Supporting Document for Amendment to CPS 4506/3

Christmas Island Phosphates
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CHRISTMAS ISLAND PHOSPHATES

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Introduction

Phosphate Resources Limited (PRL) operates phosphate mining, processing and shipping operations from Christmas Island under the trading name of Christmas Island Phosphates (CIP). PRL were provided with a mining lease and environmental approval to mine in 1997 and operated under this basis until the application of Western Australian legislation required the company to apply for clearing permits under the *Environmental Protection Act 1986* (WA) (CI) (EP Act) for all future clearing. The original lease granted was for 10 years, with a second lease provided in 1997 for a further 21 years, and a lease amendment in 2013 taking the current lease term until 2034. PRL have progressively applied for and obtained approval for clearing in target sites over mining lease MCI 70/1A.

Background

CPS 4506/3 was originally approved in 2012 under section 51E of the EP Act 1986. In July 2017, CPS 4506/2 was granted which approved a total area of not more than 222.61 hectares (ha) for clearing in situ mining, stockpile access, and exploration purposes. In May 2019, CPS 4506/3 was granted, decreasing the total area for clearing to not more than 219.69 ha after an amendment application by CIP to reduce the permit area by 2.92 ha in order to provide vegetated corridors for migrating crabs. CPS 4506/3 is valid until 16 March 2025.

Location

Christmas Island is located in the Indian Ocean, 10°30' South, 105°40' East, and approximately 2,600 km north-west of Perth, Western Australia. Christmas Island is 500 km south of the Indonesian capital Jakarta (Figure 1).

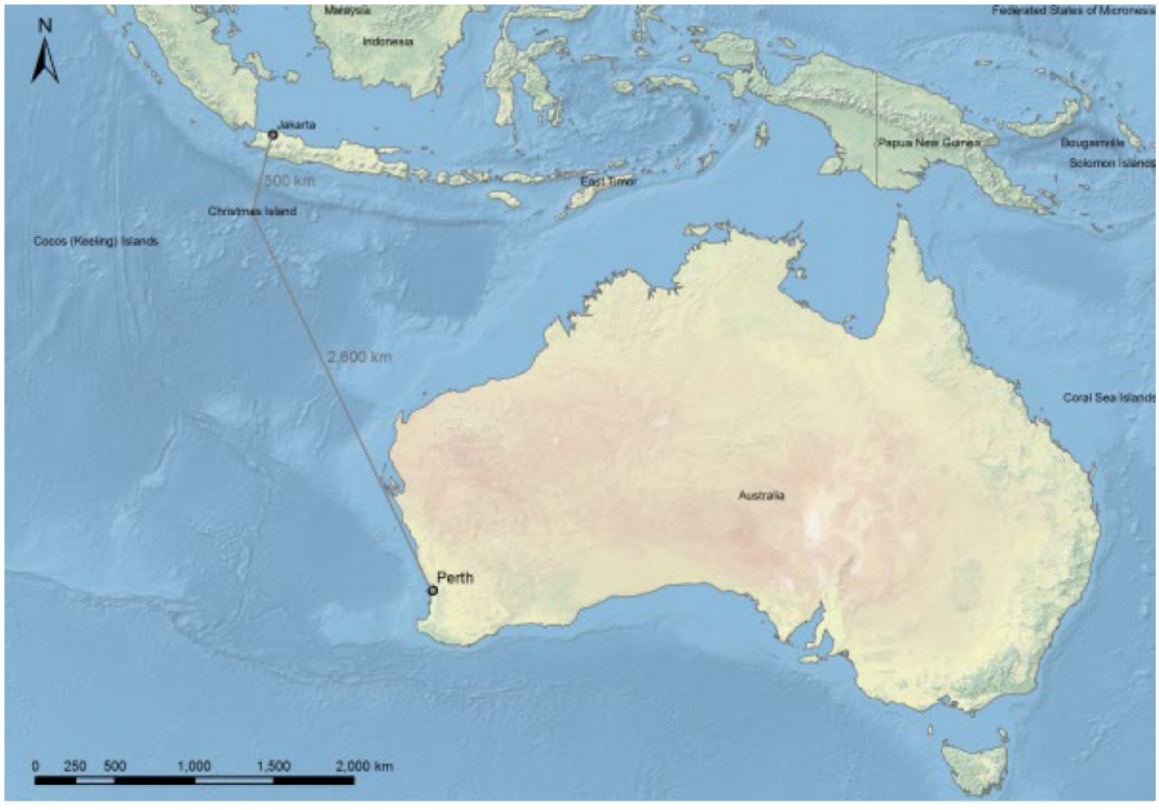

Figure 1: Location of Christmas Island (PRL 2014)

Legislative Framework

The *Christmas Island Act 1958* outlines the governance arrangements for the Island. Sections 8 and 8E of the Act make provision for the laws of Western Australia and the Commonwealth to apply in Christmas Island. The Minister lists selected Western Australian laws to be applied in the *Applied Laws (Implementation) Ordinance 1992*. The Island is governed under Commonwealth legislation and administered by the Department of Infrastructure, Transport, Regional Development, Communication and the Arts (DITRDCA). Applied Western Australian laws are administered by the relevant Commonwealth Minister, by Commonwealth officers acting under ministerial delegations, or by State officers exercising delegated power and acting pursuant to inter-government service agreements under Section 8h of the act.

CIP operations (mining, processing, transport, and shiploading) are regulated through the Licence for Prescribed Premises issued under the *Environmental Protection Act 1986* (WA) (CI) (EP Act). The licence specifies monitoring and reporting requirements.

Clearing of native vegetation is regulated under provisions in the EP Act (Section 51) and under current governance arrangements any clearing within MCI 70/1A must be assessed and approved under this legislation.

Tenure

CIP was granted approval to re-mine and/or remove existing stockpiles of low-grade ore over approximately 2,000 hectares (14% of the Island) of previously cleared areas outside the National Park in 1990 by a lease with the Commonwealth issued under the *Lands Ordinance 1987*. Mining Lease 70/1 was granted to CIP by the Commonwealth in 1997 under the *Mining Act 1978* (WA) (CI) following approval under the *Environment Protection (Impact of Proposals) Act 1974* (Commonwealth) (EPIP Act). The approval for disturbance was carried over to the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act) when the EPBC Act came into effect in 2000. In June 2013, MCI 70/1A was renewed until 2034 as part of a rewriting of the mining lease undertaken largely to clarify and update the royalty and conservation levy provisions and rehabilitation obligations.

MCI 70/1A is the principal lease for the Christmas Island operation. The lease outlines conditions that must be met by Phosphate Resources Ltd and includes the payment of royalties, rainforest protection, mine management and road maintenance and lease Covenant 8.3, which requires that the Lessee 'shall undertake to comply with all the requirements of the Environmental Management Plan' (EMP). The EMP is revised every five years, and the most recent EMP covers the 2024 – 2029 period (currently under assessment). The lease is administered by DITRDCA and expires in 2034. All CPS 4506/3 areas fall within the MCI 70/1A lease.

Conservation Levy

The rehabilitation of former mining areas is undertaken as part of the Christmas Island Minesite to Forest Rehabilitation Program. The program is funded by a conservation levy paid to the Territory Administration by Phosphate Resources Limited as a provision of Mining Lease MCI 70/1A. The program is operated by Parks Australia under a Memorandum of Understanding between the Director of National Parks and the Territory Administration. The conservation levy is paid on all lease areas for all rock and dust exported.

PRL must pay the Conservation Levy quarterly to the Department for the purpose of rehabilitating cleared areas and other high priority conservation activities on Christmas Island as the Commonwealth sees fit.

Ownership

Phosphate Resources Ltd (PRL) was established in 1990 to reopen the Christmas Island phosphate mine, first established in 1891, which had been shut down in 1987. PRL trades as Christmas Island Phosphates (CIP) which is one of PRL's subsidiaries (Figure 2). CIP is the current operator of the phosphate mine which exports phosphate rock predominantly throughout the Southeast Asian market.

Figure 2: Corporate Structure

Proposed Amendment

On 1 May 2019, Christmas Island Phosphates was granted Clearing Permit 4506/3 which approved clearance of a total not more than 219.69 ha, over 63 separate blocks for the purposes of phosphate mining, including stockpile recovery, insitu phosphate mining and exploration. The existing CPS outlines the approved areas (shown in area Plans 4506/3a – 4506/3e, and further detailed in plans *CPS 4506/3 Christmas Island Phosphates Western Area "Dog's Tail", CPS 4506/3 Christmas Island Phosphates Northern Area "Dog's Head", CPS 4506/3 Christmas Island Phosphates South Area*, and *CPS 4506/3 Christmas Island Phosphates Central Area*).

CIP does not seek to make any changes to the amount of native vegetation to be cleared in this application. All the proposed clearing within CPS 4506/3 will be undertaken in historically cleared areas within MCI 70/1A. No primary rainforest will be cleared for mining operations.

Areas within the Permit fall into the following categories:

- Stockpiles built by CIP;
- Areas dominated with fern vegetation which was previously considered a weed due to the low environmental values of these areas;
- Areas dominated by weed species;
- Areas with secondary regrowth;
- Areas which have been cleared in the past ten years but have had vegetation regeneration; and
- Areas with high value vegetation which will be protected.

Clearing permitted within the permit includes:

- Areas with clearing permitted on complete block;
- Areas approved for stockpile access only; and
- Areas for exploration only.

Extension of Permit

Currently CPS 4506/3 expires 17 March 2025. PRL request that the permit expiry is extended to align with MCI 70/1A tenure expiry, that is 26 June 2034, to ensure continuation of operations.

Conditions

PRL request to remove Condition 8(a); *Fauna Management. Clearing of native vegetation within Plan 4506/3a shall be undertaken in accordance with the Pipistrelle Bat Management Plan as approved on 27 October 2010 by the then Assistant Secretary Territories West, Department of Regional Australia, Regional Development and Local Government, Australian Government*. The Christmas Island Pipistrelle Bat which was considered as 'possibly become extinct' in the 2017 and earlier applications was transferred from Critically Endangered category to Extinct in 2021 - Amendments to the EPBC Act list of threatened species - March 2021 (DCCEEW, 2021).

Clearing to Date

Approximately 24 hectares (ha) has been cleared under CPS 4506 to date. Table 1 presents clearing undertaken per block within CPS 4506/3 (Table 1; Figure 3 to Figure 10).

Table 1: Clearing under CPS 4506/3 as of 1 July 2024

CPS 4506/3 Block	Block Use	Area Cleared (ha)	Notes
ML100 East MB4	Complete clearing	**0.3766**	
ML100SPWMB1	Complete clearing	-	
ML100 EastMB5	Complete clearing	**-**	
ML101MB1	Complete clearing	0.1255	
ML101MB2	Complete clearing	-	
ML101MB3	Complete clearing	0.5692	
ML102STP13C	Complete clearing	-	
ML102MB1	Complete clearing	-	
ML102STP13A	Complete clearing	-	
ML102STP13B	Complete clearing	-	
ML102STP102F	Complete clearing	-	
ML106 15AMB1	Complete clearing	-	
ML106STP18F	Complete clearing	-	
ML106 MB6	Complete clearing	-	
ML106 15BMB1	Complete clearing	-	
ML106 MB4	Complete clearing	1.7378	
ML106STP18C	Complete clearing	0.0036	
ML106STP18G	Complete clearing	-	
ML110STP20J	Complete clearing	-	
ML117STP23G2	Complete clearing	0.2138	
ML122STP11K	Complete clearing	0.0741	
ML122F11STP11J	Complete clearing	0.0625	
ML122F11STP11L	Complete clearing	0.1549	
ML122STP11M	Complete clearing	0.1621	
ML122MB1	Complete clearing	0.2304	

CPS 4506/3 Block	Block Use	Area Cleared (ha)	Notes
ML125STP10H	Complete clearing	0.2180	
ML125STP10C	Complete clearing	0.4620	
ML125STP10D	Complete clearing	0.2410	
ML125STP10E	Complete clearing	0.4352	
ML132MB5	Complete clearing	-	
ML132MB4	Complete clearing	-	
ML132MB6	Complete clearing	-	
ML133AF5MB3	Complete clearing	-	
ML133AF9MB2	Complete clearing	-	
ML133ASTP9B	Complete clearing	-	
ML133AF5MB4	Complete clearing	-	
ML133AF5MB4A	Complete clearing	0.8896	
ML133AF5MB5	Complete clearing	1.2709	
ML133AF5MB6	Complete clearing	8.5240	
ML133AF8MB1	Complete clearing	1.0218	
ML133AF9MB1	Complete clearing	2.9529	
ML135MB1	Complete clearing	-	
ML136MB2	Complete clearing	-	
ML138MB4	Complete clearing	0.7664	
ML138MB3	Complete clearing	0.2894	
ML139STP25D	Complete clearing	-	
ML139STP26A	Complete clearing	-	
ML106STP106B	Stockpile access		
ML110STP20KA (eastern portion of block only)	Stockpile access	-	Area of clearing reduced in 2019 amendment
ML110STP20Q	Stockpile access	-	
ML122F11STP11E	Stockpile access	0.1213	
ML122F11STP11F	Stockpile access	0.0709	
ML122F11STP11H	Stockpile access	0.1992	
ML139DTP25G	Stockpile access	-	
ML139STP25H	Stockpile access	-	
ML105MB1	Exploration	0.0018	
ML106MB5	Exploration	0.2262	
ML106MB7	Exploration	0.3922	
ML106MB8	Exploration	0.0258	
ML106MB9	Exploration	0.0352	

CPS 4506/3 Block	Block Use	Area Cleared (ha)	Notes
ML116MB3	Exploration	0.2627	
ML116MB4	Exploration	-	
ML140MB2	Exploration	-	
	TOTAL(ha)	**24.3992**	

Relinquished Areas

To date, no area within CPS4506 has been relinquished to the underlying landowners.

Mining areas in the centre and west of the island have been identified as priority areas for relinquishment (Director of National Parks, 2014). Completion of mining in these areas will enable relinquishment of the areas to Parks Australia for rehabilitation using the conservation levy contributed by Phosphate Resources Limited.

Revegetation activities undertaken under the Christmas Island Minesite to Forest Rehabilitation Program by Parks Australia ensures that lands which have been mined and are subsequently relinquished to Parks Australia can be quickly returned to a vegetated state with some habitat value for wildlife. The Commonwealth have requested for areas that have been relinquished to remain within our CPS boundary to facilitate and support the Parks Australia rehabilitation. PRL have been issued a letter from the Commonwealth giving written authority to PRL to access the land for clearing (Appendix III).

Compliance

Non-compliances to the CPS 4506/3 permit are outlined in Table 2 below. Both incidents were reported in the annual report dated June 2020.

Table 2: Non-compliance Incidents

Date	Block	Non-compliance
June 2019	ML117-STP23G2	Condition 8(b): "… shall ensure clearing of native vegetation within Plan 4506/3(d) is prohibited between March and October, the nesting period of Abbott's Booby (*Papasula abbotti*)."
July 2019	ML106-MB4	Condition 8(b): "… shall ensure clearing of native vegetation within Plan 4506/3(d) is prohibited between March and October, the nesting period of Abbott's Booby (*Papasula abbotti*)."

CIP have identified historic clearing incidents where clearing in Block ML117-STP23G2 and Block ML106 MB4 3A-MCP-STP8C which are subject to Condition 8(b) "… the Permit Holder shall not clear vegetation between March and October, the nesting period of Abbott's Booby" was undertaken in June and July 2019 respectively.

Mitigation measures taken since to prevent recurrence are outlined in the section on Clearing Activities.

Existing Environment

Climate

Christmas Island lies on the southern edge of the inter-tropical convergence zone and the climate is dominated by a low-pressure trough that seasonally circles the equator. The Island has a tropical monsoonal climate with distinct wet and dry seasons and little seasonal variation in temperature. The dry season (May to November) is dominated by low and sporadic rainfall with consistent south-east trade winds. The wet season generally occurs from December to April with the island receiving most of its rainfall during this period. Christmas Island's average annual rainfall over 30 years is around 2,000mm but may vary considerably from year to year; with the island's lowest recorded annual rainfall being 1,067mm in 1987, and the highest 5,121mm in 2016 (BOM, 2023). Temperatures remain relatively uniform throughout the year, with an average daily maximum of 28°C in March/ April and average daily minimum of 22°C in August/ September. The Island has high humidity (80-90%) throughout the year.

During the wet season, Christmas Island is subject to the influence of north-west monsoons, which typically cause high swells and high winds, with gusts of over 100 km/h. Many cyclones have passed nearby the Island, resulting in strong winds and heavy rainfall on the Island. The last cyclone to cause any real damage to the island was Cyclone Gillian, which caused significant damage to rainforest communities in 2014, with trees blown over and foliage stripped from many areas.

The island has distinct microclimates due to the island's geography, with rainfall measurements indicating that there are significant variations in rainfall (Falkland, 1999) across the island. Average rainfall at Rocky Point (Settlement), Jedda Cave and South Point (1,931, 2,375, & 1,907mm respectively) for example shows the significant variation across the Island. Daily evaporation generally exceeds rainfall between July and October.

The Christmas Island Aero weather station (Station Number 200790) has operated from 1972 to present and is situated on the plateau near the airport at an elevation on 261m above sea level.

Hydrology

A major feature of the Christmas Island geomorphology is the lack of surface drainage. Rainfall mostly infiltrates the land surface and is utilised by plants, contributes to soil water stores or recharges to groundwater. There is therefore no significant surface drainage network except down gradient of springs that arise at the interface between limestone and basalt formations (Hollingsworth, 2003).

Christmas Island's soils are generally highly permeable and there is consequently little runoff or erosion. In the Wet Season when the soils are saturated runoff can, during heavy rainfall, induce some risk of erosion and sedimentation. However, given the high natural infiltration rates the risk of erosion and sedimentation is generally localised to compacted areas such as roads and stockpile pads. Infiltration tests by Puhalovich et al. (2003) indicate that soil infiltration rates are typically substantially higher than hourly rainfall intensities.

Perennial (permanent) surface aquatic habitats (freshwater) on Christmas Island are limited to a number of spring-fed streams found along coastal or sloping areas of the Island. Hosnie's Spring (Figure 9) and The Dales (Figure 3) are both listed as a Wetland of International Importance under the Convention on Wetlands of International Importance, Water Fowl Habitat 1971 (known as the 'Ramsar Convention', with the sites referred to as Ramsar sites within internal documents) and are listed in the Directory of Important Wetlands in Australia.

