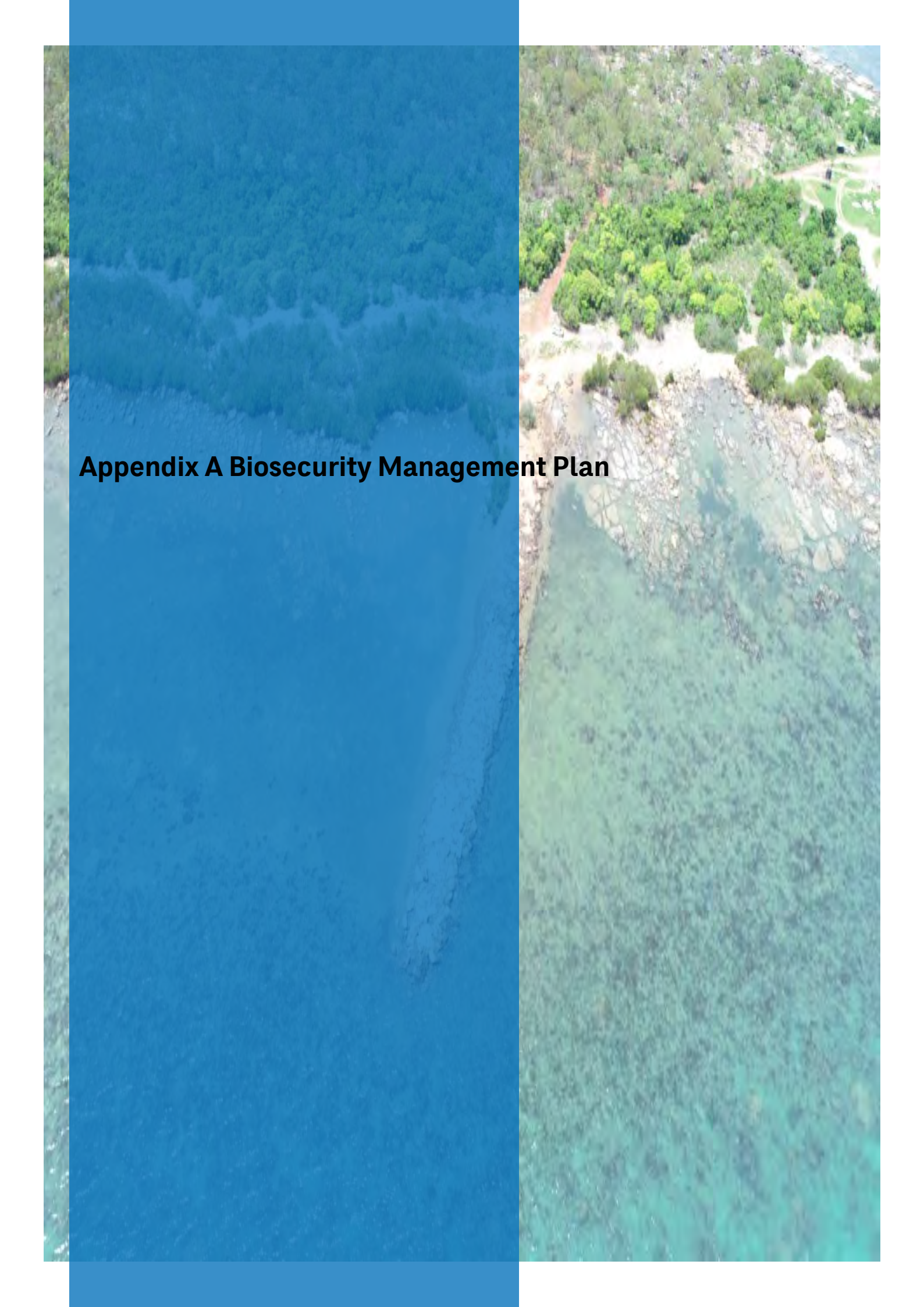


An aerial photograph of a coastal landscape. The left half of the image is covered by a semi-transparent blue overlay. The right half shows a shoreline with a mix of green trees, sandy areas, and rocky patches. The water is a deep blue, while the shallow areas near the shore are a lighter, greenish-blue, revealing some underwater features like rocks and coral.

Appendix A Biosecurity Management Plan

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Little Paradise Development – Biosecurity Management Plan

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Acronyms and Abbreviations

Acronyms	Definitions
AIMS	Australian Institute of Marine Science
ALC	Anindilyakwa Land Council
ALR Act	<i>Aboriginal Land Rights Act 1976</i>
BMP	Biosecurity Management Plan
BoM	Bureau of Meteorology
CTDD	Cane Toad Detection Dog
Cth	Commonwealth
DEPWS	Department of Environment, Parks and Water Security
DTLS	Darwin Tug and Line Services
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
GEMCO	Groote Eylandt Mining Company Pty Ltd
GHAC	Groote Holdings Aboriginal Corporation
IPA	Indigenous Protected Areas
km	Kilometre
NR	Natural Resources
NT	Northern Territory
PMST	Protected Matters Search Tool
TPWC Act	<i>Territory Parks and Wildlife Conservation Act 1976</i>
WM Act	<i>Weeds Management Act 2001</i>
WoNS	Weeds of National Significance

Section 1 Introduction

1.1 Background

Groote Holdings Aboriginal Corporation (GHAC) proposes to support the long-term economic and social future of all Anindilyakwa speaking clans of the Groote Archipelago (the Project) with the development of a new Marina facility, biosecurity facility and aquaculture research facility. The Project is located in the north-western section of Groote Eylandt off the east coast of the Northern Territory of Australia, in the Gulf of Carpentaria. Groote Eylandt is approximately 50 kilometres (km) off the east coast of Arnhem Land, about 630 km east southeast of Darwin and approximately 1,000 km west of Cairns (Figure 1-1). The Project is also described as the Little Paradise Development based on the local identifier for the area.

Groote Eylandt falls within the Anindilyakwa Land Council (ALC) area. The Anindilyakwa Land Trust holds inalienable freehold title of Aboriginal land which is administered by the ALC pursuant to the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) (the Land Rights Act). The Land Rights Act provides the legal framework for progressing social, commercial and economic development activities on Aboriginal land on behalf of traditional Aboriginal owners. Activity and development rights for Aboriginal land are administered through a lease arrangement.

The ALC (in consultation with the Traditional Owners) have authorised separate leasing areas for future development. These lease areas provide a form of tenure and are utilised for reference; however, these do not form development or clearing boundaries. Development disturbance and clearing boundaries are more refined than the lease boundaries and are utilised for delineating approved Project actions.

The Project comprises of the following components:

- Marina Harbour Facilities – Including ferry, barge and recreational boat harbourage facilities;
- Biosecurity Zones 1 & 2 – Construction and operation marina support and laydown area providing for biosecurity and functions to support marine operations;
- Logistics and Base Camp (Lease 1) – Base camp for the development and maintenance of the Little Paradise precinct including initial residential and office accommodation, storage and other necessary infrastructure; and
- Aquaculture Facility (Lease 2) – Aquaculture facility involving breeding areas, hatchery, cold storage, workers accommodation and other necessary infrastructure.

The various components of the Little Paradise development will be developed over the next decade. An indicative schedule for implementation of the Project is provided in Table 1-1.

Table 1-1 Indicative Project Schedule

Component	Immediate		Short-term			Medium-Long Term		
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Marina Harbour Facility								
Biosecurity Zone 01								
Biosecurity Zone 02								
Lease 1 - Logistics and Base Camp								
Lease 2 - Aquaculture Facility								

1.2 Purpose

In accordance with relevant ALC arrangements and Northern Territory (NT) policies, the purpose of this Biosecurity Management Plan (BMP) is to describe measures to prevent the introduction and spread of invasive fauna and flora into the Project's local environment. These measures will be implemented during construction and operation of the Project.

1.3 Objectives

The key objectives of the BMP are to:

- Identify potential biosecurity threats from the Project construction and operational activities to the local Groote Eylandt environment;
- Detail management procedures, control measures and responsibilities to avoid biosecurity related impacts to the Groote Eylandt environment, as a result of the Project construction and operational activities;
- Detail monitoring and reporting requirements relating to biosecurity aspects; and
- Ensure adequate response strategies are available and quickly activated in the event that invasive flora and fauna are detected and eradicated before they can establish, as well as ensure that eradication has been successfully achieved.

Detailed management activities and controls designed to achieve the objectives of this BMP are provided in Section 6.

1.4 Scope

The scope of the BMP is limited to the following:

- All activities associated with the construction and operation of the Little Paradise development, as listed in Section 1 and shown in Figure 1-1; and
- All activities undertaken by representatives of GHAC including sub-contractors and third parties associated with the Little Paradise development.

There are existing biosecurity arrangements managed by ALC and Groote Eylandt Mining Company Pty Ltd (GEMCO) associated with the general movement of cargo and activities on Groote Eylandt. Representatives of GHAC must comply with biosecurity obligations implemented by those entities, in addition to this BMP, as they relate to specific activities.

1.5 Proponent Details

GHAC originated from the 2012 Anindilyakwa Land Council (ALC) 15-year Strategic Plan. A plan driven by Community Elders to reverse the decisions made over the last 100 years and reassert control over Anindilyakwa destiny (GHAC, 2023). In line with its Strategic Plan, the ALC in 2018 entered into a series of agreed reforms with the NT Government to take over control of six core services and functions. The NT Government titled these Local Decision-Making Agreements (LDMAs). GHAC is one of the Aboriginal Corporations established to facilitate the Economic Development LDMA. The mandate of GHAC is to support and progress major projects and hold in-trust major infrastructure and assets as well as provide services for social and economic development of all Traditional Owners. The proponent details are outlined in Table 1-2.

Table 1-2 Proponent Details

Proponent	Groote Holdings Aboriginal Corporation	 GROOTE HOLDINGS ABORIGINAL CORPORATION
Key contact person	Mark Hewitt (Executive Director)	
Postal Address	Pole 12 Rowell Highway, Alyanula NT	
Email	mhewitt@alcnt.com.au	

1.6 Related Documents

The BMP is one of several plans that outline management measures and controls for specific aspects related to the Little Paradise development. The related but separate management plans are as follows:

- Biting Insect Management Plan;
- Threatened Species Management Plan; and
- Weed Management Plan.

1.7 Management Review and Document Control

1.7.1 Review

The BMP will be reviewed regularly by GHAC management staff or their delegate (at least every six months), including by the Project Manager and by any Construction or Operations Manager. The reviews may be run in conjunction with wider project team meetings. The review, and any suggested updates will consider:

- The level of environmental risk;
- Monitoring and inspection results;
- Recent and relevant biosecurity incidents including any lessons learnt;
- Opportunities for improvement;
- Any new legislative obligations or guidelines;
- Changes in internal and external policies and guidelines (e.g., changes to ALC or GEMCO biosecurity arrangements);
- Compliance with the ALC initiatives and activities;
- Effectiveness of biosecurity controls; and
- Adequacy of resources.

Evaluation of compliance with legal and other obligations will be undertaken through regular internal checks. During Project activities, key Project personnel described in Section 5 will be responsible for facilitating the development, implementation and update of the BMP. They will also be responsible for ensuring the adequacy of this BMP for the tasks to be undertaken. Any changes or updates that are identified, are required to be signed off by the Project Manager, prior to distribution of an updated version.

The BMP is a live document and may be reviewed and updated as required (aside from the review discussed above). Possible triggers for amendment outside of the review schedule include:

- Changes in legislation, biosecurity management guidelines or approval documentation;
- Where feedback, complaints, monitoring or site inspections have identified the need to improve biosecurity management in certain aspects or areas of the Project; and

- Where construction or operational procedures or methods necessitate the need to update the Project description and accordingly amend management measures.

1.7.2 Document Updates and Control

Relevant parties will be notified of any changes (key roles identified in Section 5) and then disseminated to the broader team. This can be through management meetings, special communications or toolbox talks.

GHAC, its contractors and delegates will use this BMP to achieve effective biosecurity management at the Project site and related activities. If separate or specific management plans or procedures related to biosecurity are developed, it must be consistent with this BMP and GHACs environmental management system and will be reviewed and approved by GHAC prior to commencement of works.



Details		Date	©COPYRIGHT CDM SMITH This drawing is confidential and shall only be used for the purpose of this project.				 Scale @ A3 - 1:6,000 GCS GDA 1994		DISCLAIMER CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map. DATA SOURCE Esri, Maxar, Geoeye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community	CONSULTANT  cdmsmith.com	CLIENT  Groote Holdings Aboriginal Corporation	Figure 1-1 PROPOSED SITE LAYOUT DRG Ref: FIG2_2_Project_SiteLayout.dwg
1	For review	20/02/24	DESIGNED	DB	CHECKED	TK						
2	Final	19/04/24	DRAWN	DB	CHECKED	TK	APPROVED		TK	DATE	22/04/24	
			Notes:									

Section 2 Local and Regional Context

Groote Eylandt, Winchelsea Island and Deception Bay lie about 50 km from the Northern Territory mainland and eastern coast of Arnhem Land, about 630 km from Darwin, in the Groote Archipelago (Figure 2-1). The Traditional Owners of the Groote Archipelago are referred to by their language name Anindilyakwa. The Anindilyakwa Archipelago contains the communities of Angurugu, Alyangula, Umbakumba, Yadagba District, Uburamudja District and Sandy Hill (Groote Eylandt) and Milyakburra District (Bickerton Island). According to the Australian Bureau of Statistics, the population of Groote Eylandt in 2006 was 1722 people. Anindilyakwa Land Council estimates that there are approximately 2,000 Anindilyakwa speaking clan groups residing on the island. Indigenous population as a percentage of total population was 45.9%.

GEMCO, a South32 / Anglo American plc joint venture operates a large manganese mine on Groote Eylandt near the community of Angurugu which has been in operation since the early 1960s. The mine produces up to 5 million tonnes annually – about a quarter of the world's total of manganese.

The Project area covers land tenure types including Aboriginal land held in an Aboriginal Land Trust, Indigenous Protected Areas (IPA), and Australia's internal waters. Groote Archipelago is legislated under *Aboriginal Land Rights Act 1976* (ALR Act) to be "owned" by its Traditional Owners (14 Clans) and in 2006 its terrestrial territory was declared an IPA. The IPA is managed according to internationally agreed protected area guidelines, forming the basis for collaboration between Traditional Owner's, ALC Rangers, Government Agencies and other interest groups to look after the cultural and natural values of the area. A Land and Sea Management Plan has been developed to set out how the Land and Sea of the Groote archipelago will be managed through the framework of the IPA.

Land and intertidal (to mean low water mark) based components of the Project fall within the Anindilyakwa Land Trust area. The Anindilyakwa Land Trust holds unalienable freehold title of Aboriginal land which is administered by the Anindilyakwa Land Council pursuant to the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth)¹. Sea based components of the Project fall within the area of Australia's 'internal waters' which is the jurisdiction of the Northern Territory Government. It is critical to note that the Groote Eylandt and sea country surrounding it is covered by the Anindilyakwa Indigenous Protection Area which is managed collaboratively in accordance with the Anindilyakwa Indigenous Protected Area Management Plan by a Management Committee, Advisory Committee, the Anindilyakwa Land and Sea Management Unit and the Anindilyakwa Land Council.

Little Paradise is relatively undeveloped. There are a few existing roads servicing the Ngadumiyerrka settlement on the northern most point of Little Paradise. There is an existing rockwall jetty which is proposed to be redeveloped as part of the Project. Access to Groote Eylandt is by air or sea.

Traditional land uses by Anindilyakwa people in the broader region include: conducting ceremonies; hunting, fishing and collecting seafood from coastal areas; collecting materials for art work; and harvesting plant material for food, medical and other purposes.

¹ The Anindilyakwa Land Trust was established by Section 4(2B) of the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) and is a body corporate. The land held by the Anindilyakwa Land Trust was granted to the pursuant section 12AAB and is described in Schedule 6 of the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth).



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1	For review	19/02/24	DESIGNED	DB	CHECKED	TK	0 5 10 20 Kilometers							
2	Final	18/04/24	DRAWN	DB	CHECKED	TK								
-	-	-	APPROVED	TK	DATE	22/04/24								
-	-	-	Notes:											
-	-	-											DRG Ref: FIG1_1_ProjectLocation	

Section 3 Existing Environment

3.1 Bioregion

Groote Eylandt is located in the Arnhem Coast Bioregion of north-eastern Arnhem Land identified in the Interim Biogeographic Regionalisation of Australia (Environment Australia 2021). The Arnhem Coast bioregion comprises a coastal strip extending from just east of the Coburg Peninsula to just north of the mouth of the Rose River in south eastern Arnhem Land, and includes many offshore islands including Groote Eylandt (DEWHA 2008). The isolation of these islands provides important refuge from processes which threaten mainland areas (Baker *et al.* 2005). The Arnhem Coast Bioregion has a tropical monsoon climate with a distinct wet and dry season, and very high temperatures throughout the year.

The vegetation of the Arnhem Coast Bioregion is characterised by eucalypt woodlands, monsoon vine forests and coastal communities. The coastal vegetation includes well developed heathlands, mangroves and saline flats, with some floodplain and wetland areas. Most noticeable of these is the extensive paperbark forest and sedgeland of the Arafura Swamp. Coastal dune systems are unusually well developed on sections of Groote Eylandt and Cape Arnhem Peninsula. Rugged Cretaceous sandstone areas occur on Groote Eylandt and islands of the Wessel group, and Tertiary laterites are extensive on the Gove Peninsula. Inland from the coast, the dominant vegetation type is eucalypt tall open forest with smaller areas of monsoon rainforest and eucalypt woodlands (Baker *et al.* 2005).

The bioregion is entirely Aboriginal land. Land uses include bauxite and manganese mining, and tourism. Nhulunbuy is the only major population centre (DEWHA 2008). Land and sea management across the Groote Archipelago is currently being guided by the Anindilyakwa Indigenous Protected Area (IPA) (GHAC 2022).

3.2 Climate

The climate at Little Paradise is characteristic of the northern Australian wet-dry tropics, with 90 % of the mean average rainfall of approximately 1300 mm falling between December and March (BoM 2021a). The average annual evaporation at Little Paradise is about 2000 mm (BoM 2021b). Based on data from the Northern Territory Bureau of Meteorology (BoM 2021a) at the Groote Eylandt Airport weather station (014518) mean minimum and maximum temperatures range from 15.1 to 28.9°C in July/August to 25.3 to 34.5°C in December/January.

The Gulf of Carpentaria is broadly dominated by the summer northwest monsoon and the winter southeast trade circulations. Wind speeds are relatively moderate with mean wind speeds typically less than 10 knots, and few instances of non-cyclonic winds exceeding 25 knots (BoM 2023).

3.3 Social

Groote Eylandt is located within the Anindilyakwa Land Council local government area. The Anindilyakwa people primarily reside in the townships of Angurugu and Umbakumba on Groote Eylandt and the township of Milyakburra on the nearby Bickerton Island. The town of Alyangula, developed as a residence for mining company workers under a special purpose lease between GEMCO, Anindilyakwa Land Council and Anindilyakwa Land Trust, is a non-Indigenous local population centre on the island.

At the 2021 census there were 2,542 people in the Anindilyakwa local government area. A total of 61.9 % of the population were Aboriginal and/or Torres Strait Islander, 27.2% were non-Indigenous and 10.7% not stated. The median age was 30 years and 16.5 % of the population were unemployed at the time of the census, compared to the state and national unemployment rates at the same time of 5.6 % and 5.1 % respectively (ABS 2021).

Detailed consultation with the community will be undertaken to maintain good communication and to understand the impacts and opportunities of the Project. Ongoing consultation and community feedback will be important with the implementation of the BMP.

3.4 Fire

Groote Eylandt and other islands in the Archipelago have retained relatively benign fire regime with many, mostly inaccessible, areas unburnt for at least five years. The fire regimes have altered since cessation of traditional Indigenous burning practices. Higher frequency burning occurs in localised areas south of Angurugu and along the Umbakumba Highway, where some areas are burnt every year. These fires are often small and patchy, but every third or fourth year an extensive fire burns about half of the island. The annual area burnt is highly variable, ranging from 1.5 to 40.0 % (DENR and ALC 2019). There is an association between geology/underlying landform and fire frequency, with the alluvial/colluvial/lateritic substrates burning on average every second year, sandstone burning every fifth year and the Aeolian sand dunes burning every tenth year. Most fires occur in August to October and there is a strong correlation between the area burnt and the amount of rainfall during the dry season (DENR and ALC 2019).

The spread of non-native invasive species can alter the natural fire regime. Fast growing invasive species, particularly grasses such as *Andropogon gayanus* (gamba grass) fuel bed characteristics of tropical northern savanna communities (Setterfield et al. 2013). Increased fire frequency and intensity caused by invasive weed species can reduced vegetation richness and structural complexity (including mid-storey vegetation) and coarse woody debris (such as hollow logs), which is a common consequence of areas that burn frequently (Aponte et al., 2014, cited in GBAP, 2021; and Woinarski & Ash, 2002 cited in Lawes et al., 2015).

3.5 Terrestrial Ecology

The introduction of weed species in the Project area may pose a risk to the local flora species and consequently, to the habitat that local fauna relies on.

A search on the Department of Environment, Parks and Water Security (DEPWS) Natural Resource (NR) Maps Database for threatened flora species and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (PMST) was undertaken for a 5 km radius of the Project area. There are a number of threatened fauna species, listed under both the Commonwealth EPBC Act and the *Territory Parks and Wildlife Conservation Act 1976* (NT) (TPWC Act), which may be present in the Little Paradise Project and surrounds.

