2024	Andy Welling	Initial submission to TI for comments
V1.1	05/12/2024	Andy Welling	Revision based of TI review
V2.0	09/12/2024	Andy Welling	Final version

Glossary and Definitions

Acoustic Specialist - means a person who has relevant professional qualifications and at least 3 years of work experience designing and implementing noise management strategies and can give an authoritative assessment and advice using relevant protocols, standards, methods and/or literature.

DCCEEW Commonwealth Department of Climate Change, Energy, the Environment & Water

DFTD Devil Facial Tumour Disease

DMCP Devil Management Constraint Period - the breeding season of devils in the proximity of [redacted] and [redacted] Road which is likely to fall between 1 February and 31 August. However, requires confirmation in writing by a suitably qualified ecologist supported by monitoring evidence that the breeding season has commenced and has been completed as Devil Facial Tumour Disease may cause breeding seasons to fluctuate.

EPBCA *Environmental Protection and Biodiversity Conservation Act 1999*

EPR Environmental Protection Requirement

[redacted] [redacted]

Heavy vehicle means a vehicle with a Gross Vehicle Mass (GVM) of 4.5 tonnes or greater.

Light vehicle means a vehicle with a GVM less than 4.5 tonnes.

MNES Matters of Environmental Significance

[redacted] [redacted] which may be used ad devil denning or shelter sites.

DNRE Department of Natural Resources and Environment Tasmania

SLM Sound Level Monitor

Suitably Qualified Ecologist - A person with relevant professional qualifications and at least three years of work experience writing, implementing and reporting on management plans for the habitat of species protected under the EPBC Act. A Suitably Qualified Ecologist can demonstrate that the implementation of those management plans achieved suitable habitat quality; and can assess and provide authoritative advice on offset management to improve habitat quality.

SWIS Sassafras Wesley Vale Irrigation Scheme

SWISA Sassafras Wesley Vale Irrigation Scheme Augmentation

TI Tasmanian Irrigation Pty Ltd

TSPA *Threatened Species Protection Act 1995*

1 Introduction

Enviro-dynamics was engaged by Tasmanian Irrigation to undertake an assessment of denning habitat for the endangered Tasmanian devil. Previously identified denning habitat occurs within the [redacted] in close proximity of the [redacted] and pipeline upgrade works associated with the Sassafras Wesley Vale Irrigation Scheme Augmentation (SWISA).

Based on initial finding of an active den in [redacted] nearby to the [redacted] additional surveys were carried out to inform potential impacts to the Tasmanian devil. This information has been used to inform an assessment of the impacts against 'significant impact criteria' under the EPBCA and to identify avoidance and mitigation measures that can be implemented to minimise impacts.

1.1 Upgrade Proposal

The Sassafras/Wesley Vale Irrigation Scheme Augmentation (SWISA) will increase the capacity of the existing Sassafras Wesley Vale Irrigation Scheme (SWIS) and replace aging infrastructure. The current and augmented scheme services areas of north west Tasmanian including Sassafras, Harford, Thirlstane, Moriarty, Wesley Vale, Northdown, Pardoe, and East Devonport.

The Sassafras Wesley Vale Irrigation Scheme Augmentation includes the upgrading of an existing [redacted] on [redacted] and the installation of a new supply pipeline from the [redacted] along [redacted] to connect to the existing scheme (Figure 1).

Refurbishment works at the [redacted] will include:

- Internal remediation and modification work, including the replacement of existing pumps with higher capacity pumps, SCADA integration, replacement of existing hydraulic system with new electric systems, installation of a new HVAC system, and access upgrades (new/upgraded doors and internal staircase).
- General repair work to internal and external structures, including application of coating to provide protection and longevity.
- Site electrical/transmission upgrades (internal and external).
- Stabilisation of an external rock wall.

The footprint of the refurbishment works is contained within the existing [redacted] site, located within modified land.

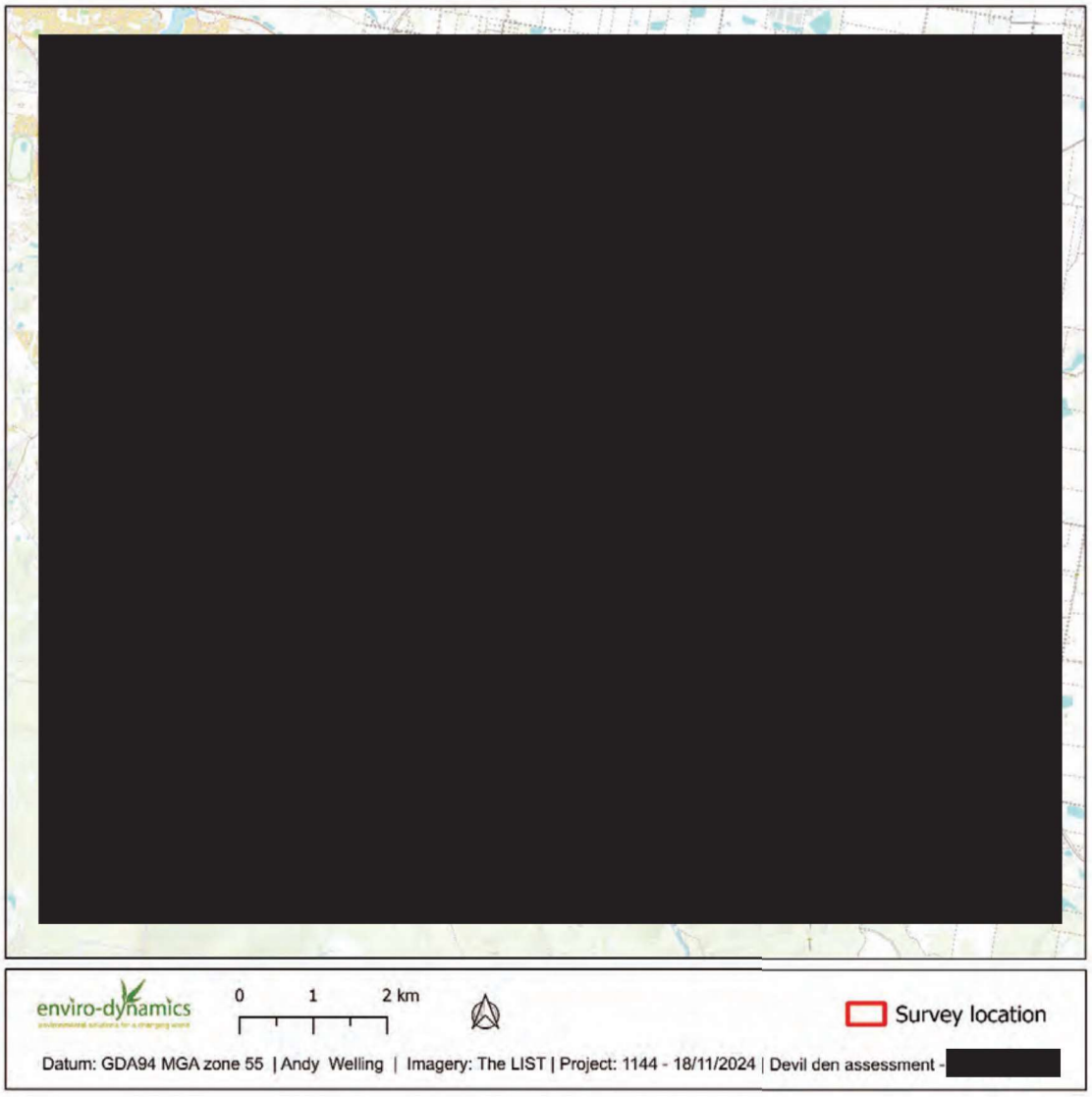

Figure 1: Location plan of survey area south of Latrobe

1.2 Purpose of the survey and report

Initial baseline fauna surveys carried out for the irrigation scheme identified the presence of a potential Tasmanian devil den in an [redacted] adjacent to the access road and within 50m of the [redacted] Further investigation of this [redacted] entrance carried out in December 2023 using motion detection cameras, confirmed that at least one [redacted] is used by devils as a maternal den.

The overall irrigation project has been classified as a controlled action under the EPBC Act due to likely significant impacts on listed threatened species and communities.

This report forms part of preliminary documentation required by the Commonwealth to assess the significance of the [redacted] upgrade works on the Tasmanian devil.

The following additional surveys and associated assessments were undertaken as part of this process:

1. Site surveys of all potential devil denning habitat within a minimum 250m radius of the [redacted] to inform the significance of the known den site
2. Monitoring of any potential den sites within the survey area using motion detection cameras to determine if they are being used by devils (and other listed mammal species)
3. Assessment of impacts on a MNES against the EPBC Significant impact guidelines 1.1.

Based on these assessments a series of avoidance, mitigation and monitoring measures have been developed to minimise disturbance and avoid significant impacts to the Tasmanian devil.

1.3 Tasmanian devils

The Tasmanian devil is a carnivorous marsupial mammal the size of a small dog. It is found only on Tasmania following its extinction on mainland Australia approximately 3,500 year ago. They live in a wide range of habitats across Tasmania, especially in landscapes with a mosaic of pasture and woodland. Habitat includes the following elements contained across an area of several square kilometres: denning habitat for daytime shelter (e.g. dense vegetation, hollow logs, burrows or caves); hunting habitat (open understorey mixed with patches of dense vegetation); breeding den habitat (areas of burrowable, well-drained soil or sheltered overhangs such as cliffs, rocky outcrops, knolls, caves and earth banks, free from risk of flooding, or windrows and log piles may also be used).

Devils are a primarily nocturnal species. They may occupy several dens or resting sites and change dens every 1-3 days. Tasmanian devils are mostly solitary, but do not defend territories. They have overlapping home ranges of 4-27 km^2 and travel an average of 8.6 km per night (Pemberton 1990). They are a specialist scavenger with possums and macropods making up a large part of their diet. The population has declined by more than 80% since the mid-1990s, when the infectious cancer Devil Facial Tumour Disease (DFTD) was first detected. DFTD has now spread across much of Tasmania. The reduced population is also likely to be more sensitive to additional threats such as death by roadkill, competition with cats and foxes, and loss or disturbance of areas surrounding traditional dens where young are raised (DNRE 2024).

The species is listed as endangered under to Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* and the *Tasmanian Threatened Species Protection Act 1995* (TSPA). It is classified as a Matter of National Environmental Significance (MNES) under the EPBCA.

2 Assessment Methods

2.1 Survey area

Field surveys involved a search on foot for potential den sites within 250m of the existing [redacted] north of the [redacted] across an area of approximately 6ha. Search methodology followed the following broad guidelines:

- Survey guidelines and management advice for development proposals that may impact on the Tasmanian devil (*Sarcophilus harrisii*), DNRE (2015)
- Guidelines for Natural Values Surveys - Terrestrial Development Proposals. DNRE (2015)
- Survey guidelines for Australia's threatened mammals – Guidelines for detecting mammals listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999'*

The survey was undertaken by three expert observers across three site visits. Denning and shelter habitat is broadly defined as:

- well drained soils easy to dig burrows
- sheltered overhangs such as cliffs, rocky outcrops, knolls, and caves, and
- earth banks and log piles with at least one entrance through which a devil could pass
- tree hollows and hollow logs
- dense vegetation, areas with open understory mixed with dense patches of vegetation which allow hunting.

The area surrounding the [redacted] contains several [redacted]. The [redacted] (referred to s [redacted] throughout the document) have a system of [redacted] and [redacted] and as such provide excellent denning habitat. The surrounding forest contains several large hollow logs, wombat hollows and a complex hollow area with natural overhangs and caves.

Where denning habitat was identified within the search area, remote motion detecting cameras were installed to monitor activity (refer to Section 3).

- Motion cameras (5) were placed at the entrances to potential den sites – 3 x [redacted], 1 burrow, and one complex hollow with cameras recording for a period of between 1-3 weeks.
- [redacted] 3 was monitored on two separate occasions to confirm denning behaviour after initial footage indicated that denning may occur there.

2.2 Assessment of noise levels

As part of the investigation of potential impacts from noise associated with the works on the Tasmanian devil, baseline noise assessment was undertaken by Tarkarri Engineering Pty Ltd. A logging sound level meter (SLM) was placed outside [redacted] 1 for a period of 2 weeks in September/October 2024 (Tarkarri Engineering, 2024).

Data recorded provides a baseline of noise levels experienced at the entrance to the [redacted] sites. This allows for the ambient background noise level to be ascertained which can be compared to noise levels emitted by various activities and machinery that are likely to be used during the [redacted] upgrade and the installation of the pipeline.

Modelling of noise levels from activities and machinery used during different aspects of the works, at [redacted] entrances, was undertaken based on the ambient levels. Modelling of the level of noise reduction achieved by various sound attenuation measures was also carried out. This information was used to determine the effectiveness of avoidance and mitigation measures for the project.

3 Results

3.1 Habitat Assessment Summary

Multiple potential den sites were discovered within 250m of the [redacted]. This included three [redacted] a complex hollow area (apparent natural overhangs and caves) and a burrow (Figure 2) (Table 1).

[redacted] **1** is located on the eastern side of [redacted] Road approximately 75m from the [redacted] and 20m from the road. No devil activity was recorded at [redacted]1 and the relatively recent collapse of [redacted] was evident. Devils rarely den in such unstable areas and as such this [redacted] provides marginal denning habitat. A **latrine site** was present outside [redacted]1. Whilst the camera monitoring did not pick up any devils using this latrine site during the monitoring period it indicates the usage of the area by devils.

[redacted] **2** is located to the southeast of the existing pipeline and approximately 30m from the [redacted]. The initial camera on this site recorded two devils entering the [redacted] One had a distended pouch. Two cameras were reset on this [redacted] entrance to gather further information of use. The second recording shows three devils entering the [redacted] with two animals with distended pouches. In one shot limbs from a young devil can be seen protruding from pouch. As such it is assumed that two devils have set up maternal dens in this [redacted]. The other devil appears to be a non-breeding animal. At least one of the devils with young using this [redacted] has exhibited signs of devil facial tumour disease (DFTD).

[redacted] **3** is located on the western side of the road approximately 80m from the [redacted] and 12m from the road. This den is in a direct line of site to the [redacted] with the [redacted] orientated to the WNW from the entrance. This [redacted], [redacted] and [redacted] [redacted]. It provides an exceptional den site with aspects in common with the most secure dens under houses. It is a classic complex site able to 'house' multiple litters, as devils are not territorial so can cluster if good habitat exists (N. Mooney, pers comm. Oct 2024). There was photographic evidence of two females with distended pouches using the [redacted] as maternal den sites. Several visits by animals carrying denning materials were also recorded. At least one other devil is also using the [redacted] with an immature devil recorded. One of the adult females had signs of advanced DFTD.

The **wombat burrow** east of the road (near to [redacted]2) and the **hollow area complex** to the west of the road and [redacted] were not used by devils.

A search of the area above the [redacted] to the west and in the low gully to the north east yielded several hollow logs that were marginally suitable for denning or shelter if the excellent [redacted] sites did not exist. Those logs had no sign of use (spiders webs, fragile litter etc).

No spotted-tailed quoll or eastern quoll were recorded on the cameras.

Walks to and from the security gate (about 1km) found one (marginally) fresh devil scat suggesting a low devil landscape density in historic terms although by contemporary (DFTD) terms it is medium (N. Mooney pers comm. Oct 2024).

Based on the results of the surveys and camera monitoring the area around the [redacted] is an important breeding area for the Tasmanian devil.

