



Greencoast Environmental Rehabilitation

Crescent Head Ilmenite Stockpile Economic Rehabilitation Project - Environmental Impact Statement

As part of an application for Development Consent over Lot 2281/DP 115793, for Extractive Industries, section 1.5, Part 4 – Designated Development under the Environmental Planning and Assessment Act (1979)

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GreenCoast Environmental Rehabilitation – CRESCENT HEAD ENVIRONMENTAL IMPACT STATEMENT

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PART ONE – PROJECT OVERVIEW AND PURPOSE

1.1. BACKGROUND

GreenCoast Environmental Rehabilitation (GER), a 100% Australian owned and operated company, plans to undertake an economic restoration of an abandoned ilmenite mineral processing stockpile. The Crescent Head ilmenite dump economic restoration project (“the project”) has two specific goals:

1. It seeks to recover an abandoned waste resource for sale into the export market, and
2. Achieve site rehabilitation by removing invasive weeds, dumped rubbish and the waste ilmenite pile, and establishing a vegetation cover that will allow natural development of a coastal hind-dune forest typical of the region

The project involves the removal and rehabilitation of an abandoned ilmenite stockpile near the township of Crescent Head to the Port of Newcastle. The stockpile site is located on Crown Land on the eastern side of Point Plomer Road, on Lot 2281 Deposited Plan 1153793.

The stockpile covers an area of approximately two hectares on the site of a former mineral separation plant or ‘dry mill’ that ceased operation in 1985. Ilmenite is an iron-titanium mineral that was a common by-product of former mineral sand mining and processing operations along much of coastal NSW and Queensland.

Raw Ilmenite is typically processed offshore to become a titanium-based product, including flux core welding wire and rods and of titanium sponge, used in a wide variety of applications including aerospace industries, high grade electronics, sunscreen and high gloss paints.

GER has drawn upon a variety of experts in coastal ecology and the Australian mineral sand mining industry to form a comprehensive project management team. With the track record of this team, we feel GER is well placed to successfully remove the Ilmenite stockpile and rehabilitate the site in accordance with best practice guidelines (**referring to best practice guides for mining operations, <https://www.industry.gov.au/data-and-publications/leading-practice-handbooks-for-sustainable-mining>**).

The Crescent Head project is a short-term, one-off project to control the invasive plant species currently colonising the stockpile, remove the former sand mining waste stockpile to natural ground level and then rehabilitate the site to natural bushland.

Importantly, the project will not involve the quarrying of any new material or minerals that require further processing, nor the removal of any of the underlying silica sand.

GER follows a business philosophy of economic rehabilitation of past mining activities where the income from the sale of a former waste product can achieve enhanced rehabilitation of past mining legacy sites.

This Environmental Impact Statement (EIS) is provided as the first step in the regulatory approvals process, namely the application for a Development Approval through Kempsey Regional Council.

This EIS describes the existing environment and proposed activities at Crescent Head. The report is structured as follows:

Part One – Overview and Purpose:

- **Section One – Overview of the product, site history and project description**
Discusses the project goals and operating philosophy, as well as project location, products, economic benefits and the staging of site works
- **Section Two – Proposed Rehabilitation Program**
Outlines the projects plans and process for rehabilitation of the two-hectare site
- **Section Three – Statutory Context**
Outlines the planning process for approval. Details the relevant federal, state and local planning instruments and integrated approvals
- **Section Four – Stakeholder Consultation**
Demonstrates the extensive consultation process to gain approvals from the initial project conception discussions with NSW government, granting of the exploration approvals, development of the SEAR's with concurrent agencies and consultation for the EIS. This section also outlines any public comment received during the project life (since 2012)

Part Two – Environmental Impact Assessment:

Contains the assessment of the project's environmental values and potential impacts on those values by the proposed activities

- **Section One: Scope and coverage of this EIS**
Describes the term and coverage of this EIS as described in Secretary's Environmental Assessment Requirements (SEAR ID no.1180) and the applicable legislative framework for the project
- **Section Two - Environmental Impact Assessment - SEAR's Requirements**
Describes the environmental values and particulars of the Crescent Head site, with reference to SEAR's requirements and that of current legislation and regulations.
- **Section Three - Environmental Impact Assessment - Supplementary Studies**
This section addressed additional legislative requirements that have come into force since the original SEAR's assessment was issued. GER have voluntarily subjected the site to a BAM mapping and assessment process to ensure that all potential impacts of the project are captured. Additionally, as part of the SEAR's, but not directly related to the SEAR's requirements, were assessment of the Traffic, Noise and Air Quality impacts of the proposal. These have also been included for completeness.
- **Section Four – Control Strategies - Action Plan**
Describes the control measures to protect environmental values identified for the project.
- **Section Five - Monitoring and Reporting**
Discusses reporting and review requirements.
- **Sections Six and Seven - References and Appendices**
These two sections detail the reference material reviewed in the preparation of this document and the separate expert studies of the environmental values of the project.

1.2. LOCATION

The Project Site is on Crown Land, lying entirely within the property boundaries of Lot 2281/DP 115793. The Project Site is bounded by:

- Goolawah National Park to the east (Lot 7302 / DP 1130597),
- Crown Land to the north (Lot 2281/DP 115793),
- freehold land to the south (Lot 291/DP 754441) and,
- Point Plomer Road to the west

The location is represented in **FIGURE ONE - PROJECT LOCATION AND ZONING**.

FIGURE ONE - PROJECT LOCATION AND ZONING



1.3. PAST SITE HISTORY

Sand mining around the township of Crescent Head commenced in 1957 by Mineral Deposits Ltd (MDL). The Crescent Head mining operation was comprised of three simple dredges in ponds and a separating plant using land based spiral units and magnetic separators, with the concentrates treated at a dry mill next to the existing ilmenite stockpile (**PLATE ONE, TWO and THREE**), Morely, (1981).

The concrete foundations of the dry mill are still present on the eastern side of the stockpile.

The Crescent Head dry mill (**FIGURE TWO**) was one of two dry mills owned by MDL in NSW which produced approximately 75,000 tonnes of rutile, zircon and monazite concentrates annually, from up to eight different mineral sand mining operations. Mineral sand from MDL's mining leases up and down the coast is believed to have been processed at the Crescent Head dry mill, as processing is understood to have continued for many years after dredge mining in the immediate vicinity of Crescent Head itself had ceased. According to the recollections of a former MDL employee, the Crescent Head stockpile site was finally vacated by MDL in or around 1985.

FIGURE THREE shows the site in 1981, close to closure date.

In more recent years, illegal rubbish dumping has taken place at the stockpile site, including dumping of domestic waste and burnt out cars (**PLATE FOUR**). GER has also noted the illegal removal of ilmenite from the northern end of the stockpile, apparently by local building contractors. GER has reported any apparently illegal activity to the landowner (Crown Lands) as soon as it was noted.

PLATE ONE - HISTORICAL BEACH MINING AT CRESCENT HEAD



PLATE TWO - HISTORICAL MINERAL PROCESSING ON EXISTING SITE



PLATE THREE - HISTORICAL MINERAL PROCESSING ON EXISTING SITE



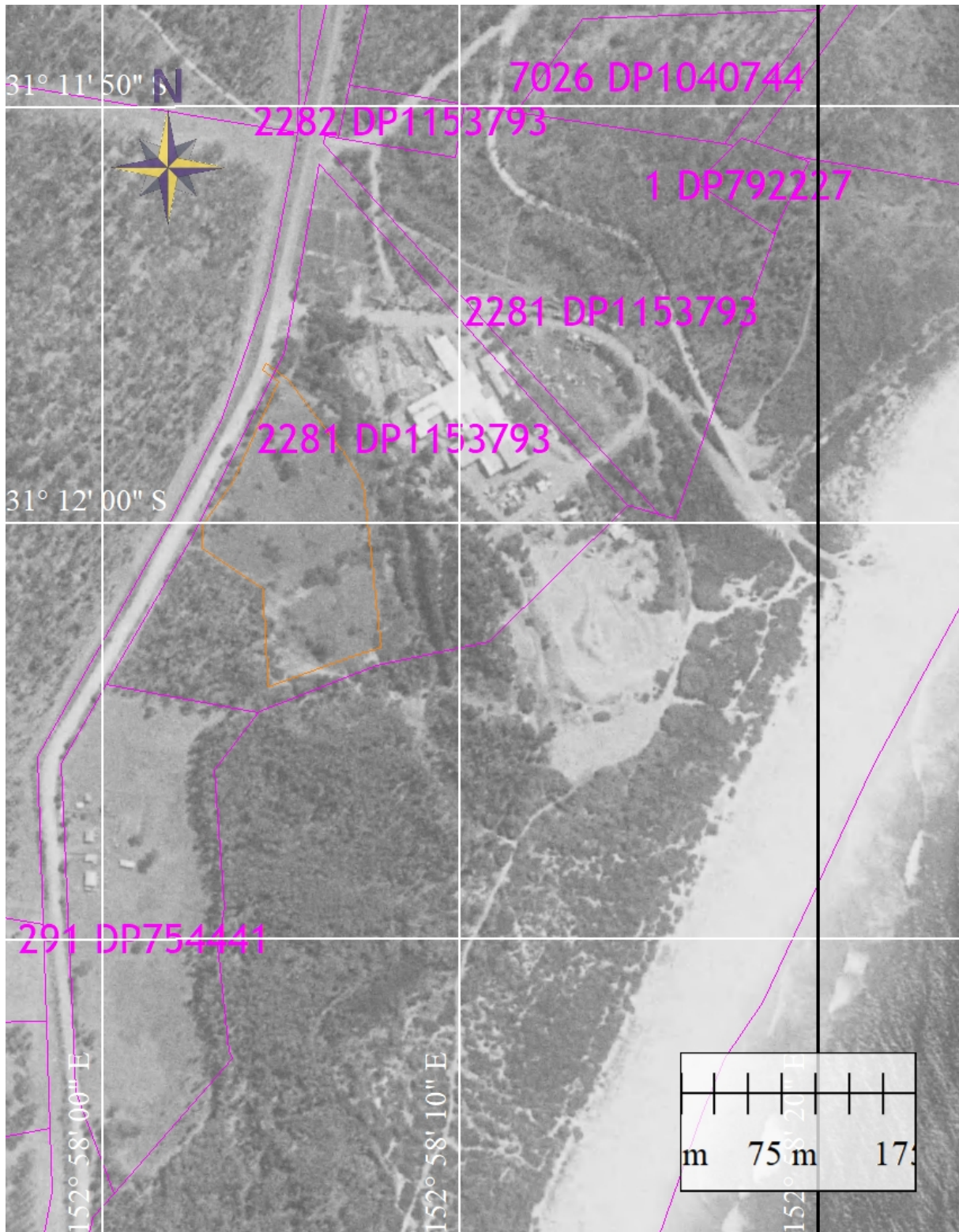
PLATE FOUR – RECENT DUMPING OF RUBBISH ON SITE



FIGURE TWO - HISTORICAL MINERAL PROCESSING ON EXISTING SITE (1956)



FIGURE THREE - HISTORICAL MINERAL PROCESSING ON EXISTING SITE (1981)



1.4. ILMENITE AS A PRODUCT

Ilmenite (FeTiO_3) is a dense, black, weakly magnetic mineral with a high resistance to weathering. Ilmenite is a common accessory mineral present in the beach sands of Eastern Australia, believed to be ultimately derived from the erosion of Tertiary Volcanic rocks from the New England Fold Belt.