As part of the Project referral process, a likelihood of occurrence assessment was undertaken for these species based the presence of suitable habitat within the Project area and confirmed records, which identified a total of 37 vertebrate species listed in existing databases as having potential to occur within 5 km of the Project area, including 3 reptiles, 12 birds, 7 mammals and 15 marine species.

No threatened flora species were noted in the desktop searches or detected during the 2022 surveys by EMS (EMS 2022).

Refer to the Threatened Species Management Plan (TSMP) for further detailed information on the results of the fauna and flora assessment. Information on weed species is provided in Section 4.

3.6 Marine Ecology

3.6.1 Benthic Habitats

Project activities may pose a risk to benthic communities and habitats within the Project area through the introduction of marine pest (e.g., Biofouling).

Benthic surveys were undertaken by EcOz Environmental Consultants in 2019 as part of a barge landing benthic impact assessment (EcOz, 2022). The surveys involved photographic transects at both the proposed disturbance area and at a nearby control site. Photographic assessment of benthic habitat recorded a total of eight coral genera and two seagrass species, *Enhalus acoroides* and *Halophila ovalis* (Table 3-1).

Benthic substrate of coarse sand and shell grit typical of fringing reefs were recorded throughout the depths and shallows of the benthic survey. According to the survey, habitat was consistent between the proposed disturbance area and adjacent undisturbed communities, comprised of seagrass, sponge and rocky coral. Habitat transition was evident in both benthic and aerial surveys. Hard bottom rocky coral common to the area was recorded immediately offshore the existing barge landing. Deeper water habitat was characterised by sandy bottom and sparse seagrass, *Halophila ovalis* (EcOz, 2022).

Table 3-1 Coral and Seagrass Species Recorded at Little Paradise

Coral Genera	Seagrass Species
<i>Acropora spp.</i>	<i>Enhalus acoroides</i>
<i>Favia spp.</i>	<i>Haophila ovalis</i>
<i>Pectinia spp.</i>	
<i>Porites spp.</i>	
<i>Montipora spp</i>	
<i>Platygyra spp..</i>	
<i>Goniopora spp.</i>	
<i>Lobophyllia spp.</i>	

The barge extension at Little Paradise is likely to impact a small area of the benthic communities. The survey found these communities are common and the proposed disturbance area supports only a small portion of potential foraging marine habitat. Consequently, it is unlikely the barge extension will significantly impact on the benthic communities or marine biota generally (EcOz, 2022).

A subsequent benthic communities and habitat assessment was undertaken by O2 Marine (2022a) to map the benthic communities and habitat (BCH) within the marine environment which may be impacted by further development of the Little Paradise marina. A summary of the findings is provided below.

The field survey was conducted over 3 days (27/05/22, 01/06/22, and 02/06/22) by two qualified and experienced marine scientists from O2 Marine. The BCH mapping fieldwork involved two primary survey techniques:

- Side scan sonar (SSS) to capture textural information over a series of broad swaths through the study area; and
- Drop camera/ROV to determine the type of benthic communities present and 'ground truth' the SSS data.

The survey area covered 88.3 hectares (ha) and was located on the northern coast of Groote Eylandt where the marine is proposed. The survey area is aligned parallel to the shoreline and incorporates the outer edge of a shallow reef platform that fringes this part of the island. Water depths ranged from 1 – 9 metres within the areas surveyed, with the shallowest sites inshore adjacent to the reef and deepest sites offshore. Table 3-2 provides the ten BCH categories identified by O2 Marine (2022a) and also the relative cover area.

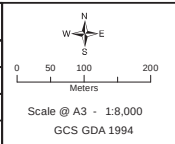
Table 3-2 Identified BCH Category Presented in Area (m², km², and ha), and relative cover (%)

BCH category	Area (m ²)	Area (km ²)	Area (ha)	Relative Cover (%)
Bioturbated sand/silt	475,195	0.4752	47.5	53.82
Sparse filter feeder	163,117	0.1631	16.3	18.47
Sparse seagrass	95,393	0.0954	9.5	10.80
Moderate cover coral field	54,779	0.0548	5.5	6.20

BCH category	Area (m ²)	Area (km ²)	Area (ha)	Relative Cover (%)
Low cover seagrass/macroalgae	32,190	0.0322	3.2	3.65
Sand/shell hash	24,660	0.0247	2.5	2.79
High cover coral/macroalgal reef	20,961	0.0210	2.1	2.37
High cover seagrass	11,569	0.0116	1.2	1.31
High cover coral reef	4,011	0.0040	0.4	0.45
Low cover macroalgae/sponge	1,105	0.0011	0.1	0.13
Total	882,981	0.8830	88.3	100



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CONSULTANT



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CLIENT



Groote Holdings
Aboriginal Corporation

Figure 3-1
BENTHIC COMMUNITY HABITAT

DRG Ref: FIG6_42_BenthicCommunities

3.6.2 Marine Fauna

Project activities may pose a risk to marine fauna within the Project area through the introduction of marine pest (e.g. biofouling) (refer to 4.4) which could impact the habitat marine fauna species rely on.

A study was undertaken in 2017 by the Australian Institute of Marine Science (AIMS) in partnership with the ALC Rangers to provide baseline fish ecological information for the then newly gazetted Anindilyakwa IPA. Follow up surveys were undertaken in 2019. General trends in fish abundance, diversity and species composition in the northern section of Groote Eylandt indicate that fish communities remain stable and highly diverse over those two years (Cure *et al.* 2020).

The survey in 2019 recorded 5,241 individual fish from 125 species. These species included three IUCN listed species:

- Queensland Grouper (*Epinephelus lanceolatus*) – Data Deficient, decreasing (IUCN);
- Barramundi Cod (*Chromileptes altivelis*) – Data Deficient, decreasing (IUCN);
- White-spotted eagle ray (*Aetobatus ocellatus*) – Vulnerable, decreasing (IUCN).

In the previous 2017 surveys, the Grey Carpetshark *Chiloscyllium punctatum* (Near Threatened, IUCN) was also recorded, as well as *Glaucostegus typus* and *Sphyrna mokarran* in a larger baseline survey in 2017 (Cure *et al.* 2020).

A conservation significant marine fauna desktop assessment was undertaken by O2 Marine (2022b) to investigate to establish baseline conditions, identify environmental risks of the Project to conservation significance marine fauna and to provide appropriate monitoring and management measures to minimise potential environmental impacts to marine species. As part of the investigation undertaken, O2 Marine (2022) identified a total of 18 marine species likely to occur near the Project area, including five mammals, seven reptiles and six sharks and rays.

Further information on fauna marine species likelihood of occurrence within the Project is provided in the TSMP.

Section 4 Relevant Pest and Weed Species

Introduction of invasive fauna and flora species can be detrimental to Groote Eylandt local environment. If inappropriately managed, the movement of equipment and material during the construction and operational phases of the Project has the potential to introduce new pest species to Groote Eylandt. Examples of biosecurity risk material includes²:

- Animal material: hair, fur, skin, faeces, shells, blood and fluids, feathers, nests, honey, flesh and bone;
- Vessel: Marine pests;
- Live animals: birds, rodents and reptiles;
- Food refuse: food scraps;
- Live insects: Khapra Beetle, wood borers, mosquitoes, bees, wasps;
- Snails: Giant African Snail;
- Plant pathogens: fungi, nematodes, bacteria, viruses etc;
- Plant material: pollen, bark, spores, flowers, seeds, gum, leaves, branches, roots, stems, wood, fruits and vegetables;
- Soil: dirt, mud, gravel, clay and sand; and
- Water: possibly harbouring mosquitoes, larvae and eggs.

4.1 Overview and Species Impacts

The Groote Eylandt has a unique native fauna and flora relatively free from many introduced pest species found elsewhere in Australia. The Groote Eylandt has a strict quarantine and biosecurity strategy in place to protect this pristine ecosystem from invasive species that has the potential to be brought onto the island through the movement of equipment, materials and people during construction and operation of the Project. Among some of the restrictions, the ALC quarantine and biosecurity program³ focuses on the following:

- **Bringing animals to the Groote Archipelago** – to avoid introduction of the Ehrlichiosis disease which has the potential to significantly impact local domestics dog and dingo population, domestic dogs from mainland must be checked by a qualified veterinarian who must undertake health check in accordance with the conditions of the ALC quarantine and biosecurity program² and complete all required forms (veterinarian and dog's owner). Ehrlichiosis is a disease that effects dogs and is caused by a tick-borne bacteria called *Ehrlichia canis*. The brown dog tick which is present across northern Australia is the main carrier of this disease, and transmission only occurs through infected ticks;
- **Bringing plants to the Groote Archipelago** – Plants and soils have the potential to bring pest species to Groote Eylandt such as weeds, invasive ants and cane toads which could have an adverse impact to the local ecosystems. If required, plants brought to the Groote Eylandt must be sourced from an approved commercial plat wholesaler and a pre-approval must be obtained from the ALC. If approved, plants can only be transported by barge where it will be inspected for the presence of pest species as part of the biosecurity program;

² Examples of biosecurity risk materials provided in the NT Port and Marine - Operational Environmental Management Plan (OEMP): https://www.ntportandmarine.com/wp-content/uploads/2018/11/NTPM-MS-ST-001-AUS-Operations-Environmental-Management-Plan_Nov-2018.pdf

³ ALC quarantine and biosecurity program: <https://anindilyakwa.com.au/land-and-sea/quarantine-and-biosecurity/>

- **Barge freight** – all barges arriving on the Groote Eylandt will undergo inspections by the ALC Quarantine and Biosecurity Office and therefore, it is required all barges to be pre-arranged so inspections can be booked in advance. All construction equipment, vehicle and machinery must comply with the following ALC Quarantine and Biosecurity conditions:
 - It has been thoroughly cleaned and visually checked
 - It is free from soil, organic material, seeds, or any plant or animal
 - It is free from any potential water reservoirs – these can provide potential breeding sites for exotic mosquitoes that can carry disease
 - Any equipment or items that have been located outside before being transported have been thoroughly checked for cane toads
 - Upon arrival on Groote Eylandt the item will be inspected for quarantine and biosecurity purposes by Sea Swift and the Quarantine and Biosecurity Officer.
- **Keeping the Groote Archipelago cane toad free** – There is no cane toad on Groote Eylandt and to keep the island cane toad free, all construction equipment, vehicle and machinery will be inspected for cane toads prior to being unloaded to the island. This includes visual inspections by the Quarantine and Biosecurity Officer and by a cane toad trained odour detection dog. All items brought to Groote Eylandt must be washed, cleaned thoroughly and are completely free of soil and organic matter before being transported to the Groote Eylandt. Cane toad has the potential to impact native fish, frogs, birds and quolls. Cane toads consumes wide variety of insects, frogs, small reptiles, mammals and even birds and produces toxic venom from skin glands which may kill native predators that eat or attempt to eat cane toads. Cane toads can also kill domestic animals if eaten and transmit diseases such as salmonella to humans. Further information on cane toads can be accessed at: <https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/land-management/health-pests-weeds-diseases/pests/invasive-animals/other/cane-toad>.
- **Keeping the Groote Archipelago free of invasive weeds** – As mentioned above, all construction equipment, vehicle and machinery must be washed, cleaned thoroughly and are completely free of soil and organic matter before being transported to the Groote Eylandt.

Any failure to comply with these conditions, the item will be denied entering the island and will be returned to the port of origin at the owner's expense.

4.2 Weed Species

There are three main categories of noxious weeds defined under the *Weeds Management Act 2001* (WM Act), which include:

- Class A – To be eradicated;
- Class B – Growth and spread to be controlled; and
- Class C – Not to be introduced to the Northern Territory. All Class A and B weeds are also considered to be Class C weeds.

In addition to this, thirty-two Weeds of National Significance (WoNS) have been agreed by Australian Governments based on an assessment process that prioritised these weeds based on their invasiveness, potential for spread and environmental, social and economic impacts. Consideration was also given to their ability to be successfully managed.

Approximately 130 non-native plant species have been recorded on Groote Eylandt, with 19 species recognised as significant weeds under NT legislation (Taylor, 2016). NT Government mapping indicates that weed infestations are mainly distributed within and adjacent to areas of human habitation, the port, mining areas and roadside verges (DENR 2021). Weed invasion on the Groote archipelago is largely restricted to Groote Eylandt and Bickerton island (NTG undated).

All industrial areas around Alyangula on Groote Eylandt have dense weedy perimeters which include snake weed *Strachytarpheta jamaicensis*, hyptis *Mesophaerum suaveolens* and Mission Grass *Cenchrus pedicellatus*. Another significant weed on Groote Eylandt is grader grass *Themeda quadrivalvis*, currently established at, and largely confined

to the community of Angurugu south of Alyangula, but now showing signs of spread along some bush tracks (Brennan, 2019).

Table 4-1 provides a list of relevant weed species identified in the Groote Archipelago Threatened Species Management Plan 2019-2028 (DNER and ALC 2019). The ALC have prioritised control of certain weeds within the IPA, based on priorities listed in Appendix VII Anindilyakwa IPA Management Plan (ALC 2016). Of the species below, at least eight have been recorded within or in close proximity to the Project area, including Guinea Grass which is considered a high priority for management (refer to table footnote and notation). All species listed as high priority for management have a fact sheet in Appendix C for reference.

Refer to the Weed Management Plan for further detailed information on weeds and relevant management activities and controls.

Table 4-1 Weed Species in the Groote Archipelago

Scientific Name	Common Name	Status		ALC Management Priority ⁴	Recommended Treatments
		NT WM Act	Cth WoNS		
<i>Alternanthera brasiliana</i>	Joyweed	-	No	-	Chemical Control - Infestations should receive initial herbicide treatments before being subjected to physical removal. This reduces the risks of spreading viable fragments, reduces the bulk of the above-ground biomass, and creates better visual access to the site. Non-chemical control - There are two main physical removal techniques: (1) deep manual digging (2) shallow mechanical excavation.
<i>Alternanthera pungens</i>	Khaki weed	B	No	-	Chemical Control - The best time to treat khaki weed is from December to March. Refer to the NTG website for treatment methods - https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/khaki-weed Non-chemical control - hand pulling and grubbing. Weeds, including their roots, are physically pulled out of the ground by hand or using hand tools.
<i>Andropogon gayanus</i>	Gamba Grass	A / B	Yes	Highest Priority	Chemical Control - Effective chemical control of Gamba grass relies on spraying the entire plant to dripping point and allowing to dry before rain (glyphosphate). For best uptake of the herbicide Gamba grass should be sprayed when actively growing and young (leaves should be at least 40cm long). Non-chemical Control - Small infestations or isolated gamba plants can be removed by hand pulling or grubbing out with a mattock or hoe.
<i>Azadirachta indica</i>	Neem	B	No	High Priority	Chemical Control - The best time to treat neem is from March to May. Refer to the NTG website for treatment methods -

⁴ As per the prioritization applied in the Groote Archipelago Threatened Species Management Plan 2019-2028 (DNER and ALC 2019).

Scientific Name	Common Name	Status		ALC Management Priority ⁴	Recommended Treatments
		NT WM Act	Cth WoNS		
					Non-chemical control – Physical removal should be done before fruit grows to stop seed spread. Hand pulling and grubbing. Weeds, including their roots, are physically pulled out of the ground by hand or using hand tools.
<i>Cascabela thevetia</i> [^]	Yellow oleander [^]	-	No	-	Chemical – In the Northern Territory, foliar sprays are considered unreliable in their effectiveness for Yellow oleander. ⁵ Non-chemical – The cut stump method is suitable for treating some unwanted vines, small shrubs and large trees that are actively growing and not stressed.
<i>Cenchrus echinatus</i> [^]	Mossman River Grass [^]	B	No	Low Priority	Chemical Control – Foliar spray with several potential herbicides including Flupropate and Glyphosate. Non-chemical Control – Complete physical removal can be done on small infestations.
<i>Cenchrus pedicellatus</i>	Annual Mission Grass	-	No	High Priority	Annual mission grass can be controlled by slashing prior to seeding (repeated slashing may be required). Adult plants will not persist to the following year. Small infestations of perennial mission grass can be hand pulled. Slashing can prevent seed formation. Regrowth can then be treated with herbicide. Chemical Control – The best time to treat mission grass is from December to March. Refer to the NTG website for treatment methods – https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/mission-grass
<i>Centrosema pubescens</i>	Centro	-	No	-	Chemical Control – Foliar spray – Glyphosate 360 at 1:100 with water applied to actively growing plants (WLM) (Smith 2002).

⁵ NT Government: [Territory Stories - Northern Territory Weed Risk Assessment Report: Yellow oleander \(Cascabela thevetia\)](#)

Scientific Name	Common Name	Status		ALC Management Priority ⁴	Recommended Treatments
		NT WM Act	Cth WoNS		
					Non-chemical control – Hand pull isolated plants and small infestations, making sure that all roots and stem fragments are removed. Plant pieces should either be bagged and taken to the dump or hung up off the ground to prevent reshooting.
<i>Clitoria ternatea</i>	Blue pea	-	No	-	Chemical Control – The herbicides imazethapyr and bentazone have been used to control this species. Non-chemical Control – Hand pull isolated plants and small infestations, making sure that all roots and stem fragments are removed.
<i>Crotalaria goreensis</i>	Gambia pea	-	No	Priority	Chemical Control – Effective chemical control of gamba grass relies on spraying the entire plant. For optimal uptake of the herbicide and high mortality rates gamba grass should be sprayed when actively growing and young (leaves should be at least 40cm long). Spraying plants prior to reaching full height will reduce time and herbicide requirements. Gamba grass is still sensitive to herbicide when flowering. Once gamba grass is seeding and the leaves are drying out herbicide will not work. Non-chemical Control – Hand pulling or grubbing is effective for individual weeds and recent outbreaks.
<i>Cryptostegia grandiflora</i>	Rubber vine	A	Yes	Priority	Chemical Control – Do not try to apply any control management prior to contacting the Weed Management Branch at: https://nt.gov.au/environment/weeds/contact-the-weed-management-branch/weed-management-branch-contacts . Rubber vine is on the alert list for environmental weeds.
<i>Cryptostegia madagascariensis</i>	Ornamental Rubber Vine	A	No	Priority	Do not try to apply any control management prior to contacting the Weed Management Branch at: https://nt.gov.au/environment/weeds/contact-the-weed-management-branch/weed-management-branch-contacts . Rubber vine is on the alert list for environmental weeds.

Scientific Name	Common Name	Status		ALC Management Priority ⁴	Recommended Treatments
		NT WM Act	Cth WoNS		
					Further information can be found at: https://denr.nt.gov.au/_data/assets/pdf_file/0016/404314/Rubber-vine-ornamental-ID-sheet-2017.pdf
<i>Hyptis suaveolens</i> [^]	Hyptis [^]	B	No	Priority	Chemical Control - The best time to treat hyptis is from December to March. Refer to the NTG website for treatment methods - https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/hyptis Non-chemical control - Hand pull isolated plants and small infestations, making sure that all roots and stem fragments are removed. Plant pieces should either be bagged and taken to the dump or hung up off the ground to prevent reshooting.
<i>Ipomoea pes-tigridis</i>	Ipomoea	-	No	-	Contact the Weed Management Branch for treatment advice specific to the site and circumstances.
<i>Ipomoea triloba</i>	Morning Glory	-	No	-	Chemical Control - Pre-emergent herbicides will not work on this plant. Systemic and broad leaf herbicides have some effect. Controls will need to be implemented over several seasons as persistent seeds can sprout. Non-chemical Control - Hand pull isolated plants and small infestations, making sure that all roots fragments are removed.
<i>Jatropha gossypifolia</i>	Bellyache bush	A / B	Yes	High Priority	Chemical Control - The best time to treat bellyache bush is from December to April. Refer to the NTG website for treatment methods - https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/bellyache-bush Non-chemical control - There are 5 ways of controlling gamba without the use of chemical. - Hand pulling and grubbing: Weeds, including their roots, are physically pulled out of the ground by hand or using hand tools.

Scientific Name	Common Name	Status		ALC Management Priority ⁴	Recommended Treatments
		NT WM Act	Cth WoNS		
					- Slashing: A brush-cutter, slasher or mower are used to cut weeds off above the ground level. - Fire: Bellyache bush is sensitive to fire, providing there is enough grass or other vegetation to carry a fire. - Stock removal: Removing stock from areas which have been treated for weeds is a common management technique used by land managers.
<i>Lantana camara</i>	Lantana	B	Yes	-	Chemical Control - The best time to treat lantana is from December to March. Refer to the NTG website for treatment methods - https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/lantana Non-chemical control – There are 4 ways of controlling gamba without the use of chemical. - Blade ploughing: A blade plough is used to push over some woody shrubs and sever their roots underground.. - Bulldozing: Bulldozers, chopper rollers or graders are used to clear large weed infestations. This leaves large areas of soil exposed so follow up control or revegetation should be considered. - Stick raking: A large blade with teeth attached to a bulldozer is used to clear large weed infestations. This leaves large areas of soil exposed so follow up control or revegetation should be considered. - Fire: Fire as a management technique is most effective when it is used together with other methods. It is useful for mass seedling control if there is a sufficient fuel load.
<i>Leucaena leucocephala</i>	Coffee bush	-	No	Priority	Chemical Control - The best time to treat coffee bushes from December to May. Refer to the NT Weed Management Handbook for treatment methods - https://nt.gov.au/_data/assets/pdf_file/0004/233833/nt-weed-management-handbook.pdf

Scientific Name	Common Name	Status		ALC Management Priority ⁴	Recommended Treatments
		NT WM Act	Cth WoNS		
					Non-chemical control – Mechanical control or burning can be used to improve access to infested areas for follow up chemical control.
<i>Macroptilium atropurpureum</i>	Siratro	-	No	-	Chemical Control – The herbicides including Glufosinate-ammonium and glyphosphate have been used to control this species. Non-chemical Control – Hand pull isolated plants and small infestations, making sure that all roots and stem fragments are removed.
<i>Macroptilium lathyroides</i>	Phasey Bean	-	No	-	Chemical Control – The herbicides including Glufosinate-ammonium and glyphosphate have been used to control this species. Non-chemical Control – Hand pull isolated plants and small infestations, making sure that all roots and stem fragments are removed.
<i>Megathyrsus maximus</i> [^]	Guinea Grass [^]	-	No	High Priority	Chemical Control – There are no herbicide products specifically registered for the control of guinea grass. Herbicides including fluazifop and glyphosphate have been used. Non-chemical Control – Manual control of guinea grass may require the digging out of larger clumps with a mattock or similar tool. ⁶
<i>Passiflora foetida</i>	Wild Passion Fruit	-	No	-	Chemical Control – There are no herbicide products specifically registered for the control of stinking passion flower; however, several may work. Advice should be sought from the NT Government before using a chemical control. Non-chemical Control – Hand pulling vines when the soil is moist is the most reliable form of control.