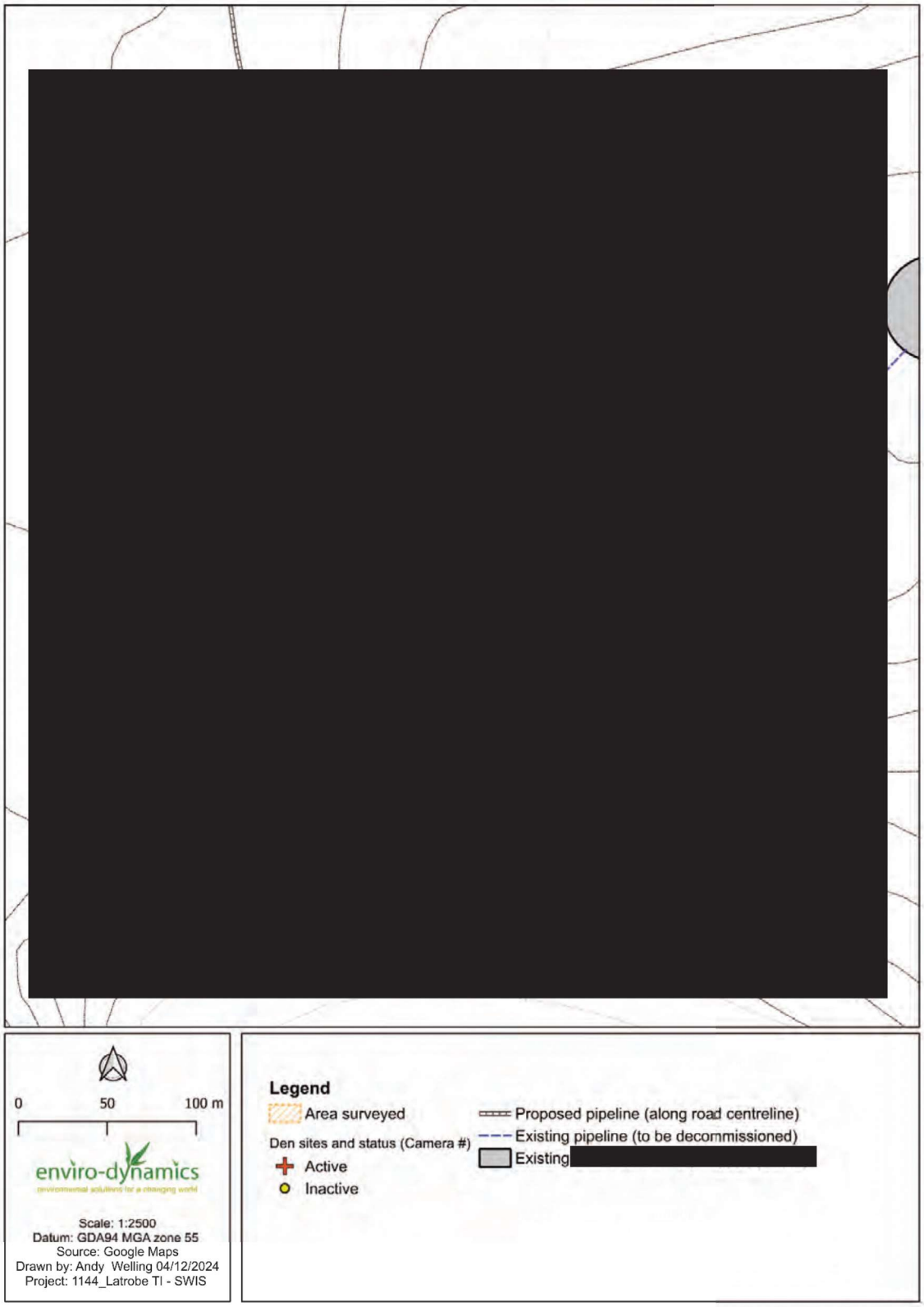

Figure 2: Site plan indicating location of monitored potential den sites, pump house and proposed new pipeline.

Table 1: Den site monitoring summary

Den site name	Camera #	Deployment dates/period	Den description	Results/comments
[redacted] 1	Cameras 1	23 Sept – 1 Oct 2024 – 8 days	[redacted]	No devils or spotted-tailed quolls (STQ) recorded.
Latrine site outside [redacted] 1	Camera 2	23 Sept – 1 Oct 2024 – 8 days	[redacted]	No devils or STQ recorded.
[redacted] 2	Camera 4	23 Sept – 1 Oct 2024 – 8 days	[redacted]	Two devils recorded on camera, one with distended pouch. No STQ recorded.
	Camera 7 and 8	11 Oct – 4 Nov 2026 – 23 days	[redacted]	Three devils recorded on cameras. Two had distended pouches. Recorded coming and going several times. Assume that two devils denning at site. Third immature devil recorded coming and going from [redacted]. At least one devil has DFTD. No STQ recorded.
[redacted] 3	Camera 5	23 Sept – 1 Oct 2024 – 8 days	[redacted]	3 devils recorded on camera. Two least 2 with distended pouches. One apparently old one (in good condition) with a DP appears to have advanced DFTD. One other old devil also in good condition and with DP and distinctive dropping RHS upper lip was repeatedly carrying nesting material in past the

			[redacted]	camera along the [redacted]. The 3rd devil appeared to be immature. These devils were coming and going in quick succession and the two older ones euro-genitally dragged across in front of the cameras, a sign of site possession and a reaction to something new (the camera). No STQ recorded.
Burrow	Camera 3	23 Sept – 1 Oct 2024 – 8 days	Likely wombat burrow. Signs of traffic at entrance, no webs across entrance.	No devils or STQ recorded.
Hole cluster	Camera 6	1 Oct – 7 Oct 2024 – 7 days	Complex cluster of potential burrows amongst natural overhangs and caves	No devils or STQ recorded.

3.2 Noise Assessment

Results from the noise assessment indicated that the ambient noise level for the site is 36dBH (refer to Appendix 4, Tarkarri Engineering, 2024).

Modelling of noise levels from machinery and equipment likely to be used for the [redacted] upgrade and pipeline installation is outlined in the Environmental Noise Assessment (Appendix 4).

The noise assessment found that all external works on the [redacted] and all drainage upgrade works will create noise levels greater than the ambient levels currently experienced at the entrance to the [redacted] (Table 2). The pipeline works in particular will generate noise levels that are well in excess of the ambient levels for [redacted] 3. Nosie levels at [redacted] 2 will only exceed ambient levels by a significant amount during fencing works (this is based on use of grinders). Pipeline works will exceed the ambient noise levels from the [redacted] to the storage tank access road to the north east of the [redacted] for [redacted] 3 (approximately 500m from the [redacted] (Figure 2)).

Noise levels at a nearby eagle nest were also modelled and found to be below ambient levels. Assessment of impacts to the nest site is not discussed in this report.

Table 2: predicted sound pressure levels at receiver positions for four model scenarios (as detailed in Section 4.2 of noise assessment report, Appendix 4).

Predicted received sound pressure levels (dBA) with no noise control					
Receiver	L_{Aeq}				L_{Amax}
	Wall descaling	Fencing	Pipeline	Pipeline (concreting)	Pipeline
D1 ([redacted] 3)	47	56	72	73	93
D2 ([redacted] 2)	36	49	39	39	54
N1	9	17	28	28	32

The noise assessment report also modelled the effects of several noise reduction measures on levels at the [redacted] entrances. Noise reduction measures modelled included installation of the sound attenuation curtaining in front of [redacted] 3 and the use of a noise control shroud around a rock breaker being used for pipeline and drainage works (if used). The modelling presented below in Table 3, does not factor in temporary sound attenuation curtaining around specific works (such as either side of an excavator operating a rock breaker or around specific activities at the [redacted] (refer to Appendix 4).

The noise levels modelled for the entrance to [redacted]2 are similar to ambient levels. The installation of sound attenuation curtaining at the entrance to this [redacted] is only likely to reduce noise levels a small amount (<5dBA). The benefits for sound attention curtaining do not outweigh the potential impacts on the den site and are not recommended.

Table 3: predicted sound pressure levels at receiver positions for four model scenarios with noise controls in place (as detailed in Section 4.2 of noise assessment report, Appendix 3).*

Predicted received sound pressure levels (dBA) with noise controls					
Receiver	L_{Aeq}				L_{Amax}
	Wall descaling	Fencing	Pipeline	Pipeline (concreting)	Pipeline
D1 ([redacted]3)	37	50	62	63	73
D2 ([redacted]2)	36	49	39	39	53
N1	9	17	28	28	32

** Noise control measures factored into modelling included installation of the sound attenuation curtaining in front of [redacted]3 and the use of a noise control shroud around a rock breaker if used*

The noise levels from construction works will be significantly higher than the ambient noise levels currently experienced at the entrance to the [redacted](dens). There is no scientific data on what level of noise results in a disturbance to devils that alters behaviour, although a review of studies on the effects of noise on animal behaviour indicated that '*...that anomalous responses from wildlife begin at noise intensities of around 40 dBA'* (*Arcangeli, et al. 2023)*. Devils however routinely breed under occupied houses and sheds and are known to tolerate noise when a high-quality denning site is available (N. Mooney pers comm. Oct 2024). Given the high quality habitat provide by [redacted]3 in particular, devils are unlikely to be discouraged from using the site.

In the absence of data on tolerable noise level for devils a precautionary approach is recommended regarding works that may disturb the den sites. This will include undertaking works that exceed the ambient level (36dBH) outside a defined Devil Management Constraint Period and employing suggested noise mitigation measures.

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4 Potential impacts on devils

The proposed works to upgrade the [redacted] and install a new pipeline along [redacted] Road have the potential to cause impact to devils using the nearby [redacted] as maternal dens during the breeding season, for shelter outside the breeding season or foraging or moving through the area.

The following potential impacts from the works on devils have been identified:

- Noise disturbance to devils using [redacted] 2 and 3 during upgrade of [redacted] – the nearby den sites may be impacted by noise from works. The level of disturbance may vary from having little to no impact on the animals through to disturbing animals during the breeding season and potentially impacting on breeding success. This risk can be mitigated by conducting major noise creating works outside the breeding season. Works can be undertaken between February and August, and by implementing sound attenuation measures.
- Noise and vibration disturbance of devils in [redacted] 3 from pipeline works along road – these impacts will be within 20m of the entrance to [redacted] 3 and could impact the devils sheltering and breeding in the [redacted]. This risk can be mitigated by conducting major noise creating works outside the breeding season. Works can be undertaken between February and August, and by implementing sound attenuation measures.
- Partial or complete collapse of roof or walls of [redacted] 1 and 3 during excavations works for pipeline – may make den sites unsuitable for breeding or use. The use of vibrating equipment will increase the risk of collapse of the roof in the [redacted]. It is not expected that rock breaking machinery will need to be used for the excavation of the pipeline trench due the soft nature of the substrate at this site. This risk can be mitigated by conducting major noise creating works outside the breeding season. Works can be undertaken between February and August.
- Collision with vehicles – during the construction period there will be an increase in vehicle use on the road leading to the [redacted]. This risk can be largely eliminated by restricting vehicle use on the access road during the hours between dusk and dawn.
- Devils becoming trapped – there is a risk of animals falling into trenches or holes or getting stuck in open pipes during installation works. This may stress animals or lead to their death (drowning). This risk can be avoided and mitigated by covering open holes, pipes and trenches, or by constructing exit ramps.

- Harassment or death from dogs – some contractors routinely bring dogs to workplaces. Uncontrolled dogs at the site could harass devils or even kill young devils. This risk can be avoided by not allowing dog access to the site.
- Disturbance of dens by visitors – increased levels of human activity at the site may lead to additional human visits to the den which could disturb devils. There were several visitors to [redacted] 3 recorded during monitoring.

Several of the potential impacts listed above are considered to pose medium risks to devils. The risks can largely be avoided and/or mitigated through the implementation of measures which will result in most risks being reduced to low (refer to Table 4).

5 Assessment of project impacts under 'Significant Impact Criteria'.

The Tasmanian devil is a listed threatened species as per the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). Under the EPBC Act an action will require approval from the minister if the action has, will have, or is likely to have, a significant impact on a Matter of National Environmental Significance (MNES).

The overall irrigation scheme augmentation has been assessment by the Commonwealth and deemed to be a controlled action under the EPBC due to potential for significant impacts to listed threatened species and communities. Due to the high-quality denning habitat nearby to the [redacted], a specific significant impact assessment is required as part of preliminary documentation under the EPBC for this part of the upgrade works.

The significant impact guidelines provide a self-assessment process which provide detailed criteria for assessing whether a significant impact will occur. A 'significant impact' is defined as an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment, which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

The potential impacts on the Tasmanian devil from the proposed [redacted] upgrade works and installation of the water pipeline will be short term (during the construction phase only) and they will not lead to the disturbance of any foraging habitat (no land clearance required) or directly impact any denning habitat.

An assessment of the significance of the impacts against criteria for endangered species is provide in Appendix 1.

6 Management of Risk

Projects that have the potential to impact EPBC listed species are required to be evaluated at the preliminary planning stage to see if impacts can be avoided to directly reduce the scale and intensity of a proposed action. After all reasonable avoidance measures have been considered, mitigation of any remaining significant impacts can be investigated (DSEWPC, 2012) to reduce risk or impact to a tolerable level. Under the circumstance where there remain significant impacts that cannot be avoided or mitigated offset measures can be proposed and implemented.

Table 2 provides a list of the potential impacts, avoidance and mitigation measures and a risk analysis with and without avoidance and mitigation measures applied.

Table 3 provides detailed mitigation measures and monitoring requirements.

6.1 Avoidance measures

The primary measures to avoid impacts to the Tasmanian devil are:

- undertake all works at the [redacted] and along pipeline within 500m of the [redacted] that have a noise level greater than the ambient noise level (set at 36 dBH) outside the breeding period. Based on observations from the dens in 2023 and 2024 the breeding period aligns with traditional breeding season from September to the end of January. The presence of DFTD in the population does not seem to have altered the breeding cycle for devils at this site. For the purposes of the project a Devil Management Contract Period (DMCP) has been designated to control the period when higher noise level activities can be undertaken. The DMCP is defined as between the 1st February and the 31st August with confirmation in writing by a suitably qualified ecologist required before works can commence.
- undertake all works in daylight hours only – this will avoid interactions with vehicles and machinery and with TI staff and contractors.
- cover and or securely fence any open holes or trenches at the end of each day to prevent devils becoming trapped or provide an exit ramp.

6.2 Mitigation measures

Mitigation measures to further reduce impact to the Tasmanian devil are:

<u>Noise reduction measures:</u>

- Works with a noise level at or below the ambient level for the site (36dBH) may be carried out within the breeding season. This will largely be restricted to low noise level works within the existing [redacted] (refer to Table 3 for list of tasks that can be undertaken within the DMCP)
- Install temporary sound attenuation curtaining in front of [redacted] 3.
    - Need to be installed outside the breeding season and walls are not to impeded access to [redacted] by devils. Access is to be monitored before and after curtaining is installed to ensure access is not impacted. Design and placement of curtaining is to be adjusted if monitoring indicates an issue.
    - Groundworks and removal of vegetation is to be avoided or minimised during installation of walls.
- Install temporary sound attenuation curtaining around works outside [redacted] between the [redacted] and entrance to [redacted] 2 and 3 where practical to so such that safety and efficacy of works aren't unduly impacted.
- Install noise control shroud sound blanket around rock breaker when excavating pipeline (if rock breaker required)
- Install temporary sound attenuation curtaining either side of rock breaker machinery when operating along road within 500m of the [redacted] where practical to so such that safety and efficacy of works aren't unduly impacted.

<u>Other measures:</u>

- undertake all works in daylight hours when devils are generally not active
- maximum speed limit of 20km/h to be enforced on access road to prevent roadkill which may attract devils to roads
- ensure no dogs are on site (with contractors)
- ensure soil ramp or rough log that can be used as a ramp is in all open holes or trenches that are not covered or fenced off
- inductions to be provided to contractors regarding the importance of the devil breeding habitat around site and methods to monitor and record devil interactions.

6.3 Offset measures

No offset measures are proposed for [redacted] works as the impacts on the Tasmanian devil can be avoided and mitigated to ensure that they are not significant.

6.4 Monitoring

Several monitoring programs are to be established and maintained through the course of works to assess if devils are being impacted. Any behavioural changes will be assessed in conjunction with acoustic and vibration monitoring results. If any behavioural changes in devils or vibrational impacts are identified during the monitoring period a stop work notice will be issued to the Contractor immediately, and a review will be undertaken to determine impacts and review safeguards and mitigation measures. Works will only recommence if a significant impact will not occur on the species or its denning/shelter habitat.