Australia's east coast beaches formerly contained substantial deposits of ilmenite that were concentrated in strandlines by wave action. Economic concentrations of mineral sands were extensively mined from beaches and dunes from the Central Coast of NSW north to Fraser Island in Queensland.

At the time of beach mining, which is no longer practiced on the east coast of Australia, ilmenite was a low-value by product which was typically dumped as 'tailings' after the separation of more valuable minerals - predominantly rutile and zircon. These "dumps" or stockpiles of Ilmenite were often left un-rehabilitated for the bush to reclaim or flattened out and buried as part of coastal residential development.

However, in more recent years, ilmenite has become a primary source of titanium, allowing for the removal and rehabilitation of many former ilmenite dumps. Notable recent ilmenite stockpile removals include a large dump from within the Bundjalung National Park in NSW and stockpiles at Rainbow Beach, Noosa North Shore and North Stradbroke Island in QLD.

1.4.1. Product Radioactivity

A potential misconception of waste ilmenite piles is the mistaken belief that they are all 'radioactive' and may therefore pose a health risk. Notable instances of this fear can be found at many coastal towns (ie Rainbow Beach in Queensland) and often old stockpiles may cause local community concern.

To accurately assess the issue and allay potential public fears, GER undertook a series of tests of the stockpile as part of both the exploration and EIS processes. These tests were thorough and involved analysis of physical samples by an independent expert and third part analytical laboratory, as well as surface sample collection and analysis by another third party to the proponent.

These results are discussed further in **Part Two, Section Three** and **APPENDIX ONE** but all testing concluded low to very low levels of radiation, typically lower than within the township of Crescent Head itself.

The primary conclusion is the Crescent Head Ilmenite pile is not classified to be radioactive in NSW, nor is it considered a health risk requiring any protection measures to be put in place during its removal.

As a precaution, and to allay public fears, GER also proposed specific control measure in **Section Four** in the advent of any product spillage during transport.

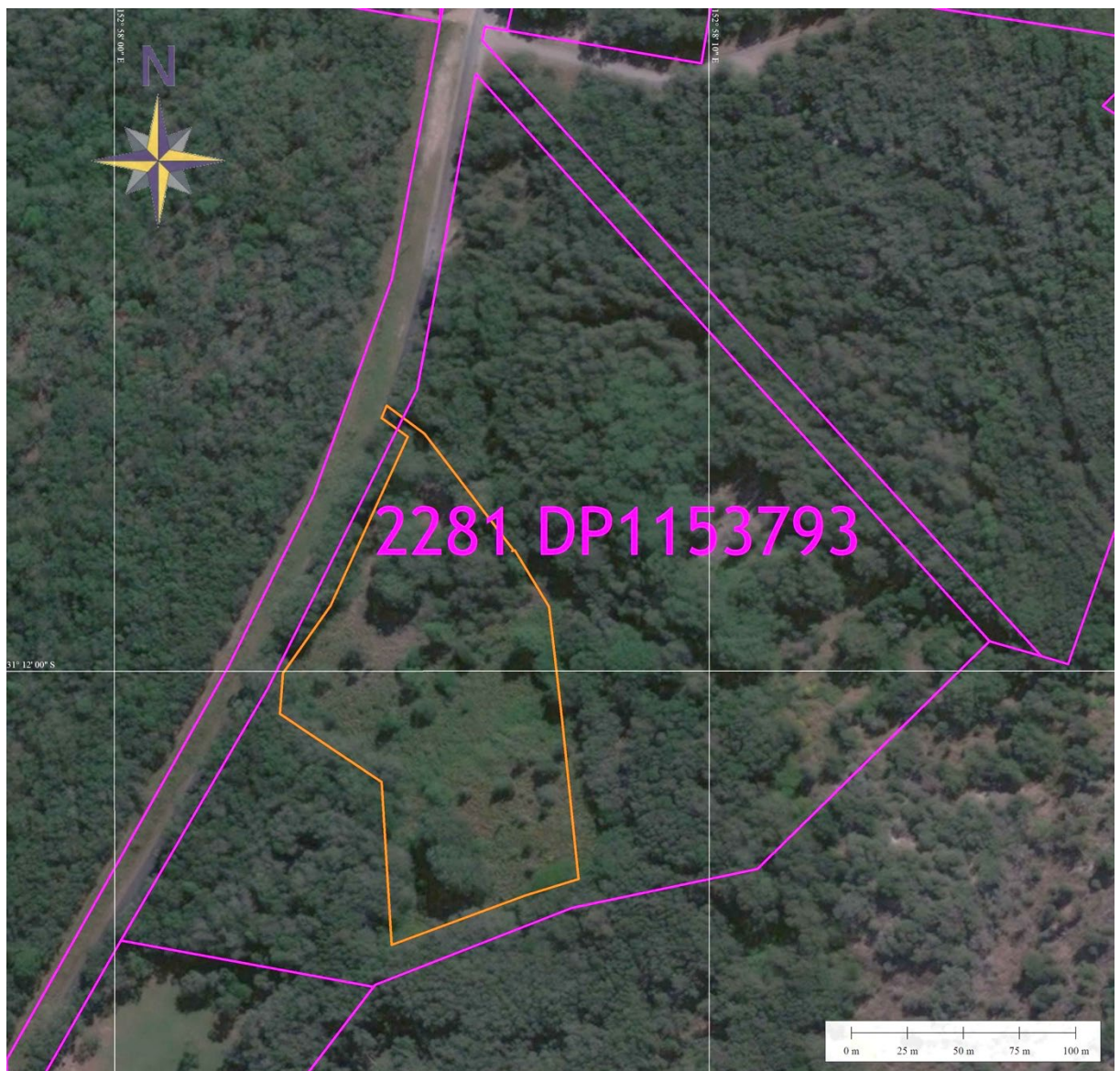
1.5. PROPOSED SITE LAYOUT

A significant component of GER's proposal is that it intended to only re-disturb a small fraction of Lot 2281. GER propose to only remove the above-ground stockpiled material that it has surveyed and tested, and ascertained is suitable for export markets. Due to the past activities on the site, the stockpiled material is well defined and easily identified making the stockpile removal straightforward., **FIGURE FIVE** will be the anticipated entire disturbance footprint for the site, which has been confirmed on by hand auger drilling results.

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No other disturbance will occur in the surrounding vegetation, preserving old growth trees, thereby avoiding any potential issues with wetland species and environments which are present on other parts of the lot.

FIGURE FIVE - STOCKPILE REMOVAL ZONE



1.6. STAGING OF SITE WORKS

1.6.1. Proposed machinery and site layout

Removal of the weeds, grubbing and raking and stockpile removal are all relatively simple activities that will be undertaken using either an excavator or front-end loader. The site is too small and compact for a large machine and it is anticipated that only one excavator will be required to prepare the site and loading of material into the trucks for transport will be undertaken with a front-end loader (FEL).

Access will be via the north western corner of the stockpile, where the existing site access point on Point Plomer Road is at present. To facilitate access, manage erosion and ensure machinery cannot get bogged, crushed rock will be placed temporarily at the access point and potentially used at any soft points in the truck loading circuit.

1.6.2. Grubbing and raking

Prior to removal of the ilmenite stockpile the surface of the pile will be mechanically grubbed and raked to remove all weeds and roots. Weeds will be mulched and air-dried, with the final decision on the best way to ensure they will not re-sprout being either composted on site for future rehabilitation or transport to the Kempsey green waste facility (dependent on final pile volume).

To ensure no product contamination, the entire stockpile surface will be thoroughly grubbed and raked over a period of three or four days, working slowly and systematically from the northern end of the stockpile to the south. During site clearing activities, a suitably qualified fauna spotter-catcher will be present to relocate any fauna disturbed during weed removal.

It is not intended to remove any mature trees as part of the grubbing and raking process. However, should a tree be determined to pose an unacceptable safety or operational risk, following a risk assessment and approval, it will be removed in the presence of the fauna spotter catcher.

1.6.3. Ilmenite stockpile removal

Removal of the material will involve the use of either a front-end loader (FEL) or similar machine. Material from the north western corner of the pile will be removed first to establish a working face. Based on the results of the ongoing radiation and grade control sampling the stockpile will be divided into grade blocks approximately 10m wide and 2m deep.

Use of survey markers graduated at 0.2m intervals and installed in hand auger holes will allow the excavator or loader operator to know the depth to natural ground surface and allow the operator to control bench heights and batter the working face back to a safe angle (See Project Execution Plan - **APPENDIX TWO**).

This method reduces the potential for unstable faces and over digging. Reclaiming the stockpile from the North to South will also provide an ongoing noise barrier for the freehold land to the south.

It should be noted that, being a historical ilmenite stockpile, potential exists for solid wastes, such as steel, concrete or polyethylene pipe to exist within or at the base of the pile. GER's experience with sites like Crescent Head indicate that this material may exist and any uncovered as part of operations will be put aside for removal off-site at the most appropriate waste management centre.

1.6.6. Mineral processing

No mineral processing will occur at the Crescent Head site as the pile material is already processed, and the stockpile composition is generally uniform in mineral composition (see **APPENDIX THREE**).

1.6.7. Ilmenite transport

During removal of the ilmenite, product will be transported from site direct to port loading facilities. The original project plan was to transport the product to a yard elsewhere within Kempsey shire (and this option is referenced in **APPENDIX TWO** and **APPENDIX FOUR**). However, following discussion with Council and to avoid any potential zoning issues, the proponent now intends to transport the ilmenite directly to port loading facilities in Newcastle.

Haulage will be undertaken via truck & dog trailers with an average load of 30m³ per trip – a total of 3,650 laden trips for the project duration.

The haulage contractor will provide three truck and dogs per day resulting in 20 laden trips a day, restricted to weekdays only – or a maximum of 100 laden trips per week (an average of four truck movements an hour).

It is expected that, provided the market conditions for ilmenite remain favourable, and a removal rate of an average of 20 laden trips per day for five days a week can be made, stockpile removal will take approximately 36 weeks.

The ilmenite will be trucked to the port of Newcastle (Carrington Precinct) as shipping dictates.

Trucks will operate between daylight hours and travel to and from site by the appropriately zoned state and local road network. The existing access track to the Ilmenite stockpile will be upgraded by GER to a standard suitable for haul trucks and removed to its existing state (or as otherwise agreed) upon completion of the works.

As described above, operations are expected to be conducted during weekdays, avoiding public holidays and school holiday periods where practicable. GER acknowledges the wishes of the local people and council to avoid peak holiday periods if possible and suggest that a calendar of operations be agreed by all parties, once the project commences.

1.6.8. Site delineation and security

The existing single entrance to the site off Point Plomer Road will be fitted with a lockable gate that will remain closed and locked at all times, except to allow GER vehicle access to site. High visibility Restricted Area Access signage will be placed at the gate and at 50m intervals along the site boundary with Point Plomer Road.