⁶ Queensland Government: [Guinea grass \(daf.qld.gov.au\)](http://daf.qld.gov.au)

Scientific Name	Common Name	Status		ALC Management Priority ⁴	Recommended Treatments
		NT WM Act	Cth WoNS		
<i>Sansevieria trifasciata</i> ^	Mother in Laws Tongue^	-	No	-	Chemical Control – There are no herbicide products specifically registered for the control of mother-in-law's tongue. Advice should be sought from the NT Government before using a chemical control. Non-chemical Control – Carefully dig out isolated plants and small infestations, making sure to remove all roots and fragments. This requires persistent effort, regular site monitoring, and removal of any new growth and its rhizome.
<i>Senna alata</i> ^	Candlebush^	B	No	Priority	Chemical Control – The best time to treat candle bush is from December to April. Refer to the NTG website for treatment methods - https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/candle-bush Non-chemical control – Hand pulling and grubbing: Weeds, including their roots, are physically pulled out of the ground by hand or using hand tools.
<i>Senna occidentalis</i>	Coffee senna	B	No	Priority	Chemical Control – The best time to treat coffee senna is from November to May. Refer to the NT Weed Management Handbook for treatment methods - https://nt.gov.au/_data/assets/pdf_file/0004/233833/nt-weed-management-handbook.pdf Non-chemical control – Can be controlled by handpulling and grubbing.
<i>Sida acuta</i> ^	Sida^	B	No	-	Chemical Control – The best time to treat sida is from November to April. Refer to the NT Weed Management Handbook for treatment methods - https://nt.gov.au/_data/assets/pdf_file/0004/233833/nt-weed-management-handbook.pdf Non-chemical control – Repeated slashing and cultivation; vigorous pasture competition. Biocontrol options are available.
<i>Sida cordifolia</i>	Flannel Weed	B	No	-	Chemical Control – The best time to treat flannel weed is from November to April. Refer to the NT Weed Management Handbook for treatment methods -

Scientific Name	Common Name	Status		ALC Management Priority ⁴	Recommended Treatments
		NT WM Act	Cth WoNS		
					https://nt.gov.au/_data/assets/pdf_file/0004/233833/nt-weed-management-handbook.pdf Non-chemical control – Repeated slashing and vigorous pasture competition.
<i>Sida rhombifolia</i>	Paddys lucerne	B	No	-	Chemical Control – The best time to treat paddys lucerne is from November to April. Refer to the NT Weed Management Handbook for treatment methods – https://nt.gov.au/_data/assets/pdf_file/0004/233833/nt-weed-management-handbook.pdf Non-chemical control – Grub plants out. Slashing before flowering will prevent seed production temporarily and produce new growth for spraying.
<i>Stachytarpheta cayennensis</i>	Snakeweed	B	No	Priority	Chemical Control – The best time to treat snakeweed is from November to April. Refer to the NT Weed Management Handbook for treatment methods – https://nt.gov.au/_data/assets/pdf_file/0004/233833/nt-weed-management-handbook.pdf Non-chemical control – Slash before seed set and re-establish pasture grass for competition.
<i>Stachytarpheta jamaicensis</i>	Snakeweed	B	No	Priority	Chemical Control – Foliar spray larger infestations when plants are actively growing. Best results are achieved during summer months. Small infestations can be spot sprayed using a foliar application. Non-chemical Control – Individual plants within small infestations can be physically pulled or grubbed out. Take care to remove larger roots. In large infestations, physical control will need to be conducted together with chemical control to obtain the best results. Slash infestations prior to flowering. Follow with foliar herbicide treatment on

Scientific Name	Common Name	Status		ALC Management Priority ⁴	Recommended Treatments
		NT WM Act	Cth WoNS		
					actively growing plants. Continued follow-up and re-treatment is essential to maintain control. ⁷
<i>Themeda quadrivalis</i>	Grader Grass	B	Yes	High Priority	Chemical Control - The best time to treat grader grass is from December to March. Refer to the NTG website for treatment methods - https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/grader-grass Non-chemical control - There are 3 ways of controlling gamba without the use of chemical. - Hand pulling and grubbing: Weeds, including their roots, are physically pulled out of the ground by hand or using hand tools. - Slashing: A brush-cutter, slasher or mower are used to cut weeds off above the ground level. - Stock removal: Removing stock from areas which have been treated for weeds is a common management technique used by land managers..
<i>Tribulus cistoides</i> [^]	Caltrop [^]	B	No	Priority	Chemical Control - The best time to treat caltrop is from November to April. Refer to the NT Weed Management Handbook for treatment methods - https://nt.gov.au/_data/assets/pdf_file/0004/233833/nt-weed-management-handbook.pdf Non-chemical control - Grub plants out by hand and burn.
<i>Tribulus terrestris</i>	Caltrop	B	No	Priority	Chemical Control - The best time to treat caltrop is from November to April. Refer to the NT Weed Management Handbook for treatment methods -

⁷ NSW Government: [NSW WeedWise](#)

Scientific Name	Common Name	Status		ALC Management Priority ⁴	Recommended Treatments
		NT WM Act	Cth WoNS		
					https://nt.gov.au/_data/assets/pdf_file/0004/233833/nt-weed-management-handbook.pdf Non-chemical control – Grub plants out by hand and burn.
<i>Urochloa mutica</i>	Para Grass	-	No	Priority	Chemical Control – Foliar applications of glyphosate at 3–4 quarts per acre or imazapyr (Arsenal, Habitat) at 2–3 quarts per acre. Spot treatments containing 3% glyphosate or 0.5–1% imazapyr are effective. A more selective option is TIGR, which can be broadcast at 40 oz/A or applied as a spot treatment at 3–5%. Re-treatments will be required with TIGR to maintain control. ²³ Non-chemical Control – Small infestations can be removed with repeated, aggressive tillage.

A: to be eradicated, B: growth and spread to be controlled, C: not to be introduced into the NT, WONS: weed of national significance, Prior: priority for management in the IPA.

^ Recorded within the Project area or in close proximity.

4.3 Pest Species

The Groote archipelago is relatively free from many of the introduced pest species that are common on the mainland Australia. Notably, there is an absence of feral pigs and introduced herbivores that are common across the NT (e.g. cattle, buffalo, donkey and horses). Results of the desktop searches of EPBC Act Protected Matters Report and DEPWS NR Map indicate that several pest species are likely to occur within 5 km of the location of the works, as listed in Table 4-2.

Table 4-2 Pest Species

Common Name	Scientific Name
Species Reported	
Goat	<i>Capra hircus</i>
Red Fox	<i>Vulpes vulpes</i>
Cat	<i>Felis catus</i>
Rabbit	<i>Oryctolagus cuniculus</i>
Pig	<i>Sus scrofa</i>
Water Buffalo	<i>Bubalus bubalis</i>
Cane Toad	<i>Rhinella marina</i>
Species Likely to Occur	
Black Rat	<i>Rattus rattus</i>
Feral cat	<i>Felis catus</i>
Asian house gecko	<i>Hemidactylus frenatus</i>

Cane toads (*Rhinella marina*) are listed as a key threatening process under the EPBC Act. They have had a dramatic impact on populations of native fauna on the mainland, including several threatened species. While several individual toads have been discovered (and disposed of) on Groote Eylandt over the past decade, no population has established (Taylor, 2016).

4.4 Marine Pests

The following marine species are major threats to NT waters:

- Asian bag mussel;
- Asian green mussel; and
- Black-striped mussel.

Monitoring at Milner Bay, on the eastern side of Groote Eylandt undertaken in 2009/10 identified no known marine pest species (Mayer *et al.* 2011).

The ALC has quarantine and biosecurity conditions which must be met when transporting a vehicle, vessel, machinery or construction equipment to the area.

Section 5 Roles and Responsibilities

All personnel involved in the Project including Project's employees, contractors and sub-contractors are required to undertake activities in accordance with this BMP. Key roles and responsibilities are included in Table 5-1 and biosecurity management measures in Section 6.

Table 5-1 Project Roles and Responsibilities

Position	Responsibilities
Project Director	Approve policies and procedures; Ensure contractors and staff are aware of the BMP requirements; Work with contractors, field and environmental personnel to implement management measures to reduce the risk of introducing pest fauna and flora and diseases to Groote Eylandt; Make strategic decisions and provides leadership and direction to project managers to implement those decisions; Ensure permits and legal approvals are secured ahead of the project; Manage project managers and enabling them to supervise and manage their own teams; and Devising cost-effective actions to enable effective compliance with the BMP.
Project Manager / Site Representative	Ensure employees and contractors understand their obligations under this BMP; Ensure requirements within this BMP are met; Retain a copy of this BMP on-site for reference by appropriate personnel; Keep and maintain appropriate records on-site; Initiate reviews and updates of the BMP when required; Prepare incident reports and implement corrective actions; Report to the regulatory agencies on environmental performance and non-compliances, as required; Manage all reporting requirements; Monitoring compliance; and Ensure that all the on-site safeguards and controls are in place.
Environmental Representative	Monitor implementation of the management procedures and mitigation measures outlined in this BMP; Conduct regular inspections of the Project site and report any non-compliances to the Project Manager; Record invasive fauna and flora species present on site; Assist Project Manager in reporting to regulatory agencies (as required); and Recommend amendments to the BMP based upon experience implementing the BMP.
All Staff and Contractors	Understand and comply with the requirements of this BMP; and Undergo inductions where necessary.

Section 6 Management Activities, Controls and Responsibilities

Management and control measures have been developed to minimise the risk of introduction of invasive fauna, flora and diseases to the local environment of Groote Eylandt due to Project construction and operational activities (refer to Table 6-1). Activities undertaken inappropriately or without pre-established suitable controls may lead to adverse impact to the local flora and fauna environment on Groote Eylandt.

Table 6-1 Biosecurity Objectives and Management Measures

Objectives					
No introduction of pest fauna and flora and diseases to Groote Eylandt.					
Management and Control Measures					
No.	Action	Monitoring	Timing	Responsibility	Compliance Evidence
1	All relevant staff and contractors trained and aware of their biosecurity management responsibilities and procedures.	NA	Construction and operation	Environmental Representative	Staff induction record
2	Biosecurity Management Plan reviewed and updated every 12 months.	NA	Construction and operation	Project Manager / Site Representative	BMP document history
3	Quarantine inspections - All barge freight transporting equipment or material to the Project must be inspected for any evidence of biosecurity material as identified in Section 4 above.	Visual inspection to be undertaken on each vessel arriving at Groote Eylandt.	Construction and operation	Environmental Representative	Inspection checklist
4	Maintain adequate biosecurity infrastructure (i.e., wash bay, fumigation area and inspection area).	NA	Construction and operation	Project Manager / Site Representative	Environmental Representative records, photos and plans
5	Obtain wash down and inspection certificates for all vehicle or equipment to be undertaken prior to be sent to Groote Eylandt.	NA	Construction and operation	Environmental Representative	DLTS and Environmental Representative
6	If noticeable traces of biosecurity material is found during inspection in any vehicle, equipment or material, it should be detained at an appropriate facility until wash down treatment or elimination/removal of this material is complete.	Visual inspection on every equipment, machinery or material for biosecurity material prior to unloading	Construction and operation	Environmental Representative	Inspection checklist, photos, Environmental Representative records

Management and Control Measures					
No.	Action	Monitoring	Timing	Responsibility	Compliance Evidence
		them to Groote Eylandt.			
7	Ensure no biosecurity material (e.g. terrestrial or marine plants or animals, seeds, pets etc.) is brought to Groote Eylandt.	Visual monitoring required for all vehicle, machinery and construction material brought to Groote Eylandt.	Construction and operation	All Staff and Contractors	Inspection checklist and incident register
8	Assist biosecurity agencies where required (i.e., marine pest monitoring).	NA	Construction and operation	All Staff and Contractors	Inspection checklist, photos, Environmental Representative records
9	Report to the environmental representative as soon as possible if invasive fauna or flora species is identified on Groote Eylandt.	NA	Construction and operation	All Staff and Contractors	Environmental Representative records
10	Implementation of the following measures designed to prevent and detain Cane Toads being introduced to Groote Eylandt from vessels (measure is specific to the biosecurity compound and associated movement of equipment or freight for the Project): Engagement with marine shipping facilities on the mainland to implement controls that prevent Cane Toads from accessing freight and measures to monitor and inspect freight in transit from the mainland; Cane Toad exclusion fencing and trapping at the Darwin Tug and Line freight and barge facility on the mainland to minimise the risk of Cane Toads entering freight yards and accessing freight destined for Groote Eylandt (refer to Appendix A for DTLS Biosecurity Flow Chart);	Visual inspection to be undertaken on all vessels during loading and unloading procedures.	Construction and operation	Environmental Representative ⁸	Environmental Representative records

⁸ Note – ALC and DTLS representatives may be responsible for certain actions/ inspections; however, GHAC representatives hold the overall responsibility to ensure the tasks are completed for in the Little Paradise biosecurity compound.

Management and Control Measures					
No.	Action	Monitoring	Timing	Responsibility	Compliance Evidence
	Visual inspections of freight after it is packed on the mainland; Cane Toad containment fencing and Cane Toad traps in the key areas where freight is unloaded/unpacked at Little Paradise biosecurity compound. This is designed to ensure that even if there are Cane Toads in freight, they will be contained within the compounds; and Visual inspections of freight before it is unloaded from the barge and inspections of freight by the Cane Toad Detection Dog (CTDD) at multiple locations across Groote Eylandt where freight is unpacked after leaving the biosecurity compound.				
11	Exclusion and containment fencing at the biosecurity compound must be constructed in accordance with design principles provided in Section 4.2.2 of the GEMCO Cane Toad Management Plan (refer to designs in Appendix B)				Environmental Representative records and photos
12	Undertake visual inspections on cane toads exclusion fencing and trapping at the Little Paradise biosecurity facility and on containment fencing at the marina for any, gap, damage, especially after severe weather events.	Undertake visual inspection for gaps and damages on containment fencing twice a week, or after severe weather events.	Construction and operation	Environmental Representative	Inspection checklist, photos, Environmental Representative records and incident register (in case of any issue)
13	Any issue discovered with the fencing during these inspections are to be rectified as soon as possible, by first ensuring that a temporary fix is arranged within 24 hours, before arranging a permanent fix.	NA	Construction and operation	Project Manager / Site Representative	Incident register
14	Exclusion and containment areas at the Little Paradise biosecurity compound area must be kept in a condition that is not conducive to Cane Toads hiding throughout the yard or in close proximity	Undertake visual inspection for gaps and damages on containment fencing at the mainland and	Construction and operation	Environmental Representative / Contractors	Inspection checklist and Environmental Representative records

Management and Control Measures					
No.	Action	Monitoring	Timing	Responsibility	Compliance Evidence
	to it. During inspections (twice a week), ensure there is: No dense ground cover conducive to sheltering Cane Toads (such as weeds) growing within the fenced area, and within 2 m outside of the fenced area; No debris or material propped up directly against the fence; No debris or material that may provide suitable shelter or hiding places for Cane Toads, within 2 m either side of the fence; and If applicable, for mainland operators with exclusion fencing (e.g. if fenced areas are located wholly within an operator's compound), no freight is to be left within 5 m outside of the fenced area to discourage Cane Toad activity in very close proximity to an exclusion area (and to discourage Cane Toads from becoming attracted to traps inside the fenced exclusion area).	Groote Eylandt port facilities twice a week, or after severe weather events.			
15	Records of all inspection to be sent weekly to the GHAC Project Manager.	NA	Construction and operation	Environmental Representative	Environmental Representative records
16	Undertake regular spotlighting surveys to identify potential Cane Toads at sites which are in proximity to the Little Paradise biosecurity compound and have potential for Cane Toad establishment, these include: Waterbody or creek/stream sites, either natural or disturbed; Disturbed sites (around human habitation and infrastructure); and Roadways.	Undertake weekly visual monitoring within the Project area and cane toad barrier fencing at the port during the wet season and on a monthly basis during the dry season.	Construction and operation	Environmental Representative	Inspection checklist and Environmental Representative records
17	Spotlighting must be conducted by two trained personnel capable of identifying Cane Toad eggs, tadpoles, metamorphs, juvenile life-history stages and Cane Toad calls.	NA	Construction and operation	Environmental Representative	Staff induction record and induction checklist

Management and Control Measures					
No.	Action	Monitoring	Timing	Responsibility	Compliance Evidence
18	If a cane toad is found, catch it and report immediately to the environmental representative.	NA	Construction and operation	All Staff and Contractors	Environmental Representative records and incident register
19	If a cane toad is found, notify the Project Director and GHAC management immediately.	NA	Construction and operation	Environmental Representative	Environmental Representative records
20	Raising awareness to all staff and contractors to raise knowledge of cane toads and their potential impact, as well as provide advice on how this risk can be managed.	NA	Construction and operation	Environmental Representative	Staff induction record and induction checklist
21	All staff and contractor to undergo inductions on biosecurity aspects, including Cane Toads, prior to arriving on Groote Eylandt.	NA	Construction and operation	Environmental Representative	Staff induction record and induction checklist
22	All commercial vessel before arriving at the Little Paradise marina must provide a biofouling management plan or biosecurity management plan. The plan must follow <i>IMO Guidelines for the Control and Management of Ships Biofouling to Minimise the Transfer of Invasive Aquatic Species</i> ⁹ , as adopted under Resolution MEPC.207(62) on 15 July 2011.	NA	Construction and operation	All Staff and Contractors	Environmental Representative records
23	The vessels' biofouling management plan as a minimum must provide evidence of: ▪ Biofouling records; ▪ Date and location that the vessel was last dry-docked; ▪ Date when the hull area, fittings, niches and voids below the waterline have been inspected by divers; ▪ Date when the hull area, fittings, niches and voids below the waterline have been cleaned by divers;	NA	Construction and operation	All Staff and Contractors	Environmental Representative records

⁹ IMO Guidelines for the Control and Management of Ships Biofouling to Minimise the Transfer of Invasive Aquatic Species:

[https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/RESOLUTION%20MEPC.207\[62\].pdf](https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/RESOLUTION%20MEPC.207[62].pdf)

Management and Control Measures					
No.	Action	Monitoring	Timing	Responsibility	Compliance Evidence
	▪ Date and location when the internal seawater cooling systems have been inspected and cleaned/treated; and ▪ Since the ship was last cleaned, has the ship spent periods of time in locations that have known incursions of invasive aquatic species.				
24	Vessels relating to the Project that have been laid up or inactive in an area identified as high risk must provide evidence of a clean hull (i.e. dive survey, video evidence, hull clean) prior to arriving to Groote Eylandt.	NA	Construction and operation	All Staff and Contractors	Inspection checklist, photos/video and Environmental Representative records
25	Dry docking and the removal/cleaning of biofouling will include hull surfaces, niche areas such as sea chests, all retractable equipment such as thrusters, intakes and outlets, anodes and voids.	NA	Construction and operation	Environmental Representative / Contractors	Environmental Representative records
26	Regular maintenance of vessel including the application of biofouling paint within its recommended lifespan.	NA	Construction and operation	Contractors	Environmental Representative records
27	Flora and fauna (native and pest species) will be managed in accordance with the requirements of the: ▪ Environmental Protection and Biodiversity Conservation Act 1999; ▪ Fisheries Act and Fisheries Regulations - aquatic pests; and ▪ Weeds Management Act 2001 and Weeds Management Regulations.	NA	Construction and operation	Environmental Representative	Environmental Representative records
28	Undertake routine inspections on all navigation aids, including mooring chain and anchor blocks.	Monthly	Construction and operation	Environmental Representative / Contractors	Inspection checklist and Environmental Representative records
29	Quarantine incidents to be monitored through the GHAC's and the Contractor's/Sub-Contractors incident-reporting databases.	NA	Construction and operation	Environmental Representative / Contractors	Incident register

Management and Control Measures					
No.	Action	Monitoring	Timing	Responsibility	Compliance Evidence
30	Monitor the Little Paradise area for new infestations of declared weeds or pest fauna every month and record the findings.	Monthly visual inspections	Construction	Environmental Representative	Inspection checklist and Environmental Representative records

Section 7 Groote Archipelago Biosecurity Procedure

Groote Eylandt is only accessible by boat. DTLS developed the Groote Archipelago Biosecurity Procedure (DTLS, 2021) to provide clear direction and resources for ensuring all relevant personnel are familiar with their roles, responsibilities and obligations regarding the biosecurity risks and how to manage them. All personnel have a responsibility to maintain biosecurity integrity. The Biosecurity Procedure outlines the roles and responsibilities of personnel, biosecurity risks and the procedure for maintaining biosecurity at Groote Eylandt throughout all stages of vessel and cargo movements within the Groote Archipelago. Components of the procedure include, but are not limited to:

- **Mainland Australia to Groote Archipelago** – these voyages pose the greatest risk to biosecurity. The entire biosecurity procedure and all documents mentioned throughout is completed for each of these voyages;
- **Within Groote Archipelago** – many islands in the Groote Archipelago are already inhabited by pest species, especially around areas of human habitation. The entire biosecurity procedure and all documents mentioned throughout is completed for each voyage within the Groote Archipelago, even if it is the same island;
- **Awareness** – awareness is raised through awareness sessions, inductions, trainings, acknowledgement and accountability and awareness refreshers;
- **Pre-delivery Measures** – used as a tool to reduce and mitigate biosecurity hazards from occurring before cargo comes into possession of DTLS. These measures include cargo booking forms, the cargo pre-delivery standard, Queensland Government Clean-down Procedure, inspections;
- **Upon Delivery Measures** – includes initial cargo inspection checklist. Where cargo fails the checklist, the client may clean the cargo before it is re-inspected. Cargo cannot proceed to the load-out facility without passing the checklist;
- **Pre-loading Measures** – includes a final pre-loading rinse, a final cargo inspection report, a vessel inspection record and a vessel masters-ALC declaration;
- **In Transit Measures** – all crew maintains vigilance during transit. At least once during Mainland to Groote Archipelago voyages, a random sample inspection for biosecurity is carried out; and
- **Unloading** – at unloading, the ALC coordinates an inspection of the cargo. Once approved, the cargo is released from the quarantine facility. The cargo may be destroyed or denied release from the quarantine facility until the hazard can be addressed if the inspection is failed.