Hydrogeology

There are three key hydrogeological units on the Island; shallow, residual soils, which overlie fractured, unconfined – semi-confined aquifers within the karstic limestone rocks, which in turn overlie relatively impermeable volcanic basement rocks (Puhalovich et al., 2003). Groundwater levels on the Island are reflected by the location of the unconfined water table within the karst limestone aquifers. Limestone aquifers can be

recharged when rainfall permeates through the soil zone into the underlying aquifers or by direct runoff of rainfall into karst features such as dolines and sinkholes that occur across the Island (Puhalovich et al., 2003). Assessments suggest that approximately half of all incident rainfall passes through the soil zone and recharges the underlying limestone aquifers (Hollingsworth, 2003; Falkland, 1999). Groundwater discharge occurs at surface springs such as Hosnie's Spring and offshore springs such as those found at Flying Fish Cove (Puhalovich et al., 2003). The complex behaviour and extent of weathered/fractured rock aquifers on the Island are not well understood.

Geology, Soils and Landforms

Christmas Island is one of a series of submarine seamounts that rise above the 5,500 m deep abyssal areas of the West Australian Basin. At the core of the island are volcanic rocks, mainly composed of basalt with a layer of limestone generally covering these volcanic rocks, with occasional outcrops, particularly along the present coastline. A series of geological uplifts and successive layering of coral reefs over the basalt core of the island have led to the eruption of new cliffs and terraces from the ocean, forming stepped terraces and inland cliffs.

The oldest (Upper Eocene) limestones are found near present sea level and the youngest (Pliocene) near the island summit, 330 m above sea level. The limestone is mixed with dolomite sediments, basalts, and tuffs. Marine sediments and guano deposition have formed a layer of phosphate-rich soil material that covers the limestone over about half of the island. The island is characterised by sea cliffs that rise via a series of terraces to a central plateau. The shoreline is dominated by cliffs and extensive shore platforms with a few small beaches including Flying Fish Cove which has a relatively large beach and shallow platform being the only safe harbour for much of the year. The island's natural landscape is dominated by karstic surface landforms and cave systems (Grimes, 2001). Figure 11 shows a cross section of Christmas Island (exaggerated vertical scale) showing volcanic core, limestone capping, water flow lines and typical cave development (source Grimes 2001).

Terrace areas on the Island reflect the height above sea level in different geologic periods. Renewed vulcanism and a series of geological uplifts at different periods have resulted in a tiered effect. The oldest limestones near the peak of the Island formed during the Eocene period (Grimes, 2001). Most the Island's limestone deposits were formed during the Tertiary (late Oligocene to mid Miocene age), with the youngest limestones deposited on the lowest terrace in the late Quaternary (Grimes, 2001).

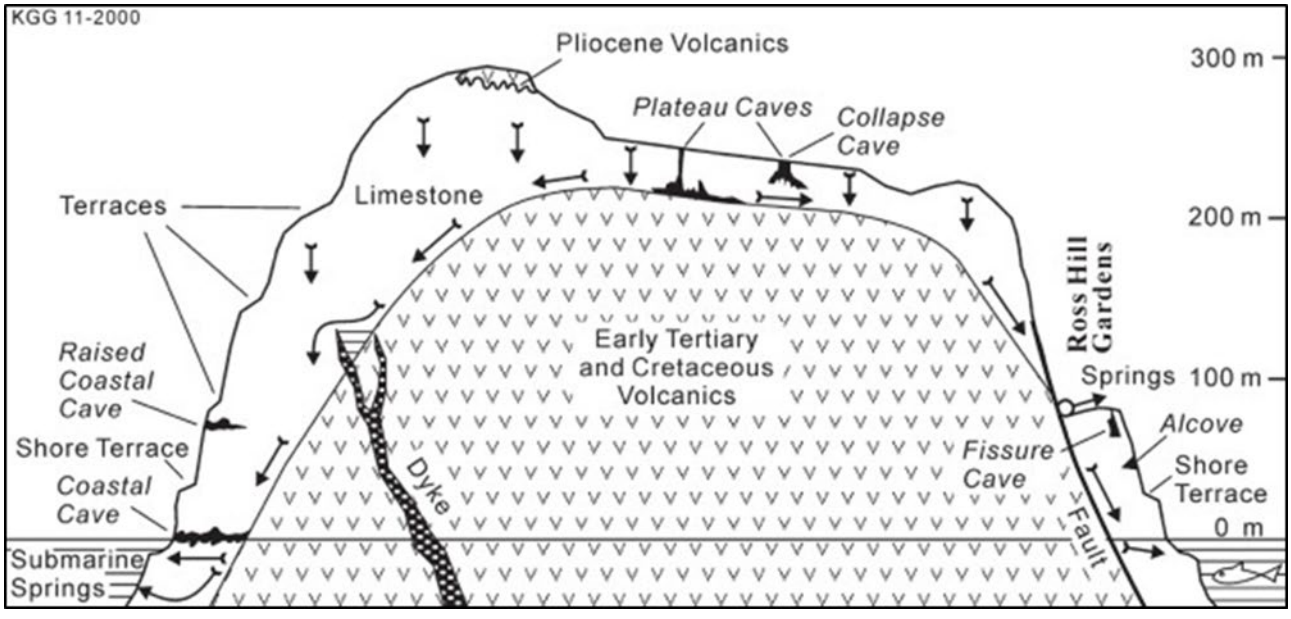

Figure 11: Diagrammatic cross-section of Christmas Island (Grimes 2001)

Land Use

There are a range of current land uses on Christmas Island with the largest land use by area being nature conservation in the form of the Christmas Island National Park (CINP), occupying 63% of the island. Other land uses include residential housing, tourism, recreation (e.g. golf course), transport and the provision of utility services Numerous businesses and services have been developed on the island to support the phosphate mine, detention centre, tourism industry and the island population, including construction, retail/hospitality, training/education, Government and maritime services, agriculture, sport/recreation, maintenance, arts, and the airport.

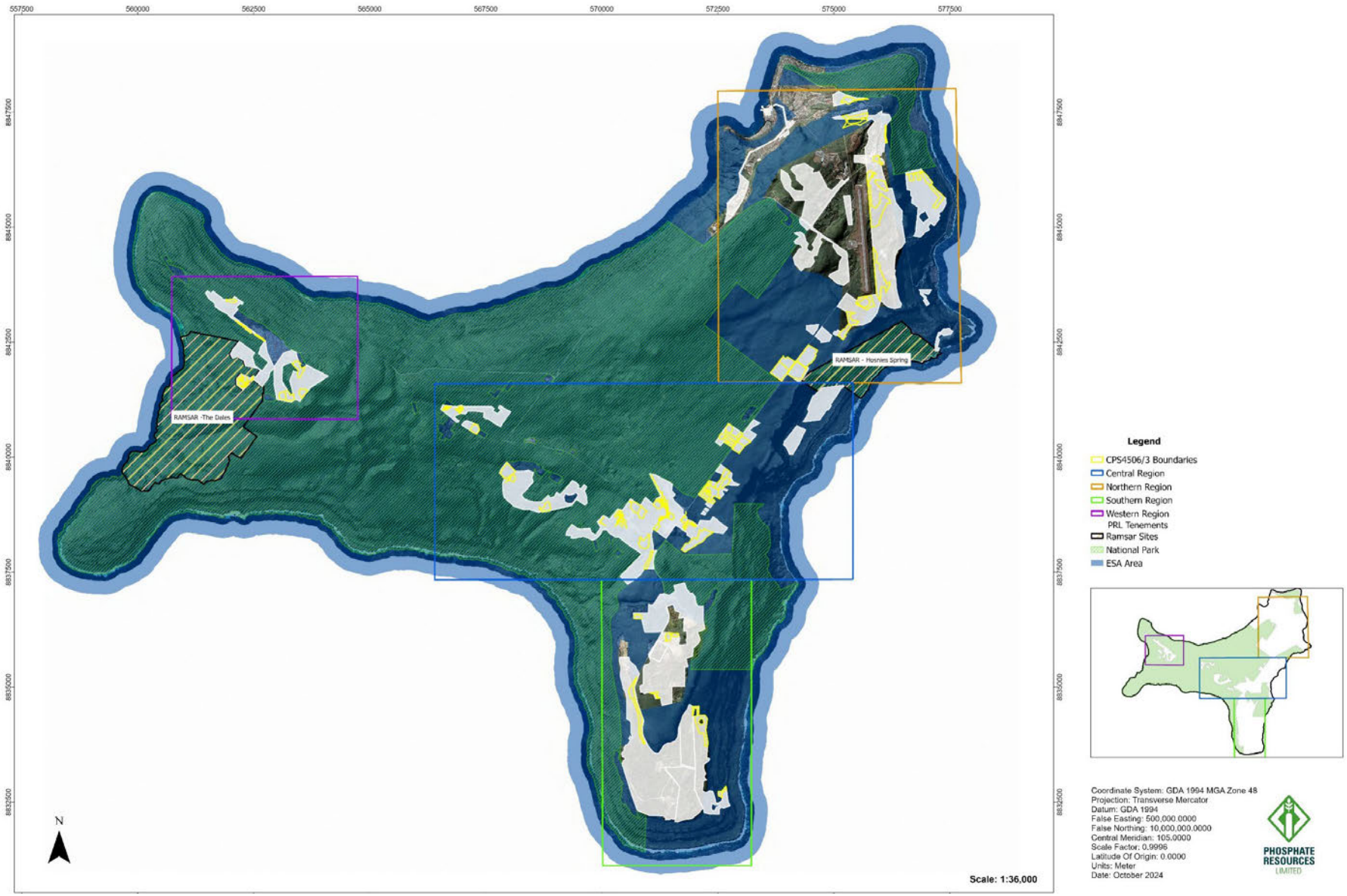

Figure 12: PRL Land Tenure and Environmentally Sensitive Areas

Land Systems

The national and regional planning framework for the systematic development of a comprehensive, adequate and representative 'CAR' National Reserve System is provided by the Interim Biogeographic Regionalisation for Australia (IBRA). IBRA was developed in 1993-94 and is endorsed by all levels of government as a key tool for identifying land for conservation under Australia's Strategy for the National Reserve System 2009-2030. The nationally agreed regionalisation was published in Thackway and Cresswell 1995, An Interim Biogeographic Regionalisation for Australia: a framework for establishing the national system of reserves.

As per the Bioregion map for IBRA, managed by DCCEW, Christmas Island is in the Interim Biogeographic Regionalisation of Australia (IBRA7) as part of ITI (Indian Tropical Islands, ITI01) (Australia's Bioregions - DCCEEWc 2023).

Environmental Sensitive Areas

An Environmentally Sensitive Area (ESA) means an area declared in Regulation 6 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* to be an Environmentally Sensitive Area. These areas are protected under legislation (EP Act).

The ESA on Christmas Island covers areas including:

- The National Heritage Listed "Christmas Island Natural Areas"
- The Ramsar listed nationally important wetlands Hosnie's Springs and The Dales

The "Christmas Island Natural Areas" ESA on Christmas Island was put in place under the EPBC Act but has subsequently been repealed; however, the gazetted *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* ruling is still in place. The "Christmas Island Natural Areas" is applicable across a large part of the island ruled to be "natural", including previously cleared areas, and areas immediately adjacent to CIP infrastructure (Figure 12). This prohibits CIP conducting any works which would ordinarily be allowed as exemptions for clearing native vegetation for certain reasons (i.e. maintenance requirements) within the ESA. A number of blocks within the permit fall outside of the ESA in the Dogs Head and South Point Regions .

CPS 4506/3 does not intersect the Ramsar listed wetlands however the Dales area is adjacent to the sub-region in Northwest Point.

A Protected Matters Search using the DCCEEW tool did not identify any additional areas requiring specific management (DCCEEWc, 2024).

Flora and Vegetation

The flora of Christmas Island has very strong taxonomic relationships with those of the Indo-Malayan and Malesian regions. Some species (e.g. *Terminalia catappa*, *Inocarpus fagifer* and *Gyrocarpus americanus*) are more widely distributed, and largely unremarkable, tropical Indo-Pacific littoral flora that extends as far east as the islands of Polynesia. Despite its isolated location, estimated 10-million-year history above sea level, and diverse 'high-island' landscape, only eighteen species are known to be endemic (denoted by §) to Christmas Island.

The flora comprises about 420 species of vascular plants with approximately 242 species indigenous to the island and a further 177 species introduced since human occupation (Director of National Parks, 2014b). The general taxonomic status and affinities of the flora are relatively well known but detailed records of population distributions across the island (and its range of habitats) are limited for many species. Some additional species of ferns, herbs and shrubs continue to be added to the flora from further collections, especially from poorly accessible terrace areas on the island.

Christmas Island National Park (CINP), which covers some 63% of the island, is assigned to IUCN reserve category II, most of which is uncleared primary rainforest; approximately 25% of the island's original vegetation has been cleared for mining and infrastructure.

Three features of the ecology of the island's native vegetation are notable:

- The occurrence of many of the widespread Indo-Malesian species in habitats that would be considered extremely atypical elsewhere in their natural ranges, and associated with this, the exceptionally large stature of some of these species.

- The low diversity of canopy and sub-canopy species and the lack of structural complexity (e.g. relatively poor development of robust woody vines and rattans, the absence of aroids and of gingers in the understorey) in the Island's rainforests; and the very low diversity and lack of speciation amongst plant genera that elsewhere in the region is characteristic of early successional, and frequently disturbed, rainforest environments (e.g. *Macaranga*, *Claoxylon* and *Pipturus*).

- The geology, geomorphology and climate on Christmas Island create the biophysical environment and constraints for the vegetation communities. These factors determine the soil nutrient status, the seasonal availability of moisture and the degree of exposure to wind, which in turn control the distribution, structure and functioning of the natural vegetation.

Vegetation Types

Vegetation mapping of the Island was initially undertaken by Mitchell (1985) for the Australian Nature Conservation Agency. This mapping had limited use due to its broad scale and spatial inaccuracy. Flora of Australia Volume 50 (Du Puy, 1993a) listed eight vegetation types for the Island.

An island wide vegetation mapping project was undertaken from 2011 to 2014 to attempt to map vegetation with better spatial accuracy, to determine height categories and to apply these consistently across the Island. The process included a Light Detection and Ranging (LiDAR) survey, review of historic aerial photography which captured past clearing, and ground truthing. Additional categories were added to include wetland vegetation and regrowth in cleared areas. The Christmas Island Vegetation and Clearing Map was developed through a collaborative project by Geoscience Australia, CIP, CINP and the Commonwealth Department of the Environment (Geoscience Australia, 2014).

The mapping classified the full extent of Christmas Island into vegetation and land cover classes (Figure 13 – Figure 20 ; Table 3), though boundaries are not always perfectly geographically accurate. Flora of Australia's vegetation types, which are still referred to in some documents, were recategorized to the following:

- 'Primary rainforest' - closed canopy evergreen forest,

- 'Marginal rainforest' - semi-deciduous forest,

- 'Areas with surface water' - perennial wetland forest,

- 'Open forest, scrubby forest and vine forest' and 'inland cliffs' - semi-deciduous scrub,

- 'Coastal fringe' and 'shore cliffs and spray zone' - coastal fringe vegetation, and

- 'Mined areas' - rehabilitation, regrowth and weed dominated veg and pioneer regrowth.

There are seven major structural types of secondary vegetation (i.e. vegetation that has established in areas that have been cleared of the original natural forest) on Christmas Island. The occurrence of these secondary vegetation types in specific disturbed areas on Christmas Island reflects the influence of four main factors:

- The areal extent and the severity /intensity of the original disturbance (especially whether the soil profile has been disrupted or removed),
- Proximity to the nearest forest boundaries and/ or to weed-infested areas,
- The subsequent disturbance or management history of the area (especially the frequency and intensity of further disturbances including fire), and
- The time since the last major disturbance occurred.

Whether or not the soil profile has been removed or disturbed, the proximity to forest and/or to weed infested areas and the occurrence of further disturbance are the major environmental determinants of secondary vegetation type and successional pathways. There are four main successional pathways, as defined by Bennett in 2010:

- Arrested successions dominated by ferns,
- Stagnant successions dominated by thickets of exotic shrubs and vines,
- Reconstructive successions dominated by *Macaranga tanarius*, and
- Retrogressive successions leading to fernlands.

There are two main vegetation types within CPS 4506/3:

- **Regrowth (~62%); and**
- **Weed dominated vegetation and pioneer regrowth (~34%).**

Table 3: Vegetation Types of Christmas Island (Du Puy 1993, and Geoscience Australia 2014)

Vegetation Type	Geoscience Australia			Indicator Species
	Level 1	Level 2	Description	
Primary Rainforest	Closed canopy evergreen forest	Closed canopy evergreen forest (tall or moderate)	Generally found on the plateau and terraces, with a closed uneven canopy up to 40 m in height. Some trees emerge up to 10 m above the canopy. Often supports ferns and orchids, young palms and lilies in the understory.	*Bolbitis heteroclita, Syzygium nervosum, Hernandia ovigera, Planchonella nitida, Pisonia umbellifera, Corymborkis veratrifolia, Ehretia javanica*
Marginal Rainforest	Semi-deciduous forest	Semi-deciduous forest	Generally found on the slopes and terraces down to the coast - and some plateau areas. Higher occurrence of semi-deciduous trees compared to Closed Canopy Evergreen, which lose a portion of leaves during the dry season. Tree height generally 10-25m	*Terminalia, Gyrocarpus, Erythrina variegata, Premna serratifolia, Pisonia grandis, Ochrosia ackeringae*
Inland Cliffs and Open Forest, scrubby forest and vine forest	Semi-deciduous scrub	Semi-deciduous scrub	Found on the terraces, steep slopes and inland cliffs. Semi-deciduous canopy with vines and shrub understory Tree height generally <10m.	*Colubrina pedunculata*[§] *Canavalia cathartica, Carmona retusa, Cycads*
Areas with Surface Water	Perennial wetland forest	*Inocarpus fagifer* dominant	Areas of fresh water runoff on the lower terraces dominated by *Inocarpus fagifer.*	*Inocarpus fagifer*
		Hibiscus tiliaceus dominant	Areas of fresh water runoff on the shore terrace dominated by *Hibiscus tiliaceus*.	*Hibiscus tiliaceus*
		Bruguiera dominant	A single patch of vegetation dominated by *Bruguiera* at Hosnie's Spring. Occurring in an area of fresh water runoff on the shore terrace.	*Bruguiera gymnorhiza*
Coastal Fringe OR Shore cliffs and spray zone, and Mined Areas	Coastal fringe vegetation	Coastal herbland	Found between the coastal scrub and coastal cliffs in exposed areas. Class is dominated by low-lying herbs, sedges and grasses.	*Portulaca tuberosa, Ischaemum nativitatis*[§] *, Oplismenus compositus, Sporobolus virginicus*
		Coastal shrubland	Dense salt-tolerant vegetation growing between the coastal herbland and the terrace cliffs.	*Pandanus christmatensis*[§]*, Scaevola, Pemphis, Argusia argentea, Cordia cordata, Guettarda*

Vegetation Type	Geoscience Australia			Indicator Species
	Level 1	Level 2	Description	
Coastal Fringe OR Shore cliffs and spray zone, and Mined Areas	Rehabilitation	Rehabilitation	Areas where forest rehabilitation has taken place. The standard of forest varies depending on the type of rehabilitation completed, species planted and management regime.	A mix of up to 30 native tree species when initially planted, dependent on characteristic of the site and year of rehabilitation. *Macaranga, Dysoxylum, Calophyllum, Tristiropsis*
	Regrowth	Regrowth	Generally, well developed regrowth vegetation >5 m mean tree height. May include some introduced or weed species.	Various species – dependent on adjacent vegetation
	Weed dominated vegetation and pioneer regrowth	**Leucaena leucocephala*	Monoculture of **Leucaena leucocephala*. Often occurring as regrowth in previously cleared areas.	**Leucaena leucocephala*
		Fern field	Expanse of low-lying ferns often growing on limestone pinnacles.	*Nephrolepis biserrata, Microsorum scolopendria, Psilotum nudum*
		Mixed weed and pioneer regrowth	Regrowth vegetation with a mean tree height of <5m. Can vary between native and introduced species depending on the location and time since clearing. Tends to have a higher occurrence of weed species compared to the 'Regrowth' category.	**Muntingia calabura, *Psidium sp. (Guava), *Mimosa, Passionfruit, Macaranga*

Note: Endemic flora taxa are denoted by §, foreign introduced weed species are denoted by*

Vegetation Condition

A field ground truthing assessment was undertaken by Mr Leonard Stapp (BSc Environmental Management – major in Conservation Biology) of Christmas Island Environmental Services to determine if there was significant change to information provided for the previous CPS application. Mr Stapp has extensive experience in botanical surveying, as well as considerable local knowledge of the flora and fauna of Christmas Island. He has been providing environmental services such as botanical field surveys and assessments, species identification, in addition to monitoring and weed management programs for Parks Australia on Christmas Island. Mr Stapp has worked as a Field Supervisor/ Technical Coordinator; and as sole proprietor at Christmas Island Environmental Services. Additionally, he has widespread experience working in Environmental Advisor and Bushland Regeneration roles on mainland WA.