Access to the work site will be restricted to personnel who have completed a site induction and hold a SafeWork NSW White Card (CIC) or visitors in the company of GER inducted employees.

To further demarcate the site project area, a temporary site boundary barrier will be installed to limit access to site operations. Depending on the identified risk, this barrier may take the form of temporary fencing, portable traffic barriers or, in already inaccessible heavily vegetated areas, barrier tape and signage, with a minimum of 1.8m high portable cyclone fencing along the boundary with Point Plomer Road.

Shade cloth or jute netting will also be installed along the boundary to limit dust and visual impacts of the site works where required.

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A trailer mounted mobile toilet and hand disinfectant gel will be available on site with wastes being removed as required by a licensed contractor.. All general rubbish will be placed in appropriately marked bins for removal weekly. No food wastes will remain on site and bins will be sealed or weighted, to avoid potential animal entry.

2. SITE REHABILITATION

GER takes great care in delivering its rehabilitation outcomes as this component of the project is typically the one of most concern for all stakeholders. Rehabilitation of the Crescent Head site is anticipated to be relatively straightforward.

The rehabilitation strategy is outlined in **APPENDIX FIVE** - Rehabilitation strategy and has been developed by an expert in coastal restoration and sand mining rehabilitation. The main steps in the strategy can be described as follows:

A. Post stockpile removal landform:

The stockpile will be removed to the original land surface so no new landform will be created. Existing and remnant contours are illustrated in **FIGURE EIGHT** and **FIGURE NINE** respectively.

B. Surface contouring and soil surface preparation:

The condition of the remnant underlaying topsoil will determine to some extent what earthworks and surface preparation may be required.

From the hand auger surveys already performed by GER, a remnant soil profile is present beneath the pile and it is unlikely that surface contouring and preparation will be required.

However, if surface contouring and preparation is required, all slopes within the removed stockpile area >5% will be contoured and flattened. It is acknowledged that this may not be feasible on the eastern edge of the pile where the natural ground level drains to the south east and, therefore, in this instance, slope lengths will be minimised to reduce erosion by installing small contour banks in the final land surface.

Final preparation of the soil surface will involve the entire site to be raked, increasing the surface permeability of the site and reducing compaction.

C. Surface stabilisation and soil amelioration:

Once the ilmenite stockpile has been removed to natural ground level, the remnant soil surface will require treatment to make it a suitable growing medium and avoid erosion.

GER will utilise hydromulch or hydrocompost treatments over the exposed surface once the pile has been completely removed.

Application of this material will be via a specialised hydraulic spray truck and this will apply a layer of:

- Stabilising soil binder,
- Organic material comprising a mixture of sugar cane, recycled paper and potentially wood fibre,
- Seed mix of cover crop and native seeds, and
- Specialised fertiliser mix, tailored to suit the sandy soils

GER's rehabilitation expert has found that for small sites and linear disturbances (such as roads, pipelines and cuttings), hydromulching and / or hydrocomposting has become the preferred method of site rehabilitation. The technique is gaining popularity across a range of industries and provides the following advantages:

- Provides for rapid, one application erosion and sediment control,

- Provides a tailored layer of organic material to each site with resulting water application,
- Can evenly introduce seed, soil binders, soil treatments (clay breakers) and fertilisers to a site without driving on it (spray cannons can reach up to 50m and material can be delivered by hose),
- Lasts for typically 6 to 12 months+ depending on the treatments used, and
- Has been proven to improve the chances of germination and growth of seeded species and those present in the topsoil well above that achieved by seeding alone.

C. Seeding and preferred seed mix:

Seeding of the site will be undertaken mostly using hydromulch application but will also require some seed to be delivered to the remediated stockpile area by hand seeding. As with all rehabilitation activities, there are a variety of plants in the seed mix which have differing growth habits / germination triggers, and therefore, different seeding methods must be used.

The seed mix for the site has been prepared and can be found in **APPENDIX FIVE** and this outlines the key species GER feels are needed to achieve the target vegetation types. There will be a focus on canopy and pioneer species, as these will be critical to provide rapid establishment and address the weed issue and lack of good soil.

Seeding will be done using the following methods:

- Spread as part of hydromulching activities, through the hydromulch machine and applied along with organic material, binders and fertilisers, and
- Spread by hand, either using a seed spreading machine (packed in packing material to ensure even coverage or using seed clay “balls”. Seed “balls” are essentially coating more delicate or resource intensive seeds in a clay coating by hand. These are then air dried and thrown into existing vegetation (in this case, establishing cover crop and native grasses). The clay balls protect the seed from insects and animals, and only break down once significant rainfalls are received.

Seed will be sourced where possible from a local supplier, collected on site, or purchased from a not for profit bush care group.

D. Maintenance and establishment monitoring:

Selection of maintenance measures will be dependent on a range of environmental factors and will also be dependent on the expectations of the land custodian (Crown Lands).

For this reason, GER will continue to monitor the site post rehabilitation activities are complete and if any significant issues that may hamper the rehabilitation outcomes are noted, these will then trigger a maintenance activity.

Expected maintenance activities that could be utilised on site include the following:

- Weed Control - As suggested above, it is expected that some weed re-establishment will occur on site forgoing rehabilitation treatments. Should this weed establishment be determined to be prohibiting rehabilitation success, herbicide or heat treatment can be employed to control weed outbreaks
- Supplemental watering - A water tanker will be utilised if required, due to lack of natural rainfall

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- Maintenance fertiliser - often when undertaking rehabilitation, initial plant establishment can use up large amounts of nutrients and then the decomposition of the initial cover species can effectively result in Nitrogen deficiency of the remaining plants. This can be effectively treated with the application of a maintenance fertiliser at the 6-12-month phase of rehabilitation
- Supplemental seeding or planting - Studies from all round the world in rehabilitated landscapes have shown that plant establishment from seed is the preferred method for establishing a resilient plant community and certainly a plant community that is expected to establish on a bare site. Tube stock plantings require a very narrow window of conditions to be successful and, for this reason, they were not selected for the rehabilitation program. Should however, some of the plants fail to become established after seeding, some planting of additional tube stock may be undertaken to improve diversity and cover.

3. STATUTORY CONTEXT

As noted in the SEAR’s response above, the project will require authorisations to ensure that it follows relevant State and Federal Acts and Regulations. GER has, as part of this EIS, considered the list of these provided as attachment 2 of the SEAR’s report and **Table Two - Relevant Acts and Guidelines** outlines which of these acts has been found to be relevant to the project.

TABLE TWO - RELEVANT STATE ACTS, REGULATIONS AND GUIDELINES

Applicable section	Management action	Section Where Addressed
Coastal Management Act 2016		
Area proposed within Coastal Wetlands and Littoral Rainforests Area Mapping	Coastal Use Area Map	Part Two, Section 2.6, 2.9, 3.1
Commonwealth Environment Protection and Biodiversity Conservation Act 1999		
No Matters of National Significance Triggered	Not Applicable	Part Two, Section 3.1
Floodplain Development Manual		
Not Applicable to location	Not Applicable	Not Applicable
Environmental Planning and Assessment Act 1979 No. 203		
Integrated Development proposal	Development Consent Required from Kempsey Shire Council, Mining Lease application pending	Part One, Section 3.3
Fisheries Management Act 1994 No. 38		
Not Applicable	Not Applicable	Not Applicable
Marine Estate Management Act 2014 No. 72.		
Not Applicable	Not Applicable	Not Applicable

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National Parks and Wildlife Act 1974 No. 80		
Not Applicable as no disturbance to National Parks	Not Applicable	Not Applicable
Protection of the Environment Operations Act 1997 No. 156		
Environmental licencing	No permit Required	Part One, Section 3.3
Biodiversity Conservation Act 2016 and Biodiversity Conservation Regulation 2017		
Minimal clearing of protected vegetation	Biodiversity Offsets Calculation	Part Two, Section 3
Water Management Act 2000		
Not Applicable as no disturbance to water courses or aquifers	Not Applicable	Part Two, Section 2.9
ANZECC (2000) Guidelines for Fresh and Marine Water Quality		
Not Applicable – no water to be used / transferred as part of the project	Not Applicable	Part Two, Section 2.9

3.1. NSW GOVERNMENT CONTEXT

The following section details how the proposal fits within the NSW state planning legislative framework.

3.1.1. North Coast Regional Plan 2036

The NSW Government’s vision outlined in the North Coast Regional Plan is for the North Coast region to be:

“The best region in Australia to live, work and play thanks to its spectacular environment and vibrant communities.”

To achieve this vision, the Government has set four goals for the region:

1. The most stunning environment in NSW
2. A thriving, interconnected economy
3. Vibrant and engaged communities
4. Great housing choice and lifestyle options

The proposal aligns with Goal One – The Most Stunning Environment in NSW in the following ways:

The regional plan defines the natural environment of the region as panoramic coastal and rural landscapes and one of the most biologically diverse regions in Australia. With natural resources that underpin industries and are the foundation on which a significant tourism sector has been built. Key to the region is a desire to direct growth to locations that do not compromise the natural environment will ensure the region grows sustainably and in line with community aspirations.

The GER project is a resource recovery and land remediation project. The key goals of the proposal are to:

- Remove an existing waste stockpile
- Remove two hectares of weed growth and replace it with native vegetation
- Remove accumulated dumped hard waste
- Restore the natural ground surface, re-establishing the natural amenity of the site
- Preserve the natural environment that has recolonised the area
- Minimise disturbance to the stockpile location only, and
- Minimise the temporary disruption to the amenity of the Crescent Head community

Key to the project is the protection of koalas and their habitat, which is a key foundation of the regional plan. GER proposed to increase the Koala habitat in the project location by planting of additional koala favoured species during site rehabilitation.

3.1.2. Relevant State Environmental Protection Policies

The project is of limited size and complexity and as such, does not trigger many of the state governments Environmental Protection Policies (SEPP's). As identified in the SEAR's component in Part Two, the project will address several Local Environmental Protection Policies (LEPP's), which in turn satisfy constraints identified in the SEPP's. **Table THREE** outlines which SEPP's are relevant to the project and where these matters have been addressed.