The Biosecurity Procedure document also includes biosecurity hazard response, a list of documents required to maintain the biosecurity procedure and how they are to be distributed, details on how inspections are undertaken, information on how to identify biosecurity risks, discarding of hazards and important contacts.

Section 8 Incidents, Complaints, Corrective and Preventative Action

Legislative obligations require the Project to take all reasonable and practicable measures to prevent and minimise environmental harm under Duty of Care provisions of the *Waste Management and Pollution Control Act 2009* (NT). All incidents, complaints and near misses must be recorded, investigated and reported. All potential and actual non-conformances, including incidents and complaints must be reported so that they can be investigated and prevented from recurring.

8.1 Induction and Training

All site personnel will undergo site specific induction training that will include environmental awareness and the need for awareness of biosecurity on site. Toolbox meetings will also be undertaken as and when required covering specific environmental or biosecurity issues.

Personnel required to conduct biosecurity control, monitoring and reporting activities are to be suitably trained or experienced in the activity. Records of all training are to be filed in accordance with the project filing system.

8.2 Incidents and Complaints

When an incident or complaint occurs, appropriate action shall be undertaken immediately in order to address the complaint and/or minimise further impact¹⁰. Corrective action is to be implemented, and an assessment conducted to determine what preventative action can be taken to prevent a similar incident from occurring again.

All incidents and complaints are to be reported to the site supervisor and progressed up the reporting hierarchy as soon as possible via an incident report. The incident report is to include:

- Date of incident/complaint;
- Details of incident/complaint;
- Actions taken to prevent and control the incident/complaint; and
- Appropriate sign-off, indicating that the incident/complaint was investigated and followed up appropriately.

All complaints and incidents shall be reported within 24 hrs and investigated within 48 hrs to identify corrective or preventative actions necessary. Actions will be implemented as soon as possible. All incident reports shall be filed in a complaint/incident register to be kept on site.

Subcontractors who become aware of an incident shall report the matter to the site supervisor.

8.3 Non-Conformances and Corrective Actions

Non-conformance or corrective actions detected during monitoring tasks such as site inspections and regular internal or external audits shall be reported within 24 hrs to site supervisors via a Non-Conformance and Corrective Action

¹⁰ For the purposes of this BMP an incident could involve the identification of pest or weed species in transit to Groote Eylandt, during inspection on island, failure to complete monitoring and inspections.

Request form. The site supervisors responses to non-conformance or corrective actions will be recorded and reported to management.

8.4 Data Retention and Record Management

All records will be legible, identifiable and traceable. Records will be stored and maintained so that they are readily retrievable and protected against damage, deterioration or loss.

All data will be stored in an electronic database; and kept for seven years following the completion of construction except when regulations specify longer storage is required.

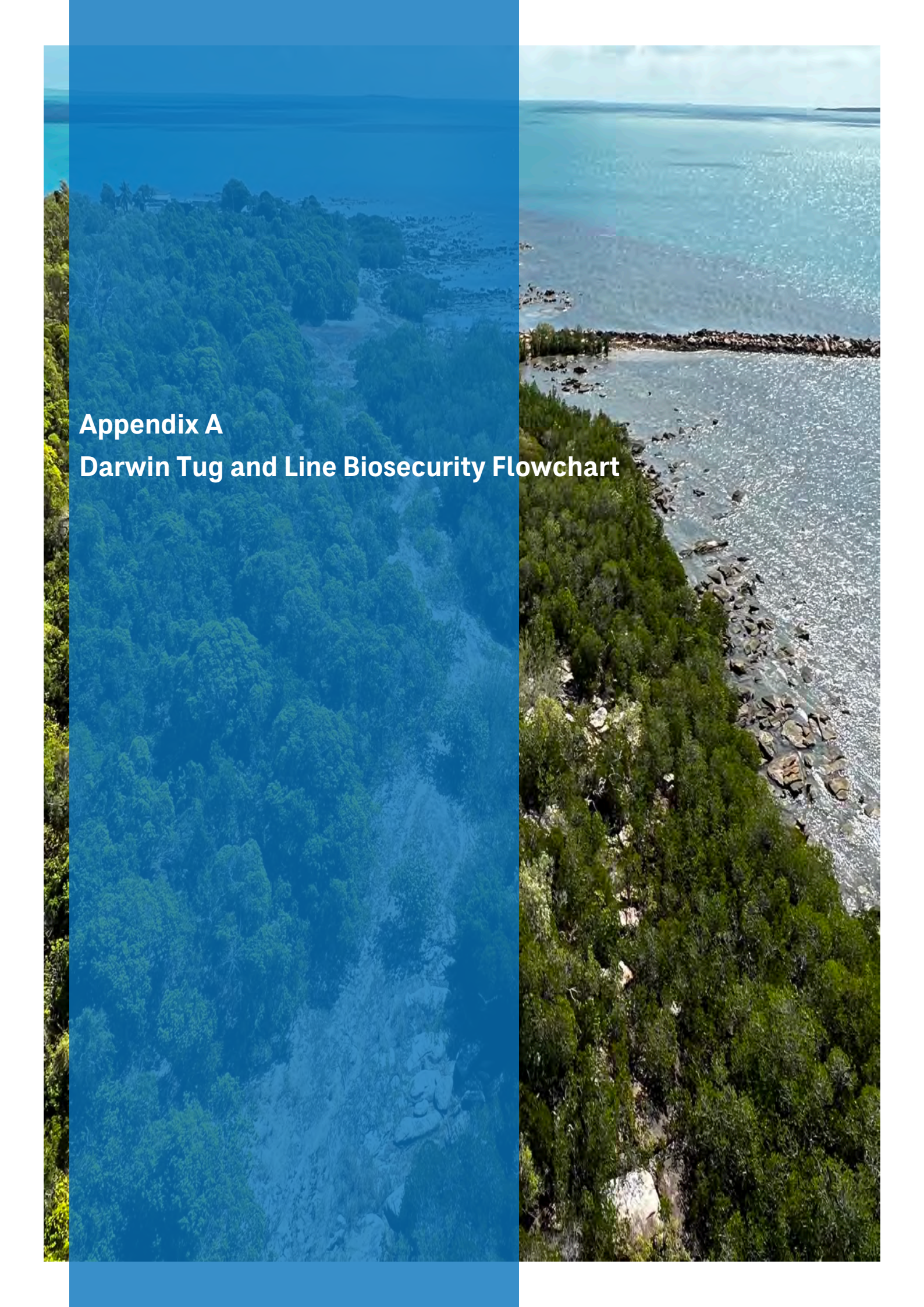
8.5 Document control

Documentation resulting under this BMP including, but not limited to, correspondence (both incoming and outgoing), reports, licenses / permits and receipts / certificates, are to be filed and easily retrievable.

Documentation, particularly reports, must provide details of revision / version in order to avoid confusion and to ensure the appropriate revision/version is being used.

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Appendix A

Darwin Tug and Line Biosecurity Flowchart

Biosecurity Procedure

Groote Archipelago



Authorisations

Document Approval and Release for Distribution

Position Title	Name	Signature	Date
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1 INTRODUCTION

The Groote Archipelago has a unique native environment which, fortunately, has not seen the introduction of many of the pest plant and animal species that are now commonly found across mainland Australia.

Darwin Tug and Line Services (DTLS) are very fortunate to have the opportunity to work with the Anindilyakwa Land Council (ALC) and are committed to ensuring that all cargo, DTLS vessels and staff comply with the ALC Quarantine and Biosecurity conditions to maintain the pristine natural environment of the Groote Archipelago.

2 PURPOSE

The purpose of the Biosecurity Procedure is to provide clear direction and recourses for ensuring all relevant personnel are familiar with their roles, responsibilities, and obligations regarding the biosecurity risks and how to best manage them.

3 ROLES AND RESPONSIBILITY

All personnel have a responsibility to maintain biosecurity integrity, the individual roles and responsibilities are outlined below.

3.1 DTLS OFFICE MANAGER / BIOSECURITY OFFICER

Maintaining the Biosecurity Procedure and its relevant forms and providing adequate training / inductions and information to the vessel master, crew and operations manager is the responsibility of the biosecurity officer.

3.2 DTLS OPERATIONS MANAGER

Providing information to cargo owners / clients regarding the biosecurity standard and obligations is the responsibility of the operations manager. As well as ensuring vessel masters and all crew maintain DTLS & ALC Biosecurity standards and regulations.

3.3 BIOSECURITY INSPECTOR

Any trained and qualified DTLS biosecurity inspector has the responsibility to enforce the DTLS biosecurity procedure upon all cargo when conducting initial cargo inspections and at any time of transport.

3.4 VESSEL MASTER

Ensuring their vessel, cargo and personnel follow the biosecurity guidelines is the responsibility of the Vessel Master. Completing or directing crew to complete relevant biosecurity forms in totality, sending them to appropriate personnel and saving them on the server. The vessel master must also sign the ALC declaration for the vessel.

3.5 VESSEL CREW & PASSANGERS

Following reasonable directions given by the vessel master, operations manager, office manager or biosecurity officer in relation to the biosecurity procedure and policy. Ensuring personal luggage and footwear is free of any biosecurity risks is the responsibility of the individual crew member or passenger. Maintaining vigilance and alerting management of potential biosecurity hazards while loading cargo and during transit.

3.6 CLIENTS / CARGO OWNERS

Understanding the importance of maintaining biosecurity integrity, following the biosecurity pre-delivery standard, and acknowledging this by signing the ALC and DTLS declarations is the responsibility of the client / cargo owner or their representative. Complying with ALC regulations and any costs involved with maintaining these regulations.

4 STAKE HOLDERS

4.1 ANINDILYAKWA LAND COUNCIL – ALC

The ALC represent the traditional owners of the Groote Archipelago. They are the governing body for the area who set and enforce the biosecurity regulations upon all contractors and lease holders within the Archipelago. The ALC reserve the right to quarantine, destroy or deny cargo from entering the Archipelago should they feel it necessary to do so.

Refer to the below link for more information regarding the quarantine and biosecurity standard for Groote Archipelago.

<https://anindilyakwa.com.au/land-and-sea/quarantine-and-biosecurity/>

4.2 GROOTE HOLDING ABORIGINAL CORPORATION – GHAC

GHAC are a branch operating under the ALC, they are an asset holding company for the assets owned by the traditional owners. The ALC own many other investment branches including Groote Aqua and Winchelsea Mining.

4.3 DARWIN TUG & LINE SERVICES – DTLS

DTLS are the marine contractors for GHAC. DTLS act on behalf of GHAC to comply with the ALC.

5 BIOSECURITY RISKS

There are many biosecurity risks that threaten the natural environment of the Groote Archipelago, these risks include:

SMALL ANIMALS & FLYING INSECTS

- Cane Toads
- Cats & Dogs
- Rats and mice
- Other unwanted animals, including native animals
- Insect nests, including ants, wasp nests and beehives
- Eggs

WATER RESERVOIRS

- Mosquitos and other water borne insects
- Diseases

SOIL MATTER

- Ants
- Ticks and fleas
- Diseases, bacteria, and fungi
- Microbes and other soil borne insects

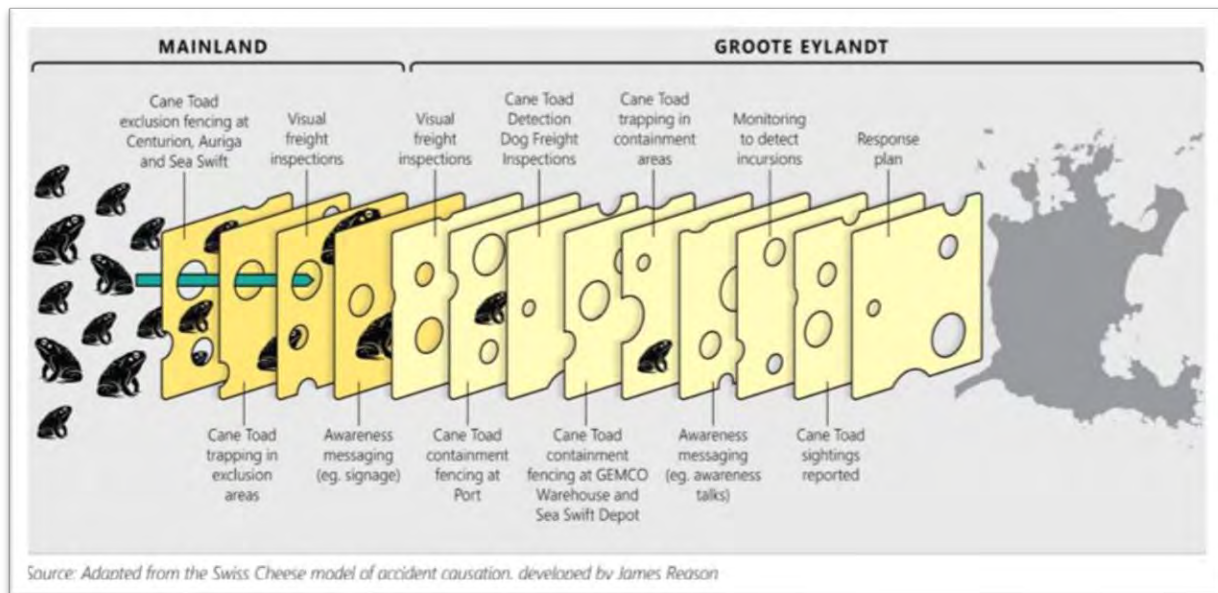
PLANT MATTER

- Seeds
- Live plants
- Diseases, viruses, bacteria, fungi, pest insects

These risks are explained in greater detail in point **7 IDENTIFYING BIOSECURITY RISKS** within the Biosecurity Procedure.

6 PROCEDURE

There are many components to maintaining biosecurity integrity, all components are just as important as each other in providing an additional layer of protection against biosecurity hazards in particular, invasive species such as Cane Toads and Gamba Grass. The 'Swiss Cheese model' below provided by the ALC represents the layers provided by quarantine / loading facilities and the ALC. DTLS are to maintain many additional layers on the forefront of this model which are outlined below throughout point 6 of this document.



6.1 MAINLAND AUSTRALIA TO GROOTE ARCHIPELAGO

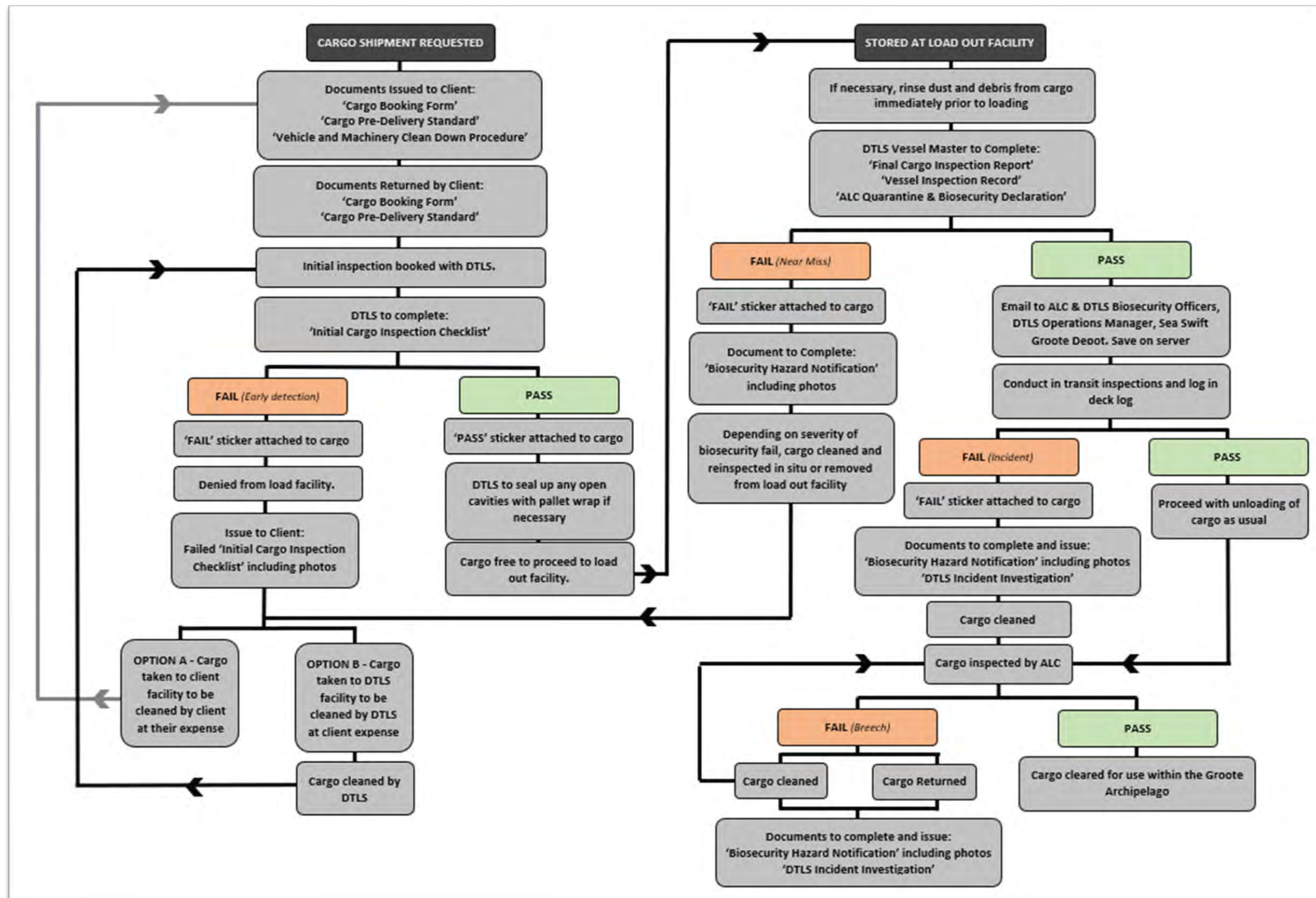
Voyages from Mainland Australia to the Groote Archipelago pose the highest risk for biosecurity. Fortunately, the longer trip, allows for additional time for cane toads and other animals to surface. The entire procedure and all the documents mentioned throughout must be completed for voyages from mainland Australia to any area in the Groote Archipelago.

6.2 WITHIN GROOTE ARCHIPELAGO

The Groote Archipelago is Cane Toad free however there are many other pest species that already inhabit certain islands and areas of the Archipelago, in particular areas of human inhabitants. The spread of pest species within the Archipelago is also integral in maintaining the biodiversity. The entire procedure and all the documents mentioned throughout must be completed when moving cargo from one area of the Archipelago to another, even it is the same island.

6.3 BIOSECURITY FLOW CHART – CHAIN ON ACTION

This flow chart can be referred to as visual step by step guide for following the 'Biosecurity Procedure' and ensuring documents are issued, returned, completed, and sent at the correct time and to the correct stake holders. All forms mentioned throughout this flow chart are explained in greater detail throughout point 6 of this procedure.



6.4 AWARENESS

The first line of defence against biosecurity hazards is awareness for all stake holders. Understanding the importance of the procedure and potential risks involved is integral in ensuring all other components are followed.

6.4.1 AWARENESS SESSIONS

The ALC provide awareness sessions to companies transporting freight to and within the Groote Archipelago. The ALC Biosecurity Coordinator maintains regular contact with DTLS and provides guidance in documentation and procedure.

6.4.2 INDUCTIONS

All relevant DTLS staff are provided with a company Biosecurity Induction. The induction covers the roles and responsibilities of each staff member, biosecurity awareness and procedural training.