The ground truthing assessments for CPS 4506/3 blocks were conducted by ranking the vegetation condition of each site based on the Keighery Condition Scale (Keighery, B.J. 1994), with some allowances and modifications made to accommodate the unique tropical environment on Christmas Island (Table 4).

Table 4: Modified Vegetation Condition Score (Keighery, B.J. 1994)

Condition Rating	Keighery Definition	Christmas Island Definition
Pristine (1)	Pristine or nearly so, no obvious signs of disturbance	Mature, undisturbed rainforest or very advanced secondary regrowth. Disturbance is limited to cyclone damage. Climax species dominate and full structural complexity is present with epiphytic orchids and ferns, terrestrial orchids and ferns, §*Pandanus*, pals, buttressing and woody lianes
Excellent (2)	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species	Little to no weed species and a largely intact landform with few signs of disturbance. The vegetation structure is beginning to develop the full complexity and diversity expected in rainforest, with climax species present and a range of features included such as buttressing, palms, ferns, epiphytes and orchids, but the canopy is likely to be more open than in undisturbed rainforest
Very Good (3)	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing	Low diversity vegetation with few signs of disturbance or moderately diverse vegetation on a disturbed landform, a canopy dominated by pioneer species through recruitment of climax species may be evident, an open canopy or poor structural complexity. Few weeds present or weeds are limited to less aggressive species.
Good (4)	Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the	Multiple signs of disturbance or with low diversity and no structural complexity. Typically displays little to no recruitment of climax tree species. Numerous weeds present or a dense understory

Condition Rating	Keighery Definition	Christmas Island Definition
	presence of some very aggressive weeds at high density, partial clearing, dieback and grazing	dominated by one or two native fern species
Degraded (5)	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing	Vegetation at very early successional stages with a canopy of one to two species and an understory dominated by ferns or weeds, typically adjacent to completely degraded land. May have the potential to develop into better quality vegetation as the canopy develops if weeds are managed
Completely degraded (6)	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs	The structures of primary rainforest are no longer present and native species are limited to only a few species, for example weed dominated shrubland with sparse emergent *Macaranga* or a near monoculture *Nephrolepis bierrata* fernland. The landscape may be highly disturbed, often with significantly reduced soil and pinnacles exposed. Predominantly lacking a native canopy and with little to no potential to develop one due to dense groundcover of shallow soil

Data collected was compared against the vegetation data collated for the original application to identify any areas of significant change. No significant changes in vegetation type or condition category were identified.

Figure 21: Example of Category 6 (Completely Degraded) vegetation from 125-STP10D (left) and 139-STP26A (right)

Figure 22: Example of Category 2 (Excellent) vegetation from 100-EASTMB5 (left) and 122-STP11E (right).

Table 5: Vegetation Condition and Comments

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
Approved for Complete Block				
ML 100 East MB4	4, 5	10.3117	Red crabs and crab burrows present. Low to medium density regrowth with maximum heights of 8 – 20m recorded. Degraded to good condition with a blend of weed and native vegetation including: Fern fields, *Leucaena leucocephala, Corida curassavica; Macaranga tanarius, Pittosporum ferrugineum, Pipturus argenteusturus argenteus, Claoxylon indicum, Ficus microcarpa, Planchonella duclita, Dysoxylum gaudichaudianum, Arenga listeri, Allophyllus cobbe*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. Much of the site is in retrogression and reconstructive succession depending on the level of recruitment afforded a particular area. Other areas are showing signs of stagnation dominated by *Leaucaena leucocephala.* Small patches of forest with little disturbance occur to the sites Northern and North-Eastern sections. Red crab density is low.
ML100 SPWMB1	4, 5	7.9600	Red crabs and crab burrows present. Low to medium density regrowth with an average height of 25m recorded. Degraded to good condition with a blend of weed and native species including: Fern fields, *Leucaena leucocephala, Cordia curassavica; Planchonella duclita, Dysoxylum gaudichaudianum, Cryptocarya nitens, Pittosporum ferrugineum, Tristiropsis acutangula, Terminalia cattapa, Pandanus elatus, Arenga listeri, Ficus microcarpa, Guettarda speciosa*	2010: Vegetation status within the nominated area classed as disturbed upper terrace forest. The site runs along the old mining block of South Point West and the North-South Baseline. It was completely cleared by 1976 and regrowth has been best along the road edge nearest the undisturbed forest to the East. Stagnant and arrested successions are more commonly represented along the Western and Central sections of this site. Red crab density is very low.
ML100 East MB5	2, 3, 6	1.4708	Red crabs and burrows, robber crabs and burrows, red footed booby nests present. Low to medium density with maximum recorded heights of 5 – 25m. Degraded to Excellent condition regrowth with a blend of weed and native species including: *Leucaena leucocephala, Cordia curassavica, Ochrosia ackeringae, Terminalia cattapa, Celtis timorensis, Guettarda speciosa, Arenga listeri, Planchonella duclita, Gyrocarpus americanus, Aidia racemosa, Pandanus elatus, Tristiropsis acutangula*	2010: Vegetation status within the nominated area classed as disturbed terrace forest. The site is located on the upper terrace of South Point and has stagnant, reconstructive and retrogressive successions existing on it. Near areas of mining activity, retrogressive and stagnant successions can be seen. In those areas closer to undisturbed forest, reconstructive successions are developing.
ML101MB1	2, 4	1.3909	Medium density, good condition regrowth with a maximum canopy 24m heigh adjacent to historic mine/fern field. Dominant species include *Pandanus elatus, Pittosporum ferrugineum, Claoxylon*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation is predominantly good reconstructive succession of 50

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
			indicum, Ficus microcarpa, Guettarda speciosa of up to 12m heigh and some red crabs and crab burrows. The southwest corner is of near excellent closed canopy forest up to 30m in height. *Planchonella duclita, Dysoxylon gaudichaudianum, Hernandia ovigera, Syzygium nervosum, Aidia racemosa, Guettarda speciosa, Pandanus elatus, Pisonia umbellifera* and no weed species.	years of age. Where mining has occurred, arrested successions dominated by ferns exist. Red crab density is low.
ML101 MB2	4, 5, 6	2.7032	Red crabs and crab burrows, robber crabs present. Low to medium density with maximum heights from 8 – 24m recorded. Completely degraded to good condition with a blend of weed and native species including: Fern fields, *Leucaena leucocephala, Cordia curassavica, Muntingia calabura*; *Macaranga tanarius, Pittosporum ferrugineum, Dysoxylum gaudichaudianum, Planchonella duclita, Tristiropsis acutangula, Arenga listeri, Syzygium nervosum, Claoxylon indicum, Cryptocarya nitens*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The site was completely cleared by 1982 and subsequently, reconstructive successions have been slow to establish. The fern Nephrolepsis biserrata has infiltrated much of the sites undergrowth and may cause problems for further ecological succession, perhaps leading to retrogressive succession tendencies. Red crab density is low.
ML101 MB3	6	0.8114	Red crabs present. Low density regrowth with a maximum recorded height of 10m. Completely degraded condition blend of weeds and native vegetation including: *Leucaena leucocephala, Cordia curassavica, Muntingia calabura, Psidium guajava,* Fern field; *Macaranga tanarius, Melochia umbellata, Tristiropsis acutangula*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The site has had some clearing conducted on it and its proximity to a significant mining area has led to regression occurring at its fringes. Reconstructive successions are still healthy nearest the undisturbed forest boundary. Red crab density is low.
ML102 STP13C	3, 4, 5	2.3009	Some red crabs and red crab burrows associated with the vegetation classified "very good" towards the south end of the block. Maximum canopy heights range from 28m in the south down to 16m in the northern two thirds of the block where vegetation condition reduces to degraded. Dominant species include *Ficus microcarpa, Barringtonia racemosa, Arenga listeri, Planchonella duclita, Tristiropsis acutangula, Dysoxylumn gaudichaudianum, Macaranga tanarius. Low presence of weed species in the south with some fern field and Psidium guajava in other areas.*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions and areas of fernland and retrogressive successions leading towards fernland. Red crab density is low.

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
ML102 MB1	4, 5	4.0880	Red crabs and crab burrows present. Low to medium density with an average maximum height of 17m recorded. Degraded to good blend of regrowth vegetation with a mix of weed and native species including: Fern fields, *Leucaena leucocephala, Cordia curassavica, Psidium guajava; Arenga listeri, Pittosporum ferrugineum, Dysoxylum gaudichaudianum, Planchonella duclita, Pandanus elatus, Tristiropsis acutangula, Barringtonia racemosa, Inocarpus fagifer.*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation is varied and ranges from fernland to regressed succession to reconstructive succession. Red crab density is low.
ML102 STP 13A	3, 4	2.1073	Red crabs and red crab burrows in the northern portion amongst vegetation with average maximum canopy height of 28m. The northern portion is considered very good condition of medium density dominated by *Dysoxylon gaudichaudianum, Arenga listeri, Planchonella duclita, Cryptocarya nitens, Leea angulata* natives and *Leucaena leucocephala* weeds. The southern portion is of medium density good condition vegeatation. Dominant native species include *Pandanus elatus, Arenga listeri, Dysoxylon gaudichaudianum* with little weed infestation.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions. Red crab density is low.
ML102 STP 13B	2, 3, 4, 5	4.7241	Red crabs and red crab burrows present in the south east portion. A large range in vegetation condition (degraded to excellent) and maximum canopy heights between 16 and 35m. Regrowth dominated by natives: *Planchonella duclita, Macaranga tanarius, Pittosporum ferrugineum, Tristiropsis acutangular and Dysoxylon gaudichaudianum* and weeds: *Leucaena leucocephala, Cordia curassavica, Melia azedarach, Psidium guajava*, fern field.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive succession, regressive succession and fernlands. Red crab density is very low.
ML102 STP102F	3, 5	2.5797	Maximum canopy heights between 15 and 25m with medium to low density vegetation ranging in condition from degraded to very good. Dominated by weed species such as ***Leucaena leucocephala, Cordia curassavica and*** **fern fields, amongst natives such as** ***Macaranga tanarius, Dysoxylon gaudichaudianum, Claoxylon indicum, Pittosporum ferrugineum, Planchonella duclita, Pandanus elatus.***	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions and areas of fernland and retrogressive successions leading towards fernland. Red crab density is low.

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
ML106 15AMB1	4, 5	1.1840	Low to medium density with maximum heights between 12 and 26m. Completely degraded to good, blend of weeds and native vegetation including: *Leucaena leucocephala, Muntingia calabura, Cordia curassavica; Macaranga tanarius, Claoxylon indicum, Tristiropsis acutangula, Planchonella duclita, Ficus microcarpa, Arenga listeri, Dysoxylum gaudichaudianum.*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions and areas of fernland and retrogressive successions leading towards stagnant succession of weeds and native species. Red crab density is very low.
ML106 STP 18F	3, 4, 5, 6	3.7985	Red crabs and crab burrows present. Low to medium density with maximum heights between 8 and 35m. Completely degraded to good blend of weeds and native vegetation including: Fern fields, *Leucaena leucocephala, Tacoma stans, Muntingia calabura, Clausena excavate, Cordia curassavica, Aleurites moluccanus; Macaranga tanarius, Claoxylon indicum, Tristiropsis acutangula, Planchonella duclita, Ficus microcarpa, Guettarda speciosa, Syzygium nervosum, Arenga listeri, Pandanus elatus, Dysoxylum gaudichaudianum, Barringtonia racemosa, Aidia racemosa.*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of retrogressive successions over much of its area. However, small pockets of reconstructive successions can be seen along the borders of the site near undisturbed forest near the North and West of the site. Other areas are in stagnant successions dominated by Leaucaena and Cordia weed.
ML106 MB6	5, 6	2.0600	Low quality with maximum heights averaging 15m. Completely degraded to degraded blend of weeds and native vegetation including: Fern fields, *Leucaena leucocephala, Cordia curassavica; Dysoxylum gaudichaudianum, Arenga listeri, Ficus microcarpa, Macaranga tanarius, Pittosporum ferrugineum, Pandanus elatus.*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of retrogressive successions over much of its area associated with the railway line. However, small pockets of reconstructive successions can be seen in areas immediately bordering stockpiled soil and in mined areas, arrested successions dominated by ferns can be seen. Red crab density is very low.
ML106 15BMB1	3	1.0735	Crab burrows present. Medium density with an average maximum height of 25m. Very good condition, with a blend of predominantly native vegetation including: *Macaranga tanarius, Claoxylon indicum, Tristiropsis acutangula, Planchonella duclita, Ficus microcarpa, Arenga listeri, Pandanus elatus, Dysoxylum gaudichaudianum, Barringtonia racemosa, Aidia racemosa, Inocarpus fagifer, Pisonia umbellifera.*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions and areas of fern encroachment. Some areas are remnant garden sites for Camp 5. Red crab density is low.

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
ML106 MB4	6	10.5778	Largely covered by low density, completely degraded historic mine/fern fields. Species are weed dominated and include *Leucaena leucocephala, Muntingia calabura* and Fern field. The few native species were *Macaranga tanarius and Dysoxylon gaudichaudianum* with a maximum canopy height of 8m. No crabs or crab burrows were identified.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of arrested successions over much of its area. However, small pockets of reconstructive successions can be seen along the borders of the site near undisturbed forest and on stockpiled material. Other areas are in retrogression. Red crab density is low.
ML106 STP18C	4, 5	2.0494	Red crabs and burrows present. Low density with maximum heights of 18 to 25m. Degraded to good blend of weed and native vegetation species including: Fern fields, *Leucaena leucocephala Cordia curassavica: Macaranga tanarius, Dysoxylum gaudichaudianum, Tristiropsis acutangula, Arenga listeri, Planchonella duclita, Claoxylon indicum*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The site is an old stockpile with predominantly retrogressive successions of open regrowth vegetation occurring with ferns and weed species dominating the undergrowth. Small pockets of reconstructive successions also occur. Red crab density low.
ML106 STP 18G	6	2.7691	Low quality fern fields	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation of the site is dominated by arrested succession of ferns. A small pocket of retrogressive open vegetation occurs in the Northwestern corner of the block. No red crabs were located.
ML110 STP20J	4, 5	6.0314	Red crabs and crab burrows. Low to medium density with maximum heights of 18 - 28m. Degraded to good blend of weed and native vegetation species including: Fern fields, *Leucaena leucocephala Cordia curassavica, Tacoma stans, Macaranga tanarius, Dysoxylum gaudichaudianum, Tristiropsis acutangula, Arenga listeri, Planchonella duclita, Barringtonia racemosa, Ehretia javanica, Pandanus elatus*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of stagnant successions of weeds and natives. However, small pockets of reconstructive successions can be seen in the Western section of the site. Red crab density is low.
ML117 STP23G2	3, 5	2.7441	Red crabs and burrows present. Low to medium density with maximum heights of 18 - 28m. Degraded to very good blend of weed and native vegetation species including: Fern fields, *Leucaena leucocephala Cordia curassavica, Spathodia*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The site is an old stockpile with predominantly retrogressive vegetation regrowth occurring throughout. In areas of least

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
			campanulate, Psidium guajava, Muntingia calabura; Macaranga tanarius, Dysoxylum gaudichaudianum, Tristiropsis acutangula, Arenga listeri, Planchonella duclita, Barringtonia racemosa, Pisonia umbellifera, Syzygium nervosum, Ehretia javanica, Inocarpus fagifer	compaction, small pockets of reconstruction are occurring. The fern *Nephrolepsis biserrata* has a stronghold on the undergrowth of the site. Red crab density is low.
ML122 STP11K	3, 4, 6	3.1939	Vegetation ranges from low density, completely degraded regrowth adjacent to the North South Baseline Road consisting only of *Leucaena leucocephala* and a portion of fern field. Vegetation increases in condition away from the road to the south east to medium density, very good regrowth with a maximum canopy height of 24m. This very good condition vegetation exhibited species such as *Dysoxylon gaudichaudianum, Planchonella duclita, Tristiropsis acutangula, Barringtonia racemosa, Arenga listeri* and no weed species. Some red crabs and crab burrows were identified in these more well vegetated areas.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The site was cleared by 1982 and since then reconstructive successional vegetation has established on the site. Regrowth is more advanced closer to the undisturbed forest edge to the East. Some retrogressive vegetation pockets occur on the Western edge. Red crab density is moderate.
ML122 F11 STP11J	4	0.9239	Medium density vegetation of good condition and a maximum canopy height of 25m. **Native species include** *Tristiropsis acutangula, Planchonella duclita, Claoxylon indicum, Guettarda speciosa, Dysoxylon gaudichaudianum and Arenga listeri.* Weed species identified include *Castilla elastica and Leucaena leucocephala.* Some red crabs and red crab burrows were identified in the southern portion of the block.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions closer to the National Park boundary and areas of fernland and retrogressive successions near the mined out blocks to the South and along the roadside edge of the block. Red crab density is low.
ML122 F11 STP11L	5, 6	0.8685	Low density, degraded to good vegetation with a maximum canopy height of 21m. Dominant native species include *Macaranga tanarius, Planchonella duclita, Dysoxylon gaudichaudianum, Tristiropsis acutangular and Pandanus elatus.* Weed species present include *Leucaena leucocephala, Psidium guajava and Muntingia calabura.* No red crabs or burrows were identified.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive succession closer to the National Park boundary to the South and areas of fernland and retrogressive successions and fernlands near the mined out blocks to the East and West of the block. Red crab density is low.
M122 STP11M	4, 6	3.5294	Completely degraded fern field covers the central third of this block. Good vegetation with maximum canopy heights between 15 and 26m run either side of the historic field and is associated with some	2010: Vegetation status within the nominated area classed as disturbed emergent forest. On mined areas, arrested successions of ferns are prevalent, however,