Monitoring measures are outlined in the EPR and Table 3 and described below:

Camera monitoring –

- Install camera outside entrance to [redacted] 3 prior to installation of sound attenuation curtaining to record direction of access to the [redacted] used by devils so access is not impeded.
    - Monitor behaviour for minimum period of 1 week before barrier erected to determine access route into [redacted]
    - Monitor for minimum period of 1 week after barrier is installed to assess any changes in behaviour. If behaviour changes recorded and they persist after a week adjust location/construction of the sound attenuation curtaining and undertake further monitoring before commencing works
- Install cameras facing entrances to [redacted] 2 and 3 to monitor comings and goings of devils during works period
- Install camera 3m (max.) inside of entrances to [redacted] 2 and 3 to monitor any behavioural changes and to monitor when maternal denning behaviour commences
- Photograph entrances and roofs in [redacted] 2 and 3 within 3 m internally before works.
    - Monitor condition of entrances and roofs on daily basis **if vibration equipment used** on site (such as rock breaking machinery).

- Cameras to be checked twice weekly by Suitably Qualified Ecologist using wireless links to minimise visitation to the den sites

Camera batteries will need to be replaced on a 2-3 week cycle.

Noise and vibration monitoring -

- Install noise receivers near entrance to two [redacted] to provide ongoing monitoring of noise levels during all work periods
    - Noise receivers to be checked twice weekly using wireless links and is to coincide with camera checking to minimise visitation to the den sites
- Measure ground vibration using a geophone if rock breaker used for pipeline and drainage work
    - Place monitors outside entrances to [redacted] 2 and 3 during rock breaking and monitor levels in real time. Geophone to be installed with remote reader (on cord) to minimise visitation to den entrances.

Visits to the [redacted] site to set up and take down monitoring equipment, change batteries and download data are to be coordinated between the Suitably Qualified Ecologist and Acoustic Specialist to minimise visitation to the [redacted].

Table 4: Summary of risks factors, avoidance and mitigation measures and risk level assessment.

Potential risk factors	Avoidance measures	Mitigation measures	Risk Analysis*		
			Likelihood of impact with controls	Consequence descriptor	Residual risk with controls
Noise disturbance from works at [redacted] impacting breeding devils in [redacted] 2 and 3	Undertake works outside DMCP.	Retain temporary sound attenuation curtaining in front of entrance to [redacted]3 to reduce incidental noise levels within breeding season.	Rare	Distribution of breeding cycle High	Low
Noise disturbance from works at [redacted] impacting non-breeding devils in [redacted]2 and 3		Implement sound attenuation measures to reduce noise levels for works carried out outside the breeding season.	Unlikely	Reduce use of [redacted]as shelter site during works periods Moderate	Low
Noise and vibration from pipeline and drainage on breeding devils in [redacted] 2 and 3	Undertake works outside DMCP.	Install temporary sound attenuation curtaining walls as per above.	Rare	Distribution of breeding cycle High	Low
Noise and vibration from pipeline and drainage on non-breeding devils in [redacted]2 and 3		Work only during daylight. Install temporary sounds walls as per above. Avoid the use of heavy vibration machinery such as rock breakers. If hard substrate is encountered when excavating trench use noise control shroud over equipment such as rock breakers.	Possible	Reduce use of [redacted]as shelter site during works periods Moderate	Medium

Potential risk factors	Avoidance measures	Mitigation measures	Risk Analysis*		
			Likelihood of impact with controls	Consequence descriptor	Residual risk with controls
Collapse of [redacted] due to vibration from excavation works on breeding devils	Undertake works outside DMCP.	Monitor [redacted] entrances with cameras during works outside breeding season. Cease work if evidence of roof or entrance instability.	Rare	Collapse could kill devils or block entrance and prevent movement Major	Medium
Collapse of [redacted] due to vibration from excavation works on non-breeding devils		Work only during daylight. Monitor [redacted] entrances with cameras. Cease work if evidence of roof or entrance instability, During excavation of pipeline trench avoid using equipment that cause deep vibrations (such as rock breaker). If hard substrate is encountered when excavating trench use noise control shroud over equipment such as rock breakers.	Unlikely	Collapse could kill devils or block entrance and prevent movement Major	High
Disturbance from human visits into the [redacted]		Ensure no non-essential visits to the [redacted] 2 or 3. No access by contractors	Unlikely	Additional visition could disturb devils. Minor	Low
Harassment or death from dogs brought to site	Dogs prohibited from site.	Fix no dogs sign on the gate. To be included in induction.	Rare	Dogs may enter [redacted] and harass or kill young devils an disturb breeding Major	Medium

Potential risk factors	Avoidance measures	Mitigation measures	Risk Analysis*		
			Likelihood of impact with controls	Consequence descriptor	Residual risk with controls
Roadkill/injury along access road during works	Work only during daylight.	Access road gate to remain locked outside work hours. Set speed limit (max 20km/h) on all vehicles between dawn and dusk. To be enforced with zero tolerance approach. Contractors to be provided with basic training on safely rescuing devils or other animals. Provide local contact for reporting (and collecting) roadkill devils or others found dead or injuries (not disease) suspected. To be included in induction.	Rare	Devils may be struck and killed by vehicles on [redacted] Road High	Low
Falling into holes and trenches they cannot escape from (risk as devils are poor jumpers)	Securely cover all holes and trenches	Leave a soil ramp or rough log as a ramp to allow any animals to escape from hole or trench if they fall in. Contractors to be provided with basic training on photographing and safely rescuing devils. Provide local contact for reporting or providing assistance to remove animals as required. To be included in induction.	Rare	Devils may get trapped in holes or trenches and die High	Low

** Likelihood and consequence descriptors and risk ratings are qualified in Tables 4-6, Appendix 2.*

Table 5 – Mitigation and monitoring measures to reduce impact from works to tolerable levels (Environmental Protection Requirements (EPR) for inclusion in the CEMP).

EPR	Mitigation measure	Accountability	Reference documents
1F.1	Noise generating work and activities at the [redacted] that exceed background noise levels at nearby dens (36dBA at [redacted] 2 and 3) must only be undertaken outside the Devil Management Constraint Period (DMCP) and in accordance with EPR 1F.4, 1F.5 and 1F.7. These works include (but are not limited to) to the following: • Descaling rock wall (use of excavator with bucket attachment scraping rock face); • Retaining wall construction (use of excavator, power tools, concrete pump, concrete vibrator, cranes); • Fence construction (use of power tools); • Kiosk transformer installation (use of excavator, power tools, concrete pump, concrete vibrator, cranes); • [redacted] external works (use of pressure washer, concrete cutting and scrabbling); and • Vehicle access to site (trucks, heavy machinery); • Any other noise generating activities which are likely to exceed 32dBA at nearby dens.	Contractor / Acoustic Specialist	Tasmanian Devil Impacts Assessment, Enviro-dynamics 2024

1F.2	Noise generating work and activities for the pipeline and drainage between the [redacted] and the access road to the existing storage tank that exceed background noise levels at nearby Dens (36dBA at [redacted] 2 and 3) must only be undertaken outside the Devil management constraint period and in accordance with EPR 1F.4, 1F.6 and 1F.7. These works include (but are not limited to) to the following: • Pipeline trench excavation (use of excavator with bucket, ripping rock breaker attachments). • Pipeline installation (use of excavators, trucks, concrete pump, hand tools). • Drainage installation (use of excavators with bucket, ripping and rock breaker attachments, trucks). • Vehicle access to site (trucks, heavy machinery); • Any other noise generating activities which are likely to exceed 36dBA at nearby dens.	Contractor / Acoustic Specialist	Tasmanian Devil Impacts Assessment, Enviro-dynamics 2024
1F.3	Work and activities at [redacted] that are below background noise levels at nearby dens (36dBA at [redacted] 2 and 3) may be undertaken within the Devil management constraint period during daylight hours only. These works may include the following: • Works only within the inside of the [redacted] building which may include concrete cutting (no cutting of external facade allowed at any time), minor power tool works, pressure cleaning and regrouting (no external walls allowed at any time). • Light vehicle access to the site • Heavy vehicle movements limited to 2 movements per week.	Contractor / Acoustic Specialist	

1F.4	Before commencement of any work or activity associated with both the [redacted] or pipeline a temporary sound attenuation curtaining must be installed in front of entrances to [redacted] 3 to reduce noise levels at dens. The sound attenuation curtaining must: • Not interfere with the access to the den sites or utilisation of the area by devils • Be installed under direction by a Suitably Qualified Ecologist and Acoustic Specialist • Be installed and decommissioned outside of the Devil Management Constraint Period • Not result in the removal of any vegetation and minimise disturbance to soil as much as practicable; and • Remain in place until completion of all works that are likely to have a noise impact on denning habitat and as confirmed by an Acoustic Specialist and Suitably Qualified Ecologist.	Suitably Qualified Ecologist / Contractor / Acoustic Specialist	Tasmanian Devil Impacts Assessment, Enviro-dynamics 2024
1F.5	Before commencement of any noise generating work or activities associated with the [redacted] install sound attenuation curtaining or other noise mitigating devices which are suitable for the task or activity. Noise mitigation approaches must: • Be developed in consultation with an Acoustic Specialist and suitable for the noise generating task or activity to be undertaken; • Be used at all times; and • Remain in place until completion of all noise generating tasks or activities.	Contractor / Acoustic Specialist	Tasmanian Devil Impacts Assessment, Enviro-dynamics 2024

1F.6	To mitigate noise and vibration from work or activity associated with the pipeline and drainage along [redacted] Road in close proximity to [redacted] 3 the following noise and vibration mitigation measures must be undertaken: • Minimise the use of equipment with the potential to generate high amplitude ground vibration (such as rock breakers); • Undertake any work during daylight hours only; • Install temporary sound attenuation curtaining in close proximity to rock breaking activities and power tool usage; and • Utilise a noise control shroud on rock breaker head.	Contractor / Acoustic Specialist	Tasmanian Devil Impacts Assessment, Enviro-dynamics 2024
1F.7	Noise generating work and activities for the [redacted], pipeline and drainage that exceed background noise levels at nearby dens (36dBA at [redacted] 2 and 3) outside of the Devil management constraint period must only be undertaken in accordance with the following monitoring requirements carried out by a Suitably Qualified Ecologist and Acoustic Specialist: <u>Camera Monitoring</u> • Install cameras outside the entrance to [redacted] 3 prior to installation of sound attenuation curtaining to record direction of access to the [redacted] used by devils so access is not impeded. o Monitor behaviour for minimum period of 1 week before barrier erected to determine access route into [redacted] o Monitor for minimum period of 1 week after barrier is installed to assess any changes in behaviour. If behaviour changes recorded and they persist after a week adjust	Suitably Qualified Ecologist / Contractor / Acoustic Specialist	Tasmanian Devil Impacts Assessment, Enviro-dynamics 2024

	location/construction of the sound attenuation curtaining and undertake further monitoring before commencing works
	• Install cameras facing entrances to [redacted] 2 and 3 to monitor comings and goings of devils during works period
	• Install camera 3m (max.) inside of entrances to [redacted] 2 and 3 to monitor any behavioural changes and to monitor when maternal denning behaviour commences.
	• Photograph entrances and roofs in [redacted] 2 and 3 within 3 m internally before works.
	  ○ Monitor condition of entrances and roofs on daily basis **if vibration equipment used** on site (such as rock breaking machinery)
	• Cameras to be checked twice weekly by Suitably Qualified Ecologist using wireless links to minimise visitation to the den sites
	• Camera batteries will need to be replaced on a 2-3 week cycle.
	<u>Noise and Vibration Monitoring -</u>
	• Install noise receivers near entrance to two [redacted] to provide ongoing monitoring of noise levels during all work periods
	  ○ Noise receivers to be checked twice weekly using wireless links and is to coincide with camera checking to minimise visitation to the den sites
	• Measure ground vibration using a geophone if rock breaker used for pipeline and drainage work		

	○ Place monitors outside entrances to [redacted] 2 and 3 during rock breaking and monitor levels in real time. Geophone to be installed with remote reader (on cord) to minimise visitation to den entrances. Visits to the [redacted] site to set up and take down monitoring equipment, change batteries and download data are to be coordinated between the Suitably Qualified Ecologist and Acoustic Specialist to minimise visitation to the [redacted]. If any behavioural changes are identified during the monitoring period a stop work notice will be issued to the Contractor immediately, and a review will be undertaken in order to determine impacts and review safeguards and mitigation measures. Works will only recommence if a significant impact will not occur on the species		
1F.8	To minimise human disturbance to [redacted] 2 and 3 only a Suitably Qualified Ecologist and Acoustic Specialist will be allowed to visit these sites, only as required, to undertake the following activities: • Installing and checking cameras • Installing and checking noise receivers; • Installing and checking geophone vibration monitors • Photographing and monitoring [redacted] roof and entrance conditions Cameras, noise receivers and geophone to be checked using wireless links to minimise visitation to the den sites	Suitably Qualified Ecologist / Acoustic Specialist	
1F.9	No dogs or other pets are allowed on site at any time. Appropriate signage and inductions must be undertaken.	Contractor	

1F.10	To mitigate any roadkill or injury to Dasyurids the following mitigation measures must be undertaken: • Access road gate to [redacted] Road must always remain locked outside work hours to ensure no vehicular access between dusk and dawn. • Max speed limit of 20km/h on all vehicles along [redacted] Road. Appropriate signage erected that the 20 km/h relates to wildlife collision risk. Enforced with zero tolerance approach to workers exceeding this speed limit. • Contractors to be provided with basic training on safely rescuing injured devils or other animals and processes for transfer to wildlife carers. • Where a threat to wildlife is identified during construction, TI's project representative must be notified immediately, and Bonorong (0447 264 625) contacted for advice. Works may need to cease if fauna is in danger or has been harmed . For non-threatened species only suitably qualified wildlife carers should attempt to relocate wildlife, under an approved permit from NRE Tas. Threatened species are to be relocated in accordance with their relevant EPR.	Contractor	
1F.11	To minimise the risk of entrapment and injury to Dasyurids the following mitigation measures must be undertaken: • Measures will be put in place such that if fauna enter any trench, there must be enough ramps (with slopes less than 45 degrees) placed within the trench to allow animals to readily vacate the trench.	Contractor	

	• The period trenches are open must be minimised to the maximum extent. Trenches must be progressively backfilled to cover each days laid pipe. • Open trenches must have wildlife proof fencing overnight or while operations are not in progress. • The ends of pipe within trenches or stored pipe must be closed to ensure that fauna cannot enter the pipe. • Inspection of trenches prior to commencement of works each morning must occur and removal of wildlife from the trench by appropriately trained personnel. Appropriately trained personnel must be approved by TI. • Surveillance of the open trenches in sensitive areas and the removal of wildlife from the trench by appropriately trained personnel. Appropriately trained personnel must be approved by TI. • Trapped fauna within open trench or pipeline must be removed and relocated by a suitably qualified wildlife carer . Dead fauna must be removed from the project site to reduce the potential for secondary impacts to scavenging species. All instances of fauna entrapment must be recorded, including species, condition, date, time and location coordinates. Data will be reported to TI on a weekly basis. • Any deaths or injuries to MNES species are to be reported to TI immediately.		

7 Conclusions

The Sassafras Wesley Vale Irrigation Scheme includes the upgrade of [redacted] on the [redacted] and the replacement of the main water line from the [redacted] Road.

The upgrade of the [redacted] will include ground works to stabilise a steep bank behind the [redacted] and the demolition and construction works which include concrete cutting, and general construction noise. The proposed new pipeline from the [redacted] will be installed along an existing access road and will require the excavation of the trench and laying of the new pipeline. Improvement to road drainage nearby to the [redacted] will also be undertaken.

Surveys carried out in the vicinity of the [redacted] and proposed pipeline detected two active devil den sites. [redacted]3 in particular provides a very well used and important maternal den site. The proposed works have the potential to impact the animals using this [redacted] and other sites nearby for denning and shelter.

Assessment of the potential impacts of the works on the Tasmanian devil under EPBCA Significant Impact Criteria identified that there is potential for the works to significantly impact the species if avoidance and mitigation measures are not implemented.

The following avoidance and mitigation measures are recommended to minimise the potential impacts:

- Undertake works that generate noise levels greater than ambient level at site (36dBH) outside the Devil Management Constraint Period between 1st February and 31st August to minimise impacts on breeding devils.
- Implement noise reductions measures for works within 500m of the [redacted] including installing sounds attenuation curtaining in front of the entrance to [redacted]3, sound attention curtaining around works at [redacted] and rock breaker and noise control shroud on rock breakers (if rock breaker required).
- Undertake all works during daylight hours, restrict speed limits on access road to 20km/h
- Prohibit any access by dogs to the site with contractors.
- Secure open trenches and /or holes after work hours by fencing or covering or provide ramps out of trenches to prevent accidental trapping of devils (or other animals).
- Restrict visits to [redacted] by all but essential personnel to reduce disturbance.