6.4.3 TRAINING

All relevant DTLS staff are provided with accredited training in cleaning vehicles and equipment in accordance with biosecurity standards. Vessel Masters in particular, are trained in accordance with the *'Biosecurity Procedure'*.

6.4.4 ACKNOWLEDGEMENT & ACCOUNTABILITY

Once a staff member has been formally inducted, provided with the *'Biosecurity Procedure'* and trained their training will be acknowledged by the employee by signing the relevant section of *'GHAC – HSEQ Acknowledgement Register'* and recorded in the *'GHAC HSEQ Register'*.

6.4.5 AWARENESS REFRESHERS

As the biosecurity officer feels appropriate or every 6 months (whichever is sooner) all relevant staff will carry out a biosecurity awareness refresher. This can be done in the monthly safety meetings or a specific training session.

6.5 PRE-DELIVERY MEASURES

Pre-delivery measures are used as a tool to reduce and mitigate biosecurity hazards from occurring before cargo comes into the possession of DTLS.

6.5.1 CARGO BOOKING FORM

Upon initial engagement with the client / cargo owner information regarding cargo specifications will be gathered using this form. This form is to be issued to the client in conjunction with the '*Cargo Pre-Delivery Standard*' form detailed below. Cargo locations and potential inspection dates / times can be indicated on this form by the client which can then be used to book in the initial biosecurity inspection. Refer to point 5.2.4 for information on booking an inspection.

The completed form needs to be saved on the server in accordance with point 6.9 of this procedure.

6.5.2 CARGO PRE-DELIVERY STANDARD

The '*Cargo Pre-Delivery Standard*' document is to be issued to the client / cargo owner upon first engagement with the client. Delivery / collection times cannot be organised until the client has been made aware of their obligations regarding cargo cleanliness. This document is a thorough guide as to what is expected of their cargo, what DTLS will be inspecting and potential fees and charges relating to cleaning should their cargo not pass the initial inspection. The client / cargo owner or a representative of, must sign both the DTLS declaration and the ALC declaration within the '*Cargo Pre-Delivery Standard*'.

If items of cargo or particular clients are likely to harbour biosecurity risks even after the '*Cargo Pre-Delivery Standard*' has been issued then it is reasonable to request photos of the cargo upon return of this form and prior to booking the initial inspection.

6.5.2.1 DTLS DECLARATION

The DTLS declaration is a section within the '*Cargo Pre-Delivery Standard*' and is to be signed by the client / cargo owner to accept the schedule of rates if applicable and acknowledge that DTLS cannot be held financially responsible for decisions made on behalf of the ALC.

6.5.2.2 ALC DECLARATION

The ALC declaration is in addition to the DTLS declaration, this is an ALC document and is required to be returned to the ALC by DTLS once signed by the client.

6.5.3 QUEENSLAND GOVERNMENT CLEANDOWN PROCEDURE

This procedure is a recourse that is to be shared with the client along with the '*Cargo Pre-Delivery Standard*' form as a guideline for clients on how to clean their vehicles and machinery for transport to a biosecurity protection zone.

6.5.4 BOOKING AN INSPECTION

Once the above steps have been completed then an initial biosecurity inspection can be booked. It is preferred that the inspection takes place at the client or DTLS facility, prior to being delivered to the load out facility. Once an inspection location, date and time is agreed upon with the client / cargo owner the 'DTLS Office Use Only' section of the '*Cargo Booking Form*' can be completed and returned to the client as confirmation of booking. The booking information is to be entered into the '*Shipment Scheduler*' from which an inspection schedule can be extracted. When booking inspections and creating the inspection schedule, ensure sufficient time is allowed for however ultimate efficiency is achieved.

6.6 UPON DELIVERY MEASURES

DTLS can be held responsible for biosecurity breaches should negligence on our behalf be determined. Therefore, we have a responsibility to visually inspect every item of cargo thoroughly and allow time for biosecurity hazards to be detected and rectified prior to being loaded onto the vessel and ideally prior to being delivered to the load out facility.

6.6.1 INITIAL CARGO INSPECTION CHECKLIST

This checklist is designed as a comprehensive guide for DTLS biosecurity inspectors to check all areas of cargo for biosecurity hazards and to record cargo and inspection details.

The checklist is printed in triplicate carbon copy books, each set of triplicate pages will generate a report number in the top right corner, this number will be assigned to the item of cargo and will be referenced on other documents as per instructed throughout this procedure.

HSEQ - BIOSECURITY Initial Cargo Inspection Checklist	 Anindilyakwa Land Council		Report No. 001
<i>A separate checklist must be completed for each item of cargo.</i>			
INSPECTION DETAILS			

The top page (white) is the DTLS copy to keep onboard the vessel and scan into the server once the load is complete and then sent to the ALC prior to arrival. The middle page (green) is the client copy, this can be handed to the client or representative or left inside the vehicle. The final page (yellow) is left in the book, once the book is complete it can be archived in the DTLS office.

From completing the checklist, the decision can be made as to whether the cargo passes or fails the inspection and inspection stickers can be applied. Make note of the decision using the *Initial Inspection Summary* section.

Should an item fail and the client / cargo owner wish to engage DTLS for cleaning services they will need to accept the fees and charges relating to this service by signing the client approval section. If they wish to reclean the cargo at their own expense, then they are not required to sign this section. See sections 5.3.1.1 and 5.3.1.2 for actions on these decisions.

INITIAL INSPECTION SUMMARY	
PASS	Cargo cleared to proceed - inspector has thoroughly inspected item of cargo and is satisfied cargo is 'AS CLEAN AS NEW' and free of any visible biosecurity hazards
FAIL	Cargo presents biosecurity hazards and is denied entry to quarantine facility
CLEANING OPTIONS	Option A - Cargo taken to client facility to be cleaned by client and reinspected by DTLS
	Option B - Cargo taken to DTLS facility to be cleaned by DTLS at client's expense, complete below section
	CLIENT APPROVAL
	Client representative agrees to the additional fees and charges relating to the cleaning of cargo as per the 'DTLS Cargo Pre-Delivery Standard' for transport to the Groote Archipelago.
	Client Representative: _____ Sign: _____

This checklist can be completed at the client's facility / location of cargo or at the DTLS facility. Inspections can be conducted at the Sea Swift load out facility however this is not preferred as it does not allow sufficient time to rectify potential biosecurity hazards and could require relocation for cleaning.

CARGO INSPECTED FOR BIOSECURITY HAZARDS			
PASS			
Cargo cleared to proceed			
Inspection Date	___ / ___ / ___	Initial Inspection Report No.	
Cargo still requires final inspection prior to loading. Use 'Final Cargo Inspection Report'			

6.6.1.1 PASSED CARGO

Cargo must only be passed once it has been thoroughly inspected and the DTLS biosecurity inspector is satisfied that it is free of any visible and foreseeable biosecurity hazards.

Passed cargo should be sealed up and is free to proceed with transport to the load out facility within 48 hours of initial inspection.

A green 'PASS' sticker is to be applied to the cargo once the inspection date and corresponding report number from the 'Initial Cargo Inspection Checklist' is noted on the sticker. **DO NOT PLACE STICKERS ON VEHICLE PAINT**, see point 6.10 for application locations. This sticker is to remain on the cargo throughout transport and cargo cannot be loaded onto the vessel without this sticker present. Passed cargo still requires final inspection prior to loading, see point 6.5.

CARGO INSPECTED FOR BIOSECURITY HAZARDS			
FAIL			
Cargo requires further cleaning			
Inspection Date	___ / ___ / ___	Initial Inspection Report No.	
Cargo is required to undergo a secondary initial inspection. Use 'Initial Cargo Inspection Checklist'			

6.6.1.2 FAILED CARGO

Failed cargo is not free to proceed with transport to the load out facility. If cargo is already located at load out facility, it is to be removed from the facility to be cleaned as the load out facility is intended for clean – hazard free cargo only.

A 'FAIL' sticker is to be applied and report number and date noted.

A secondary 'Initial Cargo Inspection Checklist' is required to be completed and the cargo cannot proceed for transport until it has been passed by a DTLS biosecurity inspector.

Do not remove 'FAIL' stickers, as this is a clear visual record of DTLS inspections for the ALC upon arrival, simply place 'PASS' sticker next to fail sticker.

The Operations Manager is to send the failed inspection checklist to the client and offer one of the two cleaning options listed on the 'Cargo Pre-Delivery Standard' form.

Failed 'Initial Cargo Inspection Checklist' needs to be recorded in the 'GHAC HSEQ Register' under the 'Biosecurity Hazards' tab as 'Early Detection'

6.6.1.2.1 CLEANING OPTION A

Cargo taken to client facility to be cleaned by client and reinspected by DTLS.

In accordance with the HSEQ Procedure, the Operations Manager must coordinate and clearly communicate to all stake holders the below:

- If applicable, relocation / removal of the cargo from the load out facility
- Reinspection of failed cargo until it is passed (this may take multiple attempts)
- Redelivery of cargo for loading
- Track labour costings involved with the above

6.6.1.2.2 CLEANING OPTION B

Cargo taken to DTLS facility to be cleaned and reinspected by DTLS.

In accordance with the HSEQ Procedure, the Operations Manager must coordinate and clearly communicate to all stake holders the below:

- If applicable, relocation of cargo to the DTLS facility
- Cleaning of failed cargo
- Reinspection of failed cargo
- Redelivery of cargo for loading
- Track labour costings involved with the above

The 'CLIENT APPROVAL' section must be completed if 'Option B' is selected.

6.7 PRE-LOADING MEASURES

A secondary layer of inspections is required by DTLS for the below reasons.

- During the laydown time and transport to load out facility, cargo can be reinfected with biosecurity hazards
- Biosecurity hazards can surface between initial inspection and final inspection
- The transporting vessel, personnel luggage and crew could harbor biosecurity hazards

6.7.1 FINAL PRE-LOADING RINSE

Directly prior to loading, cargo needs to undergo a final rinse down. This is not intended as a thorough clean as that has been covered in the previous steps. The final rinse is simply to remove any dust or bird feces that may contain weed seeds or pathogens and to disturb any potential cane toads, animals or insects that may have entered the cargo during laydown time or during transportation.

6.7.2 FINAL CARGO INSPECTION REPORT

Once cargo has been rinsed it can undergo the final inspection and the results can be recorded on 'Final Cargo Inspection Report'.

The first page of this document is to be used to capture the shipment details, cargo quantities, summarise the inspection results, including any notes and track accountability of the person carrying out the final inspection and the vessel master.

The second page of this document is an inspection log for each item of cargo, the 'Total' number noted under the 'Deck Cargo Details' section should reflect the number of sections that are completed, e.g., if the total states 8, then 8 item sections need to be completed. Each log page needs to be numbered in the top right corner, only print as many log pages as you require.

When completing each section, in the 'INITIAL Inspection' section, reference the corresponding 'Initial Cargo Inspection Checklist' report number in the red circled section below, this number can be easily located on the inspection stickers on the cargo and the original checklist, if multiple inspections have been carried out, note all report numbers.

The 'FINAL Inspection' section is used to log that the cargo has been rinsed, had a brief final inspection for biosecurity hazards and that all pre-delivery, upon delivery and pre-loading measures detailed throughout this procedure have been followed. Only once all steps have been completed is an item passed for transport to and within the Groote Archipelago. Please circle 'PASS' or 'FAIL'. If an item fails, a 'Biosecurity Hazard Notification' must be completed, and the 'Biosecurity Flow Chart' referred to for further directions.

Item No.	Description of Cargo	Rego	
INITIAL Inspection	'Initial Cargo Inspection Checklist' Report no.		
FINAL Inspection	Cargo free of biosecurity hazards and necessary checklists completed?	YES	NO
	FINAL Inspections Results	PASS	FAIL
Item No.	Description of Cargo	Rego	
INITIAL Inspection	'Initial Cargo Inspection Checklist' Report no.		
FINAL Inspection	Cargo free of biosecurity hazards and necessary checklists completed?	YES	NO
	FINAL Inspections Results	PASS	FAIL

Once completed, the entire form, including all log pages and all the corresponding 'Initial Cargo Inspection Checklist' reports need to be saved on the server in accordance with point 6.9 of this document and emailed to the ALC Biosecurity Coordinator, DTLS Biosecurity Officer and the Operations Manager.

6.7.3 VESSEL INSPECTION RECORD

Prior to loading cargo the vessel itself must be inspected for biosecurity hazards using the *'Vessel Inspection Record'*.

Once completed, the form needs to be saved on the server in accordance with point 6.9 of this document and emailed to the ALC Biosecurity Coordinator, DTLS Biosecurity Officer and the Operations Manager.

6.7.4 VESSEL MASTERS - ALC DECLARATION

The ALC declaration is in addition to the DTLS forms and checklist, this is a declaration issued to all freighting companies and it required to be signed by the vessel master. Once done so the declaration needs to be saved on the server in accordance with point 6.9 of this document and emailed to the ALC Biosecurity Coordinator, DTLS Biosecurity Officer and the Operations Manager.

6.8 IN TRANSIT MEASURES

Crew, including vessel masters, engineers, mates, deckhands, and trainees must maintain vigilance for biosecurity hazards while the vessel is in transit. At least once throughout the voyage from mainland Australia to the Groote Archipelago the deckhand must carry out a random sample inspection for the purpose of biosecurity hazard detection on deck cargo and make note of this on the vessel deck log. The random sample inspection must include a minimum of at least 30% of all cargo onboard and a combination of different types of cargo, e.g., 1 vehicle, 2 pallets, 1 break bulk cargo from a load of 10 items.

6.9 UNLOADING

Once the cargo is unloaded within the Groote Archipelago, DTLS can be confident that all reasonable measures have been taken to mitigate the risk of bringing biosecurity hazards to the Archipelago.

6.9.1 ALC INSPECTION - PASS

Upon unloading the ALC will coordinate an inspection with an ALC Biosecurity Coordinator or Officer and the cane toad detection dog. All cargo is inspected by the ALC and can only be released from the receiving quarantine facility once approved for use by the ALC.

6.9.2 ALC INSPECTION - FAIL

If an item of cargo is found to have biosecurity hazards, then the ALC reserve the right to refuse cargo entry to the Groote Archipelago, destroy the cargo or prevent the release of the cargo from the quarantine facility until the hazard can be addressed. Costs relating to this can be passed onto DTLS should we be found negligent.

A *'Quarantine and Biosecurity Incident Report'* will be issued to DTLS which will outline incident details and corrective actions.

DTLS must also complete a *'Biosecurity Hazard Notification'* and carry out an *'Incident Investigation'* and track the incidents in the *'GHAC HSEQ Register'*.

6.10 BIOSECURITY HAZARD RESPONSE

Should an item of cargo fail at any point throughout the procedure corrective actions will need to be taken to ensure the hazard does not proceed further down the line. The point at which the hazard is detected and the severity of the hazard will determine the corrective action to take, please refer to point **5.1 BIOSECURITY FLOW CHART** for guidance. If unsure how to respond to a hazard, contact the DTLS Biosecurity Officer (refer point **10**).

6.10.1 BIOSECURITY HAZARD RESPONSE KIT

The vessel will be supplied with a biosecurity hazard response kit. This is to be used to contain hazards in the unlikely event of a biosecurity incident or breach. Refer to the *'Bio-Hazard Response Manual'* within the kit for direction on containing specific hazards. The hazard response kit must be maintained and kept restocked in accordance with the *'PMS ITP – Bio-Hazard Response Equipment'*.

Do **NOT** try to catch snakes if you are unsure if they are venomous, refer to point **9 IMPORTANT CONTACTS** of this procedure to gain further direction. If snake bites occur, refer to the medical emergency section of the *'DTLS 2B Vessel Emergency Response Manual'*.

6.10.2 BIOSECURITY HAZARD NOTIFICATION

This form is to be used to record biosecurity hazards that make it past the *'Initial Cargo Inspection Checklist'*.

The *'Early Detection'* option on the *'Biosecurity Hazard Notification'* is blanked out as you are not required to complete this form should a biosecurity hazard be identified during the *'Initial Cargo Inspection Checklist'*.

If a biosecurity hazard is detected upon initial inspection, the hazards can simply be recorded on the *'Initial Cargo Inspection Checklist'* as a *'FAIL'* and be recorded in the *'GHAC HSEQ Register'* under the *'Biosecurity Hazards'* tab.

HSEQ			
Severity of Hazard & Internal Actions (Bracketed items indicate document destination)			
Early Detection	Near Miss	Incident	Breach
Resolved – no further documentation required	Hazard Notification (DTLS & cargo owner / client)	Hazard Notification (DTLS, ALC & cargo owner / client) Incident Investigation (DTLS)	Hazard Notification (DTLS, ALC & cargo owner / client) Incident Investigation (DTLS & ALC)
ALC APPROVAL FOR USE			
Required for incident and breach			
ALC Representative Name		Position	
Sign		Date of Approval	

6.10.3 GHAC HSEQ REGISTER – BIOSECURITY HAZARDS TAB

The information captured in the *'Biosecurity Hazard Notification'* is reflected in the *'GHAC HSEQ Register'* under the *'Biosecurity Hazards'* tab. The headings and options correlate so DTLS and GHAC can keep a visual log of all hazards identified at all stages. The purpose of this is to track trends in types of cargo, cargo owners and inspectors to clearly identify how and why incidents occur so they can be reduced and mitigated moving forward.



6.11 DOCUMENT DISTRIBUTION – DOCUMENT GUIDE & REPORTING SCHEDULE

Document Name	Document Purpose	Frequency of Use	Distribution Once Complete (if nec)	Originals Location (Documents – GHAC)
Biosecurity Policy	Briefly communicate DTLS commitment to Biosecurity	On-going	Display on Vessel	03 Forms & Documents > 01 Biosecurity > 01 Biosecurity Procedure
Biosecurity Procedure	Provide clear, in-depth direction on DTLS biosecurity procedure and use of documents	Upon training, inductions and as reference tools for all staff	Send to: All relevant staff Vessel	03 Forms & Documents > 01 Biosecurity > 01 Biosecurity Procedure
Cargo Booking Form	Gather cargo information and initial inspection times.	Upon every shipment of cargo requested – one form for every piece of cargo	Send to: Client / Cargo Owner Save Completed Form: Documents – GHAC > 01 Operations > 01 Scheduler & Trackers > 01 Shipping Schedule > 01 Completed Shipment Forms	01 Operations > 01 Scheduler & Trackers > 01 Shipping Schedule > 00 Folder Template > 01 Cargo Booking Form
Cargo Pre-Delivery Standard	Communicate to clients / cargo owners the standard of which their cargo needs to meet to travel to the Groote Archipelago. Cargo owner to accept this responsibility.	Upon every shipment of cargo requested – one form for every client for every shipment	Send to: Client / Cargo Owner Save Completed Form: Documents – GHAC > 01 Operations > 01 Scheduler & Trackers > 01 Shipping Schedule > 01 Completed Shipment Forms	01 Operations > 01 Scheduler & Trackers > 01 Shipping Schedule > 00 Folder Template > 02 Cargo Pre-Delivery Standard
Vehicle and Machinery Clean Down Procedure	Provide cleaning directions to cargo owners for vehicles and machinery.	Upon every shipment of cargo requested – one form for every client for every shipment	Send to: Client / Cargo Owner	01 Operations > 01 Scheduler & Trackers > 01 Shipping Schedule > 00 Folder Template > 02 Cargo Pre-Delivery Standard
Initial Cargo Inspection Checklist	Record initial inspections, prompt inspectors, determine inspection results and further actions.	Upon every shipment of cargo requested – one form for every piece of cargo	Send to: Client / Cargo Owner ALC Biosecurity Co-ordinator Sea Swift Groote Depot DTLS Biosecurity Officer, Office Manager, Operations Manager Save Completed Form: Documents – GHAC > 03 Forms & Documents > 01 Biosecurity > 03 Completed Forms	03 Forms & Documents > 01 Biosecurity > 02 Form Templates



PASS / FAIL Sticker	Record a pass / fail result of an initial cargo inspection	Upon every shipment of cargo requested – one sticker for every piece of cargo	Place on Cargo (DO NOT PLACE STICKERS ON VEHICLE PAINT, refer to point 6.13 PLACEMENT OF INSPECTION STICKERS of this procedure for direction)	03 Forms & Documents > 01 Biosecurity > 02 Form Templates
Vessel Inspection Record	Record and prompt inspection of vessel	Directly prior to loading cargo	Send to: ALC Biosecurity Co-ordinator Sea Swift Groote Depot DTLS Biosecurity Officer, Office Manager, Operations Manager Save Completed Form: Documents – GHAC > 03 Forms & Documents > 01 Biosecurity > 03 Completed Forms	03 Forms & Documents > 01 Biosecurity > 02 Form Templates
Final Cargo Inspection Report	Report that all cargo has passed initial inspection and prompt a brief final inspection of all cargo prior to loading.	Upon loading of shipment of cargo	Send to: ALC Biosecurity Co-ordinator Sea Swift Groote Depot DTLS Biosecurity Officer, Office Manager, Operations Manager Save Completed Form: Documents – GHAC > 03 Forms & Documents > 01 Biosecurity > 03 Completed Forms	03 Forms & Documents > 01 Biosecurity > 02 Form Templates
ALC Quarantine & Biosecurity Declaration	Declare vessel master's responsibility to comply with ALC biosecurity regulations.	Upon every cargo delivery voyage.	Send to: ALC Biosecurity Co-ordinator Sea Swift Groote Depot DTLS Biosecurity Officer, Office Manager, Operations Manager Save Completed Form: Documents – GHAC > 03 Forms & Documents > 01 Biosecurity > 03 Completed Forms	03 Forms & Documents > 01 Biosecurity > 02 Form Templates
Biosecurity Hazard Notification	Record biosecurity hazards details	Upon hazards identified after a passed initial cargo inspection	Send to: ALC Biosecurity Co-ordinator DTLS Biosecurity Officer, Office Manager, Operations Manager Save Completed Form: Documents – GHAC > 03 Forms & Documents > 01 Biosecurity > 04 Biosecurity Incidents	03 Forms & Documents > 01 Biosecurity > 02 Form Templates
GHAC HSEQ Register	Record biosecurity inductions, distributions of procedure and acknowledgment of procedure	As required	DTLS Office	04 HSEQ
GHAC HSEQ Acknowledgment Register	Record staff acknowledge of biosecurity inductions, distributions of procedure and acknowledgment of procedure	As required	DTLS Office	04 HSEQ

6.12 CARGO

Prior to entering the quarantine facility, all cargo must be thoroughly inspected. Any small open areas that could conceal a cane toad, small animal, insect nest, soil, plant matter or act as a water reservoir must be inspected and recorded using the *'Cargo Inspection Record'*.

