TABLE OF CONTENTS

APPENDIX 1 : ASC FLIGHT HARDWARE PLAN

APPENDIX 2 : VEGETATION AND HABITAT ASSESSMENT – ARNHEM SPACE CENTRE

APPENDIX 3 : ASC STAKEHOLDER ENGAGEMENT PLAN

APPENDIX 4 : SAFETY AND RETRIEVAL COMMITTEE (SRC) CHARTER

APPENDIX 5 : ELA MISSION OPTIMISATION PROCESS

APPENDIX 6 : POLLUTANT DISPERSION MODELLING

APPENDIX 7 : SPATIAL COORDINATES – PROPOSAL FOOTPRINT

APPENDIX 8 : PREPARATION OF REPORT AND STUDIES DECLARATION

APPENDIX 9 : ASC PRINCIPLES FOR LAND AND SEA ACCESS AND VEHICLE RECOVERY

APPENDIX 10: ELA ENVIROMENT POLICY

APPENDIX 11: GUMATJ LETTER: ARNHEM SPACE CENTRE: APPROACH TO ONGOING STAKEHOLDER ENGAGMEENT AND CONSULTATION

APPENDIX 12: UNEXPECTED FINDS PROCESS

ASC Flight Hardware Recovery Plan

ELA-000029

VERSION: 1.0

VERSION APPROVAL

	Name	Title	Date	Signed
Prepared	Taylor Simpson	Launch and Mission Control Specialist	15/01/2023	
Reviewed	Deb Houlahan	Customer Campaign Coordinator	13/06/2024	
Endorsed				
Approved	Ben Tett	General Manager, Operations and Launch	13/06/2024	

APPROVAL HISTORY

CR Number	Title	Date
CR-0000050	LFL Baseline Addition	07/02/2023

TABLE OF CONTENTS

1 PURPOSE 4
2 SCOPE 4
3 REFERENCES 4
3.1 External References 4
3.2 ELA Documents 4
3.3 Definitions and Acronyms 5
4 ROLE DEFINITIONS 5
5 PRINCIPLES AND PROTOCOLS FOR LAND AND SEA ACCESS FOR VEHICLE RECOVERY 6
6 RECOVERY ZONES 6
7 RECOVERY PLANNING AND OPERATIONS APPROACH 8
7.1 Launch Planning Phase 9
7.2 Recovery Phase 9
8 BRIEFING AND DEBRIEFING 10
9 COMMUNICATIONS 10
10 RECORDKEEPING AND REPORTING 10
11 SAFETY 10
11.1 Rest and Preparedness 11
11.2 Survival Gear 11
11.3 Seasonal Recovery Provisions 11
11.4 Helicopter Safety 11
11.5 Vessel Safety 11
12 RECOVERY EQUIPMENT 11
13 ANNEXES 12

TABLE OF TABLES

TABLE 1: RECOVERY ZONE DEFINITIONS 7

TABLE OF FIGURES

FIGURE 1: RECOVERY AREAS FOR SOUNDING ROCKET (ORANGE) AND ORBITAL LAUNCH BOOSTERS (RED) .. 7
FIGURE 2: ZONE D (AUSTRALIAN NATIONAL PARKS AND AREAS OF SIGNIFICANCE 7
FIGURE 3: ELA FLIGHT HARDWARE RECOVERY PHASES 8

1 PURPOSE

This plan describes the general practices that ELA follows to locate, remove, and transport flight hardware from recovery areas back to the ASC following a launch. It is not intended to provide details of specific recovery operations, as these will be situation specific and dependent on multiple factors including weather, location of the hardware, hazardous payload systems, and other factors.

2 SCOPE

This plan articulates the following:

- Role Definitions
- Principles and Protocols for Land and Sea Access and Hardware Recovery
- Recovery Approaches
- Safety
- Recovery Equipment

3 REFERENCES

3.1 EXTERNAL REFERENCES

Serial	Title	Author	Version
A	Civil Aviation Safety Regulations 1998 (Cth)	Commonwealth of Australia	2023
B	Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (Cth)	Commonwealth of Australia	2018
C	Marine Safety (Domestic Commercial Vessel) National Law Regulations 2013 (Cth)	Commonwealth of Australia	2023
D	Navigation Act 2012 (Cth)	Commonwealth of Australia	2019
E	Navigation Regulations 2013 (Cth)	Commonwealth of Australia	2015
F	Space (Launches and Returns) (General) Rules 2019 (Cth)	Commonwealth of Australia	2019

3.2 ELA DOCUMENTS

Serial	DIN	Title	Version
G	ELA-000040	ASC Helicopter Operations Plan	Latest Version
H	ELA-000117	ASC Principles for Land and Sea Access and Vehicle Recovery	
I	ELA-000044	ASC Launch Control Plan	
J	ELA-000118	ASC Launch and Recovery Register	
K	ELA-000025	ELA Communication Plan	
L	ELA-000024	ELA Information Management Plan	
M	ELA-000021	ELA Operations Manual	
N	ELA-000015	ELA Organisation Plan	
O	ELA-000031	ELA Terms and Definitions	
P	ELA-000039	ELA Waste Management Plan	
Q	WIN-000016	Mission Optimisation Process	
R	WIN-000017	Unexpected Finds Process	

3.3 Definitions and Acronyms

Definitions and acronyms applicable to this document may be listed in ELA-000031, ELA Terminology and Definitions (reference O).

4 ROLE DEFINITIONS

Refer to ELA Organisation Plan at reference N for details on ELA roles. The following roles and responsibilities are defined to remove ambiguity in recovery-oriented decision-making.

4.1.1 Aircraft Pilot

Responsible for the safety of any given flight and abides by all applicable CASA regulations (reference A). The pilot holds the final go/no-go decision authority for any flight based on flight safety, both at base and in the field. The pilot operates in accordance with the ASC Helicopter Operations Plan at reference G.

4.1.2 Ship Captain

Responsible for the safety of any given sea expedition and abides by all applicable marine regulations (reference C). The captain holds the final go/no-go decision authority for any sea operation based on marine safety.

4.1.3 Recovery and Range (Air and Sea) Specialist (RAS)

Responsible for planning, coordinating and managing safe recovery of descending vehicle hardware or objects over land or sea.

4.1.4 Recovery Technician

Responsible for assisting the Recovery and Range (Air and Sea) Specialist during the execution of recovery activities in accordance with this plan. This role may require specialist skills and be sub-contracted to ELA. The Recovery Technician may

1. Act as the Recovery and Range (Air and Sea) Specialist if required,
2. Be responsible for overseeing any payload or motor making safe procedures in the field and
3. Has the final authority to declare flight hardware safe to approach, rig, and transport.

4.1.5 Payload or Motor Technician

Responsible for making safe a motor or payload when required. If the Recovery Technician is not present, this technician will assume final responsibility for the safety of hazardous payload or motor systems. This role may also be filled by client personnel.

4.1.6 Additional Field Personnel

Additional field personnel, such as aerial observers, serve in an advisory role only and are not expected to make final decisions about recovery activities.

4.1.7 Traditional Owners

Traditional Owners (TO) serve in an advisory role to ELA when they have jurisdiction at the expected recovery site(s).

A TO will be appointed per recovery operation and will be available (in person or via telecommunications) for advice and consultation.

For operations suspected to be within a sacred site, consultation with the appropriate TOs is undertaken prior to recovery operations and as to determine the best approach to minimise disturbance to the site.

In the event of an "unexpected find" during recovery operations the work instruction at reference R will be followed.

5 PRINCIPLES AND PROTOCOLS FOR LAND AND SEA ACCESS FOR VEHICLE RECOVERY

Land or water access will be required to facilitate the recovery of ELA and/or Client rocket vehicle assets (primarily stage 1 booster motors) following launches and ELA commits that this process is undertaken in genuine partnership and cooperation with traditional owners and/or land managers (including Ranger groups) in the most respectful and appropriate way possible.

While recovery will be managed in accordance with this plan, ASC Operations Manual procedures and the detailed recovery operational plan, ELA assures adherence to the set of principles in Reference H, aimed to ensure the appropriate steps are taken when ELA and launch clients are accessing land for retrieval purposes. Principles covered in Reference H include:

1 Communication to Land and Sea Managers
2 Access processes to up-range and down-range recovery sites
3 Site impact remediation
4 Recovery operations safety and emergency

ELA will seek and obtain all required permits and conditional approvals during the launch planning process once a specific trajectory has been defined by client requirements and the likely recovery area is calculated. The process will include consultation with appropriate authorities and undertaking searches of the following:

- Heritage Register (NT)
- Protected Matters Search Tool (Commonwealth)

Permits and conditional approvals may include:

- Authority Certificate (Aboriginal Areas Protection Authority)
- Land Clearing (Department of Land Resource Management)
- Environmental Approval (Department of Climate Change, Energy, the Environment, and Water)

ELA anticipates that approvals may have conditions requiring, for example:

- Avoidance of sacred sites
- Avoidance of vulnerable or otherwise significant sites
- Process for unexpected finds (reference R)
- Reporting of incidents (reference M)
- Remediation of damage

6 RECOVERY ZONES

Table 1 highlights how the most common recovery areas fall into key zones. Table 1 describes five zones and the planned recovery commitment within each zone. Launch trajectories are planned to avoid debris (e.g., stage 1 motors) falling in National Park or Marine Park areas within these zones.

Zone	Scope	Frequency
A	Mainland Australia and within 3km of mainland Australia's coastline	Plan to recover after every launch (where practicable)
B	Gulf of Carpentaria (marine only)	
C	Waters >3km off mainland Australia and within 200 nautical miles (EEZ boundary) of Australia's coastline	
D	Great Barrier Reef / PNG waters	Plan to avoid
E	International waters outside of Australia's EEZ	Not recovered

Table 1: Recovery Zone Definitions

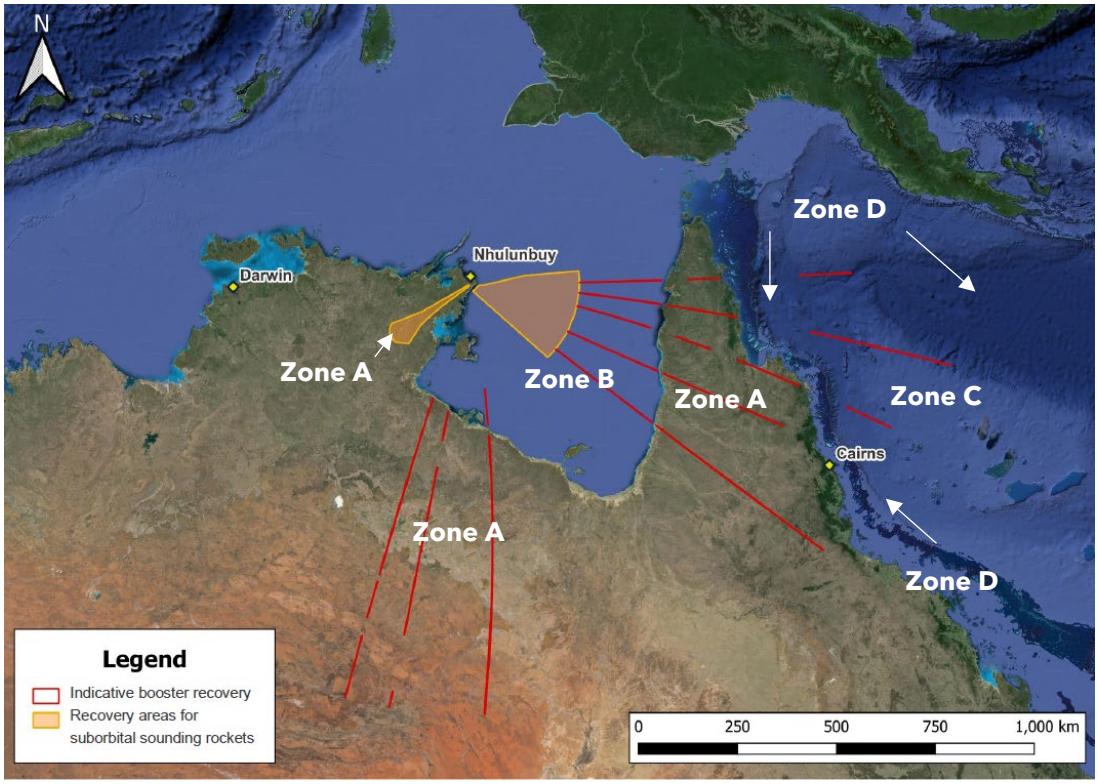


Figure 1: Recovery areas for sounding rocket (orange) and orbital launch boosters (red)

Figure 2 illustrates a high level view of National Parks or areas of national significance where no planned recovery activities are undertaken. A detailed list of recovery areas and their considerations is managed in ASC Launch and Recovery Register (reference J).

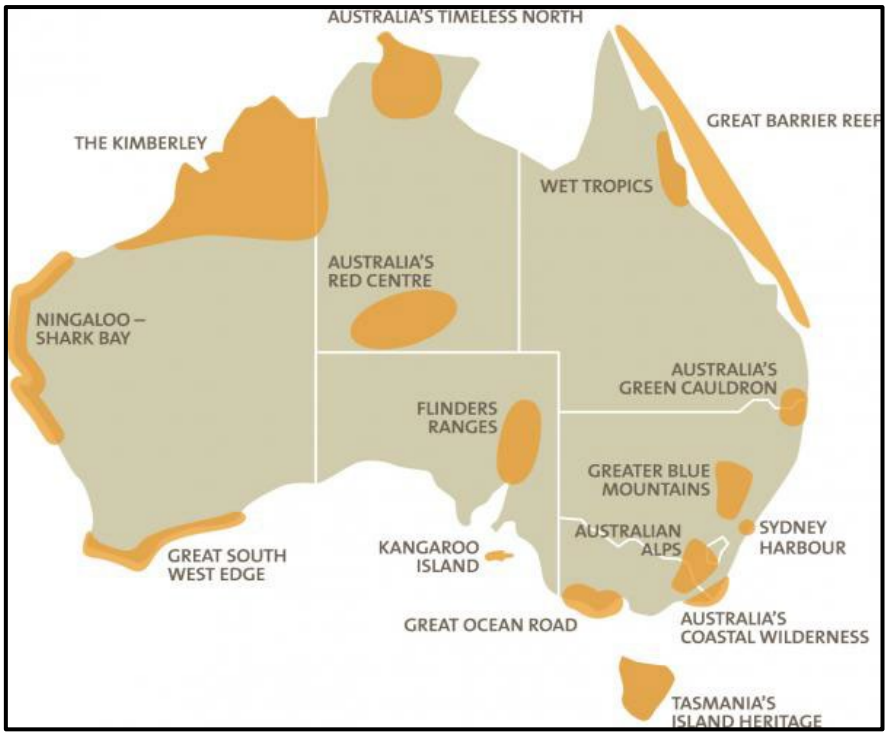


Figure 2: Zone D (Australian National Parks and Areas of Significance

7 RECOVERY PLANNING AND OPERATIONS APPROACH

The three phases of the launch cycle comprise of Launch Planning Phase (section 7.1) , Recovery Phase (section 7.2) and Reporting Phase (section 10) with Figure 3 mapping the ELA flight hardware recovery approach within the broader launch phase(s) and where recovery operations follow five main steps:

1. Locate flight hardware (section 7.2.1)
2. Operational planning for recovery (section 7.2.2)
3. Execution of recovery and remediation activities (section 7.2.3)
4. Handover (and disposal of) recovered hardware, and (sections 7.2.4, 7.2.5 and 7.2.6)
5. Reporting on recovery operations (section 10)

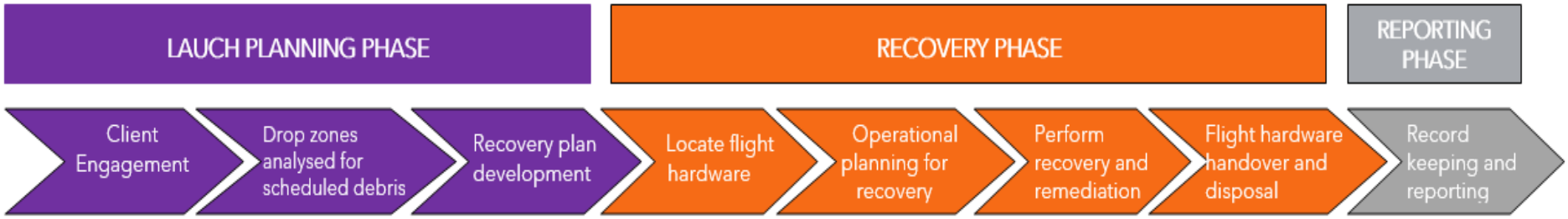


Figure 3: ELA Flight Hardware Recovery Phases

7.1 LAUNCH PLANNING PHASE

Launch planning involves the identification of the specific trajectory that the LV will follow and calculation of the actual recovery area based (Figure 1) on the LV size/weight, fuel load, payload, and meteorology. The optimisation of this trajectory to balance mission objectives and safety or environmental constraints is conducted with ELA Mission Optimisation Process at reference Q. This occurs approximately 9 months out from a prospective launch. ELA can then consult communicate to and engage with the appropriate stakeholders including Traditional Owners regarding specific operational parameters and obtain consent for the dropping and recovery of LV and payload hardware such as first stage booster motor and payload fairings (where relevant).

Recovery is carefully planned with recovery areas spatially defined to within 3 sigma (99%) as part of the regulated Risk Hazard analysis (RHA). Launch parameters will ensure that recovery areas will avoid inhabited areas, the coastal areas of the Gulf of Carpentaria, the Great Barrier Reef, and spatially definable areas of high ecological value including those in the Coral Sea. Other areas may also be spatially defined and excluded as ELA becomes aware of them during each launch planning process.

Post successful and safe launch of the rocket, ELA will work with the client to provide as close to as possible the location of all descending flight hardware. This is done through tracking and telemetry data and/or on board GPS. With a more accurate understanding of the locations, recovery operations plans are finalised and recovery operations begin.

Recovery operations conclude when the RAS discontinues recovery sorties, and all recovered hardware has been handed over to or disposed of as agreed with the client.

All approvals and land access permits will have been already completed and all resources prepared and assembled (up range and down range).

7.2 RECOVERY PHASE

7.2.1 LOCATE FLIGHT HARDWARE

Recovery sorties are managed in accordance with the ELA Operations Manual (reference M) and the zoning criteria outlined in Section 6 and are undertaken in accordance with the appropriate Civil Aviation Safety Authority (CASA) and Australian Maritime Safety Authority regulations (references A and C).

Land and water recovery operations are planned in accordance with this plan and the ELA Operations Manual (reference M) such that an aerial search of the predicted recovery areas is conducted as soon as practicable after launch.

The search is focused on area identified in pre-launch trajectory mapping and post launch tracking data. The search area may be expanded if the rocket hardware is not found within the initial refined search area.

For hardware impacting water recovery operations aims to occur on the same day as launch, scheduled at the time of 'splash down' (or conducted as soon as practicable after launch). Arial search may be conducted if hardware is near land, however it is more likely a boat will be used to both locate and retrieve hardware.

7.2.2 OPERATIONAL PLANNING (OPERATIONAL RECOVERY PLAN)

Once the hardware recovery location is known, the launch specific Operational Recovery Plan is re-confirmed to ensure the plan is documented and communicated to all those involved, in accordance with the ELA Operations Manual (reference M):

The launch specific Operational Recovery Plan includes nominated sections addressing the following:

- Personnel requirements (refer section 11.1)
- Recovery and remediation equipment (refer section 12)
- Safety equipment (refer section 11.2)
- Communication (refer section 9),
- Transportation,

- Weather (refer section 11.3),
- Airspace management,
- Contingency planning (including actions on separation from the recovery team) (refer section 11.2), and
- Unexpected finds processes

7.2.3 Perform Hardware Recovery and Remediation

Recovery operations is executed in accordance with launch specific Operational Recovery Plan and supporting work instructions. This released in accordance with this plan and ASC Operations Manual.

7.2.4 Flight Hardware and Handover or Disposal

All recovered hardware is taken to the ASC storage facility (client specific building or ELA shared facility), where it is recorded and temporarily stored until it is either handed back to the client or proper disposal is undertaken.

Export controlled technology is dealt with in accordance with the appropriate export requirements and procedures.

7.2.5 Handover to Client

The handover of hardware to the client will be undertaken as per the Debris Handover Work Instruction.

7.2.6 Disposal

In the event ELA is made responsible for the disposal of recovered hardware, disposal is managed by ASC in accordance with the Waste Management Plan at Reference P.

8 BRIEFING AND DEBRIEFING

Prior to any recovery operation, the recovery team receives a recovery operations briefing in accordance with the Recovery Operations Plan which includes, but is not limited to, a safety briefing provided by the pilot/captain, environmental safety issues (sun exposure, heat stress, wildlife hazards etc.) and recovery operations briefing by the RAS.

At the conclusion of a recovery operation, ELA performs a recovery debriefing. These are done in accordance with the ASC Operations Manual and supporting work instructions.

9 COMMUNICATIONS

Recovery communications are to be conducted in accordance with protocols described in the ASC Communication Plan at Reference K.

10 RECORDKEEPING AND REPORTING

A Launch Database of rockets launched and the locations at which each component returns to earth is maintained by RAS for every launch. This database, as well as all digital imagery, notes and files will be managed in accordance with the Information Management Plan at Reference L.

A comprehensive report on all recovery operations for a given campaign is generated by the RAS as required.

11 SAFETY

All Recovery Team members must meet the requirements outlined in the Recovery Personnel Checklist. Personnel weight limits may be applicable for aerial operations and are advised of by the pilot. At least one member of the Recovery Team is to be certified as a Wilderness First Responder or have an equivalent level of first-aid training.

Where required, specialised training for the different stages of the recovery will be provided. This training could include (but is not limited to):

1 Training for specific helicopter activities such as hot entry/exit and sling loading.
2 Training for specific marine activities such as marine salvage operations and diving.
3 Use of hazardous equipment such as gas saws and power tools.
4 Overland travel hazard and appropriate remote survival training.
5 Payload making safe activities.
6 Helicopter marine incident training.

11.1 Rest and Preparedness

Recovery Team members must be well rested, fed, and hydrated before each operation. The RAS is responsible for managing team member fatigue, safety equipment and survival kits during recovery operations.

Any Recovery Team member requiring medication must notify the RAS and ensure that the appropriate medication is included in their survival kit when participating in recovery sorties.

The RAS does not have an active role in launch operations to ensure they are ready and available to undertake recovery operations when they arise.

11.2 Survival Gear

11.2.1 Aerial Operations

Emergency and survival gear listed in Annex A to this document are carried on all flights (exact numbers confirmed as part of the Recovery Operations Plan). Each Recovery Team member carries a satellite tracker and on-person survival kit on their person while away from ASC or other populated areas and whenever airborne.

Team members dress in preparation for possible survival situations, wearing clothing appropriate to the climate and possible environmental hazards. Clothing made of materials to reduce risk of burn injury in a post-crash fire will be provided.

11.2.2 Sea Operations

Emergency and survival gear listed in Annex B are carried on all sea expeditions (exact numbers confirmed as part of the Recovery Operations Plan). Each Recovery Team member carries a satellite tracker and lifejacket with reflective tape on his or her person whilst at sea.

Team members dress in preparation for possible survival situations, wearing clothing appropriate to the climate and possible environmental hazards.

11.3 Seasonal Recovery Provisions

Due to the varying weather conditions experienced at ASC, the work instructions for recovery operations contain provisions for extreme weather conditions (e.g., heat). It is the responsibility of the RAS to determine when these provisions are implemented for a given recovery operation

11.4 Helicopter Safety

All helicopter recovery activities are managed in accordance with the Helicopter Operations Plan at Reference G.

11.5 Vessel Safety

All sea operations are undertaken in accordance with Australian Maritime Safety Authority regulations. The sea captain is responsible for ensuring safe and efficient operation of the vessel. An informed and educated recovery team ensures that each team member understands and supports the captains weather-related decisions.

12 RECOVERY EQUIPMENT

The equipment that may be required for a given recovery operation is situational and will differ depending upon the nature of the recovery task(s).

It is the responsibility of RAS or delegate for overseeing the acquisition, maintenance, and distribution of all recovery equipment.

13 ANNEXES

A. Land recovery (Flight) Survival Gear
B. Marine Recovery (Sea) Survival Gear

ANNEX A
LAND RECOVERY (FLIGHT) SURVIVAL GEAR

Earplugs - pair of
Glasses - safety - pair of (for doors-off flight)
Glasses - safety - pair of
Gloves - Fuelling - pair of
Gloves - Cut resistant - pair of
Hard hat
Hi-Vis Vest
Cat hole kit - Trowel
Cat hole kit - Toilet Paper (roll of)
Cat hole kit - Disposable butane lighter
Cat hole kit - Dry sack
Survival Blanket
Signal Mirror
Rescue Whistle
Fire Striker
Waterproof tinder
Compass
Duct tape
Fishing supplies
Sewing supplies
Torch flame lighter
Water purification tablets
Water purification tablets (1 litre)
Satellite Tracking device
First Aid Kit
Water bladder (6 litre minimum)
Emergency food ration (3600 Kcal)
Flares - aerial signal
Flares - smoke
Hatchet - lightweight
Handsaw - folding
Lighter - disposal butane
Manual - Outback Survival
Tent - Lightweight with bug mesh
Bivouac Sack
Sleeping pad - Inflatable thermal
Sleeping pad - repair kit
Insect repellent - sealed bottle
Duffel to pack - items not carried elsewhere

ANNEX B
MARINE RECOVERY (SEA) SURVIVAL GEAR

Earplugs - pair of
Glasses - safety - pair of
Glasses - safety - pair of
Gloves - Cut resistant - pair of
Hard hat
Hi-Vis Vest
Life Jacket
Cat hole kit - Toilet Paper (roll of)
Cat hole kit - Disposable butane lighter
Cat hole kit - Dry sack
Survival Blanket
Signal Mirror
Rescue Whistle
Compass
Duct tape
Fishing supplies
Sewing supplies
Torch flame lighter
Water purification tablets
Water purification tablets (1 litre)
Satellite Tracking device
First Aid Kit
Water bladder (6 litre minimum)
Emergency food ration (3600 Kcal)
Flares - aerial signal
Flares - smoke
Bivouac Sack
Sleeping pad - Inflatable thermal
Sleeping pad - repair kit
Insect repellent - sealed bottle
Duffel to pack - items not carried elsewhere

Vegetation and habitat assessment

Arnhem Space Centre

Equatorial Launch Australia

www.ecoz.com.au

DOCUMENT CONTROL RECORD

Job	**EZ23233**
Document ID	238057-76
Author(s)	Simon Aylott

DOCUMENT HISTORY

Rev	Reviewed by	Approved by	Issued to	Date
1	Chris Brady	Simon Aylott	Ben Tett	10 May 2024
2	Simon Aylott	Simon Aylott	Ben Tett	20 May 2024
3	Glen Ewers	Simon Aylott	Ben Tett	21 May 2024

Recipients are responsible for eliminating all superseded documents in their possession.

EcOz Pty Ltd.
ABN: 81 143 989 039
Level 1, 70 Cavenagh Street
DARWIN NT 0800
GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
Facsimile: +61 8 8981 1102
Email: ecoz@ecoz.com.au
Internet: www.ecoz.com.au

TABLE OF CONTENTS

1 INTRODUCTION 1

2 ENVIRONMENTAL CONTEXT 3

2.1 Method 3

2.1.1 Bioregion 3
2.1.2 Land system mapping 3
2.1.3 Existing threatening processes 3
2.1.4 Previous biodiversity surveys 7

3 PRELIMINARY THREATENED SPECIES ASSESSMENT 8

3.1 Procedure 8

3.2 Likelihood of occurrence assessment 9

4 FIELD ASSESSMENT 13

4.1 Method 13

4.2 Results 16

4.2.1 Land types of the project area 16
4.2.2 Vegetation 17
4.2.3 Habitat 19
4.2.4 Significant or sensitive vegetation 14

5 DISCUSSION OF THREATENED SPECIES 16

5.1 Updated likelihood of occurrence assessment 16

5.1.1 Black-footed Tree-rat (*Mesembriomys gouldii gouldii*) 19
5.1.2 Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis*) 20
5.1.3 Partridge Pigeon (*Geophaps smithii smithii*) 20
5.1.4 Fawn Antechinus (*Antechinus bellus*) 20
5.1.5 Northern Brush-tailed Phascogale (*Phascogale pirata*) 21

6 MIGRATORY SPECIES 21

7 SUMMARY & RECOMMENDATIONS 22

8 REFERENCES 23

Appendices

APPENDIX A VEGETATION ASSESSMENT DATA

APPENDIX B PROTECT MATTERS SEARCH TOOL (PMST) REPORT

Tables

Table 2-1. Weed species relevant to the project area 6
Table 3-1. Ratings for the desktop threatened species likelihood of occurrence assessment 8
Table 3-2. Threatened species 'likelihood of occurrence' assessment summary 9
Table 4-1. Summary of cover and structural classification (NVIS) adopted to describe vegetation descriptions 13
Table 4-2. Summary of height classifications (NVIS) used to describe vegetation descriptions 14
Table 4-3. Land type descriptions for the project area 16
Table 4-4. Habitat table for seven species 13
Table 5-1. Threatened species 'likelihood of occurrence' assessment summary 16

Figures

Figure 1-1. Map of the project area 2
Figure 2-1. Map of fire frequency within the project area 2014-2023 5
Figure 4-1. Map of land types within the project area 15
Figure 4-2. Photograph of intact *Eucalypt tetrodonta* woodland in the project area 17
Figure 4-3. Photographs showing regrowth at two sites S4 (left) and S8 (right) 18
Figure 4-4. Photograph showing edge of monsoon vine forest (S2) 19
Figure 4-5. Photographs showing typical habitat within project area 20
Figure 4-6. Photograph of felled tree >50 cm DBH near S6 14
Figure 4-7. Map of significant vegetation and large trees within the project area 15

1 INTRODUCTION

EcOz Environmental Consultants (EcOz) has been engaged by Equatorial Launch Australia Pty Ltd (ELA) to prepare a vegetation and habitat assessment to support a development proposal for NT portion 1646, 22730 Central Arnhem Road ('the project area') as part of the ELA's Phase 2 Expansion of the Arnhem Space Centre ('the Project'). The project area is approximately 305 ha and is situated on the existing Gulkula Mine site, approximately 30 km south of Nhulunbuy along the Central Arnhem Road (Figure 1-1). Within this project area, the proponent wishes to clear approximately 91 ha of intact vegetation[1] as well as some of the rehabilitated areas of the Gulkula Mine. The final area of vegetation regrowth to be cleared will be confirmed when master planning work is completed in June/July 2024. A 5 ha dam has also been proposed within this clearing footprint.

The Gulkula Mine site lies on top of the Dhupuma Plateau, a narrow bauxite capped plateau situated approximately 100 m above the valley floor below. The plateau was used as a tracking station for the European Launcher Development Organisation (1966-1970), and bauxite has been mine by Gulkula - an Indigenous owned company (2017 – present). The Arnhem Space Centre was established in in the southern end of the Gulkula Mine, with their first launch in June 2022. The ELA plans to utilise the whole 305 ha project area once the Mine ceases operations in late 2024.

The objectives of this report are to:

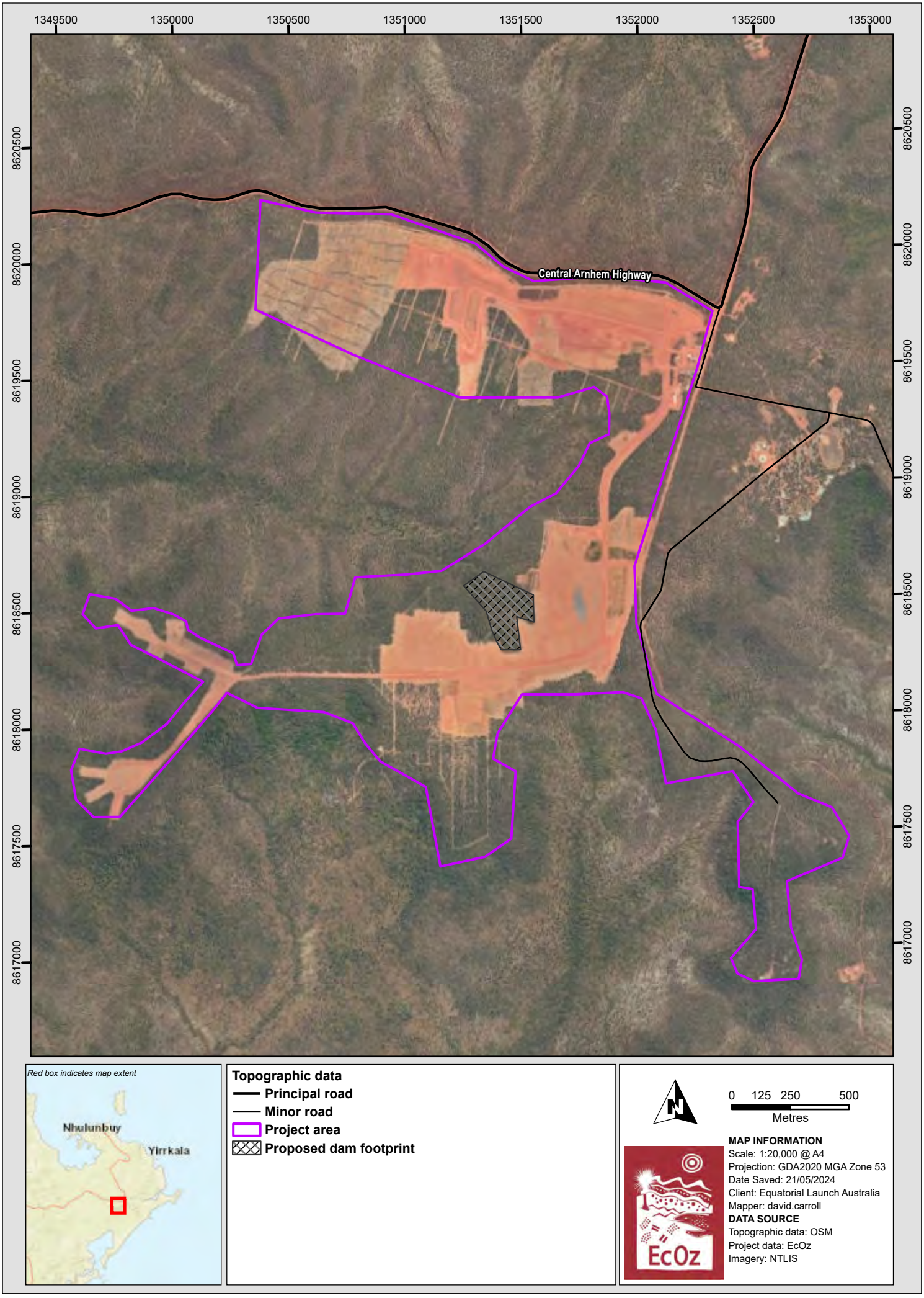
- Map land types at a scale of 1:10,000 and identify significant vegetation communities.
- Describe the vegetation composition and structure of the project area (both intact and rehabilitated areas).
- Provide an assessment of the quality of threatened species' habitat within the project area.
- Assess the likelihood of occurrence for threatened species[2] and determine the likely impact to these species from the proposed land clearing[3].

The report concludes that the intact vegetation across the plateau is predominantly *Eucalyptus tetrodonta* open woodland with some pockets of monsoon forest on the southern plateau side slopes. The rehabilitated areas consist of a developing canopy of *Acacia, Grevillea* and *Eucalyptus* species at different stages of growth. With respect to threatened fauna the habitat is generally of low to moderate quality, mostly due to frequent fires, and is generally consistent with the habitat quality of the region.

[1] An additional clearing area of ~10 ha was added while this report was in draft. The area has been included in the 91 ha area quoted here and the vegetation and habitat assessments of this new area is discussed in Sections 4.2.2 and 4.2.4

[2] According to *Territory Parks and Wildlife Conservation Act* (TPWC) and *Environmental Protection and Biodiversity Conservation Act* (EPBC)

[3] This report aims to provide detailed baseline information that will underpin development, design and management decisions. It consolidates all matters of conservation significance identified from desktop research and field investigations, with particular consideration for priority species which may require management actions beyond the general minimal impact standards. This report does not assess the significance of potential impacts.