To assess the effectiveness of avoidance and mitigation measures, baseline monitoring is to be carried out before works commence at the site to provide a comparison in devil behaviour and condition of the [redacted] before during and after works.

No offset measures are proposed for this project as the risks can be avoided or mitigated to avoid a significant impact to the species.

If the works are conducted outside the Devil Management Constraint Period, all mitigation measures implemented and direct impacts are managed to avoid mortality, there is unlikely to be a significant impact on the species from the works.

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Appendix 1 – Assessment against Significant Impact Criteria

Table 6: Listed critically endangered and endangered species assessed against the EPBC Act Significant Impact Criteria.

Significant Impact Criteria - Tasmanian devil, (*Sarcophilus harrisii*).	Comment on whether significance criteria will be trigger by proposed works.
Lead to a long-term decrease in the size of a population	**Unlikely** – The dens site nearby to the proposed works are classified as high quality and devils are unlikely to be deterred from using the dens. Disturbance caused by works has the potential to interrupt the breeding cycle however the one-off works will not lead to a decrease in the size of the devil population. The risk of disturbance to breeding can be mitigated by the timing of the works and other noise reduction measures. The increased movement of vehicles during the construction period has the potential to increase roadkill risk however provided mitigation measures are implement this will not lead to a long-term decrease in the devil population.
Reduce the area of occupancy of the species	**Unlikely** – There will be no impact to the area of occupancy. The area of occupancy of the Tasmanian Devil is 64,030 km^2 (DPIPWE 2010). The proposed works will not lead to the removal of any vegetation, denning or foraging habitat or impact areas to be occupied in long term. There is some potential that the works may have a temporary effect on the devils denning in the area however the works will be for a short time period and the devils are likely to continue to use the nearby den sites and maintain the same area of occupancy.
Fragment an existing population into two or more populations	**Unlikely** – The works will not lead to the fragmentation of an existing population. The works may lead to a disturbance of a breeding cycle if no mitigation measures are adopted, but it will not fragment the local population.
Adversely affect habitat critical to the survival of a species	**Unlikely** – No habitat will be directly impacted by the works. The den sites nearby to the works are well-used and productive and hence any permanent impacts to these dens have the potential to adversely impact habitat critical to the survival of a species. If mitigation measures are implemented, it is however **unlikely** that the works will adversely impact critical habitat.

Significant Impact Criteria - Tasmanian devil, (*Sarcophilus harrisii*).	Comment on whether significance criteria will be trigger by proposed works.
Disrupt the breeding cycle of a population	**Unlikely with mitigation** – Two den sites occur within close proximity of the [redacted] and the pipeline route (within 50m). The works will not physically impact dens sites however noise and vibration associated with the works have the potential to disturb the den and may in the worst-case scenario led to the failure of breeding at the well-used den sites during the works. Mitigation measures can be implemented to minimise the likelihood of the works disturbing breeding cycles and reduce this risk to unlikely.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** – No habitat will be modified, destroyed, removed or isolated as a result of the works. Nearby den sites may be temporarily disturbed during works however this impact is unlikely to lead to a decline in the species.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	**Unlikely** – there are no known harmful invasive species likely to become established as a result of the proposed action. Foxes are the only invasive species listed as a threat in the draft recovery plan (DPIPWE 2010a) and the works will in no way contribute to an increase in this risk. Pest management measures will be implemented as part of the works to prevent the establishment of pest species which may be harmful to the devils or impact their foraging and hunting habitat.
Introduce disease that may cause the species to decline	**Unlikely** – Devil Facial Tumour Disease (DFTD) is already present within the area (Woods et al 2018). Several devils that were recorded on cameras at the site shows signs of DFTD including females with pouch young. There have been no local extinctions of the Tasmanian Devil as a result of the DFTD (Woods et al 2018) There are no other known diseases that impact the Tasmanian devil that are likely to be spread by the proposed works. The works will be subject to strict pest management measures designed to prevent the introduction of novel diseases that have the potential to be spread.

Significant Impact Criteria - Tasmanian devil, (*Sarcophilus harrisii*).	Comment on whether significance criteria will be trigger by proposed works.
Interfere with the recovery of the species	**Unlikely** – [redacted]3 nearby to the works provides excellent den sites and it appears to be a productive site based on monitoring data from 2023 and 2024. Devils are unlikely to be discouraged from using this site because of works. Provided mitigation measures are implemented, the impacts are unlikely to be significant and interfere with the recovery of the species.

Appendix 2 – Likelihood and consequence descriptors, risk ratings

Table 5-1: Likelihood descriptors

Qualitative measure of likelihood	How likely is it that this event/issue will occur with control strategies in place
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur due to the works
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	Low chance of occurring except in exceptional circumstances

Table 5-2: Consequence descriptors

Qualitative measure of consequences	What will be the consequence/result if this issue does occur (based on impact to local population)
Minor	Minor short-term disturbance which is unlikely to lead to behavioural changes in breeding and non-breeding devils
Moderate	Disturbance of animals which may result in short-term avoidance of local area during works period
High	Substantial disruption of breeding cycle which may result in lower breeding success in short term or injury of an animal.
Major	Major disruption of breeding cycle which may result in lower breeding success in short term or death of individual animal impacting local population
Critical	Severe impact on adults or juvenile animals or habitat which may reduce overall devil population

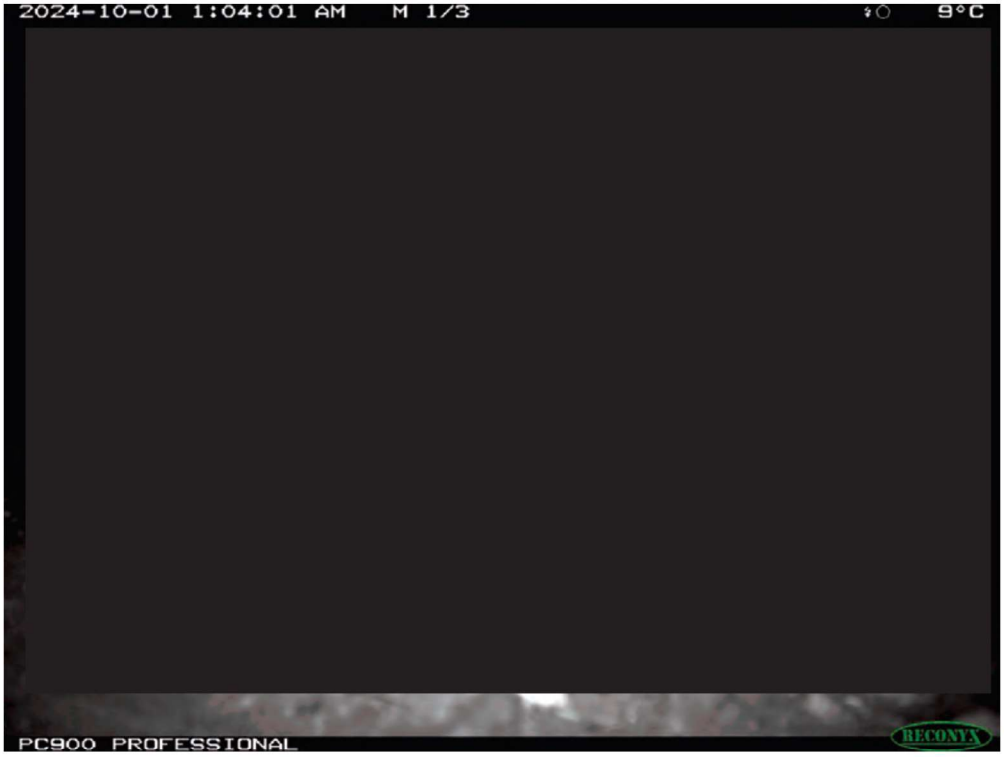
Table 5-3: Risk ratings

	Minor	Moderate	High	Major	Critical
Highly Likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possible	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

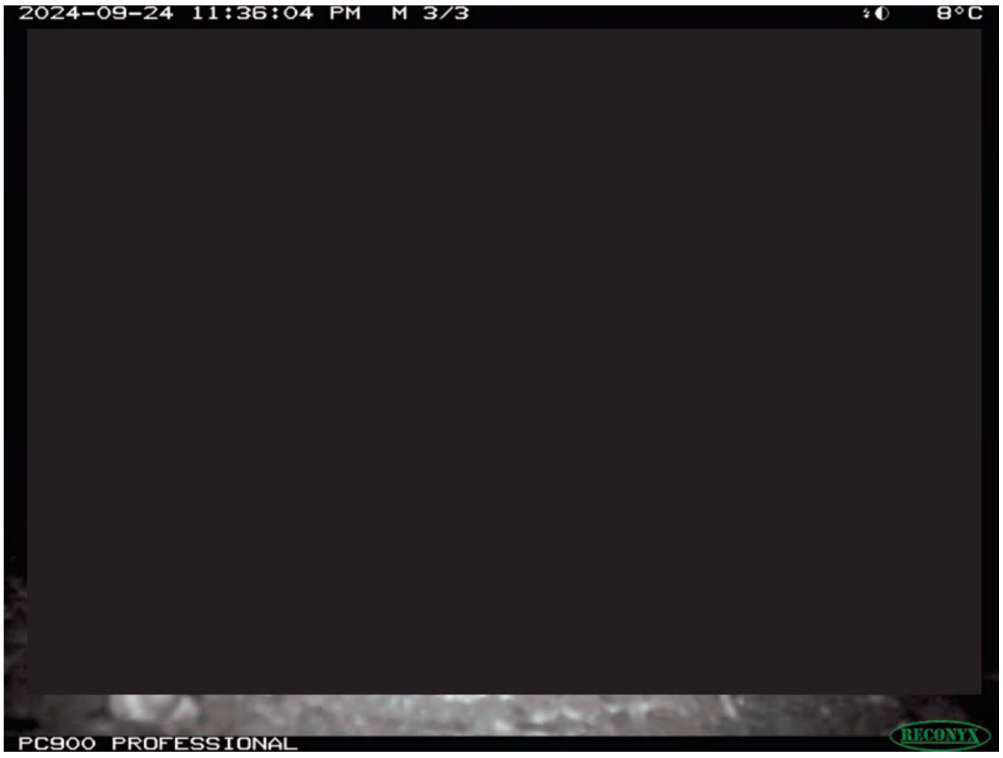
Appendix 3 – Images from camera monitoring

Devil with distended pouch – [redacted] 2 November 2024

Immature devil – [redacted] 2 October 2024



Devil carrying nest material – [redacted] 3 October 2024



Devil with facial tumour disease – [redacted] 3 September 2024

Appendix 4 – Environmental noise assessment (Tarkarri Engineering 2024)

Tasmanian Irrigation

Sassafras Wesley Vale Irrigation Scheme Augmentation devil den environmental noise assessment

Report No. 5997_AC_R_R1

TARKARRI ENGINEERING PTY LTD
PO Box 506
Kings Meadows TAS 7249

December 2024

Tarkarri Engineering

Air Quality • Acoustics • Environment • Vibration

DOCUMENT CONTROL

SASSAFRAS WESLEY VALE IRRIGATION SCHEME AUGMENTATION DEVIL DEN ENVIRONMENTAL NOISE ASSESSMENT

Report No.
5997_AC_R_R1
Prepared for
Tasmanian Irrigation
Level 2, Launceston Airport Passenger Terminal Building
201, Evandale Rd
Western Junction,
TAS 7212
Contact Mr John Wright
☎ +61 3 6398 8433
Mobile +61(0)475 108 660
Email john.wright@tasirrigation.com.au

Library Code
AC
Prepared by
Tarkarri Engineering Pty Ltd
PO Box 506
Kings Meadows
Tasmania 7249
Contact Dr Alex McLeod
☎ +61 3 6343 2077
Mobile +61(0)439 357 297
Email alex.mcleod@tarkarri.com

Author	Alex McLeod Director / Principal Consultant	Date: 6 December 2024

Revision History

Revision No.	Date Issued	Reason/Comments
0	22/11/2024	Initial release
1	06/12/2024	Edits, additional modelling

Distribution

Copy No._____	Revision No.	Location
1	1	Project/Client File
2	1	Client
3	1	Tarkarri Engineering Library

Keywords

Sound pressure level – *The difference between the instantaneous pressure at a point from a sound wave and the static pressure of the air, measured in pascals and converted to a logarithmic value relative to a reference pressure (i.e. 20 μPa).*

Sound power level – *The total sound energy radiated by a sound source per unit of time.*

dBA – *Decibels A-weighted.*

A-weighting – *Weighting of the audible frequencies reflective of the response of the human ear to noise.*

$L_{Aeq,T}$ – *Equivalent continuous A-weighted sound pressure level over a given time (T).*

$L_{A90,T}$ – *A-weighted sound pressure level exceeded for 90 % of a given time period (T), typically known as the background.*

$L_{A10,T}$ – *A-weighted sound pressure level exceeded for 10 % of a given time period (T).*

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References

[1] SoundPLAN Acoustic modelling software - Braunstein & Berndt GmbH.

[2] ISO 9613-2:2024 Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: Engineering method for the prediction of sound pressure levels outdoors.

1 Introduction

Tarkarri Engineering was commissioned by Tasmanian Irrigation to conduct an environmental noise assessment of construction associated with the upgrade to the [redacted] Sassafras Wesley Vale Irrigation Scheme Augmentation (SWISA). A number of sensitive locations near to the construction have need identified where Tasmanian Devil (*Sarcophilus harrisii*) and Wedged Tailed Eagle (*Aquila audax*) activity is present in the form of denning and nesting sites. Concern has been raised in relation to the potential impact of noise generated during construction on these species, in particular in relation to behavioural changes during critical periods such as breeding season.

2 Site description

The [redacted] is located at [redacted] Rd, [redacted]

Table 2.1 presents location information for the dens and nest that have been identified. Figures 2.1 provides an aerial view showing the locations of these.

Environmental noise receiver positions		
Position No.	Location	Coordinates (Datum: GDA94, Zone 55)
D1	Devil den entrance [redacted]	4525[redacted] / 54304[redacted]
D2	Devil den entrance	4525[redacted] / 54304[redacted]
N1	Eagle nest	4521[redacted] / 54299[redacted]

Table 2-1: Environmental noise model receiver positions.

Figure 2-1: Aerial view of environmental noise receiver positions.

3 Ambient noise

Ambient noise measurements were conducted in the vicinity of the [redacted] at a location previously identified as a Devil Den (recent observation has noted that this location is no longer active, MGA coord. 4525[redacted]54304[redacted]).

Figure 3-1 presents an aerial view showing the location where a logging sound level meter (SLM) was located for a period of approx. 2-weeks in September/October. Figure 3-2 presents a photograph of the SLM at the measurement location,

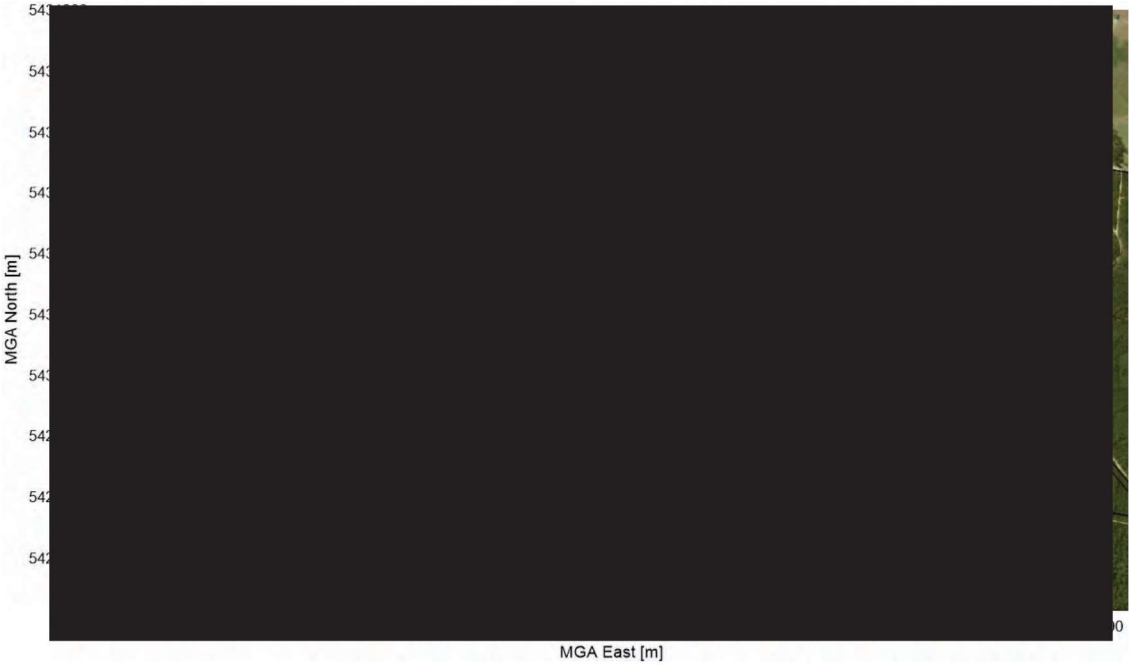

Figure 3-1: Aerial view of environmental noise receiver positions.