TABLE THREE - STATE ENVIRONMENTAL PROTECTION POLICIES

NSW State Environmental Protection Policies (as at 12 Oct 2020)	Section Where Addressed
State Environmental Planning Policy (Aboriginal Land) 2019	Part Two, Section 2.1, Part Two, Section 4.2.11
State Environmental Planning Policy (Activation Precincts) 2020	N/A
State Environmental Planning Policy (Affordable Rental Housing) 2009	N/A
State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004	N/A
State Environmental Planning Policy (Coastal Management) 2018 (note replaces State Environmental Planning Policy 71. Coastal Protection)	Part Two, Section 3.1, Part Two, Section 4.1.3
State Environmental Planning Policy (Concurrences and Consents) 2018	N/A
State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017	N/A
State Environmental Planning Policy (Exempt and Complying Development Codes) 2008	N/A
State Environmental Planning Policy (Gosford City Centre) 2018	N/A
State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004	N/A
State Environmental Planning Policy (Infrastructure) 2007	N/A
State Environmental Planning Policy (Koala Habitat Protection) 2019	Part Two, Section 3.1, Part Two, Section 4.1.3
State Environmental Planning Policy (Kosciuszko National Park—Alpine Resorts) 2007	N/A
State Environmental Planning Policy (Kurnell Peninsula) 1989	N/A

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State Environmental Planning Policy (Major Infrastructure Corridors) 2020	N/A
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007	Part One, Section 3
State Environmental Planning Policy No 19—Bushland in Urban Areas	N/A
State Environmental Planning Policy No 21—Caravan Parks	N/A
State Environmental Planning Policy No 33—Hazardous and Offensive Development	N/A
State Environmental Planning Policy No 36—Manufactured Home Estates	N/A
State Environmental Planning Policy No 47—Moore Park Showground	N/A
State Environmental Planning Policy No 50—Canal Estate Development	N/A
State Environmental Planning Policy No 55—Remediation of Land	N/A
State Environmental Planning Policy No 64—Advertising and Signage	N/A
State Environmental Planning Policy No 65—Design Quality of Residential Apartment Development	N/A
State Environmental Planning Policy No 70—Affordable Housing (Revised Schemes)	N/A
State Environmental Planning Policy (Penrith Lakes Scheme) 1989	N/A
State Environmental Planning Policy (Primary Production and Rural Development) 2019 (note: replaces repealed SEPP 30)	Part One, Section 3.2
State Environmental Planning Policy (State and Regional Development) 2011	N/A
State Environmental Planning Policy (State Significant Precincts) 2005	N/A
State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011	N/A
State Environmental Planning Policy (Sydney Region Growth Centres) 2006	N/A

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State Environmental Planning Policy (Three Ports) 2013	N/A
State Environmental Planning Policy (Urban Renewal) 2010	N/A
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017	N/A
State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	N/A
State Environmental Planning Policy (Western Sydney Employment Area) 2009	N/A
State Environmental Planning Policy (Western Sydney Parklands) 2009	N/A

3.2. LOCAL GOVERNMENT CONTEXT

The following section outlines the current zoning and authorisations of the land, as well as the policies and plans that are applicable to the proposed activities.

3.2.1. GER Planning pathway and project history

GER specialises in small mining legacy rehabilitation projects and has been in operation since 2010. During 2011, GER undertook a strategic review of historic NSW and QLD sand mining data sets (including historic aerial photography) with an aim to identify a number of former processing plants north of Sydney.

This review indicated a series of potential sites, including the former Mineral Deposits Limited (MDL) plant south of Crescent Head. A subsequent site visit confirmed a large stockpile of waste ilmenite remaining at the former plant site.

The proposal from GER was to obtain the appropriate instrument over lot 2281 on DP 115793 to allow for the removal of stockpiled ilmenite that has essentially been tenure stranded since the original mining lease was surrendered.

To do this, GER first had to obtain an exploration application over lot 2281 and then convert the exploration licence to a mining lease on advice from the now NSW Department of Planning, Industry and Environment. As described above, the proposal does not constitute 'mining' in the true sense, however there are no other planning instruments available to GER that enable the removal of the ilmenite stockpile, which is classed as a mineral under NSW state legislation.

Therefore, the removal of minerals from a legacy mining site, such as the ilmenite stockpile, even ones that have already been "won" from the earth and stockpiled, where no actual extraction is required, still require a mining lease.

As the history illustrated below shows, advice received prior to the SEAR's being issued was that, to obtain a mining lease, GER must first obtain development consent from Kempsey Shire Council. This EIS document and supplementary reports are part of a **Development application for consent** to remove the stockpile and rehabilitate the site (**Extractive Industries**).

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For the purposes of the Environmental Planning and Assessment Act (1979) - Section 1.5 "development" is any of the following (as it applies to GER in bold):

- (e) the use of land,
- (f) the subdivision of land,
- (g) the erection of a building,
- (h) the carrying out of a work,
- (i) the demolition of a building or work,
- (j) **(any other act, matter or thing that may be controlled by an environmental planning instrument).**

(2) However, development does not include any act, matter or thing excluded by the regulations (either generally for the purposes of this Act or only for the purposes of specified provisions of this Act).

(3) For the purposes of this Act, the "carrying out of development" is the doing of the acts, matters or things referred to in subsection (1).

There are the following categories of development under this Act:

- (k) Exempt development (development that is exempt from the assessment and consent or approval requirements of this Act),
- (l) **Development requiring development consent under Part 4, including the following:**
 - (i) complying development (development that complies with pre-determined development standards and requires consent in the form of a complying development certificate by a consent authority or accredited certifier),
 - (ii) development that requires consent by a council or other public authority specified as the consent authority (including by a local planning panel or delegated council staff on behalf of a council),
 - (iii) regionally significant development (development that requires consent by a Sydney district or regional planning panel),
 - (iv) State significant development (development that requires consent by the Independent Planning Commission or the Minister),
 - (v) designated development (development, other than State significant development, that requires an environmental impact statement for an application for consent),
 - (vi) **integrated development (development that also requires approvals under other legislation that are integrated under general terms of approval),**
- (m) Development that is an activity requiring environmental assessment under Division 5.1 before it is carried out by a public authority or before a public authority gives approval for the carrying out of the activity,
- (n) State significant infrastructure (including critical State significant infrastructure) requiring approval under Division 5.2 by the Minister.

Importantly, it must also be noted that, although the proposal by GER will fit best under the planning activity, Extractive industries (as permitted in the zoning for the land) the NSW Department of Environment and Protection Authority (EPA) which provided input into the SEAR's advised that, under the Protection of the Environment Operations Act 1997, no license will be required to be issued by the EPA, in respect of the proposal as the proposed activity would not be classified as 'land-based extractive activity' under the Protection of the Environment Operations Act 1997 (POPEO Act).

This is significant to the assessment of the impacts of the proposal and the management of those impacts post development consent.

3.2.2. Project approvals timeline

The following timeline is a summary of the steps GER has taken to gain access to the site for the purposes of preparing this EIS:

- November 2012 - Exploration Licence application ELA 4711 submitted by GER.
- December 2012 - Public consultation process commences, including publication of Exploration Licence Application (ELA 4711) details published in the Macleay Argus and Sydney Morning Herald newspapers (11 December 2012. **APPENDIX SIX**)
- May 2013 - Grant of EL 8085 to GER (under Mining Act, 1992) (16th May 2013, **APPENDIX SEVEN**)
- November 2013 - Landowner access arrangement signed with Crown Lands (18th of September 2013, **APPENDIX EIGHT**).
- January 2014 - GER completes a low impact exploration program of the ilmenite dump including surface sampling, hand auger drilling, laboratory analyses and a volumetric survey.
- January 2014 - GER establishes potential export market for the Crescent Head ilmenite indicating the project is economically viable.
- April 2017 - Appointment of planning consultants, Blueprint Planning Consultants to investigate requirements for approval and to coordinate SEAR's process
- 12 May 2017 - correspondence from Kempsey Shire Council confirms DA requirement, and initial environmental constraints identified.
- May - November 2017 - discussions with NSW Planning and Environment - Resources and Geosciences on approval pathway and investigations of Section 11A approval pathway (**APPENDIX NINE**). Subsequent advice that a SEARS was required received from NSW Planning and Environment - Resources and Geosciences and SEAR's process commenced
- 24 November 2017 - Receipt of SEARS assessment from NSW Planning and Environment - Resources and Geosciences (**APPENDIX TEN**)
- August 2017 - June 2018 - Undertake a full environmental impact assessment of the site as outlined in the SEARS
- 17 July 2017 – Renewal of EL 8085 under section 114 of the Mining Act 1992 for period of three years (**APPENDIX ELEVEN**)
- 17 August 2018 - GER Meeting with NSW Planning and Environment - Resources and Geosciences to finalise the appropriate approvals pathway for the project
- February 2019 - change of planning consultant from Blueprint Consulting to Pandanus Solutions due to timing issues
- February 2019 - Appointment of Pandanus Solutions to lead the preparation of the EIS based on the previous SEAR's advice, meeting outcomes from the 17th of August 2019 and including the new Biodiversity Assessment Method provisions of the revised Biodiversity Conservation Act (2016) for a Development Application with Kempsey Shire Council

- August 2019 - BAM process commenced
- May 2020 - BAM finalised
- 18 May 2020 - EIS submitted to Kempsey Shire Council
- 31 August 2020 – Comments on Draft EIS received from Kempsey Shire Council (**APPENDIX TWELVE**)
- 26 October 2020 – revised EIS documentation submitted to Kempsey Shire Council

3.2.3. Kempsey Shire Council Local Strategic Planning Statement 2020

The Kempsey Shire Council have published the Future Macleay Growth and Character Local Strategic Planning Statement in early 2020. This statement outlines the planning objectives, goals and themes for the entire shire.

GER believe the project objectives, delivery and final outcomes are consistent with Theme One – Healthy Environment, section 8.1.3 Vegetation, section 8.1.4 Biodiversity and section 8.1.6 Environmentally sustainable growth

3.2.4. Permissibility - Kempsey Local Environmental Plan (2013)

Lot 2281/DP 115793 is currently zoned by the Kempsey Local Environmental Plan (2013) (KLEP) as Rural Landscape (RU2), **FIGURE FOUR**.

Rural Landscape (RU2) is defined under the Kempsey Local Environmental Plan 2013 (Current version for 28 February 2019 to date - accessed 15 October 2019 at 05:42) below.

GER's believe that the project proposal is permissible with consent as per the below highlighted permitted uses for this zoning.

Zone RU2 Rural Landscape

1 Objectives of zone

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To maintain the rural landscape character of the land.*
- *To provide for a range of compatible land uses, including extensive agriculture.*

2 Permitted without consent

Environmental protection works; Extensive agriculture; **Forestry**; Home-based childcare; Home occupations

3 Permitted with consent

*Agriculture; Air transport facilities; Airstrips; Animal boarding or training establishments; Aquaculture; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cellar door premises; Cemeteries; Charter and tourism boating facilities; Community facilities; Crematoria; Dual occupancies; Dwelling houses; Eco-tourist facilities; Environmental facilities; **Extractive industries**; Farm buildings; Flood mitigation works; Freight transport facilities; Group homes; Heavy industries; Helipads; Home businesses; Home industries; Hospitals; Industrial training facilities; Information and education*

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facilities; Jetties; Liquid fuel depots; Marinas; Mooring pens; Moorings; Places of public worship; Recreation areas; Recreation facilities (major); Recreation facilities (outdoor); Restaurants or cafes; Roads; Roadside stalls; Rural industries; Rural supplies; Rural workers' dwellings; Secondary dwellings; Signage; Tourist and visitor accommodation; Transport depots; Truck depots; Veterinary hospitals; Water recreation structures; Water supply systems; Wharf or boating facilities

4 Prohibited

Backpackers' accommodation; Hotel or motel accommodation; Serviced apartments; Any other development not specified in item 2 or 3

GER, working in conjunction with state and local agencies, have determined that the proposed removal of the ilmenite stockpile and rehabilitation of the site (Economic rehabilitation) is not deemed to be exempt development by council (see correspondence received from Kempsey Shire Council - May 12, 2017, **APPENDIX TWELVE**) and that **development consent for Extractive industries within Lot 2281 / DP 115793 (Zoned RU2) must be obtained from council.**

Kempsey shire council has advised that, as minimum, the following site constraints were identified for Lot 2281 / DP 115793:

- Potential endangered ecological community
- Threatened fauna
- Wildlife corridor
- Koala Habitat - Comprehensive Koala plan of management: Class 1, 2A and Unknown
- SEPP 71 (note: repealed, replaced by SEPP Coastal Management 2018)
- SEPP 30 (note: repealed, replaced SEPP (Primary Production and Rural Development) 2019)
- Draft Contaminated Land
- Draft Coastal Management SEPP 2016 - Coastal Wetland and Coastal Wetlands 100m buffer

These potential constraints are addressed throughout this document.