6.12.1 BREAK BULK CARGO

'Break Bulk Cargo' can include bulker bags, parcels, drums, pipes, cables, spools and any other bulky cargo that does not fall under the other listed categories.

The contents, interiors, exterior and lifting points of the break bulk cargo must be inspected.

6.12.2 SHIPPING CONTAINERS

Once shipping / sea containers have been sealed by the owner of the container, the exterior of the container must also be inspected, this includes the lifts points and fork slots.

6.12.3 IBC / ISO / PALLET

IBC's and ISO's are used to carry bulk liquid. The containers must be inspected for leaks and cracks that could cause potential chemical leakages or allow for mosquitos to breed in fresh water supplies. Palletised goods need to be inspected as well as the pallet itself, particular attention should be paid to forklift lifting slots.

6.12.4 RO RO CARGO

Roll on Roll Off (RO RO) cargo characterises any piece equipment that rolls, including all types of trailers, light vehicles, motor bikes, ATV's, lawn mowers, etc.

This type of cargo must undergo the *'Vehicle & Equipment Inspection Checklist'* and also be signed off on the *'Cargo Inspection Record'*.

6.12.5 MINING / CIVIL MACHINERY

Mining and civil equipment characterise much larger machinery, such as earth moving, and earth works machinery. This equipment poses the highest biosecurity risk as it is used directly with soil and plant matter. This type of cargo must also undergo the *'Vehicle & Equipment Inspection Checklist'* and also be signed off on the *'Cargo Inspection Record'*.

6.13 PLACEMENT OF INSPECTION STICKERS

The location of sticker placement will vary depending on the type of cargo, when placing stickers, biosecurity inspectors must consider the below points:

- Potential damage to vehicle paint and client assets
- Client preferences
- Visibility of stickers

When placing stickers, particularly for vehicles and machinery, check with the cargo owner first if they are comfortable with a sticker being placed on their belongings and where their preferred location might be if not one of the locations listed below.

If unsure about where to place a sticker, please contact the Operations Manager or Biosecurity Officer.

6.13.1 BREAK BULK CARGO

The sticker location for this type of cargo will vary drastically depending on the specific break bulk cargo. Consider the visibility of the sticker once cargo is unloaded, stickers should be placed on the sides on break bulk cargo rather than on top incase cargo is stacked, and the sticker is hidden. Stickers should only be placed once final wrapping / sealing of cargo is complete to avoid covering the sticker with wrapping. Placing stickers at eye height is ideal if possible.

6.13.2 SHIPPING CONTAINERS

Stickers should be placed in a such a way that the sticker overlaps both doors of the container, sealing the container so that it can be clearly seen that the sticker has been tampered with after placement, e.i the container has been opened after inspection allowing for potential reinfection.

6.13.3 IBC / ISO / PALLET

Consider the stacking and short-term storage of this type of cargo when placing stickers, do not place stickers on top of cargo that could be potentially stacked on top of each other. If cargo can only be lifted with a forklift from a particular direction, then place sticker where the forklift driver will clearly be able to see.



6.13.4 RO RO CARGO

Place stickers where an operator of the equipment can easily locate the sticker, consider where someone will go to move this cargo.

6.13.4.1 TRAILERS

Inspection stickers for trailers and trailered cargo (boats) should be placed on the draw bar of trailer for easy visibility.

6.13.4.2 VEHICLES

DO NOT PLACE STICKERS ON VEHICLE PAINT. Sticker residue may mark or peel vehicle paint and damage could occur from finger nails when removing. See images below for sticker locations.



Ideal location for stickers is on glass, glass can be easily cleaned should a residue remain and won't scratch or peel upon removal. Do not place stickers in a location that will obstruct driver vision.

Place stickers on the bottom right-hand corner (drivers' side) of the front windscreen.

If the owner of the vehicle has requested to not have stickers placed on the windscreen, then the sticker can be cut away from the sticker pad / strip, leave the protective backing remaining and place inside the vehicle at the bottom right-hand corner (drivers' side) of the dash where it can still be clearly visible for further inspections down the line.

If the owner does not wish to have the sticker placed on the windscreen and access to the interior of the vehicle is not possible at the time of initial inspection, then the sticker can be placed around the windscreen wiper. Do not allow sticker contact to the windscreen wiper. See below images for instructions.

1. Cut sticker away from sticker pad, leave protective backing remaining.
2. Tightly roll protective backing around windscreen wiper covering all surface area of wiper arm.
3. Connect sticker ends to each other so sticky backing is covered and sticker can be secured.



6.13.5 MINING AND CIVIL EQUIPMENT

The preferred location on this type of cargo is once again on the bottom right-hand corner of the front windscreen. If undesired by cargo owner or there is no windscreen, stickers can be attached to side mirrors or other exterior items (on drivers' side if possible) where it can be wrapped around using the above method. They can also be cut out and left inside the cab if access is possible and the cabin is enclosed (open cabins could allow sticker to blow out during transport).

7 IDENTIFYING BIOSECURITY RISKS

As mentioned in section 4 of the Biosecurity Procedure, there are many biosecurity risks for the Groote Archipelago. Section 7 will outline these risks and the impact they could potentially have on the natural environment.

7.1 SMALL ANIMALS & FLYING INSECTS

In this document 'small animals & flying insects' are characterised by animals that typically live in or on, water, soil or plants.

7.1.1 CANE TOADS

Cane Toads (*Rhinella marina* syn. *Bufo marinus*) were released in 1935 in Queensland to control destructive beetles in sugarcane crops, since then they have spread across Queensland, into north-western Australia and throughout the Northern Territory, including 8 of the 398 NT islands.

Native to South and Central America, they are considered marine toads making them great swimmers and due to Northern Australia's similar tropical climate, this provides the ideal environment for these pests to thrive.

7.1.1.1 ENVIRONMENTAL IMPACT

Cane toads compete with native wildlife for shelter, food and breeding grounds. They also prey on smaller frogs, tadpoles and reptiles.

They produce a toxic milky poison when the toad is provoked, they release the poison from glands located behind the eyes. If ingested, this can kill native wildlife and cause skin and eye irritation to larger animals including humans.

The combination of all these invasive characteristics have led to the decimation of native wildlife within mainland Australia. It is in the best interests of Groote Eylandt's pristine biome that these pests do not spread throughout the Archipelago. Just one pregnant female toad could be the end of toad free Groote.

7.1.1.2 IDENTIFICATION

Some native frog and toad species can look very similar to Cane Toads, particularly when juvenile. It is important that we correctly identify the animal so the correct treatment can be allocated.

One of the most distinctive features that differentiate them from native frog species are their poison glands. They also have a unique call which can be listened to by following the link, <https://www.frogid.net.au/frogs/rhinella-marina>, and at reference point 12.3.1.

Please reference the below diagram if you are unfamiliar with the appearance of a Cane Toad.



7.1.2 CATS & DOGS

A 2005 NT Islands Report found that feral cats currently inhabit 10 of the 398 Northern Territory islands, feral dogs inhabit 13.

These highly predatory animals give many native mammal and marsupial species no chance. Dogs would not go unnoticed on a vessel however cats are able to hide in high and tight places, they are often found under vehicles and in wheel arches.

7.1.3 ASIAN HOUSE GECKO

Otherwise known as the common house Gecko, they inhabit 9 NT islands. Although considered a low impact pest, little information is known on the environmental impacts, any introduced species can disturb ecosystems in ways we may not realise by introducing diseases and competing with native species. Geckos and their eggs are easily concealed and are often found in indoor spaces as well as outdoors.

7.1.4 RATS & MICE

Rats and mice are fast breeders and will not hesitate to prey on small reptiles and their eggs. They often carry diseases and bacteria along with ticks and fleas which are easily transferable to native mammals and marsupials.

7.1.5 UNWANTED NATIVE MAINLAND SPECIES

Although an animal may be native to Australia or even the island within the Archipelago the animal could still be carrying infectious diseases, viruses and bacteria that could spread to other native wildlife. No new animal, regardless of native status, should enter the Groote Archipelago or be transferred between islands unless quarantined and appropriate measures followed.

7.1.6 FLYING INSECT NESTS

Wasp nests and small beehives are often found in sheltered areas and small cavities. Their nests can be inconspicuous and are often difficult to penetrate due to the mud like exterior (depending on species), meaning they may persist after initial cleaning of equipment. Some wasp species have parasitic egg laying abilities which can be beneficial when treating pest insects however can be detrimental when the wrong species is targeted.

7.1.7 EGGS

Eggs and nests can be easily concealed, therefore it is imperative to thoroughly clean all equipment and increase vigilance on exposed items.

7.2 WATER RESERVOIRS

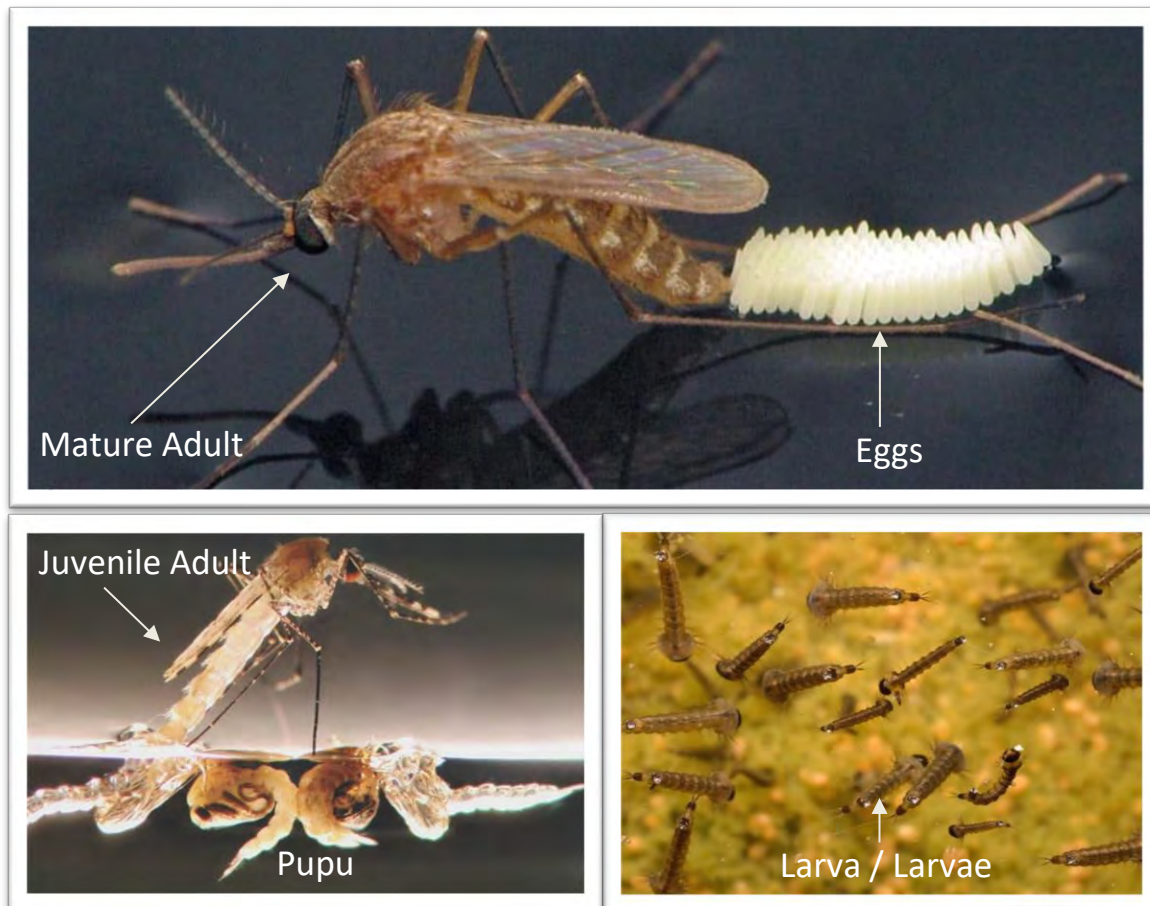
Water reservoirs characterise opening that hold water for extended periods of time and are exposed to the elements, i.e not sealed.

7.2.1 MOSQUITOS

Mosquitos can carry many diseases and viruses which can be transferred to humans and other animals through 'biting'. These diseases can be spread swiftly and can decimate wildlife and local indigenous and non-indigenous populations.

7.2.1.1 BREEDING CYCLE

The mosquito life cycle is extremely short, they can metamorphosise from egg to a flying insect in a very short time. They will often lay their eggs on the surface of water or on the side of a container holding water, they can live in these conditions for many months and will hatch only when water is available for larva stage. This makes them extremely robust; prevention is achieved by ensuring there are no open water reservoirs in which mosquitos can lay their eggs., even a small area of water is enough to attract a mosquito. Once in the larva and pupa stage, they are easily identifiable, the small worm like larvae will hover mostly around the surface of the water.



7.2.2 DISEASES

Mosquito borne diseases often come from the mosquito breeding in stagnant, muddy or unsanitary water. The most common mosquito borne infection in the NT is Ross River Virus.

7.2.3 SEEDS

Many invasive plant species are aquatic plants, their seeds are often very small and are dispersed through water, even small water reservoirs can conceal seeds. See point 7.4.2.3 for more information.

7.3 SOIL MATTER

Soil matter is any inorganic matter that characterises, rocks, dirt, sand, clay, mud, dust, etc. These materials can be brought in by footwear, vehicle, machinery and equipment. Items that directly touch the ground are most at risk for being contaminated with soil matter. Although soil is inorganic, it carries with it many organic particles and living organisms, many of which can be harmful to the unsuspecting ecosystem.

7.3.1 ANTS

Many species of ant nest in the ground, due to their small size they can easily be brought in with soil matter. Foreign ant species can carry destructive fungi, diseases, bacteria and viruses that can be harmful to local populations.

7.3.1.1 FIRE ANTS

Fire ants (*Solenopsis geminata*) are an invasive ant species in the NT, often brought in with nursery plants and contaminated soil matter. They are an aggressive species and usually nest in dry, sandy soils and prefer warmer environments however are adaptable to most conditions. Fire ants are already quite well established in the Northern Territory.



7.3.1.2 YELLOW CRAZY ANT

The yellow crazy ants (*Anoplolepis gracilipes*), given their name from their erratic walking style, particularly when disturbed. These ants already inhabit parts of the NT, including Arnhem Land and are known to thrive in a range of environments from rainforest to dry arid land. They are considered one of the top 100 worst invasive pest species in the world by the IUCN and are currently causing destruction to the red crab population on Christmas Island.



7.3.2 Ticks AND FLEAS

As mentioned in point 7.1.4, ticks and fleas are often introduced through other pest animals such as rats, mice, dogs and cats as well as native animals. Ticks breed in/on the soil and pose a high risk should any soil matter pass the quarantine inspections. Ticks are commonly known for transmitting Lyme Disease however there are many other diseases that they can also transmit. Ticks and fleas will breed in/on the soil as well as on clothing, furniture, or any other soft material. The ideal breeding environment for these parasites are warm moist conditions.

7.3.3 DISEASES, BACTERIA AND FUNGI

Just like any other ecosystem, the soil ecosystem is vital, even the smallest bacteria or fungi can off balance this fragile system. Life starts in the soil and can affect so many other components such as plants and therefore insects and animals, including humans.

7.3.3.1 LEGIONNAIRES DISEASE

Legionnaires Disease is a common disease in the Northern Territory, infection is caused by inhaling the Legionella bacteria found in soil/dust. This disease causes lung inflammation and is extremely dangerous to vulnerable people and anyone already suffering lung complications.

7.3.3.2 MELIOIDOSIS

Melioidosis is a common illness in the Northern Territory, infection is caused by contact, particularly open wounds with muddy soil and stagnant moist areas. The greatest risk is during the wet season and to people who already have a compromised immune system.

7.4 PLANT MATTER

Plant matter includes whole plants, leaves, stem, bark, husk, roots, flowers, fruit and seeds. Some plants species pose a higher biosecurity risk than others, invasive species are often native to areas that have similar climate, rainfall, soils, temperature and overall conditions. Areas such as Africa, Southern Asia and Central America are the native home to many of the species we now call weeds and pests. These conditions allow for the plant species to thrive with no natural predator / biocontrol to keep the species at a balanced manageable level. Plant matter can also carry viruses, bacteria, diseases and pests which can be passed onto other plants, even native plants must be thoroughly checked and quarantined prior to entrance.

7.4.1 SEEDS

The general rule of thumb is one season on seeds will take 7 years' worth of control to eradicate. Seeds can be easily brought into biosecurity and quarantine areas by footwear, machinery, vehicles and via wind and animal dispersal from neighboring pest plants. For this reason, it is integral that the sanitation measures outlined throughout this procedure are followed. It is also important to keep the areas around the quarantine facility free of invasive species. At least 100m around the quarantine facility should be completely free of weeds, particularly wind dispersed seed bearing species such as Gamba Grass. All cargo and vessels should be inspected for bird and bat feces prior to departure.

7.4.2 LIVE PLANTS

No live plants should be shipped to or within the Groote Archipelago unless they are purchased from an approved grower, have written approval from the Biosecurity Coordinator and have been inspected and passed the quarantine period and standards.

A full list of declared NT weeds can be found within the *Declared Weeds in the Northern Territory* document released by the Department of Environment and Natural Resources within appendices 11.1. of this document or by following the link in reference point 12.3.10.

Declared weeds are grouped into the following classes

- Class A – Eradicate
- Class B – Control
- Class C – Prevent Entry

Many plants will fall under multiple classes and some plants that are considered invasive have not yet been declared as a particular class.

Some of the most invasive weed species are outlined in the next points.

Note: Italics indicate scientific names, **common plant and animal names** are **not** accurate identifying names and can often be used for multiple different plants and animals.

7.4.2.1 GAMBA GRASS

Gamba Grass (*Andropogon gayanus*) is quite possibly the most invasive land plant species in the Northern Territory, it is a class A declared weed in the NT. This African native grass is usually the diet of the large herbivorous mammals' home to Africa, in Australia, there are very few animals that feed on Gamba Grass and those that do are also pest species. This grass was originally introduced and propagated by humans as cattle feed in the 1930's.

Fortunately, the Groote Archipelago is free from Gamba Grass and it is imperative that we keep it this way. The extremely hardy, fire resistant and fast growing Gamba Grass is spread via seed dispersal, with chemical usage seemingly the only effective method of control. Once established it is near impossible to eradicate.

7.4.2.1.1 ENVIRONMENTAL IMPACT

Gamba Grass is a transformative weed, meaning it changes entire landscapes, even the soil composition. Where Gamba Grass is infested, almost no other species exists, even small animals tend not to nest in it.

The height of this grass also poses a massive threat to even large, developed trees, when bush fires rampage through they burn much higher and hotter than what the Australian bush has adapted to. High flames burn tree canopies, often resulting in engulfment, destroying the tree and any animals taking refuge within. A Gamba fire is very difficult to control and very fast spreading.

A landscape stripped of biodiversity and overrun by Gamba Grass will not rejuvenate without human interference.

7.4.2.1.2 IDENTIFICATION

Grasses can be difficult to identify, particularly without flowers and when juvenile. No other grass in the NT gets as tall as Gamba Grass, reaching heights of 4 meters tall. When juvenile and green, the key identifying feature of Gamba Grass is the white center vein that continues along the entire leaf and the hairy stems. There are a few native grasses that can look similar to Gamba Grass, these natural competitors should be correctly identified to ensure only the target pest is eradicated. More information on this can be found in reference point 12.3.14.



7.4.2.2 ALLIGATOR WEED

Alligator Weed (*Alternanthera philoxeroides*) is another class A weed. Invasive aquatic plants pose a high risk to natural water ways and marine life, choking of water systems is detrimental to marine biodiversity. This plant is extremely adaptable and able to grow in many different habitats, it is generally a water plant however also can grow on land, the habitat will affect the appearance of the plant. The hollow stems, glossy opposite leaves and silvery white flower heads are some identifying feature of this plant. Please refer to *Appendix 11.3* for an identification guide.



7.4.2.3 CABOMBA

Cabomba caroliniana is another invasive class A aquatic weed that will choke water ways, it was a popular aquarium plant and now very prevalent in Darwin River. The runners often get wrapped around outboard propellers and fishing lures. Extreme care should be taken for outboard vessels and trailers that have been in the Darwin River Region.