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
			low density red crab burrows. Native species in these areas include *Macaranga tanarius, Dysoxylon gaudichaudianum, Tristiropsis acutangula, Planchonella duclita, Pandanus elatus, Barringtonia racemosa* and *Guettarda speciosa*	good reconstructive successions have also established in parts. Some retrogressive successions have established where Macaranga's have died before sufficient replacement densities of native trees have been established. Red crab density is moderate.
ML122 MB1	4, 5	1.5292	The central third of this block is dominated by low density, degraded fern field with a maximum canopy height of 9m. Other species include *Macaranga tanarius, Barringtonia racemosa, Claoxylon indicum.* Surrounding the fernfield are remnent pockets of good regrowth dominated by *Pisonia umbellifera, Dysoxylon gaudichaudianum, Inocarpus fagifer, Arenga listeri, Tristiropsis acutangula, Claoxylon indicum and Leucaena leucocephala*. Low density red crab burrows were identified in the western end of the block.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions closer to the Western boundary. Vegetation tends to become more open and tending towards a regression succession of fernland near the North-South baseline to the East. A small 500m^2 patch of open forest/fernland interrupts the progression towards a more stable succession from East to West. Red crab density is very low.
ML125 STP10H	3, 4, 5, 6	9.2524	Red crabs and burrows present. Low – medium density, maximum height 10m 25m. Completely degraded to good blend of weed and native species including: *Nephrolepsis biserrata, Leucaena leucocephala, Mikania micrantha, Castilla elastica, Clausena excavata; Macaranga tanarius, Arenga listeri, Tristiropsis acutangula, Dysoxylum gaudichaudianum, Claoxylon indicum, Planchonella duclita, Guettarda speciosa, Leea angulata, Pipturus argenteusturus argentus, Pandanus elatus, Syzygium nervosum, Inocarpus fagifer, Pittosporum ferrugineum, Ficus microcarpa, Barringtonia racemosa, Allophyllus cobbe*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. In mined out areas, arrested successions of ferns prevail. On forest edges and stockpile edges, reconstructive successions have established. In some areas, retrogression can be seen, particularly closer to the mined areas. Red crab density is moderate.
ML125 STP10C	3, 4, 5, 6	11.5145	A completely degraded mine/fern field lies central to this block. Surrounding this is low density, good condition vegetation consisting of native species like *Planchonella duclita, Dysoxylon gaudichaudianum, Macaranga tanarius, Pittosporum ferrugineum, Claoxylon indicum, Syzygium nervosum, Arenga listeri, Leea angulata and Tristiropsis acutangular and Leea angulata.* Common	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The site was cleared 30 years and since then good reconstructive successions have established on the site. Some areas are in retrogression towards stagnant successions of

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
			weed species in these areas include *Leucaena leucocephala, Cordia curassavica, Clausena excavata, Psidium guajava.* The southern portion of the block exhibits high density, very good condition vegetation with a maximum canopy height of 32m. Dominant species in this portion include *Barringtonia racemosa, Dysoxylon gaudichaudianum, Macaranga tanarius, Tristiropsis acutangula, Hernandia ovigera, Inocarpus fagifer and Planchonella duclita.* No weed species were recorded in these southern areas and red crabs and burrows were identified.	weeds and arrested successions of ferns. Red crab density is low.
ML125 STP10D	3, 4, 5, 6	5.3437	South eastern portion consists of historic mine/ fern field. The rest of this block has increasing quality vegetation moving north, away from the fern field. Vegetation ranges from degraded edges on the field to high density very good condition vegetation with a maximum canopy height of 30m to the north. Dominant species in the north include *Macaranga tanarius, Ficus microcarpa, Pisonia umbellifera, Barringtonia racemosa, Tristiropsis acutangula, Leea angulata, Inocarpus fagifer,* while the edges of fern field consist largely of Planchonella duclita, Dysoxylon gaudichaudianum, Arenga listeri. *Leucaena leucocephala* if found throughout with *Cordia curassavica and Clausena excavata* also common in the lower grade transitionary vegetation. Red crabs and crab burrows were present in the northern areas.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. In mined out areas, arrested successions of ferns prevail. On forest edges and stockpile edges, reconstructive successions have established. In some areas, retrogression can be seen, especially in previously mined areas. Red crab density is low.
ML125 STP10E	3, 4, 6	8.7102	A range of completely degraded mine/fern field and good to very good vegetation in the north western portion of the block. Canopy height varies between 5m across the fern fields and 20 to 28m in the higher quality, medium density vegetation where some red crabs and crab burrows were identified. Native species within this area include ***Ehretia javanica, Planchonella duclita, Dysoxylon gaudichaudianum, Arenga listeri, Macaranga tanarius, Inocarpus fagifer and Pisonia umbellifera.*** Weed species throughout include ***Leucaena leucocephala and Castilla elastica.***	2010: Vegetation status within the nominated area classed as disturbed emergent forest. In mined out areas, arrested successions of ferns prevail. On forest edges and stockpile edges, reconstructive successions have established. In some areas, retrogression can be seen, especially in previously mined areas. Red crab density is low.

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
ML132 MB5	4	2.5858	Low density with maximum heights recorded of 15m. Good condition regrowth with a blend of weed and native species including: Ferns, *Leucaena leucocephala, Cordia curassavica, Tecoma stans. Clausena excavata; Terminalia catappa, Dysoxylum gaudichaudianum, Ficus microcarpa, Pipturus argenteusturus argenteus, Guettarda speciosa, Tristiropsis acutangula, Macaranga tanarius*	2010: Vegetation status within the nominated area classed as disturbed terrace forest. The vegetation is a mixture of reconstructive, retrogressive and stagnant successions of native and exotic species. Red crab density is low.
ML132 MB4	5	2.9162	Red crabs present. Low density block with maximum heights recorded of 5 -10m. Degraded condition regrowth with blend of weed and native species including: Ferns, *Clausena excavate, Cordia curassavica, Muntingia calabura, Tecoma stans, Leucaena leucocephala; Guettarda speciosa, Ficus microcarpa, Macaranga tanarius, Dysoxylum gaudichaudianum, Tristiropsis acutangula, Terminalia capatta*	2010: Vegetation status within the nominated area classed as disturbed terrace forest. The vegetation is a mixture of reconstructive, arrested, retrogressive and stagnant successions of native and exotic species. Red crab density is moderate.
ML132 MB6	4, 5	4.6431	Low to medium density, with maximum heights recorded of 8 – 17m. Degraded to good condition regrowth with a blend of weed and native species including: *Leucaena leucocephala, Tecoma stans, Cordia curassavica, Muntingia calabura; Dysoxylum gaudichaudianum, Guettarda speciosa. Macaranga tanarius, Tristiropsis acutangula, Pipturus argenteusturus argenteus, Ficus microcarpa*	2010: Vegetation status within the nominated area classed as disturbed terrace forest. The vegetation is a mixture of retrogressive, stagnant and arrested successions of native and exotic species. Red crab density is low.
ML133A F5MB3	6	0.8437	Completely degraded vegetation existing on the eastern edge of a historic mine/fern field. Consists of fern field and regrowth with significant edge effects and a canopy of no more than 6m. Native species include *Macaranga tanarius, Ficus microcarpa, Terminalia catappa, Pandanus elatus and Terminalia catappa.* Significant presence of weed species such as ***Leucaena leucocephala, Cordia curassavica, Clausena excavata, Tecoma stans.***	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The site is the Eastern edge of an existing mine field and as such has significant edge effects that reduce the quality of the vegetation growing there. Most areas are a stagnant succession dominated by Leaucaena, however smaller sections of stunted reconstructions occur in the Southern section. Red crab density is low.
ML133A F9MB2	4, 6	3.4719	This block is predominantly completely degraded, historic mine/fern field with a maximum canopy height of 5m. The one area of vegetation that does exists in this block is of good condition and	2010: Vegetation status within the nominated area classed as disturbed closed forest. The vegetation is a mixture of reconstructive, retrogressive and stagnant

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
			dominated by *Dysoxylon gaudichaudianum, Pandanus elatus, Barringtonia racemosa and Inocarpus fagifer* with a maximum height of 22m with some red crabs and crab burrows present. Weed species present include *Leucaena leucocephala, Cordia curassavica and Clausena excavate.*	successions of native and exotic species. Arrested successions of ferns occur in 50% of the site. Red crab density is moderate.
ML133A STP9B	3, 4, 6	3.6657	This block consists of a central completely degraded, historic mine/fern field surrounded by good to very good vegetation with a maximum canopy height between 26 and 35m. Common species within this surrounding regrowth includes *Macaranga tanarius, Syzygium nervosum, Tristiropsis acutangula, Planchonella duclita, Claoxylon indicum, Terminalia catappa, Inocarpus fagifer, Pandanus elatus and Barringtonia racemosa*. Outside of the fern field were weeds such as *Leucaena leucocephala, Clausena excavata, Cordia curassavica,and Castilla elastica.* Inside of this vegetation there were red crabs and crab burrows identified, as well as a Red Footed Booby nest and a Red Footed Booby.	2010: Vegetation status within the nominated area classed as disturbed closed forest. The vegetation is a predominantly arrested succession and reconstructive/retrogressive successions in the central and Northern parts of the block associated with the greatest mining activity. Primary rainforest with minimal disturbance from drill line activity can be seen in the Southern section. Red crab density is low.
ML133A F5MB4	5	1.9400	Low density degraded vegetation covers much of this block. Maximum canopy height varies between 8 and 19m with species such as *Guettarda speciosa, Pittosporum ferrugineum, Macaranga tanarius, Tristiropsis acutangula, Planchonella duclita, Arenga listeri, Dysoxylon gaudichaudianum, Cryptocarya nitens* and weeds *Cordia curassavica, Leucaena leucocephala, Tecoma stans, Clausena excavata, Psidium guajava.* Low density red crabs and crab burrows in the central region.	2010: Vegetation status within the nominated area classed as disturbed terrace forest. The vegetation is a mixture of reconstructive, retrogressive and stagnant successions of native and exotic species. Red crab density is low.
ML133A F5MB4A	5	2.1629	Regrowth areas are of low density, degraded value with a maximum canopy height of 14m. Dominant native species include *Macaranga tanarius, Pittosporum ferrugineum, Dysoxylon gaudichaudianum, Pandanus elatus and Ehretia javanica* while weed species consist of *Leucaena leucocephala, Cordia curassavica, Muntingia calabura, Clausena excavata, Psidium guajava and Tecoma stans.*	2010: Vegetation status within the nominated area classed as disturbed terrace forest. The vegetation is predominantly a stagnant succession of native and exotic species dominated by *Cordia sp*., *Leucaena sp*. and *Murraya sp*. Red crab density is very low.

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
ML133A F5 MB5	4, 5	3.6134	No evidence of crabs or red crab burrows. Low density degraded regrowth to medium density good regrowth with a maximum canopy height of 15 to 17m. Native species consist of *Pandanus elatus, Pittosporum ferrugineum, Terminalia catappa, Inocarpus fagifer, Dysoxylon gaudichaudianum, Barringtonia racemosa.* Weeds were common and dominated by *Leucaena leucocephala, Cordia curassavica, Clausena excavata, Muntingia calabura.*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation shows signs of retrogression and stagnation in many areas with small pockets of reconstructive successions. Red crab density is very low.
ML133A F5 MB6	3, 5, Cleared	16.6410	A large portion of this block has been recently cleared for mining. To the north east there are remnant areas of vegetation ranging from low density degraded vegetation with a maximum height of 15m to medium density, good condition with a maximum canopy height of 22m. Native species include *Planchonella duclita, Ficus microcarpa, Guettarda speciosa, Tristiropsis acutangula, Dysoxylon gaudichaudianum, Macaranga tanarius, Arenga listeri.* Weed species include *Leucaena leucocephala, Clausena excavata, Cordia curassavica.* Red crabs and red crab burrows were identified in this vegetated portion of the block.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation shows signs of retrogression and stagnation in many areas with small pockets of reconstructive successions. Red crab density is very low.
ML133A F8 MB1	3, 4, 5, 6	13.7417	Some red crabs and crab burrows were associated with medium density vegetation of very good condition where maximum canopy heights were 28m. Dominant species in these areas include *Ficus microcarpa, Dysoxylon gaudichaudianum, Ochrosia ackeringae, Arenga listeri, Claoxylon indicum, Guettarda speciosa, Pisonia umbellifera and Pandanus elatus.* Weed species present include ***Melia azedarach, Leucaena leucocephala, Cordia curassavica.*** Much of the rest of this block is of low density degraded and completely degraded regrowth with maximum canopy height between 6 and 17m. Dominant species present in these areas *include Dysoxylon gaudichaudianum, Guettarda speciosa, Pittosporum ferrugineum,* ***Macaranga*** *tanarius, Melochia umbellate* and weed species *Leucaena leucocephala, Cordia curassavica, Clausena excavata, Melia azedarach, Psidium guajava and Tecoma stans.*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation shows signs of reconstruction over much of the site. Smaller areas of retrogression and stagnation can be seen in areas where disturbance has been significant. Red crab density is low.

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
ML133A F9 MB1	5	4.5421	Largely degraded, low density regrowth with maximum canopy height of 13 to 14m. Native species present include *Macaranga tanarius, Melochia umbellata, Dysoxylon gaudichaudianum* and *Pittosporum ferrugineum.* Weed species are common and include *Leucaena leucocephala, Cordia curassavica and Muntingia calabura.* No evidence of crabs or red crab burrows.	2010: Vegetation status within the nominated area classed as disturbed closed forest. The vegetation is a mixture of reconstructive, retrogressive and stagnant successions of native and exotic species. Red crab density is low.
ML135 MB1	4, 5, 6	6.6236	The southern portion of this block is largely degraded or completely degraded low density regrowth with a maximum canopy height between 10 and 14m. Areas that are vegetated consist largely of *Macaranga tanarius, Pipturus argenteusturus argenteus, Pittosporum ferrugineum, Dysoxylon gaudichaudianum, Guettarda speciosa* with weed species *Clausena excavata, Cordia curassavica, Leucaena leucocephala, Melia azedarach, Manihot esculenta.* The northern portion of the block is made up of historic pinnacle field and, to the west, medium density good condition regrowth with a maximum canopy height of 24m. Species include *Ficus microcarpa, Dysoxylon gaudichaudianum, Pittosporum ferrugineum, Pandanus elatus* and also weed species *Leucaena leucocephala, Delonix regia, Cordia curassavica, Cordia curassavicaal vine and Clausena excavate.* Very low presence of red crabs and red crab burrows.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. **The site has incurred significant mining activity over a period of time and since then vegetation regrowth has been poor with the exception of reconstructive succession seen in the North Western section of the block. Stagnant successions dominated by the weeds Leaucaena, Muntingia and Cordia are common as well as some areas of retrogressive and arrested succession. Red crab density is very low.**
ML136 MB2	3, 4, 5	3.3617	Red crabs and crab burrows present. Vegetation ranges in condition from medium density and very good with a maximum canopy height of 24m to low density and degraded with a maximum canopy height of 17m. Weed species are common throughout and include *Cordia curassavica, Leucaena leucocephala, Clausena excavata, Tecoma stans.* Dominant native species include *Tristiropsis acutangula, Guettarda speciosa, Ficus microcarpa, Terminalia catappa, Ochrosia ackeringae, Pisonia umbellifera, Macaranga tanarius* and *Planchonella duclita.*	2010: Vegetation status within the nominated area classed as disturbed terrace forest. The area has two types of regrowth associated with two disturbance events separated by 60 years. Older regrowth over much of the site has reconstructed the forest well, however, stagnant successions have developed in areas where mining disturbance occurred in the 1970's. Red crab density is low.

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
ML138 MB4	5, 6	1.6594	Low density, average maximum height of 12m. Degraded to completely degraded blend of weed and native species including: *Leucaena leucocephala, Muntingia calabura, Tacoma stans; Macaranga tanarius, Allophyllus cobbe, Arenga listeri, Tristiropsis acutangula, Dysoxylum gaudichaudianum, Planchonella duclita, Ficus microcarpa, Melochia umbellata*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation is predominantly a stagnant succession of native and exotic species with some areas showing signs of further development. Red crab density is moderate.
ML138 MB3	5	1.1368	Adjacent to historic mine/fern field, low density, average height of 8m. Degraded blend of weed and native species including: *Leucaena leucocephala, Tacoma stans; Arenga listeri, Tristiropsis acutangula, Terminalia catappa, Guettarda speciosa, Ficus microcarpa*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation is predominantly a stagnant succession. Of native and exotic species. Red crab density is very low.
ML139 STP25D	5, 6	2.2226	Low density with maximum height of 17m. Degraded to completely degraded blend of weeds and native vegetation including: *Leucaena leucocephala, Muntingia calabura, Fern fields, Macaranga tanarius, Arenga listeri, Tristiropsis acutangula, Ficus microcarpa, Dysoxylum gaudichaudianum, Syzygium nervosum*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation is predominantly an arrested succession of *Nephrolepsis biserrata* with some areas of native and exotic species in stagnant succession. Red crab density is very low.
ML139 STP26A	4, 5, 6,	4.0897	Red crabs and burrows present. Low -medium density with average maximum heights of 8m. Good to completely degraded blend of weed and native vegetation species including: *Leucaena leucocephala, Cordia curassavica, Fern fields, Mikania micrantha, Native vine thickets, Tacoma stans, Muntingia calabura; Macaranga tanarius, Tristiropsis acutangula, Planchonella duclita, Arenga listeri, Claoxylon indicum,*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation is predominantly a stagnant succession of native and exotic species and fernlands with some areas showing signs of further development. Red crab density is very low.
Approved Stockpile Access Only				
ML106 STP106B	Cleared	4.4602	Cleared for mining	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of retrogressive, stagnant and arrested successions. However, small pockets of reconstructive successions can be seen in the southern section of the site. Red crab density is low.