Path: Z:\01 EcOz_Documents\05 EcOz M-Files GIS\2024\EZ23233 - ASC land clearing application\1. Project Files\2. Report Maps\EZ23233\EZ23233.aprx

Figure 1-1. Map of the project area

2 ENVIRONMENTAL CONTEXT

The environmental values of the project area are described in this section and utilised in Sections 3 to inform the 'likelihood of occurrence' of threatened and migratory species. The information for this section mostly comes from desktop databases and reports and was supplemented by a site visit in April 2024.

2.1 Method

A desktop review of satellite imagery and online land information databases was undertaken to map land types across the study area and to identify potentially sensitive or significant vegetation types. The online government resource 'NR Maps' and government publications were used to source the following data:

- Location of areas of environmental significance
- Location of waterways and areas of seasonal inundation
- Land systems (1:250,000)
- NT Government (NTG) flora and fauna records

Previous ecological survey reports were consulted and are summarised in Section 2.1.2. A threatened species 'likelihood of assessment' was also undertaken for the study area; the procedure and results of this assessment are presented in Section 3.

2.1.1 Bioregion

Bioregions are relatively large land areas characterised by broad, landscape-scale natural features and environmental processes that influence the functions of entire ecosystems. They are linked to fauna and flora assemblages and processes at the ecosystem scale, thus providing a useful means for simplifying and reporting on more complex patterns of biodiversity (NSW 2003). NT bioregions are described in Baker et al. (2005).

The project area occurs within the Arnhem Coast bioregion which comprises a coastal strip extending from just east of Cobourg Peninsula to southeastern Arnhem Land (Baker et al. 2005). Inland, the vegetation is typically eucalypt tall open forest, dominated by *Eucalyptus miniata* and *Eucalyptus tetrodonta*, with smaller areas of monsoon rainforest and eucalypt woodlands.

2.1.2 Land system mapping

No land unit mapping currently exists for the project area. NT Government land system mapping (at a scale of 1:250,000) describes the landforms within the project area as lateritic plains and rises with vegetation dominated by tall open woodland of *E. tetrodonta, E. miniata, C. bleeseri, Erythrophleum chlorostachys, E. tectifica* over a sparse to mid-dense grass cover (*Heteropogon triticeus, Chrysopogon fallax, Sorghum* spp).

2.1.3 Existing threatening processes

There are multiple threatening processes to biodiversity in the region. These are discussed below.

Fire

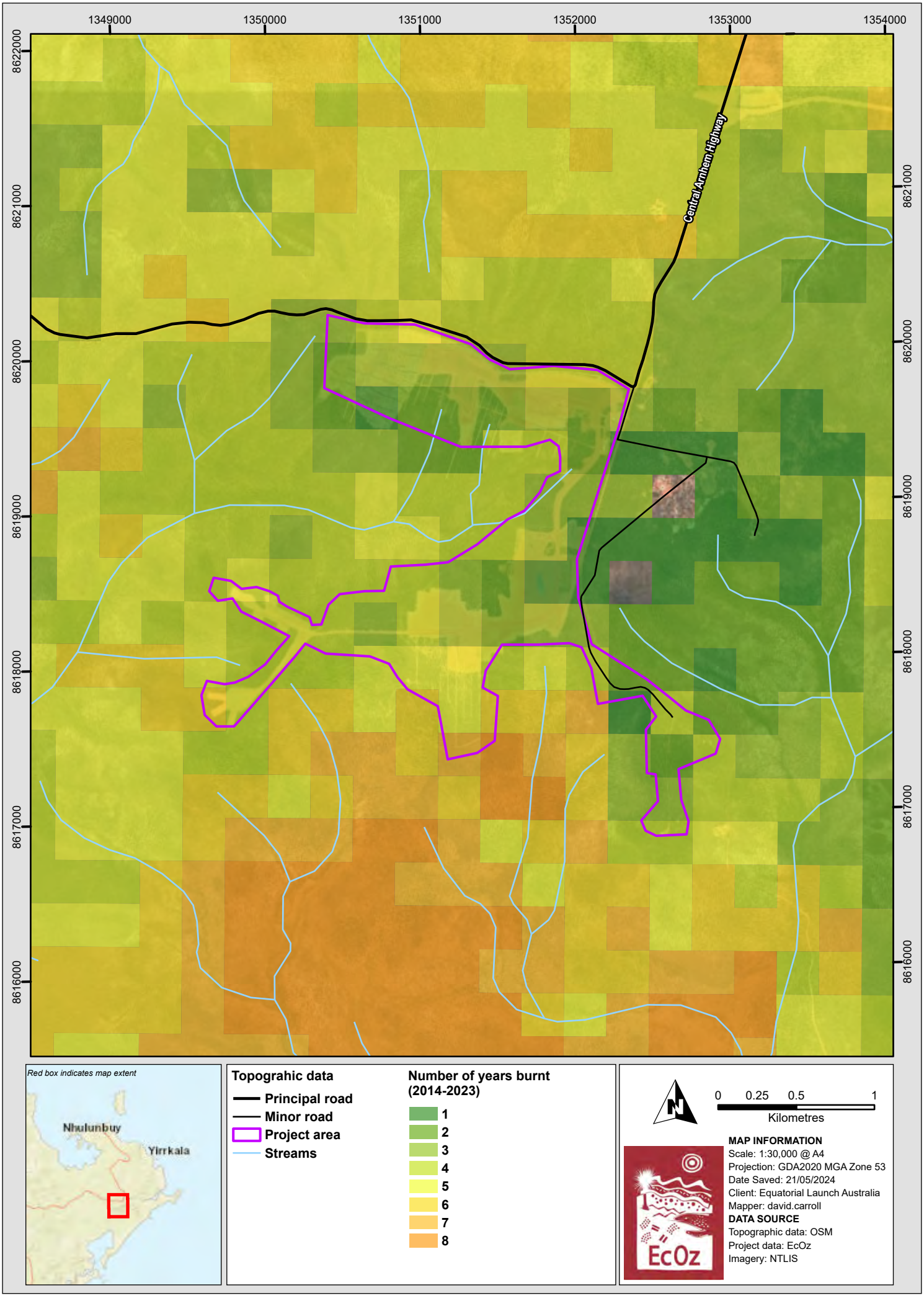
Regular fires have always been a natural part of the environment in the Top End. However, frequent fires can result in fewer flora species and reduced structural complexity (McKay 2017), both of which can also significantly diminish the habitat quality for fauna and facilitate weed invasion.

Regional fire history and fire scar mapping was obtained through the Northern Australia and Rangelands Fire Information (NAFI) website. In the past 10 years, the majority of the project area has been burned at least 4

times (Figure 2-1). Fires are more frequent on the fringes of the northern, western and southern edges of the project area, particularly just outside the southern boundary where fires have occurred in 7-8 of the past 10 years. All these fires records are of late season fires. Late season fires (from August onwards) are typically hotter than those occurring earlier in the dry season and usually more detrimental to flora and fauna.

In 2023, cool fires burned through much of the southern portion of the lease (Carly Smith, ASC Site Maintenance Assistant, pers. comm. 2 April 2024). NAFI data identifies that the least burnt areas correspond to assessment sites S9 and S10, which have not been burnt since 2018.

Overall, the satellite data as well as field observations (fire scars, *E. chlorostachys* resprouts, other coppicing regrowth) indicate that the vegetation of the project area, despite some small variations depending on location, is subject to regular late season fires, especially from the south.



Path: Z:\01 EcOz_Documents\05 EcOz M-Files GIS\2024\EZ23233 - ASC land clearing application\1. Project Files\2. Report Maps\EZ23233\EZ23233.aprx

Figure 2-2. Map of fire frequency within project area 2014-2023

Weeds

Some species of introduced flora are declared to be weeds under the NT *Weeds Management Act*. Class A weeds are to be eradicated by landowners and occupiers. Class B weeds must have their growth and spread controlled. The remaining introduced flora species are referred to as *environmental weeds*. The Commonwealth Government has also categorised some species as Weeds of National Significance (WoNS).

A review of the NT Weed Branch weed dataset shows that there are 33 weed records within a 10 km radius of the project area, probably related to a low survey effort due to the remoteness of the site. All of the NT declared weeds within this buffer, as well as any environmental weeds are listed in Table 2-1.

An incidental weed survey was undertaken across the project area during the survey. None of the weeds listed in Table 2-1 were observed within the project area; however, Hyptis (*Mesosphaerum* (*Hyptis*) *suaveolens*), a class B weed, was noted within the monsoon vine forest during a previous EcOz survey (2019).

The project area lies within the *Darwin Regional Weed Management Plan 2021-2026* (DEPWS 2021b). That plan focusses on weeds that are most important to the region, categorising them as either:

- Category 1 – Priority weeds for eradication
- Category 2 – Priority weeds for strategic control (including eradication of outliers)
- Category 3 – Weeds of concern – prevent spread
- Category 4 – Hygiene or biosecurity weeds – prevent spread
- Category 5 – Alert weeds - eradication on detection

Table 2-1. Weed species relevant to the project area

Common name	Botanical name	Class	WoNS	Status in management plan	Recorded in project area
Yellow Oleander	*Cascabela thevetia*	Environmental	No	N/A	Yes
Mission Grass - annual	*Cenchrus pedicellatus*	Environmental	No	Category 3 – Weeds of concern – prevent spread	No
Mission Grass - perennial	*Cenchrus polystachios*	B	No	Category 2 – Priority weeds for strategic control (including eradication of outliers)	Yes
Gambia Pea	*Crotalaria goreensis*	Environmental	No	Deemed low risk	Yes
Indian goosegrass	*Eleusine indica*	Environmental	No	N/A	Yes
Milkweed	*Euphorbia heterophylla*	Environmental	No	N/A	Yes
White Teak	*Gmelina arborea*	Environmental	No	N/A	Yes
Hyptis	*Mesosphaerum* (*Hyptis*) *suaveolens*	B	No	Category 4 - Hygiene and biosecurity weeds – prevent spread	Yes
Sida	*Sida acuta*	B	No	Category 4 - Hygiene and biosecurity weeds – prevent spread	Yes
Sida	*Sida cordifolia*	B	No	Category 4 - Hygiene and biosecurity weeds – prevent spread	Yes

Pest animals

According to the NT Fauna Atlas, at least four introduced fauna species are widespread and abundant within the region, and hence likely to occur within the project area. These are Feral Cattle (*Bos taurus*), Water buffalo (*Bubalus bubalis*), Feral Cat (*Felis catus*), Feral Pig (*Sus scrofa*), Cane Toad (*Rhinella marina*). Evidence of Feral Cattle and/or Water buffalo (scats and tracks) was observed during the field assessment in April 2024.

2.1.4 Previous biodiversity surveys

This section presents a list of recent surveys of the Dhupuma Plateau and surrounds as well as a summary of key findings.

Ecosmart Ecology (2015) *Dhupuma Plateau: Terrestrial Fauna Survey and Assessment.* [unpublished report]

Presents findings of fauna survey commissioned by Gulkula Mining Pty Ltd over 12 days in 2014/15 within a 500 ha area, to fulfil requirements for a Mining Management Plan (MMP). Deployed a combination of IR camera traps, Anabat devices, Elliot traps, and active searching mostly in the northern section of the project area (near assessment sites S12 and CS2) as well as near S7, S9 and S2 in the south. Concluded that no *TPWC* or *EPBC Act* listed threatened fauna species were likely to occur within areas affected by proposed actions (i.e. Gulkula Mine), largely because the vegetation type (*E. tetrodonta*) is common and widespread throughout the region. A possible exception was the Gove Crow Butterfly, whose habitat was thought to occur 850 m west of the project area, at the West Soak.

Mitchell, A. (2015) *Flora and Vegetation Survey Report: Proposed Gulkula Mine.* [unpublished].

Report commissioned by Gulkula Mining Pty Ltd as part of the environmental baseline assessment for the Mine. Report provides assessment of flora species and vegetation of mine site area. Found that the *Eucalyptus tetrodonta* woodlands, the predominant vegetation community within the region, is also the dominant vegetation type of the Dhupuma Plateau. Minor variations in the stringybark woodland were considered to be associated with the position of the vegetation in the terrain. Apart from these minor variations, the vegetation was described as “extremely uniform”. A key finding is that “The plateau environment is harsh and has high levels of tree mortality due to prevailing dry season winds, shallow soils, frequent bushfire and cyclones. Consequently the vegetation present is of limited stature and species diversity.”

Wills, J. and M. Annandale (2017) *Vegetation comparison between the western and central areas of the Dhupuma Plateau in the Gove region of the Northern Territory, Australia.* Tropical Forests and People Research Centre, University of the Sunshine Coast (USC), Maroochydore.

Report commissioned by the Gumatj Corporation to compare the vegetation between the central and western sides of the Dhupuma Platueau. Eight 500 m^2 transects spread over the western side of the study area were sampled and compared to pre-existing data. Report states: “Due to the frequent cyclones and wildfires the vegetation on the plateau has a sparse large-tree layer with a thick layer of coppicing regrowth.”. The report found that the structure and composition of the western and central areas of the plateau are uniform and therefore have comparable habitat and conservation value.

Ecoz (2017) *Gove Crow Butterfly – habitat assessment.* [unpublished].

Report on Gove Crow Butterfly habitat commissioned by Gulkula Mining as part of their environmental assessment process. Found that neither the West or East Soak were ideal habitat for the species, and that the Butterfly had not been recorded there, although the report could not definitively rule out this possibility.

Ecoz (2019) *Land Capability Assessment for Arnhem Space Centre*. [unpublished report].

Report prepared for Gumatj Corporation to determine suitability of south-western portion of site for development of Phase 1 of the Arnhem Space Centre. Describes vegetation, soil and landscape attributes for three land types found within the 61 ha project footprint (where current ASC launch pads and administrative buildings are located). Found that only land type 1 – the plateau surface – was suitable for development.

3 PRELIMINARY THREATENED SPECIES ASSESSMENT

To determine which threatened species have potential to occur within the project area, analysis of regional flora and fauna records – informed by the results of the Commonwealth and NT threatened species search tools (described below) – was undertaken. For each of these species, the likelihood that the species occurs within the project area was then assessed based on habitat requirements, distribution, and the number and dates of proximate records. The purpose of such an assessment was to identify those species that required further consideration (including, possibly, field surveys), and those that can be reasonably excluded from further assessment because they are unlikely to occur within the project area.

For this report, the project area is limited to the sub-lease within which land will be cleared and all infrastructure will be placed (i.e. not the flight path of rockets launched from the site, which will be addressed in a separate document).

This report focusses on species that are listed as Vulnerable, Endangered or Critically Endangered under the NT *Territory Parks and Wildlife Conservation Act* (*TPWC Act*) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*).

3.1 Procedure

The following procedure was used to determine which threatened species have the potential to occur in the project area:

- Identify all threatened flora and fauna records for the Arnhem Coast bioregion using the latest NT Flora and Fauna Atlas database (last updated in April 2024).
- Use the Protected Matters Search Tool to determine species listed as threatened under the *EPBC Act 1999* (undertaken March 2018). A buffer of 50 km around the project footprint was applied.
- Combine the results to generate a list of threatened species that may occur within the bioregion intersected by the project area.
- Collate the following details for each of those species – conservation status (NT and Commonwealth), habitat requirements, distribution, and number of records within the search area (from the NT Fauna and Flora Atlas dataset).
- Analyse the likelihood that each species will occur in the project area by applying the following likelihood classifications.

Table 3-1. Ratings for the desktop threatened species likelihood of occurrence assessment

Rating	Definition
HIGH	It is expected that this species occurs within the project footprint because there is core habitat and recent (post-2000) proximate records or knowledge that the species occurs in the local area.
MEDIUM	Species may occur within the project footprint because there is suitable habitat; however, there is evidence that lowers its likelihood of occurrence (known range contraction of the species in the region, no recent records within or close to the solar farm footprint, substantial loss of habitat within the project footprint since previous records, species is naturally-rare or occurs at a low density etc.).
LOW	Species may occur, as a vagrant, within the project footprint; only marginally-suitable habitat is expected.
NONE	There is strong evidence that this species will not occur within the project footprint (i.e. there is no suitable habitat and/or the species is considered to be regionally-extinct).

3.2 Likelihood of occurrence assessment

A total of **65** threatened species were considered in the 'likelihood of occurrence' assessment. Of these, 15 were discounted because they were either marine or freshwater species, neither of which occurs within the project area. The results for the remaining **50** species from the threatened species 'likelihood of occurrence' assessment are presented in Table 3-2, and summarised as follows:

- **Five** species have a medium likelihood of occurring, meaning it is expected that these species occur within the project area (at least seasonally) because of the presence of suitable habitat, and/or there are recent proximate records.
- The remainder have a low or no likelihood of occurring, meaning that apart from the occasional vagrant, it is not expected that these species occur within the project area.

Table 3-2. Threatened species 'likelihood of occurrence' assessment summary

Likelihood	Common name	Scientific name	Class	Status		Justification
				Cth	NT	
MEDIUM	Black-footed Tree-rat (Kimberley and mainland Northern Territory subsp.)	*Mesembriomys gouldii gouldii*	Mammal	EN	VU	Marginally-suitable habitat in the project area and no records for the plateau or in Ecosmart Ecology 2015 fauna survey. Several records within 10 km (2013).
	Northern Brushtail Possum (Common Brushtail Possum (north-western)	*Trichosurus vulpecula arnhemensis*		VU	-	Marginally suitable habitat, no recent proximate records.
	Northern Quoll	*Dasyurus hallucatus*		EN	CR	Suitable habitat, but severe range contraction / population decline due to Cane Toads. No recent proximate records on mainland.
	Floodplain Monitor	*Varanus panoptes*	Reptile (terrestrial)	-	VU	Suitable habitat but no proximate records. Severe population decline due to Cane Toads
	Northern Blue-tongued Skink	*Tiliqua scincoides intermedia*		CR	CR	Suitable habitat, but severe population decline due to Cane Toads
LOW	Australian Painted Snipe	*Rostratula australis*	Bird	EN	EN	Vagrant in the NT and no nearby records
	Crested Shrike-tit (northern subsp.)	*Falcunculus frontatus whitei*		VU	-	Possibly-suitable habitat but few regional records. Nearest record is 70 km west (2009).
	Gouldian Finch	*Erythrura gouldiae*		EN	VU	Suitable foraging habitat but edge of distribution; no proximate records or breeding habitat in project area.
	Grey Falcon	*Falco hypoleucos*		-	VU	Vagrant in the NT and no nearby records

Likelihood	Common name	Scientific name	Class	Status		Justification
				Cth	NT	
	Masked Owl (mainland Top End)	*Tyto novaehollandiae kimberli*		VU	VU	Limited nesting habitat within project area. Few regional records.
	Partridge Pigeon (eastern subsp.)	*Geophaps smithii smithii*		VU	VU	Possibly-suitable habitat but few regional records (two to the south are geo-spatial errors). Severe range contraction
	Red Goshawk	*Erythrotriorchis radiatus*		VU	VU	No suitable habitat in project area. One record near Yirrkala 2020.
	Fawn Antechinus	*Antechinus bellus*	Mammal	VU	EN	No suitable habitat in the project area but potential habitat in monsoon vine forest nearby. Severe range contraction / population decline
	Golden Bandicoot	*Isoodon auratus*		VU	EN	Marginal habitat in project area and species does not occur on mainland due to severe range contraction / population decline.
	Golden-backed Tree-rat	*Mesembriomys macrurus*		VU	CR	Suitable habitat in the project area, but no proximate records and severe range contraction / population decline.
	Ghost Bat	*Macroderma gigas*		VU	-	Marginally suitable habitat. Only one proximate (4 km) record in 1990.
	Northern Brush-tailed Phascogale	*Phascogale pirata*		VU	EN	Suitable habitat, but severe range contraction / population decline. No recent records in Eastern Arnhem Land.
	Bare-rumped Sheath-tailed Bat	*Saccolaimus saccolaimus (nudicluniatus)*		VU	-	Suitable foraging habitat but no nesting habitat within project area. No records for species in East Arnhem Land.
	Pale Field-rat	*Rattus tunneyi*		-	VU	No suitable habitat within project area but drainage areas nearby may support species.
	a sedge	*Eleocharis retroflexa*	Plant	VU	DD	Possibly-suitable habitat, but no proximate records
	a fern	*Sticherus flabellatus*		-	VU	Possibly-suitable habitat, but no proximate records
	a sedge	*Mapania macrocephala*		-	VU	Possibly-suitable habitat, but no proximate records
	a tree	*Pternandra coerulescens*		-	VU	Possibly-suitable habitat, but project footprint outside catchments containing records

Likelihood	Common name	Scientific name	Class	Status		Justification
				Cth	NT	
NONE	Asian Dowitcher	*Limnodromus semipalmatus*	Bird	-	VU	No suitable habitat, no proximate records and very few for the Gulf
	Bar-tailed Godwit subsp.	*Limosa lapponica subsp. menzbieri / baueri*		VU/ CR	VU	No suitable habitat in the project area and few proximate records No suitable habitat and relatively-few proximate records
	Black-tailed Godwit	*Limosa limosa*		EN		
	Common Greenshank	*Tringa nebularia*		VU	-	
	Eastern Curlew	*Numenius madagascariensis*		CR	VU	
	Great Knot	*Calidris tenuirostris*		CR	VU	
	Greater Sand Plover	*Charadrius leschenaultii*		VU	VU	
	Grey Plover	*Pluvialis squatarola*		VU	-	
	Red Knot	*Calidris canutus*		EN	VU	
	Ruddy Turnstone	*Arenaria interpres*		VU	-	
	Sharp-tailed Sandpiper	*Calidris acuminata*		VU	-	
	Terek Sandpiper	*Xenus cinereus*		EN	-	
	Curlew Sandpiper	*Calidris ferruginea*		CR	VU	
	Lesser Sand Plover	*Charadrius mongolus*		EN	VU	No suitable habitat, no proximate records
	Brush-tailed Rabbit-rat	*Conilurus penicillatus*	Mammal	VU	EN	Suitable habitat, but severe range contraction / population decline
	Northern Hopping-mouse	*Notomys aquilo*		VU	VU	No suitable habitat in project area. Found only on Groote Eylandt due to severe range contraction / population decline.
	Nabarlek (Top End subsp.)	*Petrogale concinna canescens*		EN	VU	No suitable habitat and no records for the bioregion
	Water Mouse	*Xeromys myoides*		VU	-	Possibly-suitable habitat, but no records for the Gulf
	a climber	*Freycinetia excelsa*	Plant	-	VU	No habitat or regional records
	a subshrub	*Erythroxylum sp. Cholmondely Creek*		-	EN	Range restricted to one site closer to Gove
	a tree	*Intsia bijuga*		-	CR	Range restricted to one site closer to Gove
	a bladderwort	*Utricularia singeriana*		-	VU	No suitable habitat or proximate records
	Arafura Snake-eyed Skink	*Cryptoblepharus gurrmul*	Reptile	-	EN	Restricted-range to islands in the west of the bioregion
	Mertens' Water Monitor	*Varanus mertensi*		-	VU	Regional records, but no habitat
	Mitchell's Water Monitor	*Varanus mitchelli*		-	VU	No nearby records and no habitat

Likelihood	Common name	Scientific name	Class	Status		Justification
				Cth	NT	
	Oenpelli Python	*Nyctophilopython oenpelliensis*		-	VU	Range restricted to western Arnhem Land escarpment
	Plains Death Adder	*Acanthophis hawkei*		VU	VU	No suitable habitat and no records for the bioregion

Key: CR = Critically Endangered, CD = Conservation Dependent, EN = Endangered, VU = Vulnerable, DD = Data Deficient

4 FIELD ASSESSMENT

4.1 Method

Survey design

A land type map was created based on the desktop assessment. Land types were chosen so that information could be collected to support a land capability assessment – to be submitted separately.

Thirteen full assessment sites (S1 to S13) and three rapid check-sites (CS1 to CS3) were chosen that represented all land types within the project area (Figure 4-1). Four reference sites from a previous land capability assessment report (EcOz 2019) were chosen to view to help ensure consistency (Figure 4-1). The 2019 assessment results were used in creating of a land type map and are included in Figure 4-1.

Field assessment overview

A field assessment of the project area was undertaken by two EcOz senior environmental consultants, Simon Aylott and Andrew Lewis on 2 to 4 April 2024. After visiting the reference sites, each assessment and check-site was visited on foot to ground-truth the land type map and to record soil, landform, vegetation and habitat attributes. The methods used to collect this information are described below and the information collected is provided in Appendix A.

Soil and landform types

Soils were described based on surface characteristics only (although depth was recorded at most sites). Each assessment was described in accordance with the *Australia Soil and Land Survey Field Handbook* (NCST 2009) and the *Munsell Soil Colour Charts* (Munsell 2009). Surface soil descriptions and site photographs were collected and are provided in Appendix A. Information about landform was recorded – including landform element, description, and slope. This information, in combination with vegetation indicators, provides insight into soil drainage and absorption capacity.

Vegetation

Vegetation was described to National Vegetation Information System (NVIS) Level 5 detail, in line with the *NT Guidelines and Field Methodology* (Brocklehurst et al. 2007). Within each stratum (upper, mid and lower), three dominant species were recorded, cover was estimated and height was measured using the categories presented in Table 4-1 and

Table 4-2.

Table 4-1. Summary of cover and structural classification (NVIS) adopted to describe vegetation descriptions

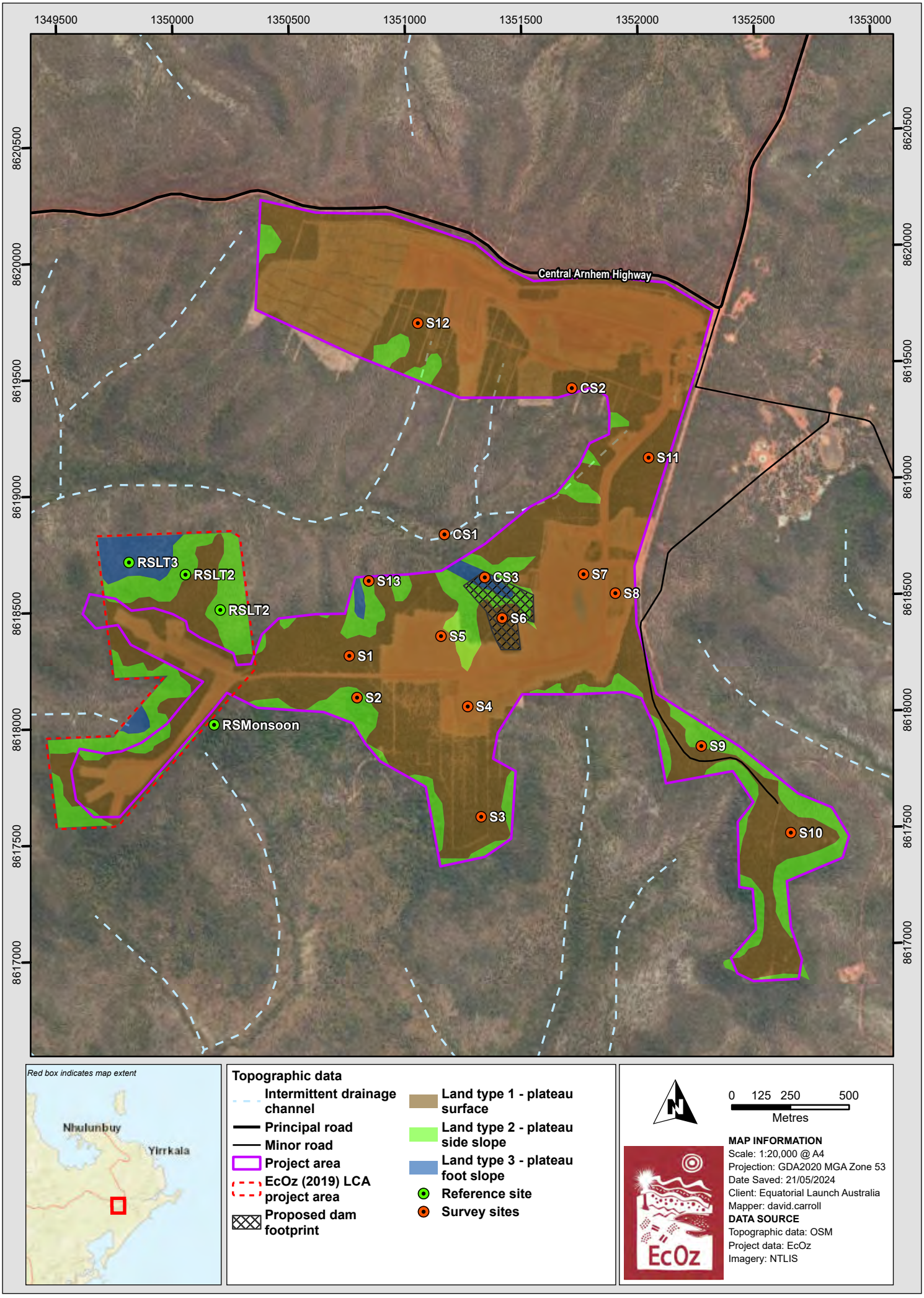
Canopy cover (%)	Trees	Shrubs
<0.25	Isolated trees	Isolated shrubs
0.25 - 20	Open woodland	Sparse shrubs
20 - 50	Woodland	Open shrubland
50 - 80	Open forest	Shrubland
>80	Forest	Closed shrubland

Table 4-2. Summary of height classifications (NVIS) used to describe vegetation descriptions

Height (m)	Trees	Shrubs	Grass
>30	Tall	-	-
10 - 30	Mid	Tall	-
<10	Low	Mid	-
<3	-	Low	-
1 - 2	-	-	Tall
0.5 - 1	-	-	Mid
<0.5	-	-	Low

Habitat

In addition to the assessment sites, transects were walked at nine sites with intact vegetation (S1, S2, S3, S6, S9, S10, S11, S12 & S13). At each site, two parallel transects were walked to approximately 100 m. All mid-story species (1 m – 12 m) up to 2 m either side of each line were recorded by species name and location using a hand-held GPS. Any trees with a diameter larger than 40 cm were also recorded. Notes were made at each site about presence of hollow logs and density and composition of the ground layer. Transects were not conducted in the rehabilitated areas because these areas were deemed unlikely to support hollow-using animals (e.g. Woinarski et al. 2008). This is because hollows will only form in rehabilitation vegetation until they are at least 50 years old. The rehabilitated vegetation in the project area is 2-5 years old.



Path: Z:\01 EcOz_Documents\05 EcOz M-Files GIS\2024\EZ23233 - ASC land clearing application\1. Project Files\2. Report Maps\EZ23233\EZ23233.aprx

Figure 4-1. Map of land types within the project area

4.2 Results

4.2.1 Land types of the project area

Soil, landform and vegetation data has been summarised in Table 4-3 to provide descriptions for each land type recorded within the survey area. These descriptions were taken from a previous Land Capability Assessment (EcOz 2019) and verified across the rest of the site during the field assessment. A map outlining the identified land type boundaries is shown in Figure 4-1.

Table 4-3. Land type descriptions for the project area

Land type	Survey sites	Description
Land type 1 – Plateau surface	S1, S2, S3, S4, S5, S6, S7, S8, S10, S11, S12, CS2	Bauxitic plateau surface with slopes ranging from 1% to 5%. Supporting a *Eucalyptus tetrodonta* woodland. Supports species including *Livistonia humilis*, *Erythrophleum chlorostachys* and *Pandanus spiralis* in the shrub layer, overtopping well drained rocky, gravelly (rudosol) soils.
Land type 2 – Plateau side slope	S9, S13	Plateau side slope with slopes ranging from 15% to 45%. Supporting a *Eucalyptus tetrodonta* woodland. Supports species including *Livistonia humilis*, *Erythrophleum chlorostachys* and *Pandanus spiralis* in the shrub layer, overtopping well drained rocky, gravelly (rudosol) soils.
Land type 3 – Plateau foot slope	CS1, CS3	Plateau foot slopes with slopes ranging from 2% to 5%. Supporting a *Eucalyptus tetrodonta* open woodland. Supports species including *Grevillea pteridifolia*, *Melaleuca viridiflora, Livistonia humilis, Erythrophleum chlorostachys* and *Pandanus spiralis* and in the shrub layer, overtopping shallow poorly drained sandy loam soils, receiving seepage and overland flows during the annual wet season.

A detailed overview of soil, landform and vegetation data is provided in Appendix A.

4.2.2 Vegetation

Eucalypt woodland

A Eucalypt woodland community is the dominant vegetation type across the project area and is typical of the region. It is relatively uniform in species composition and structure, composed of a *Eucalyptus tetrodonta* woodland with *Eucalyptus miniata* over *Livistona humilis* and a sparse understorey of *Heteropogon triticeus.* In most areas there were dense resprouts in the mid and ground strata, typically comprising *E. tetrodonta, E. miniata* (mid-strata), and *Erythrophleum chlorostachys* with *Buchanania obovata* and *Brachychiton megaphyllus* (ground strata). There was some minor variation between sites in structure and composition (Appendix A). For example, assessment site S10 had a higher density of immature *B. obovata* and *B. megaphyllus;* assessment site S9 had a greater number of mature *E. chlorostachys.* However, these variations can be explained by location and fire history – these two sites were the longest unburnt areas assessed during the field survey. The description of the intact vegetation provided here is similar to those of Mitchell (2015) and Wills et al. (2017). Both describe the vegetation on the plateau surface as being limited or sparse due to the harsh conditions there – an area which is subject to strong winds, cyclones, regular fires and shallow soils.

While the report was in draft, an additional clearing area of ~10 ha was added in the south-east. Because this specific area was not surveyed, the vegetation, habitat quality and presence of significant vegetation was inferred from assessment sites S9 and S10, NAFI fire history data and satellite imagery. From this, it is highly likely that the area has the same vegetation composition and structure as the rest of the plateau and is similar in habitat quality to assessment site S10, which is ~500 m north of the area. There is an abandoned residence in the south end of the area and approximately 0.13 ha of previously cleared land.

Figure 4-2. Photograph of intact *Eucalypt tetrodonta* woodland in the project area

Rehabilitated vegetation

The rehabilitated areas within the project area are at different stages of growth ranging from approximately 2-5 years. They contain a mix of species including *Acacia*, *Grevillea*, *Eucalypt* and *Corymbia.* The rehabilitated areas show a developing canopy only and therefore no hollow-bearing trees. Ground cover was sparse in all areas.

Figure 4-3. Photographs showing regrowth at two sites S4 (left) and S8 (right)

Monsoon vine forest

A monsoon vine forest patch was observed in the south of the project area, downslope of assessment site S2. The western patch was partially described in the EcOz 2019 survey and this same site was visited during the 2024 survey (see 'RSMonsoon' - Figure 4-1) for consistency.

The EcOz (2019) assessment described this vegetation community as "heavily dominated by *Diospyros maritima*, *Canarium australianum* and *Terminalia microcarpa* in the upper mid and ground strata… two flora species, *Pternandra coerulescens* and *Hernandia nymphaeifolia*, listed as Vulnerable under the *Territory Parks and Wildlife Conservation Act*, were targeted during the survey and neither were recorded." No springs were noted during either the 2019 or 2024 field surveys.

Figure 4-4. Photograph showing edge of monsoon vine forest (S2)

4.2.3 Habitat

Habitat can be defined as the place and resources that are used by a species. In this report, the habitat assessment methodology was informed by the foraging and nesting requirements of threatened species with a high or moderate likelihood of occurrence in the area, as well as threatened species of concern identified by the NT EPA as part of the referral process[4] (Table 4-4). As a result, the field assessment focused on the composition and density of the mid-story, the presence of hollow-bearing trees (also known as old-growth trees), and the density of the ground layer.