This plant can reproduce from small vegetative segments and the 4mm long seeds can be concealed in very small spaces. The submerged leaves look very different to the leaves that float on the surface of the water, this is important to know for identification. The small white flowers with yellow centers are another key identifier.

The native hornwort can be easily mistaken for *Cabomba* so correct identification is key. More general and identification information can be found in reference point 12.3.16.

7.4.2.4 NEEM TREE

Azadirachta indica are an invasive tree species prominent throughout Northern Australia, native to India the similar environmental conditions allow for this weed to flourish. As the case with many invasive plant species, these trees have a very high seed germination rate meaning they compete aggressively with native tree species. Although the neem tree is known to have many beneficial characteristics, it is a class B weed and should not be left to spread.



7.4.2.5 COFFEE BUSH

The common name, coffee bush, has no relation to the caffeinated beverage. *Leucaena leucocephala* is not yet a classified weed in the Northern Territory however is very noteworthy as it has many invasive characteristics and infestations are becoming increasingly common. This tree can be identified by the abundance of seed pods, both mature and green, persistent on the tree at all times of the year and the white globular flowers. There are many NT native tree species that can be easily mistaken, particularly when juvenile so correct identification is key. *Leucaena leucocephala* also have the incredible ability to suppress other seeds and saplings from germinating and growing, their own green waste produces a suppressant chemical, this means once an infestation is established other plant species don't stand a chance.



7.4.2.6 DEVIL'S CLAW

Martynia annua is another class A weed, although it is not overly prevalent near coastal Northern Territory, it has invaded Katherine, Pine Creek and other remote areas. The common name devil's claw is deserved from the 2 distinct claw like hooks attached to the end of the 3-4cm long fruit. These claws are designed to catch on animal fur and feathers and therefore clothes, shoes, bags, etc. making the seeds easily dispersed very long distances. The flowers are light pink, elongated bell shape and pumpkin shaped leaves. For more in dept identification refer to reference point 12.3.20

7.4.2.7 LANTANA

Lantana camara (upright plant) and *Lantana montevidensis* (creeping plant) are two different species of class B weeds in the *Lantana* genus. They are both found in Darwin, Katharine and Groote Eylandt, care must be taken to not spread either of these invasive plants to other islands within the Groote Archipelago. *Lantana montevidensis* flowers are light purple to mauve while *Lantana camara* flowers can range from red, orange, pink, purple, yellow to cream and will generally show 2 different colour's on the one flower cluster. For more in dept identification refer to reference point 12.3.21



8 DISCARDING OF HAZARDS

Hazards should first be contained using the biohazard response kit and then stored in the freezer. The biohazard can be surrendered to the ALC for appropriate discarding or brought back to mainland Australia for disposal. Do not discard biohazards overboard or mix with general waste.

8.1 DISCARDING OF CANE TOADS

If you find an animal within The Groote Archipelago, on a vessel, within cargo or a quarantine facility which you believe to be a Cane Toad, you should capture and contain the animal first using the biosecurity hazard response kit. Take a photo and contact the ALC Biosecurity Coordinator, contact details can be located at point **10** of this document. The animal might not be a Cane Toad so correct identification is essential however it is always better to contain the animal if unsure, do not attempt to euthanise the animal yourself unless you are mid voyage and the animal cannot be safely captured and stored. Cane Toads aren't aware of the harm they are causing so it is important that they are still discarded with humanity.

According to the Charles Darwin University Animal Ethics Committee, Standard Operating Procedure GSOP 02.2019: Cane Toad Euthanasia, the most humane method of field euthanasia is 'stunning followed by decapitation'. Please refer to pages 6 – 8 of *appendix 11.4* for information and instructions.

Refer to point **6.3 BIOSECURITY FLOW CHAIN OF ACTION** for further instruction regarding reporting the hazard.

8.2 DISCARDING OF UNWANTED NATIVE ANIMAL SPECIES

Although the animal may be native to Australia or even the island within the Archipelago the animal could still be carrying infectious diseases, viruses and bacteria that could spread to other native wildlife. No new animal, regardless of native status, should enter the Groote Archipelago unless quarantined and appropriate measures followed.

8.2.1 PRIOR TO DEPARTURE

If a native animal is found within the quarantine area or onboard the vessel prior departure of Darwin Harbour then Parks and Wildlife should be called to collect the animal. Do not attempt to catch the animal yourself if the animal is potentially dangerous / venomous. The animal can be released back into the wild or rehabilitated by a Wildlife Carer.

8.2.2 POST DEPARTURE

If a native animal is found onboard the vessel after the vessel has departed and / or is disembarking on any of the islands within the Groote Archipelago then the animal should be captured if safe to do so and euthanised according to Parks and Wildlife. If you are

9 IMPORTANT CONTACTS

POSITION / ORGANISATION	CONTACT	PHONE	EMAIL
ALC Biosecurity Coordinator	Tom Lawton	0418 678 495	biosecurity@alcrangers.com.au
ALC Ranger Manager	Daniel Keynes	0429 854 223	Manager@alcrangers.com.au
ALC Ranger Office	General	8987 6703	
East Arnhem Regional Council	General	8986 8986	info@eastarnhem.net.gov.au
Plant Biosecurity Branch	Karlee Foster	8951 8166	Plantbiosecurity@nt.gov.au
NTG Plant Pest Hotline	General	1800 084 881	
NTG Aquatic Biosecurity Hotline	General	0413 381 094	
Biosecurity Hotline	General	1800 084 881	
NT Snake Report Line	General	1800 453210	
DTLS General Manager	Peter West	0417 886 048	info@dtls.com.au
DTLS Operations Manager	Brenon Oliver	0418 858 942	fleetsupport@dtls.com.au
DTLS Office Manager / Biosecurity	Tarni Brown	0418 193 307	accounts@dtls.com.au
Sea Swift Darwin Freight Manager	Steve Cummings	0419 744 045	steven@seaswift.com.au
Sea Swift Groote Freight Manager	Dave Bramley	0419 579 110	davidb@seaswift.com.au
Sea Swift Groote Depot	General	08 8935 2430	groote@seaswift.com.au

10 APPENDICES

10.1 VEHICLE AND MACHINERY CLEANDOWN PROCEDURES

10.2 DECLARED WEEDS IN THE NORTHERN TERRITORY

10.3 ALLIGATOR WEED

11 DEFINITIONS

11.1 ACRONYMS

ALC *Anindilyakwa Land Council*

ATV *All Terrain Vehicle*

DTLS *Darwin Tug & Line Services*

GHAC *Groote Holdings Aboriginal Corporation*

IBC *Intermediate Bulk Container*

ISO *International Organisation for Standardisation*

IUCN *International Union for Conservation of Nature*

RO RO *Roll On Roll Off*

11.2 DEFINITIONS

11.3 REFERENCES

11.3.1

Cane Toad Call

<https://www.frogid.net.au/frogs/rhinella-marina>

11.3.2

Charles Darwin University Animal Ethics Committee, Standard Operating Procedure GSOP 02.2019: Cane Toad Euthanasia

<https://www.cdu.edu.au/files/2020-07/GSOP%2002.2019%20Cane%20toad%20euthanasia.pdf>

This document can also be found in the biosecurity folder under 04 HSEQ > 01 Biosecurity or within the biosecurity folder onboard the vessel.

11.3.3

Introduced Animals on Northern Territory Islands: improving Australia's ability to protect its island habitats from feral animals.

<https://www.awe.gov.au/sites/default/files/documents/nt-islands-report.pdf>

11.3.4

The invasion and potential impact of the Asian House Gecko (*Hemidactylus frenatus*) in Australiaaec_2143 240..251

http://biology-assets.anu.edu.au/hosted_sites/Scott/2011hoskinaustecol.pdf

11.3.5

Mosquito laying eggs image

<https://capemaycountynj.gov/489/Mosquito-Biology>

11.3.6

Mosquito larva image

<http://content.yardmap.org/wp-content/uploads/2016/05/mosquito-larvae-800x534.jpg>

11.3.7

Mosquito pupa image

<https://www.ecosia.org/images?q=mosquito%20laying%20eggs#id=51C0EBC6F6AED183B35E9B5BBE95F8DF4501EAFC>

11.3.8

Fire Ant Image

<https://www.macrophotography.cz/photos/solenopsis-geminata-710.jpg>

11.3.9

Yellow Crazy Ant images and information

<https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/land-management/health-pests-weeds-diseases/pests/invasive-animals/restricted/yellow-crazy-ant>

11.3.10

Declared Weeds in the Northern Territory

<https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT>

11.3.11

Gamba Grass Image

<https://gambagrassroots.org.au/how-to-identify-gamba/>

11.3.12

Gamba Grass leaf image

<https://www.territorynrm.org.au/gamba-grass-hub>

11.3.13

Gamba Grass stem image

<https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/gamba>

11.3.14

Gamba Grass identification and similar looking plants

<https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/gamba>

11.3.15

Alligator weed image and information

<https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/alligator-weed>

11.3.16

Cabomba caroliniana information and seed image

<https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/cabomba>

11.3.17

Cabomba caroliniana leaf and flower image

<https://www.nzflora.info/factsheet/taxon/Cabomba-caroliniana.html>

11.3.18

Neem tree image

<https://ayurveda-by-nelly.blogspot.com/2019/12/neem-20-health-benefits-one-tree.html>

11.3.19

Devil's Claw image

https://keyserver.lucidcentral.org/weeds/data/media/Html/martynia_annua.htm

11.3.20

Devil's Claw identification information

<https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/devils-claw>

11.3.21

Lantana image and identification information

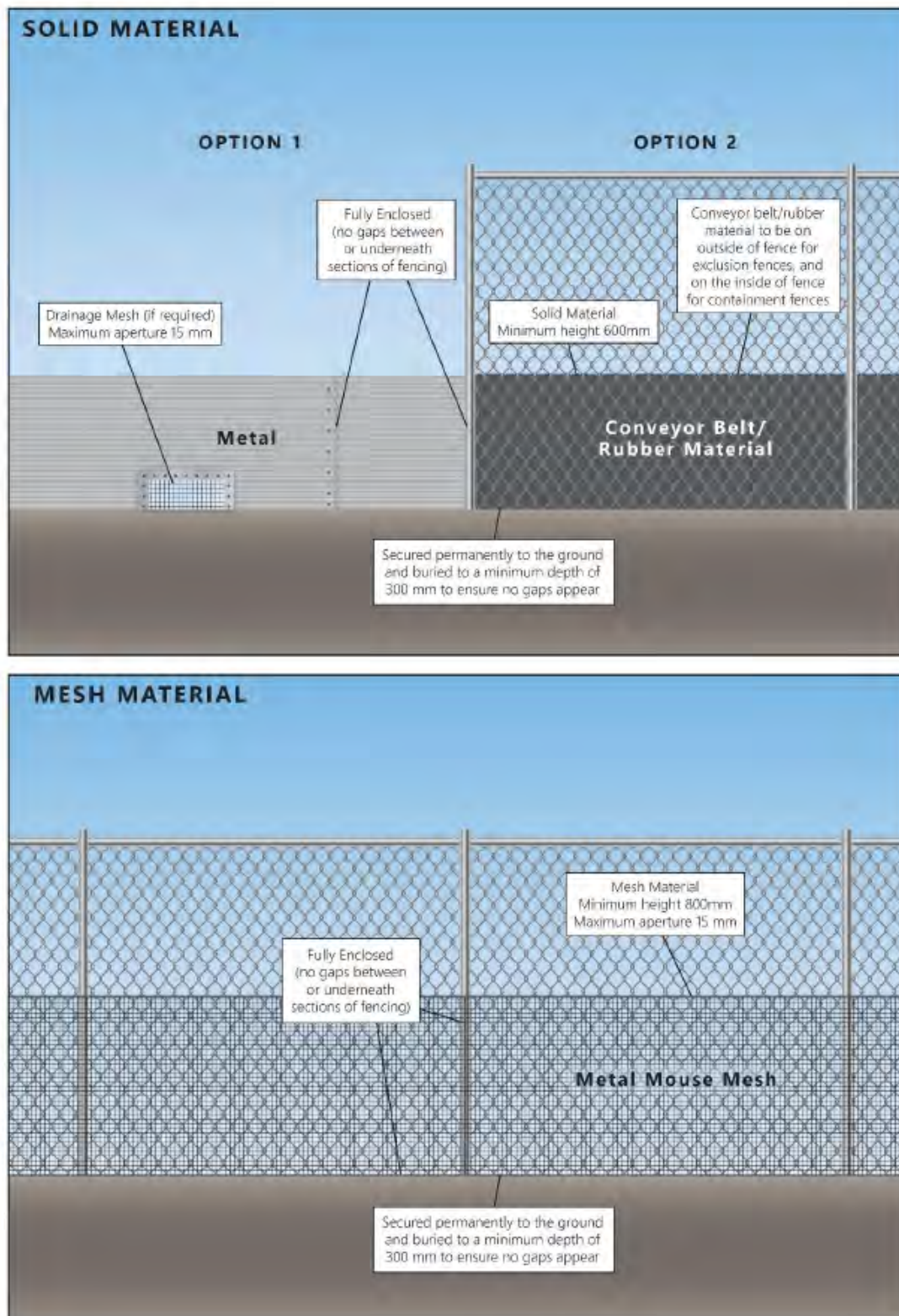
<https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT/lantana>

The image is a vertical composition. The left half is an aerial photograph of a dense, green forest covering a coastal area, with a blue semi-transparent overlay. The right half is a photograph of a rocky coastline with green vegetation, meeting a body of water under a cloudy sky. The text is positioned on the left side, over the forest image.

Appendix B

Cane Toad Fencing

Appendix B - Cane Toad Exclusion Fencing Designs



(GEMCO, 2021)



Appendix C

Pest Fact Sheets

Gamba grass

Andropogon gayanus

HABIT	STEMS & BRANCHES	LEAVES	FLOWERS	FRUIT & SEED
				
Tussocks can grow to 4m high and up to 70cm in diameter.	Gamba grass stems are robust and covered in soft hair. The shallow root system can spread up to 1m from the tussock.	Leaves are up to 60cm long with a distinctive white midrib and covered with soft hairs.	Flower heads occur on tall stems above the leaves. The seed head consists of up to 6 groups of branches.	The fluffy seeds are contained in a V-shaped seed head.

Gamba grass is a declared weed in accordance with the Weeds Management Act 2001 and is a Weed of National Significance in Australia. The class of declaration varies according to the location in the Northern Territory.

- Class A – to be eradicated (all areas of the Northern Territory except where it is classified as Class B)
- Class B – growth and spread to be controlled (in the area roughly bounded by the NT coastline, the western boundary of Kakadu National Park in the east, the town of Katherine in the south, and the Daly River mouth in the west)
- Class C – prevent new entry (all areas of the Northern Territory)

Areas identified as Class A (the eradication zone) generally have lower density infestations which are considered to have a high feasibility of eradication and control. Areas identified as B (the management zone) generally have higher density infestations which have a lower feasibility of eradication or control.

The problem

Gamba grass was originally introduced into Australia from Africa for use as a pasture species. Gamba grass has proven to be extremely tolerant of drought, fire and low nutrient soils which are characteristic of north Australian savannas.

Gamba grass grows to form tussocks which are bigger, taller and more dense than native grass species. These tussocks cure (dry off) late in the dry season creating an unnaturally high fuel load, which can result in late, high intensity fires. These fires can dramatically alter the structure of native plant communities and severely decrease local biodiversity.



Gamba grass produces vast quantities of seed (up to 250,000 per season), which can germinate and establish in both disturbed and undisturbed areas. Areas which have been affected by the extremely hot gamba grass fires are highly susceptible to further gamba grass establishment. In some areas this process of hot, late fires, coupled with the ability of gamba grass to quickly colonise the disturbed areas it creates, is leading to a cycle of woodlands being replaced by tall perennial grasslands which are capable of sustaining further damaging fires. Soil nutrient and soil water cycles are also being altered in areas of dense gamba grass infestations.

Notably gamba grass fires are also harder to control, require more resources and place fire fighters and volunteers at greater risk. There is also considerable risk of infrastructure, crop and livestock losses from gamba grass fires.

Habitat and distribution

Gamba grass is suited to most soil types found in the Top End, except for heavy clays where waterlogging reduces survival. It requires an annual rainfall of at least 600mm. Gamba grass currently occupies an area estimated at between 10,000 km² and 15,000 km². It is estimated gamba grass has the potential to occupy an area covering 380,000 km² in the Northern Territory. Most infestations are currently north of Katherine.

Preventing spread (Class C)

Spread prevention is the most successful and cost effective way of managing weeds. Gamba grass seed can be spread via wind, water, livestock and other animals (e.g. feral pig and buffalo) and machinery contaminated with seed. It can also be spread inadvertently if any fill, gravel or bailed hay contains seeds. By implementing the following recommendations potential seed spread can be significantly reduced:

- map infestations to enable the development of a coordinated and planned management approach
- design and implement a seed spread prevention program
- follow strict hygiene regimes to prevent spread into clean areas
- where attempting to eradicate or contain gamba grass infestations schedule works prior to seed maturation
- in areas where gamba grass is legitimately being used for pasture, graze it with enough stock to keep grass height below 90cm, in order to reduce seed production
- spray/destroy any tussocks that establish on fence lines, fire breaks and roadsides or outside paddocks
- ensure any gravel, sand, livestock, hay or any other product is free of gamba grass seeds
- where possible integrate weed management into a broader natural resource management program
- weeds often thrive in degraded areas, such as those impacted by erosion, wild fire and feral animals

Gamba grass eradication and containment (Classes A and B)

All control methods should be undertaken prior to seeding events to minimise the risk of spread and regeneration. Gamba grass generally flowers in April, with seed production and fall occurring from May to August. A second seeding event may occur in November in response to early wet season storms.

Non-chemical Control

Individual plants can be controlled by hand pulling or by using a mattock or hoe. Excess soil should be removed from the root system to ensure that the plant dies.

Mature gamba grass is fire tolerant and unlikely to be killed by fire. Fire can be used to improve access for slashing or spraying. Burning is best performed during the wet season where low intensity 'cooler' fires are achievable, which are less likely to damage native species.

Check with the Bushfires NT about permit requirements prior to lighting any fires.

Slashing will not eradicate gamba grass, but it can reduce the biomass (fuel load), decrease seed production and create opportunities for more desirable species to establish. By spraying the new shoots which emerge after slashing complete herbicide coverage of the plant can be easily achieved, this reduces costs and increases control effectiveness. Always ensure equipment and machinery is cleaned before moving to new sites.

In areas where gamba grass is already being used as a pasture (B/C Zone), careful management is required to maximise productivity and limit seed production and spread. Gamba grass should be grazed with enough stock to keep grass height below 90 cm, above this height tussocks become unpalatable and may be avoided by stock and allowed to seed.

After lightly grazing pasture in the early wet season, a stocking density of at least 4-5 head per hectare is required to control growth for the remainder of the wet season. It is noted that while grazing strategies can reduce risks associated with gamba grass growth and spread, it should not be used in isolation from other control methods described.

Gamba grass is not recommended for cattle production on smaller properties.

Chemical control

Chemical and concentration	Rate	Situation, method and comments
Glyphosate 360g/L Various trade names and formulations	10ml / 1L	Seedling or adult (individuals or infestation) Foliar spray – apply when actively growing (December - March) Use surfactant

Optimum treatment times – Darker colours represent preferred months for foliar treatment											
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Effective chemical control of gamba grass relies on spraying the entire plant. For optimal uptake of the herbicide and high mortality rates, gamba grass should be sprayed when actively growing and young (leaves should be at least 40 cm long). Spraying plants prior to reaching full height, or during regeneration periods following slashing and/or burning will reduce time and herbicide requirements. Gamba grass is particularly sensitive to herbicide when flowering.

To treat large infestation areas, start at the edges and work inwards, gradually reducing infestation size. Linear infestations should also be controlled in a strategic manner. Control of plants high in the catchment should be prioritised. Along transport corridors the outbreaks furthest from major/source infestations should be targeted first.

Follow up

It is vital that follow up works are carried out to control seedling recruitment and regrowth after a site has been treated. Treatment areas must be revisited no less than four weeks after spraying, but prior to seed-set in May to ensure the plants are dead. Follow-up control to kill any regrowth or new germinants is to be done for at least three years after treatment. Areas are to be checked for two years after eradication. If left uncontrolled, seedlings and regrowth may develop into a bigger problem than the initial infestation.

Disclaimer

The use of pesticides and herbicides in Australia is governed by the *Agvet Code Act 1994 (Commonwealth)* and the *Agricultural and Veterinary Chemical (Control of Use) Act (NT)*. Herbicides must be used according to the directions on the registered label. Users are not absolved from compliance with the directions on the label or conditions of the permit by reason of any statement made or omitted to be made in this publication. For further details see the [Australian Pesticides and Veterinary Medicines Authority website](http://www.pesticides.gov.au/).

Further information

Weed Management Officers from the Weed Management Branch can provide advice on all aspects of weed management including control techniques, biological control, legislative responsibilities, policy advice, monitoring and reporting and regional planning.

For further information on weed management planning, integrated control, herbicide application techniques and monitoring please refer to the [NT Weed Management Handbook](http://www.nt.gov.au/environment/weeds/weed-management-planning). The Gamba grass Weed Management Plan can be found at www.nt.gov.au/environment/weeds/weed-management-planning.