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
ML110 STP 20KA (eastern portion only)	4, 6	1.5836	Crab burrows present. Medium density with a maximum height of 18m. Completely degraded to good blend of weed and native vegetation including: Ferns fields, Leucaena leucocephala; Dysoxylum gaudichaudianum, Tristiropsis acutangula, Arenga listeri, Planchonella duclita, Pandanus elatus, Pittosporum ferrugineum	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions on the old stockpiles and retrogressive successions in areas bordering the old mine blocks. Arrested successions dominated by ferns can be seen in the Western area of the site. Red crab density is low.
ML110 STP20Q	4, 5	2.6147	Low – medium density, with a maximum height of 16 – 26m. Good to degraded blend of weed and native vegetation including: *Cordia curassavica, Tacoma stans, Leucaena leucocephala, Psidium guajava; Dysoxylum gaudichaudianum, Tristiropsis acutangula, Arenga listeri, Planchonella duclita, Pandanus elatus, Pittosporum ferrugineum, Macaranga tanarius, Guettarda speciosa, Claoxylon indicum.*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of retrogressive and reconstructive successions over much of its area. Retrogressive vegetation occurs predominantly nearer older mining activity and reconstructive vegetation nearer undisturbed forest near the Southern boundary of the site. Red crab density is low.
ML122 F11STP11E	2, 3, 4	2.1988	Vegetation condition ranges from good, low density regrowth with a maximum canopy height of 18m in the east, enhancing to excellent, high density regrowth up to 30m in height towards the west. Dominant native species include *Ehretia javanica, Planchonella duclita, Macaranga tanarius, Arenga listeri, Claoxylon indicum, Dysoxylon gaudichaudianum, Barringtonia racemosa.* Weed species across the eastern two thirds include *Castilla elastica, Leucaena leucocephala* and fern field. No red crabs or crab burrows were recorded.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions closer to the National Park boundary and areas of fernland and retrogressive successions leading towards stagnant succession of weeds and native species and fernlands near the mined out blocks to the east. Red crab density is low.
ML122 F11STP11F	3, 4	1.0917	Good to very good regrowth 22 to 28m in height consisting predominantly of natives *Macaranga tanarius, Dysoxylon* gaudichaudianum, *Pandanus elatus, Ehretia javanica, Claoxylon indicum, Leea angulata, Arenga listeri, Planchonella duclita, Tristiropsis acutangular. Leucaena leucocephala is present in the south of the block.* No crabs or red crab burrows were recorded.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions closer to the National Park boundary and areas of fernland and retrogressive successions leading towards stagnant succession of weeds and native species and fernlands near the mined out blocks to the east. Red crab density is very low.

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
ML122 F11STP11 H	3, 4	1.9988	Good to very good regrowth of medium density between 22 and 28m consisting predominantly of native species *Ehretia javanica, Dysoxylon gaudichaudianum, Pittosporum ferrugineum, Claoxylon indicum, Tristiropsis acutangula, Arenga listeri, Pandanus elatus, Barringtonia racemosa and Planchonella duclita. Castilla elastica and Leucaena leucocephala also present.* Red crabs and crab burrows were identified only in the easternmost portion of the block.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions along the bottom edges of the stockpiles. Slower growing forest systems are developing on the top of the stockpiled material and retrogressive successions leading towards stagnant succession of weeds and native species and fernlands near the mined out blocks to the South, East and Northern boundaries of the site. Red crab density is low.
ML139 STP25G	6	3.0241	Low density with an average height of 5m. Completely degraded blend of weed and native vegetation species including: Fern fields, *Leucaena leucocephala; Ficus microcarpa, Macaranga tanarius, Guettarda speciosa, Dysoxylum gaudichaudianum.* No crabs or red crab burrows were recorded.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation is predominantly an arrested succession of fern species with a small section of retrogressive regrowth on the Southern face of the stockpile. Red crab density is very low.
ML139 STP25H	5	2.0961	Low density with an average height of 13m. Completely degraded blend of weed and native vegetation species including: Fern fields, *Leucaena leucocephala, Cordia curassavica; Ficus microcarpa, Macaranga tanarius, Dysoxylum gaudichaudianum, Arenga listeri, Planchonella duclita, Tristiropsis acutangula, Claoxylon indicum.* No crabs or red crab burrows were recorded.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation is predominantly a retrogressive succession of native and exotic species dominated by emergent *Macaranga*. Arrested successions dominated by ferns are seen on the slopes of the stockpile and reconstructive successions can be seen towards the Southern boundary. Red crab density is very low.
Approved for Exploration Only				
ML105 MB1	4* Inferred	0.2288	A single exploration track approximately 3m wide. Ground truthing 2024 not conducted.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions, however in some areas stagnant successions of weed thickets have emerged. Red crab density is very low.

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
ML106 MB5	4, 5, 6	0.4611	Exploration tracks. Vegetation highly variable across both historic fern fields and degraded remnants of *Pittosporum ferrugineum, Tristiropsis acutangula, Pandanus elatus, Arenga listeri, Planchonella duclita, Dysoxylon gaudichaudianum and Psidium guajava, Leucaena leucocephala*. No crabs or red crab burrows were recorded.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of retrogressive successions over much of its area. However, small pockets of reconstructive successions can be seen in areas immediately bordering the small patch of tall forest that was only disturbed by drilling activities. Red crab density is low.
ML106 MB7	4	0.7791	Exploration tracks. Medium density with a maximum height of 26m. Good condition blend of weed and native vegetation including: Leucaena leucocephala Cordia curassavica; Tristiropsis acutangula, Arenga listeri, Pandanus elatus, Ficus microcarpa, Claoxylon indicum. No crabs or red crab burrows were recorded.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation generally exhibits the characteristics of reconstructive successions and areas of fernland and retrogressive successions leading towards stagnant succession of weeds and native species. Red crab density is very low.
ML106 MB8	4	0.5791	Exploration tracks. Red crabs and crab burrows present. Medium density with an average maximum height of 26m. Good condition blend of weed and native vegetation including: *Leucaena leucocephala, Cordia curassavica, Clausena excavata*, Fern fields; *Planchonella duclita, Arenga listeri, Syzygium nervosum, Dysoxylum gaudichaudianum, Pittosporum ferrugineum, Guettarda Speciosa, Tristiropsis acutangula, Cryptocarya nitens, Barringtonia racemosa*	2010: Vegetation status within the nominated area classed as disturbed emergent forest. **Closer to the undisturbed forest on the Western boundary reconstructive successions exist. In areas closer to the mined areas, arrested successions and retrogressive successions are prevalent. Red crab density is low.**
ML106 MB9	4* Inferred	0.0943	Two intersecting exploration tracks. Ground truthing 2024 not conducted, though extrapolating from nearby areas, medium density good condition regrowth dominated by *Pandanus elatus*. Expected to be some red crabs present.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. In areas of least disturbance to the West of the block, reconstructive successions have been successful. However, small pockets of stagnant and retrogressive successions in other areas are evident, particularly along the stockpile edge of the old mining block to the East. Red crab density is low.
ML116 MB3	3, 4, 6* Inferred	0.2314	Exploration tracks not assessed in 2024 ground truthing.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. Arrested

Location	2024 Vegetation Condition Rating/s	Area (ha)	2024 Ground-truthing Assessment	Comments from previous assessment/s
			Covers completely degraded mine/fern field, cleared exploration tracks from 2013 and some more structured vegetation tending towards the National Park boundary.	succession vegetation occurs predominantly nearer older mining activity and reconstructive vegetation nearer undisturbed forest near the Northern boundary of the site. In between these two main vegetation types is a section of stagnant succession vegetation. Red crab density is low.
ML116 MB4	5, 6* Inferred	0.1791	Exploration tracks not assessed in 2024 ground truthing. This area consists largely of historic mine/fern fields.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. Arrested succession vegetation occurs predominantly nearer older mining activity and reconstructive vegetation nearer undisturbed forest near the Western boundary of the site that adjoins the National Park. Retrogressive successions occur in the Eastern area. Red crab density is low.
ML140 MB2	5, 6* Inferred	0.5710	Exploration tracks not assessed in 2024 ground truthing. Largely degraded to completely degraded regrowth, this area has an overlying clearing permit CPS6323/1.	2010: Vegetation status within the nominated area classed as disturbed emergent forest. The vegetation is a mixture of reconstructive, arrested, retrogressive and stagnant successions of native and exotic species. Red crab density is low.

*Area was not directly assessed in 2024 but inferred from surrounding vegetation of a similar condition

Significant Changes to Vegetation

Assessment and comparison against the 2014 Geoscience dataset classifying vegetation into zones was undertaken. No locations were identified as having significant changes to the quality of vegetation against the 2019 amendment, except for where clearing has been undertaken.

Flora of Conservation Significance

Three flora species which occur on Christmas Island are listed as threatened species under the *Environmental Protection and Biodiversity Conservation Act 1999* (Table 6).

No flora species of conservation significance is known to occur within CPS 4506/3.

Minimum boundaries are specified with Condition 10: Flora Management, should any protected flora species be identified in the proposed clearing areas.

Figure 13 through to Figure 20 include the locations of identified priority fauna species neighbouring CPS 4506/3 blocks.

Table 6: Conservation Significant Flora Species

Genus (Family)	Conservation Status (listed under EPBC Act)	Habitat	Description	Distribution
Aspelenium listeri (Aspleniaceae)	CR	Limestone rock crevices in dry, exposed areas	A lithophytic fern with short erect fronds, 3.5 – 9 cm long, which grow in a crown	Christmas Island
Tectaria devexa var. minor (Dryopteridaceae)	EN	Primary rainforest (tall and largely undisturbed), above 80 metres elevation; both in deeper soils and as a lithophyte (on mossy pinnacles at the base of a slope, a wet site).	A small, tufted, terrestrial fern with pale green fronds.	Christmas Island and Sri Lanka.
Pneumatopteris truncata (Thelypteridaceae)	CR	Permanently moist sites in semi-deciduous closed forest.	A large terrestrial fern with an erect rhizome and fronds growing in a crown to 120 cm long. The fronds have aerophores (respiratory structures) at the base of the pinnae.	Fragmented distribution over Asia and Malaysia and two sites on Christmas Island.

***Asplenium listeri* (Christmas Island Spleenwort)**

The Christmas Island Spleenwort occurs in limestone rock crevices in dry, exposed areas on Christmas Island and hence is not associated with proposed clearing sites. The likelihood of Christmas Island Spleenwort being impacted by the proposed clearing is negligible due to an absence of suitable habitat in proposed clearing areas.

Figure 23: Christmas Island Spleenwort (Asplenium listeri[§])

Tectaria devexa var. minor

Tectaria devexa var. minor grows colonially, mainly on the plateau, in primary rainforest (tall and largely undisturbed), above 80 metres elevation; both in deeper soils and as a lithophyte (on mossy pinnacles at the base of a slope, a wet site). Ten populations of Tectaria devexa have been identified at Christmas Island, with the majority of these occurring in the National Park. No known populations of *Tectaria devexa* have been identified at proposed clearing locations from previous surveys or the 2024 ground truthing, though additional risk-based management measures may be proposed to mitigate against the risk of *Tectaria devexa* being disturbed.

Figure 24: Tectaria devexa var. minor

Pneumatopteris truncata

Pneumatopteris truncata is known from two sites at Christmas Island (Hugh's Dale and Blowholes Ravine), and has a specialised habitat associated with groundwater seepage (Reddell et al, 2020). Neither location is within or close to the proposed clearing areas, which all occur within regrowth closed canopy evergreen forest, excepting one site which is on the boundary of evergreen and semi-deciduous forest. *Pneumatopteris truncata* grows in permanently moist sites in semi-deciduous closed forest. Due to the small number of known populations, its habitat requirements are not known. The likelihood of *Pneumatopteris truncata* being impacted

by the proposed clearing is negligible due to the proposed clearing areas occurring on the plateau in mining regrowth.

Figure 25: Pneumatopteris truncate

Fauna and Habitat

EPBC Act listed species, red crabs and robber crabs were identified as those prioritised for assessment of potential impact. Evidence which was used to identify potential habitats included assessment against known breeding habitats and locations, and preferred habitats. This was compared against findings from the original application. In addition, whilst conducting the flora surveys, the areas were also surveyed for evidence of fauna habitat, particularly Abbotts's Booby. No locations were identified as being affected by the proposed clearing areas.

Fauna of Conservation Significance

A desktop assessment of the likelihood of EPBC listed fauna species occurring in the permit areas, either resident or transient, was made on the basis of their breeding ecology, habitat preferences and known location records held by Parks Australia, and consultants who have previously conducted surveys for clearing permits including Range to Reef Environmental and JBS&G. An assessment of the impact of the proposed clearing has been made against the clearing principles later in this report, together with other notes on impact and proposed mitigation.

Likelihood of presence of conservation significant fauna species within proposed clearing areas was assessed and the potential for significant impact to the species was examined (Table 7). The assessment suggested that the risk posed to conservation significant species from the proposed mining activity would be low and not significant in the context of species conservation. The general absence of natural habitat and low biodiversity value of the area suggested limited habitat important for the lifecycle of listed species.

The Draft Christmas Island Biodiversity Conservation Plan (2014) lists five criteria for determining the significance of fauna on the island and identified 27 species as significant. For the purposes of the plan, a significant species was defined as a native terrestrial species which meets one or more of the following criteria:

- A species listed (or under consideration for listing) as threatened under the EPBC Act,
- A species with an important or 'keystone' role in maintaining the island's ecology or which characterises a significant ecosystem,
- Species which are of conservation concern (those which have a substantial decline on Christmas Island) but not listed as threatened,

- An endemic vertebrate, and/ or
- A species of international conservation significance with strong community support for its conservation

EPBC Act listed species, red crabs and robber crabs were identified as those prioritised for assessment of potential impact. Evidence which was used to identify potential habitats included assessment against known breeding habitats and locations, and preferred habitats. This was compared against findings from the original application. In addition, whilst conducting the ground truthing assessments, the areas were also assessed for evidence of fauna habitat, particularly Abbotts's Booby. No locations were identified as being affected by the proposed clearing areas.

Table 7: Fauna of Conservation Significance

Species	Status	Description	Distribution & Habitat	Likelihood of Occurrence
BIRDS				
Papasula abbotti Abbotts Booby	EN	A large sea bird about 80 cm from beak to tail, with off-white plumage; black panda-like eye patches; black wings, flank marks and tails; and black outer ends to its blue webbed feet. Males have pale grey bills, tipped black and females have black-tipped pink bills (Pizzey & Knight 1997). Abbotts Booby is a marine species which spends much of its time at sea but needs to come ashore to breed.	Endemic to Christmas Island. Most nests for this species are situated in the tall rainforest on the central and western areas of the Island (Department of National Parks, 2016). Nest sites for Abbott's Booby have been mapped in previous island wide surveys (conducted by Parks Australia), and ground truthing activities have noted any potential or actual Abbott's Booby nest locations. No sites containing Abbott's Booby nests were identified in the CPS 4506 2024 ground truthing, however historic (2015) Parks Australia data has identified Abbotts Booby nesting sites in blocks ML125-STP10H, ML125-STP10C, ML125-STP10D, and ML125-STP10E. The historic data also identified Abbott's Booby nesting sites outside of blocks predominantly in the central and north-west areas of the island. These areas are unlikely to be impacted as no clearing of primary rainforest is proposed it is unlikely that the Abbott's Booby will be present in areas to be cleared.	Possible; however critical nesting habitat unlikely to be impacted
Chalcophaps indica natalis Christmas Island Emerald Dove	EN	A small pigeon about 23 to 26 cm long, with a mass of about 80 to 135 g. It is mostly purplish-brown or red-brown with iridescent dark-green wings, dark brown irises, an orange bill (with a darker base) and red or purple-red legs and feet. The male differs from the female in having a grey crown, white forehead, white stripe above each eye, narrow white line across each shoulder, and dark grey (rather than red-brown) lower back, rump and tail (Department of the Environment, 2014).	Whilst endemic and confined to Christmas Island, this species is widespread and common in areas of rainforest (Director of National Parks, 2014b). It is estimated that more than 60% of the population occurs within the boundaries of the National Park. It is most common in tall, closed evergreen rainforest and open semi-deciduous rainforest, especially on the terraces that surround the central plateau of the island. The dove is also regularly observed in deciduous scrub, disturbed vegetation such as thickets of weeds and secondary regrowth (including areas dominated by *Muntingia calabura*), settled areas (on lawns, in gardens and around houses), and on forest tracks (Department of the Environment, 2014). It is likely that the Christmas Island Emerald Dove will be present in areas proposed for clearing, however, the species is highly mobile, capable of	Likely; however highly mobile and critical nesting habitat unlikely to be impacted

Species	Status	Description	Distribution & Habitat	Likelihood of Occurrence
			relocating during the clearing process. With better than 60% of the population estimated to be within the National Park, the proposed clearing is not considered a significant threat to the species.	
Fregata andrewsi Christmas Island frigatebird	EN	A very large seabird with a mainly black body, a glossy green sheen to the feathers of its head and back, and varying patches of white on the underbody. It has slender, long wings, a deeply forked tail and a long bill with a hooked tip. Its legs are dull pink, and its feet are black above with pale soles. Adult males have a large, red gular (throat) pouch which can be inflated (Department of the Environment, 2014).	Endemic to Christmas Island but known to fly vast distances to feed and can be seen in Indonesia. Christmas Island is, however, the only place in the world where they breed (Department of National Parks, 2016). Breeding colonies are currently confined to the terrace forests of Christmas Island. The three recorded breeding colonies are known as the Golf Course, Cemetery and Margaret Beaches colonies. Tree species used for nesting include Beach Almond (*Terminalia catappa*), Stinkwood (*Celtis timorensis*), Strangler Fig (*Ficus* sp.), Propeller tree (*Gyrocarpus americanis*) and Pongamia (*Pongamia pinnata*). Multiple pairs will nest in the same tree, sometimes less than 1 m apart. These tree species occur right around the island, and yet the species nests only in a small area of the island (DCCEEW, 2024a). It is unlikely that the Christmas Island Frigatebird will be present in areas proposed for clearing.	Unlikely
Accipiter hiogaster natalis Christmas Island Goshawk	EN	A large hawk with a dark grey head and upperparts, mostly rufous underparts with fine and sometimes almost imperceptible white barring, yellow irises, yellow eyelids, greenish-yellow cere, yellow legs and feet and black talons. Females are larger than males and the throat of the female has a rufous-brown wash while the throat of the male is white with grey spots. Adults weigh from 200-490 g and are around 40 cm length. The Christmas Island Goshawk feeds on large insects, small birds, mammals and reptiles (Department of the Environment, 2014).	Whilst confined to Christmas Island, this species is widespread and has been recorded in all major island habitats from primary and marginal rainforests to areas of regrowth vegetation (Hill, 2004b). The Christmas Island Goshawk is an endemic, territorial resident of Christmas Island. It occurs in all forest types on the island, but is commonly seen in secondary forest, settlements or rehabilitated habitat. The Christmas Island Goshawk nests in tall trees in forest patches of more than 1.5 ha. Its nest sites are often near cleared land, possibly because these sites provide better visibility and access to food (Department of the Environment, 2014). Primary and Marginal Rainforest have been identified as critical habitat for the species and it is understood that regrowth vegetation may also be critical habitat for the species, though the quality of regrowth necessary has not yet been identified (Hill, 2004).	Likely; however critical nesting habitat unlikely to be impacted