Figure 3-2: SLM, taken by Tarkarri Engineering.

10-minte interval noise statistics were recorded with Figure 3-3 below presented a time trace of the following noise statistics:

- $L_{Aeq,T}$
- $L_{A90,T}$
- $L_{A10,T}$

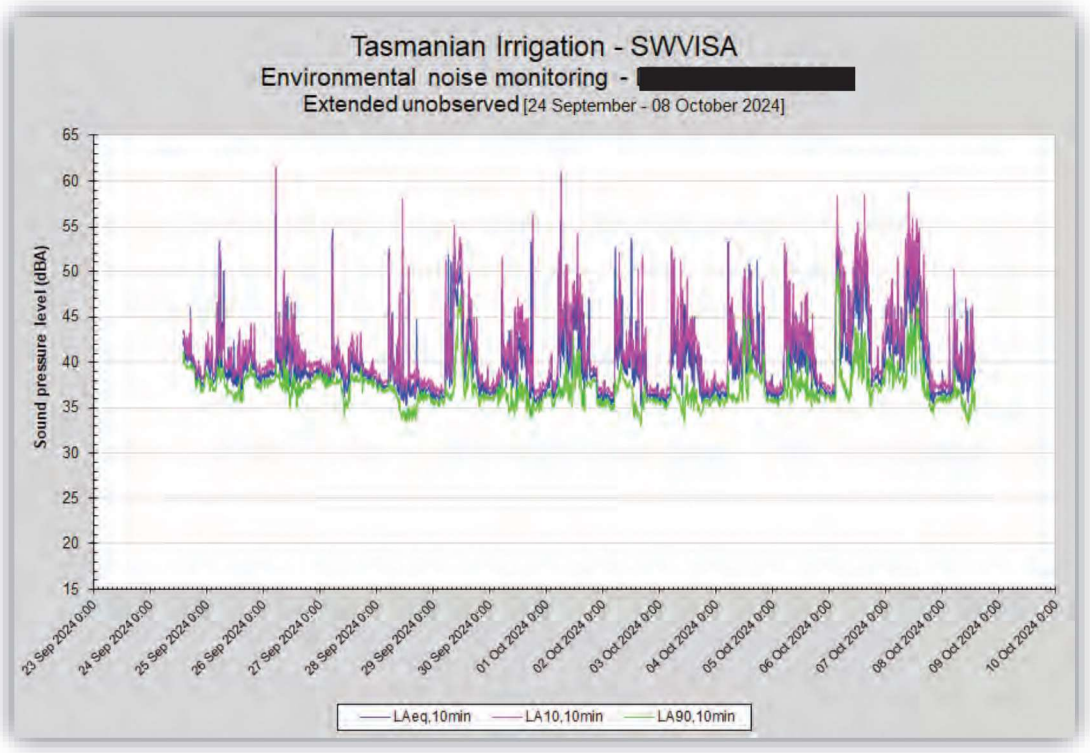

Figure 3-3: Time trace of measured $L_{Aeq,10min}$, $L_{A10,10min}$ and $L_{A90,10min}$ noise statistics.

Noise levels are generally above 35 dBA with nearby flow noise from the [redacted] likely the controlling factor. Periods of elevated noise levels likely relate to wind induced noise through the surrounding vegetation, rainfall and local faunal activity. During the day period the Rated Background Level (determined in accordance with the *Tasmanian Nosie Measurement Procedures Manual*) was 36 dBA.

4 Model setup

SoundPLAN[1] software was used for carrying out detailed noise emission spectra and contour modelling of potential construction activity. This program allows the use of the ISO 9613[2] calculation methods for modelling propagation of environmental noise. Parameters influencing sound propagation and attenuation include:

- Source type (point, line, plane).
- Relative source and receiver height.
- Topography and barriers.
- Industrial buildings as sources and/or barriers.
- Ground absorption.
- Distance attenuation.

- Atmospheric conditions
- Reflecting surfaces.
- Source directivity.

As all propagation and attenuation parameters are frequency dependent, all input source data has been based on 1/3-octave band sound power spectra.

Spatial was obtained from LiDAR data of the area (obtained from the Intergovernmental Committee on Surveying and Mapping, Elvis - Elevation and Depth - Foundation Spatial Data: https://elevation.fsdf.org.au/) and used to develop a digital ground model for the noise model domain (1m 1nd 0.5 m contours).

Building locations and heights and source locations were determined from aerial photography and on-site mapping.

All source and geodata is projected in the Australian Map Grid reference coordinate system.

4.1 Noise sources input data

Sound power level (SWL) spectra for all potential construction noise sources were developed from information provided by Tasmanian Irrigation and Tarkarri Engineering library data. This data is summarised in * L_{Amax} SWL 106 dBA

Table 4-1. Table 4-2 presents the 1/1-octave band sound power spectra.

Overall sound power levels (dBA)			
Source Area		SWL	Comment
Excavator (large)	Engine	**104**	
	RB head (L_{Amax})	**129**	Rock breaker head impact noise
Excavator (small)		**99**	
Crane		**99**	
Grinding		**107**	Metal grinding
Vibrator		**104**	Concrete vibrator
Truck		**104***	On entry road
Concrete pump		**101**	

* L_{Amax} SWL 106 dBA

Table 4-1: Source area sound power levels.

Sound power level spectra (dBA)										
Area		1/1-octave band frequency (Hz)								
		31.5	63	125	250	500	1k	2k	4k	8k	Total
Excavator (large)	Engine	70	78	91	92	99	98	98	92	84	**104**
	RB head	60	86	101	113	121	122	123	124	116	**129**
Excavator (small)		55	71	90	90	94	92	91	87	78	**99**
Crane		55	71	90	90	94	92	91	87	78	**99**
Grinding		23	38	54	69	80	93	102	101	102	**107**
Vibrator		69	80	93	94	95	99	97	91	82	**104**
Truck		55	85	93	92	100	100	96	89	79	**104**
Concrete pump		67	82	95	90	94	93	93	92	80	**101**

Table 4-2: Source area sound power level 1/1-octave band spectra.

4.2 Model scenarios

The following modelling scenarios were considered in this study to represent potential construction operations at the [redacted]:

- Wall descaling: Small excavator operating near the face of the rock wall to the north of the [redacted].
- Fencing: Crane and concrete vibrator operating at the base of the rock wall to the north of the [redacted] with grading activity occurring at the top of the wall.
- Pipeline: Truck entering the site via the access road from the north with two excavators (one with a rock breaker head) operating along the pipeline alignment adjacent to the Tasmanian Devil den entrance.
- Pipeline (concreting): Truck entering the site via the access road from the north with two excavators and a concrete pump operating along the pipeline alignment adjacent to the Tasmanian Devil den entrance.

NB: Internal works in the [redacted] building were not considered with the building structure considered likely to provide adequate containment such that noise impact from such works would not be significant.

For visual assistance, Figures 4-1 to 4-6 present model plan views (with aerial photographic underlay) of the model sicarios detailed above, the location of the model receivers (X2 dens, D1 and D2, and nest, N1) and a model wire-frame view from the south.

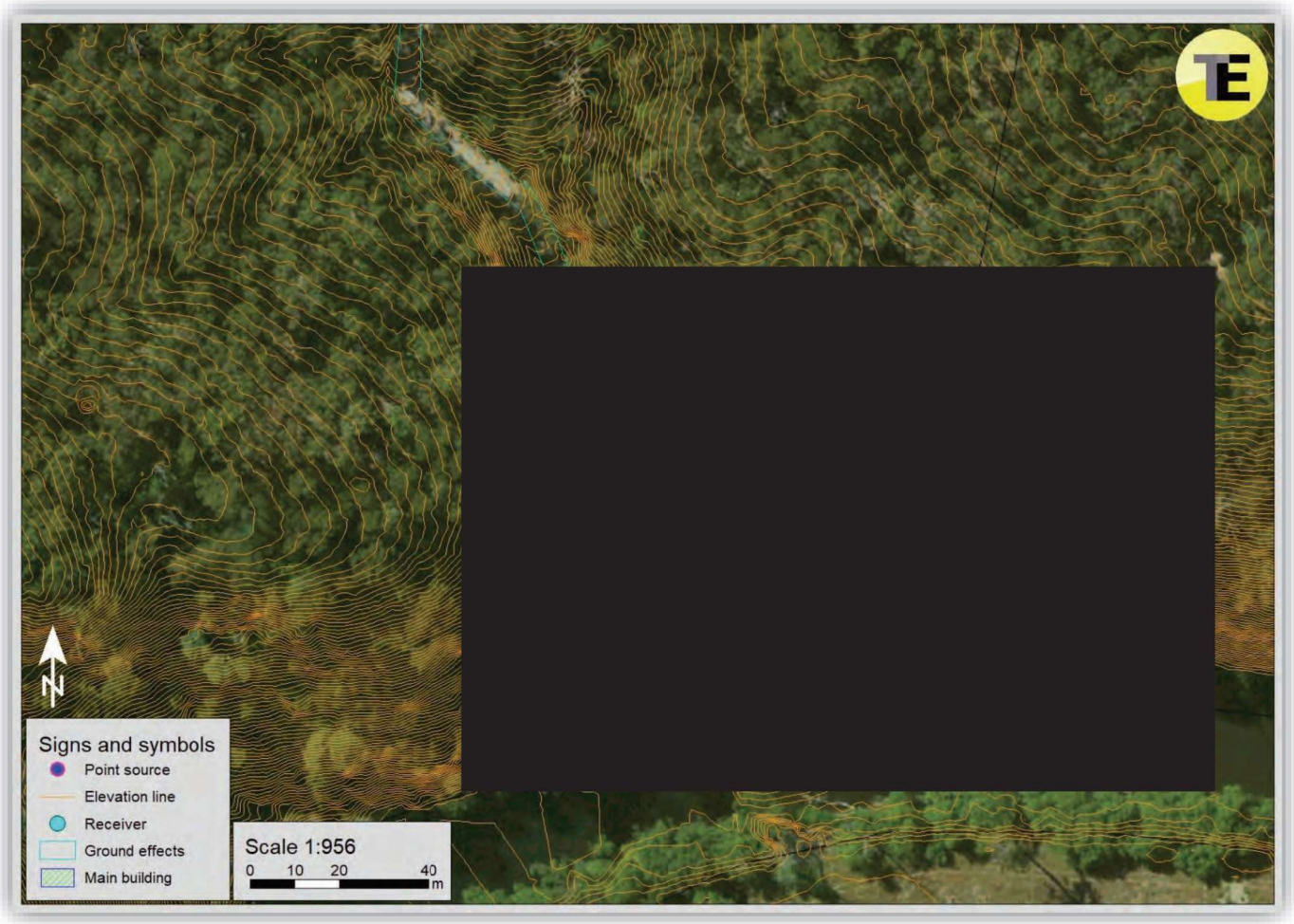

Figure 4-1: Model plan view: Wall descaling.

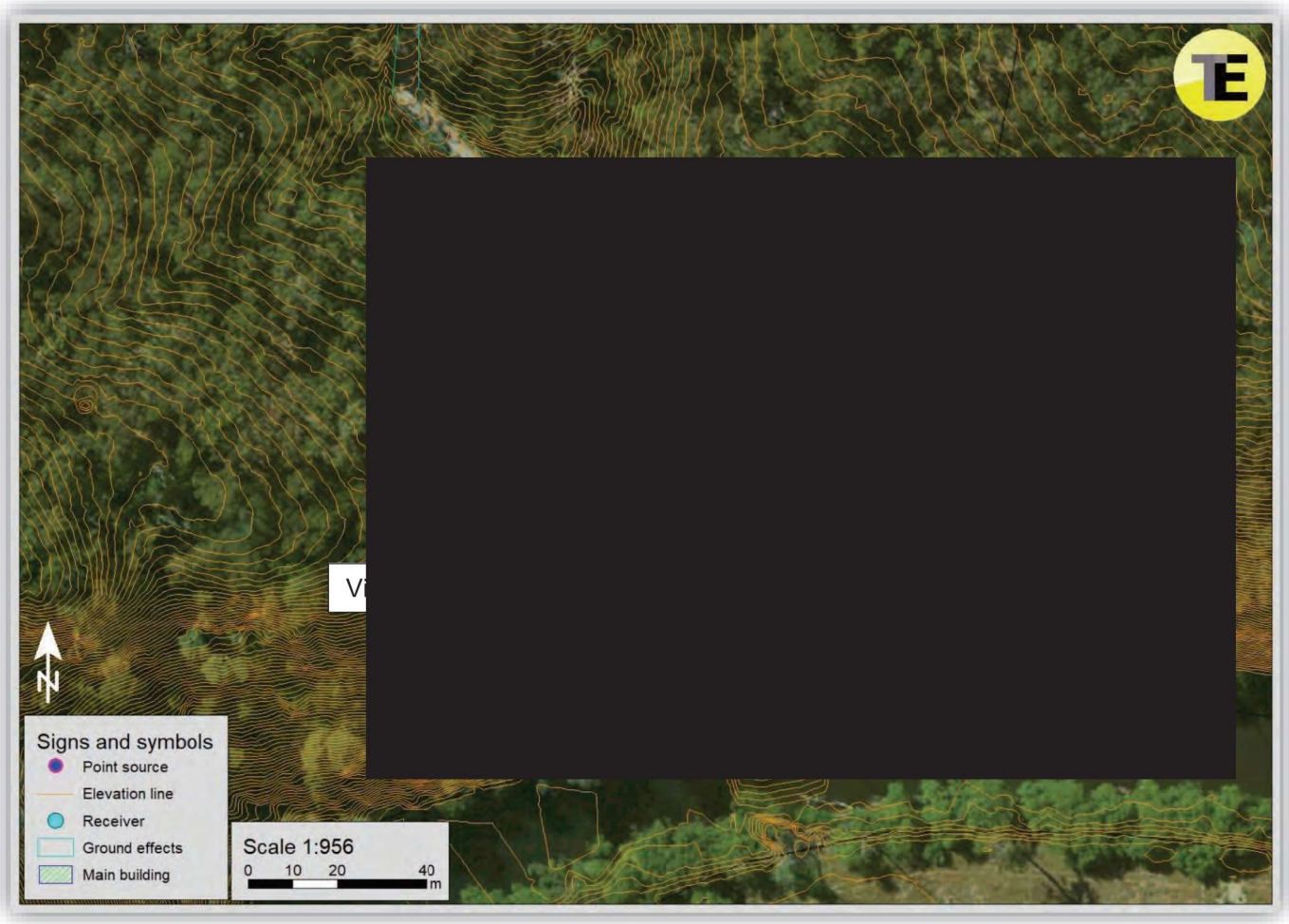

Figure 4-2: Model plan view: Fencing.