The overall assessment of this habitat in the project area is of a low quality. The mid-story is dominated by *E. tetrodonta* resprouts and *L. humilis*. Two plants species, *B. obovata* and *B. megaphyllus* are found across the whole area as coppicing growth in the ground layer but are more prominent in the mid-story stratum of assessment sites S3 and S10, probably due to differing fire regimes at the site. *E. chlorostachys* occurs in most assessment sites as a dense coppicing growth, rarely higher than 1 m, except in assessment sites S2, S3 and S9, where it grows above 2 m. The low, dense coppicing growth of *E. chlorostachys* and the abundant resprouts of *B. obovata* in the ground stratum and *E. tetrodonta* in the mid-stratum are indicators that the site is subject to frequent fires. Figure 4-5 shows some of the habitat of the project area.

The vegetation in the rehabilitated areas is immature (2-5 years-old) and are therefore unlikely to support fauna that use hollows or rely on dense ground cover. Hollows will only form in vegetation that is at least 50 years old (Woinarski et al. 2008).

[4] See NT EPA Direction Ref EP2023/031

Figure 4-5. Photographs showing typical habitat within project area

Table 4-4 (below) describes the preferred habitat of seven threatened fauna species that historically have been found in the region. For each species, an evaluation has been made (low, moderate or high) of the value of the habitat within the project area (specifically the plateau surface) for this species.

Table 4-4. Habitat table for seven species

Species	Preferred habitat	Assessment
Black-footed Tree-rat (*Mesembriomys gouldii gouldii*)	Prefers woodlands and open forests with large trees and a moderately diverse mid-storey. Generally, require fruit and seed resources including Pandanus fruits, and fruiting trees and shrubs (Rankmore 2006). Shelters in tree hollows and occasionally Pandanus (DEPWS 2021d). Thought to be more prevalent in woodlands with infrequent and low intensity fires (Price et al. 2005).	LOW - Frequent fires, cyclones and shallow soils on the plateau surface limit the number of large trees for nesting and lower the mid-storey species diversity for foraging. Patches of monsoon vine thicket outside project area may provide some habitat.
Partridge Pigeon (*Geophaps smithii smithii*)	Prefers woodland dominated by *Eucalyptus tetrodonta* and *E. miniata* (Garnett et al. 2011). Favours a structurally-patchy savanna understorey at a relatively intricate scale. Prefer to feed in areas that have an open ground layer (e.g. following fire); however, more likely to nest where there is dense vegetation cover. Require the seeds of certain perennial grasses and sedges, particular the perennial grass species *Alloteropsis semialata* and *Chrysopogon* (Fraser 2001).	LOW - Plateau surface does not contain structurally patchy understorey due to the frequent fires. Perennial grass species *Alloteropsis semialata* and *Chrysopogon* not observed during field survey.
Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis*)	Prefers tall eucalypt open forests with large hollow-bearing trees (TSSC 2001). Found in higher abundance when shrub density is high, particularly shrubs that bear large, fleshy fruits (Stobo-Wilson 2019).	LOW - Plateau surface has a low density of large (>40cm DBH) trees. While mid-story fruiting trees, such as *B. obovata* and *B. megaphyllus* do occur, they are typically juveniles or resprouts and poor foraging habitat. Monsoon vine forest patches outside of the project area would potentially support this species.
Northern Brush-tailed Phascogale (*Phascogale pirata*)	Prefers tall open forests dominated by *E. miniata* and *E. tetrodonta* (Rhind et al. 2008). Are primarily arboreal and seldom feed on the ground. Insectivores.	LOW - Plateau surface has a low density of large (>40cm DBH) trees.
Fawn Antechinus (*Antechinus bellus*)	Prefers open forests and woodlands dominated by *E. miniata* and/or *E. tetrodonta*, particularly where these forests have a relatively dense shrubby understorey (Friend 1985). Declines in areas with frequent intense fires (Corbett et al. 2003) but not necessarily common in areas where fire has been excluded for long periods (>20 years; Woinarski et al. 2004).	LOW - Some areas of the plateau surface have a dense shrubby understorey made up of *E. chlorostachys* resprouts. However, this is linked with more frequent fires.
Floodplain Monitor (*Varanus panoptes*)	Broad range of habitats from coastal beaches to savannah woodlands (Christian 2004). Also common throughout floodplains grasslands and a variety of native woodlands (DEPWS 2021e).	LOW - Shallow soils on the plateau surface and a lack of permanent water reduce lower the habitat value of the project area for this species.
Northern Blue-tongued Skink (*Tiliqua scincoides intermedia*)	Prefers area of dense vegetation that provide cool and moist conditions, such as dense thickets within woodlands and monsoon vine thickets. Often found close to seasonal or permanent water (DCCEEW 2023).	LOW - The plateau surface is rapidly draining and does not contain water sources that would provide habitat for this species. At time of survey (April 2024) there was dense understorey that would provide protection from predators but this is temporary due to frequent fires. Would be a higher likelihood of occurrence around monsoon vine forest patches.

4.2.4 Significant or sensitive vegetation

Monsoon vine forest

A monsoon vine forest patch was observed adjacent to assessment site S2 at the south of the site on the plateau side slope. Another patch was observed by EcOz (2019) 600 m west of S2 at RSMonsoon (Figure 4-1). Between these two points there is approximately 6 ha of this vegetation type, occurring within 1.15 ha of the project area. An isolated patch of approximately 0.13 ha was also observed on satellite imagery 300 m south-west of assessment site S10.

Monsoon vine forests are considered a significant vegetation type under the NT land clearing guidelines as they are spatially restricted and important to a relatively large number of species. They are also sensitive to changes in hydrology and fire regimes.

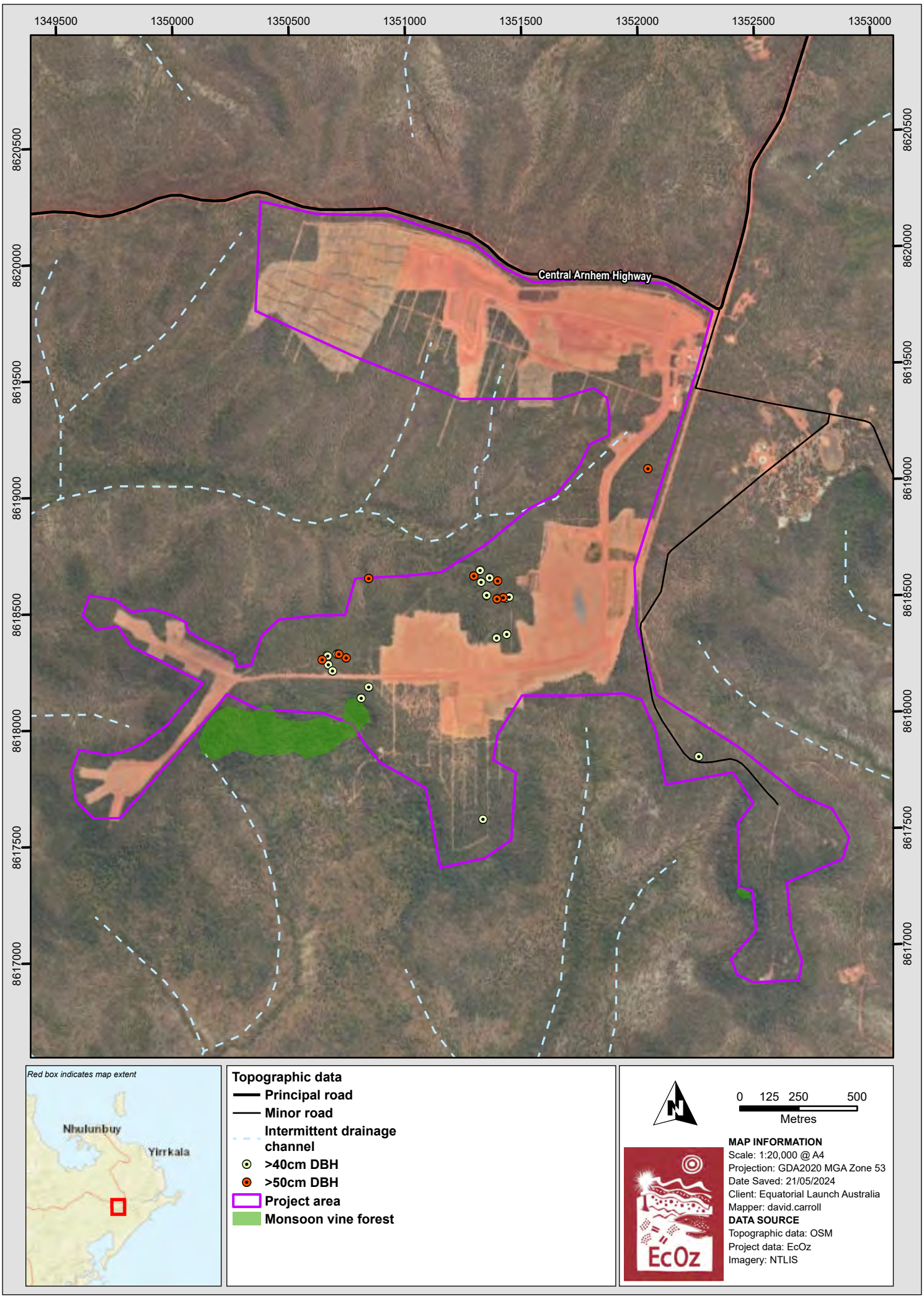
Hollow-bearing trees

The size of a tree (height and diameter at breast height) is linked to its age and the potential for that tree to support hollows critical for numerous hollow-dependent fauna species. The *Land Clearing Guidelines* states that a Eucalypt forest that has either five or more stems growing greater than 50 cm in diameter at breast height (DBH) per hectare, and/or 30 or more Eucalypt stems greater than 40 cm DBH per ha, is considered to be of high value for biodiversity (DEPWS 2021a).

Large trees were recorded during site assessments, habitat transects and incidentally during the field survey. Of a total of 27 large trees recorded, 18 had a DBH of >40 cm and 9 had a DBH of >50 cm (see Figure 4-7). The highest density of large trees (also known as old-growth trees) was found near check-site CS3, where four >50 cm DBH trees and seven >40 cm DBH trees were identified within a 2 ha area[5] (Figure 4-6). Because these fall below the land clearing guideline's threshold of 30 x >40 cm DBH per hectare or 5 x >50 cm DBH per hectare, this vegetation is not classified as significant.

Figure 4-6. Photograph of felled tree >50 cm DBH near S6

[5] Also recorded were six stumps of felled trees that were >50 cm DBH.



Path: Z:\01 EcOz_Documents\05 EcOz M-Files GIS\2024\EZ23233 - ASC land clearing application\1. Project Files\2. Report Maps\EZ23233\EZ23233.aprx

FIgure 4-7. Map of significant vegetation within the project area

5 DISCUSSION OF THREATENED SPECIES

5.1 Updated likelihood of occurrence assessment

This section presents an updated 'likelihood of occurrence' assessment based on the results of the field surveys.

The assessment found that all species had either a low or no likelihood of occurring, meaning that apart from the occasional vagrant, it is not expected that these species occur within the project area. These results are presented in Table 5-1, and summarised as follows:

Table 5-1. Threatened species 'likelihood of occurrence' assessment summary

Likelihood	Common name	Scientific name	Class	Status		Justification
				Cth	NT	
LOW	Australian Painted Snipe	*Rostratula australis*	Bird	EN	EN	Vagrant in the NT and no nearby records.
	Crested Shrike-tit (northern subsp.)	*Falcunculus frontatus whitei*		VU	-	Suitable habitat but few regional records. Nearest record is 70 km west (2009).
	Gouldian Finch	*Erythrura gouldiae*		EN	VU	Marginal foraging habitat but limited nesting habitat due to lack of tree hollows. On edge of species distribution; no proximate records within 70km.
	Ghost Bat	*Macroderma gigas*		VU	-	Suitable foraging habitat only and only one proximate (4 km) record in 1990.
	Grey Falcon	*Falco hypoleucos*		-	VU	Vagrant in the NT and no nearby records
	Masked Owl (mainland Top End)	*Tyto novaehollandiae kimberli*		VU	VU	Limited nesting habitat within project area due to lack of tree hollows. Few regional records.
	Partridge Pigeon (eastern subsp.)	*Geophaps smithii smithii*		VU	VU	Marginally-suitable habitat but few regional records (two to the south are geo-spatial errors). Severe range contraction.
	Red Goshawk	*Erythrotriorchis radiatus*		VU	VU	Few regional records (one record near Yirrkala 2020) and limited habitat in the project area with few tall trees and no watercourses.
	Black-footed Tree-rat (Kimberley and mainland Northern Territory subsp.)	*Mesembriomys gouldii gouldii*	Mammal	EN	VU	Marginally-suitable habitat in the project area. Several records within 10 km (2013), but no records of species from project area including in Ecosmart Ecology 2015 fauna survey.

Likelihood	Common name	Scientific name	Class	Status		Justification
				Cth	NT	
	Fawn Antechinus	*Antechinus bellus*		VU	EN	No suitable habitat in the project area but potential habitat in monsoon vine forest nearby. Severe range contraction / population decline.
	Floodplain Monitor	*Varanus panoptes*		-	VU	Marginally suitable habitat in project area but no permanent water source, severe population decline due to Cane Toads.
	Golden Bandicoot	*Isoodon auratus*		VU	EN	Marginal habitat in project area and species does not occur on mainland due to severe range contraction / population decline.
	Golden-backed Tree-rat	*Mesembriomys macrurus*		VU	CR	Suitable habitat in the project area, but no proximate records and severe range contraction / population decline.
	Northern Brush-tailed Phascogale	*Phascogale pirata*		VU	EN	Marginally suitable habitat with few large hollows and frequent fires; severe range contraction / population decline. No recent records in Eastern Arnhem Land.
	Pale Field-rat	*Rattus tunneyi*		-	VU	No suitable habitat within project area but drainage areas nearby may support species.
	Bare-rumped Sheath-tailed Bat	*Saccolaimus saccolaimus (nudicluniatus)*		VU	-	Suitable foraging habitat but no nesting habitat within project area. No records for species in East Arnhem Land.
	Northern Brushtail Possum (Common Brushtail Possum (north-western)	*Trichosurus vulpecula arnhemensis*		VU	-	Limited nesting habitat due to lack of large hollows in project area. Potentially suitable habitat within monsoon vine forest patches outside of project area. No records of species in the project area.
	Northern Quoll	*Dasyurus hallucatus*		EN	CR	Project area does not contain large boulders/rocks and few large hollows, severe range contraction / population decline due to Cane Toads. No recent proximate records on mainland.
	a sedge	*Eleocharis retroflexa*	Plant	VU	DD	No suitable habitat in project area, but no proximate records
	a fern	*Sticherus flabellatus*		-	VU	No suitable habitat, but no proximate records

Likelihood	Common name	Scientific name	Class	Status		Justification
				Cth	NT	
	a sedge	*Mapania macrocephala*		-	VU	No suitable habitat as no springs observed, but no proximate records
	a tree	*Pternandra coerulescens*		-	VU	No springs observed and tree not recorded in 2019 survey. No records within project area.
	Northern Blue-tongued Skink	*Tiliqua scincoides intermedia*	Reptile	CR	CR	Marginally suitable habitat due to lack of permanent water. No records in project area and lack of permanent water. Severe population decline due to Cane Toads.
NONE	Asian Dowitcher	*Limnodromus semipalmatus*	Bird	-	VU	No suitable habitat, no proximate records and very few for the Gulf
	Bar-tailed Godwit subsp.	*Limosa lapponica subsp. menzbieri / baueri*		VU/ CR	VU	No suitable habitat in the project area and few proximate records. No suitable habitat and relatively-few proximate records
	Black-tailed Godwit	Limosa limosa		EN		
	Common Greenshank	Tringa nebularia		VU	-	
	Eastern Curlew	*Numenius madagascariensis*		CR	VU	
	Great Knot	*Calidris tenuirostris*		CR	VU	
	Greater Sand Plover	*Charadrius leschenaultii*		VU	VU	
	Grey Plover	Pluvialis squatarola		VU	-	
	Red Knot	*Calidris canutus*		EN	VU	
	Ruddy Turnstone	*Arenaria interpres*		VU	-	
	Sharp-tailed Sandpiper	*Calidris acuminata*		VU	-	
	Terek Sandpiper	*Xenus cinereus*		EN	-	
	Curlew Sandpiper	*Calidris ferruginea*		CR	VU	
	Lesser Sand Plover	*Charadrius mongolus*		EN	VU	No suitable habitat, and no proximate records
	Brush-tailed Rabbit-rat	*Conilurus penicillatus*	Mammal	VU	EN	Marginally-suitable habitat, but severe range contraction / population decline.
	Nabarlek (Top End subsp.)	*Petrogale concinna canescens*		EN	VU	No suitable habitat and no records for the bioregion
	Northern Hopping-mouse	*Notomys aquilo*		VU	VU	No suitable habitat in project area. Found only on Groote Eylandt due to severe range contraction / population decline.

Likelihood	Common name	Scientific name	Class	Status		Justification
				Cth	NT	
	Water Mouse	*Xeromys myoides*		VU	-	No suitable habitat, no records for the Gulf region
	a climber	*Freycinetia excelsa*	Plant	-	VU	No habitat or regional records
	a subshrub	*Erythroxylum sp. Cholmondely Creek*		-	EN	Range restricted to one site closer to Gove
	a tree	*Intsia bijuga*		-	CR	Range restricted to one site closer to Gove
	a bladderwort	*Utricularia singeriana*		-	VU	No suitable habitat or proximate records
	Arafura Snake-eyed Skink	*Cryptoblepharus gurrmul*	Reptile	-	EN	Restricted-range to islands in the west of the bioregion
	Mertens' Water Monitor	*Varanus mertensi*		-	VU	Regional records, but no habitat
	Mitchell's Water Monitor	*Varanus mitchelli*		-	VU	No nearby records and no habitat
	Oenpelli Python	Nyctophilopython oenpelliensis		-	VU	Range restricted to western Arnhem Land escarpment
	Plains Death Adder	*Acanthophis hawkei*		VU	VU	No suitable habitat and no records for the bioregion

Key: CR = Critically Endangered, CD = Conservation Dependent, EN = Endangered, VU = Vulnerable, DD = Data Deficient

Five threatened species were identified as being of concern in NT EPA Direction (Ref EP2023/031). More detail on their assessment is provided below.

5.1.1 Black-footed Tree-rat (*Mesembriomys gouldii gouldii*)

The Kimberley and mainland Northern Territory sub-species of the Black-footed Tree-rat (*Mesembriomys gouldii gouldii*) is listed as Endangered under both the *EPBC* and *TPWC Acts*. It predominantly occurs in woodlands and lowland open forests with large trees dominated by *Eucalyptus miniata* and/or *E. tetrodonta* and a moderately dense and diverse mid-storey of small trees and shrubs where the subspecies dens mostly in tree hollows but may also use clumps of *Pandanus spiralis* (DEPWS 2021). The Black-footed Tree-rat generally requires fruit and seed resources including Pandanus fruits, fruiting trees and shrubs (Rankmore 2006). Black-footed Tree-rats have a large home range (~67 ha) (Rankmore and Friend 2008).

The subspecies is thought to be more prevalent in woodlands with infrequent and low intensity fires (Price and Baker 2005) with greater fruiting species diversity to support a greater abundance of Black-Footed Tree-rat individuals (Rankmore 2006). Frequently burnt landscapes may contain fewer larger hollow-bearing trees which is an important resource for the species, whilst natural events such as cyclones may also reduce the number of trees and hence hollow availability (Woinarski and Westaway 2008). This species does not use highly modified habitat and requires forested corridors connecting remnant patches of intact woodland larger than 1 ha in size (Rankmore and Price 2004).

The field assessment found that the habitat for this species within the project area is of low quality. There are few hollow-bearing trees and/or Pandanus trees suitable for nesting and a sparse fruiting mid-storey with a low species diversity. Of the ~15 records of the Black-footed Tree-rat in east Arnhem Land in the last 10 years, none occur within 5 km of the project area, although this may be due in part to a lack of survey effort (although they were not recorded in a previous fauna survey of the area (Ecosmart 2015). For these reasons, it is concluded that the Black-footed Tree-rat has a low likelihood of occurrence in the project area.

5.1.2 Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis*)

The north-western sub-species of the Brushtail Possum (*Trichosurus vulpecula arnhemensis*) is listed as Vulnerable under the *EPBC Act* and not listed under the *TPWC Act*. The Northern Brushtail Possum mainly inhabits tall eucalypt open forests and woodlands with large hollow-bearing trees, particularly where the understorey contains shrubs that bear fleshy fruits (TSSC 2021). The sub-species' abundance is associated with high shrub density (Stobo-Wilson et al. 2019).

The broadscale decline of the subspecies' populations in Australia's Top End and reduction of its distribution across the Northern Territory – an estimated 72% decrease in the species' historical geographic range in north-western Australia between 1993 and 2019 – is largely attributed to frequent extensive fires, which reduces shelter sites and shrub density, thereby increasing risk of feral cat predation, as well as habitat modification from invasive grasses, namely the African Gamba grass (*Andropogon gayanus*) and Mission grass (*Cenchrus polystachios*) (Stobo-Wilson et al. 2019; TSSC 2021).

The assessment found that the likelihood of occurrence for the Northern Brushtail Possum was low. There are no recent records for this sub-species in east Arnhem Land. The lack of nesting habitat (large hollows) or suitable foraging habitat (a dense fruiting mid-storey) also lowers the likelihood of occurrence within the project area. The monsoon vine forest patches – a significant vegetation type in the NT - to the south of the project area, may provide some habitat for the Northern Brushtail Possum. Protection of these vegetation communities are discussed further in Section 7.

5.1.3 Partridge Pigeon (*Geophaps smithii smithii*)

The Partridge Pigeon (*Geophaps smithii smithii*) is listed as Vulnerable under both the *EPBC* and *TPWC Acts.* It is a medium-sized ground dwelling bird which forages entirely on the ground and rarely flies, except when flushed. The species is largely sedentary and typically occurs singly or in small family groups. Larger aggregations may occur around waterholes. The Partridge Pigeon nests on the ground, preferentially in lowland eucalypt open forests and woodlands at sites with relatively dense grass cover. This is in contrast to the relatively open (often burnt) areas the species prefers for feeding, which suggests that fire regimes may significantly affect the species. Nesting occurs mostly in the early dry season (Woinarski 2004).

There are no recent records for this sub-species in east Arnhem Land and it is likely to be locally-extinct. The frequent, large-scale fires in the area have lowered the quality of habitat for the Partridge Pigeon, creating a more homogeneous ground cover and reducing the availability of grass species. For these reasons, this species is assessed as having a low likelihood of occurrence in the project area.

5.1.4 Fawn Antechinus (*Antechinus bellus*)

The Fawn Antechinus (*Antechinus bellus*) is listed as Vulnerable under the *EPBC Act* and Endangered under the *TPWC Act*. This species is found in the savannah woodland and tall open forest of the Top End. It shelters in tree hollows and fallen logs and appears to prefer areas exposed to less frequent and cooler fires. The species decline is likely due to predation by cats and inappropriate fire regimes affecting habitat quality. Weeds and grazing by livestock and feral animals may have reduced the availability of preferred food (DEPWS 2021).

There are no recent records for this sub-species in east Arnhem Land and it is likely to be locally-extinct. The habitat of the project area lacks tree hollows and the dense undergrowth that this species prefers and is subject to frequent fires. For these reasons, the species is assessed as having a low likelihood of occurring within the project area.

5.1.5 Northern Brush-tailed Phascogale (*Phascogale pirata*)

The Northern Brush-tailed Phascogale is listed as Vulnerable under the *EPBC Act* and as Endangered under the *TPWC Act*. The Northern Brush-tailed Phascogale is an elusive and poorly known mammal. It is an intermediate sized, hollow-dwelling, carnivorous marsupial weighing 150 to 200 g (DEPWS 2021h). The Northern Brush-tailed Phascogale is endemic and restricted to the coastal savannas in the Top End (Geyle et al. 2020). A small number of records exist, including on Melville Island from tall open Eucalypt forests (DEPWS 2021c). While few records exist, there is evidence of a decline in both population and distribution of this species across the Top End (Woinarski et al 2014). Melville Island is a stronghold for small to medium mammals and this is an important population for the species long-term survival due to species not being recorded on the mainland for more than twenty years, despite targeted survey effort (Geyle et al. 2020).

There are no recent records for this species on the mainland for the past 20 years, and it is likely to be locally-extinct. The project area habitat is assessed as low for this species as it lacks large nesting hollows and is subject to frequent fires. Therefore the Northern Brush-tailed Phascogale is assessed as having a low likelihood of occurrence.

6 MIGRATORY SPECIES

Australia is a signatory to three bilateral migratory bird agreements with Japan, China and the Republic of Korea. These agreements provide a basis for cooperation on activities for the conservation of migratory birds that move between each country. Species listed on the annexes to these agreements are a Matter of National Environmental Significance under the EPBC Act as listed migratory species.

The PMST report (see Appendix B) identified the possibility of 55 migratory species protected under international agreements occurring within the region. Of these species, 23 are threatened species that have already been assessed to have a low or no likelihood of occurring in the project area in Section 3. The remaining 22 species are all species for which there is either not appropriate habitat in the project area – for example, water-dwelling species, species requiring tidal mudflats or species requiring wetlands – or else the species utilises a range of habitats and is not dependent on the habitat in the project area. Thus, the habitat within the project area is not considered to be important habitat for any migratory species. Assuming that the project activities remain within the project area and mitigation strategies are implemented to minimise indirect impacts outside of the project area– such as sediment control to minimise indirect impacts onto the adjacent mangrove communities – migratory species are unlikely to be impacted by the proposed project.

7 SUMMARY & RECOMMENDATIONS

The assessment found that the intact vegetation of the project area is composed of an *E. tetrodonta* and *E. miniata* woodland with *L. humilis* over a *H. triticeus* ground layer. This vegetation community is relatively uniform across the project area and typical of the region. The plateau surface is subject to strong winds, cyclones, frequent fires and has shallow soils, which result in a sparse mid-storey with reduced species diversity and a dense resprouting ground story, dominated by *E. chlorostachys* and *E. tetrodonta.* A patch of monsoon vine forest – a significant vegetation community – occurred in the south of the project area. A threatened species likelihood of occurrence assessment found none of the assessed species had a high or medium likelihood of occurrence within the project area.

The following measures are recommended to lower the risk to ecological values in the project area:

- A buffer of at least 50 m be applied to the outer edge of the monsoon vine forest patches for protection, as outlined in the land clearing guidelines.
- Apply a 20 m native vegetation buffer around the plateau edge to minimise the risk of erosion.
- Undertake clearing at the during the dry season and develop a comprehensive ESCP for the life of the project.
- Any large trees (>40 cm DBH) felled during construction are placed in adjacent vegetation within the project area as habitat.

8 REFERENCES

Baker, B., Price, O., Woinarski, J., Gold, S., Connors, G., Fisher, A. & Hempel, C. (2005). *Northern Territory Bioregions – Assessment of Key Biodiversity Values and Threat.* Palmerston: Department of Natural Resources, Environment and the Arts, Northern Territory Government.

Brocklehurst, P, Lewis, D, Napier, D & Lynch, D (2007). Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping. Technical Report No. 02/2007D. Department of Natural Resources, Environment and the Arts, Palmerston, Northern Territory.

Corbett L. K., Andersen, A.N. and Muller, W.J. (2003). Terrestrial vertebrates. In: Andersen, A.N., Cook, G.D. and Williams, R.J. (eds.). Fire in Tropical Savannas: The Kapalga Experiment. Springer-Verlag, New York: pp. 126–152.

Christian, K. (2004). Varanus mertensi. In: Pianka et al. (eds.). Varanoid lizards of the world. Indiana University Press, Bloomington, Indianapolis.

(DCCEEW) Department of Climate Change, Energy, the Environment and Water (2023). Conservation Advice for *Tiliqua scincoides intermedia* (northern blue-tongue). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/89838-conservation-advice-21122023.pdf.

(DCCEEW) Department of Climate Change, Energy, the Environment and Water (2023). Protected Matters Search Tool. Available at http://www.environment.gov.au/webgis-framework/apps/pmst/pmstcoordinate.

(DEPWS) Department of Environment, Parks and Water Security (2021a). Land Clearing Guidelines - Northern Territory Planning Scheme. Northern Territory Government. Available at: https://nt.gov.au/__data/assets/pdf_file/0007/236815/land-clearing-guidelines.pdf.

(DEPWS) Department of Environment, Parks and Water Security (2021b). Darwin Regional Weeds Strategy 2021-2026. Northern Territory Government. Available at: https://nt.gov.au/__data/assets/pdf_file/0004/291514/darwin-regional-weeds-strategy.pdf

(DEPWS) Department of Environment, Parks and Water Security (2021c) *Threatened species of the Northern Territory - Northern brush-tailed phascogale (Phascogale pirata).* Available at: https://nt.gov.au/__data/assets/pdf_file/0003/205509/northern-brush-tailed-phascogale.pdf

(DEPWS) Department of Environment, Parks and Water Security (2021d) Threatened species of the Northern Territory - Black-footed tree-rat (Kimberley and mainland Northern Territory) *Mesembriomys gouldii gouldii.* Available at: https://nt.gov.au/__data/assets/pdf_file/0018/205515/black-footed-tree-rat-kimberley-mainland-nt.pdf

(DEPWS) Department of Environment, Parks and Water Security (2021d) Threatened species of the Northern Territory (2021e) yellow-spotted Monitor / Northern Sand Goanna / Floodplain Monitor (*Varanus panoptes*). Available at: https://nt.gov.au/__data/assets/pdf_file/0006/206466/floodplain-monitor.pdf

(DEPWS) Department of Environment, Parks and Water Security (2023a). NR Maps. Northern Territory Government. Available at: https://nrmaps.nt.gov.au/

Ecosmart Ecology (2015) Dhupuma Plateau: Terrestrial Fauna Survey and Assessment. [unpublished report]

Ecoz (2017) Gove Crow Butterfly – habitat assessment. [unpublished].

Ecoz (2019) Land Capability Assessment for Arnhem Space Centre. [unpublished report].

Fisher, A., Baker, B. and Woinarski, J. (2002). *Biodiversity Audit – bioregional case study – Mitchell Grass Downs, Northern Territory*. Darwin: Parks and Wildlife Commission of the Northern Territory.

Fraser, F. (2001). Species profile: Partridge Pigeon *Geophaps smithii*. Northern Territory Naturalist 16, 38-39.

Friend G & Taylor J (1985) Habitat preferences of small mammals in tropical open-forest of the Northern Territory. Australian Journal of Ecology 10, 173-185.

Garnett, S.T., Szabo, J.K. and Dutson, G. (2011). The Action Plan for Australian Birds 2010. CSIRO Publishing. Collingwood, Australia.

Geyle, H.M., Woolley, L-A., Davies, H.F., Woinarski, J.C.Z. and Murphy, B.P. (2020). Targeted sampling successfully detects the cryptic and declining arboreal marsupial (*Phascogale pirata*) in northern Australia. Pacific Conservation Biology. DOI: 10.1071/PC20008

Harrison, L., McGuire, L., Ward, S. Fisher, A., Pavey, C., Fegan, M. and Lynch, B. (2009). *An inventory of sites of international and national significance for biodiversity values in the Northern Territory*. Department of Natural Resources, Environment, the Arts and Sport, Darwin, NT.

McKay, L. (2017). *A Guide to the Wildlife and Protected Areas of the Top End*, The Environment Centre NT, Darwin.

Mitchell, A. (2015) Flora and Vegetation Survey Report: Proposed Gulkula Mine. [unpublished].

NSW National Parks and Wildlife Service (NSW) (2003). *The Bioregions of New South Wales: their biodiversity, conservation and history.* NSW National Parks and Wildlife Service, Hurstville.

Phillips, B.L., Brown, G.P., and Shine, R. (2003), Assessing the potential impact of cane toads Bufo marinus on Australian snakes, *Conservation Biology*, 16(6), pp. 1738-1747.

Price, O. and Baker, B. (2007). Fire regimes and their correlates in the Darwin region of northern Australia, *Pacific Conservation Biology*, Vol 13: 177-88.

Rankmore, B. R., & Price, O. (2004). Effects of habitat fragmentation on the vertebrate fauna of tropical woodlands, Northern Territory. In D. Lunney (Ed.), Conservation of Australia's Forest Fauna (2 ed., pp. 452-473). Royal Zoological Society of NSW.

Price, O., Rankmore, B., Milne, D.J., Brock, C., Tynan, C., Kean, L. and Roger, L. (2005). Regional patterns of mammal abundance and their relationships to landscape variables in eucalypt woodlands near Darwin, northern Australia. Wildlife Research, Vol. 32, pp. 435-446.

Rankmore, B.R. 2006. Impacts of Habitat Fragmentation on the Vertebrate Fauna of the Tropical Savannas of Northern Australia; with Special Reference to Medium-sized Mammals. PhD Thesis, Charles Darwin University, Darwin.

Rankmore, B. R., & Friend, G. R. (2008). Black-footed tree-rat Mesembriomys gouldii. In S. Van Dyck & R. Strahan, The mammals of Australia (pp. 591-593). Third edition. Sydney: Reed New Holland.

Rhind, S.G., Woinarski, J. and Aplin, K.P. (2008). Brush-tailed Phascogale. In: Van Dyck, S. and Strahan, R. (eds). The Mammals of Australia. Reed New Holland, Chatswood, NSW.

Richardson S, Irvine E., Froend R., Boon P., Barber S., Bonneville B. (2011) *Australian groundwater-dependent ecosystem toolbox part 1: assessment framework. Waterlines report*. National Water Commission. Canberra

Russell-Smith, J. and Whitehead, P.J. (2015). Reimagining fire management if fire-prone northern Australia. In Murphy, B.P., Edwards, A.C., Meyer, M. and Russell-Smith, J. (eds), *Carbon Accounting and Savanna Fire Management*, CSIRO, Clayton South, Victoria.

Russell-Smith. J. (1991). Classification, species richness, and environmental relations of monsoon rainforest vegetation in the Northern Territory, Australia. *Journal of Vegetation Science,* 2, pp. 259–78.

Stobo-Wilson A, Murphy B, & Cremona T (2019) Contrasting patterns of decline in two arboreal marsupials from Northern Australia. Biodiversity Conservation 28, 2951

(TSSC) Threatened Species Scientific Committee (2021). Conservation Advice *Trichosurus vulpecula arnhemensis* Northern Brushtail Possum. Canberra: Department of Agriculture, Water and the Environment. Available from http://www.environment.gov.au/biodiversity/threatened/species/pubs/83091-conservation-advice-11052021.pdf

Wills, J. and M. Annandale (2017) Vegetation comparison between the western and central areas of the Dhupuma Plateau in the Gove region of the Northern Territory, Australia. Tropical Forests and People Research Centre, University of the Sunshine Coast (USC), Maroochydore.

Woinarski JCZ (2004). 'National multi-species recovery plan for the Partridge Pigeon [eastern subspecies] *Geophaps smithii smithii*, Crested Shrike-tit [northern (sub)species] Falcunculus (frontatus) whitei, Masked Owl [north Australian mainland subspecies] *Tyto novaehollandiae kimberli*; and Masked Owl [Tiwi Islands subspecies] *Tyto novaehollandiae melvillensis*, 2004–2009'. Northern Territory Department of Infrastructure, Planning and Environment, Darwin.