Species	Status	Description	Distribution & Habitat	Likelihood of Occurrence
			It is likely that the Christmas Island Goshawk may be present in areas proposed for clearing but these areas are not used as nesting habitat.	
Ninox natalis Christmas Island Hawk-Owl	VU	A small owl about the size of a common pigeon (26 to 29 cm and weighing approximately 140 to 210 g) but with a barred breast. It has an unmistakeable boo-book call. There is little difference in size between males and females with females being only slightly larger than the male. The Hawk-Owl feeds mainly on large insects and sometimes on small vertebrates. It is nocturnal, feeding mainly in the understorey of primary forest, or in secondary vegetation along roadsides (Department of the Environment, 2014).	This species is confined to Christmas Island and occupies permanent territories in all forest types on the island, with highest densities in primary forest and lowest in post-mining regrowth. Breeding does not occur in secondary growth because trees there are not old enough to have developed hollows. Habitat critical to the survival of the Christmas Island Hawk-Owl is defined as Primary and Marginal rainforest, and secondary growth rainforest that provide suitable hollows. Suitable secondary growth forest has not been identified (Hill, 2004). It is likely that the Christmas Island Hawk-Owl will forage in areas proposed for clearing but these areas are not used as nesting habitat due to the predominance of secondary growth.	Possible; however individuals and roosting habitat unlikely to be affected
Turdus poliocephalus erythropleurus Christmas Island Thrush	EN	A subspecies of Island Thrush, 21 to 22 cm long, with a mass of 44 to 68 g. It has brown to dark-grey upperparts, a white chin and throat, a grey brown to grey breast, dull orange flanks, and a belly that is dull orange on the sides and white in the centre. It has dark brown irises, a prominent ring of yellow to orange-yellow skin around each eye, a yellow to orange bill, and yellow to orange-yellow legs and feet (Department of the Environment, 2014).	Whilst endemic and confined to Christmas Island, this species is widespread across the island (Director of National Parks, 2014b). This Thrush is common in most habitats on Christmas Island, including tall, closed evergreen rainforest, open semi-deciduous rainforest, secondary regrowth, thickets of weeds and semi-deciduous vines, settled areas (where it forages on lawns and nests on buildings), and on the Christmas Island golf course. It is most common in the evergreen rainforest and open rainforest on the coastal and higher terraces and plateau of Christmas Island. It is least common in disturbed habitats (such as urban areas, regrowth and post-mining wasteland) and in suboptimal endemic vegetation such as thickets of §Pandanus and patches of low vegetation in coastal areas (Department of Environment, 2014). No habitat has been identified as critical to the subspecies (Director of National Parks, 2014). It is likely that the Christmas Island Thrush will be present in areas proposed for clearing as it is a habitat generalist, but the species is highly mobile and will self-relocate during any clearing activities and re-establish in the disturbed habitat.	Likely; however highly mobile

Species	Status	Description	Distribution & Habitat	Likelihood of Occurrence
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird	EN	The white-tailed tropicbird (Christmas Island) is a medium-sized, whitish seabird with long central tail-feathers ('streamers'), a yellow bill and black wing-bars on its upper wings. It is distinguished from the white-tailed tropicbird (Indian Ocean) by having a golden or apricot wash to its white plumage (Pizzey & Knight 1997; Dunlop et al., 2001). However, there is considerable variation in the extent and intensity of colour (Department of the Environment, 2014). The Golden Bosun has been regarded as a subspecies of the White-tailed tropicbird, however one that is confined to Christmas Island. There has been an observed/ inferred and projected decline in numbers (DCCEEW,	Widely distributed across the island (Christmas Island National Park, 2013) and roosts and forages over the Indian Ocean. Both adults and juveniles appear to disperse widely across Christmas Island (Marchant & Higgins, 1990). It can utilise a range of nest-sites, including hollows in rainforest trees and crevices on rock faces, cliffs and quarries (Dunlop et al., 1988b). Potential nest sites are plentiful, the species is adaptable to new nest sites, and some breeding appears to occur across most parts of Christmas Island (Dunlop et al., 1988b). No habitat has been identified as critical to the subspecies (Director of National Parks, 2014). This endemic species has been found using nest boxes installed for the Christmas Island Hawk-owl as part of a collaboration between Christmas Island Phosphates and Christmas Island District High School (pers. comm. Andrew Hill). There has been an observed/ inferred and projected decline in numbers (DCCEEW, 2023b) however the rate and cause of decline has yet to be established. Feral cat and rat predation is presumed to be a significant contributor. It is possible that this bird will be present in areas proposed for clearing as it is a habitat generalist but the species is highly mobile and will self-relocate during any clearing activities, and re-establish in the disturbed habitat.	Possible; however critical breeding habitat unlikely to be impacted
Phaethon rubricauda westralis Red-tailed Tropicbird, Indian Ocean Red-Tailed Tropicbird,	EN	The Red-tailed tropicbird is a medium-sized seabird with a body length of around 100cm, with a wingspan of around 115 cm, and weight between 600g to 1kg (Marchant & Higgins 1990; Menkhorst et al. 2017). Adult birds are mainly white with a bright red beak and long red tail streamers. The only dark markings are a short black eye-stripe with comma-like hook; dark outer primary feathershafts can also be observed, mostly when birds are in flight. Both sexes have similar plumage and show no seasonal variation. Juveniles are heavily barred and scaled with black across most of their upper	Christmas Island contains one of the largest breeding populations in Australia. Cat and rat predation on the island are considered the source behind the significant decline in the Silver Bosunbird population (DCCEEW, 2023a). This bird lays a single, pink egg and prefers bare ground nesting sites on the island including rock crevices, and under vegetation on coastal cliffs (R Willacy et al. 2021).	Unlikely

Species	Status	Description	Distribution & Habitat	Likelihood of Occurrence
		parts, lack tail streamers, and have a black beak (DEECC, 2023)		
MAMMALS				
Crocidura attenuata trichura Christmas Island Shrew	CR	The Christmas Island shrew is a small insectivorous mammal that varies from light-brown or reddish-brown to dark-slate grey in colouration, and weighs 4.5–6 g (Schulz, 2004). All members of the Crocidura genus are small, with a head and body length of 40–180 mm and tail length of 40–110 mm, and a distinctly pointed muzzle (Schulz, 2004)	Listed as Critically Endangered but its current distribution on island is unknown. The last two individuals were captured in 1984 and 1985 (Woinarski *et al.* 2014). The most recent records (in 1984 and 1985) are of single individuals from tall plateau rainforest in deep soils (Tranter pers. comm., cited in Schulz 2004) and terrace rainforest with shallow soils (Goh pers. comm., cited in Schulz 2004), with one recorded from a fallen bird's nest fern (Meek 2000). The majority of remaining primary plateau and terrace rainforest (about 75 percent of the original native rainforest vegetation remains), including the locations of the 1984 and 1985 sightings, is now protected within the Christmas Island National Park (Woinarski et al. 2014; Director of National Parks, 2014). It is unknown whether the shrew occurs in post-mined secondary regrowth, and there are no records from areas of human habitation on the island.	Unlikely
Pipistrellus murrayi Christmas Island Pipistrelle	EX	-	-	N/A
Pteropus melanotus natalis Christmas Island Flying Fox	CR	The Christmas Island Flying Fox is small compared to most Australian Pteropus species, weighing on average 350 g when fully grown (Department of the Environment, 2014). The subspecies is described as having uniformly long, black fur, giving a 'chubby' appearance. A faint reddish collar of fur exists on some individuals. The subspecies forages during the day as well as at night (Department of the Environment, 2014).	The Christmas Island Flying Fox is endemic to Christmas Island with three known breeding colonies (DCCEEWe. 2024) The entire island is used for foraging, with suitable fruit and nectar being found in most vegetation types including rainforests, residential gardens, and post-mine revegetation. They disperse seeds and pollen as they go, making them an important part of the rainforest system (Parks Australia, 2024). All recorded roosts have been located on the coastal terrace or around the first land cliff and semi-deciduous forest. All previously uncleared vegetation is considered critical foraging habitat. Mined areas are not considered critical habitat for this species.	Possible; however individuals and roosting habitat unlikely to be affected

Species	Status	Description	Distribution & Habitat	Likelihood of Occurrence
			It is possible that the Christmas Island Flying Fox will be present in areas proposed for clearing but these areas are not known roost sites.	
Rattus macleari Maclear's rat	EX	-	-	N/A
Rattus nativitatis Bulldog rat	EX	-	-	N/A
REPTILES				
Ramphotyphlops exocoetid Christmas Island Blind Snake	VU	A brown snake growing to 35 cm, with a pale brown belly, rounded snout, scales in 20 rows at mid-body and an oval scale at the tip of the snout (Department of the Environment, 2014). The Christmas Island Blind Snake almost certainly preys on the eggs, larvae and pupae of ants and termites.	The Christmas Island Blind Snake is endemic to Christmas Island. The few records with information on locality or habitat suggest that this species occurs primarily where the deeper soils and primary rainforests occur on the island's central plateau. The Christmas Island Blind Snake is a fossorial snake found in the sub-surface soil and surface litter of the forest floor. It is usually active on the surface only at night (Cogger, 2006). No specimens have been found since 2009, and it is assumed that the species occurs only in parts of the island where dense vegetation is abundant (DCCEEWd. 2024) so it is considered unlikely that the species will occur in proposed clearing areas.	Unlikely
Lepidodactylus listeri Lister's Gecko	EW	A brown reptile growing to 5 cm with a broad, pale fawn/grey vertebral stripe which expands to cover the top of the head and matches the colour and pattern of the tail, scattered darker-brown flecks/blotches on the back, whitish belly and body covered with small, smooth scales. Eats a broad spectrum of small invertebrates, with termites, small beetles, bugs and slaters predominating (Department of the Environment, 2014).	Endemic to Christmas Island where it was previously found to have been most abundant on the plateau area in primary rainforest (Cogger, 2006). Lister's Gecko is considered extinct in the wild (Parks Australia, 2024) so it is unlikely that the species will occur in proposed clearing areas.	Would Not Occur
Cyrtodactylus sadleiri Giant Gecko	EN	A large gecko, around 8-10 cm from head to vent, with an average body weight of 15 g. The species is dark grey, brown or blackish in colour, flecked with a mixture of darker and lighter patches, with obscure paler bands	The giant gecko is endemic to Christmas Island and is likely to occur in small populations scattered across the Island, occurring in all habitats except areas lacking in tree or shrub cover (Cogger, et al., 1983; TSSC, 2013).	Possible; however highly mobile

Species	Status	Description	Distribution & Habitat	Likelihood of Occurrence
		across the dorsal side. It has a long slender tail with alternating cream and grey-brown bands (Director of National Parks, 2012a). The Giant Gecko is a nocturnal predator of small invertebrates. (Threatened Species Scientific Committee, 2013).	Found in all island habitats, except for areas lacking trees and shrubs, including formerly mined areas with dense regrowth. Evergreen, tall, closed forest is considered critical habitat for this species (Director of National Parks, 2014). Numbers of Giant Geckos recorded during targeted surveys have markedly declined due to predation from wolf snakes, giant centipedes, and rats. Given that the species utilises revegetated mining areas, and there has previously been three sightings within these areas (one record captured by Range to Reef in 2017 in block 122-STP11K, and two adjacent records from Parks 2011 Island Wide Survey in block 125-STP10C) it is considered possible that the species may be present in areas proposed for clearing.	
Emoia natitivitatis Christmas Island Forest Skink	EX	-	-	N/A
INVERTEBRATES - CRUSTACEANS				
Gecarcoidea natalis Red Crab	N/A	A land crab with distinctive red colouring and an adult carapace measuring up to 11.6 cm across. Males are larger than females, but females have a much broader abdomen and usually have smaller claws than males. Red crabs are diurnal, and their diet consists mainly of fallen leaves, fruits, flowers and seedlings. They are not solely vegetarian and will eat other dead crabs, birds, the introduced Giant African Snail and palatable human refuse (Department of the Environment, 2014).	Endemic to Christmas Island, the red crab is abundant across most parts of the island and critical to the ecology of the island (Director of National Parks, 2014). They are a keystone species in the forest ecology, influencing the structure and function of the rainforest where the majority of them live. They selectively consume seeds, seedlings and leaf litter, turning over the soil and spreading seeds by burrowing, and fertilising soil with their droppings (Department of the Environment, 2014). Habitat critical to their survival occurs throughout the whole island (Director of National Parks, 2014). It is likely that some Red Crab will be present in areas proposed for clearing.	Likely; however, the crab burrow density in these areas is less than in the high density coastal terraces (Parks Australia 2023 Crab Burrow Density).
Birgus latro Robber Crab, Coconut Crab	N/A	The largest terrestrial crustacean in the world with a weight of up to 4 kg and a leg span up to 1 m. The robber crab is related to the hermit crab but does not carry a shell. They are semi-nomadic and omnivorous, feeding on fruit, coconut, carrion and other crabs, including the Red Crab (Krieger et al., 2012).	This crab is abundant but critical to the ecology of the island (Director of National Parks, 2014). Christmas Island has the world's largest and best protected population of the world's biggest land crustacean (Parks Australia 2024). They are found in most parts of the island but are also a keystone species in the forest ecology, influencing the structure and function of the rainforest by	Likely; however, the physical relocation of robber crabs will be suitable mitigation

Species	Status	Description	Distribution & Habitat	Likelihood of Occurrence
			foraging the forest floor, feeding mainly on seeds, fruits and the pith of fallen trees. They also scavenge the carcasses of dead animals. It is likely that the Robber Crab will be present in areas proposed for clearing. The main threat to Robber Crabs are vehicles.	
Discoplax celeste Blue Crab	N/A	A large crab with a deep and rounded carapace with a width of 45 mm or more. Adults are overall blue to bluish white (Ng and Davie, 2012).	Endemic to Christmas Island, with a restricted distribution in perennially wet/moist areas and seepages of the coastal terraces and below, though they may range further during the wet season. The species is of conservation significance because it characterises a significant ecosystem. All spring and wetland areas are considered critical habitat (Director of National Parks, 2014). The species will be absent from proposed clearing areas which are confined to the upper terraces.	Would Not Occur

Heritage

There are no Aboriginal Sites of significance or Native Title Claims over the area however there are sites on the National Heritage List (EPBC Act). Christmas Island has been mined for phosphate since the 1890s and contains a unique collection of structures and sites of heritage significance associated with this mining and blended cultural past.

Under the National Heritage List, comprising of natural and historical places, nine sites were identified on Christmas Island for its outstanding heritage significance to the Australian nation (DoE, 2004a, b, c, d, e, f, g, h, i). Three of which are located within PRL lease areas (Figure 26).

- Drumsite Industrial Area,
- Industrial and Administrative Group (Phosphate Rock Storage Bins, Phosphate Dust Storage Building and Downhill Conveyor System (from Drumsite to Dry Storage Bins), and Phosphate Loading Cantilevers), and
- Phosphate Hill Historic Area (Phosphate Hill Mine Workings).

National heritage sites are protected and thus would require approval for an action that will or is likely to have a significant impact on matters of National Environmental Significance (NES). **There are no heritage places within CPS 4506/3.**

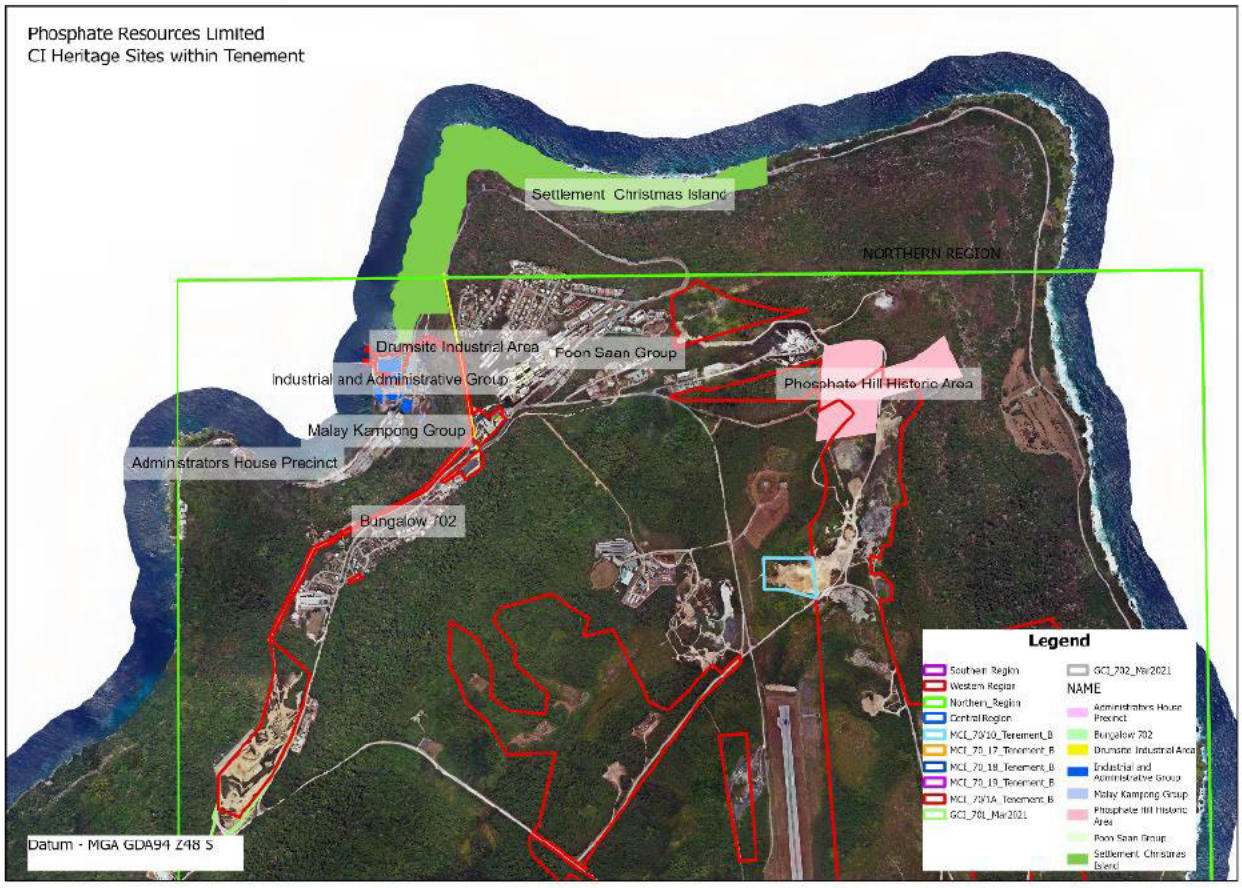

Figure 26: National Heritage List sites

Environmental Management

Clearing Activities

Key management commitments from the Christmas Island Phosphate Environmental Management Plan 2024 – 2029 (ENV-Plan-001) which will reduce the impact of clearing upon the biodiversity values of the island are listed below:

- Undertake works in accordance with procedure ENV-SOP-002: Vegetation Clearing Procedure.
- Ensure a Mine Works Clearing Permit is completed, and any restrictions/conditions highlighted and understood by all involved prior to starting any clearing activities.
- Comply with all conditions of clearing permits.
- Provide an annual report to DWER for clearing permits in accordance with permit conditions.
- Undertake mine site planning for all clearing operations to identify potential erosion potential and mitigation strategies in liaison with neighbouring land managers (where applicable).
- Ensure appropriate pre-clearing assessment and flagging is undertaken to identify areas to be cleared, boundaries of National Park and other areas to be protected (heritage and/or rainforest areas). CIP will include standard Buffer Zones in all areas to be cleared (against roadway and site boundaries) and will comply with any additional buffer zones as imposed by the Permit Conditions.
- Utilise an appropriate onsite audit and reporting program for mine site operations to thoroughly risk assess sites prior to clearing and assess compliance with clearing conditions and boundary impacts to surrounding vegetation and habitats.
- Identify any primary habitat within MCI 70/1A and ensure appropriate management of mining activities to protect these areas.
- Ensure no primary rainforest within MCI 70/1A is disturbed or cleared; and minimise the amount of native vegetation to cleared.