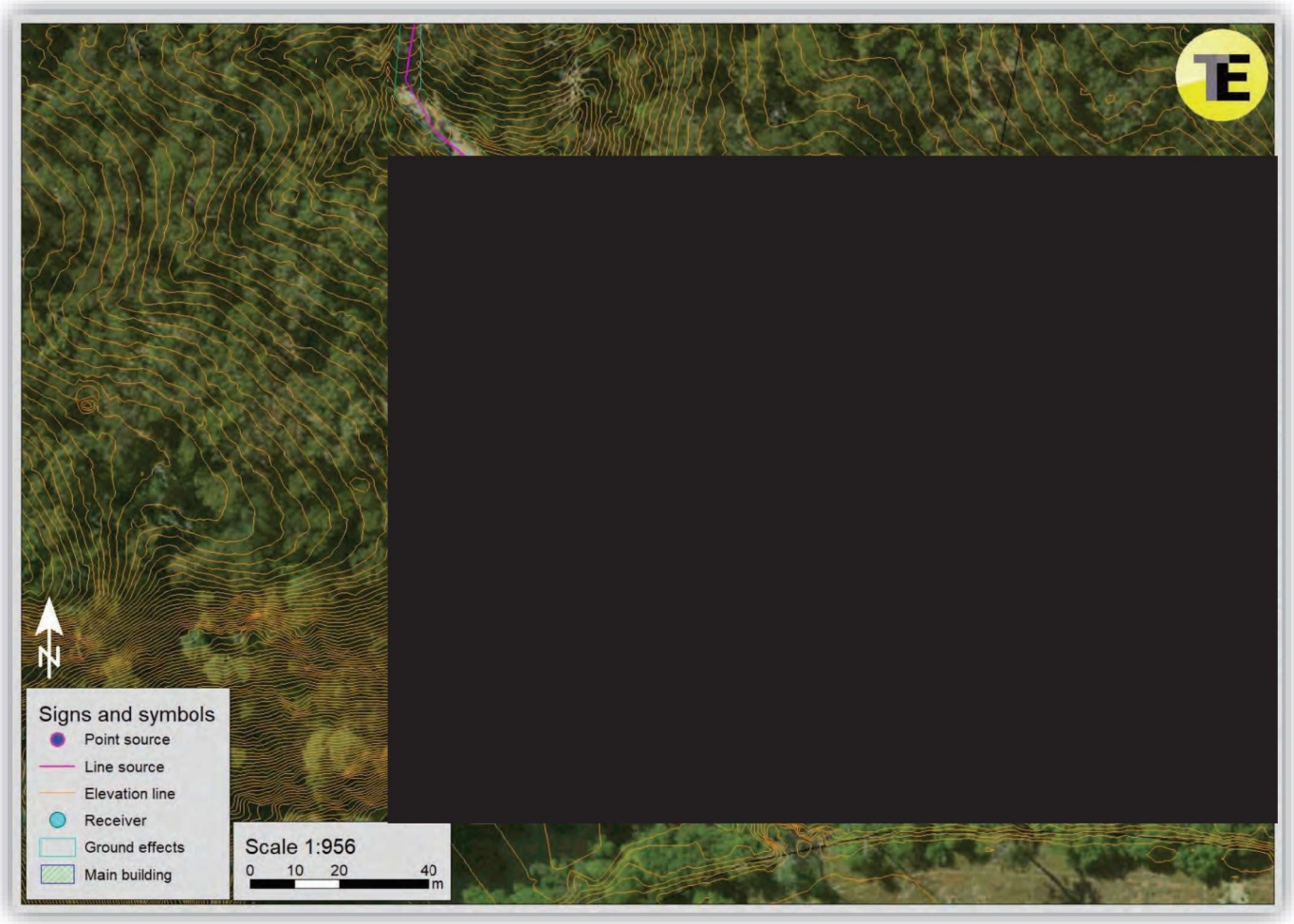

Figure 4-3: Model plan view: Pipeline.

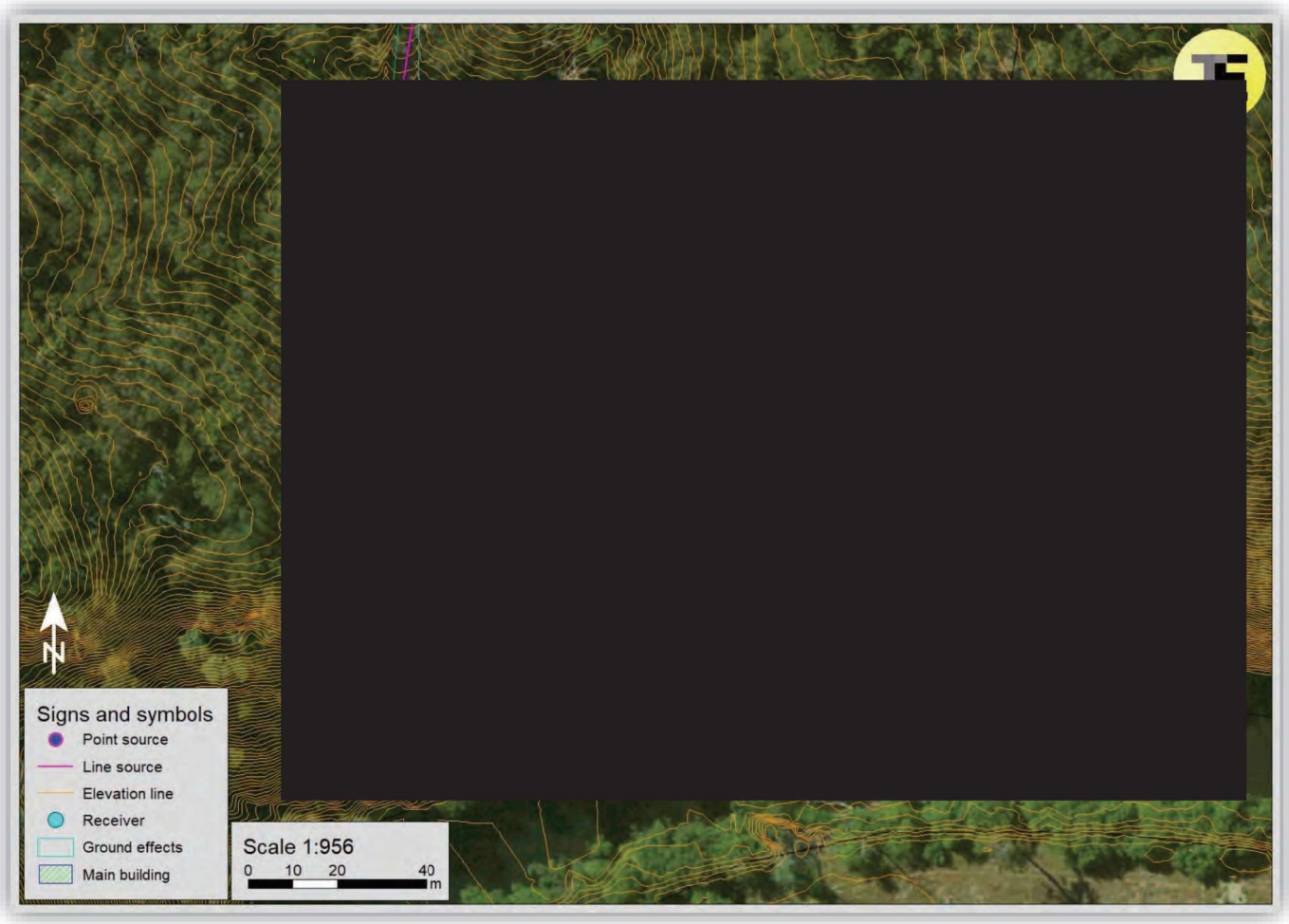

Figure 4-4: Model plan view: Pipeline (concreting).

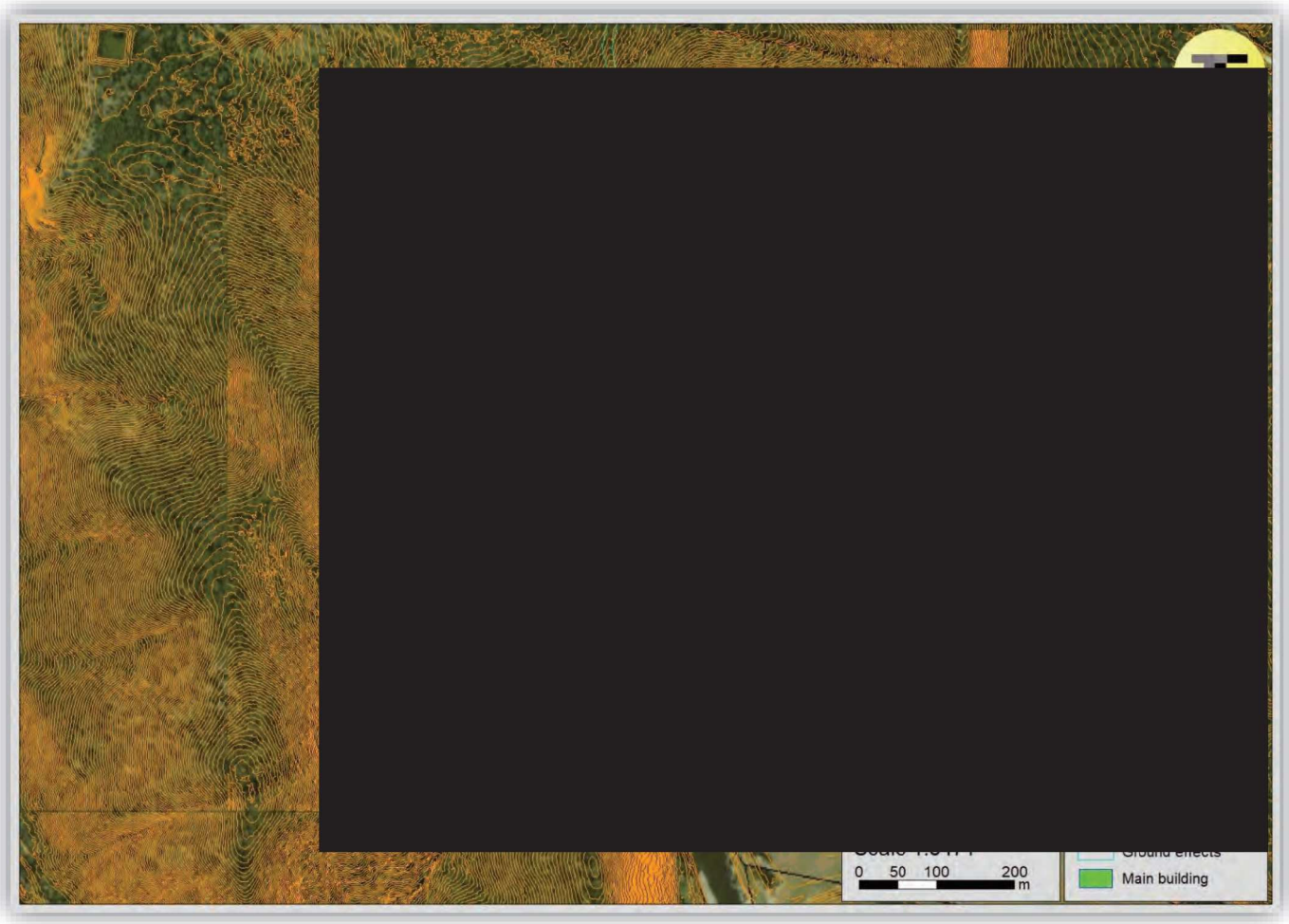

Figure 4-5: Model plan view: Receiver locations.

Figure 4-6: Wire-frame model view, from the south.

5 Model results

5.1 Single point receivers

Table 5-1 presents predicted sound pressure levels at the receiver positions for the four model scenarios detailed in Section 4.2.

Predicted received sound pressure levels (dBA)					
Receiver	L_{Aeq}				L_{Amax}
	Wall descaling	Fencing	Pipeline	Pipeline (concreting)	Pipeline
D1	47	56	72	73	93
D2	36	49	39	39	54
N1	9	17	28	28	34

Table 5-1: Predicted sound pressure levels at receiver positions.

5.2 Noise emission contour maps

To assist with visualisation of noise emission propagation from the construction operations the model was used to calculate noise emission contour maps for each model scenario as follows:

- Wall descaling.
- Fencing.
- Pipeline.
- Pipeline (concreting).
- Pipeline, L_{Amax}.

Figures 5-1 to 5-5 present the noise contour maps.

Figure 5-1: Predicted noise contour map, Wall descaling.

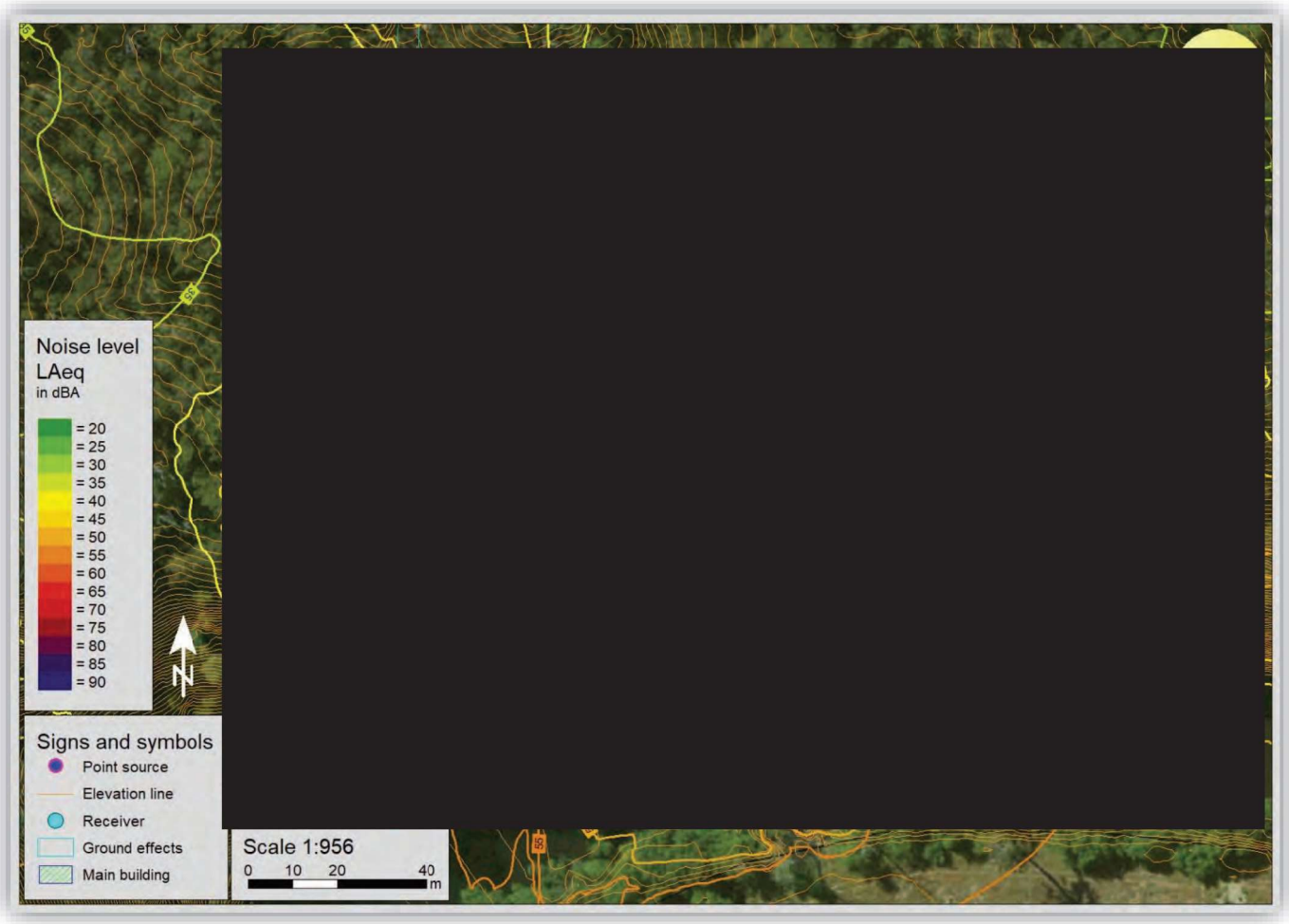

Figure 5-2: Predicted noise contour map, Fencing.