Woinarski, J. et al. (2008) *Long-term vertebrate fauna monitoring - Rio Tinto Alcan Gove rehabilitation monitoring*. NT Department of Natural Resources Environment and The Arts. [unpublished report]

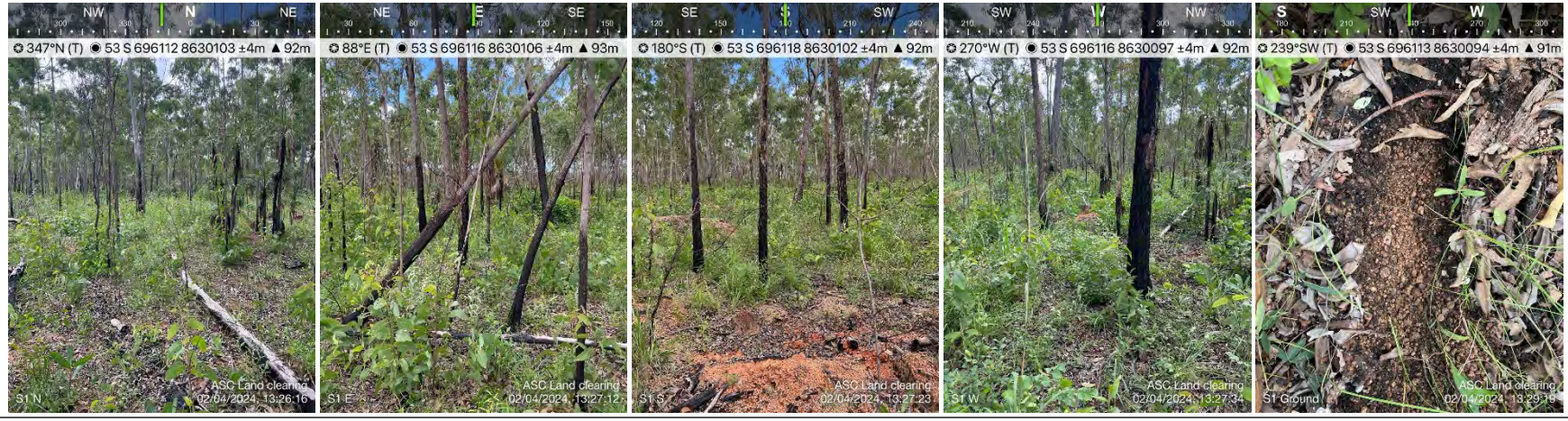
Woinarski, John & Westaway, J. (2008). Hollow formation in the *Eucalyptus miniata–E. tetrodonta* open forests and savanna woodlands of tropical northern Australia.

Woinarski, J., Burbidge, A. and Harrison, P. (2014). The Action Plan for Australian Mammals 2012. CSIRO Publishing: pp. 125-127.

APPENDIX A VEGETATION ASSESSMENT DATA

Vegetation site	S1			Land type	1 – plateau surface	
Vegetation type	*Eucalyptus tetradonta* mid high woodland with *Eucalyptus miniata* over *E. tetradonta* and *E. minitata* high open shrubland with *Livistonia humilis*, over mid-high *Heteropogon triciceus* low sparse tussock grassland with *Erythrophloem chlorostachys* recruits.					
Landform	Very gently inclined flat plateau surface. Slope 3% with northerly aspect.					
Surface soils	Light reddish brown sandy clay loam with 60% gravel (1-30mm, ave. 2mm). Rapidly drained.			**Soil depth**	400mm	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	55	0	30	5	10	0
Threatening processes	Fire scars up to 3m, partially burnt logs, many *Erythrophloem chlorostachys* recruits (0.5m-1m) indictating recent fires. Isolated small borrow pits / drilling exploration pits.					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	*Eucalyptus tetradonta*	10-20	14	50
	Eucalyptus miniata	8-18	12	5
Mid stratum	*Eucalyptus tetradonta*	8-10	9	10
	Eucalyptus miniata	8-10	9	10
	Livistonia humilis	1-4	2	5
	Coyrmbia sp.	6	6	1
	Brachychiton megaphyllus	1	1	1
Ground stratum	*Heteropogon triciceus*	1	1	5
	Hibbertia complanata	1-2	1	10
	Erythrophloem chlorostachys resprouts	0-1	0.5	1
	Buchanania obovata recruits			

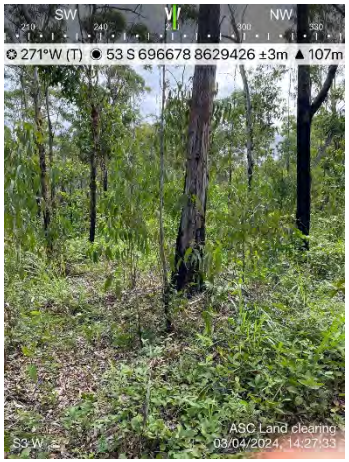


Vegetation site	S2			Land type	2 – plateau side slopes	
Vegetation type	Transitional vegetation between *E. tetrodonta* woodland and closed monsoon forest.					
Landform	Steep maximal upper slope. Slope 40% with south-westerly aspect.					
Surface soils	Brown sandy loam; 80-90% surface rocks. Very rapidly drained.			**Soil depth**	Not recorded	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	35	0	50	15	0	0
Threatening processes	None observed					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	*Eucalyptus tetrodonta*	8-18	12	40
	Canarium australianum	6	6	30
Mid stratum	*Erythrophleum chlorostachys*	1-5	2	20
	Brachychiton megaphyllus	1	1	5
	Canarium australianum	2	2	5
	Diospyros maritima	5	5	5
	Pandanus spiralis	2	2	5
Ground stratum	*Heteropogon triticeus*	-	-	2
	Erythrophleum chlorostachys resprouts	-	-	20
Comment				

Vegetation site	S3			Land type	1 – plateau surface	
Vegetation type	*Eucalyptus tetrodonta* mid high open woodland with *Eucalyptus miniata* over *E. tetrodonta* and *E. miniata* high open shrubland with *Livistonia humilis*, over mid-high *Heteropogon triciceus* low sparse tussock grassland with *Erythrophloem chlorostachys* recruits.					
Landform	Very gently inclined flat: plateau surface. Slope of 3% with northerly aspect.					
Surface soils	Light reddish brown sandy clay loam with 60% gravel (10-40 mm; ave. 20 mm). Rapidly drained.			**Soil depth**	Not recorded	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	34	0	60	1	5	0
Threatening processes	Exploration drilling access tracks 20 m from assessment site.					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	*Eucalyptus tetrodonta* *Eucalyptus miniata*	12-20 12	14 12	30 10
Mid stratum	*Erythrophleum chlorostachys* *E. tetrodonta* *Livistonia humilis* *E. miniata*	2 8-12 1-3 8-12	2 10 2 10	10 10 5 5
Ground stratum	*Alloteropsis semialata* *L. humilis* recruits *E. chlorostachys* resprouts	- - -	- - -	5 5 10
Comment				

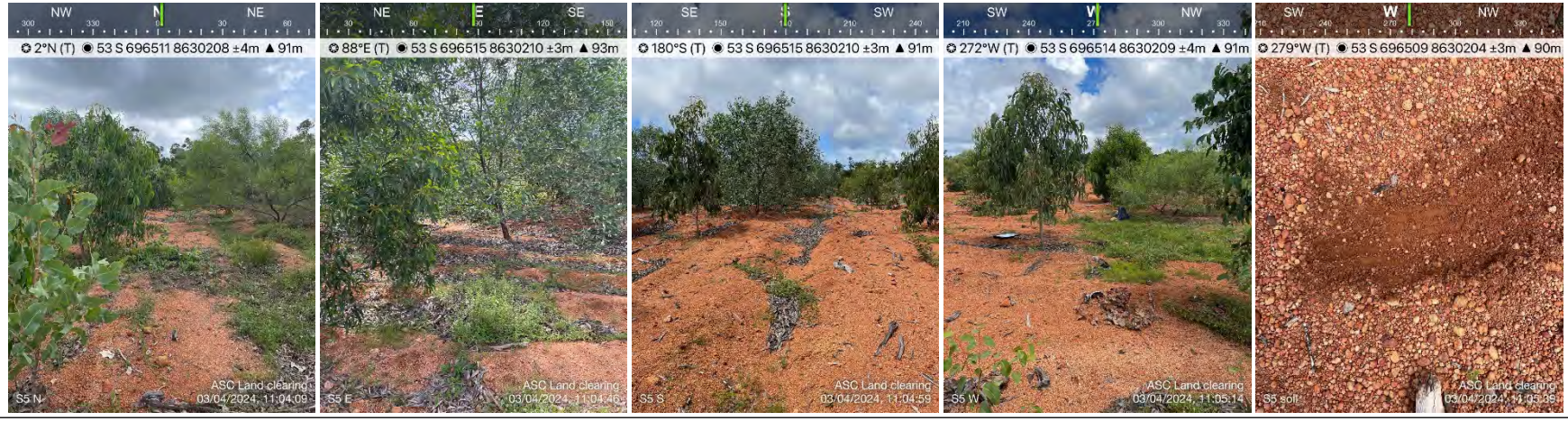


Vegetation site	S4			Land type	1 – plateau surface	
Vegetation type	Rehabilitated vegetation: *Acacia* high open shrubland with *Eucalypt* and *Corymbia* spp.					
Landform	Very gently inclined flat plateau surface. Slope <3% with northerly aspect.					
Surface soils	Light reddish brown sandy clay loam; with soil in loose trenches approx 20 cm high, running in N-S direction. Rapidly drained.			**Soil depth**	Not recorded	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	8	0	1	1	90	0
Threatening processes	None observed.					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	*None*	-	-	-
Mid stratum	*Acacia spp.* *Corymbia phoenicea* *E. tetrodonta*	1-4 2 2	3 2 2	10 5 5
Ground stratum	Isolated herbs; isolated *Acacia* and *Eucalypt* recruits			
Comment				

Vegetation site	S5			Land type	1 – plateau surface	
Vegetation type	Rehabilitated vegetation: *Acacia* high open shrubland with *Eucalypt* and *Corymbia* spp.					
Landform	Very gently inclined flat plateau surface. Slope <2% with westerly aspect.					
Surface soils	Light reddish brown sandy clay loam; soil in loose trenches approx. 20 cm high and spaced 30 cm apart. Rapidly drained.			Soil depth	Not recorded	
Ground cover (%)	Vegetation	Bare soil	Leaf litter	Rock	Gravel	Water
	30	0	5	5	60	0
Threatening processes	None observed					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	-	-	-	-
Mid stratum	*Acacia* spp. - mix *E. tetrodonta* *E. miniata*	2-6 3-4 3	4 3 3	15 5 1
Ground stratum	*L. humilis* *E. tetrodonta*	- -	- -	5 5
Comment				

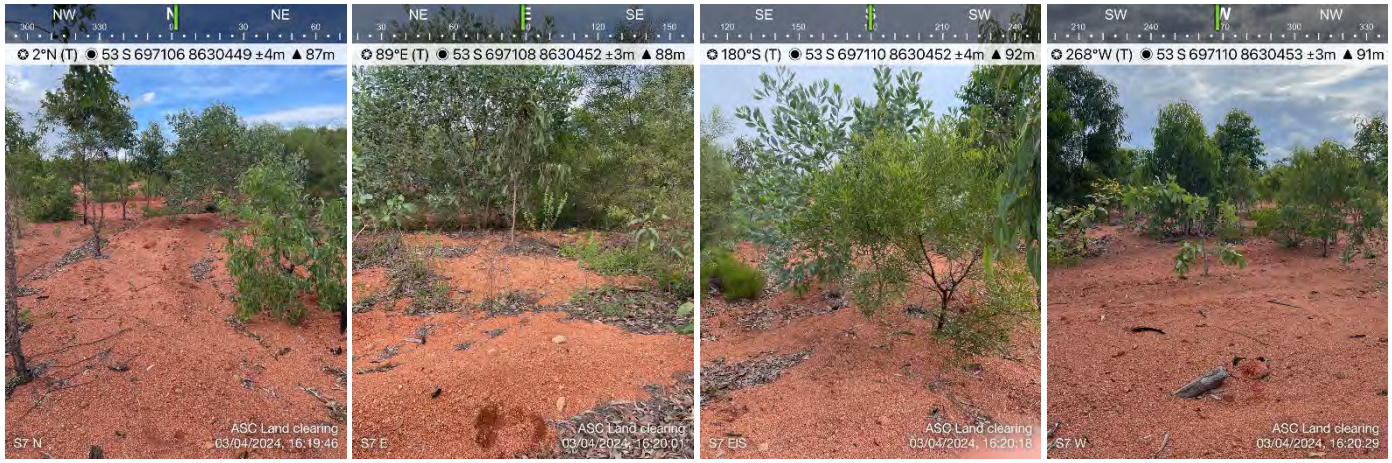


Vegetation site	S6			Land type	1 – plateau surface	
Vegetation type	*Eucalyptus tetrodonta* mid high open woodland with *Eucalyptus miniata* over *E. tetrodonta* and *E. miniata* high open shrubland with *Livistonia humilis*, over mid-high *Heteropogon triciceus* low sparse tussock grassland with *Erythrophloem chlorostachys* recruits.					
Landform	Gently inclined flat plateau surface. Slope 3-5% with northerly aspect					
Surface soils	Brown sandy clay loam; high in organic matter; 60% gravel (10-30 mm, average 20 mm). Rapidly drained.			**Soil depth**	>500 mm	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	33	0	25	2	40	0
Threatening processes	Minor earthworks nearby.					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	*E. tetrodonta* *E. miniata*	12-20 12-18	14 12	20 20
Mid stratum	*E. tetrodonta* *E. miniata* *L. humilis* *Pandanus spiralis*	2-10 2-10 2 1	4 4 2 1	10 10 5 2
Ground stratum	*Heteropogon triticeus* *Grevillea sp.*	- -	- -	5 1
Comment				

Vegetation site	S7			Land type	1 – plateau surface	
Vegetation type	Rehabilitated vegetation: *Acacia* high open shrubland with *Eucalypt* and *Corymbia* spp.					
Landform	Very gently inclined flat plateau surface. Slope 1-3% with westerly aspect.					
Surface soils	Light reddish brown sandy clay loam; soil in loose trenches approx. 20 cm high and spaced 30 cm apart. Rapidly drained.			**Soil depth**	Not recorded	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	10	0	15	5	70	0
Threatening processes	None observed					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	-	-	-	-
Mid stratum	*Mix of Acacia* spp. including *A. multisiliqua, A. holosericea,*	3-4	3	15
	Corymbia phoenicea	3	3	1
	E. tetrodonta	2-4	3	5
	Buchanania obovata	2	2	1
	Planchonia careya	2	2	1
	Grevillea pteridifolia.	2	2	5
Ground stratum	-	-	-	-
Comment				



Vegetation site	S8			Land type	1 – plateau surface	
Vegetation type	Rehabilitated vegetation: *Acacia* high open shrubland with *Eucalypt* and *Corymbia* spp.					
Landform	Very gently inclined flat plateau surface. Slope 1-3% with westerly aspect. .					
Surface soils	Light reddish brown sandy clay loam. Trenches in top-soil typically 10-20cm high and 20cm apart. Rapidly drained.			Soil depth	Not recorded	
Ground cover (%)	Vegetation	Bare soil	Leaf litter	Rock	Gravel	Water
	30	0	20	5	45	0
Threatening processes	None observed					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	-	-	-	-
Mid stratum	*Grevillea pteridifolia*	4-6	3	20
	Grevillea heliosperma	3	3	5
	Acacia spp. - various	3-4	3	15
	E. tetrodonta	2-4	3	5
	B. obovata	1	1	1
Ground stratum	-	-	-	-
Comment				

Vegetation site	S9			Land type	2 – plateau side slope	
Vegetation type	*Eucalyptus tetrodonta* mid high woodland with *Eucalyptus miniata* over *Erythroploem chlorostacys* high open shrubland, over mid-high *Heteropogon triciceus* low sparse tussock grassland with *Erythrophloem chlorostachys* recruits.					
Landform	Steep maximal upper slope. Slope 45% with northerly aspect.					
Surface soils	Dark brown sandy loam with organic material present. 10% rocks 20-60 mm (average 30 mm). Very rapidly drained.			Soil depth	>500 mm	
Ground cover (%)	Vegetation	Bare soil	Leaf litter	Rock	Gravel	Water
	9	0	80	10	1	0
Threatening processes	Recent fire scars ~1 m high.					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	*E. tetrodonta*	8-12	10	30
Mid stratum	*E. chlorostachys*	2-10	6	20
	B. megaphyllus	1-2	1	2
	Canarium australianum	0-2	1	2
	L. humilis	1-2	2	10
Ground stratum	*Alloteropsis semialata*	-	-	2
	H. triticeus	-	-	1
	B. obovata recruits	-	-	5
Comment	Medium height *E. chlorostachys* are dominant in mid-story here and much taller than at other sites. Two low *P. spiralis* trees noted on plateau surface nearby.			

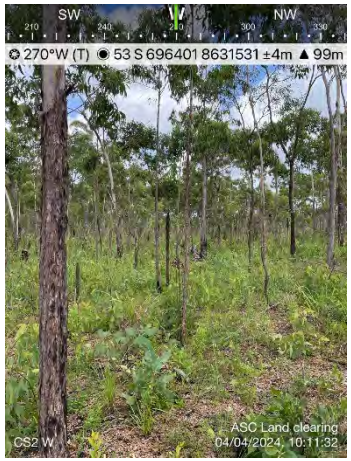
Vegetation site	S10			Land type	1 – plateau surface	
Vegetation type	*E. tetrodonta* and *E. minitata* mid high open woodland over *E. tetrodonta* high open shrubland with *Livistonia humilis*, over mid-high *Heteropogon triticeus* low sparse tussock grassland.					
Landform	Very gently inclined flat: plateau surface. Slope 1% with south-easterly aspect.					
Surface soils	Light brown sandy clay loam; 40% rocks. Rapidly drained			**Soil depth**	Bedrock at 150 mm	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	20	0	30	40	10	0
Threatening processes	No recent fire scars, many recruits. Estimate fire >2 years ago at this site.					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	*E. tetrodonta* *E. miniata*	12-14 10-12	13 11	20 15
Mid stratum	*E. tetrodonta* *E. miniata* *L. humilis* *B. megaphyllus* *B. obovata*	1-3 1-3 1-2 1-3 1	2 2 2 2 1	5 2 5 5 5
Ground stratum	*Alloteropsis semialata* *Heteropogon triticeus*	- -	- -	5 5
Comment				

Vegetation site	S11			Land type	1 – plateau surface	
Vegetation type	*E. tetrodonta* and *E. minitata* mid high open woodland over *E. tetrodonta* high open shrubland with *Livistonia humilis*, over mid-high *Heteropogon triticeus* low sparse tussock grassland.					
Landform	Very gently inclined flat plateau surface. Slope 3% with westerly aspect.					
Surface soils	Light reddish brown sandy loam; 30% large rocks on surface up to 500mm. Rapidly drained.			**Soil depth**	Bedrock at 250 mm	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	20	0	40	30	10	0
Threatening processes	Recent fire scars 1-2m (within 1 year).					
Vegetation	**Dominant species**			**Height range (m)**	**Average height (m)**	**Cover (%)**
Upper stratum	*E. tetrodonta* *E. miniata*			10-12 10-12	11 11	30 40
Mid stratum	*L. humilis* *P. spiralis*			1-3 3	2 3	10 1
Ground stratum	*A. semialata* *H. triticeus*			- -	- -	10 5
Comment	*E. miniata* slightly more dominant in this localised patch. *B. obovata* and *B. megaphyllus* absent.					

Vegetation site	S12			Land type	1 – plateau surface	
Vegetation type	*E. tetrodonta* mid high open woodlandwith *E. miniata* over *L. humilis* high open shrubland, over *H. triticeus* and *A. semialata* low sparse tussock grassland.					
Landform	Very gently inclined flat plateau surface. Slope 3% with southerly aspect.					
Surface soils	Light reddish brown sandy loam. Very few rocks. Surface gravel 5-10 mm. Rapidly drained.			**Soil depth**	Bedrock at 450 mm	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	28	2	10	0	60	0
Threatening processes						

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	*E. tetrodonta* *E. miniata*	10-20 8-18	12 12	20 5
Mid stratum	*E. tetrodonta* *L. humilis* *B. obovata*	0-1 0-2 1	1 1 1	30 5 1
Ground stratum	*H. triticeus* *Alloteropsis semialata* *B. megaphyllus*	- - -	- - -	5 1 1
Comment	Area has been rehabilitated (Klaus Helm, pers. comms. April 2024). Evidence of large tree-felling.			

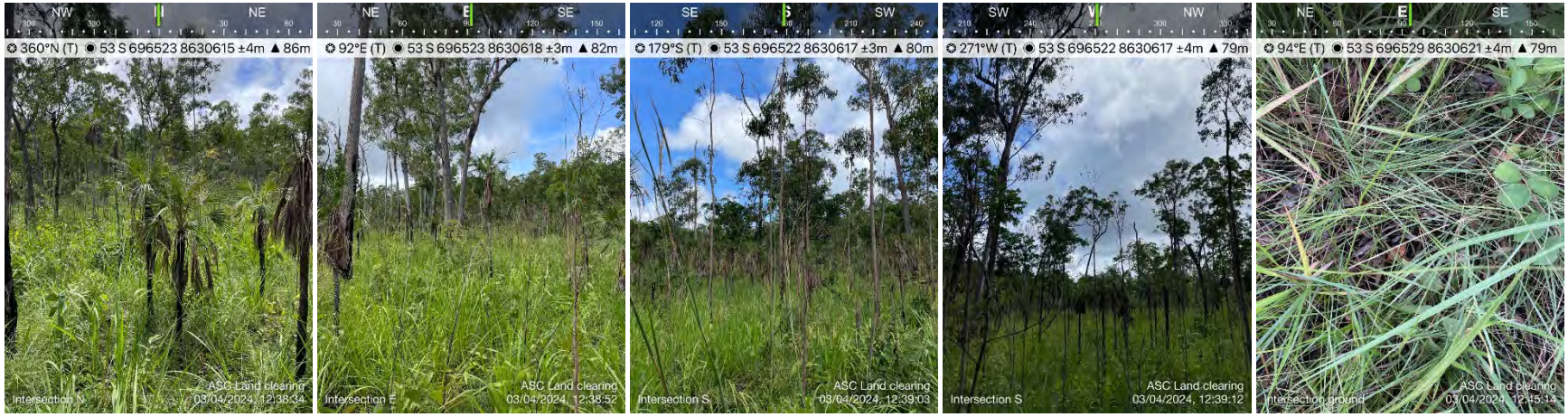


Vegetation site	S13			Land type	2 – plateau side slope	
Vegetation type	*E. tetrodonta* and *E. miniata* mid high open woodland over *E. tetrodonta* high open shrubland with *L. humilis*, over *H. triticeus* and *A. semialata* mid-high sparse tussock grassland.					
Landform	Steep simple slope. Slope 45% with westerly aspect.					
Surface soils	Brown sandy loam; 10% rocks. Very rapidly drained.			**Soil depth**	>500 mm	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	60	0	20	10	10	0
Threatening processes						

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	*E. tetrodonta*	12-20	14	45
	E. miniata	12	12	2
Mid stratum	*L. humilis*	1-3	2	10
	P. spiralis	2	2	2
	E. tetrodonta	3-10	5	5
	E. miniata	3-10	5	5
Ground stratum	*Alloteropsis semialata*	-	-	5
	H. triticeus	-	-	20
	Mnesithea rottboellioides	-	-	5
	Acacia spp.	-	-	5
	B. megaphyllus	-	-	5
Comment	Many *E. chlorostachys* resprouts			

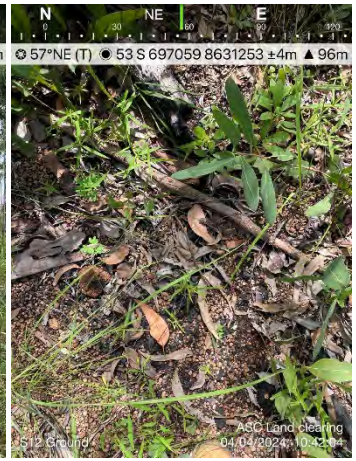
Vegetation site	CS1 (intersection of drainage channels)			Land type	3 – plateau foot slopes	
Vegetation type	*E. tetrodonta* mid high open woodland over *P. spiralis, L. humilis* and *E. chlorostachys* high open shrubland.					
Landform	Very gently open depression: drainage depression. Slope <3% with north-westerly aspect.					
Surface soils	Brown sandy clay loam			**Soil depth**	>500 mm	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	83	5	10	0	2	0
Threatening processes	-					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	-	-	-	-
Mid stratum	-	-	-	-
Ground stratum	-	-	-	-
Comment	This site was outside of project area, at the intersection of several drainage channels and downstream of the proposed dam. Most old-growth trees in this area (approx. 6 tree between 40-50 cm diametre) have been felled. Large logs relatively common in this area. No *Melaleuca* spp. observed at this site or near by.			



Vegetation site	CS2			Land type	1 – plateau surface	
Vegetation type	*E. tetrodonta* and *E. miniata* mid high open woodland over *E. tetrodonta* high open shrubland with *L. humilis*, over *H. triticeus* and *A. semialata* Mid-high sparse tussock grassland.					
Landform	Very gently inclined flat: plateau surface. Slope 1-3% with south-westerly aspect.					
Surface soils	Light reddish brown sandy loam. Very few rocks. Surface gravel 5-10 mm. Rapidly drained.			**Soil depth**	Bedrock at 530 mm	
Ground cover (%)	**Vegetation**	**Bare soil**	**Leaf litter**	**Rock**	**Gravel**	**Water**
	-	-	-	-	-	-
Threatening processes	-					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	*E. tetrodonta* *E. miniata*	- -	- -	- -
Mid stratum	*L. humilis*	-	-	-
Ground stratum	*A. semialata* *H. triticeus*	- -	- -	- -
Comment	Very similar in structure and composition to CS2 however more dense upper and ground strata, and a less dense mid-story. Area was historically used for Woomera satellite tracking station housing and has been rehabilitated (Klaus Helm, pers. comms. April 2024).			



Vegetation site	CS3			Land type	3 – plateau foot slopes	
Vegetation type	*E. tetrodonta* mid high open woodland with *E. miniata* over *P. spiralis, L. humilis* and *E. chlorostachys* high open shrubland. Mid-high sparse tussock grassland.					
Landform	Very gently inclined flat: plateau surface. Slope 1-3% with south-westerly aspect.					
Surface soils	Brown sandy clay loam			Soil depth	>500 mm	
Ground cover (%)	Vegetation	Bare soil	Leaf litter	Rock	Gravel	Water
	85	5	10	0	2	0
Threatening processes	-					

Vegetation	Dominant species	Height range (m)	Average height (m)	Cover (%)
Upper stratum	-	-	-	-
Mid stratum	-	-	-	-
Ground stratum	-	-	-	-
Comment	Similar to check-site CS1, which is 250m to north-west. Has high proportion of large trees in this area. No *Melaleuca* spp. observed at this site or nearby. Fallen logs common throughout area. Approximately 6 large trees felled here.			

APPENDIX B PROTECT MATTERS SEARCH TOOL (PMST) REPORT

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 23-Apr-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	47
Listed Migratory Species:	55

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	8
Commonwealth Heritage Places:	None
Listed Marine Species:	88
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	1
Habitat Critical to the Survival of Marine Turtles:	5

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	3
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	10
Key Ecological Features (Marine):	1
Biologically Important Areas:	11
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places			[Resource Information]
Name	State	Legal Status	Buffer Status
Indigenous			
Wurrwurrwuy	NT	Listed place	In buffer area only

Commonwealth Marine Area	[Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name	Buffer Status
Commonwealth Marine Areas (EPBC Act)	In buffer area only
Commonwealth Marine Areas (EPBC Act)	In buffer area only

Listed Threatened Species			[Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris tenuirostris			
Great Knot [862]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Charadrius leschenaultii			
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat known to occur within area	In feature area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat may occur within area	In feature area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat may occur within area	In buffer area only
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area	In feature area
FISH			
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area	In feature area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area	In feature area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Mesembriomys gouldii gouldii Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga, Manbul [87618]	Endangered	Species or species habitat known to occur within area	In feature area
Notomys aquilo Northern Hopping-mouse, Woorrentinta [123]	Endangered	Species or species habitat known to occur within area	In feature area
Petrogale concinna canescens Nabarlek (Top End) [87606]	Endangered	Species or species habitat likely to occur within area	In feature area
Phascogale pirata Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat may occur within area	In feature area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Trichosurus vulpecula arnhemensis](#) Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Xeromys myoides](#) Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area	In feature area
PLANT			
[Erythroxylum sp. Cholmondely Creek (J.R.Clarkson 9367) (Northern Territory Population)](#) [91740]	Vulnerable	Species or species habitat known to occur within area	In feature area
REPTILE			
[Acanthophis hawkei](#) Plains Death Adder [83821]	Vulnerable	Species or species habitat may occur within area	In feature area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In buffer area only
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area	In buffer area only
[Lepidochelys olivacea](#) Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area	In buffer area only
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area	In buffer area only
[Tiliqua scincoides intermedia](#) Northern Blue-tongued Skink [89838]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Varanus mertensi			
Mertens' Water Monitor, Mertens's Water Monitor [1568]	Endangered	Species or species habitat known to occur within area	In feature area
SHARK			
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Glyphis garricki			
Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area	In buffer area only
Glyphis glyphis			
Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Pristis clavata			
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Pristis zijsron			
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sphyrna lewini			
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus			
Common Noddy [825]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat likely to occur within area	In buffer area only
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area	In buffer area only
[Fregata minor](#) Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area	In buffer area only
[Onychoprion anaethetus](#) Bridled Tern [82845]		Breeding known to occur within area	In buffer area only
[Phaethon lepturus](#) White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
[Sterna dougallii](#) Roseate Tern [817]		Breeding known to occur within area	In buffer area only
[Sterna sumatrana](#) Black-naped Tern [800]		Breeding known to occur within area	In buffer area only
[Sternula albifrons](#) Little Tern [82849]		Species or species habitat may occur within area	In buffer area only
Migratory Marine Species			
[Anoxypristis cuspidata](#) Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area	In buffer area only
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In buffer area only
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Dugong dugon Dugong [28]		Species or species habitat likely to occur within area	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area	In buffer area only
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area	In buffer area only
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat likely to occur within area	In buffer area only
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area	In buffer area only
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area	In buffer area only
Migratory Terrestrial Species			
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Cuculus optatus](#) Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat may occur within area	In feature area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
[Acrocephalus orientalis](#) Oriental Reed-Warbler [59570]		Species or species habitat may occur within area	In feature area
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Calidris canutus](#) Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
[Calidris tenuirostris](#) Great Knot [862]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area	In feature area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area	In feature area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In buffer area only
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Defence		
Defence - NHULUNBUY TRG DEP [70065]	NT	In buffer area only

Commonwealth Land Name	State	Buffer Status
Defence - NHULUNBUY TRG DEP [70064]	NT	In buffer area only
Defence - NHULUNBUY TRG DEP [70067]	NT	In buffer area only
Defence - NHULUNBUY TRG DEP [70066]	NT	In buffer area only
Defence - NORFORCE DEPOT - NHULUNBUY [70070]	NT	In buffer area only
Unknown		
Commonwealth Land - [71140]	NT	In feature area
Commonwealth Land - [70971]	NT	In buffer area only
Commonwealth Land - [70970]	NT	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat may occur within area overfly marine area	In feature area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous stolidus Common Noddy [825]		Breeding known to occur within area	In buffer area only
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In buffer area only
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area	In buffer area only
Cecropis daurica as Hirundo daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat may occur within area overfly marine area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area	In buffer area only
[Fregata minor](#) Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area	In buffer area only
[Glareola maldivarum](#) Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area	In feature area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat may occur within area overfly marine area	In feature area
[Limnodromus semipalmatus](#) Asian Dowitcher [843]	Vulnerable	Species or species habitat may occur within area overfly marine area	In buffer area only
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
[Limosa limosa](#) Black-tailed Godwit [845]	Endangered	Species or species habitat likely to occur within area overfly marine area	In buffer area only
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Onychoprion anaethetus as Sterna anaethetus			
Bridled Tern [82845]		Breeding known to occur within area	In buffer area only
Pandion haliaetus			
Osprey [952]		Breeding known to occur within area	In buffer area only
Phaethon lepturus			
White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Rhipidura rufifrons			
Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Sterna dougallii			
Roseate Tern [817]		Breeding known to occur within area	In buffer area only
Sterna sumatrana			
Black-naped Tern [800]		Breeding known to occur within area	In buffer area only
Sternula albifrons as Sterna albifrons			
Little Tern [82849]		Species or species habitat may occur within area	In buffer area only
Thalasseus bergii as Sterna bergii			
Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area	In buffer area only
Fish			
Campichthys tricarinatus			
Three-keel Pipefish [66192]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Choeroichthys brachysoma](#) Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area	In buffer area only
[Choeroichthys suillus](#) Pig-snouted Pipefish [66198]		Species or species habitat may occur within area	In buffer area only
[Corythoichthys amplexus](#) Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area	In buffer area only
[Corythoichthys flavofasciatus](#) Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area	In buffer area only
[Corythoichthys haematopterus](#) Reef-top Pipefish [66201]		Species or species habitat may occur within area	In buffer area only
[Doryrhamphus excisus](#) Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area	In buffer area only
[Doryrhamphus janssi](#) Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area	In buffer area only
[Festucalex cinctus](#) Girdled Pipefish [66214]		Species or species habitat may occur within area	In buffer area only
[Halicampus brocki](#) Brock's Pipefish [66219]		Species or species habitat may occur within area	In buffer area only
[Halicampus grayi](#) Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area	In buffer area only
[Halicampus spinirostris](#) Spiny-snout Pipefish [66225]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area	In buffer area only
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area	In buffer area only
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area	In buffer area only
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area	In buffer area only
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area	In buffer area only
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area	In buffer area only
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area	In buffer area only
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area	In buffer area only
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area	In buffer area only
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area	In buffer area only
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Trachyrhamphus longirostris](#) Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area	In buffer area only
Mammal			
[Dugong dugon](#) Dugong [28]		Species or species habitat likely to occur within area	In buffer area only
Reptile			
[Aipysurus duboisii](#) Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area	In buffer area only
[Aipysurus laevis](#) Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area	In buffer area only
[Aipysurus mosaicus as Aipysurus eydouxii](#) Mosaic Sea Snake [87261]		Species or species habitat may occur within area	In buffer area only
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In buffer area only
[Crocodylus johnstoni](#) Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area	In feature area
[Crocodylus porosus](#) Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area	In feature area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area	In buffer area only
Hydrophis atriceps Black-headed Sea Snake [1101]		Species or species habitat may occur within area	In buffer area only
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area	In buffer area only
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area	In buffer area only
Hydrophis hardwickii as Lapemis hardwickii Spine-bellied Sea Snake [93516]		Species or species habitat may occur within area	In buffer area only
Hydrophis inornatus Plain Sea Snake [1107]		Species or species habitat may occur within area	In buffer area only
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area	In buffer area only
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area	In buffer area only
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area	In buffer area only
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area	In buffer area only
Hydrophis pacificus Pacific Sea Snake, Large-headed Sea Snake [1112]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area	In buffer area only
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area	In buffer area only
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area	In buffer area only
Hydrophis zweiffei as Enhydrina schistosa Australian Beaked Sea Snake [93514]		Species or species habitat may occur within area	In buffer area only
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area	In buffer area only
Parahydrophis mertoni Arafura Smooth Sea Snake, Northern Mangrove Sea Snake [1090]		Species or species habitat may occur within area	In buffer area only

Whales and Other Cetaceans			[Resource Information]
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area	In buffer area only
Sousa sahulensis Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area	In buffer area only
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories	Buffer Status
Wessel	Habitat Protection Zone (IUCN IV)	In buffer area only

Habitat Critical to the Survival of Marine Turtles [Resource Information]

Scientific Name	Behaviour	Presence	Buffer Status
Aug - Sep			

Scientific Name	Behaviour	Presence	Buffer Status
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur	In buffer area only
Dec - Jan			
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur	In buffer area only
Dermochelys coriacea Leatherback Turtle [1768]	Nesting	Known to occur	In buffer area only
May - Jul			
Lepidochelys olivacea Olive Ridley Turtle [1767]	Nesting	Known to occur	In buffer area only
Nov - May			
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur	In buffer area only

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Dhimurru	Indigenous Protected Area	NT	In feature area
Dhimurru	Indigenous Protected Area	NT	In buffer area only
Laynhapuy - Stage 1	Indigenous Protected Area	NT	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Katherine to Gove Gas Pipeline Project	2012/6605	Controlled Action	Post-Approval	In buffer area only
PNG-Qld Gas Pipeline - Gove Lateral	2006/2615	Controlled Action	Completed	In buffer area only
Trans-territory Gas Pipeline	2003/1186	Controlled Action	Completed	In buffer area only
Not controlled action				
Borrow area development, Gove operations, Rio Tinto Aluminium, Nhulunbuy NT	2017/8114	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
External Borrow Pit for Pond 6 South	2011/5970	Not Controlled Action	Completed	In buffer area only
GMC Dhupuma Plateau Bauxite Mine, Gove, NT	2016/7826	Not Controlled Action	Completed	In feature area
Gove Alumina Refinery Expansion	2003/1068	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
External Borrow Pit for Stage 2 Construction of Additional Waste Storage Pond 8, NT	2011/5849	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
temporary boat disposal	2005/2281	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Referral decision				
Addtional , Standalone Containment Pond	2012/6347	Referral Decision	Completed	In buffer area only

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region	Buffer Status
Gulf of Carpentaria basin	North	In buffer area only

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence	Buffer Status
Marine Turtles			
Chelonia mydas Green Turtle [1765]	Foraging	Likely to occur	In buffer area only
Chelonia mydas Green Turtle [1765]	Internesting	Likely to occur	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting	Likely to occur	In buffer area only
Lepidochelys olivacea Olive Ridley Turtle [1767]	Internesting	Likely to occur	In buffer area only
Natator depressus Flatback Turtle [59257]	Internesting	Likely to occur	In buffer area only
Seabirds			

Scientific Name	Behaviour	Presence	Buffer Status
Anous stolidus Common Noddy [825]	Breeding	Known to occur	In buffer area only
Onychoprion anaethetus Bridled Tern [82845]	Breeding	Known to occur	In buffer area only
Onychoprion anaethetus Bridled Tern [82845]	Breeding (high numbers)	Known to occur	In buffer area only
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur	In buffer area only
Sterna dougallii Roseate Tern [817]	Breeding (high numbers)	Known to occur	In buffer area only
Thalasseus bergii Crested Tern [83000]	Breeding	Known to occur	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

EcOz Environmental Consultants

EcOz Pty Ltd.
ABN 81 143 989 039

Level 1, 70 Cavenagh St,
GPO Box 381,
Darwin NT 0801

T: +61 8 8981 1100
E: ecoz@ecoz.com.au

www.ecoz.com.au

EQUATORIAL LAUNCH AUSTRALIA

ASC Stakeholder Engagement Plan

ELA-000178

VERSION 1.0

VERSION APPROVAL

	Name	Role	Date	Signed
Prepared	Ben Tett	General Manager, Launch and Operations	13/03/2024	
Reviewed	Amanda Hudswell	Head of Marketing and Communications	26/03/2024	
Endorsed				
Approved	Michael Jones	CEO, Equatorial Launch Group	05/04/2024	

APPROVAL HISTORY

CR No.	Title	Date
CR-000027	Acceptance into ASC Baseline	23/04/2024

TABLE OF CONTENTS

1 PURPOSE 4
2 REFERENCES 4
2.1 External References 4
2.2 ELA Documents 4
2.4 Definitions and Acronyms 5
3 PROPOSAL AND REGULATORY REQUIREMENTS 5
4 PREVIOUS ENGAGEMENT 6
5 STAKEHOLDER ENGAGEMENT APPROACH 6
5.1 Nature of Activities at ASC and Segmentation of Stakeholders 6
5.2 Engagement Principles 8
5.3 Engagement Approach 9
5.4 Stakeholder List and Engagement Commitments 9
5.5 Engaging with Aboriginal Stakeholders 11
5.6 Resources and Responsibilities 11
5.7 Stakeholder Feedback, Evaluation and Review (Monitoring) 12
6 REPORTING STAKEHOLDER ENGAGEMENT 13
6.1 Northern Territory Environmental Protection Act Objectives 13
7 ANNEXES 13

LIST OF FIGURES

FIGURE 1: KEY ORBITAL LAUNCH TRAJECTORIES (RED) FOR CUSTOMERS 6
FIGURE 2: LIKELY LAUNCH TRAJECTORIES HIGHLIGHTING ALTITUDE OF ORBITAL ROCKETS VS GENERAL AVIATION 7
FIGURE 3: STAKEHOLDER ENGAGEMENT LEVELS 9

LIST OF TABLES

TABLE 1: ASC STAKEHOLDER IIAP2 COMMITMENTS 9

1 PURPOSE

The Arnhem Space Centre (ASC) Stakeholder Engagement Plan has been developed to define the approach undertaken by Equatorial Launch Australia (ELA) in relation to stakeholder engagement during Phase 2 expansion and subsequent launch operations undertaken at the ASC.