The 2019 decision approving CPS 4506/3 noted the proposed clearing areas may impact on the pipistrelle bat (*Pipistrellus murrayi*) and red crab (*Geocarcoidea natalis*) habitat, and indirectly impact the Abbott's booby (*Papasula abbotti*), and specified conditions to mitigate this are noted in the Fauna Management sections below.

It should be noted that the Christmas Island Pipistrelle Bat which was listed as 'possibly become extinct' in earlier applications was transferred from the Critically Endangered category to Extinct in 2021 (Amendments to the EPBC Act list of threatened species - March 2021, DCCEEW, 2021) and CIP request to remove Condition 8(a) relating to the Pipistrelle from this amendment.

Specific Conditions including Buffers and Restricted Periods

Specific conditions are those which require the permit holder (CIP) to comply with specific measures which are used as an instrument to prevent, control, abate, or mitigate environmental harm. Within CPS 4506/3 Part II – Assessment Sequence and Management Procedures contains several site-specific conditions which impact a selection or all blocks at various times.

Buffers are required specified within CPS 4506/3 Condition 7(c) "Avoid, minimise and reduce the impacts of clearing", which requires that CIP (the 'Permit Holder') "reduce the impact of clearing on any environmental value"

i. Maintain a 5 metre buffer of vegetation for visual amenity purposes alongside gazetted roads; and
ii. Maintain a 5 metre buffer of vegetation for visual amenity purposes alongside Margaret Knoll access track.

Restrictions on the timing of vegetation clearance are specified within Condition 8 “Fauna Management” and include Condition 8(b) and 8(c) as below:

- “The Permit Holder shall ensure clearing of native vegetation within Plan 4506/3(d) is prohibited between March and October, the nesting period of Abbott’s Booby (*Papasula abbotti*);
- Within the mining lease areas listed below, the Permit Holder shall not clear vegetation between May and September:
  i. ML136; and
  ii. ML132.”

CIP have made improvements to ensure compliance with all required conditions including enforcing restricted periods and applying buffers. This includes applying expanded measures to ensure the specific conditions are compiled with such as:

- Thoroughly checking any requirements as per clearing permit prior to undertaking any clearing/ boundary marking e.g. restrictions in clearing dates due to Abbott’s Booby nesting seasons, or specific buffers required for blocks/ block boundaries such as the 5m vegetation buffer required alongside Margaret Knoll access track.
- Ensuring restricted clearing periods are included in mine works permit planning.
- Creating the buffer according to CPS requirements, then adding an additional buffer of 5-7m where identified as required (risk-based approach - depending on site layout/ issues).
- Ensuring when marking with survey tags if under dense canopy to improve GPS accuracy, the survey tags are moved further into the known boundary to avoid inadvertent GPS communication errors.
- Creating a map of roughly tagged area for Mine Works Permit (MWP).
- Preclearing meeting with Mining & Haulage (M&H) operator to run through details of mark up and any potential complications.
- For any sections or fields that are not safe to walk preclearing, a live clearing method is implemented where the surveyor is on site during the clearing to guide operators, ensuring they stay well within any boundaries and slowly working towards buffer.

Flora Management

Flora management conditions specified within CPS 4506/3 include:

- Condition 10: CIP (the ‘Permit Holder’) shall identify the following listed flora species and shall maintain a buffer around each species in accordance with *Table 1* of CPS 4506/3 (below).

Species	Buffer
▪ All species listed as a “Protected Species” in accordance with the *Environmental Protection and Biodiversity Conservation Regulations 2000*, Schedule 12.	▪ 50m
▪ *Asplenium listeri* ▪ Christmas Island Spleenwort ▪ *EPBC listed (CE)	▪ 10m
▪ *Pneumatopteris truncate* ▪ Fern ▪ *EPBC listed (CE)	▪ 30m
▪ *Tectaria devexa* ▪ *EPBC listed (E)	▪ 50m

In addition, CIP commit to the following assurances for flora management:

- Undertake appropriate assessments in clearing permit approvals processes to ensure no threatened flora species are located within proposed mining areas.
- Risk-based pre-clearing ground truthing will be undertaken where identified as required.
- Should threatened species be identified, CIP will contact DCCEEW & Parks Australia to determine appropriate measures to protect the populations located.

Fauna Management

Fauna management conditions specified within CPS 4506/3 include:

- Condition 8(a): regarding the Pipistrelle Bat Management Plan, which is requested to be removed from the permit in this renewal/amendment due to the Pipistrelle's change in listing from "Critically Endangered" to "Extinct" in 2021 (Amendments to the EPBC Act list of threatened species - March 2021, DCCEEW, 2021).
- Condition 8(b): The Permit Holder shall ensure clearing of native vegetation within Plan 4506/d is prohibited between March and October, the nesting period of Abbott's Booby (*Papasula abbotti*)(Abbotts Booby) (EN):
- Condition 8(c): Within the mining lease areas listed below, the Permit Holder shall not clear vegetation between May and September:
    i. ML136; and
    ii. ML132

In addition, CIP commit to the following assurances for fauna management:

Red Crabs

- Liaise with Parks Australia to determine the most appropriate timing of clearing to minimise impacts on the Red Crab population.
- Haul routes prior to migration are discussed with Parks Australia, both in formal and informal communications. Crab migration routes are dynamic to an extent i.e. road crossing points may vary. Where required we manage the routes around crab migration i.e. certain routes being used over others.

Robber Crabs

- Relocate Robber Crabs from clearing areas for mining operations.

Abbott's Booby

- Assess potential impacts on Abbott's Booby and other threatened species in the clearing permit approval process to ensure no significant impacts on habitat or abundance due to clearing.
- Conduct risk-based pre-clearing ground truthing; with particular care paid prior to clearing the sites identified previously as being adjacent to or nearby known Abbott's Booby nesting areas; this may include the use of aerial drone footage where nests have previously been identified in the surrounding areas.
- If an aerial footage survey identifies a suspected Abbott's Booby nest DCCEEW/Parks will be contacted prior to any clearing works taking place.
- Ensure all minimum buffers and boundaries, and restricted periods, are enforced utilising the Mines Works Permit process.

Red Footed Booby

- Condition 8(c) is enlisted to avoid, minimise and reduce the impacts on the Red Footed Booby (and the Greater Frigate Bird) by prohibiting clearing of vegetation in ML132 and ML136 within their nesting season between May – September.
- Undertake a risk-based approach incorporating the use of aerial surveys prior to clearing in areas where the Red Footed Booby has previously been identified (ML100-EastMB5, and ML133A-STP9B) and prohibit clearing until the end of nesting season in October where required.

- Ensure all minimum buffers and boundaries, and restricted periods, are enforced utilising the Mines Works Permit process.

Christmas Island Giant Gecko

- Unless an alternative is agreed by Parks Australia or a suitably qualified specialist, CIP suggest the following for 133A-STP9B and 100EASTMB5:
  When clearing suitable habitat within 100 metres of a known giant gecko location the Permit Holder shall search, capture and relocate giant geckos from the area to be cleared, in accordance with:
  a) staff are to traverse the area, spaced 10 metres apart or an appropriate distance with consideration of the vegetation present and search for giant geckos;
  b) all sightings of giant geckos are to be recorded using a Global Positioning System (GPS), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
  c) where practical capture by hand, any giant gecko observed within the area to be cleared;
  d) place captured giant geckos individually into linen bags;
  e) release captured giant geckos 50 metres outside of the area to be cleared within similar habitat to the capture site;
  f) release individuals within 60 minutes of capture; and
  g) giant gecko capture and release activities are to occur the night immediately prior to clearing.

Weed Management

Weed management conditions specified within CPS 4506/3 include:

- Condition 9(a): When undertaking any clearing, or other activity pursuant to this permit, CIP (as the Permit Holder) must take the following steps to minimise the risk of the introduction and spread of weeds:
  i. Clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
  ii. Ensure that no weed-affected mulch, fill or other material is bought into the area to be cleared; and
  iii. Restrict the movement of machines and other vehicles to the limits of the areas to be cleared.
- Condition 9(b): Weed management activities will be undertaken by the Permit Holder in accordance with commitments in the Environmental Management Plan as approved by the Minister for Territories Department of Infrastructure, Regional Development and Cities.

CIP commits to the following under the Environmental Management Plan (EMP):

- Undertaking weed management in accordance with the Weed Management Plan (ENV-Plan-003).
- Undertaking weed control on Priority Species based on meeting regulatory requirements, minimising the establishment of new weed populations, and protecting natural vegetation and conservation areas from invasion by Priority weed species.
- Complying with all Mine Works Permit (MWP) conditions during clearing. These are:
  - Clean earth- moving machinery of soil and vegetation prior to entering and leaving the area to be cleared
  - Ensure that no weed-affected mulch, fill, or other material is bought into the area to be cleared
  - Restrict the movement of machines and other vehicles to the limits of the areas to be cleared
- Working collaboratively with Island partners to address pest species management of priority Island wide weed species.
- Providing training and awareness programs for the workforce on weed and pest identification, reporting and management.

Ten Clearing Principals

An assessment carried out against the ten clearing principles provided under Part V Division 2 of the EP Act is shown in Table 8.

Table 8: Assessment of ten clearing principles

Clearing Principle	Is the Proposal at Variance?	Justification for Variance
Principle (A) Native vegetation should not be cleared if it comprises a high level of biological diversity.	Proposal **may be** at variance to Principle (A)	Christmas Island is home to approximately 420 species of vascular plants, including 177 introduced species and 242 species thought to be indigenous to the island. Eighteen species are known to be endemic to Christmas Island, with the other flora being more widely distributed through the Indo-Malayan and Malesian regions, or throughout the tropical Indo-Pacific. No Priority Flora species are listed for Christmas Island. Areas of the island which have not been previously cleared and retain high biodiversity have been reserved as National Park, including the island's two Ramsar wetlands. Areas which have been previously cleared have been allocated to the Shire of Christmas Island for future development, or to Mining Lease for future mining. Vegetation varies at each site/ block, and consists of secondary regrowth forest species including, *Dysoxylum gaudichaudianum, Pandanus elatus, Tristiropsis acutangula, Nephrolepsis biserrata, Barringtonia racemosa, Macaranga tanarius, Claoxylon indicum, Ficus Microcarpa, Planchonella duclita, Guettarda speciosa, Arenga listeri* and weed species including Fern fields, *Leucaena leucocephala, Cordia curassavica, Clausena excavata, Tacoma stans, Mikania micrantha, Guava sp.,* etc. CIP are not permitted to clear primary rainforest under the existing conditions of CPS 4506/3. All areas proposed for clearing have been previously disturbed through clearing and/or mining, though some of these have regrowth vegetation that is up to 40 years old. Condition of regrowth varies, with a number of sites being weed dominated and are not considered to hold high biological diversity. Given that there are no significant habitats or species that are found solely in these areas, and all areas proposed for clearing have been previously cleared, the proposal is not likely to be at variance to this principle, however may be at variance for ML100-EastMB5, ML102-STP13B, and ML122-STP11E which recorded vegetation condition scores of 2 (Excellent) for parts of the block.
Principle (B) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for	Proposal **may be** at variance to Principle (B)	Christmas Island provides habitat for several fauna indigenous to the island including 14 native bird species and nine species of seabird which use the island for breeding. Three seabird taxa and nine land bird taxa are endemic to the island. A further 104 migratory or vagrant bird species have been recorded on the island. Eight of the island's endemic birds are listed as threatened under the EPBC Act 1999 (DCCEEW, 2024).

Clearing Principle	Is the Proposal at Variance?	Justification for Variance
the maintenance of, a significant habitat for fauna.		Five endemic native mammals were historically recorded on Christmas Island with only one, the Christmas Island flying-fox, now known to remain. Christmas Island has six species of native terrestrial reptiles, five of them endemic. Mammal and reptile species indigenous to the island have undergone a catastrophic decline since human settlement, largely because of the introduction of invasive species. Crustaceans are the most conspicuous invertebrate fauna of Christmas Island, with the island supporting over 20 terrestrial and intertidal crab species of which 14 are regarded as true land crabs, depending on the ocean only for their larval development. Three land-crab species have been identified as conservation significant: the Red Crab, Blue Crab and Robber Crab. Blue Crabs have a restricted distribution and do not occur within the areas proposed for clearing. Red crabs are common throughout the island and are a keystone species in the island's ecology. Robber crabs have a wide distribution across many Indian and Pacific oceanic islands. Although abundant on Christmas Island their exact conservation status is unknown. Robber crabs are present in proposed clearing areas in much lower numbers than red crabs. Key considerations in assessing impacts include: • The majority of the Island's forest has never been cleared and is securely held in National Park. This provides high quality virgin forest habitat for the Island's fauna. • In comparison, the areas proposed to be cleared have all been cleared previously for mining and in some cases, landforms have been significantly modified. The vegetation is a mix of weed dominated shrublands, ferns and regrowth. Whilst these vegetation types will provide habitat for some species, they are depauperate compared to the uncleared primary forests and have much lower fauna values than the primary forests. • There are several species (e.g. the Christmas Island thrush) which, although listed as threatened species under the EPBC Act due to their endemic status, are found across the whole Island, are common and habitat generalist who recolonise disturbed areas. Whilst there is potential for these species to be in the proposed clearing areas, the small, localised clearing is unlikely to have significant impacts for these species and the risk of species impact is very low.

Clearing Principle	Is the Proposal at Variance?	Justification for Variance
		• The Island fauna species that are of particular conservation concern due to low population numbers or special risks include the Abbott's booby, and other listed species. While there have been historic records of Abbott's in some blocks, no sightings were made in the 2024 ground truthing assessments. • There are no unique or significant fauna habitats found on the proposed clearing sites. • There are no fauna species that rely solely upon habitat in areas proposed to be cleared. • The sizes of the individual clearing areas are small areas (0.0943 to 16.6410 ha of primarily weed dominated regrowth, with 75% of sites <3.8ha) compared to the habitat that remains (>10,000 ha of primary forest). Much of the remaining primary forest (~7,500 ha of primary forest) is securely protected in national park. The species of conservation significance thought to be at greatest risk of impact from the proposed clearing are the Abbott's Booby and the Red Crab. Red Crab Assessment: • Red crabs are ubiquitous and common, estimated to number between >100 million and their preferred habitat is in undisturbed rainforest, most of which is protected in the Christmas Island National Park. The density of red crab burrows within the proposal area is relatively low. It is not possible to undertake clearing without some localised, albeit small, impact. The key consideration is that any impacts will be minor compared to the large and well protected existing population and following rehabilitation it would be expected that red crabs would recolonise these areas and they would again become productive red crab habitat. Therefore, any localised impacts on red crabs are likely to be insignificant to the Island population. Abbott's Booby Assessment: • There were no Abbott's Booby nest trees identified within the proposed clearing areas during the 2024 ground truthing. There are existing conditions in CPS4506/3 (Condition 8b)) which imposes clearing restrictions on the area identified in Plan 4506/3(d) • Historic data from 2009 referred to potential Abbott's Booby nests in blocks ML125-STP10H, ML125-STP10C, ML125-STP10D, and ML125-STP10E, which were assessed as part of the 2011 application and no specific conditions were applied. Nesting data from 2015 further

Clearing Principle	Is the Proposal at Variance?	Justification for Variance
		identified potential Abbott's Booby nests within the location of the ML125 blocks, CIP will apply risk-based ground truthing and the ML125 blocks will be subject to an aerial survey by drone. If an Abbott's Booby nest site is identified, appropriate mitigation measures and buffers will be implemented. • Furthermore, there are identified historic Abbott's Booby nest trees in adjoining land areas (within 50m of blocks ML106MB5, ML106STP18C, ML106STP18F, ML106 MB4, ML106STP18C, ML110STP20J, ML110STP20Q, ML122F11STP11J, ML122F11STP11L, Ml125STP10H, ML139STP26A) however indirect impacts with regard to topography, vegetation height and / or prevailing wind conditions, and especially to turbulence created by clearing is considered a low risk (*see below for more detail); and a risk-based assessment approach will be used prior to any clearing in block/s with known adjacent Abbott's Booby nesting sites. Fauna of the island is supported by the surrounding extensive and intact vegetation; therefore, while the clearing is not likely to be at variance to this proposal for most native fauna species, it **may be** at variance to this principle for the Abbott's Booby. The specific risk, however, is considered to be both manageable, and low risk/ low impact. **Hypothesised Turbulence Impacts* Turbulence impacts on Abbott's booby nesting have been hypothesised based on modelling of the hypothetical removal of a primary rainforest. This is based on removal of a natural undisturbed canopy which would be the maximum change and impact due to clearing activities. The impacts due to increased turbulence in adjoining forest areas from the clearing as proposed would not be at this level, as the forest to be cleared is already disturbed and turbulence effects would already have been experienced on the adjoining forest when the site was originally cleared (circa 1970's). The anticipated change in turbulence will vary for different sites as they have different dimensions, different canopy heights and vegetation. Some clearing is expected to have minimal increased turbulence due to the extent of existing clearing in the area (i.e. the effective change in the canopy will be minimal). Turbulence impacts will also only be realised if Abbott's booby nest trees are situated within the ten canopy heights downwind of the cleared areas (Range to Reef, 2018).