3.2.5. Kempsey Development Control Plan 2013

The Kempsey Development Control Plan 2013 (Kempsey DCP) aims to provide both council and the local community with a high degree of certainty that the future planning of the local government area will address the local community's current and future expectations.

Whilst specific controls have not been identified in the DCP for projects such as the proposed, the Kempsey DCP specifies that, for development applications that it is the consent authority for, require the preparation of control measures, that address a wide range of environmental issues. GER has prepared a series of control strategies in **Part Two, Section Four** to address these issues as well as a commitment to Project Execution Plan (**APPENDIX TWO**) which also details how the control measures will be managed on site. **TABLE FOUR** presents the relevant development controls identified in the Kempsey DCP and where they have been addressed in the EIS.

TABLE FOUR – KEMPSEY DEVELOPMENT CONTROL CONTROLS

Relevant DCP Section	Development Controls	Section Where Addressed
Chapter B2: Parking, Access and Traffic Management, Section 6		
6.1	Access and traffic management	Part Two, Section 3.2 and Section 4.2.4
Chapter B4: Earthworks and Sediment Erosion Control, Section 4		
4.2	Earthworks general	Part One, Section 1.7 and Part Two, Section 4.2.7
4.3	Sediment and Erosion Control	Part One, Section 1.7 and Part Two, Section 4.2.7
Chapter B5: Stormwater Management, Section 4		
4.1	Stormwater General	Part Two, Section 2.9
4.2	Water Quality	Part Two, Section 2.9
4.3	Water Cycle Balance	Part Two, Section 2.9
Chapter B11: Koala Habitat Management		
4	Compliance with CKPoM and SEPP44	Part Two, Section 3.1, 4.1.3
Chapter B12: Aboriginal Heritage		

5.1	Due Diligence Check	Part Two, Section 2.1
5.2	Potential Impacts	Part Two, Section 2.1 and 4.2.11

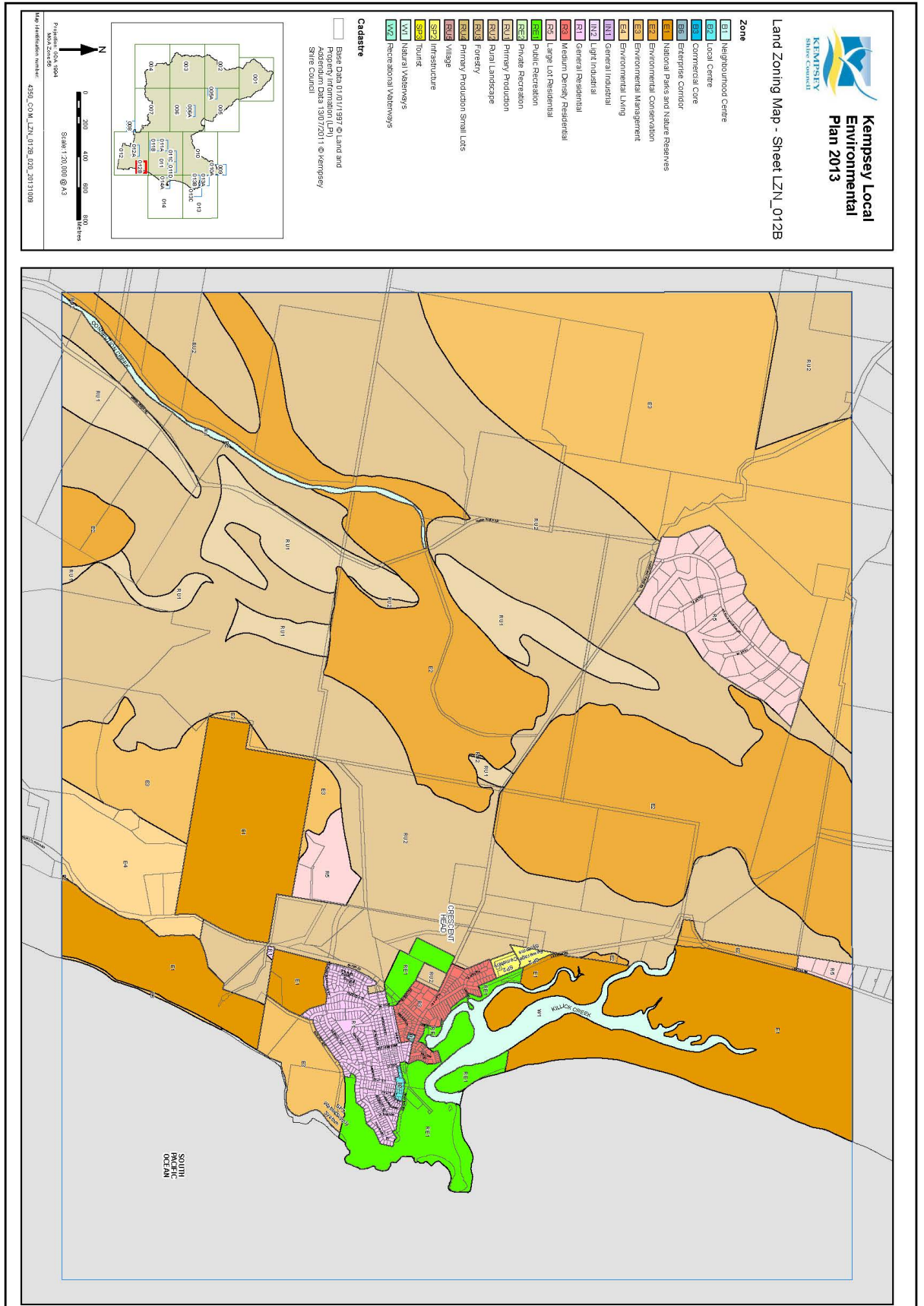
3.2.6. Kempsey Shire Council Comprehensive Koala Plan of Management 2011

In accordance with state planning policy, SEPP 44 Koala Habitat Protection, Kempsey Shire Council have prepared a Comprehensive Koala Plan of Management for the shire. This plan encompasses the project area and as such, this proposal must demonstrate compliance with the objectives and restrictions outlined in the plan.

Part Two, Section Three outlines the risks to koalas and their habitat identified for this proposal and outlines management actions and control to address any potential or perceived impacts.

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FIGURE FOUR - TENURE AND ZONING



3.3. INTEGRATED APPROVALS (UNDER SECTION 42)

Division 3 of the *EPA Regulation 2000* details the requirements of the consent authority for assessment of development application for integrated development. The Kempsey Shire Council is the consent authority for this proposal and the following section outlines the anticipated additional approvals that will be required for the proposal.

After detailed discussion and planning of the project, its methodology and potential impacts, GER and representatives of the NSW Government – Planning and Environment, Resources and Geosciences division agreed that only one additional approval would be required outside of the DA process.

This requirement was for a mining lease issued under Part 5 of the *Mining Act 1992* to permit the removal of the mineral stockpile, which is within the definition of “mining of minerals” within the act.

3.3.1. EPBC Act approvals

Greenloaning Biostudies Pty Ltd (2020 – **Part Two, Section Three** and **APPENDIX THIRTEEN**) state that no species or ecological community listed under the *Environment Protection and Biodiversity Conservation Act 1999* would be significantly impacted by the proposal and, as a result, a referral under the Act is not required.

3.3.2. Other approvals

Due to the simple truck and haul nature of the project, the lack of physical ground disturbance, the absence of any water use and the application for development consent, no other approvals other than those identified above are required for the project.

3.3.3. Mandatory considerations for consideration

As described above, there are limited mandatory requirements of the proposal due to the small nature of the project, that no actual mining of minerals would be undertaken and that the mineral recovered (Ilmenite) is not of key strategic importance to the NSW Government. Therefore, the matters for mandatory consideration are as follows:

- *Mining Act 1992* - The Mining Act 1992 (Mining Act) is administered by the Division of Mining, Exploration and Geoscience (MEG) within the DPIE. The Mining Act provides the framework for exploration, development, operation, and closure of mines, and provides for the management of exploration licences and mining leases to allow access to mineral resources. The proposal requires a mining lease under the Mining Act prior to the commencement of operations. A mining lease application has been made to the Minister for Regional New South Wales, Industry and Trade in accordance with the Mining Act and is pending the approval of this DA.
- *Protection of the Environment Operations Act 1997* - The Protection of the Environment Act 1997 (POEO Act) is administered by the Environment Protection Authority (EPA) within the DPIE, which issues environment protection licences (EPLs) for wide-ranging scheduled activities, including mining. In the case of this proposal, it is under the threshold that requires an EPL and does not satisfy multiple other mandatory requirements for an EPL. However, the POEO Act also requires immediate reporting of pollution incidents, which cause or threaten to cause material harm to the environment.
- *Roads Act 1993* - The Roads Act 1993 (Roads Act) applies to public roads in NSW, and depending upon the type of road, is administered by the Transport for NSW or local council. Consent is required under Section 138 of the Roads Act for

works or structures that disturb the surface of a public road, connect a road to a classified road or any other activity in a road reserve managed by the Transport for NSW or Council. The project does not trigger any of the requirements for a permit as it does not seek to interfere with, join to or modify any existing road. Similarly, a permit and associated Work Authority Deed is not required from Transport for NSW for intersection works at the intersection with the Point Plomer Road

- *Biodiversity Conservation Act 2016* - The Biodiversity Conservation Act 2016 (BC Act) establishes a framework for assessing and offsetting biodiversity impacts from proposed development in NSW. The Act establishes through the Biodiversity Assessment Method a systematic methodology for determining the biodiversity values in the vicinity of a proposed development and the nature and scale of potential impacts. The Act also establishes a scheme to offset residual biodiversity impacts through establishment of Stewardship Sites to be managed in perpetuity for biodiversity purposes. Such Stewardship Sites generate biodiversity credits which may be purchased and / or retired by developers such as the Proponent of offset residual biodiversity impacts associated with projects. Alternatively, developers may pay into the Biodiversity Conservation Trust (BCT) to offset anticipated biodiversity impacts. In this instance, payment into the BCT is preferred by the proponent and is outlined in **Part Two, Section 3** and **APPENDIX THIRTEEN**.

4. PROJECT ECONOMICS AND POTENTIAL BENEFITS

4.1. PROJECT ECONOMICS

Whilst the project life is relatively short lived, there is potential for the project to contribute to both state and local economies, whilst providing an environmental benefit.