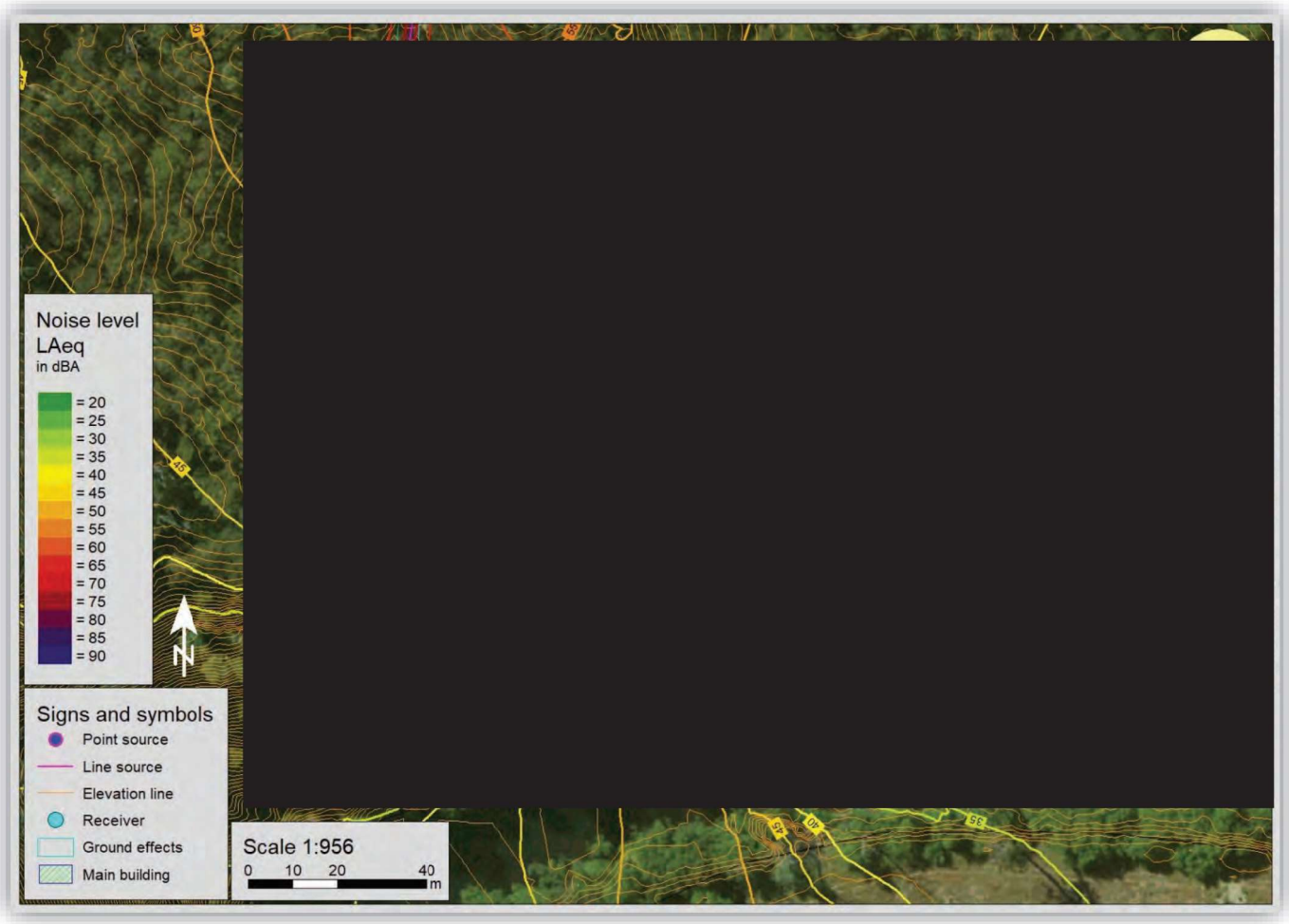

Figure 5-3: Predicted noise contour map, Pipeline.

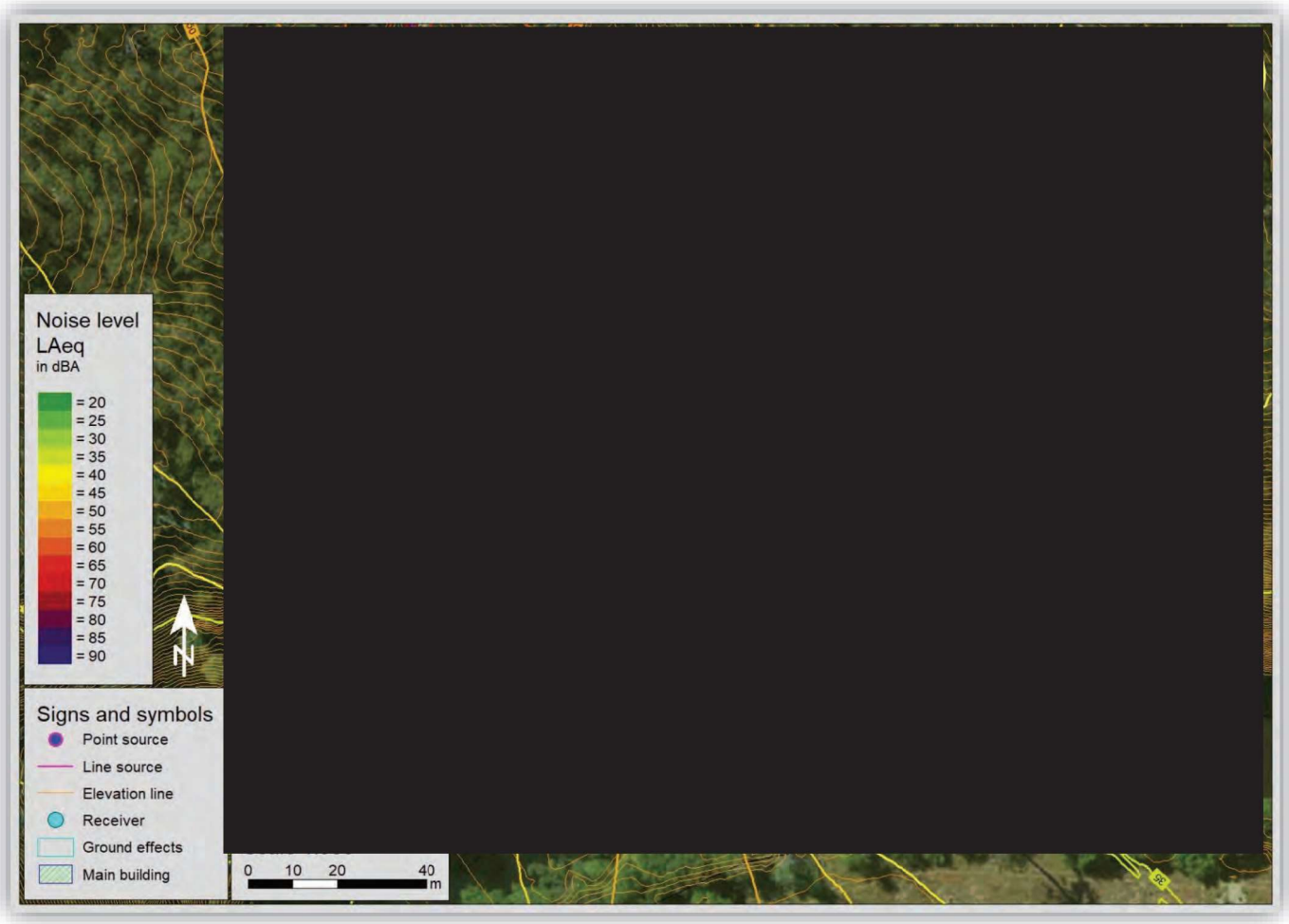

Figure 5-4: Predicted noise contour map, Pipeline (concreting).

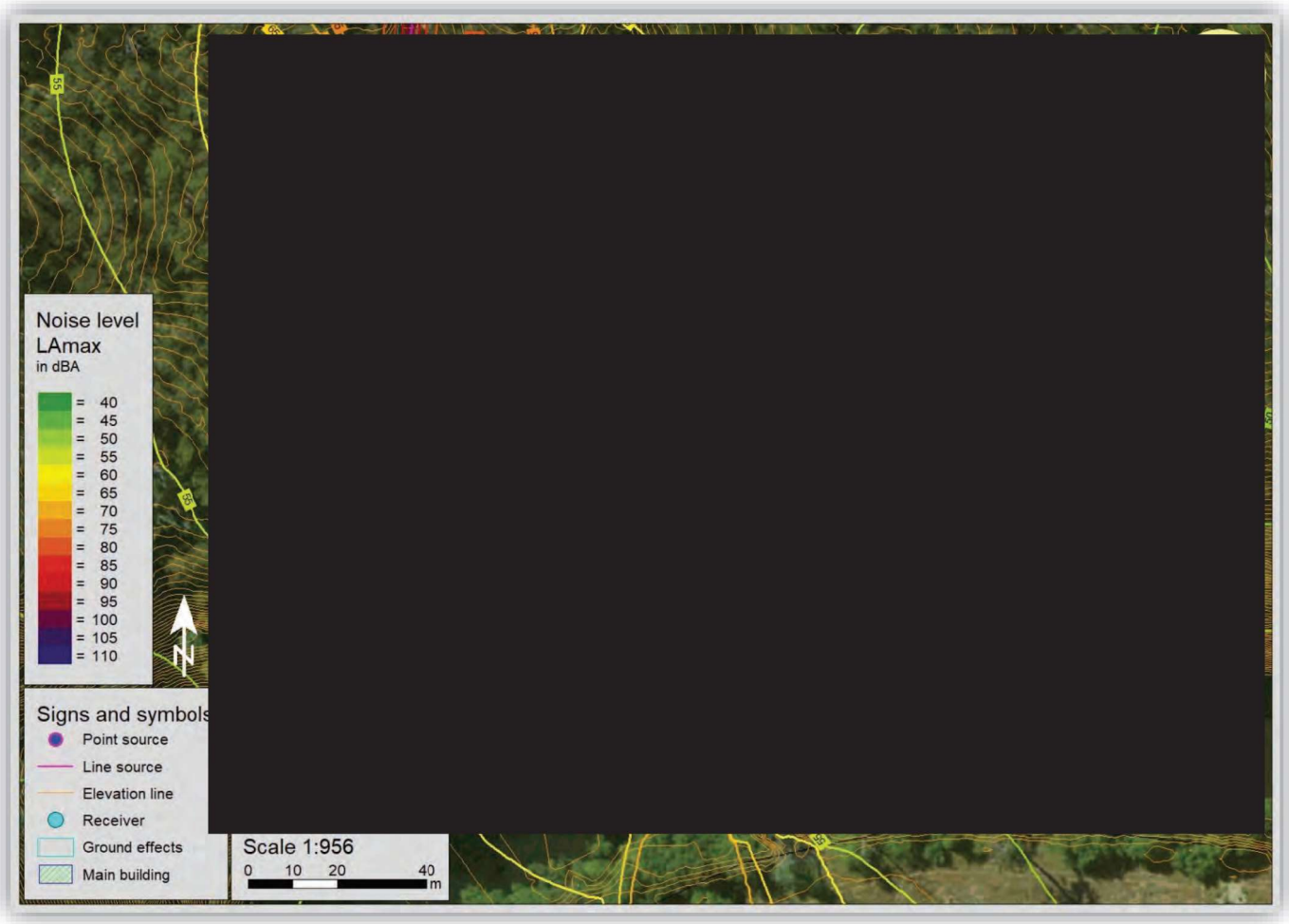

Figure 5-5: Predicted noise contour map, Pipeline, L_{Amax}.

6 Discussion

The modelling results indicate that the noise levels at the Tasmanian Devil dens can be up to 30 to 35 dBA above ambient levels, particularly at D1 during works along the Pipeline, with maximum noise levels from rock breaking up to 55 dBA above ambient. Activity in the immediate vicinity of the [redacted] (e.g. wall descaling and fencing) is at greater distance and shielded from the den sites, as such predicted noise levels are lower, although remain above typical ambient.

Arcangeli, G., Lulli, L. G., Traversini, V., De Sio, S., Cannizzaro, E., Galea, R. P. and Mucci, N. (2023) Neurobehavioral Alterations from Noise Exposure in Animals: A Systematic Review. Int. J. Environ. Res. Public Health, 20(591), 1-21, note from examination of a wide range of studies '…that anomalous responses from wildlife begin at noise intensities of around 40 dBA'. While this should be interpreted here with caution as this is not specific to either species considered here, it suggests that minimising potential noise impact on the Tasmanian Devil den should be considered for the construction works proposed for the [redacted] upgrade.

NB: Noise levels at the Wedge Tailed Eagle nest are well below ambient and unlikely to have effects on bird behaviour at the nest.

7 Noise controls

Following discussion with Tasmanian Irrigation the following noise controls were explored for the construction works in conjunction with minimising particularly high noise generating activities during sensitive times for the Tasmanian Devils (i.e. breeding season):

- Approx. 12 m long, 3 m high noise control barrier, constructed of acoustic curtaining, between the den at entrance at D1 and access road.

  NB: The extent of this barrier may be adjusted during construction depending on the potential for Devil behaviour to be effected and the practicalities of construction.

- Noise control shroud (providing up to 10 dB reduction) for the rock breaker head when utilised along the pipeline.

NB: Once works on the pipeline are north of MGA coordinate location 4525[redacted]54307[redacted] noise levels from the works would likely be similar to existing ambient noise levels at D1 and noise controls would become less critical, noting the vehicles entering the site are still likely to generate significant noise levels at D1 when the travelling to and from the [redacted].

NB: Temporary sound attenuation curtaining around specific works would be explored where practical to so such that safety and efficacy of works aren't unduly impacted. This is not considered in the modelling results presented below.

Figure 7-1 present a model plan view with the barrier extent shown while Figure 7-2 present images of the rock breaker shroud and acoustic curtaining. Details relating to the acoustic curtaining and shroud can be found at https://hushtecsolutions.com/au/construction/

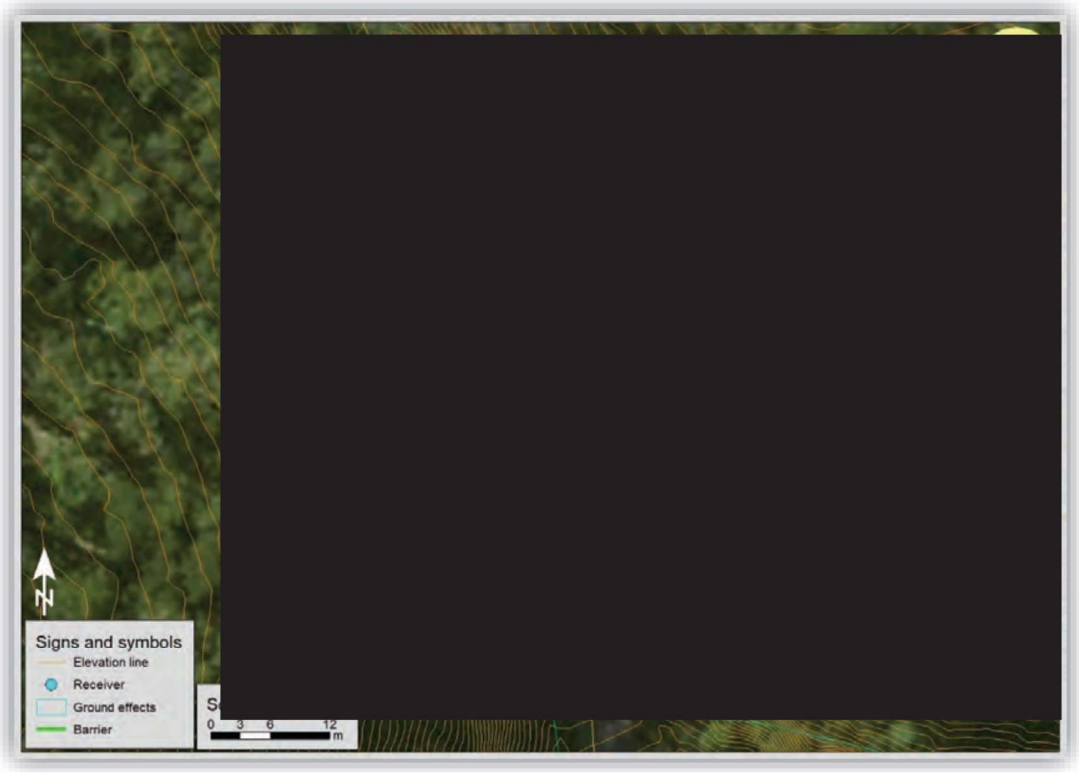

Figure 7-1: Model plan view showing extent of noise control barrier.