The objectives of the plan are:

1. To describe the communication approaches for impacted and potentially affected communities (near site and also specific requirements during launches), and identifying culturally appropriate methods of communication,
2. To describe the ASC approach for community awareness and potential involvement during site expansion activities and launch operations activities as appropriate for the stakeholders impacts,
3. To recognise the role that Aboriginal people and other landowners have as stewards of their country and the importance of participation of Aboriginal people, landowners and communities in environmental and recovery decision making processes,
4. To identify the actions required for implementation to create and build relationships with key stakeholders, gaining local support and maximising positive benefits,
5. To identify and plan the actions and activities required to support meeting legislative requirements (references A through E) to engage with stakeholders for land access, agreements and approvals.

This plan does not include ELA customer stakeholders which are Australian or international launch companies ("Clients") seeking to launch with ELA.

2 REFERENCES

2.1 EXTERNAL REFERENCES

Serial	Title	Author	Version
A	Environment Protection Act 2019 (NT)	NT Government	Latest Version
B	Environment Protection Regulations 2020 (NT)	NT Government	
C	Environment Protection and Biodiversity Conservation Act 1999 (Cth)	Commonwealth of Australia	
D	Space (Launches and Returns) Act 2018 (Cth)	Commonwealth of Australia	
E	Space (Launches and Returns) Regulations (Cth)	Commonwealth of Australia	
F	Best Practice Guide for Remote Engagement and Coordination	NT Government	
G	NT EPA Stakeholder Engagement and Consultation Guidelines	NT Government	

2.2 ELA DOCUMENTS

Serial	DIN	Title	Version
H	ELA-00117	ASC Principles of Land and Water Access	3.0

2.4 DEFINITIONS AND ACRONYMS

Definitions and acronyms applicable to this document are listed below.

Term	Definition
Environment	As defined by Environment Protection Act 2019 (NT) s6 o all aspects of the surroundings of humans including physical, biological, economic, cultural and social aspects.
Impact	As defined by Environment Protection Act 2019 (NT) s10 o an event or circumstance that is a direct consequence of the action; or that is an indirect consequence of the action, and the action is a substantial cause of that event or circumstance.
Significant Impact	As defined by Environment Protection Act 2019 (NT) s 11 o an impact of major consequence having regard to: o the context and intensity of the impact; o the sensitivity, value and quality of the environment impacted on; and o the duration, magnitude and geographic extent of the impact.
Stakeholders	a) People or entities who are, or have the potential to be, directly or indirectly affected by a proposal and with an interest or stake in the outcome of a decision and/or the ability to influence its outcome, either positively or negatively. b) Stakeholders of a proposal undergoing environmental assessment can include individuals, communities, groups, non-government organisations, land councils, government agencies, industries and industry associations, and interest groups
Engagement	Involves communication, dialogue, listening and responding, and may involve formal consultation to meet legal requirements
Consultation	Involves two-way communication initiated by proponents to obtain feedback from stakeholders, usually through questions and answers
Up-Range	The area close to and around the launch site, typically defined around launch safety areas which are specific to each launch vehicle
Down-Range	The area away from the launch site, typically defined around the safety areas in which vehicle hardware may return (recovery areas).
Recovery Area	Area in which descending launch vehicle hardware (typically first stage booster motor) will land and be recovered from.

3 PROPOSAL AND REGULATORY REQUIREMENTS

ELA was founded in 2015 to develop multi-user commercial space launch capacity in Australia. ELA's mission is to be the pre-eminent multi-user, commercial space launch company providing world-class equatorial spaceport services, supporting test, launch, and recovery of space vehicles and payloads flown to and from all space orbits.

Phase 1 was completed in 2022 and Phase 2 will expand the ASC to the area that was previously the Gulkula South Mine and the Gulkula North Mine and will develop the final and preferred primary launch site on a total lease area of 630 ha. The affected area (including Phase 1 site) will be approximately 250-300 ha of land where the majority has been previously mined and in some smaller areas, partially rehabilitated by Gulkula Mine. An additional seven primary Launch Pads and seven back up pad locations with supporting infrastructure, including mission support buildings, fuel storage, and water storage for the launch deluge system, will be constructed from 2024 to 2026.

The key regulatory requirements for approval and operation of ASC as a space port are included in references A through E. The response to and application of these requirements are implemented through ELA's bespoke ASC operating model (people, policies, plans, procedures, systems) and is reviewed and approved by Australian Space Agency in application for the Launch Facility Licence (ALP) as well as checked before granting of each Australian Launch Permit (ALP).

4 PREVIOUS ENGAGEMENT

Through the entirety of its existence, and despite erroneous self-serving commentary to the contrary by a prominent but absolutely sole protagonist, ELA has undertaken extensive and constant engagement and information programs with local and affected community elements. Initial lease and environmental approval engagement including comprehensive consultation was conducted when establishing the ASC. This was assessed under the Environmental Assessment Act 1982 where the decision was made that the "potential" environmental (including social) impacts and risks of the proposed action were not so significant as to warrant environmental impact assessment by the NT EPA under provisions of the EA Act at the level of a Public Environmental Report or Environmental Impact Statement.

Through this process and that of building the initial site and implementing the NASA launch campaign, ELA established and refined the approach and protocols for engaging locally around the site as well as down-range when required for recovery. This improved approach is reflected in this plan.

5 STAKEHOLDER ENGAGEMENT APPROACH

5.1 NATURE OF ACTIVITIES AT ASC AND SEGMENTATION OF STAKEHOLDERS

The location of ASC is unique and allows for capability of both orbital and sounding launch trajectories. These areas are depicted in Figure 1 below with the primary aim (>98% of launches) of fulfilling the key orbital trajectories (red lines) East (Equatorial/Low inclination), South-East (Mid-inclination) and South (Polar and Sun-synchronous orbits). The small and shorter suborbital ranges (shaded areas) where all items from sub-orbital launches only are expected to return to earth and be recovered by ELA are of less demand by industry and expected to be activated less frequently (<2% of launches).

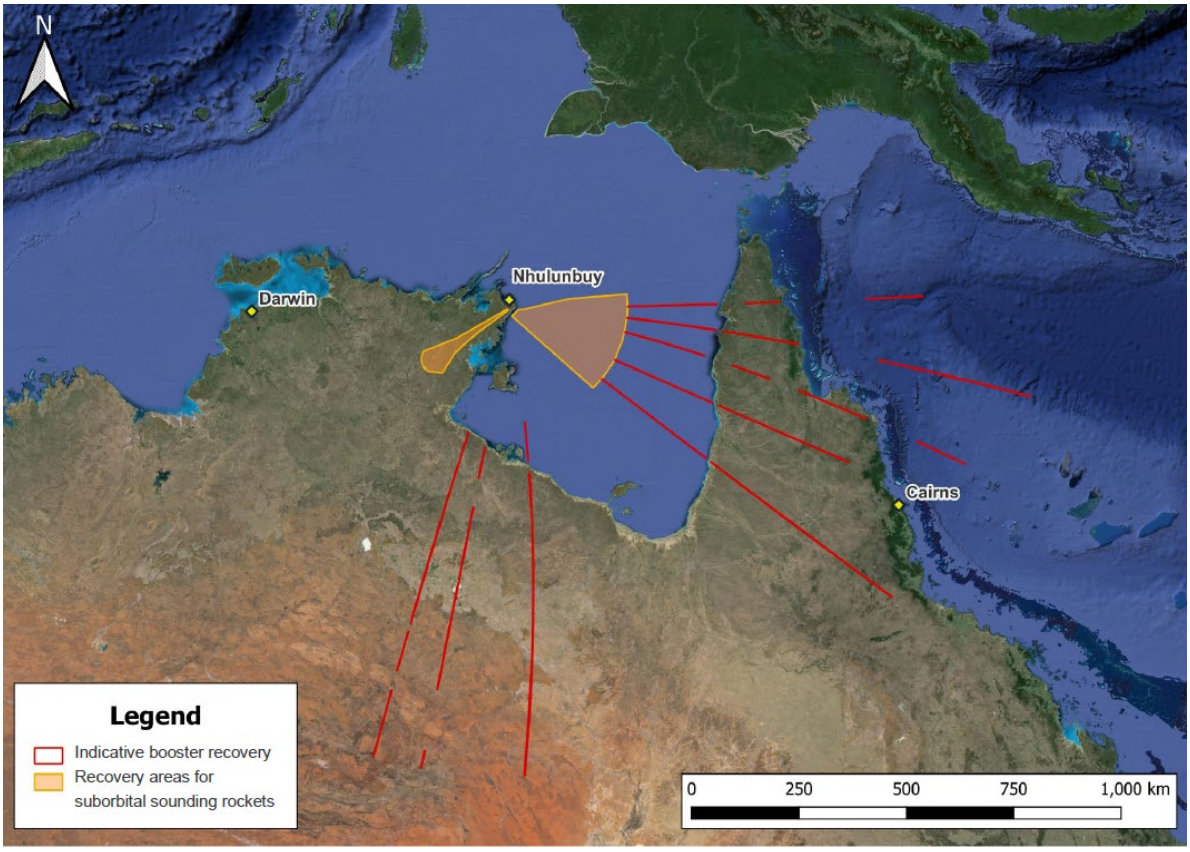


Figure 1: Sounding rocket areas and key Orbital Launch Trajectories (red) for Customers

Whilst the red lines on Figure 1 are used to depict the progression and trajectory of rockets during their flights and are where potential booster recovery will occur, the altitude (largely in space) are of absolutely no impact to either people or the environment. Figure 2 shows that for a typical flight path the rocket climbs vertically for more than 40kms and only turn "downrange" after this initial climb which is largely within the boundary of the ASC. Furthermore, this launch to space generally takes between 1-2mins.

It should be noted there is a mis-conception or perception that anyone who is close to the ground tracking path (black line) needs engagement. This is not correct, and depending on each launch specifics, only stakeholders in close proximity to the launch site and down-range recovery areas may be required to be engaged.

By the time the launch vehicle traverses (green line flight path) over any down-range land areas the launch vehicle is much, much higher (up to 60-90 times higher) than general aviation aircraft and moving into space with thousands of other satellites traversing over Australia every day.

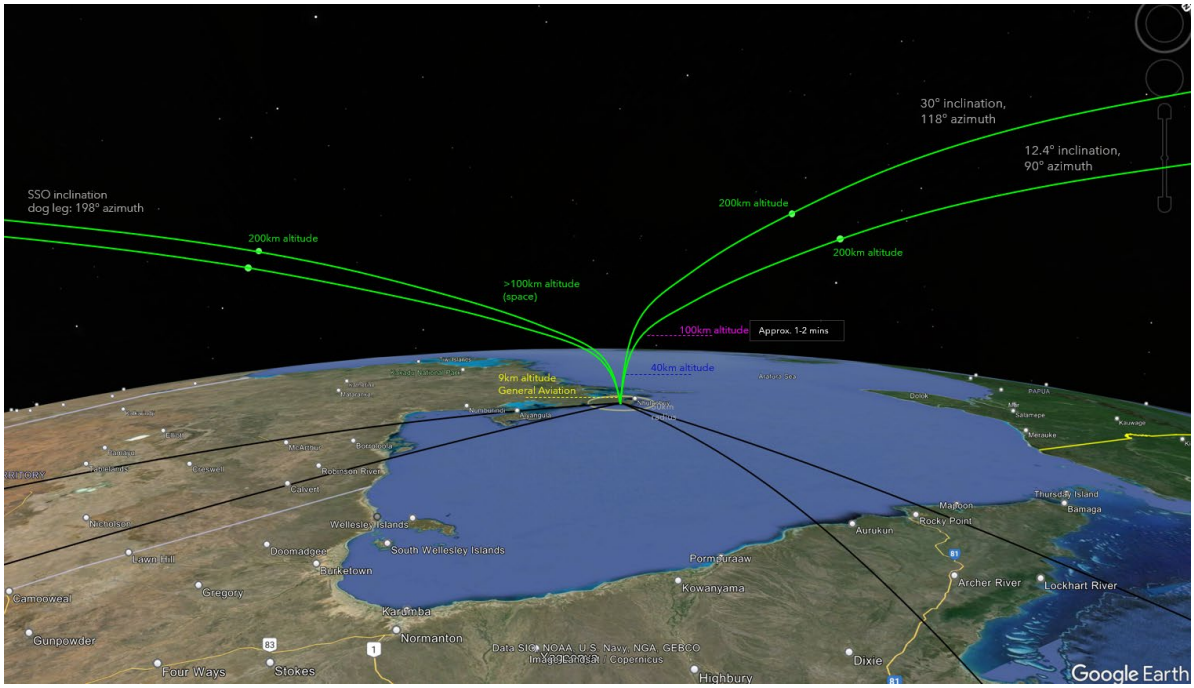


Figure 2: Likely Launch Trajectories highlighting altitude of orbital rockets vs general aviation

The details of each launch are not known and confirmed until ~9months prior to each launch. Due to the nature of launch variability, on both the direction and rocket type, the safety areas and procedures for each launch will be different, therefore ELA has separated stakeholders who could be potential affected by the operations of the ASC into 2 discrete categories:

1) Site development and local site operations; and/or
2) Launch operations.

Operational activities within categories (1) and (2) are summarised below, where it should be noted that Category 2 stakeholders are engaged only during the Australian Launch Permit process, which is specific to each rocket mission, and the timeline provided in Annex B.

The effectiveness of launch "up-range" (at the spaceport) and "down-range" (>500km from launch site where spent stages and fairings will be recovered for refurbishment) engagement is reviewed as part of every Australian Launch Permit (ALP) process with ASA and a launch cannot proceed until the ALP is granted.

Category 1: Site Development:

- Earth works, infrastructure construction such as large sheds, cement launch pads, storage facilities,

- Transport between Gove Port, Nhulunbuy and Kathrine to ASC for construction materials and consumables,
- On site accommodation for ELA and supporting construction staff.

Category 1: Site Operations:

- Transport between Gove Port, Nhulunbuy and Katherine for launch materials and consumables (may include dangerous goods),
- Site maintenance activities including cleaning, weed management, fire prevention etc,
- On site accommodation for ELA and launch clients.

Category 2: Launch Operations:

- Up-Range (close to site):
  - Establishing a launch safety area around ASC for public safety in accordance with the Launch Permit. This area will include restricting access to ASC for launch as well as a short distance away from site along the path of trajectory. Depending on the direction of launch and type of launch vehicle road closure for Bawaka Rd and removal of public from this launch safety area may be required for 30min.
- Down-Range (away from site):
  - If required, establishing a recovery public safety area around where any descending hardware is projected to land in accordance with the Launch Permit. Depending on the direction of launch and type of launch vehicle road closures and removal of public from this safety area may be required for 30min.
  - Recovery operations to retrieve the descending hardware (stage 1 booster motor) and remediate the impact site – this may be achieved through 4x4 vehicles, helicopter or boat.

5.2 ENGAGEMENT PRINCIPLES

ELA's principles for local engagement stem from our company values and are as follows:

Respect	We have respect for each other and all those we deal with. In particular, we respect traditional peoples of our land and the lasting relationship we have with them. We take care to be open to alternative views and to listen as well as speak. We respect our stakeholders' expertise and knowledge and appreciate the benefits of mutual learning.
Integrity	We act honestly and with the highest ethical standards. Always.
Purposeful	We begin every engagement with a clear understanding of what we want to achieve. We support the activity as a process to make better decisions and incorporate the interests and concerns of impacted stakeholders.
Inclusive and flexible	We identify relevant stakeholders and make it easy for them to engage. We recognise the different communication needs and preferences of stakeholders and endeavour to meet these wherever possible.
Timely	We involve impacted stakeholders from the start and agree on when and how to engage. We will adapt the plan and/or process if the engagement is not achieving its intended purpose and objectives.
Transparent	We are open and honest in our engagement and set clear expectations. We will explain the engagement process, the role of stakeholders in the engagement process and communicate how their input will inform the Project.

5.3 ENGAGEMENT APPROACH

ELA is committed to an open and transparent engagement and has adopted the NT EPA recommended (reference G) International Association of Public Participation (IAP2) framework in Figure 3.

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain feedback on analysis alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provided feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provided feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible	We will implement what you decide.

Figure 3: Stakeholder Engagement Levels

5.4 STAKEHOLDER LIST AND ENGAGEMENT COMMITMENTS

In Table 1 ELA has mapped the key ASC stakeholders against each Category and applying the level of the IAP2 commitments based on their level of being affected for that Category as well as level of influence on a positive outcome.

As ELA's lease holder, the Gumatj Traditional Owner Corporation is the only impacted entity and hence is the only stakeholder with the INVOLVE IAP2 commitment.

Table 1: ASC Stakeholder IAP2 Commitments

Stakeholder List	Category 1		Category 2	
	Site Development	Site Operations	Launch Operations	
			Up-Range	Down-Range
Gumatj Aboriginal Corporation (landlord)	INVOLVE	INVOLVE	INVOLVE	N/A
Northern Land Council including community consultation at a regional level	INFORM	N/A	N/A	N/A

Stakeholder List	Category 1		Category 2	
	Site Development	Site Operations	Launch Operations	
			Up-Range	Down-Range
Central Land Council including community consultation at a regional level	N/A	N/A	N/A	CONSULT
Andilyakwa Land Council (Groote Eylandt)	N/A	N/A	N/A	CONSULT (possible airspace impacts)
Traditional Owners • Dhimurru Aboriginal Corporation • Laynhapuy Homelands Aboriginal Corporation • Rirratjingu Aboriginal Corporation • Mimal Aboriginal Corporation • Afura Swamp Rangers • Southern East Arnhem Limited (SEAL) IPA Aboriginal Corporation	INFORMED	INFORMED	CONSULT (dependent on launch)	CONSULT (dependent on launch)
Nhulunbuy Town Board	INFORMED	INFORMED	N/A	N/A
Nhulunbuy Construction Suppliers and Service Providers	INFORMED	INFORMED	N/A	N/A
East Arnhem Schools	INFORMED	INFORMED	N/A	N/A
East Arnhem Land Tourism Association	INFORMED	INFORMED	N/A	N/A
East Arnhem Regional Council – local authorities in Yirrkala and Gunyangara	INFORMED	INFORMED	N/A	N/A
Regional Economic Development Committee	INFORMED	INFORMED	N/A	N/A
NT Government	INFORMED	INFORMED	INFORMED	INFORMED
Australian Space Agency (ASA)	INFORMED	INFORMED	INFORMED	INFORMED
NT EPA	INFORMED	INFORMED	INFORMED	INFORMED
Nature Positive Regulation Division | Environment Assessments West Branch | SA & NT Section (Department of Climate Change, Environment, Energy and Water)	INFORMED	INFORMED	INFORMED	INFORMED
Parks Australia (Department of Climate Change, Environment, Energy and Water)	N/A	N/A	N/A	CONSULT
Aboriginal Authority Protection Agency (AAPA)	INFORMED	N/A	INFORMED	CONSULT (dependent on launch)
Gove Airport	INFORMED	INFORMED	CONSULT	N/A
Gulkula Mine	INFORMED	CONSULT	CONSULT	N/A
Rio Tinto Gove Operations	INFORMED	INFORMED	N/A	N/A
Developing East Arnhem Land (DEAL)	INFORMED	INFORMED	N/A	N/A
NT Worksafe	INFORMED	CONSULT	N/A	N/A
Air Services Australia	N/A	N/A	CONSULT	CONSULT
CASA	N/A	N/A	CONSULT	CONSULT
Australian Boarder Force	N/A	INFORMED	N/A	N/A
Defence Export Controls	N/A	INFORMED	N/A	N/A
ACMA	N/A	INFORMED	N/A	N/A
AMSA	N/A	INFORMED	N/A	N/A

Stakeholder List	Category 1		Category 2	
	Site Development	Site Operations	Launch Operations	
			Up-Range	Down-Range
NT CMC	INFORMED	INFORMED	INFORMED	INFORMED
Nhulunbuy EMS (Fire, Police, Emergency)	INFORMED	INFORMED	CONSULT	N/A
Recovery area EMS (Fire, Police, Emergency)	N/A	N/A	N/A	CONSULT
Australian Maritime Safety Office	N/A	N/A	N/A	CONSULT
Australian Defence Force	N/A	N/A	INFORMED	INFORMED

5.4.1 CONTACT INFORMATION

The contact information (redacted individual names for public release) for ELA's stakeholders is found at Annex D. This list is maintained and updated before each launch as a requirement by the Space Act legislation and is critical in the support of key ASC operating communication procedures.

5.5 ENGAGING WITH ABORIGINAL STAKEHOLDERS

ELA is committed to engaging with Aboriginal communities in a culturally appropriate manner and aims to apply the guidance materials at reference G and summary table in Annex A. Critically and to good effect, ELA has regular engagement with, and has relied on, local Aboriginal Elders, Aboriginal Organisation CEOs and key community officials (NT Government, local land councils, community groups/forums) to provide feedback and support.

Applying this approach, ELA formed and matured the Safety and Retrieval Committee (SRC) leading into the NASA campaign and has been running this regularly to ensure two-way conversation is enabled on the following areas:

- information about ELA,
- information about the Phase 2 redevelopment,
- information about future launches and specific upcoming launch safety requirements,
- the extent to which activities will, or are likely to, affect the environment both inside and outside the affected land area,
- proposed water, timber or other requirements to be obtained from the land,
- estimated infrastructure and numbers of vehicles and people that are likely to be on the affected land,
- proposed mechanisms for minimising social impact,
- working with Aboriginal people to identify values and impacts,
- consideration of education and training, employment and economic development opportunities and,
- consideration of how local people can be engaged in research, monitoring and reporting activities.

This approach and SRC forum enabled the collaboration on and creation and use of ASC Principles of Land and Water Access (reference H) which acts as a protocol for ELA in conducting down range recovery planning and operations.

5.6 RESOURCES AND RESPONSIBILITIES

Each of our stakeholders should have access to information that is relevant, meaningful and well understood.

We have prepared and continue to refine a general suite of materials to cater for the INFORMED commitments to our stakeholders. These include:

Local activity (including up-range launch operations):

- Electronic Direct Mail (email) to stakeholder groups,

- Communications, announcements and content shared via ELA owned community social media channels,
- Posts on community social media pages (e.g. Gove Noticeboard Facebook page),
- Local radio announcements,
- In language radio,
- Marine and Airspace pathways (NOTMAR, NOTAM),
- A dedicated Launch info website page – [to be initiated/released going into next Launch]
- Project FAQ (in local language if required),
- Visual information posters to support communication with Traditional Owners,
- Community notice board posters,
- Media releases (local media and national consumer media),
- Community meetings / Open days.

Key Messages:

- Site Development and Operations:
  - ELA business growth and ASC development,
  - Environmental considerations,
  - Local construction and jobs,
  - FAQ and how to contact ELA.
- Launch Operations (up-range and down-range recovery):
  - Who is the launch company launching the rocket and what rocket is it,
  - Up-range safety areas and short timeframe road closures (if required),
  - What is descending to be recovered,
  - Environmental considerations,
  - Safey area and short timeframe road closures (if required),
  - How and when recovery will be conducted (e.g. helicopter, boat, 4x4),
  - FAQ and how to contact ELA.

ELA's commitment to CONSULT is delivered through tailored and direct meetings and for launches, using the Safety and Retrieval Committee (SRC).

ELA is responsible for ensuring effective implementation of stakeholder engagement relevant to the affected stakeholder and timing to the project. This is reviewed for each ALP application once specifics of the launch is known.

A key mechanism to assist in reaching affected stakeholders is leveraging the terms of reference for the SRC, which requires Aboriginal group leaders to cascade and carry messages to their organisations, communities and stakeholders. ELA then complements this through use of other communication channels as referenced above.

5.7 Stakeholder Feedback, Evaluation and Review (Monitoring)

ELA's catalogue of stakeholder engagement is included at Annex C and records the key improvements made as result of engagement and consultation to date.

ELA takes on board the feedback provided through formal Environmental Referral processes and provides minutes to all SRC and local community meetings for ongoing opportunity for feedback.

ELA's SRC continues to act as primary forum for ongoing engagement which aims to:

- maintain relationships with the community and stakeholders,
- achieve positive outcomes for the community,
- inform decisions regarding operations of ASC,

- meet the object of the EP Act (section 3(e)) to recognise the importance of participation by Aboriginal people and communities in environmental decision-making processes.

6 REPORTING STAKEHOLDER ENGAGEMENT

Stakeholder engagement processes undertaken are reported back to affected stakeholders through the established SRC forum and other supporting local community forms as required and will include:

- commitments made during, or as a result of, stakeholder consultations for ongoing stakeholder engagement processes throughout all stages of development including after the environmental impact assessment process is completed, such as during operation, decommissioning and closure,
- details of any stakeholder agreements to be negotiated, including agreements with state and local government agencies,
- information on how stakeholders can have ongoing interaction with the proponent, if the project is approved, to ensure emerging issues can be addressed,
- plan for future/ongoing engagement.

The outcomes of stakeholder engagement are incorporated into key plans, including specific launch safety area and recovery plans, and included in ELA's submission to ASA for issuance of the Launch Permit.

6.1 NORTHERN TERRITORY ENVIRONMENTAL PROTECTION ACT OBJECTIVES

In the interest of continuing to build community awareness, trust and support, ELA is committed to an open and transparent approach to stakeholder engagement and therefore intends to include this plan in NT EPA and EPBC environmental reviews.

7 ANNEXES

A. Best Practice Guide for Remote Engagement and Coordination
B. Launch stakeholder engagement timeline
C. Stakeholder engagement catalogue
D. ASC Master Contact List (Redacted)

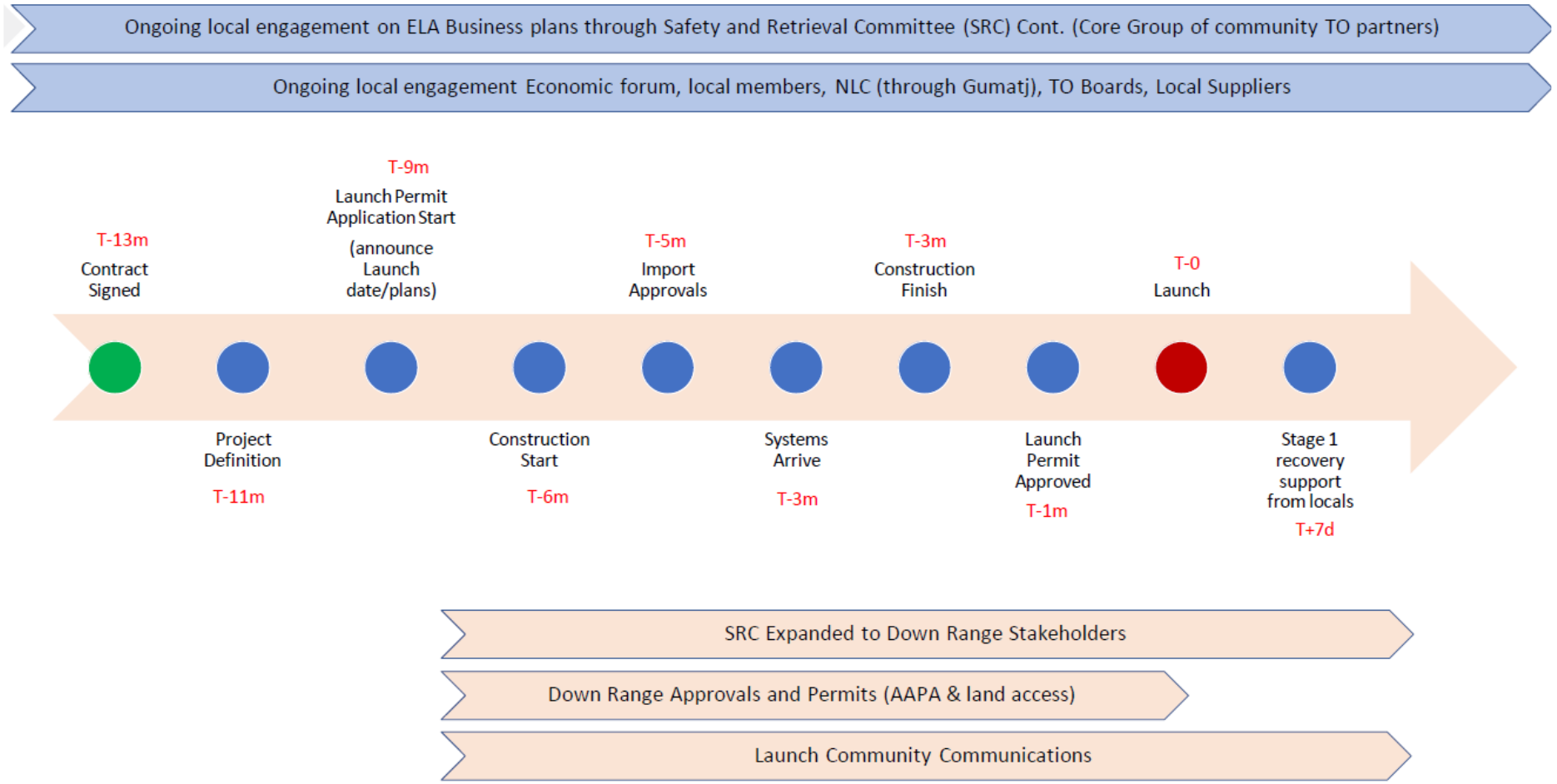
ANNEX A
BEST PRACTICE GUIDE FOR REMOTE ENGAGEMENT AND COORDINATION MATRIX

Focus	Engagement – Key Actions	Coordination – Key Actions
Community	• Find out about the community, language, Aboriginal governance, cultural protocols, restrictions, local dynamics and any 'burning' issues bushtel.nt.gov.au.	• Identify Aboriginal authorities, key stakeholders, other community members and regional staff who you should be informing, working with and learning from on the project or issue.
You	• Consider your self-awareness, engagement skills, cultural competency, basic skills and training and identify gaps in your knowledge and skills. • Be aware of assumptions and cultural bias you may be bringing, or even whether you are suited to regional and remote work. • Stay open to learning and reflect on your performance.	• Identify, organise and promote professional support, learning or training opportunities you may need. • Record your reflections and evaluations.
Project	• Define the project, opportunity or issue as well as the objectives and outcomes. • Clarify the decisions being made including negotiable and non-negotiables and who will make them, as well as any related decisions already made so that there is clarity on what can be influenced. • Identify community and other stakeholders. • Describe the role of the stakeholders and the intended relationship of the stakeholder with the government agency. • Identify the level and goal of engagement for each stakeholder group (see Levels of Remote Community Participation spectrum). • Identify the community engagement purpose, objectives, community expectations and outcomes (describe what success would look like if these engagement goals were to be met). • Plan and use methods and tools that suit the engagement and ensure the full participation of all stakeholders. • Identify risks and plan how to manage them throughout the project.	• Find out what is already known about the project, opportunity or issue, knowledge gaps, relevant history, level of interest and potential conflict or risk. • Use Remote Information Coordination Systems for planning, documenting and evaluating engagement, coordination and visit bushtel.nt.gov.au and bushready.nt.gov.au. • Find out how to contact other stakeholders, and where opportunities for collaboration, coordination, challenges or conflicts may exist or arise. • Develop, support and use community-based and regional processes (e.g. Aboriginal governance groups, inter-agency meetings, Regional Coordination Committees). • Facilitate community members' understanding of government processes and responses. • Establish a clear sequence of communications and engagement activities that aligns with the community's governance and protocols. • Identify critical resources such as the Aboriginal Interpreter Service and other resources necessary for the engagement process.
Relationships	• Good relationships are essential – find ways to build understanding and trust with Aboriginal authorities, community members and other stakeholders. • Respect and follow local cultural protocols.	• Work closely with community-based and regional staff and others who have well-developed relationships with community members. • Keep everyone well informed at every stage of the project/process.