As well as providing essentially free removal of a 100 000-tonne waste stockpile and invasive weeds on Crown Land, the project is expected to deliver the following economic benefits:

- Employment of 50 FTE for 120 Days, (based on 40 FTE for truck drivers, maintenance, and service staff, 5FTE at Port and 5 FTE for site supervision)
- Up to \$12 690 000 in Operating expenditure broken down as the following:
 - Stockpile recovery and rehabilitation activities - \$100 000
 - Road Haulage - \$3 500 000
 - Port Operations (preferred port is Newcastle) - \$1 100 000
 - Shipping - \$4 500 000
 - Sales and commissions - \$600 000
 - Royalties to NSW government - \$590 000
 - Corporate and project expenditure - \$1 900 000 and
 - Site administration - \$100 000
- Due to the short project life (around 120 days) there is no Capex expenditure expected with all equipment to be hired or provided by local contractors
- An average sale price of USD \$104.50 / tonne CFR China
- Total expected project revenue of \$14 500 000

4.2. POTENTIAL BENEFITS

4.2.1. *Employment*

As mentioned above, it is expected that up to 50 FTE will be required for a period of 120 days. Most of these employees will be contract or subcontract employees and GER has committed to sourcing these persons from the Crescent Head and Kempsey Shire area where possible (aside from Port personnel).

4.2.2. *Social Needs*

During the current economic climate, sources of employment within the Crescent Head area and the greater Kempsey Shire local government area are reducing due to the current economic recession and the effects of COVID-19 shutdowns and business closures. Of those affected most, casual, contract and part time employees are believed to be the most affected.

This project has the potential benefit of providing a short term, direct employment benefit to the local area and assist with providing more opportunities for local people seeking work.

4.2.3. Restoration of Ecosystem Services

Unlike traditional mining projects, resource recovery projects such as the one proposed have an additional benefit in that they seek to provide economic rehabilitation of an area that would previously be the responsibility of the state or local authority.

The economic rehabilitation model is founded in the genuine goal of economic return from a waste resources AND the rehabilitation of land as key parts of the same process.

5. STAKEHOLDER CONSULTATION

Stakeholder consultation for this project has been ongoing since Exploration Licence applications were made in early 2012. GER has discussed the project extensively with many levels of government to determine the most appropriate process for approvals. Additionally, through the public notification process of the ELA and MLA as well as the council DA process, there has been limited comment / consultation with the community in general. A summary of this consultation is presented in the following sections.

GER plan to provide opportunity for community consultation at all stages of the project and this is outlined in **Part Two, Section 4.2.9, 4.2.10** and in detail in **Part Two, Section 5.4** and **APPENDIX FOURTEEN – COMMUNITY ENGAGEMENT PLAN**.

5.1.1. Public Notification - Exploration Licence Application 4711 (Now EPM 8085)

Exploration Licence Application 4711 (ELA 4711, subsequently granted as EPM 8085) was advertised locally (Macleay Argus) and throughout New South Wales (Sydney Morning Herald) in December 2012, in accordance with the Mining Act. Copies of both the advertisements are presented in **APPENDIX SEVEN**.

As a result of the advertising the company received three telephone enquiries. Two enquiries were from callers identifying themselves as local residents. In both cases the enquiries related to the potential for 'new mineral sand mining'. The company clarified that the project did not involve mining but rather the removal of former sand mining waste from a site near Crescent Head.

A third query was received by Mr John Jeayes, the Secretary of the North Coast Environment Council. Mr Jeayes was also initially concerned that mineral sand mining could be undertaken near Crescent Head. However, Mr Jeayes concern was allayed once the details of the project were described. Mr Jeayes subsequently discussed the project with a number of local residents, and the stockpile removal was mentioned in an Opinion Piece he wrote for the Macleay Argus in April 2013 (**APPENDIX SIX**).

ELA 4711 was subsequently granted by NSW Trade & Investment, Resources & Energy as Exploration Permit (EPM) 8085 effective from 16th May 2013. EPM 4711 can be viewed by the public online at <https://minview.geoscience.nsw.gov.au/>.

5.1.2. Public Notification - Mining Lease Application 588

Mining Lease Application (MLA 588) was advertised locally (Macleay Argus) and throughout New South Wales (The Land) in July 2020 (**APPENDIX SIX**), in accordance with the Mining Act. Copies of both advertisements are attached. No public queries were received. MLA 588 can be viewed by the public online at <https://minview.geoscience.nsw.gov.au/>

5.1.3. Development Application T6-20-207

The company's Development Application T6-20-207 was placed on the Kempsey Shire Development Application Public Register on 1 June 2020. No public enquiries to date have been received by the company as a result of the DA. One enquiry has been received in relation to the Mining Lease application (discussed in section 5.1.5 below).

5.1.4. Traditional Land Owners (KLAC)

The company has been dealing with the Kempsey Local Aboriginal Land Council to provide an Aboriginal Cultural Heritage Assessment. A site investigation was conducted by Mr Tim

Hill of Everick Heritage Consultants and Mr Wayne Sines, Site Officer, on 29th January 2018 (**Part Two, Section 2.1** and **APPENDIX FIFTEEN and SIXTEEN**).

The Assessment Report described the stockpile site to be covered by regrowth trees and invasive weeds. The report stated that no aboriginal artifacts were detected, and none are expected in future, given the nature of the site.

5.1.5. Dhungutti Elders in Council

Separate to the formal inspection of the site by KLAC, GER have been contacted by Mr. Reg Wooderson of the Dhungutti Elders by telephone on several occasions in mid-2020 to discuss the merits of the project.

Mr Wooderson was supportive of the project and its objectives and expressed his desire to see the site rehabilitated. . GER intend to continue to liaise with Mr Wooderson and involve him and the elders in the rehabilitation phase of the project.

5.1.6. Representatives of Mining, Exploration & Geoscience, Department of Regional NSW

The company has been liaising with Mining, Exploration & Geoscience since 2012, first during the granting of EL 8085 up to the submission of MLA 588, including numerous emails and phone calls, a video conference and face to face meetings in Maitland NSW held on 17th August 2019 and 12th February 2020. The Company has dealt with a number of people from the department over eight years, most recently the company has been liaising with Mr Peter Bower, Acting Senior Assessment Analyst – Resource Assessments in regard to MLA 588.

5.1.7. Crown Lands

The company has conducted ongoing liaison with Crown Lands since 2012. Crown Lands is the owner of the land the ilmenite stockpile sits on (Lot No 2281 DP 1153793), most recently through Mr David Baber, Projects Manager & Regional Projects. Most recently to negotiate a land access agreement as part of the MLA. Prior to Mr Baber GER dealt with Mr Terrence Hemmingway, Group Leader Property Management Mid North Coast Area Catchments and Lands, to approve land access to the stockpile during the exploration phase (now completed).

5.1.8. National Parks and Wildlife Service

NPWS manage Lot No 2281 DP 1153793 on behalf of Crown Lands. The company has been liaising with Ms Janet Cavanaugh regarding the land access agreement with Crown Lands required as part of the MLA.

5.1.9. Kempsey Shire Council

GER has been liaising with successive planning officers at Kempsey Shire Council since October 2019. Due to delays in completing the BDAR assessment, an extension to the SEAR's was required. This occurred during February 2020 and extensive consultation occurred with council whilst the SEAR's was reviewed. Once a new SEAR's was issued, submission for adequacy of the draft EIS was made to Kempsey Shire Council on the 19 May 2020.

A formal response was received on the 3 June 2020, and DA processing fees were paid at this point in the timeline. No further responses were received from council despite follow up contact being made by GER until the 19 August 2020. A formal review of the EIS was received by GER on the 31 August 2020, where council requested significant changes to

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the document (**APPENDIX TWELVE**). The document was revised and resubmitted to council on the 26 October 2020.

PART TWO – ENVIRONMENTAL IMPACT ASSESSMENT

1. EIS SCOPE

1.1. SEAR'S REQUIREMENTS

The project is deemed to be designated local development under Part 4 of the Environmental Planning and Assessment Act (1979) (EP&A Act) and as such, the project must satisfy the requirements in Clauses 6 and 7, schedule 2 of the Environmental Planning and Assessment Regulation (2000) (EP&A Reg).

A Secretary's Environmental Assessment Requirements (SEAR's) was issued by the NSW Government - Planning and Environment, Resource and Energy Assessments section on the 24th of November 2017.

The SEAR's requirements (EAR ID no. 1180) are reproduced in **APPENDIX TEN** and summarised in the **Table Five - SEAR's Requirements**.

As part of the lead agencies consultation, the following departments and agencies provided comment and input into the SEAR's:

- Kempsey Shire Council,
- NSW Government - Office of Environment and Heritage,
- NSW Government - Planning and Environment, Resources and Geoscience,
- NSW Government - Department of Industry, and
- NSW Government - Department of Transport, Roads and Marine

TABLE FIVE- SEAR'S REQUIREMENTS:

TITLE	REFERENCE	VERSION / DATE ACCESSED
Relevant Legislation		
Coastal Protection Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+13+1979+cd+0+N	Act has been repealed. Replaced by the Coastal Management Act 2016 No. 20. Current version 1 July 2018 to date (accessed 6 September 2019)
Commonwealth Environment Protection and Biodiversity Conservation Act 1999	http://www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/	Compilation date 29 October 2018
Floodplain Development Manual	http://www.environment.nsw.gov.au/floodplains/manual.htm	Last updated 18 May 2018
Environmental Planning and Assessment Act 1979 No. 203	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N	Current version for 1 July 2019 to date (accessed 6 Sep 2019)
Fisheries Management Act 1994 No. 38	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N	Current version for 1 December 2019 to date (accessed 6 Sep 2019)
Marine Parks Act 1997 No. 64	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+64+1997+cd+0+N	Act has been repealed. Replaced by the Marine Estate Management Act 2014 No. 72. Current version for 1 August 2018 (accessed 6 September 2019)
National Parks and Wildlife Act 1974 No. 80	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N	Current version for 26 October 2018 (accessed 6 September 2019)
Protection of the Environment Operations Act 1997 No. 156	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N	Current version for 5 July 2019 to date (accessed 6 Sep 2019)
Biodiversity Conservation Act 2016	https://www.legislation.nsw.gov.au/~view/act/2016/63	Current version for 1 July 2019 to date (accessed 6 September 2019)
Biodiversity Conservation Regulation 2017	https://www.legislation.nsw.gov.au/~view/regulation/2017/432	Current version for 9 November 2018 to date (accessed 6 Sep 2019)
Biodiversity Conservation (Savings and	https://www.legislation.nsw.gov.au/~view/regulation/2017433	Current version for 08 Feb 2019 to date