Clearing Principle	Is the Proposal at Variance?	Justification for Variance
		A notional 300m distance is often quoted but it should be noted that this is based on the forest having a 30m canopy height. In this particular case canopy height of vegetation to be cleared are relatively low (with 99% of vegetated areas being less than 20m, and 92% less than 15m), with weed and fern fields being generally less than 5m. Given that these clearing areas will be rehabilitated post mining, any effects of turbulence will be temporary with the growth of rehabilitation progressively diminishing turbulence affects. 2017 assessments by Range to Reef suggest that there may be an improvement in the number of breeding pairs of the species in the areas surveyed and concluded therefore that increase in turbulence will be low, and the resultant risk to Abbott's Booby is negligible and reversible over time with rehabilitation after mining.
Principle (C) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.	Proposal is **not likely** to be at variance to Principle (C)	There are three species listed as Threatened under the EPBC Act 1999. These are: *Asplenium listeri*§ (Christmas Island Spleenwort), listed as Critically Endangered, *Tectaria devexa var. minor*, listed as Endangered and *Pneumatopteris truncata,* listed as Critically Endangered. Parks Australia records and ground truthing surveys conducted in 2024 did not locate any of these species in the areas to be cleared nor within the immediate boundary. *A. listeri*§ occurs in limestone rock crevices in dry, exposed areas on Christmas Island and hence is not associated with proposed clearing sites. *T. devexa* grows colonially, mainly on the plateau, in primary rainforest (tall and largely undisturbed), above 80 metres elevation; both in deeper soils and as a lithophyte (on mossy pinnacles at the base of a sloped, wet site). Ten populations of *T. devexa* have been identified at Christmas Island, with the majority of these occurring in the National Park. No known populations of *T. devexa* have been identified at proposed clearing locations. *P. truncata* is known from two sites on Christmas Island. Neither location is within the CP4506/3 clearing areas. *P. truncata* grows in permanently moist sites in semi-deciduous closed forest and is known to be found in two sub-populations (one at Hugh's Dale, the other at Blowholes Ravine, neither of which are associated with any of the proposed clearing sites.

Clearing Principle	Is the Proposal at Variance?	Justification for Variance
		As buffers from the National Park boundaries will be in place, and no primary forest will be cleared as part of this CPS, there is likely no variance to this principle.
Principle (D) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.	Proposal is **not** at variance to Principle (D)	There are no listed Threatened Ecological Communities on Christmas Island.
Principle (E) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	Proposal is **not likely** to be at variance to Principle (E)	Approximately 75% of Christmas Island is covered with native vegetation and 84% of this (63% of total island area) is protected within National Park. The proposed clearing occurs on land that has previously been cleared for phosphate mining and consists of predominantly regrowth vegetation and weed species, together with some lower value native species common across the island. The vegetation under application is not part of the island's original forests and the vegetation for many of the application areas is in a degraded condition which is no longer representative of rainforest structural values. The vegetation within the application area is not considered to be significant remnant vegetation as it is not located in an extensively cleared landscape and therefore is not at variance to this principle.
Principle (F) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	Proposal is **not likely** to be at variance to Principle (F).	None of the proposed clearing is associated with or adjacent to a watercourse or wetland. Perennial surface water features on Christmas Island are limited to spring fed streams on coastal or sloping areas of the island. All the area under application is situated on the plateau and not within wetland areas. This proposal is not at variance to this principle.
Principle (G) Native vegetation should not be cleared if the clearing of the	Proposal is **not likely** to be at variance to Principle (G)	The interior of the island is slightly undulating plateau, from about 160-360m above sea level. The area under application is situated on the plateau with relatively little relief, and above the terraces. Due to the nature of phosphate mining, topsoil will be removed in areas for in situ mining and all other areas will be mined to ground level. All areas that are mined in situ will be left as limestone boulders, or

Clearing Principle	Is the Proposal at Variance?	Justification for Variance
vegetation is likely to cause appreciable land degradation.		pinnacles. The land is currently approved for mining so its land capability will not be impacted by clearing. No wind erosion, water erosion, salinity, eutrophication, or waterlogging is expected as a result of the proposed clearing, and all mined areas are to be made safe at the completion of mining, so this proposal is not likely to be at variance to this principle.
Principle (H) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	Proposal is **not likely** to be **at** variance to Principle (H)	There are four noteworthy conservation areas at Christmas Island. These are the Christmas Island National Park, the Ramsar wetlands Hosnie's Springs and The Dales, and the Commonwealth Heritage Site "Christmas Island Natural Areas". Block ML140 MB2 is nearby to The Dales Ramsar wetland while several areas are adjacent to the Christmas Island National Park. Most areas under application are highly disturbed and unlikely to be acting as an effective buffer to the adjacent conservation areas. The clearing of some blocks as proposed may result in adjacent conservation areas being exposed to minor edge effects but these are not likely to have a significant impact on the environmental value. A condition of a 5m vegetation buffer alongside the Margaret Knoll access track is in place (affecting blocks ML125 STP10C and ML125 STP10H). Green et al. (2004) remarked that undisturbed Christmas Island rainforest vegetation was naturally resistant to weed invasion. However, there are some shade tolerant species that can spread into forested areas. Following clearing, CIP will implement weed management as per the approved Environmental Management Plan to ensure that the development does not result in the localised introduction and spread of priority weed species into the National Park. Furthermore, several of the proposed blocks for clearing have 'stockpile only' removal conditions. This involves mining historic stockpiles and returning the ground level to its original natural level (as opposed to in situ mining to limestone pinnacles). This approach has the advantage of retaining the original soil profile which facilities vegetative growth and rehabilitation activities. The rapid return of vegetation will be beneficial in ameliorating edge effects to the adjoining National Park and allowing recovery of the site. This condition is already in place for blocks:

Clearing Principle	Is the Proposal at Variance?	Justification for Variance
		ML106 STP106B ML110 STP 20KA (eastern portion of block only) ML110 STP20Q ML122 F11 STP11E ML122 F11 STP11F ML122 F11 STP11H ML139 STP25 G ML139 STP25H These conditions, adequate buffers as specified, and the continued implementation of weed management as per the Environmental Management Plan should be sufficient to ensure conservation areas are not compromised.
Principle (I) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	Proposal is **not likely** to be at variance to Principle (I)	Due to the high natural rate of infiltration at Christmas Island, erosion and sedimentation is generally localised to compacted areas such as roads and stockpiles. There is limited potential for deterioration of underground water as a result of clearing. Due to the location of the areas proposed to be cleared, it is unlikely that the clearing of native vegetation for phosphate mining will cause deterioration in the quality of surface water or groundwater within the local area.
Principle (J) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	Proposal is **not likely** to be at variance to Principle (J)	Christmas Island's soils and karstic limestone rocks are generally highly permeable so clearing on the island does not cause or exacerbate flooding. As the proposed clearing is not likely to cause or exacerbate waterlogging or flooding, and as the water features on Christmas Island are not close to the applied area, the clearing as proposed is not likely to be at variance to this principle.

Conclusion

This proposed clearing permit amendment is a request to extend Clearing Permit CPS 4503/6 (Purpose Permit) approved on 01 May 2019, for the clearing of native vegetation by Christmas Island Phosphates for the areas expressly covered in the application for the purpose of stockpile recovery and insitu phosphate mining.

All conditions of CPS 4506/3 have been complied with, with the exception of the two non-compliances relating to restricted clearing periods recorded in 2019, which did not cause environmental harm.

Two minor changes are being requested as part of this application for extension, including:

- Extension of the duration of the Permit from March 2025, to align with the tenement expiry MCI 70/ 1A in June 2034, to allow the remaining clearing and mining activity to be completed; and

- Removal of Condition 8(a) 'Clearing of native vegetation within Plan 4506/3(a) shall be undertaken in accordance with the Pipistrelle Bat Management Plan as approved on 27 October 2010 by the then Assistant Secretary Territories West, Department of Regional Development and Local Government, Australian Government' as the Pipistrelle Bat was formally listed as extinct in March 2021 (Threatened Species Scientific Committee, 2021).

Thorough ground truthing has recently been conducted and identified no significant changes in the vegetation condition of the proposed clearing areas within CPS 4506/3 from previous assessments and the CPS approved in May 2019. Changes to the classification of several fauna species on the EPBC Act have been detailed. Risk assessment of impacts on flora and fauna have been improved with further mapping since the previous application which has been utilised during this assessment.

CIP has re-assessed the proposed clearing of up to 219.69ha within CPS 4506/3 against the ten clearing principles and found that the clearing may be at variance to clearing principles A and B, will not be at variance to clearing principle D, and not likely to be at variance of any others. No significant changes against the previous assessment in 2019 have been identified (other than the Abbotts Booby data from 2015).

References

Andrews, C. (1900). A monograph of Christmas Island (Indian Ocean). London: British Museum (Natural History).

ABS (2023). 2021 Christmas Island, Census All persons QuickStats. Australian Bureau of Statistics (ABS), Canberra.

ANZECC. 2000. Review of the National Strategy for the Conservation of Australia's Biological Diversity, Australian and New Zealand Environment and Conservation Council, Environment Australia, Canberra, Australian Capital Territory.

Beard, J.S. 1990. Plant Life of Western Australia. Kangaroo Press, Perth, Western Australia.

Bennett, M. (2010). Native vegetation clearing application CIP MCI 70/1 Mining Clearing Permit Local Permit ID: ML105 MB1. Unpublished report prepared for Christmas Island Phosphates, Indian Ocean.

BOM. 2023. Climatic averages for Australian Sites, publicly available data prepared by the Bureau of Meteorology, Commonwealth of Australia, URL: http://www.bom.gov.au/climate/dwo/IDCJDW6026.latest.shtml

Butz, M. 2004. National Recovery Plan for Tectaria devexa. Department of the Environment and Heritage. Canberra, Australia.

Claussen, J. (2005). Native Plants of Christmas Island (Vol. Flora of Australia Supplementary Series Number 22). Canberra: Australian Biological Resources Study and Christmas Island Natural History Association.

Commonwealth of Australia. 2013. Mining Lease No. MCI 70/1. Signed by the Honourable Caterine King MP, Minister for Regional Services, Local Communities and Territories on Behalf of the Commonwealth of Australia, 27 June 2013.

DBCA 2023 Florabase – the Western Australian Flora. Descriptions by the Western Australian Herbarium. Department of Biodiversity, Conservation and Attractions. Perth. Western Australia.

DCCEEWa. 2023. Conservation Advice for *Phaethon rubricauda Westralia* (Indian Ocean Red-tailed tropicbird). Accessed December 2023. URL: https://www.environment.gov.au/biodiversity/threatened/species/pubs/91824-conservation-advice-21122023.pdf

DCCEEWb. 2023. Conservation Advice *Phaethon lepturus fulvus* (White Tailed Tropic Bird Christmas Island). Accessed December 2023. URL: https://www.environment.gov.au/biodiversity/threatened/species/pubs/26021-conservation-advice.pdf

DCCEEWc. 2023. EPBC Act List of Threatened Fauna. Accessed December 2023. URL: https://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl

DCCEEWd 2023. Australia's Bioregions (IBRA). Accessed December 2023. URL: https://www.dcceew.gov.au/environment/land/nrs/science/ibra

DCCEEW. 2024 Amendments to the EPBC Act list of threatened species. Accessed May 2024. https://www.dcceew.gov.au/news/2021/03/02/amendments-epbc-act-list-threatened-species

DCCEEWb. 2024 Conservation Advice for the Christmas Island Frigatebird - *Fregata andrews*. Accessed June 2024. URL: ihttp://www.environment.gov.au/biodiversity/threatened/species/pubs/1011-conservation-advice-19102020.pdf

DCCEEWc. 2024. Protected Matters Seach Tool. Accessed July 2024. URL: https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool

DCCEEWd. 2024 Conservation Advice for *Ramphotypholps exocoeti* - Christmas Island Blind Snake. Accessed July 2024. URL: https://www.environment.gov.au/biodiversity/threatened/species/pubs/1262-conservation-advice-15072016.pdf

DCCEEWe. 2024 Conservation advice for *Pteropus melanotus natalis* – Christmas Island Flying Fox. Accessed July 2024. URL: https://www.dcceew.gov.au/sites/default/files/env/pages/2cd790fe-e19b-4c90-8589-d5f7026b5477/files/64801-conservation-advice.pdf

DEH (now DCCEEW) 2004. National Recovery Plan for the Abbott's Booby *Papasula abbotti*. Department of the Environment and Heritage, Canberra, Australian Capital Territory.

Director of National Parks. 2014. DRAFT Christmas Island Biodiversity Conservation Plan. Department of the Environment, Canberra, Australian Capital Territory.

Director of National Parks. 2014b. Christmas Island National Park Management Plan 2014 – 2024. Director of National Parks, Canberra, Australian Capital Territory.

Drew, M., Harzsch, S., Stensmyr, M., Erland, S. and Hansson, B.S. (2010). A review of the biology and ecology of the robber crab, *Birgus latro* (Linnaeus, 1767) (Anomura: Coenobitidae). Zoologischer Anzeiger. 2010.03.001.

EPA. 2016. Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, 2016. Environmental Protection Authority, Perth, Western Australia.

EPA. 2020. Statement of Environmental Principles, Factors and Objectives. Environmental Protection Authority, Perth, Western Australia.

Green, P.T, Lake, P.S, and O'Dowd, D.J. (2004). Resistance of island rainforest to invasion by alien plants: influence of microhabitat and herbivory on seedling performance: Biological Invasions. Kluwer Academic Publishers (6): 1:9

Grimes, K. (2001). Karst features of Christmas Island (Indian Ocean). Helictite, 37(2), 41-58.

Hill, R. 2004a. National Recovery Plan for the Christmas Island Goshawk Accipiter fasciatus natalis. Commonwealth of Australia, Canberra.

Hill, R. 2004b. National recovery plan for the Christmas Island Hawk-Owl Ninox natalis. [Online]. Department of the Environment and Heritage. Canberra, Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/recovery/n-natalis/index.html.

Hollingsworth, I. (2003). Soils and geomorphology in relation to proposed new mining leases, Christmas Island, Indian Ocean. In Draft Environmental Impact Statement for the Proposed Christmas Island Phosphate Mines, Technical Appendices Vol 1 (2005 ed.). Perth: Phosphate Resources Ltd.

Holmes, J., & Holmes, G. (2002). Conservation status of the flora of Christmas Island, Indian Ocean. Unpublished report to Parks Australia.

JBS&G. 2022. Phosphate Resources Limited Christmas Island Mountain Bike Track – Clearing Permit Application and Supporting Documentation. Perth, Australia.

James, D., Green, P., Humphreys, W., & Woinarski, J. (2019). Endemic species of Christmas Island, Indian Ocean. Records of the Western Australian Museum, 34(2), 55-114.

Keighery, B.J. 1994. Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of Western Australia (Inc). Nedlands, Western Australia.

McKenzie, N. L., May, J. E. and McKenna, S. 2002. Bioregional Summary of the 2002 Biodiversity Audit for Western Australia. Department of Conservation and Land Management. Perth.

Mitchell, B.A. 1985. A vegetation survey of Christmas Island. Report to Australian Nature Conservation Agency, Canberra.

Nelson, J.B. and Powell, D. 1986. The breeding ecology of Abbott's booby. *Emu* 86:33-46.

Ng, P. K. L. and Davie, P. J. F. 2012. The Blue Crab of Christmas Island, *Discoplax celeste*, new species (Crustacea: Decapoda: Brachyura: Gecarcinidae). Raffles Bulletin of Zoology, 60: 89–100.

NVIS Technical Working Group. (2017). Australian Vegetation Attribute Manual Version 7.0. Canberra: NVIS Technical Working Group, Department of the Environment and Energy.

Ohlsen, D., Perrie, L., Shepherd, & Bayly, M. (2015). Taxonomic status and distribution of the critically endangered Christmas Island spleenwort (Asplenium listeri, Aspleniaceae): it is not as rare as we thought. Australian Systemic Botany (27), 372-377.

Parks Australia, Christmas Island National Park/ Animals. Accessed June 2024. URL: https://parksaustralia.gov.au/christmas/discover/nature/animals/

PRL, 2024, Christmas Island Social and Economic Impact, Accessed May 2024. URL: https://prlgroup.com.au/community-sustainability/christmas-island-impact/

Puhalovich, A., Jacobsen, N., & Overall, R. (2003). Surface water and groundwater hydrology in relation to proposed new mining leases, Christmas Island, Indian Ocean. In Draft Environmental Impact Statement for the Proposed Christmas Island Phosphate Mines, Technical Appendices Vol. 1 (2005 ed.). Phosphate Resources Ltd.

Range to Reef Environmental. 2012. Flora and Fauna Risk Assessment - Report to support Environment Protection (Biodiversity Conservation) Act 1999 referral for Proposed Phosphate Mining in South Point Christmas Island. Perth, Australia.

Range to Reef Environmental. 2013. Fauna and Flora Survey, Block 2, South Point, Christmas Island. Perth, Western Australia.

Range to Reef Environmental. 2014. Clearing Permit Application Supporting Documentation. Unpublished report prepared for Christmas Island Phosphates by Range to Reef Environmental.

Range to Reef. 2018.Part A- Clearing Permit Application, Case-by-case Areas 2018. Unpublished report prepared for Christmas Island Phosphates by Range to Reef Environmental.

Range to Reef. 2018. Part B- Flora and Fauna Assessment, Case-by-case Areas 2018. Unpublished report prepared for Christmas Island Phosphates by Range to Reef Environmental.

Regional Development Organisation Australia. 2022. Indian Ocean Territories Strategic Regional Plan 2030. Indian Ocean Territories Regional Development Organisation, under Regional Development Australia.

Reddell, P., Zimmerman, A., & Milnes, A.R. (2020). Vegetation surveys to assess possible impacts of phosphate mining, Christmas Island, Indican Ocean. Technical Report published on ResearchGate. Accessed June 2024. URL: https://www.researchgate.net/publication/342673319_Vegetation_surveys_to_assess_possible_impacts_of_phosphate_mining_Christmas_Island_Indian_Ocean

Shire of Christmas Island. 2015. Christmas Island Local Planning Strategy. Shire of Christmas Island.

Shire of Christmas Island. 2016 Town Planning Scheme Map No. 2. Shire of Christmas Island.

Shire of Christmas Island. (2016, February 17). Local Planning Scheme No. 2 District Zoning Scheme. Government Gazette, WA (No. 27 Special), pp. 480-514.

Swarbrick, J.T. and Hart. R. 2000. Environmental weeds of Christmas Island (Indian Ocean) and their management. Plant Protection Quarterly Vol 16 (2): 54-57

Threatened Species Scientific Committee. (2021). *Listing Advice* Pipistrellus murrayi *Christmas Island Pipistrelle*. Canberra: Department of Agriculture, Water and the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/64383-listing-advice-03032021.pdf. In effect under the EPBC Act from 03-Mar-2021.

Appendices

Appendix I Condition Survey Photos and Scores
Appendix II Protected Matters Search Report
Appendix III Letter of Authorisation from DITRDCA – Relinquished Areas within CPS (Assistant Director, Indian Ocean Territories Government Arrangements, Department of Infrastructure, Transport, Regional Development, Communications and the Arts