Figure 7-2: Rock breaker shroud and acoustic curtain.

Table 7-1 presents predicted sound pressure levels at the receiver positions for the four model scenarios detailed in Section 4.2 with the above noise controls in place.

Predicted received sound pressure levels (dBA) with noise controls					
Receiver	L_{Aeq}				L_{Amax}
	Wall descaling	Fencing	Pipeline	Pipeline (concreting)	Pipeline
D1	37	50	62	63	73
D2	36	49	39	39	53
N2	9	17	28	28	32

Table 7-1: Predicted sound pressure levels at receiver positions, with noise controls.

The noise controls outlined above provide 6 to 10 dB reduction in noise at the den entrance at D1 and 20 dB in maximum noise generated by the rock breaker.

NB: Details of the den entry to the den at D1 were provided to Tarkarri Engineering (i.e. dimensions and depth of the [redacted] and the number of corners in the [redacted] through to the denning location). Treating the [redacted] as a duct with regard to noise propagation (conservatively as a smooth duct with no absorption), a further 10 – 15 dBA attenuation is likely though to where the Tasmanian Devils are denning. This would result in noise levels between 30 and 50 dBA from construction activity and maximum noise levels of between 50 to 60 dBA from rock breaking.

To assist with visualisation of noise emission propagation from the construction operations with the noise controls in place the model was used to calculate noise emission contour maps for each model scenario as follows:

- Wall descaling.
- Fencing.
- Pipeline.
- Pipeline (concreting).
- Pipeline, L_{Amax}.

Figures 7-1 to 7-5 present the noise contour maps.

NB: Based on the results of the representative modelling conducted here a comprehensive list of construction activities and associated noise impact controls have been developed and these are provided in table format in the Appendix to this report.

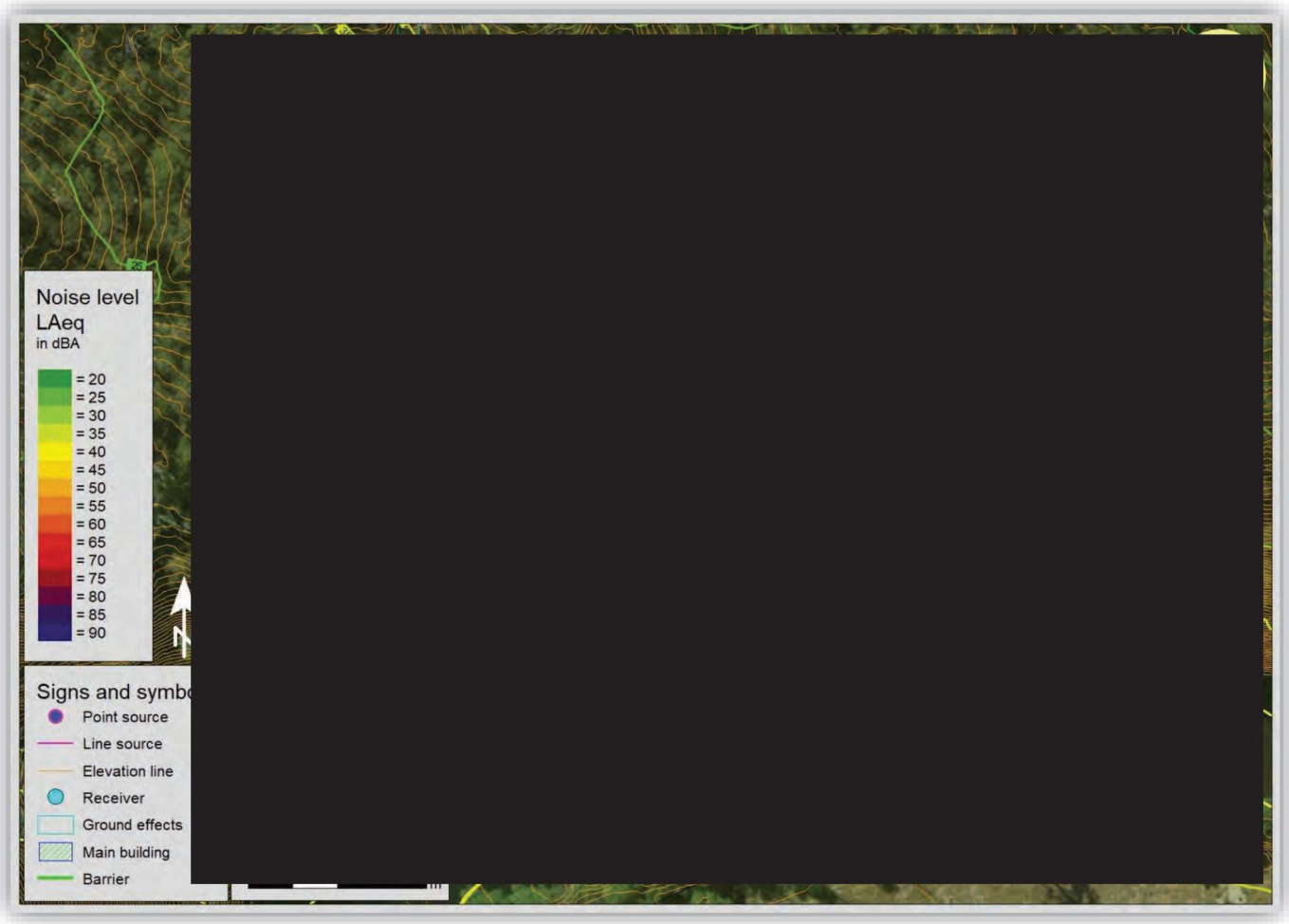

Figure 7-1: Predicted noise contour map, Wall descaling, **with noise controls**.

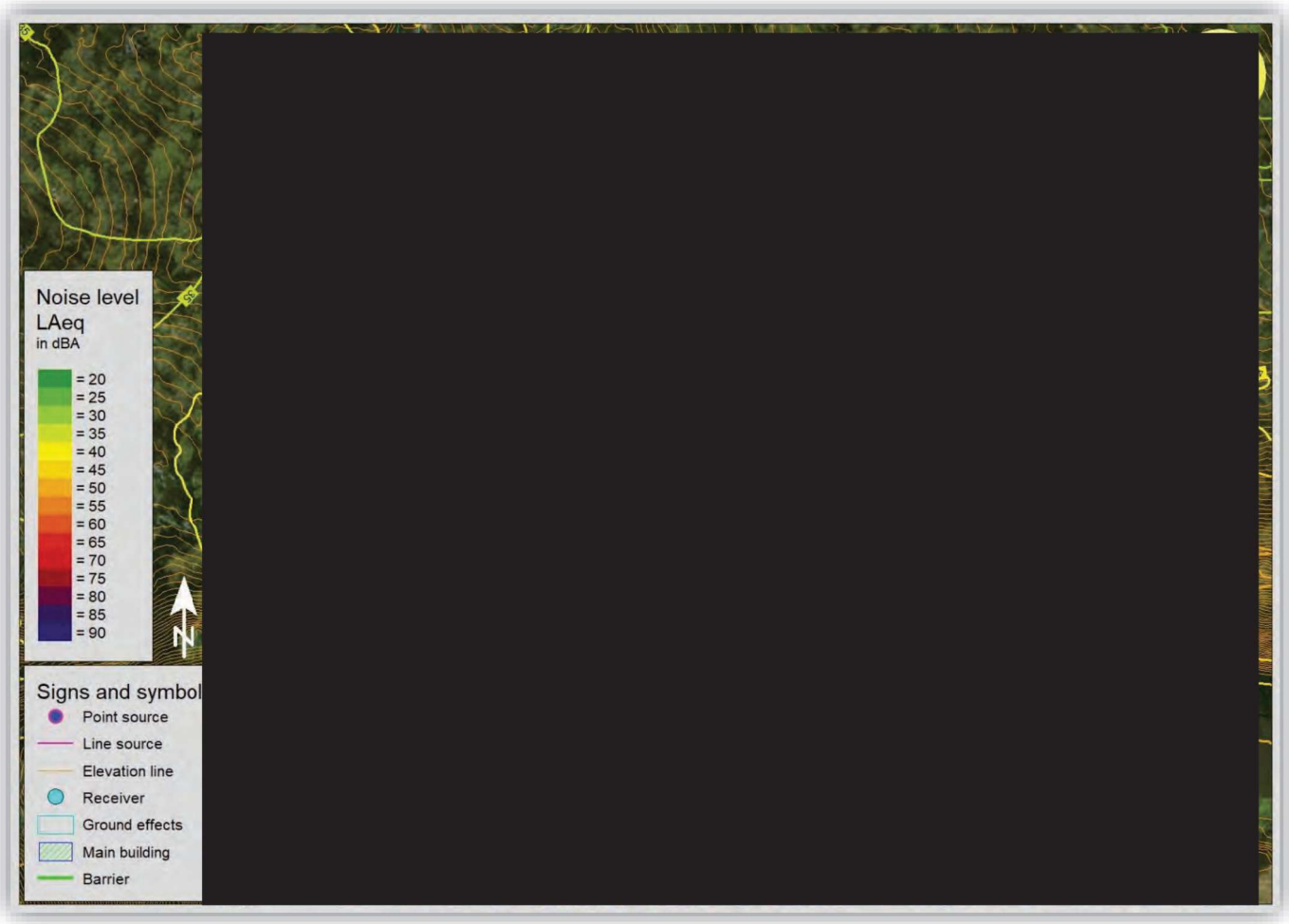

Figure 7-2: Predicted noise contour map, Fencing, **with noise controls**.

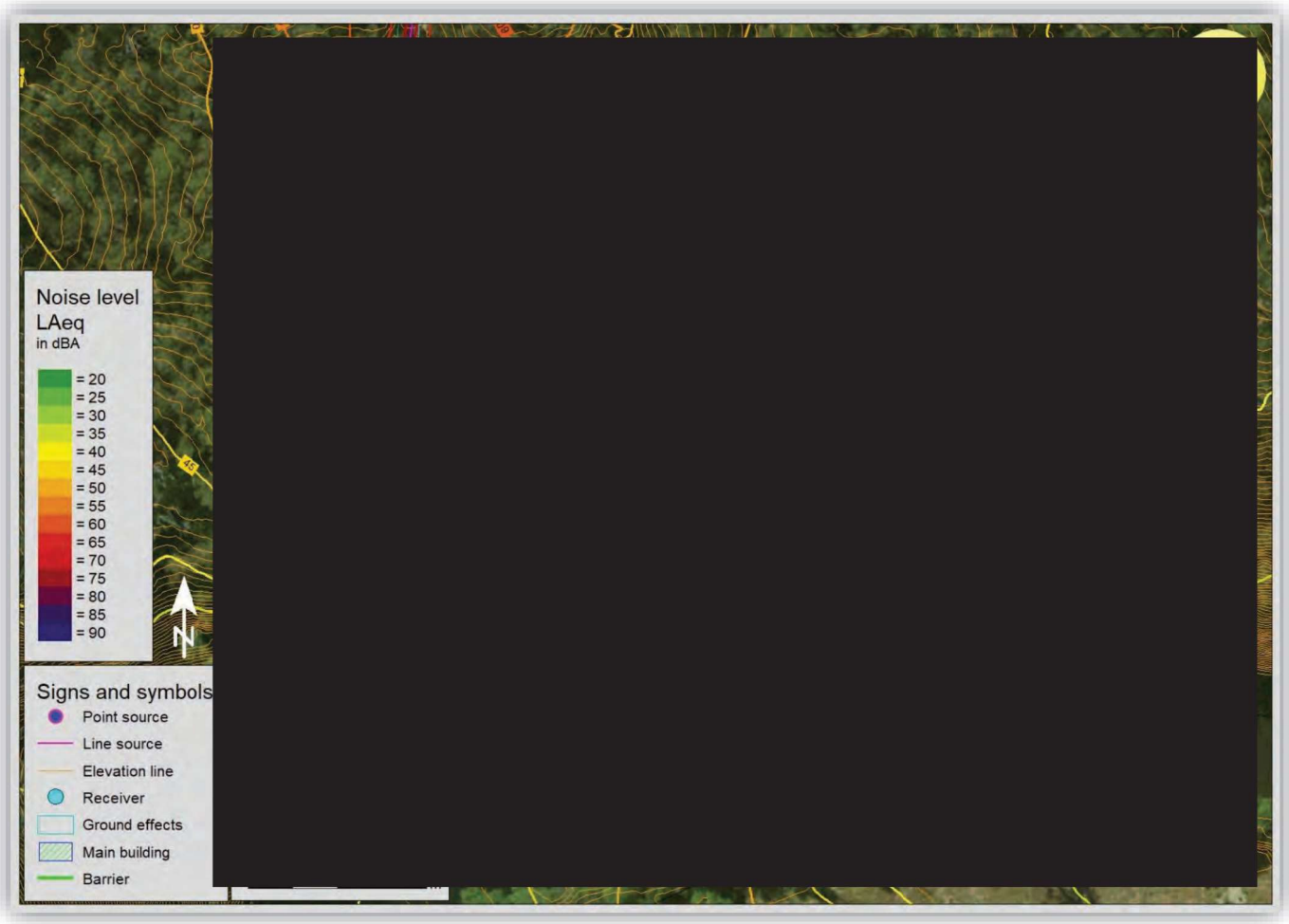

Figure 7-3: Predicted noise contour map, Pipeline, **with noise controls**.

Figure 7-4: Predicted noise contour map, Pipeline (concreting), **with noise controls**.

Figure 7-5: Predicted noise contour map, Pipeline, L_{Amax}, **with noise controls**.

Appendix

Potential risk factors	Avoidance measures	Mitigation measures	Activities
Noise disturbance from works at [redacted] on devils in [redacted] 2 and 3 Including vehicles accessing site.	Undertake all works that are above ambient background noise levels (set at 36 dBA) at [redacted] 2 and 3 outside devil breeding season (between Feb and end of August)	Works undertake outside breeding season as per following mitigation measures: • Install temporary sound attenuation curtaining in front of entrances to [redacted] 2 and 3 to reduce noise levels for works carried out outside the breeding season. ○ Installation of curtaining to be carried out in consultation with contractors, acoustic engineer and ecologist on site. ○ curtaining support structures are to be constructed outside breeding season. ○ Removal of vegetation and disturbance of soil is to be minimised. • Install temporary sound attenuation curtaining around works at [redacted] where practical to so such that safety and efficacy of works aren't unduly impacted.	Works to be carried out outside breeding season: • Descaling rock wall (use of excavator with bucket attachment scabbling rock face). • Retaining wall construction (use of excavator, power tools, concrete pump, concrete vibrator, cranes). • Fence construction (use power tools). • Kiosk transformer installation (use of excavator, power tools, concrete pump, concrete vibrator, cranes). • [redacted] external works (use of pressure washer, concrete cutting and scrabbling). • Vehicle access to site.
	Work only during daylight hours	Works at or below ambient levels can be carried out at any time during daylight hours.	Works that can be carried out during breeding season: • Works inside the [redacted] building: ○ Concrete cutting (no cutting of external facade). ○ Power tool works. ○ Pressure cleaning and regrouting. • Vehicle access to site (kept to a minimum).

Potential risk factors	Avoidance measures	Mitigation measures	Activities
Noise and vibration from pipeline work along road in close proximity to [redacted]3.	Undertake all works that are above ambient background noise levels (set at 36 dBA) at [redacted]2 and 3 outside devil breeding season (between Feb and end of August) Work only during daylight hours	Works undertake outside breeding season as per following mitigation measures. • Install temporary sound attenuation curtaining in front of entrances as per above. • Install temporary curtaining in close proximity to rock breaking activities and power tool usage where practical to so such that safety and efficacy of works aren't unduly impacted. • Attach noise control shroud to rock breaker head .	Works to be carried out outside breeding season: • Pipeline trench excavation (use of excavator with bucket, ripping rock breaker attachments). • Pipeline installation (use of excavators, trucks, concrete pump, hand tools). • Drainage installation (use of excavators with bucket, ripping and rock breaker attachments, trucks). • Vehicle access to site.