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Transitional) Regulation 2017		(accessed 6 September 2019)
Water Management Act 2000	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N	Current version for 1 July 2019 to date (accessed 6 September 2019)
Aboriginal Cultural Heritage		
Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010)	http://www.environment.nsw.gov.au/licences/consultation.htm	1 April 2010
Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010)	http://www.environment.nsw.gov.au/licences/archinvestigations.htm	1 September 2010
Aboriginal Site Impact Recording Form	http://www.environment.nsw.gov.au/licences/DECCAHIMSSiteRecordingForm.htm	Last updated 8 August 2019
Aboriginal Heritage Information Management System (AHIMS) Registrar	http://www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm	Last updated 8 August 2019
Biodiversity		
Biodiversity Assessment Method (OEH 2017)	http://www.environment.nsw.gov.au/resources/bcact/biodiversityassessment-method-170206.pdf	August 2017
Biodiversity Assessment Calculator	https://www.lmbc.nsw.gov.au/bamcalc	App last updated: 04/07/19 (version 1.2.4.00) BAM data last updated 30/08/19 (version 13)
Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna -Amphibians (DECCW, 2009)	http://www.environment.nsw.gov.au/resources/threatenedspecies/09213amphibians.pdf	April 2009
Field Survey Methods	http://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/surveys-andassessments/field-survey-methods	Downloaded February 2018

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Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft (DEC, 2004)	http://www.environment.nsw.gov.au/resources/nature/TBSAGuidelinesDraft.pdf	Working draft Nov 2004
OEH Threatened Species website	http://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species	Accessed 6 September 2019
Atlas of NSW Wildlife	http://www.environment.nsw.gov.au/wildlifeatlas/about.htm	Last updated 26 July 2018
BioNet Vegetation Classification (NSW Vegetation Classification System)	http://www.environment.nsw.gov.au/researchNisclassification.htm	Accessed June 2019
PlantNET	http://plantnet.rbgsyd.nsw.gov.au	Version 2.0
Online Zoological Collections of Australian Museums	http://www.ozcam.org.au	Accessed 6 September 2019
Threatened Species Assessment Guidelines: the Assessment of Significance (DECC 2007)	http://www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-species-assessment guidelines	August 2007
Principles for the use of biodiversity offsets in NSW	http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm	Last updated 28 November 2018
OEH ESTATE		
Land reserved or acquired under the NPW Act		
List of national parks	http://www.environment.nsw.gov.au/NationalParks/parksearchato.aspx	Accessed 6 September 2019
OEH Revocation of Land Policy	http://www.environment.nsw.gov.au/policies/RevocationOfLandPolicy.htm	Last updated 3 August 2018
Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water (DECCW, 2010)	http://www.environment.nsw.gov.au/resources/protectedareas/10509devadjdeccw.pdf	First published June 2010. Revised Mar 2013.
Water and Soils		
Acid Sulphate Soils		

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Acid Sulfate Soils Planning Maps	http://canri.nsw.gov.au/download	Last updated 8 August 2019
Acid Sulfate Soils Manual (Stone et al. 1998)	http://www.landcom.com.au/whats-new/the-blue-book.aspx http://www.planning.nsw.gov.au/rda/guidelines/documents/NSW%20Acid%20Sulfate%20Soils%20Planning%20Guidelines.pdf http://www.planning.nsw.gov.au/rda/guidelines/documents/NSW%20Acid%20Sulfate%20Soils%20Assessment%20Guidelines.pdf	August 1998. August 1998
Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al. 2004)	http://www.derm.qld.gov.au/land/ass/pdfs/lmq.pdf	Version 2.1 June 2004
Flooding and Coastal Erosion		
Reforms to Coastal Erosion Management	http://www.environment.nsw.gov.au/coasts/coastalerosionmgmt.htm	Last updated 14 Aug 2018
Floodplain Development Manual	http://www.dnr.nsw.gov.au/floodplains/manuals.html	Last updated 18 May 2018
Guidelines for Preparing Coastal Zone Management Plans	http://www.environment.nsw.gov.au/resources/coasts/130224CZMPGuide.pdf	Updated 27 August 2019
Climate Change Impacts and Risk Management	http://www.environment.gov.au/climate-change	Accessed 6 September 2019
Water		
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm	Updated 28 June 2006
ANZECC (2000) Guidelines for Fresh and Marine Water Quality	http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality	Last updated 24 July 2019
Applying Goals for Ambient Water Quality Guidance for Operations Officers - Mixing Zones	http://deccnet/water/resources/AWQGuidance.pdf	
Approved Methods for the Sampling and Analysis of Water	http://www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf	March 2004

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Pollutant in NSW (2004)		
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2. ENVIRONMENTAL IMPACT ASSESSMENT AGAINST THE SEAR'S

The following section details GER's response to the Secretary's Environmental Assessment Requirements (SEAR's) for the economic rehabilitation and removal of the Crescent Head ilmenite stockpile, which is designated local development under Part 4 of the Environmental Planning and Assessment Act (1979) (EP&A Act).

Several environmental values to be protected were identified in the Crescent Head area, particular to the proposed location of works. These environmental values have been grouped below, according to the impact guidance headings outlined in section B and detailed in sections C to I in the SEAR's documentation (**APPENDIX TEN**).

Note: the SEAR's was revised and re-issued on the 31 March 2020.

"Environmental Impacts of the Proposal

Impacts related to the following environmental issues need to be assessed, quantified, and reported on:

- *Aboriginal cultural heritage*
- *Biodiversity*
- *NPWS Estate (land reserved or acquired under the National Parks and Wildlife Act 1974)*
- *Acid Sulphate Soils*
- *Flooding, Stormwater and Coastal Erosion*
- *Cumulative Impacts"*

Any anticipated impacts will be addressed using appropriate environmental controls outlined in the responses to the SEAR's components below and collated in the action plan described in **SECTION FOUR**.

2.1. ABORIGINAL CULTURAL HERITAGE

2.1.1. SEAR's requirements - Aboriginal Heritage

The EIS should contain:

1. A description of the Aboriginal objects and declared Aboriginal places located within the area of the proposed development.
2. A description of the cultural heritage values, including the significance of any Aboriginal objects and/or declared Aboriginal places, that exist across the whole area that will be affected by the proposed development, and the significance of these values for the Aboriginal people who have a cultural association with the land.
3. A description of any consultation with Aboriginal people on the proposed development and the significance of any Aboriginal cultural heritage values identified through that consultation. The Biodiversity and Conservation Division advises that the proponent may utilise the former OEH's Aboriginal Consultation Requirements for Proponents 2010 as best practice guidelines for such consultation (these requirements for consultation must be followed if the proposed development requires an Aboriginal Heritage Impact Permit or the Aboriginal heritage assessment requires archaeological testing).
4. The views of those Aboriginal people regarding the likely impact of the proposed development on their cultural heritage. If any submissions have been received as a part of the consultation requirements, then the report must include a copy of each submission and the proponent's response.
5. A description of the actual or likely harm posed to the Aboriginal objects and/or declared Aboriginal places from the proposed development, with reference to the cultural heritage values identified.
6. A description of any practical measures that may be taken to protect and conserve those Aboriginal objects and/or declared Aboriginal places.
7. A description of any practical measures that may be taken to avoid or mitigate any actual or likely harm, alternatives to harm or, if this is not possible, to manage (minimise) harm, to those Aboriginal objects and/or declared Aboriginal places.

In addressing these requirements, the proponent must refer to the following documents:

Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (OEH, 2010) - www.environment.nsw.gov.au/resources/cultureheritage/ddcop/10798ddcop.pdf. These guidelines identify a process that could be used to prepare Aboriginal cultural heritage assessments for development proposals assessed under Part 4 of the Environmental Planning and Assessment Act 1979.

Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (OEH, 2010) - www.environment.nsw.gov.au/licences/consultation.htm. This document further explains the consultation requirements that are set out in clause 80C of the National Parks and Wildlife Regulation 2009. The process set out in this document must be followed and documented in the EIS if the proposal requires an Aboriginal Heritage Impact Permit or the Aboriginal heritage assessment requires archaeological testing.

Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (OEH, 2010) - www.environment.nsw.gov.au/licences/archinvestigations.htm. The process described in this Code should be followed and documented where the assessment of Aboriginal cultural heritage requires archaeological testing to be undertaken.

Notes:

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An Aboriginal Site Impact Recording Form (<http://www.environment.nsw.gov.au/licences/DECCAHIMSSiteRecordingForm.htm>) must be completed and submitted to the Aboriginal Heritage Information Management System (AHIMS) Registrar, for each AHIMS site that is harmed through archaeological investigations required or permitted through these environmental assessment requirements.

Under section 89A of the National Parks and Wildlife Act 1974, it is an offence for a person not to notify OEH of the location of any Aboriginal object the person becomes aware of, not already recorded on the Aboriginal Heritage Information Management System (AHIMS). An AHIMS Site Recording Form should be completed and submitted to the AHIMS Registrar (<http://www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm>), for each Aboriginal site found during investigations.

2.1.2. RESPONSE to SEAR's

Everick Heritage Consultants (**APPENDIX FIFTEEN**) was commissioned by GER to undertake an assessment of Aboriginal and European cultural heritage. In accordance with the relevant administrative and legislative standards for New South Wales, the methods employed in this assessment included:

- A search of relevant heritage registers including the Aboriginal Heritage Information Management System ('AHIMS');
- A site inspection undertaken by Everick senior archaeologist Tim Hill, and Wayne Sime from Kempsey Local Aboriginal Land Council ('KLALC') on 25 January 2018 (**APPENDIX SIXTEEN** for their separate report);
- Consultation with the Board of KLALC regarding the project and its impact on Aboriginal Land Claims;
- Notification and ongoing consultation of the Dhungutti Elders Aboriginal Corporation; and
- Assessment of the potential for the Project Area to contain significant Aboriginal heritage and the impact on the Project may have on said heritage.

The methods used for this assessment are in compliance with the OEH Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010 and all relevant legislation.

As a result of the desktop study, field inspection, Aboriginal community consultation, and archaeological investigation of the Project Area, the following was found:

- No artefacts were observed within the soil stockpile or surrounding sand plain.
- It is considered that the stockpile and sand plain have a low potential to contain Aboriginal sites based on the history of disturbance across the Project Area, and proximity to other natural features that would provide better access to resources. These include the headland and hills to the north and Goolawah Beach.
- Should shell midden material have occurred within the sand dune deposits subjected to sand mining, it is expected that the shell specimens would be highly fragmented because of the mining process. Likewise, it is expected that stone artefacts would be separated and either stockpiled or reused. It is not expected that organic material would survive in such a disturbed environment.
- In consideration of the potential of the sand plain to contain Aboriginal sites, it is noted that the hind dunes would provide better access to beach resources. It is not common to find midden sites within the back-plain environments and it is understood that these areas were typically utilised for hunting and gathering but rarely used for camping and tool production.
- No items or relics of European heritage were identified during the assessment. The old concrete loading facilities are intact; however, these are not listed as being of local heritage significance.

After the survey by Everick Heritage Consultants, GER has been contacted by representatives from the Dhungutti Elders and associated archaeologists to confirm their desire to rehabilitate the site. They have indicated support for GER's proposal to rehabilitate the site and restore at least part of the site to a landform and vegetation type similar to what was present before the mineral processing facility was established.