Focus	Engagement – Key Actions	Coordination – Key Actions
Time	• Avoid rushing – allow time and flexibility to build relationships and enable maximum participation. • Allow time for community members and other stakeholders to understand and provide input into the project, opportunity or issue.	• Early pre-engagement planning is crucial for getting the community prepared and ready. • Base the negotiation of timing and timeframes on both community and government parameters. • Ensure all stakeholders are kept up to date and have time to respond when things change.
Communication and Close the loop	• Communicate in ways that are appropriate and understood. • Understand the diversity of the target audience, including those living in regional and remote locations with a disability. • Where possible use a qualified Aboriginal Interpreter who can assist with communicating in first language. • Ensure community members and other stakeholders are informed before, during and after the engagement. • Follow up and close the loop with community members and other stakeholders.	• Engage the Aboriginal Interpreter Service early in your project to understand what is needed to communicate your project or information effectively in first language. • Help community members raise ideas and issues with the appropriate government agencies or organisations. • Obtain and pass on responses to these.
Evaluation	• Before you start, plan evaluation of the engagement objectives, outcomes and process – from introducing the project, staying in touch and receiving feedback. • As you go along, document, monitor and evaluate what happens, whether planned engagement objectives were met or not and any unplanned outcomes. • Ensure evaluation process is relevant and meaningful to the stakeholders. • Use evaluation to continuously improve engagement practice.	• Facilitate input into the ongoing evaluation and improvement of the Remote Engagement and Coordination Strategy and the Remote Information Coordination System from community and other stakeholders at regional and executive levels.

Sourced from bushready.nt.gov.au @ https://bushready.nt.gov.au/__data/assets/pdf_file/0018/282231/Best-practice-guide.pdf

ANNEX B
LAUNCH STAKEHOLDER ENGAGEMENT TIMELINE



ANNEX C
STAKEHOLDER ENGAGEMENT CATALOGUE

Stakeholder/s	Applicable ASC Stakeholder IAP2 Commitments	Nature of Engagement/s	Concerns and Issues Raised and/or Key Improvements Made as a Result
After Submission of Referral and before submission of SER (Jun 2024)			
Gumatj Aboriginal Corporation	**Category 1: INVOLVE** **Category 2**: **INVOLVE**	1. Weekly direct meetings between ELA and Gumatj to progress and support Phase 2 development. This includes understanding of ELA's referral and Phase 2 operational plans to assist in Gumatj and NLC consultations for extension of S19 sub-lease. This includes simplified and in language (Yolngu) materials to be used ongoing. 2. Attendance at ASC Safety and Retrieval Committee.	**Concerns or issues raised:** Nil. **Resolutions or key improvements made:** • Support and guidance on engaging local and Traditional Owner stakeholders – NLC regional meeting and Economic forums • Support on site lease expansion and AAPA processes • Guidance on communication materials for expansion and launch activities
Northern Land Council	**Category 1: INFORM** Category 2: N/A	1. Direct meetings to support lease expansion and supporting NLC facilitated consultations 2. NLC attendance to ASC Safety and Retrieval Committee meeting 3. ELA attendance at NLC Regional Council meeting to provide update on Phase 2 plans and address any questions	**Concerns or issues raised:** • AAPA process is followed for all launches when objects land and are recovered in the NT • Lease expansion consultations ensure all stakeholders are fully informed (on lease key terms and ASC Phase 2 operations) **Resolutions or key improvements made:** • ELA commitment to AAPA Authority Certificate noted in Referral application as well as correspondence between ELA and AAPA • ELA supporting a NLC facilitated 3rd party review of ELA plans (including NT EPA and EPBC referrals) which will inform NLC lease consultation information • Guidance on communication materials for expansion and launch activities • With recognition of Rio Tinto leaving the area, there is strong advocacy from local members at NLC Regional Council meeting
Central Land Council	Category 1: N/A **Category 2: CONSULT** (launch dependent)	No impact from ASC site operations. 1. Letter written to Central Land Council (CLC) to inform on ELA plans and processes in which CLC may be engaged which includes invite to the ASC Safety and Retrieval Committee – if required for southern launches	**Concerns or issues raised:** Nil. **Resolutions or key improvements made:** • To be incorporated for specific southern launch when required

Stakeholder/s	Applicable ASC Stakeholder IAP2 Commitments	Nature of Engagement/s	Concerns and Issues Raised and/or Key Improvements Made as a Result
Andilyakwa Land Council (Groote Eylandt)	Category 1: N/A **Category 2: CONSULT** (launch dependent)	No impact from ASC site operations. *(Civil Aviation Safety Agency (CASA) govern air traffic restricted spaces and the processes for engagement to General Aviation affected stakeholders)* 1. Letter written to Andilyakwa Land Council (ALC) to inform on ELA plans and processes in which ALC may be engaged as directed by CASA requirements	**Concerns or issues raised:** Nil. **Resolutions or key improvements made:** • To be incorporated for specific southern launch when required
Aboriginal Authority Protection Agency (AAPA)	**Category 1: INFORMED** **Category 2: CONSULT** (launch dependent)	1. Meetings to support Authority Certificate application for expansion of site area 2. Correspondence and meeting to support understanding and ELA commitment to Authority Certificate process for down range recovery area requirements (as per plans and procedures submitted in NT EPA Referral application)	**Concerns or issues raised:** Nil. **Resolutions or key improvements made:** Nil.
Local Traditional Owners: • **Dhimurru Aboriginal Corporation**	**Category 1: INFORMED** **Category 2: CONSULT**	1. Meeting with new CEO to update on Phase to plans and answer any questions 2. Ensure new CEO is aware on how to communicate to ELA and provide any ongoing feedback (e.g. direct to ELA and/or via the Safety and Retrieval Committee standing invite)	**Concerns or issues raised:** • Seeking clarity on impact to Bawaka Rd and nearby campgrounds. **Resolutions or key improvements made:** • Bawaka Rd will remain unimpacted for majority of ASC operations, during launch periods, to ensure public safety, the road may be blocked for 30 mins. • Campgrounds to the west of ASC are not impacted, but will be communicated to as per previous and agreed process conducted for NASA launches.
Local Traditional Owners: • **Dhimurru Aboriginal Corporation** • **Laynhapuy Homelands Aboriginal Corporation** • **Rirratjingu Aboriginal Corporation**	**Category 1: INFORMED** **Category 2: CONSULT**	1. Attendance at ASC Safety and Retrieval Committee meetings focusing on updates to ELA business plans and updates for ASC Phase 2 operations including: a. Latest lease expansion and Gumatj/NLC consultation plans b. Update on next client's launch plans c. Update on approval processes in progress and any key issues (none) d. How we can help each other (local supplier engagement) – getting ready for construction	**Concerns or issues raised:** • Nil **Resolutions or key improvements made:** • All supportive of ELA business plans and want to understand when next launches will occur

Stakeholder/s	Applicable ASC Stakeholder IAP2 Commitments	Nature of Engagement/s	Concerns and Issues Raised and/or Key Improvements Made as a Result
		2. Planned Gumatj/NLC/ELA discovery awareness and lease consultation engagement Q3-4 2024	
Regional Economic Development Committee	**Category 1: INFORMED** **Category 2: N/A**	1. ELA presentation to Economic forum on latest Phase 2 plans and estimates of high-level impacts to the area (jobs) 2. Planned Gumatj/NLC/ELA discovery awareness and lease consultation engagement Q3-4 2024	**Concerns or issues raised:** • Accommodation is already tight, so may become an issue for ELA and launch clients (as well as pressure back onto other town members) **Resolutions or key improvements made:** • Awareness and support of ELA plans and launches • ELA continue to discuss Accommodation options with local agencies, Rio Tinto Handback Committee as well as NT Government
Gulkula Mine	**Category 1: CONSULT** **Category 2: CONSULT** (up-range)	1. Meeting to share updated Phase 2 plans for expanded lease area 2. Also to review progress and tasks to complete transition from Mining Lease to S19 lease	**Concerns or issues raised:** • Nil **Resolutions or key improvements made:** • Nil
East Arnhem Regional Council – Mulka	**Category 1: INFORMED** **Category 2: N/A**	1. Meeting in Darwin with Member for Mulka to provide update on ELA Phase 2 plans and provide opportunity to address any concerns 2. Planned Gumatj/NLC/ELA discovery awareness and lease consultation engagement Q3-4 2024	**Concerns or issues raised:** • ASC will be a military base • Consultations for Phase 1 were not conducted appropriately • Spaceport is not safe for public **Resolutions or key improvements made:** • ELA confirm ASC is not planned to be a military base, but will support Defence scientific testing • ELA are supporting NLC governed lease consultation process, including a 3rd party review of all ASC plans and procedures to help inform the consultations on safety.
East Arnhem Regional Council – local authorities in Yirrkala and Gunyangara	**Category 1: INFORMED** **Category 2: INFORMED**	1. Planned Gumatj/NLC/ELA discovery awareness and lease consultation engagement Q3-4 2024	**Concerns or issues raised:** • Request to be informed on upcoming launches to help town be ready **Resolutions or key improvements made:** • Continue communications to this group when launch specifics are known

Stakeholder/s	Applicable ASC Stakeholder IAP2 Commitments	Nature of Engagement/s	Concerns and Issues Raised and/or Key Improvements Made as a Result
Nhulunbuy Construction Suppliers and Service Providers	**Category 1: INFORMED** **Category 2: N/A**	1. Local supplier Phase 2 update on ASC plans and processes for engagement and procurement opportunities	**Concerns or issues raised:** • Nil **Resolutions or key improvements made:** • Key town suppliers and service providers aware of how to engage with ELA on work opportunities
Local School Teachers and Students	**Category 1: INFORMED** **Category 2: N/A**	1. ELA facilitated open day for all local schools to come to ASC to learn about the business and what is next for launches 2. ELA staff supported and helped students do mini-bottle rocket launches on the NASA launch pad	**Concerns or issues raised:** • Want to know when next launch is **Resolutions or key improvements made:** • Continue communications to this group when launch specifics are known
Before submission of Phase 2 Referral (Aug 2023)			
Gumatj Aboriginal Corporation	**Category 1: INVOLVE** **Category 2: INVOLVE**	1. Weekly direct meetings between ELA and Gumatj to progress and support Phase 2 development. This includes understanding of ELA's referral and Phase 2 operational plans to assist in Gumatj and NLC consultations for extension of S19 sub-lease. This includes simplified and in language (Yolngu) materials to be used ongoing 2. Attendance at ASC Safety and Retrieval Committee meetings on Phase 2 expansion	**Concerns or issues raised:** Nil. **Resolutions or key improvements made:** • Support and guidance on engaging Traditional Owner stakeholders (incorporated into ELA Stakeholder Engagement Plan) • Support on site lease expansion and AAPA processes • Guidance on approach to multi-agency processes in the NT to enable Phase 2 expansion
Northern Land Council	**Category 1: INFORM** Category 2: N/A	1. Attendance at ASC Safety and Retrieval Committee meetings on Phase 2 expansion	**Concerns or issues raised:** • AAPA process followed for all launches when objects landing in NT • Expansion consultations ensure all stakeholders are fully informed (on lease key terms and ASC Phase 2 operations) **Resolutions or key improvements made:** • ELA commitment to AAPA Authority Certificate incorporated in Referral application • NLC to incorporate Phase 2 key info as part of new lease consultations

Stakeholder/s	Applicable ASC Stakeholder IAP2 Commitments	Nature of Engagement/s	Concerns and Issues Raised and/or Key Improvements Made as a Result
Aboriginal Authority Protection Agency (AAPA)	**Category 1: INFORMED** **Category 2: CONSULT** (launch dependent)	1. ELA visit to Darwin to update on operations and Phase 2 operations where landing areas may be in southern NT and how do we approach Authority Certificate processes in that region	**Concerns or issues raised:** • Re-confirmed requirement to Sacred Sites Act and obligations for Authority Certificate process. **Resolutions or key improvements made:** • Incorporated better clarity on process into ASC Recovery Plan as well as NT EPA Referral application.
Local Traditional Owners: **Dhimurru Aboriginal Corporation**	**Category 1: INFORMED** **Category 2: CONSULT**	1. Meeting with CEO and Chairman to update on Phase to plans and answer any questions	**Concerns or issues raised:** • Seeking clarity on impact to Bawaka Rd and nearby campgrounds. • Seeking understanding on how ELA can work with locals in the area to take part in ASC operations or adjacent opportunities **Resolutions or key improvements made:** • Bawaka Rd will remain unimpacted for majority of ASC operations, during launch periods, to ensure public safety, the road may be blocked for 30 mins. • Campgrounds to the west of ASC are not impacted, but will be communicated to as per previous and agreed process conducted for NASA launches. • Request to maintain regular updates and meetings between ELA and Dhimurru
Local Traditional Owners: • **Dhimurru Aboriginal Corporation** • **Laynhapuy Homelands Aboriginal Corporation** • **Rirratjingu Aboriginal Corporation** • **Mimal Aboriginal Corporation** • **Afura Swamp Rangers**	**Category 1: INFORMED** **Category 2: CONSULT**	1. Attendance to ASC Safety and Retrieval Committee meetings focusing on ELA business plans and updates for ASC Phase 2 operations: a. Proposed lease expansion b. Types of launches and update on next clients plans c. Other approval processes in progress and any key issues (none) d. How we can help each other (local supplier engagement)	**Concerns or issues raised:** • What is the main difference between NASA launches and ELA future launches? • How can they continue to be involved and have opportunity to take part (be hired for) in key roles as ASC grows? • How will ELA conduct launches around Garma Festival? • How will ELA conduct recovery and remediation? **Resolutions or key improvements made:** • Clarity provided through examples of what and how future launches will look like • ELA confirmed intent to source filling roles at ASC through local resources. Highlight on support provided by Mimal for NASA recovery operations and strong intent by ELA to continue to leverage local TO support on range safety and recovery operations.

Stakeholder/s	Applicable ASC Stakeholder IAP2 Commitments	Nature of Engagement/s	Concerns and Issues Raised and/or Key Improvements Made as a Result
• **Southern East Arnhem Limited (SEAL) IPA Aboriginal Corporation**			• Planned adjustments to ELA launch schedule to not impact Garma Festival • ELA re-confirm that the protocols for down range land access and retrieval that were formed in collaboration with these TO groups is the basis for future operations and will be applied weather it is in NT or another State.
Nhulunbuy Town Board	**Category 1: INFORMED** **Category 2: INFORMED**	1. Presentation from ELA to update on NASA program and highlight ELA plans for growth	**Concerns or issues raised:** • Request to be informed on upcoming launches to help town be ready **Resolutions or key improvements made:** • Continue communications to this group when launch specifics are known
East Arnhem Land Tourism Association	**Category 1: INFORMED** **Category 2: INFORMED**	1. Attendance at Community Launch Coordination Working Group (facilitated in partnership with DEAL) – addressed NASA program and Phase 2	**Concerns or issues raised:** • Request to be informed on upcoming launches to help town be ready **Resolutions or key improvements made:** • Continue communications to this group when launch specifics are known
East Arnhem Regional Council – Mulka	**Category 1: INFORMED** **Category 2: N/A**	1. Meeting with Member for Mulka at ASC to provide update on ELA plans and provide opportunity to address any concerns	**Concerns or issues raised:** • Consultations for Phase 1 were not conducted appropriately **Resolutions or key improvements made:** • Explanation of that most future launches will be to the East or South and not have direct impact • Subsequent consultation processes will address impacted stakeholders
Regional Economic Development Committee	**Category 1: INFORMED** **Category 2: INFORMED**	1. ELA presentation to Economic forum on initial Phase 2 plans for ASC	**Concerns or issues raised:** • How will the community know when launches are going to occur **Resolutions or key improvements made:** • Membership extended to Community Launch Coordination Working Group (facilitated in partnership with DEAL) as each launch becomes known

Stakeholder/s	Applicable ASC Stakeholder IAP2 Commitments	Nature of Engagement/s	Concerns and Issues Raised and/or Key Improvements Made as a Result
NT Government	**Category 1: INFORMED** **Category 2: INFORMED**	1. Ongoing fortnightly meetings in relation to Phase 2 operations and supporting ASC growth in local area 2. Attendance at ASC Safety and Retrieval Committee meeting	**Concerns or issues raised:** • ELA integration with local community highly important • Aim to focus on clear communications and stakeholder engagement, helping reduce a complex business to local relevance – e.g. how it matters to those affected in the area **Resolutions or key improvements made:** • Local NTG membership on Safety and Retrieval Committee • Guidance on ELA approaches for local stakeholder engagement • Guidance on approval processes required in NT
Australian Space Agency (ASA)	**Category 1: INFORMED** **Category 2: INFORMED**	1. Ongoing fortnightly meetings in relation to Phase 2 operations and supporting Launch Facility Licence (LFL) and Australian Launch Permits (ALP)	**Concerns or issues raised:** • Ensure all supporting State and Federal permits, approvals and licences are in place before Facility Licence can be issued • Sufficient local and down-range stakeholder communications are in place **Resolutions or key improvements made:** • Guidance supported ELA to submit separate referral to EPBC • Refined down range communication procedures and work instructions
NT EPA	**Category 1: INFORMED** **Category 2: INFORMED**	1. ELA visits to Darwin to update on Phase 2 operations and future Environmental considerations	**Concerns or issues raised:** • Engage with affected stakeholders early • Provided as much evidence as possible to support Environmental statements made in application • Be clear on stating the scope of the proposed action in relation to Phase 1/Site 1 **Resolutions or key improvements made:** • Prompted more formal formation of ELA Stakeholder Engagement plan with guidance from NT Guidelines • ELA commissioned new site habitat survey completed by EcOz Environmental Consultants • Katestone Environmental Consultants build new air pollution impacts model and assessed risk to public and sensitive receptors

Stakeholder/s	Applicable ASC Stakeholder IAP2 Commitments	Nature of Engagement/s	Concerns and Issues Raised and/or Key Improvements Made as a Result
Nature Positive Regulation Division | Environment Assessments West Branch | SA & NT Section (Department of Climate Change, Environment, Energy and Water)	**Category 1: INFORMED** **Category 2: INFORMED**	1. Engagement for guidance on Environmental Referral submission	**Concerns or issues raised:** • Provided as much evidence as possible to support Environmental statements made in application • Be clear on stating the scope of the proposed action in relation to site construction/operation vs down range recovery **Resolutions or key improvements made:** • Helped guide scope of Referral (in context of NT EPA Referral in progress at same time) • Created clarity on the Referral process and allowed ELA to refine application scope
Parks Australia (Department of Climate Change, Environment, Energy and Water)	**Category 1: N/A** **Category 2: CONSULT** (down-range if required)	1. Engagement for clarification on additional layer of compliance required for recovery activities in marine waters	**Concerns or issues raised:** • Nil in general. Will be dependent on where each launch may go. **Resolutions or key improvements made:** • Confirmation Sea Dumping Permits are not applicable • Guidance provided on how ELA recovery activities will interact the North Network of Marine Parks and the Coral Sea Marine Park • Guidance provided on how to apply for marine parks permit if required
Gove Airport	**Category 1: INFORMED** **Category 2: CONSULT** (up-range if required)	1. Meeting with Airport Manager briefing on ELA operations and process in which Airport may be impacted during launch operations	**Concerns or issues raised:** • Clarity on when launches are happening and what that means for airspace control in the area **Resolutions or key improvements made:** • Include in communications when new launch specifics are known • Engage as guided per CASA and Air Services processes and protocols
Gulkula Mine	**Category 1: CONSULT** **Category 2: CONSULT** 1. (up-range)	1. Meeting sharing initial Phase 2 plans for expanded lease area 2. Emergency planning and support – what resources can we share	**Concerns or issues raised:** • Clarity on impacts to Gulkula mine operations **Resolutions or key improvements made:** • No impacts as Gulkula mine operations will be complete by Phase 2 launch operations commencing

Stakeholder/s	Applicable ASC Stakeholder IAP2 Commitments	Nature of Engagement/s	Concerns and Issues Raised and/or Key Improvements Made as a Result
Developing East Arnhem Land (DEAL)	**Category 1: INFORMED** **Category 2: INFORMED**	1. Meeting with DEAL CEO to update on ELA business plans and Phase 2 work 2. Attendance and support at Community Launch Coordination Working Group (facilitated in partnership with ELA) 3. Support on securing local accommodation options 4. Invited to local awareness 'open day' at ASC as new Client launches become known – as required	**Concerns or issues raised:** • Nil. **Resolutions or key improvements made:** • Awareness and support of ELA plans and launches • Support for ELA and Launch Client accommodation, transport and hospitality needs
NT Worksafe	**Category 1: CONSULT** **Category 2: N/A**	1. Briefing on ELA phase 2 operations and ELA's Work Health and Safety System	**Concerns or issues raised:** • Nil. **Resolutions or key improvements made:** • ELA's WHS documentation and procedures heading in the right direction to be in place for mature Phase 2
Air Services Australia	**Category 1: N/A** **Category 2: CONSULT**	1. Meeting on approach on managing Temporary Restricted Airspaces (TRAs) for rocket launches	**Concerns or issues raised:** • Nil. **Resolutions or key improvements made:** • Continue to collaborate on managing air space for rocket launches
CASA	**Category 1: N/A** **Category 2: CONSULT**	1. Meeting on approach on General Aviation airspace approval for rocket launches from ASC	**Concerns or issues raised:** • Ensure General Aviation (GA) community in the area are informed on future launches **Resolutions or key improvements made:** • Continue to follow CASA processes

ANNEX D
ASC MASTER CONTACT LIST

Name	Phone	Email
Airservices Australia	[redacted]	[redacted]
Australian Cyber Security Hotline (Australian Signals Directorate)	1300 292 371	
Australian Federal Police Hotline	(02) 5126 0000	
Australian Government Office of the Australian Information Commissioner	1300 363 992	
Australian Government National Emergency Management Agency (National Situation Room) – formerly known as Crisis Coordination Centre	N/A	contact@nema.gov.au
Australian Government Security Vetting Agency (AGSVA)	1800 640 450	securityclearances@defence.gov.au
Australian Hydrographic Office	(02) 4223 6500	datacentre@hydro.gov.au
Australian Maritime Safety Office	1800 641 792	[redacted]
Australian Security Intelligence Organisation (ASIO)	1800 123 400	
Australian Space Agency – Office of Space Regulation	[redacted]	regulation@space.gov.au
CASA – Office of Airspace Regulation	N/A	oar@casa.gov.au [redacted] sport@casa.gov.au
Defence	N/A	adf.airspace@defence.gov.au casa.lo@defence.gov.au 452sqndar.opscdr@defence.gov.au 452sqn.tdlfltopscdr@defence.gov.au
East Arnhem Regional Council	(08) 8986 8986	info@eastarnhem.nt.gov.au
Gove Airport (operations M-F 0700 – 1500)	(08) 8987 1370	mac@ncl.net.au
Gulkula Mine	[redacted]	[redacted]
Local Fire Service	0408 899 092	nhulunbuy.firestation@pfes.nt.gov.au [redacted]
National Security Hotline	1800 123 400	hotline@nationalsecurity.gov.au
NT Chief Health Officer	(08) 8922 7464	[redacted] radiationprotection@nt.gov.au

Name	Phone	Email
NT Darwin Weed Management Branch	(08) 8999 4567	N/A
NT Department of Health	(08) 8922 7464	N/A
NT Emergency Service	(08) 8922 3630	ntes@pfes.nt.gov.au territorydutyoffice.ntes@pfes.nt.gov.au
NT Emergency Services (Flood, Storm, Cyclone)	132 500	N/A
NT Emergency Services (Police, Fire, Ambulance)	000	N/A
NT EPA (Urgent Pollution)	1800 064 567	ntepa@nt.gov.au
NT EPA – General contact	(08) 8924 4218	ntepa@nt.gov.au [redacted]
NT Fire and Rescue Service	(08) 8999 3473 or 000	N/A
NT Government	N/A	[redacted] eastarnhem.cmc@nt.gov.au [redacted]
NT Heritage Council	N/A	heritagecouncil@nt.gov.au
NT Police (non-emergency)	131 444	N/A
NT St John Ambulance	(08) 8922 6200 or 000	am.nhulunbuy@stjohnnt.asn.au [redacted]
NT WorkSafe – Explosives	1800 193 111	territorybusinesscentre@nt.gov.au [redacted] ntworksafe@nt.gov.au [redacted]
NT WorkSafe – General contact	1800 019 115	ntworksafe@nt.gov.au
Nhulunbuy Police Station	(08) 8987 1333 **or** 000	[redacted]
Northern Territory Police Force (EMS coordination)	(08) 8985 8743 [redacted]	[redacted]
Royal Flying Doctor Service	(08) 8998 9940	enquiries@flyingdoctor.net
Security Construction and Equipment Committee	N/A	scec@scec.gov.au
Safety and Retrieval Committee Stakeholders including: • Gumatj Corporation • Dhimurru Rangers • Laynhapuy Homelands Aboriginal Corporation • Southeast Arnhem Land IPA (Numbulwar / Ngukurr) • Arafura Swamp Rangers • Mimal • NLC • NTG CM&C		

EQUATORIAL LAUNCH AUSTRALIA

Safety and Retrieval Committee (SRC) Charter

ELA-000065

VERSION 1

VERSION APPROVAL

	Name	Role	Date	Signed
Prepared	Deb Houlahan	Customer Campaign Manager	10/05/2023	
Reviewed	Matthew Fraser	Regulatory and Compliance Manager	15/05/2023	
Endorsed				
Approved	Ben Tett	General Manager Operations and Launch	17/05/2023	

APPROVAL HISTORY

CR No.	Title	Date
CR-000050	LFL Baseline Addition	07/002/2023

TABLE OF CONTENTS

1 PURPOSE 4
2 TERMS OF REFERENCE 4
3 TYPE OF COMMITTEE AND LENGTH OF TERM 5
4 REFERENCES 5
4.1 External References 5
4.2 ELA Documents 5
4.3 Definitions and Acronyms 5
5 GOVERNANCE AND RELATIONSHIPS 5
6 MEMBERSHIP 5
6.1 Core Members 5
6.2 Other Attendees 6
6.3 Attendance Costs 6
7 RESPONSIBILITIES 6
7.1 Meeting Chair 6
7.2 Members 6
8 DELIVERY 7
8.1 Frequency and Timing of Meetings 7
8.2 Standing Agenda Items 7
8.3 Communication and Record 7
9 CONFLICTS OF INTEREST 7

1 PURPOSE

The Safety and Retrieval Committee (SRC) is an integral part of ELA operations and safety framework. The SRC allows Traditional Owner and Local Community representatives to hear first-hand of ELA's operational plans, concerns and issues and to provides a forum for them to also raise concerns or issues with safety in relation to the local and traditional owner land.

The SRC is an ELA committee and reports to the General Manager Operations and Launch who in turn is accountable to the CEO of ELA for all safety and launch operations.

The SRC is to meet regularly and should aim to maintain a committed focus on the ongoing safety of the community members. To facilitate this focus the SRC responsibilities include:

1. Advise and assist ELA to develop and implement a communication strategy to notify outlying homelands and communities of upcoming launches and safety related protocols.
2. Advise and assist ELA to develop and implement retrieval strategies and operations for the collection of rockets and payloads from the drop/impact zone.
3. Support and Advise ELA and its clients, contractors and personnel on how to better protect, promote and ensure respect for Sacred and Important Sites. This to include assisting and advising ELA on the processes and the communication and cooperation with the Northern Land Council (NLC) processes for the issuing of permits.
4. Nominate a traditional owner custodian to be invited by ELA to assist each on land retrieval expedition. This custodian is to be empowered and qualified to advise ELA and provided assistance for the collection of rocket components and other debris from the drop/impact zone or other areas to reduce the risk of disturbance, or desecration of Sacred Sites.
5. Facilitate and support communications and dissemination of information to local residents regarding both the issues above and any other issues arising in relation to safety of launches, the retrievals process and other matters affecting the interests of the Land Trust, the traditional Aboriginal owners, other Aboriginal people who live in the area and others with legitimate interests in the Land.

2 TERMS OF REFERENCE

The role of the SRC is to:

- Provide ELA with a liaison mechanism and single point of contact, in relation to Community Safety, Traditional Owners and other legitimate interested parties in relation to launch safety and the protection and respect of Traditional lands and sacred sites.
- Provide a single reference point for consideration, recording, investigation, sharing and tracking of community safety initiatives undertaken.
- Provide recommendations to ELA senior management and the ELA Emergency Response Planning Committee (ERPC) to improve the Emergency Responses processes as they relate to Traditional Owners and other interested parties.
- Provide feedback and recommendations to the ELA ERPC on previously unknown community impacts in relation to flight hardware recovery.
- Work to ensure community safety engagement messaging is delivered and understood, and where required provide recommendations to improve messaging.
- Report on and provide feedback on community safety in relation to each launch cycle, including pre and post launch community initiatives.
- Cooperate with ELA and provide leadership within the traditional owner and local community in facilitating the implementation of community safety initiatives.
- Ensure continuous improvement in relation to community safety training, messaging and communications.
- Share information and consult about community safety within the committee and community groups to ensure the best community outcomes are always the priority.

- Ensure a continued focus on effective community safety by identifying and reporting risk in an effective and timely manner.

3 TYPE OF COMMITTEE AND LENGTH OF TERM

Type: Safety

Term: Ongoing

4 REFERENCES

4.1 EXTERNAL REFERENCES

None

4.2 ELA DOCUMENTS

Serial	DIN	Title	Version
A	ELA-000031	ELA Terminology and Definitions	1.0

4.3 DEFINITIONS AND ACRONYMS

Definitions and acronyms applicable to this document may be listed in ELA-000031, ELA Terminology and Definitions (reference A)

5 GOVERNANCE

The SRC Chair is responsible and accountable for ensuring appropriate representation at each meeting and for the performance of the committee in this respect.

Membership requirements imply and dictate that each committee member has the ability to make the necessary recommendations to ELA senior management and the EPRC to ensure the ongoing safety of the East Arnhem community.

ELA will and must have due regard to any recommendation of the Safety and Retrieval Committee.

6 MEMBERSHIP

Members of the SRC comprises core members and other attendees as required.

6.1 CORE MEMBERS

Core committee membership includes the specified representative or his/her delegate as the core committee members. If a core committee member is unavailable to attend any meeting, then they are expected to send a duly authorised delegate that is empowered to act on their behalf.

As part of the ELA safety framework, membership of the SRC must comprise:

Committee Role	Organisational/Stakeholder Nominee
Chair	GM, Operations and Launch (or Launch Safety Manager)
Member	Range Safety Supervisor
Member	Range and Recovery Specialist – Air and Sea
Gumatj Representative	[redacted]
Gumatj Representative	[redacted]
Dhimurru IPA/Ranger's representative	Dhimurru to nominate
Laynhapuy IPA/Ranger's representative	Laynhapuy IPA/Rangers to nominate
NLC Representative (Observer)	NLC to nominate
Custodian	NLC to nominate
Custodian	NLC to nominate
Member (as required)	General Manager Arnhem Space Centre
Member (as required)	General Manager Operations and Launch

The Northern Land Council is not an official member of the SRC but has observer status and is entitled to attend all meetings of the SRC. Other Traditional Owner groups may be invited to join the committee from time to time.

6.2 Other Attendees

As required and following approval by the SRC Chair, other attendees may be invited to the SRC meetings to present information on specific issues and initiatives or to provide subject matter expertise.

6.3 Attendance Costs

Subject to justification and pre-approval ELA bears reasonable costs of the SRC and Northern Land Council's attendance at committee meetings. ELA agrees to pay at least the minimum wage for nominated SRC members listed in section 6.1 to each nominated SRC member for the purpose of their attendance at SRC meetings and for any performance of services including accompanying ELA or launch client in relation to retrievals in the drop zone.

7 RESPONSIBILITIES

7.1 Meeting Chair

- No less than five business days prior to any meeting of the SRC and agenda is circulated by ELA to each Safety and Retrieval Committee member.
- Keep minutes or a written record of each meeting of each SRC meeting including details of decisions, approvals, resolutions, positions, recommendations, and determinations made; and
- As soon as practicable after the relevant meeting of the SRC, provide copies of the minutes or record to each SRC member and seek confirmation as the accuracy of those minutes.
- Ensure a briefing from each representative has occurred, and the status of all initiatives is known.
- Ensure that the meeting material is distributed prior to the meeting.
- Ensure that the ERPC stakeholders are appropriately equipped with relevant and timely information regarding SRC activities.
- Ensure identified risks are reported in a timely manner.
- Provide regular updates to the ERPC and other interested parties.
- Lead meetings by framing the issues for discussion and actively engaging all team members in discussion, encouraging expression of diverse views.
- In collaboration with members, establish and maintain the meeting's operating ground rules, so as to continually improve community safety and retrieval processes.

7.2 Members

- Contribute input on behalf of the community they represent.
- Ensure that their input to the meeting is made available to the Chair prior to the meeting to enable meeting materials to be prepared.
- Manage their area of responsibility regarding SRC activities.
- Monitor and report actions that may need attention to ensure the success of the SRC activities.
- Communicate and disseminate information back to their respective communities.
- Continually identify significant community safety risks and issues to ensure continuous improvement of ELA community safety processes.
- Act in the best interests of the communities they represent.
- Participate in determining, and abide by, the meeting's ground rules for operating.
- Prepare adequately for meetings and ensure relevant action items are completed and preparatory material reviewed.

8 DELIVERY

8.1 FREQUENCY AND TIMING OF MEETINGS

- The frequency and method of convening the meetings of the SRC are to be provided in SRC rules. ELA is to draft and circulate the final version rules for adoption by the SRC prior to the second meeting.
- Subject to final confirmation and ratification in the Committee rules, the SRC will meet no less than two (2) times a year. In lead up to new launch missions, more frequent meetings will be called by ELA.
- Any committee member may request an unscheduled meeting to be convened to address either urgent safety or community issues, and subject to committee majority agreement, a meeting must be convened as soon as is practicable.
- When required, material to be considered by the committee to be at the next SRC meeting is to be distributed at least five working days prior to each meeting to allow members to prepare for discussion.
- The meetings will by default be held via teleconference. Face to face meetings on site may be convened from time to time.

8.2 STANDING AGENDA ITEMS

- Action items and Issues from Previous Meetings ***(All)***
- Community Updates – As Required by Each representative
- Agenda Items with Decisions. Actions required ***(All)***
- Launch Timetables and Specific Safety/Community Issues ***(ELA)***
  - *Discussions and each launch specific and any concerns with plans*
  - *Each Launch is to address, launch site, and downrange aspects of Safety and recovery program*
- General Issues and Discussion ***(All)***
- Community Liaison Safety initiatives and priorities update ***(Chair)***
- Key issues and risks review ***(All)***
- Next meeting ***(Chair)***

8.3 COMMUNICATION AND RECORD

- Outline Minutes, Decisions and Action items are recorded in the minutes of SRC meetings, and distributed by the Chair to all members.
- Members in turn distribute and communicate relevant decisions and other information within the communities or groups they represent, as appropriate.
  - Formal communication actions as a result of SRC meeting discussions are determined at the end of each meeting and included in the action items list.
- Out of session decisions are recorded in the minutes of the following meeting.
- While all meeting minutes and associated documents are distributed, they are also be stored electronically by ELA and available on request.
- To enable simple communications, the following email group is used: [Community.Safety@ela.space]
- If required, on any occasion, Aboriginal language interpreters are to be present to ensure complete understanding of all Safety and Cultural Issues are clearly conveyed by all present.

9 CONFLICTS OF INTEREST

In accordance with the Equatorial Launch Australia *Code of Conduct*, conflicts of interest are brought to the attention of the Chair as they arise, and a decision is made on appropriate handling at that time.

1. PURPOSE

Each launch (Mission trajectory) is unique and subject to each launch vehicle, client, payload objectives, fuel type and environmental conditions.

The ELA process to manage the ambiguity of each launch, taking into account public safety, environmental constraints, recovery areas, and unique mission constraints, is detailed below.

2. BACKGROUND

1. Flight Safety is primarily concerned with the risk that the launch vehicle departs from its planned trajectory and/or breaks up in flight, causing debris to fall outside planned impact areas.
2. The objective of Flight Safety is to protect the public, personnel and property during launch operations.
3. Launch campaigns and missions are planned and executed such that Flight Safety risks are controlled to acceptable levels while enabling missions to obtain their objectives.
4. The Australian Launch Permit (ALP) application process includes the preparation of a Flight Safety Plan which describes the proposed launch vehicle flight path and the means to conduct the operation safely.
5. To support the ALP and Flight Safety Plan, a Risk Hazard Analysis (RHA) is conducted by a Suitably Qualified Expert (SQE) to identify potential hazards during launches or returns that may cause harm to public health and safety as well as to critical assets.