Neem

Azadirachta indica

HABIT	BARK & ROOTS	LEAVES	FLOWERS	FRUIT & SEED
				
A fast growing tree 12 to 24m high.	Bark red-brown, cracked and flaking in older trees. Strong root system with a deep tap root and extensive lateral roots.	Compound leaves 20 to 40cm that are made up of 20 to 30 leaflets each between 3 to 8m in length.	Flowers are small and cream coloured, honey scented and grow in sprays to 30cm long.	Ripe fruit are yellow in colour and similar to olives in size and shape.

Neem is declared a Class B (growth and spread to be controlled) weed in the Northern Territory.
Neem is a declared weed in accordance with the Weeds Management Act 2011.

The problem

Neem has become naturalised in many areas across northern Australia, where the expansion of unmanaged populations has demonstrated neem's capacity to compete with native plant species in intact environments. Neem infestations are starting to develop in some riparian areas in the Top End including the Katherine River. In these areas it is proving to be highly invasive and competitive. Deep tap roots and extensive lateral roots enable neem trees to flourish in areas affected by seasonal drought. Their large size and preference for wet areas means that control can be difficult and expensive.

Mature neem trees prolifically produce seed that is readily dispersed by birds and bats. Plants are capable of establishing in relatively undisturbed vegetation. Suckers can also be produced following damage to the roots.

Habitat and distribution

Neem is believed to be native to the seasonally-dry, tropical woodlands of northeast India and perhaps other parts of the Indian sub-continent. Neem tree has been deliberately introduced throughout the tropics and subtropics where it has been grown as a garden ornamental for shade and for the production of azadirachtin, a broad spectrum insecticide and insect repellent. In the Northern Territory, neem was deliberately planted to provide shade for cattle as far south as Elliott. It is claimed that neem was first introduced into Darwin and Mackay in the 1940s. In the 1960s it was reportedly planted in Darwin as part of a Government Royal Australian Air Force initiative, with plantings at the airport and on other city streets.

Between 1965 and 1988, trial plantations were established in Darwin. Plantations were also established in Queensland and Western Australia. Neem continues to be promoted as a multi purpose plantation species by some advocates. Despite this, a neem industry has not proven viable.

Neem is now spread into savanna areas, particularly favouring creek, river and drainage systems. Populations have established in the Victoria River District, Roper and Gulf districts. Neem remains a common garden plant in Darwin, Katherine and the rural area.

Preventing spread of Neem

By implementing the following recommendations neem spread can be significantly reduced:

- remove neem trees from gardens/landscaping (birds and bats can spread neem seeds far off-site)
- suckers can regenerate from existing root stock, so follow up control may be necessary
- as neem trees can grow from cuttings, lopped material should be chipped or disposed of appropriately
- schedule the control of large trees prior to the production of fruit (generally November to April)
- prioritise the control of seedlings (neem trees will grow rapidly and start producing fruit after 5 years)
- for large, naturalised infestations, land managers should map neem trees to enable the development of a strategic and coordinated management program
- infestations along drainage lines should be targeted first, focusing on upstream areas as a priority

Neem control

Chemical control

Chemical and concentration	Rate	Situation, method and comments
Aminopyralid 8g/L + Triclopyr 300g/L + Picloram 100g/L Grazon® Extra	350ml / 100L	Seedling (individuals and infestations under 2m): Foliar spray, apply when actively growing + non-ionic wetting agent required
Triclopyr 300g/L and Picloram 100g/L Various trade names	350ml / 100L	Seedling (individuals and infestations under 2m): Foliar spray, apply when actively growing + non-ionic wetting agent required
Triclopyr 600g/L Various trade names	1L / 60L (diesel) 1L / 60L (diesel)	Seedling (individuals): Basal bark < 5cm stem diameter Adult (individuals or infestation): Cut stump > 5cm stem diameter
Fluroxypyr 333g/L Starane® Advanced	1.8L / 100L (diesel) 1.8L / 100L (diesel)	Seedling (individuals): Basal bark < 15cm stem diameter, treat up to 45m from ground Adult (individuals or infestation): Cut stump > 15cm stem diameter
Triclopyr 240g/L + Picloram 120g/L Access®	1L / 60L (diesel) 1L / 60L (diesel)	Seedling (individuals): Basal bark < 15cm stem diameter Adult (individuals or infestation): Cut stump > 15cm stem diameter
Picloram 20g/kg Tordon® granules	35 to 45g / m ²	Apply granules over an area extending from the main stem to 30cm outside the dripline to cover the main part of the root system

Optimum treatment times – Darker colours represent preferred months for foliar treatment. Basal bark and cut stump treatment can be carried out all year round.

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
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Mission grass, perennial

Cenchrus polystachios

HABIT	STEMS & BRANCHES	LEAVES	FLOWER SPIKE	SEED HEAD
				
Mission grass is a large, tough, perennial grass. The grass forms a loose clump to 3m high.	The stems are slender and fairly straight, sometimes rooting at the lower nodes.	The leaf blades are hairy and elongated to 45cm long and up to 18mm wide. Can have a red-purplish colour particularly when stressed. Will stay green long after native grasses have dried.	Flower heads appear in the early dry season and are a dense spike, 5 to 26cm long and 1.3 to 2.6cm wide. Generally will have a golden colour.	Seeds are hairy on the lower half making them ideal for dispersal by wind, and on animals and vehicles. Flowering to seed maturity can occur in 14 days. Closely packed seeds on spike.

Perennial mission grass is a declared weed is declared a Class B (perennial) and not declared (annual) weed in the Northern Territory in accordance with the Weeds Management Act 2001.

The problem

Introduced as a pasture species and rarely establishing outside the tropics, *Cenchrus polystachios* is a perennial grass which readily competes with native annual species and occupies disturbed areas including roadsides. By remaining green until the late dry season, this grass provides fuel for much hotter fires later in the year. It is also encouraged by repeated burning. Fuel load from this species is often 3 to 5 times that of neighbouring areas free of mission grass. This fuel load results in more intense fires and has a detrimental impact on other native species as well as on property and horticulture.

Habitat and distribution

Mission grass is native to tropical Africa and rarely extends beyond latitude 23°N and 23°S. It is now considered a weed of several countries including India, Thailand and Fiji. Mission grass was introduced into Australia for testing as a pasture species, and was first noticed in the Darwin area in the early 1970s. It is now widely established in the Top End of the Northern Territory (NT) in both Katherine and Darwin regions. Management efforts are currently focussed on containment and prevention of spread where the species is well established, whilst in areas affected by minor infestations the focus is prevention of establishment through active eradication programs.

Mission grass is closely related to another introduced species *Cenchrus pedicellatus* which differs by being an annual grass which usually grows to a height of 1m with cream to pale purple seed heads.

Preventing mission grass spread

Mission grass is highly invasive, produces vast quantities of seed and has the capacity to spread into both disturbed and undisturbed areas.

- map infestations before commencing control to enable the development of a coordinated management strategy
- control plants before the seeds mature
- follow strict hygiene regimes to prevent spread into clean areas
- spray any tussocks that establish on fence lines, fire breaks and roadsides or outside paddocks
- ensure any hay brought into clean areas for fodder or mulch is weed free

Mission grass control

Chemical control

There are a wide range of products registered for use in the NT that can be used effectively for the management of perennial mission grass in accordance to the land use situation. These products contain active ingredients that include glyphosate, hexazinone, haloxyfop or sethoxydim for example.

Chemical and concentration	Rate	Situation, method and comments
Glyphosate 360g/L Various trade names and formulations	10ml / 1L	Seedling or adult (individuals or infestation) Foliar spray - apply when actively growing

Optimum treatment times – Darker colours represent preferred months for foliar treatment											
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Non-chemical control

Hand grubbing, slashing.

Follow-up

It is vital that follow up works are carried out to control seedling recruitment and regrowth after a site has been treated. If left uncontrolled, seedlings and regrowth may develop into a bigger problem than the initial infestation.

Disclaimer

In the Northern Territory, a registered product must only be used in situations consistent to those appearing on the label, unless authorised under a permit and a person:

- must not have in their possession or use a chemical product unless the product is registered in Australia (exemptions apply)
- may use a registered product at a concentration, rate or frequency lower than that specified on the label unless this is specifically prohibited on the label. This does not apply to herbicide use occurring under an APVMA permit
- may use a registered product to control a pest not specified on the label provided the pest is in a situation that is on the label and use on that pest is not specifically prohibited on the label
- may also use a registered product using a method not specified on the label unless this is specifically prohibited on the label

Users of agricultural (or veterinary) chemical products must always read the label and any permit, before using the product and strictly comply with the directions on the label and any conditions of any permit. Users are not absolved from compliance with the directions on the label or conditions of the permit by reason of any statement made in or omission from this publication.

Further information

Weed Management Officers from the Weed Management Branch can provide advice on all aspects of weed management including control techniques, biological control, legislative responsibilities, policy advice, monitoring and reporting and regional planning.

For further information on weed management planning, integrated control, herbicide application techniques and monitoring please refer to the [NT Weed Management Handbook](#).



Non-chemical control

Hand grubbing small plants may be a viable option. Physical removal should be implemented prior to the production of fruit to avoid seed spread.

Further information

Weed Management Officers from the Weed Management Branch can provide advice on all aspects of weed management including control techniques, biological control, legislative responsibilities, policy advice, monitoring and reporting and regional planning.

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Bellyache bush

Jatropha gossypifolia

HABIT	STEMS & BRANCHES	LEAVES	FLOWERS	FRUIT & SEED
				
Bellyache bush is an erect, perennial shrub that can grow up to 4m in height, with most plants averaging between 2 to 3m.	Bellyache bush is a multi-stemmed bush. The stems, leaf stalks and leaf margins are covered with coarse, gland tipped, sticky, brown hairs.	Leaves alternate, and are divided into 3 to 5 segments. Leaf lobes are pointed. The 'Darwin Purple' has predominantly purple/red foliage and the 'Katherine Green' has green foliage.	The small, red flowers have yellow centres and are found in clusters around the top part of the plant.	The fruit capsules are oblong, approximately 1cm in diameter and contain 3 to 4 seeds. Each seed is about 8mm long.

Bellyache bush is a declared weed in accordance with the Weeds Management Act 2001 and is a Weed of National Significance in Australia. The class of declaration varies according to the location in the Northern Territory.

- Class A – to be eradicated (all areas of the Northern Territory except where it is classified as Class B)
- Class B – growth and spread to be controlled (in the area roughly described as the Aroona, Mathison and Scott Creek subcatchments in the upper Daly River catchment, and the Greenant Creek subcatchment in the lower Daly River catchment)
- Class C – prevent new entry (all areas of the Northern Territory).

Areas identified as Class A (the eradication zone) generally have lower density infestations which are considered to have a high feasibility of eradication and control. Areas identified as B (the management zone) generally have higher density infestations which have a lower feasibility of eradication or control.

The problem

Bellyache bush seedlings are particularly hardy and competitive, they have been observed to reduce the recruitment of native species in both disturbed and undisturbed areas. Native riparian plants are particularly susceptible to bellyache bush invasion. High rates of opportunistic succession by bellyache bush have been observed after natural disturbance events such as flooding. By excluding native flora, and subsequently fauna, bellyache bush can reduce local biodiversity and ecosystem functioning. Thickets of bellyache bush may be used as refuges by feral animals, hindering their control.

Bellyache bush can spread into pastoral land, forming dense thickets which render land unsuitable for grazing, hinder mustering and obscure fence lines. Direct stock losses have been attributed to poisoning, particularly when viable food sources are scarce.



Habitat and distribution

Bellyache bush, a native of Central and South America, has been recorded in at least 30 localities across the Northern Territory. These sites range from extensive well established infestations in the Daly river catchment, through to isolated, less established sites elsewhere in the Darwin, Katherine and Gulf regions. Bellyache bush is an opportunistic coloniser of disturbed sites, rapidly forming dense monocultures in areas where native vegetation has been compromised. It thrives in riparian zones and can also spread into intact savanna woodland and grassland habitats.

Preventing spread of bellyache bush

In optimal conditions a single bellyache bush plant may produce up to 12,000 seeds per year, with the initial seeding occurring as early as 55 days after germination. Growth can also occur from stem and root segments, including dumped cuttings, slashed plants and plants damaged in events such as flooding.

Spread prevention is the most successful and cost effective way of managing weeds. Bellyache bush seed can be spread via water, ants, livestock and other animals (e.g. feral pig and buffalo) and machinery contaminated with seed. It can also be spread inadvertently if any fill, gravel or bailed hay contains seeds. By implementing the following recommendations potential seed spread can be significantly reduced:

- map infestations to enable the development of a coordinated and planned management approach
 - design and implement a seed spread prevention program
 - follow strict hygiene regimes to prevent spread into clean areas
 - where attempting to eradicate or contain bellyache bush infestations schedule works prior to seed maturation
 - spray/destroy any plants that establish on fence lines, fire breaks and roadsides or outside paddocks;
 - ensure any gravel, sand, livestock, hay or any other product is free of seeds
 - where possible integrate weed management into a broader natural resource management program.
- Weeds often thrive in degraded areas, such as those impacted by erosion, wild fire and feral animals

Bellyache bush control

All control methods should be undertaken prior to seeding events to minimise the risk of spread and regeneration. Flowering generally correlates with the wet season (Feb-Apr), and seeding follows (May-July), although these times may vary depending on the availability of water.

Chemical control

Chemical and concentration	Rate	Situation, method and comments
Fluroxypyr 200g/L Various trade names	500ml / 100L or 3L / ha (boom) 3L / 100L (diesel) 500ml / 100L or 3L / ha (boom)	Seedling (individuals or infestation) Foliar spray – apply when actively growing Adult (individuals) Cut stump or basal bark – all year round Adult (infestation) Foliar spray
Metsulfuron-methyl 600g/L Various trade names	10g / 100L 10g / 100L	Seedling (individuals or infestation) Foliar spray - apply when actively growing, need wetting agent Adult (infestation) Foliar spray

Optimum treatment times – Darker colours represent preferred months for foliar treatment

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
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Non-chemical control

Individual plants (seedlings and juveniles) can be removed by hand or by using a mattock. The entire root mass should be removed and excess soil shaken off the root system to ensure regrowth does not occur. Physical removal is very laborious and may therefore only be effective and/or feasible where plant numbers are limited.

Slashing will not eradicate bellyache bush however slashing will kill most plants, reduce the biomass, provide easy access for other treatment options and create opportunities for more desirable species to establish. Slashing can be undertaken at any time of year. Ensure equipment and machinery is cleaned prior to moving to new sites.

Grazing should be minimised after any control efforts to encourage the growth of any perennial grasses. The competition from many pasture species can reduce bellyache bush germination and seedling growth.

Bellyache bush is sensitive to fire, providing there is enough grass or other vegetation to carry a fire. Young plants tend to be more susceptible than mature plants. A large portion of the seed bank will usually survive, as many are buried beyond the reach of lethal temperatures.

The creation and management of a buffer zone free of bellyache bush which isolates all infested areas from adjoining properties will reduce the amount of seed transferring into clean areas.

Follow up

It is vital that follow up works are carried out to control seedling recruitment and regrowth after a site has been treated. Treatment areas must be revisited no less than four weeks after spraying, but prior to seed-set. Seeds in the soil can remain viable for at least four years, and up to seven years under dry conditions, so follow-up control to kill any regrowth or new germinants should be done for at least four years after treatment. Areas should be checked for two years after eradication. If left uncontrolled, seedlings and regrowth may develop into a bigger problem than the initial infestation.

Disclaimer

In the Northern Territory, a registered product must only be used in situations consistent to those appearing on the label, unless authorised under a permit and a person:

- must not have in their possession or use a chemical product unless the product is registered in Australia (exemptions apply)
- may use a registered product at a concentration, rate or frequency lower than that specified on the label unless this is specifically prohibited on the label. This does not apply to herbicide use occurring under an APVMA permit
- may use a registered product to control a pest not specified on the label provided the pest is in a situation that is on the label and use on that pest is not specifically prohibited on the label
- may also use a registered product using a method not specified on the label unless this is specifically prohibited on the label

Users of agricultural (or veterinary) chemical products must always read the label and any permit, before using the product and strictly comply with the directions on the label and any conditions of any permit. Users are not absolved from compliance with the directions on the label or conditions of the permit by reason of any statement made in or omission from this publication.

Further information

Weed Management Officers from the Weed Management Branch can provide advice on all aspects of weed management including control techniques, biological control, legislative responsibilities, policy advice, monitoring and reporting and regional planning.

For further information on weed management planning, integrated control, herbicide application techniques and monitoring please refer to the [NT Weed Management Handbook](#). The Bellyache bush Weed Management Plan and Management Guide can be found at www.nt.gov.au/environment/weeds/weed-management-planning.

Guinea grass

Megathyrsus maximus var maximus



Guinea grass is an example of a useful fodder species that causes problems when growing in the wrong place at the wrong time. Guinea grass is a coloniser of disturbed sites, including roadsides, and particularly untended areas. This robust grass forms clumps and may foster soil erosion in invaded areas. The seeds can be easily spread on the fur of native mammals passing through an infestation of guinea grass. Continued use as a fodder grass may lead to invasion of areas inaccessible to livestock, and into native areas.

Legal requirements

Guinea grass is not a prohibited or restricted invasive plant under the *Biosecurity Act 2014*. However, by law, everyone has a general biosecurity obligation (GBO) to take reasonable and practical steps to minimise the risks associated with invasive plants under their control.

Local governments must have a biosecurity plan that covers invasive plants in their area. This plan may include actions to be taken on certain species. Some of these actions may be required under local laws. Contact your local government for more information.



Description

Guinea grass is a perennial species and may form quite large clumps. Commonly found at around 1.5 m tall, some individuals have been recorded at 3 m tall. The leaf blades are long, narrow and finely tipped. They have a prominent mid-rib and are approximately 1 cm wide. Seed heads are large (up to 40 cm long) and are well-spread, with a large number of fine branches. Seeds are oblong in shape and are often purple in colour.

Green panic (*Panicum maximum* var. *trichoglume*) is a closely related species that differs from guinea grass in that it has softly hairy seeds.

Management strategies

Manual control of guinea grass may require the digging out of larger clumps with a mattock or similar tool.

Herbicide control

There are no herbicide products specifically registered for the control of guinea grass in Queensland. However, a permit held by the Department of Agriculture and Fisheries allows people generally to use some herbicide products to control guinea grass as an environmental weed in various situations.

See Table 1 for the treatment options in situations allowed by the permit.

Prior to using the herbicides listed under this permit (PER11463) you must read or have read to you and understand the conditions of the permit. To obtain a copy of this permit visit apvma.gov.au.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland on 13 25 23 or visit biosecurity.qld.gov.au.

Table 1. Herbicides for the control of guinea grass

Situation	Herbicide	Rate	Registration details	Comments
Domestic areas, commercial, industrial and public service areas, agricultural buildings and other farm situations	Glyphosate 360 g/L (e.g. Roundup, Weedmaster Duo) and other formulations	1.3 L per 100 L water (360 g/L) 200 mL/15 L water 9 L per ha (360 g/L) Consult label for rate for other formulations	Registered	Foliar spray (hand gun/ knapsack/boom) Apply to actively growing plants at early head stage.
		1 L per 2 L water (360 g/L) Consult label for rate for other formulations	Registered	Wick wiper Plants should be at least 15 cm above the desirable vegetation at the time of application
	Fluazifop 212 g/L	2–4 L per ha	APVMA permit PER11463 Permit expires 30/06/2023	Spray young vegetative growth with 3–6 leaves per shoot when growing actively Use up to 4 L per ha for well established infestations or where greater control is required in one season

Read the herbicide label carefully before use. Always use the herbicide in accordance with label.

This fact sheet is developed with funding support from the Land Protection Fund.

Fact sheets are available from Department of Agriculture and Fisheries (DAF) service centres and our Customer Service Centre (telephone 13 25 23). Check our website at biosecurity.qld.gov.au to ensure you have the latest version of this fact sheet. The control methods referred to in this fact sheet should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, DAF does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.



Grader grass

Themeda quadrivalvis

Grader grass is declared a Class B (growth and spread to be controlled) and Class C (not to be introduced) weed in the Northern Territory.

Grader grass is a declared weed in accordance with the *Weeds Management Act*.

HABIT



Erect, tufted annual grass growing to 2m high, often in dense patches. Tufts range from having only a few stems up to 10 or more.

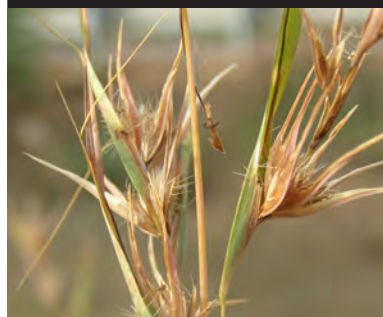
STEMS & BRANCHES



Robust, cane-like stems with long branched seed heads.

Mature stands become a golden red or orange in colour.

SEED HEADS



Seed heads generally appear between February and June. Spikelets in the seed head are 4 - 7mm long, with distinct, bulbous-based bristles.

SEED



Produces up to 1000 seeds in one seed head, although seeds are short lived at the soil surface. Seeds can germinate throughout the year in the right conditions.

SIMILAR SPECIES



Grader grass appears similar to the native perennial kangaroo grass (*Themeda triandra*). Kangaroo grass is generally smaller (about 1m) and brown rather than golden when mature.

Weed Management Officers from the Weed Management Branch can provide advice on all aspects of weed management including control techniques, biological control, legislative responsibilities, policy advice, monitoring and reporting and regional planning. For further information on weed management planning, integrated control, herbicide application techniques and monitoring please refer to the [NT Weed Management Handbook](#).