3. TRAJECTORY OPTIMISATION AND SELECTION PROCESS

To determine the optimal launch trajectory, an iterative analysis, planning and optimisation process is performed by ELA with support from the client and the RHA SQE to consider the following, but not limited to, impacts and constraints:

1. Public safety:
    - Total casualty expectation
    - Individual risk isopleths
    - Population centres and population densities
    - Aircraft routes
    - Shipping routes
    - Trigger debris and assets of catastrophic potential
    - 3-sigma* recovery areas for scheduled debris
    - Meteorological effects
    - Failure probabilities and failure modes
2. Environmental:
    - Matters of National Environmental Significance (MNES) within 3-sigma* recovery areas for scheduled debris
    - Impact of recovery of scheduled debris
    - Fuel type, burn rate and residual quantities in scheduled debris
    - Aboriginal Areas Protection Authority (AAPA) matters
3. Mission constraints and objectives:
    - Launch window requirements
    - Launch vehicle performance constraints
    - Launch parameter constraints
    - Orbit requirements (e.g., final inclination, final orbital altitude, payload capacity)

4. ASSESSMENT OF ENVIRONMENTAL IMPACTS

To assess the impacts that a proposed launch trajectory may have on all relevant environmental matters, ELA first determines whether the proposed action is approved under a valid current environmental approval, by performing an internal impact assessment on matters related to NT and EPBC environments.

If the internal impact assessments determine that the proposed action falls outside of approved environmental constraints, then ELA reiterates the process of optimisation and selection of the launch trajectory. The new iteration of trajectory optimisation and selection takes into the account the new environmental constraints posed by environmental protected matters as identified in the impact assessment.

If the Optimised Mission is within the scope of a valid current environmental approval, ELA may proceed without further approval necessary and documents the findings of the impact assessment within the ALP process.

If the Optimised Mission is not within the scope of a valid current environmental approval, then ELA performs and keeps on record an NT EPA Self-Assessment and/or EPBC Self-Assessment, if required, to determine whether the proposed action impacts items including:

1. For NT EPA Self-Assessment:

    - Land
        - Landforms
        - Terrestrial environmental quality
        - Terrestrial ecosystems
    - Water
        - Hydrological processes
        - Inland water environmental quality
        - Aquatic ecosystems
    - Sea
        - Coastal processes
        - Marine environmental quality
        - Marine ecosystems
    - Air
        - Air quality
        - Atmospheric processes
    - People
        - Community and Economy
        - Culture and heritage
        - Human health

2. For EPBC Self-Assessment:

    - National threatened species and ecological communities,
    - Migratory species under international agreements,
    - Ramsar wetlands of international significance,
    - the Commonwealth marine environment,
    - World Heritage properties, and
    - National Heritage places.

Figure 1 depicts the mission optimisation process, including the activities undertaken to ensure environmental constraints are adhered to, mitigated or managed in accordance with the requirements of the environmental approvals held.

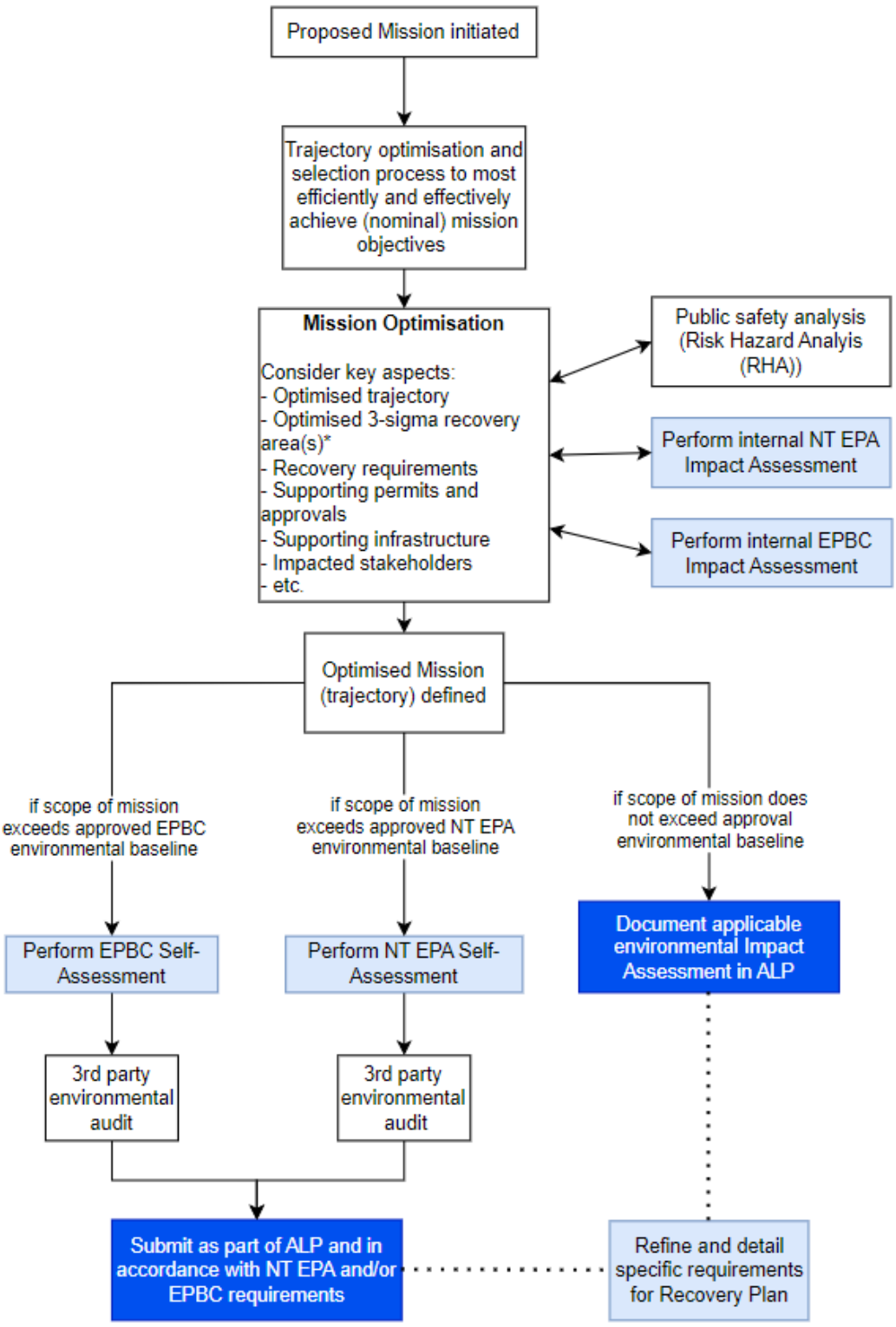


Figure 1 – Mission Optimisation Process – Environmental Actions

* 3-sigma recovery areas, within which 99.7% of all schedule debris will impact, are determined during the mission optimisation process and are optimised to minimise environmental and public risk. This implies that there exists only a 0.3% probability that debris will descend outside of the designated recovery areas.

In the event of environmental non-compliance to the above process, which may include an inability to recover vehicle hardware and/or impacts of unscheduled debris (vehicle failure) outside of approved areas, ELA performs the NT EPA and/or EPBC incident reporting process.

APPENDIX 6 – POLLUTANT DISPERSION MODELLING

Figure 14 - Figure 19 present the dispersion modelling for CO and NO2 emitted by liquid-fuelled LV at the proposed launch pads designated Green, Maroon, and Aqua by ELA.

Figure 20 - Figure 25 present the dispersion modelling for HCl and Al2O3 emitted by solid-fuelled LV at the proposed launch pads designated Green, Maroon, and Aqua by ELA

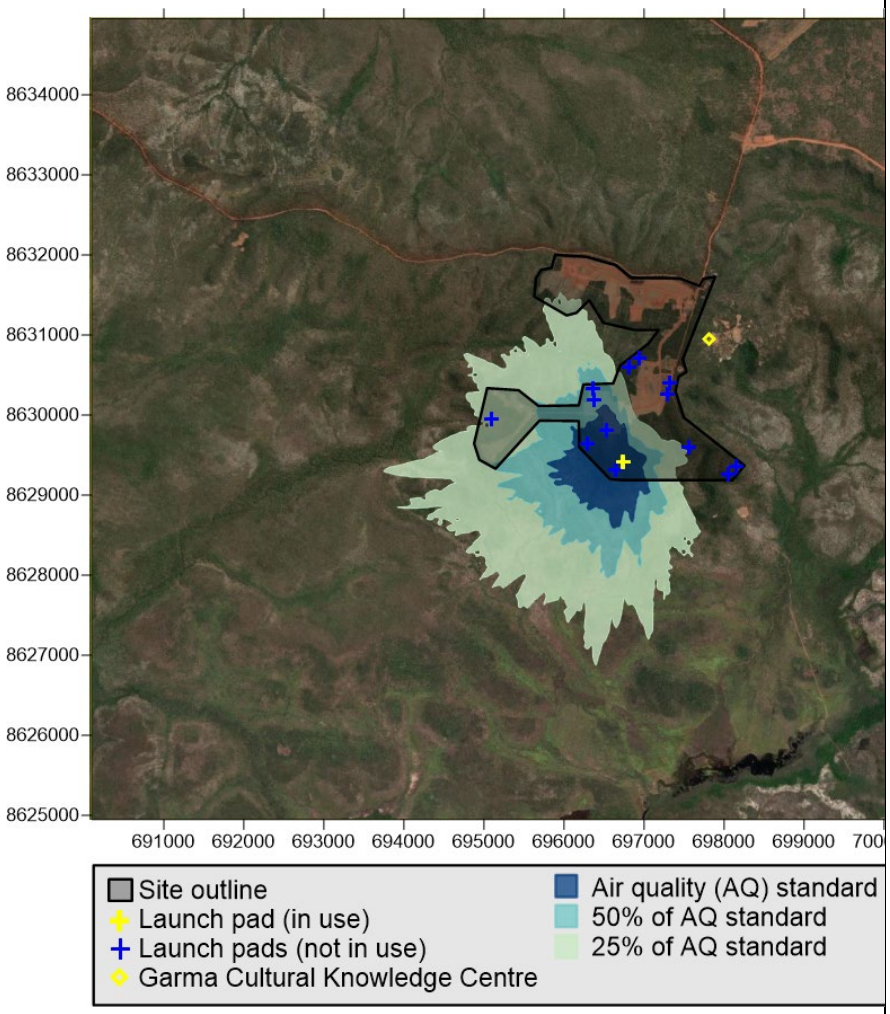


Figure 14: Predicted 1-hour ground concentration of CO from launch of liquid fuelled LV from Green launch pad

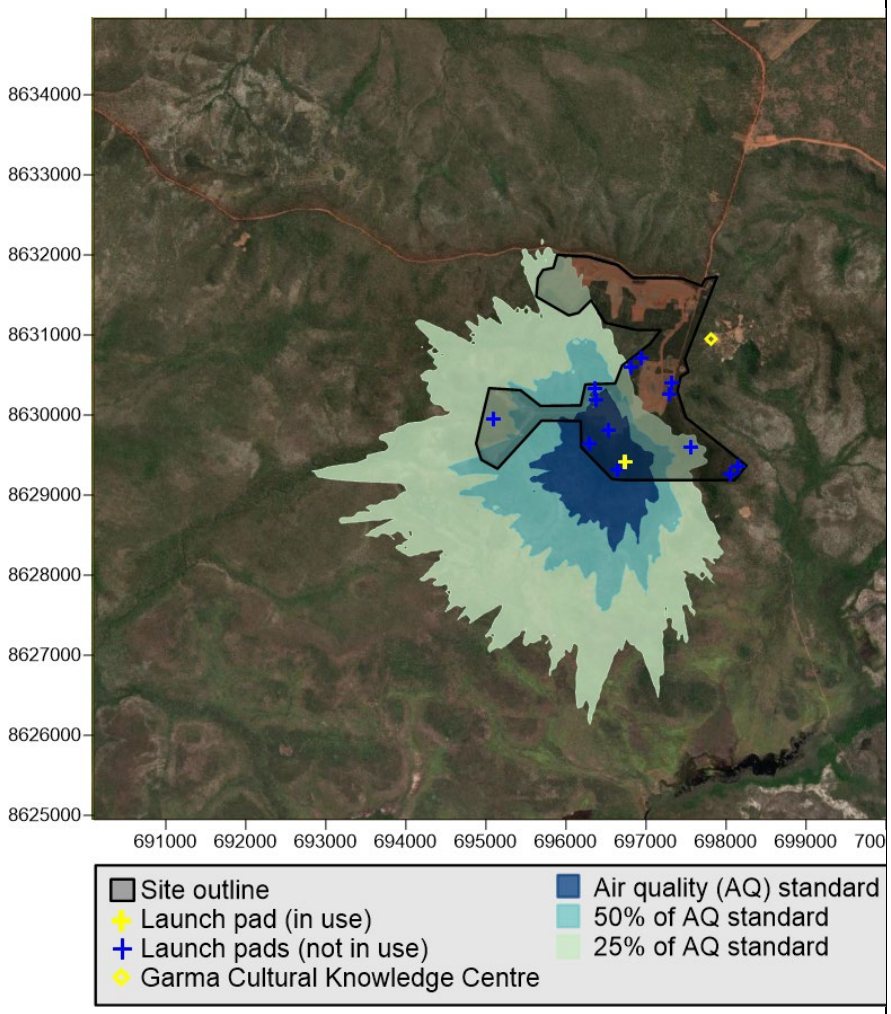


Figure 15: Predicted 1-hour ground concentration of NO_2 from launch of liquid fuelled LV from Green launch pad

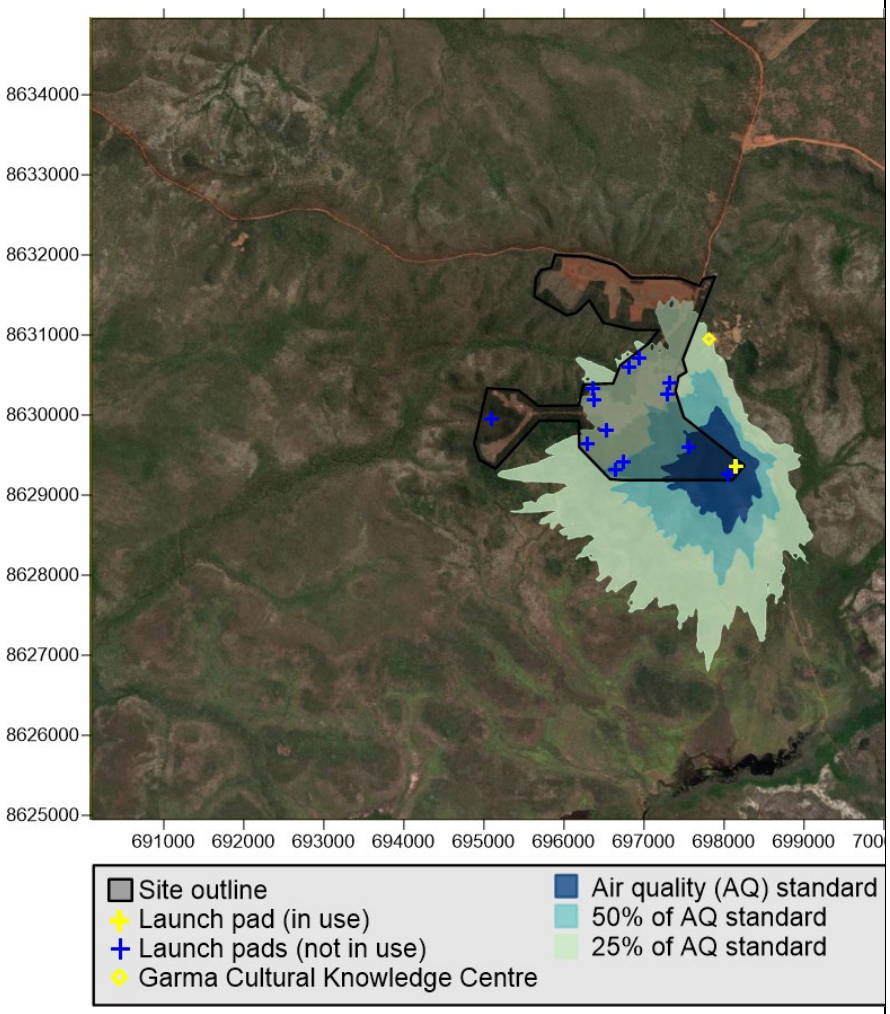


Figure 16: Predicted 1-hour ground concentration of CO from launch of liquid fuelled LV from Maroon launch pad

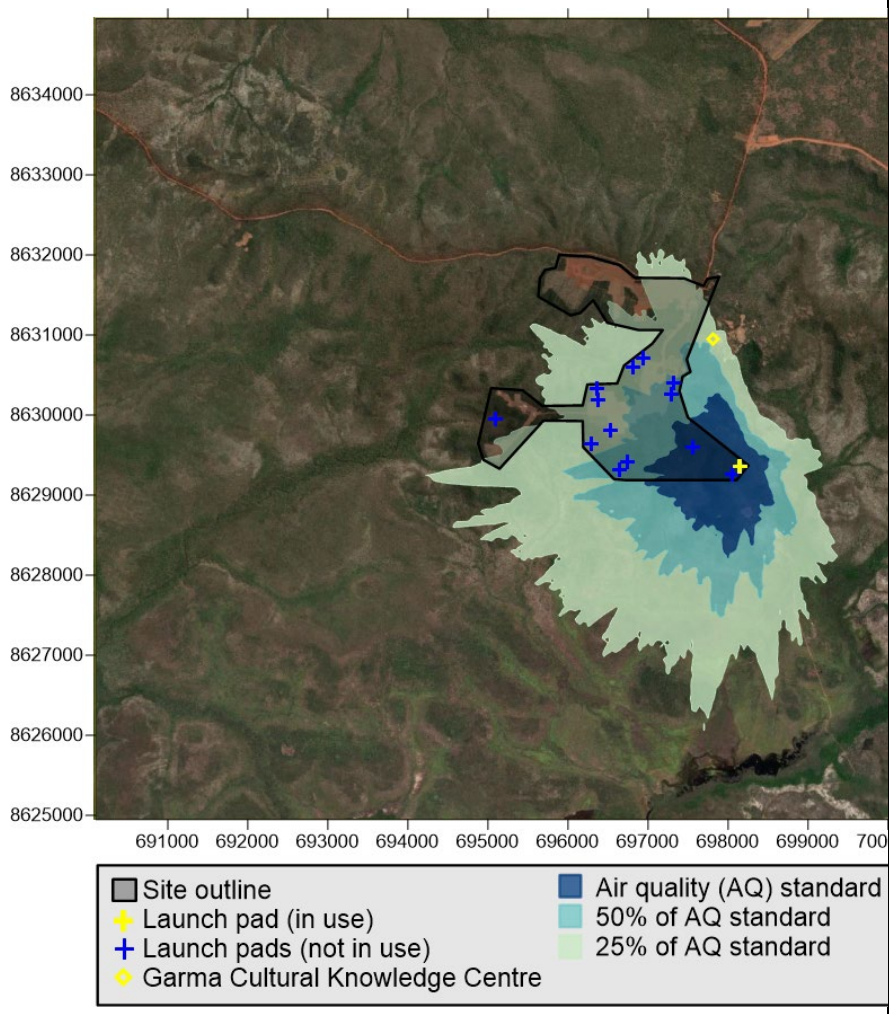


Figure 17: Predicted 1-hour ground concentration of NO_2 from launch of liquid fuelled LV from Maroon launch pad

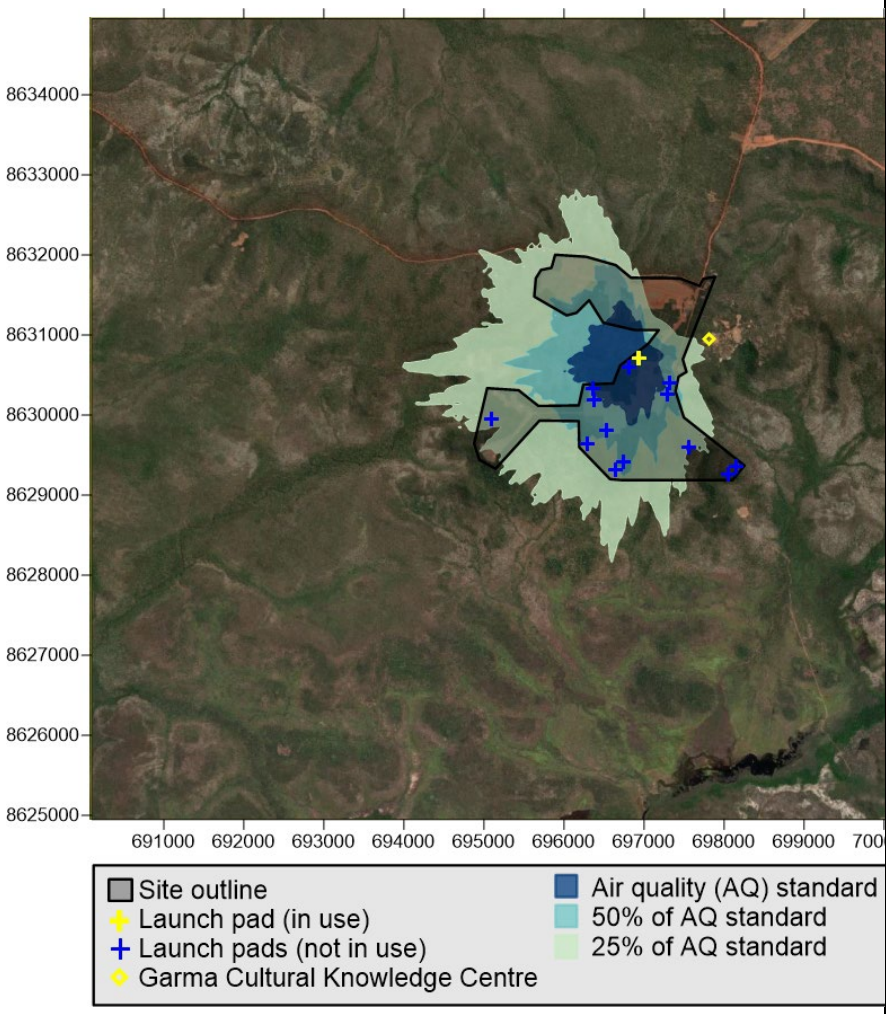


Figure 18: Predicted 1-hour ground concentration of CO from launch of liquid fuelled LV from pad Aqua launch pad

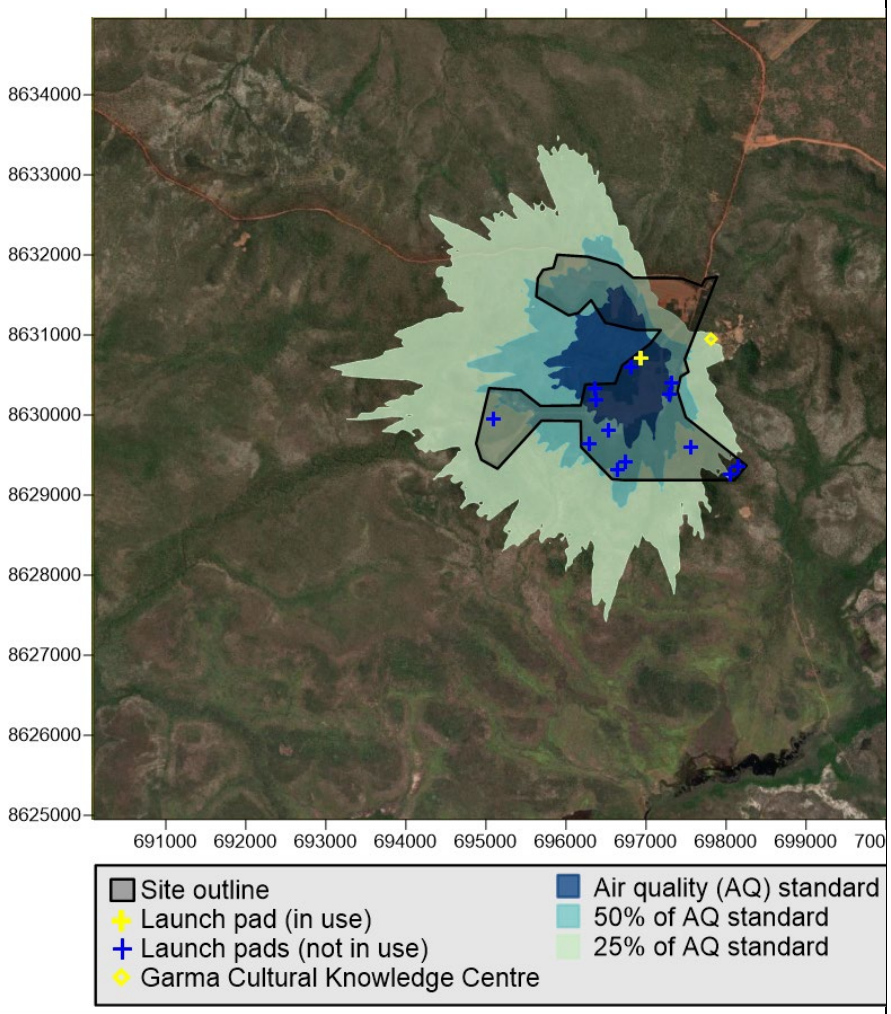


Figure 19: Predicted 1-hour ground concentration of NO_2 from launch of liquid fuelled LV from Aqua launch pad

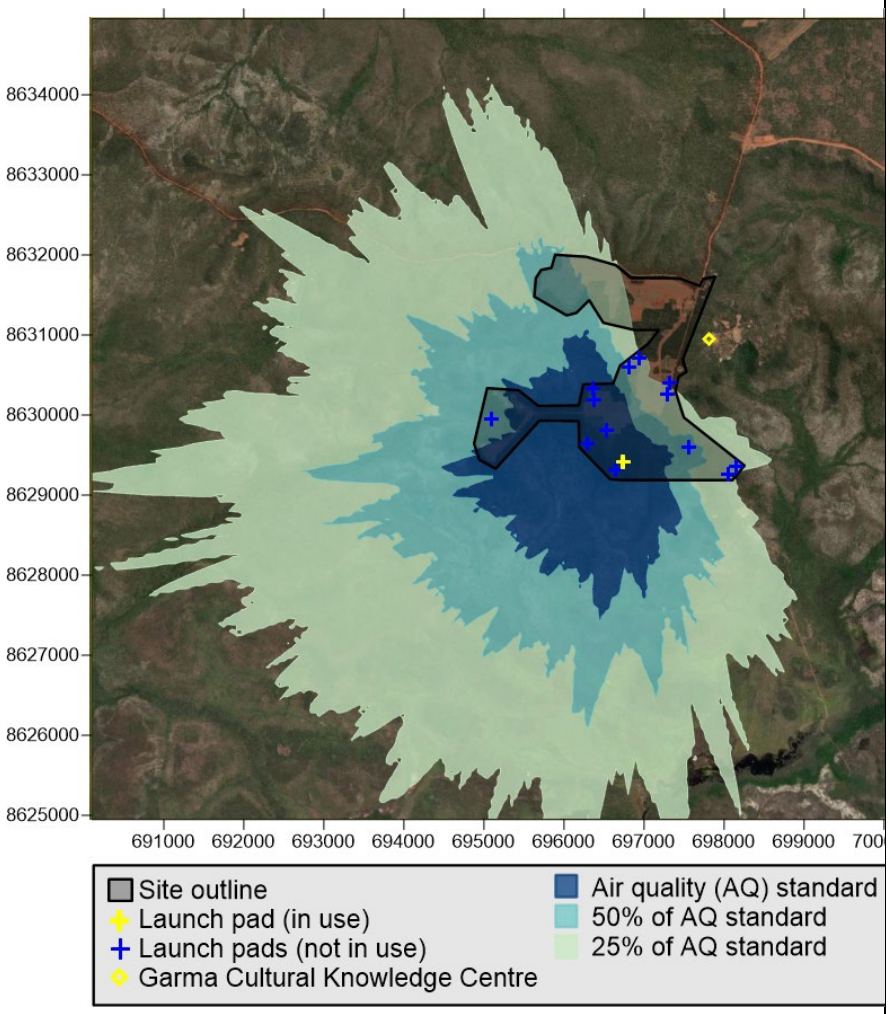


Figure 20: Predicted 1-hour ground concentration of HCl from launch of solid fuelled LV from Green launch pad

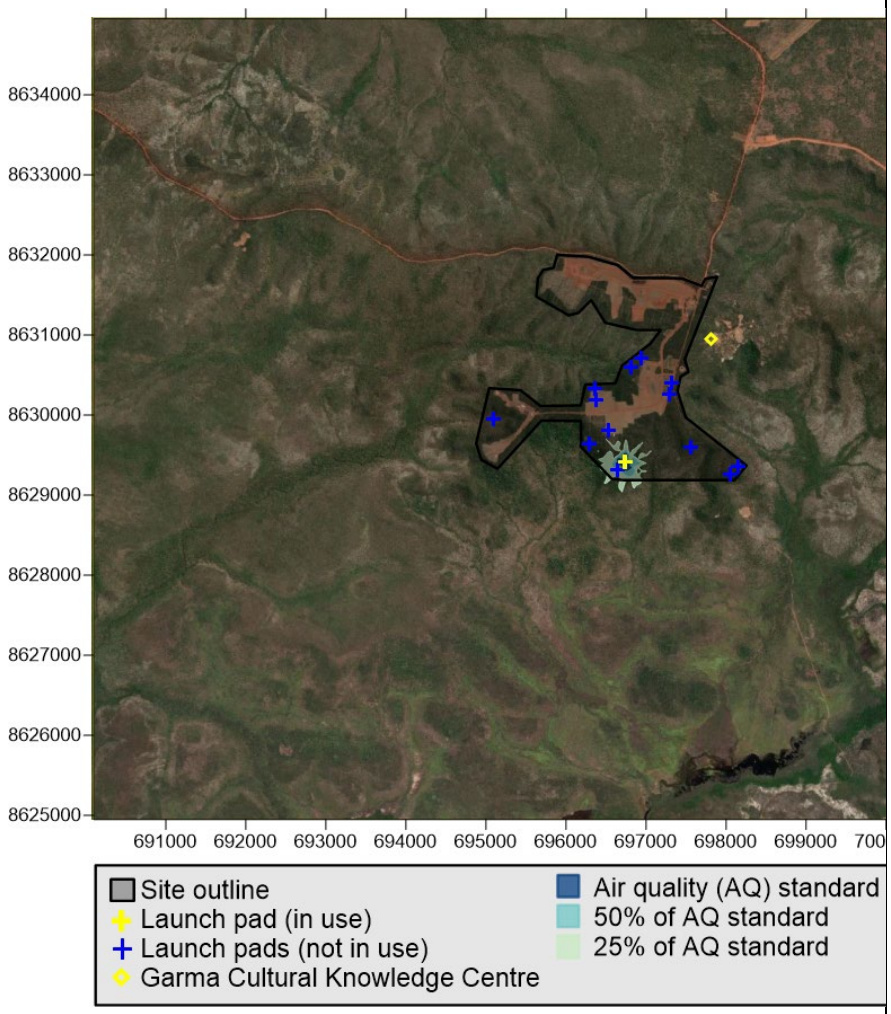


Figure 21: Predicted 1-hour ground concentration of Al_2O_3 from launch of solid fuelled LV from Green launch pad

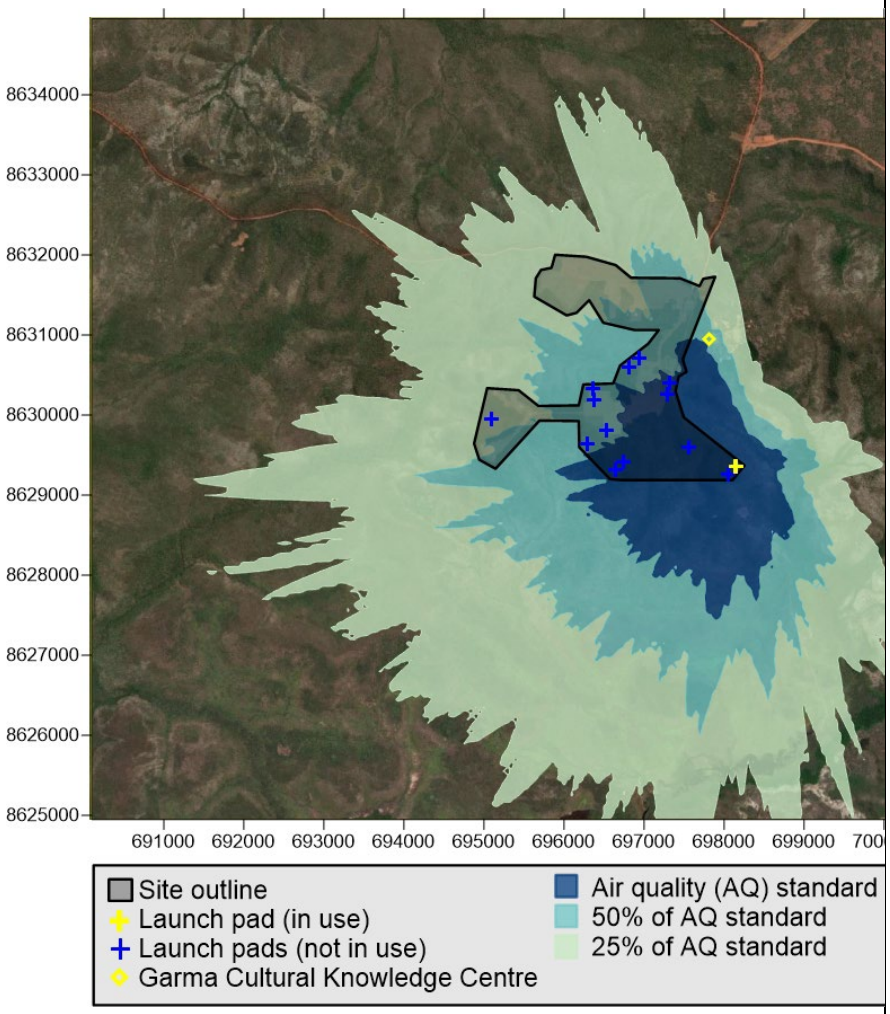


Figure 22: Predicted 1-hour ground concentration of HCl from launch of solid fuelled LV from Maroon launch pad

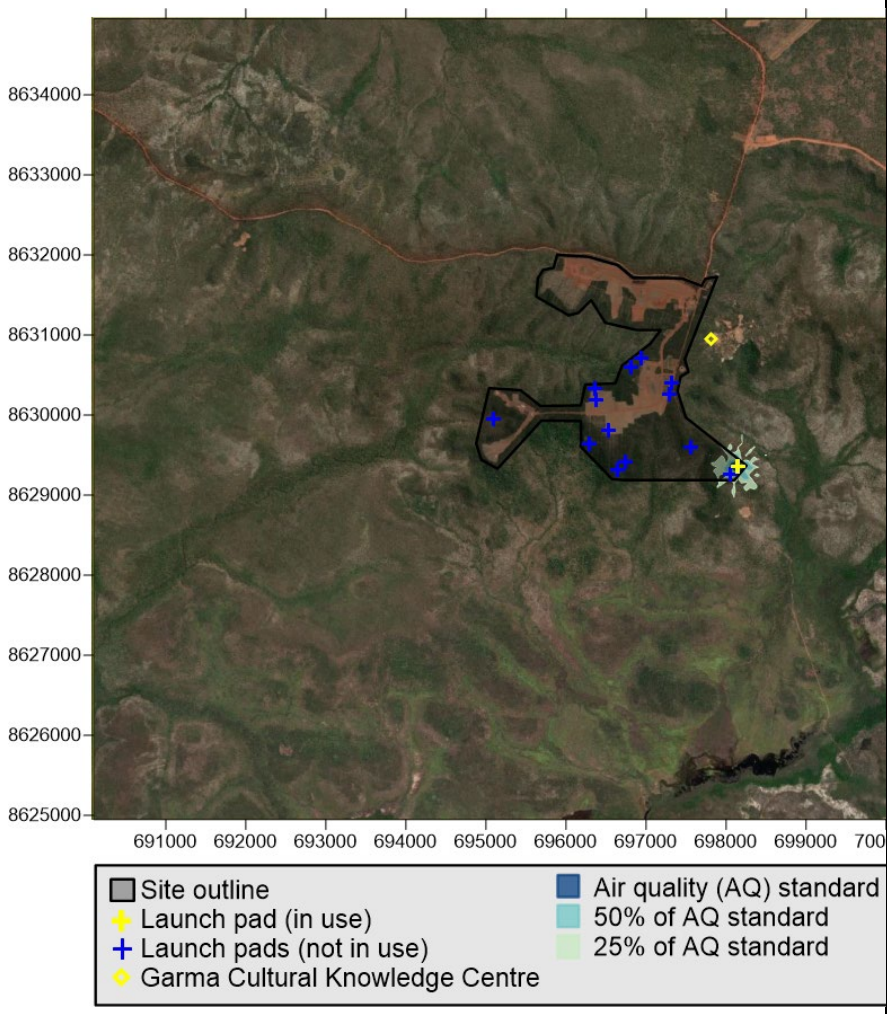


Figure 23: Predicted 1-hour ground concentration of Al_2O_3 from launch of solid fuelled LV from Maroon launch pad

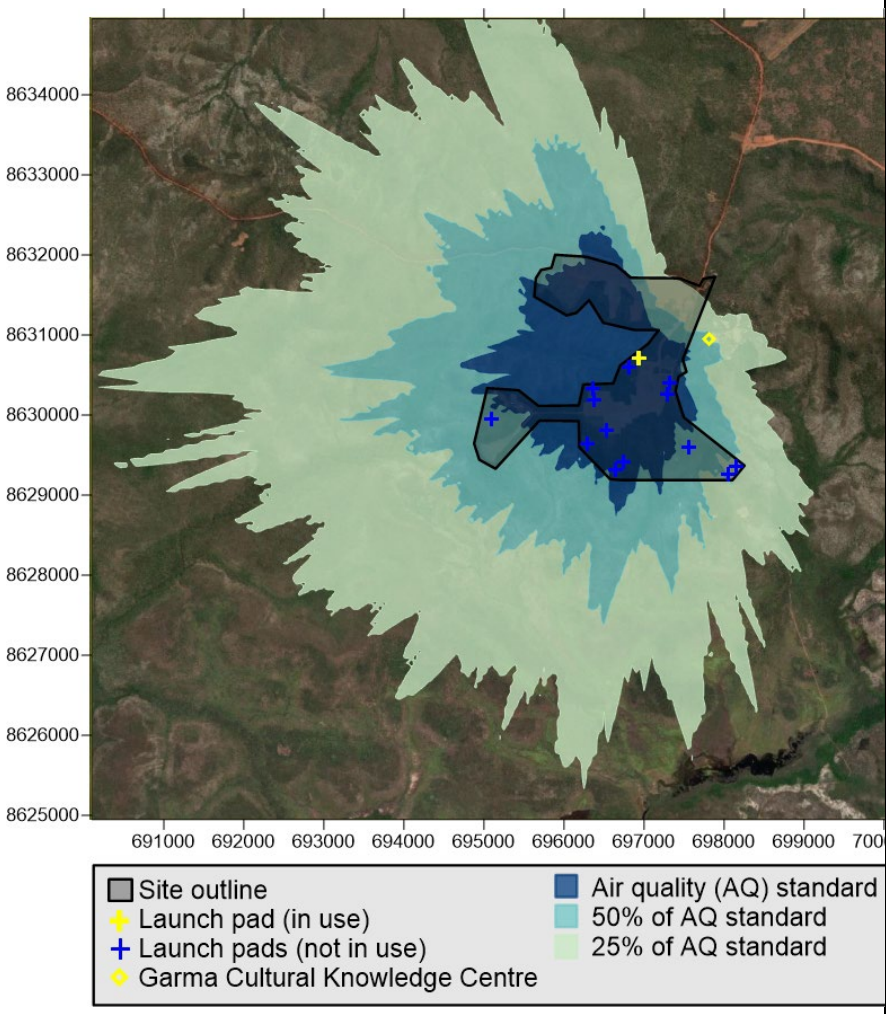


Figure 24: Predicted 1-hour ground concentration of HCl from launch of solid fuelled LV from Aqua launch pad

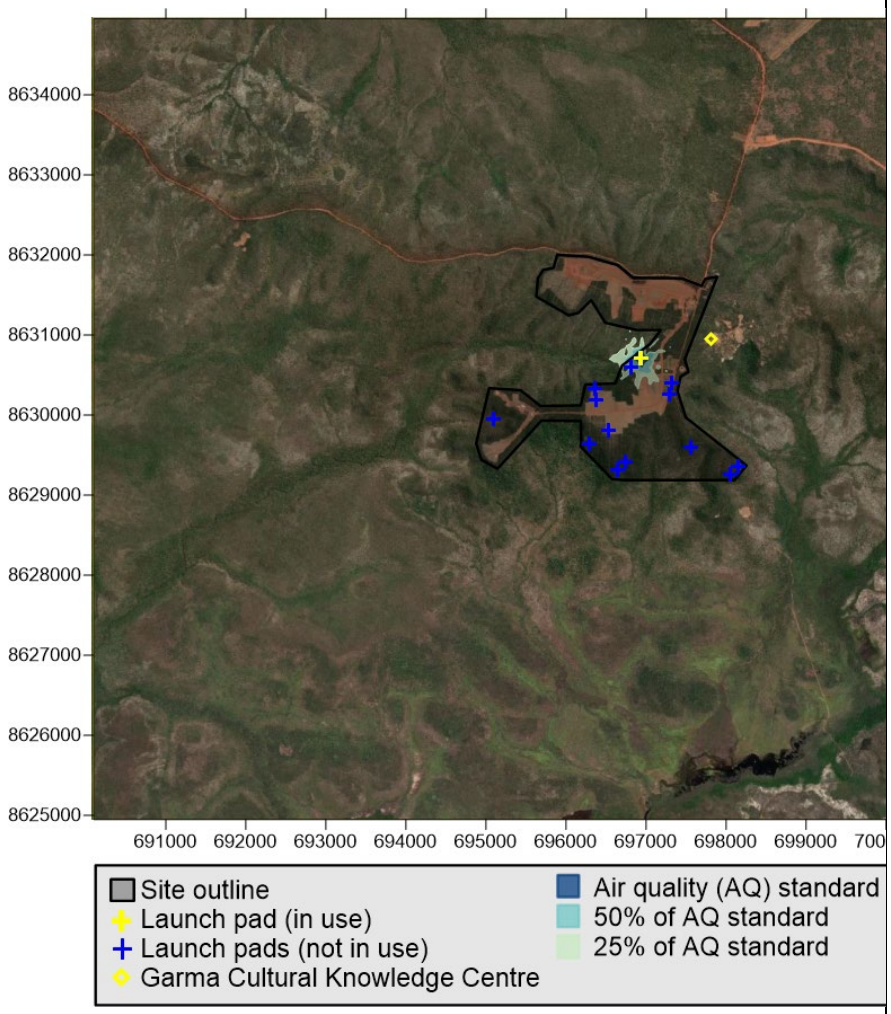
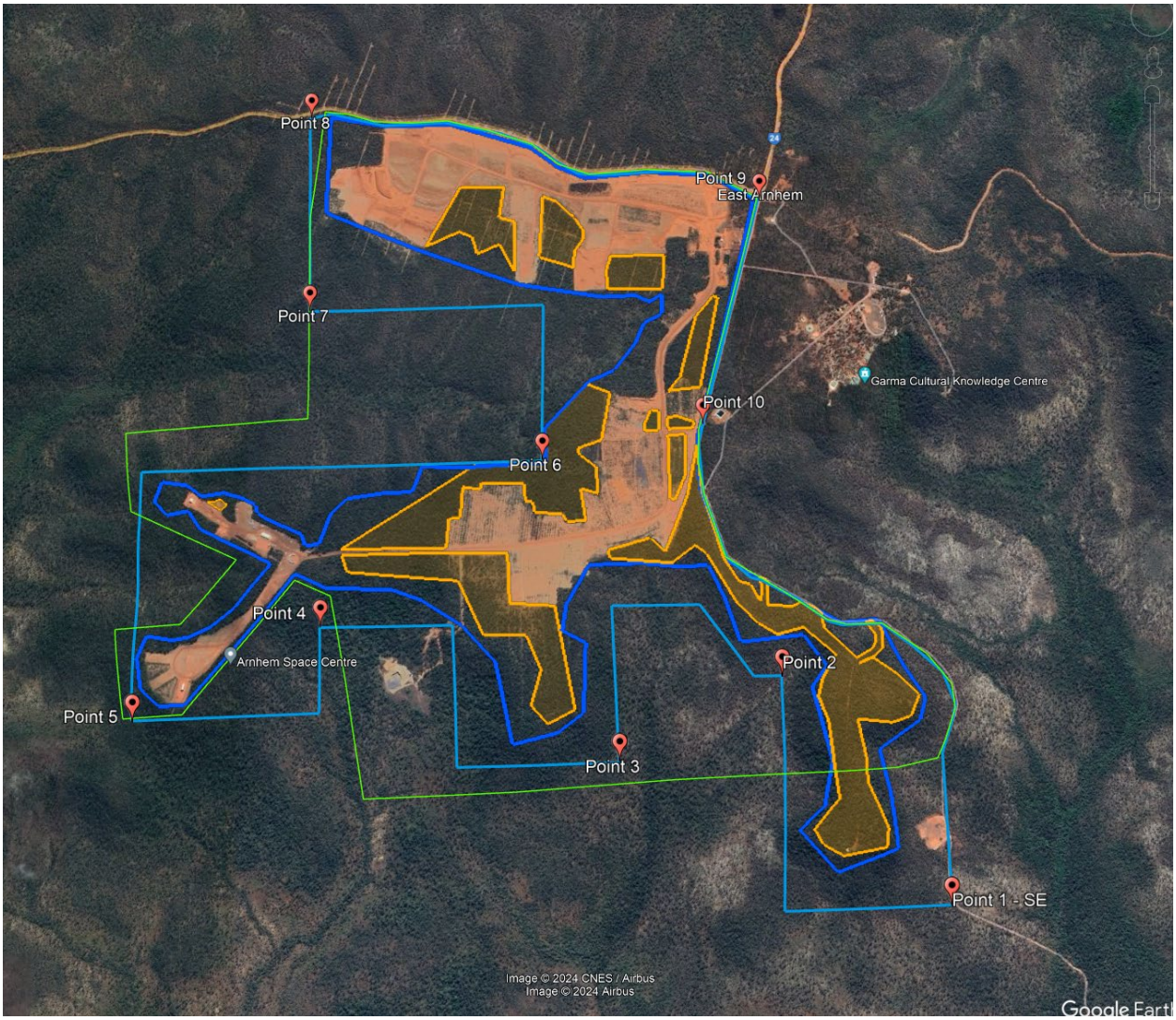


Figure 25: Predicted 1-hour ground concentration of Al_2O_3 from launch of solid fuelled LV from Aqua launch pad

APPENDIX 7 – SPATIAL COORDINATES OF THE PROPOSAL AREA



*ASC Lease area (light blue polygon – 530ha), ASC operational area (dark blue polygon (incl. site 2) - ~320 ha) and areas for vegetation clearance (orange polygons – 91 ha)

Legend:

Line	Description	Area
	Green line - Initial Sub-lease for ELA expansion	Initial Sub-lease area – The Land
	Light blue Line - Final Sub-lease for ELA expansion	Final Sub-lease area – The Land
	Dark blue Line	Likely operational area
	Orange lines/areas	Estimated Tree clearing areas
	Reference Point for Boundary	

**NOTE: ELA is finalising master planning work and the final lease is still expected to be in place with Gumatj and the Northern Land Council in Jun/Jul 2024. The areas and coordinates are supported by Gumatj and will be confirmed on final survey expected Jun/Jul 2024. Any changes to final lease area and/or final area for vegetation clearance are not expected to be material to this and would be confirmed before seeking vegetation clearance permit.*

Boundary coordinates:

Name Description	Latitude	Longitude	Comments
Points sequenced clockwise from the SE Corner at Point 1			
South East Corner – Point 1	12°24'00.98"S	136°49'26.50"E	Most South eastern point of the land
West from Point 1	12°24'01.55"S	136°49'04.33"E	Due west from Point 1
Point 2	12°23'31.63"S	136°49'04.31"E	
NW from Point 2	12°23'22.67"S	136°48'52.11"E	
Due East	12°23'23.09"S	136°48'41.38"E	
Point 3	12°23'41.72"S	136°48'40.88"E	
West from Point 3	12°23'41.48"S	136°48'19.91"E	Southwestern point of middle southern section
North	12°23'22.23"S	136°48'18.56"E	
Point 4	12°23'21.96"S	136°48'00.20"E	
South of Point 4	12°23'34.16"S	136°47'59.96"E	
Point 5	12°23'34.47"S	136°47'35.10"E	Southwest Corner
North of Point 5	12°22'57.96"S	136°47'31.93"E	Northwest corner of southern section
Point 6	12°22'57.45"S	136°48'31.97"E	
North of Point 6	12°22'36.95"S	136°48'31.62"E	
Point 7	12°22'36.13"S	136°47'57.66"E	
Point 8	12°22'06.17"S	136°47'57.54"E	
Point 9	12°22'20.51"S	136°49'05.45"E	
Point 10	12°22'55.01"S	136°48'55.49"E	

APPENDIX 8 – PREPARATION OF REPORT AND STUDIES

Title	Author(s)		Qualifications	Experience
NT Supplementary Environmental Report	Katestone Environmental	Dr Craig Miller	BSc (Zoology), MSc. (Zoology, 1st Class Hons), Ph.D. (Forestry)	Dr Craig Miller has over 30 years' experience as an ecologist, research scientist and environmental consultant in Australia, New Zealand, and southeast Asia. He has been involved in environmental approval applications for a wide range of development projects across Australia with a commitment to ecologically sustainable development. Dr Miller is currently Team Leader at Katestone Environmental with a focus on climate change, greenhouse gases, and special projects.
NT Supplementary Environmental Report	Equatorial Launch Australia	Ben Tett	Bachelors Space and Mechanical Engineering.	Ben has 15+ years' experience as an executive and engineer spanning areas such as Aerospace Engineering, Project and Program management, PMO and Portfolio Management, Innovation, Strategy Development and Business Transformation. Over the last 10 years, Ben has worked in commercial aviation at Virgin Australia where he established a strong brand and reputation for a being a people-focused leader and for delivering complex programs. Ben has a Bachelor of Engineering from the University of Queensland.
Vegetation and Habitat Assessment : Arnhem Space Centre	EcOz Pty Ltd	Simon Aylott	BSc Biology / BA Biological Anthropology (Hons)	Simon has worked at EcOz Environmental Consultants since 2022. In addition to weed, bird and threatened species surveys, Simon has worked on a range of development applications involving ecological and significant impact assessments. Some examples of work Simon has undertaken across the Top End are ecological constraints assessments, baseline ecological surveys, significant impact assessments, property development plans, land capability and land suitability assessments, and site and soil evaluations.

ARNHEM SPACE CENTRE
PRINCIPLES AND PROTOCOLS FOR
LAND/SEA ACCESS AND VEHICLE RECOVERY

22 Oct 2023

1 PURPOSE

Equatorial Launch Australia acknowledge that the land the Arnhem Space Centre sits upon and the lands over which rockets will be launched and some come to rest are Aboriginal as well as inter-state lands or waters. We recognise the continuing connection of the Aboriginal people to the land and waters, and thank them for protecting this country, coastline and its ecosystems since time immemorial. We pay our respects to their Elders past and present, and extend that respect to all First Nations people who participate in our launch activities.

Land and water access will be required to facilitate the recovery of ELA and/or Client rocket vehicle assets following some launches from Arnhem Space Centre (ASC). ELA wants to ensure that this process is undertaken in genuine partnership and cooperation with Land Owners, Land Managers (including Ranger groups) as well as land/sea Protected Area Management Agencies (e.g. Marine Parks) in the most respectful and appropriate way possible.

Recovery will be managed in accordance with the ASC Operations Manual procedures and the ELA Recovery Plan and specific requirements and instructions as required for each launch. ELA will also assure adherence to the set of principles in this document which are aimed to ensure the appropriate steps are taken when ELA and Launch Clients are accessing land/water for retrieval purposes.

The principles covered in this document include:

- Communication to Land Managers & Protected Area Management agencies
- Access processes to up-range and down-range recovery sites
- Site impact remediation
- Recovery operations safety and emergency

2 PRINCIPLES FOR RECOVERY FROM RANGE AREAS

2.1 COMMUNICATION TO LAND MANAGERS & PROTECTED AREA MANAGEMENT AGENCIES

a. Impacted Land Managers (where Traditional Owners' land has been identified as likely landing zone of vehicle assets) and/or Protected Area Management Agencies will aim to be identified as early as possible during a launch campaign through access consultation with the State Governments and State Environmental agencies.

b. ELA will engage with impacted Land Managers, the Aboriginal Areas Protection Authority (AAPA) and Protected Area Management Agencies through direct briefing on the launch campaign including all available information on launch dates and probable landing locations.

c. ELA will invite impacted Land/Water Managers to attend ELA's community Safety and Retrieval Committee (SRC) leading into each launch campaign for ongoing engagement and communications related to the launch including identifying any particularly sensitive areas in the probable recovery zone.

d. ELA will arrange for the assembly/prepositioning of nominated Land/Water Managers (likely senior Rangers for the probable recovery areas) at the Arnhem Space Centre or in an appropriate location as agreed prior with the impacted stakeholder group prior to the rocket launch.

e. Once landing location/s have been identified, the SRC, including the impacted Land/Water Manager/s will be notified by ELA.

f. ELA and the relevant Land/Water Manager/s may be required to meet swiftly to discuss the landing location and proposed retrieval activities including the correct protocols to addressing or accessing sensitive/sacred sites should these areas be impacted. ELA's retrieval activities will be guided by the Land Managers, in particular to gain an understanding of any cultural sensitivities or geographical characteristics of the landing location that could impact upon retrieval activities.

g. Once retrieval has been completed, the appropriate Land Manager/s will be notified by ELA and documentary evidence of the retrieval activities and the landing location will be provided to the Land Managers and environmental agencies if required.

2.2 Access to Up-Range and Down-Range Recovery Sites

a. Recovery activities will aim to take place within 48hrs of launch (or the contracted term with ELA Client)

b. A helicopter (for land) and boat (for water) will be the preferred method of recovery and may involve down-range re-fuelling and land transport aspects at agreed locations.

c. ELA will aim for there to be sufficient capacity in the helicopter/boat for a nominated senior representative of the Land/Water Manager and/or Traditional Owners of the recovery area to be invited to participate in recovery activities. However, some flights will have more cargo than others and may have additional critical personnel to support retrieval. Space will therefore be determined where weight and balance can accommodate. In circumstances where cargo weight prevents the carriage of traditional Aboriginal owners or representative rangers on the retrieval flight, ELA facilitates a reconnaissance flight with TOs and rangers so they may inspect the landing site and provide advice on retrieval.

d. For Land recovery, Living vegetation such as small shrubs may be required to be trimmed to improve helicopter landing zone in the interest of safety, but living shrubs where possible are not to be removed completely, and living trees not cut unless it would be impossible to safely recover a component without doing so. Standing dead wood can be cut to improve landing zone and prevent sling gear from snagging during lifting operations.

e. All recovery activities undertaken which impact upon the land and water environments will be documented with photos and videos and shared with the relevant Land/Water Manager at the conclusion of recovery activities.

f. The hardware may either be transported directly from its staging site to ASC, or be transported to previously agreed and permitted nearby road- or airstrip-accessible rally point, loaded into a truck or airplane, then transported to ASC.

g. ELA will conduct a de-brief following the recovery activities with the SRC (including AAPA where required) to identify improvement of these protocols for future launches which involve land or water-based retrievals.

2.3 Land Site Recovery

To ensure compliance with the Northern Territory and Queensland Environmental Protection Authority guidelines, and in accordance with the ELA Recovery Plan, site remediation work (where required) will be undertaken during the recovery process.

Site remediation work with respect to a potentially impacted sacred site is not endorsed or recommended by the Land Council. Such work may be a criminal offence under the Sacred Site Act. Instead, if ELA becomes aware (through the Land Council, AAPA, SRC, cultural monitors, rangers engaged to assist with the recovery activity or otherwise) of a potential sacred site disturbance, it will:

a. notify both the Land Council and AAPA; and

b. cease retrieval activity until such time as guidance from the Land Council and AAPA is given.

Where remediation work can be undertaken, it will include:

c. All impact sites remediated to pre-disturbance visual character

d. Filling any depression formed by the component's landing

e. Distribution of vegetative matter, such as leaf litter from the surrounding area, over disturbed soils

f. All tools used for remediation cleaned of soil and plant material, before attending and leaving the site, to prevent the spread of invasive species

g. Personnel attending the site will practice Leave-No-Trace Australia1 guidelines with regards to environmental disturbance, gear, trash, and body waste

h. Wherever possible, trees involved in the entanglement of parachutes are not to be damaged more than is necessary to extract the chute, with minor limb removal being preferred to major limb removal or cutting of entire trees

i. ELA will record the retrieval and remediated area location for review in 12months, working with local relevant rangers

2.4 Water Site Recovery

To ensure compliance with the EPBC Matters of National Environmental Significance (MNES), ELA conducts impacts assessments prior to launch and from this includes any specific requirements into the recovery plan for that launch.

ELA will ensure all members taking part in recovery are briefed on any particular MNES considerations prior to conducting recovery operations.

In some cases, ELA may engage in subject matter experts to assist in recovery planning to ensure best approaches are undertaken.

Recovery personnel attending the site will practice Leave-No-Trace Australia[2] guidelines with regards to environmental disturbance, gear, trash, and body waste

2.5 Recovery Operations Safety and Emergency

Safety and emergency procedures are addressed under ELA Operations Manual. The safety of all individuals engaged in the recovery process will be paramount, therefore anyone undertaking support in recovery operations must:

a. Undergo appropriate ASC site induction

b. As required, attend recovery operations planning

c. Complete any specific training required to sport the method of recovery - e.g. Helicopter or marine vessel training as arranged by ELA

d. As required, be available to join recovery team for recovery operations

ELA and relevant SRC groups will put in place appropriate commercial arrangements to support these activities.

[1] https://www.lnt.org.au/programs/7-principles/
[2] https://www.lnt.org.au/programs/7-principles/

ENVIRONMENT POLICY

1 COMMITMENT

Equatorial Launch Australia (ELA) is committed to conducting all activities in a responsible manner.

Activities shall be planned and implemented in such a way as to ensure impacts to the environment are either avoided or kept to an acceptable level. The environment includes air, water, land, natural resources, flora and fauna, as well as human beings and their cultural heritage.

ELA aims to adopt a best endeavours approach to applying leave-no-trace practices with regards to environmental disturbance and waste.

2 OBLIGATION

ELA commits to ensuring compliance with the following relevant legislation:

Northern Territory State:

1. Environment Protection Act 2019 (EP Act)
2. Environment Protection Regulations 2020 (EP Regulations)
3. Heritage Act 2011
4. Northern Territory Sacred Sites Act 1989
5. Water Act 1992
6. Waste Management and Pollutions Control Act 1998
7. Planning Act 1999

Australian Federal Government:

1. Environment Protection and Biodiversity Conservation Act 1999
2. Space (Launches and Returns) Act 2018

3 ACTIONS

To meet these commitments, ELA shall strive to:

- Ensure ELA is in compliance with relevant State and Federal regulations,
- Provide a safe and healthy workplace,
- Focus on safety and monitoring practices on ASC site in the lead up to, during, and post launch,
- Manage environmental matters as a critical business activity,
- Adopt best practice management strategies and implement continual improvement programs,
- Delay or stop activities where effective environmental mitigation controls are not in place to manage identified hazards,
- Apply a systematic approach to reduce impacts to the biological, physical and social environments and ensure continuous improvement in environmental performance,
- Where possible, reduce energy use, emissions, waste and discharges,
- Enhance awareness among our employees and users – to act in an environmentally responsible manner,
- Require contractors and clients to manage the environment in line with this policy,
- Work with suppliers who promote sound environmental practices,
- Work positively with regulators to ensure awareness of how ELA will meet requirements,
- Work positively with the community to engage appropriately in conversations about ongoing environmental care,
- Continuously improve environmental performance, protection and understanding, and
- Conduct audits, evaluations, and self-assessments of our practices in the implementation of this policy.

4 GOVERNANCE

The implementation and effectiveness of this Environment Policy is the responsibility of all ELA employees.

The Executive Chairman & Group CEO of ELA is accountable to the Board of Directors for ensuring this policy is implemented.

This policy shall be reviewed periodically and updated as required to ensure our commitments are relevant and our objectives are met.

VERSION APPROVAL

	Name	Role	Date	Signed
Approved	Michael Jones	Executive Chair and Group CEO	19/09/2023	

APPROVAL HISTORY

CR No.	Title	Date
CR-000044	LFL Baseline addition	

GUMATJ CORPORATION LTD
ABN 99 123 471 787

12/06/2024

Michael Jones
Level 2, Stone and Chalk Bldg, Lot Fourteen
North Terrace Adelaide SA 5000
michael.jones@ela.space

Dear Michael,

Arnhem Space Centre: Ongoing stakeholder engagement and consultation

Through discussion with members of the Equatorial Launch Australia team it has come to our attention that there is a request to demonstrate further engagement, beyond that already completed, to support ELA's NT EPA Referral application (including Supplementary Environmental Report).

We request that we collaborate to achieve these outcomes through the joint communication strategy that we have already commissioned through ARDS, to be delivered in parallel to the Northern Land Council section 19 lease consultations for Arnhem Space Centre Phase 2.

We have engaged ARDS to lead this work as they, through their combination of a language centre, radio and creative media teams and over 50 years' experience in supporting Yolŋu to exercise greater choice and control over their lives, are recognised as the experts in this field.

As you are aware, we are in the final stages of a comprehensive discovery education process which will inform the development of a variety of resources and communication materials that we will jointly deploy as we initiate direct consultations throughout the East Arnhem region. The Executive Summary of your Supplementary Environmental Report has already been included as an input into this process.

Discovery education involves two-way learning, in which a bridge is built between the two worlds through respectful and detailed dialogues between cross-cultural facilitators and key highly skilled Yolŋu facilitators to surface potential communication obstacles and develop recommendations to increase cross-cultural understanding.

There are a variety of concepts and technical components of this project which do not directly translate into Yolŋu languages, the discovery education process allows appropriate metaphors and analogies to be identified and used to explain the project in a way that is meaningful and accessible to Yolŋu audiences whilst maintaining factual accuracy.

Once the discovery education process is complete, plain English scripts will be developed which can then be back-translated into a number of relevant Yolŋu dialects to support the development of visual and multimedia resources. The plain English scripts will also be made available to the NLC to support the development of their consultation materials. Once materials are developed we will jointly engage with all key regional forums, Yolŋu organisations as well as a number of Traditional Owner groups and Homelands residents.

We ask that the integrity of this process is maintained by not undertaking any further consultations beyond those planned to be jointly held by Gumatj Traditional Owners and ELA at the completion of the ARDS process. We have been advised by both ARDS and Gumatj Traditional Owners that the most respectful and effective way of conducting this engagement is in parallel to the NLC process, so that there is one unified and connected up story for Yolŋu people affected by this project.

Yours sincerely,

Liam Flanagan
Chief Operating Officer
Gumatj Corporation

WIN-00017

Unexpected Finds Process

1 IDENTIFICATION

ASC site and Recovery Activities

2 PURPOSE

The Unexpected Finds Process details the steps to undertake when an unanticipated discovery of heritage, archaeological or human remains, occurs during construction or recovery activities.

3 OBJECTIVES

The objectives of the Unexpected Finds Process are to ensure:

1. Protection of people, the environment and cultural heritage
2. A consistent approach to the application of dealing with unexpected finds
3. Accountabilities and responsibilities are identified
4. Impacts of the find(s) are well-understood
5. Finds are recorded, evaluated and notified in accordance with statutory requirements
6. Minimisation of any risk exposure (supporting ELA's risk profile)
7. Minimisation of the severity of any impact and disruption, and
8. Stakeholders can contribute or provide input to changes and receive appropriate and timely communication about the find.

4 HAZARDOUS MATERIALS

Nil

5 REQUIREMENTS

Entry requirements for this process are documented at Reference A (section 2.3)

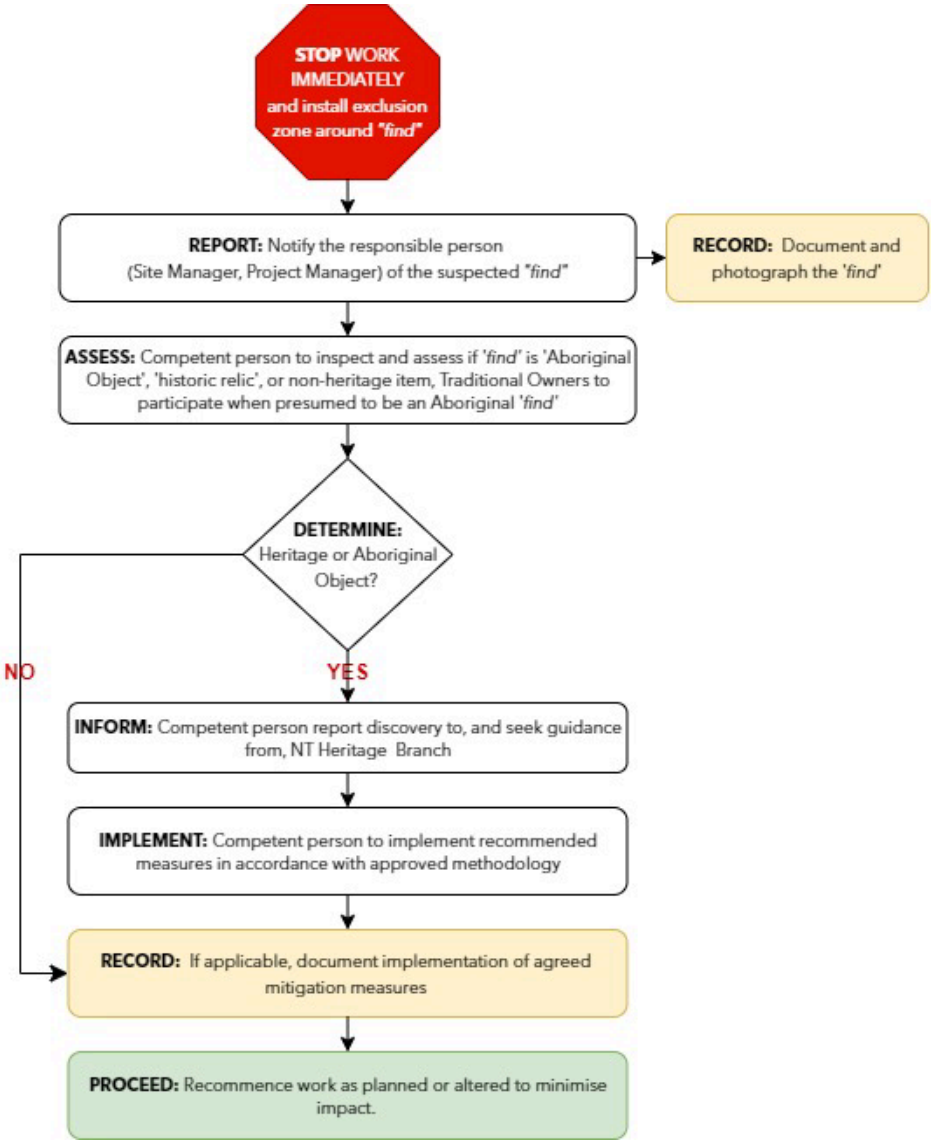
6 ADDITIONAL TOOLS AND EQUIPMENT

Nil

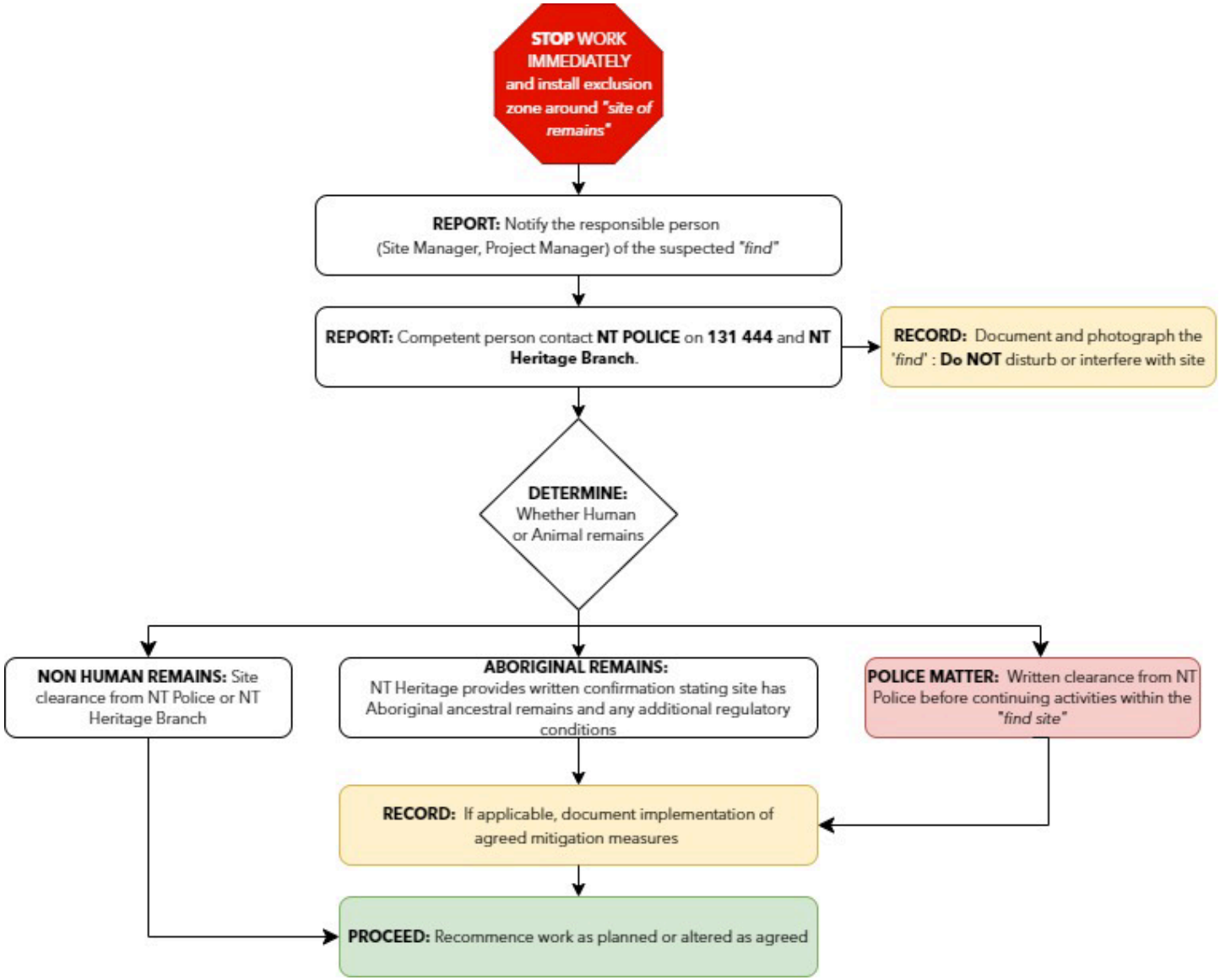
7 WORK INSTRUCTION

IF '*FIND*' is **not** human remains follow section 7.1
IF '*FIND*' **is** human remains follow section 7.2

7.1 Discovery of Unexpected Archaeological or Heritage "Find"



7.2 Discovery of Human Skeletal Remains



END OF WORK INSTRUCTION

8 REFERENCES

Serial	DIN	Title	Version
A	ELA-0000XX	Land and Sea Access Protocols	Latest approved