2.6. BIODIVERSITY

2.6.1. SEAR's requirements

1. The EIS must assess the impacts of the proposed development on biodiversity values to determine if the proposed development is "likely to significantly affect threatened species" for the purposes of Section 7.2 of the Biodiversity Conservation Act 2016 (BC Act) as follows:
 - A. The EIS must demonstrate whether the proposed development is to be carried out in a declared area of outstanding biodiversity value.
 - B. If the proposed development is not carried out in a declared area of outstanding biodiversity value, then the EIS must demonstrate and document whether the proposed development exceeds the biodiversity offset scheme threshold, as set out in section 7.4 of the BC Act and clause 7.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation), by determining whether the proposed development involves:
 - I. The clearing of native vegetation of an area declared by clause 7.23 of the BC Regulation as exceeding the threshold, or
 - II. The clearing of native vegetation, or other action prescribed by clause 6.1 of the BC Regulation, on land included on the Biodiversity Values Map published under clause 7.3 of the BC Regulation.
 - C. If the biodiversity offset scheme threshold is not exceeded, then the EIS must document the test for determining whether proposed development is likely to significantly affect threatened species or ecological communities as outlined in Section 7.3 of the BC Act, by preparing an ecological assessment that:
 - I. Should include a field survey of the site conducted and documented in accordance with relevant guidelines, including:
 - a. Field survey methods for environmental consultants and surveyors when assessing proposed developments or other activities on sites containing threatened species <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/field-survey-method-guidelines.pdf>
 - b. Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna -Amphibians (DECC, 2009) http://www.environment.nsw.gov.au/resources/threatenedspecies/0921a_mphibians.pdf
 - c. NSW Guide to Surveying Threatened Plants (OEH 2016) <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/guide-surveying-threatened-plants-160129.pdf>
 - d. "Species credit' threatened bats and their habitats <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/species-credit-threatened-bats-survey-guide-180466.pdf>
 - e. Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft (DEC, 2004), <http://www.environment.nsw.gov.au/resources/nature/TBSAGuideilnesDraft.pdf>

If a proposed field survey methodology is likely to vary significantly from the methods in the guidelines above, then the proponent should discuss the proposed methodology with the Biodiversity and Conservation Division prior to undertaking

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surveys for the EIS, to determine whether the Biodiversity and Conservation Division considers the proposed methodology appropriate.

The results of recent (less than five years old) field surveys may be used. However, the results of previous field surveys should not be used if they have:

- been undertaken in seasons, weather conditions or following extensive disturbance events when the subject species are unlikely to be detected or present, or
- utilised methodologies, survey sampling intensities, timeframes or baits that are not the most appropriate for detecting the target subject species,

unless these differences can be clearly demonstrated to have had an insignificant impact upon the outcomes of the field surveys.

If the results of previous field surveys are used, then field surveys for any additional threatened entities listed under the BC Act since the previous field surveys took place, must be undertaken and documented.

The list of potential threatened species, populations, ecological communities, or their habitats for the site should be determined in accordance with:

- the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft (DEC, 2004), and
- the Department's Threatened Species website <http://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species>, and
- the Bionet Atlas of NSW <http://www.environment.nsw.gov.au/wildlifeatlas/about.htm>, and
- the Vegetation Information System (BioNet Vegetation Classification) <http://www.environment.nsw.gov.au/researchNisclassification.htm>, and
- other data sources (e.g. PlantNET, Online Zoological Collections of Australian Museums (<http://www.ozcam.org/>), previous or nearby surveys etc.) may also be used to compile the list.

II. Should include the following information as a minimum:

- a. A description, spatial data files, and geo-referenced mapping of the study area, (overlays on topographic maps, satellite images and /or aerial photos, including details of map datum, projection and zone), showing all field survey locations, vegetation communities classified in accordance with the BioNet Vegetation Classification (<http://www.environment.nsw.gov.au/researchNisclassification.htm>), key habitat features and reported locations of threatened species and ecological communities present in the subject site and study area.
- b. A description of survey methodologies used, including timing, location and weather conditions.
- c. Details, including qualifications and experience, of all persons undertaking the surveys, mapping and assessment of impacts as part of the EIS.
- d. Identification of national and state listed threatened biota known or likely to occur in the study area and their conservation status.
- e. A description of the likely impacts of the proposed development on biodiversity values, including direct and indirect impacts and construction and operation impacts, with impacts quantified, wherever possible, such as the amount of each vegetation community or species habitat to be cleared or impacted, and/or the degree of fragmentation of a habitat connectivity.

- f. Identification of the avoidance, mitigation and management measures that will be put in place as part of the proposed development to avoid or minimise biodiversity impacts, including details about alternative options considered and how long-term management arrangements will be guaranteed.
 - g. A description of the residual impacts of the proposed development.
 - III. Must include the 'test for determining whether proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats' as outlined in Section 7.3 of the BC Act undertaken in accordance with the gazetted Threatened Species Test of Significance Guidelines (OEH 2018) available at: <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/threatened-species-test-significance-guidelines-170634.pdf>
2. If the EIS determines under 1 above that the proposed development is likely to significantly affect threatened species, then in accordance with Section 7.7 of the BC Act the EIS must be accompanied by a Biodiversity Development Assessment Report prepared in accordance with Part 6, Division 3 of the BC Act.
3. If the EIS determines under 1 above that the proposed development is unlikely to significantly affect threatened species, then the proposed development should:
 - a. be designed to avoid and minimise impacts on biodiversity values to the fullest extent possible, and
 - b. include a biodiversity offset package to offset remaining direct and indirect impacts on biodiversity values, prepared in accordance with the Department's 13 offsetting principles available at <http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm>:

Note:

For the Commonwealth Environment Protection and Biodiversity Conservation Act 1999, the EIS should identify any relevant Matters of National Environmental Significance and whether the proposal has been referred to the Commonwealth or already determined to be a controlled action

2.6.2. Response to SEAR's

The project area has been surveyed for potential impacts on site biodiversity on two separate occasions. The primary survey, undertaken in February 2019, followed the guidance and methodology outlined in the SEAR's, and can be found in **APPENDIX SEVENTEEN – FLORA AND FAUNA SURVEY** and subsequently using the methodology outlined in the Biodiversity Conservation Act (2016), **APPENDIX THIRTEEN – BIODIVERSITY ASSESSMENT**

For the purposes of assessment against the requirements of the SEAR's, the latter survey, Biodiversity Development Assessment Report (**APPENDIX THIRTEEN**), prepared by Greeloaning Biostudies Pty Ltd has been used due to its more thorough assessment of the requirements and its compliance with the BDAR assessment protocols.

The first assessment was prepared prior to legal advice suggesting the BDAR process be utilised over the original assessment methodology and, therefore, any relevant findings from the assessment provided in **APPENDIX SEVENTEEN** have been incorporated into the Biodiversity Development Assessment Report.

A full account of the survey methodology used is outlined in the supplied subconsultant report, however assessment of biodiversity for the proposal site is best summarised as follows:

Desktop review methodology

Desktop reviews were undertaken for the purpose of identifying the potential occurrence of threatened flora and fauna species, populations and/or ecological communities in the vicinity of the subject property and proposed resource recovery area. The desktop review process incorporated the following:

- A search of the NSW OEH Bionet data, including the Bionet Atlas and Vegetation Information System Datasets, the BV Map and threatened species and ecological communities distribution maps;
- A search using the EPBC Act Protected Matters Search Tool for any threatened species, ecological communities, RAMSAR sites and/or migratory species listed under the Act that have been detected, and/or considered to have likely habitat, within the subregion and particularly within the locality;
- Searches on the **Sharing and Enabling Environmental Data (SEED)** Portal for relevant background mapping;
- Reviews of available background information on individual threatened species and communities;
- Review of available aerial images of the subject property and environs;
- Searches of Council's website for relevant documents and mapping, plus direct liaison with Council regarding vegetation mapping;
- Direct liaison with Council to obtain spatial data representing the Koala Plan of Management Preferred Koala Habitat mapping
- Reviews of relevant legislation and planning documents as documented in **SECTION TWO**;
- Detailed reviews of Plant Community Types (PCTs), threatened species profiles and relevant background information; and
- Reviews of any reports prepared in relation to ecological attributes of the general locality of the project (refer to **APPENDIX SEVENTEEN**)

Relevant desktop information and QGIS 3.8.1 were used to determine the percentage cover of native vegetation within the 1500m buffer area for the subject property. Vegetation cover was determined as defined in the s 4.3.2 of the BAM and page 13 of the BAM Operational Manual and the methodology applied was as follows:

- QGIS 3.8.1 was used to assess the vegetation cover based on imagery sourced from ArcGIS REST Services Directory WMS server provided by Spatial Services, NSW Department of Finance and Services (public/NSW Imagery) and to apply a 1500m buffer using the Offset Curve tool. The resulting layer was inclusive of the study site. The buffer area was calculated within QGIS using area geometry (986ha).
- The ocean and estuarine (Killock Creek) areas were subtracted from the buffer area (986 less 374.59ha) to produce a net buffer area of 611.41ha.

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- Ten polygons were created in QGIS to represent the native vegetation as determined by the assessor, based on aerial imagery and field assessments. The area of each polygon was calculated within QGIS using area geometry.
- The gross area of four of the polygons was reduced by a percentage as determined appropriate by the assessor. This was to reflect the sparseness of the vegetation in these polygons (refer to **Table 3.**, **APPENDIX THIRTEEN**) compared with other polygons, and was considered a conservative approach.
- Urban areas and infrastructure, estuarine and ocean areas and grassy patches were excluded.
- Grassy patches were conservatively considered to be dominated by exotic pasture species, and
- Percentage cover was calculated by dividing the sum of the vegetation polygons net area by the net buffer area.

Overall Native vegetation cover was calculated at 62% and is assigned to the 30 - 70% class.

The calculation of the patch size was determined using QGIS 3.8.1 according to the definition described on p 21 of the 'manual' (BAM Operational Manual) and Section 5.3.2 of the BAM and the method applied was as follows:

- The patch is an area of intact native vegetation occurring on the subject land and beyond and includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or less than 30m for non-woody ecosystems).
- The boundary of the patch was determined to be equivalent to that of the polygons used to calculate native vegetation extent using the method outlined above.
- The contiguous nature of the vegetation resulted in one patch of approximately 380ha within the buffer (refer to **FIGURE 13**, **Section 3.2** and **Table 3.1**). All vegetation zones on the site are included in the same patch, and
- As the one patch exceeds the maximum patch class size of >100ha, there is no requirement for the calculation of patch size to include areas outside the buffer in order to allocate each PCT and vegetation zone to the maximum patch size class.

The one patch of approximately 380ha was assigned to the maximum patch size class size of > 100ha.

GIS methods and spatial data sources utilised were as follows:

- QGIS 3.8.1 (Zanzibar) was used to prepare all mapping presented within the BDAR.
- Resource recovery site (stockpile) boundary and stockpile topography spatial data supplied by Pandanus Solutions
- Koala mapping (CKPoM Preferred Koala Habitat) shapefile supplied by GIS Department, Kempsey Shire Council 12/2/2020.
- Base imagery and cadastral data sourced from the Web Map Service (WMS) Directory provided by NSW Spatial Services, a division of the Department of Finance, Service and Innovation (DFSI). Accessed from

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https://mapprod3.environment.nsw.gov.au/arcgis/services/Planning/EPI_PrimaryPlanning_Layers/MapServer/WMServer?request=GetCapabilities&service=WMS

The following spatial datasets were used to prepare maps in this BDAR and/or identify relevant information used in this BDAR:

- Mitchell landscapes Version V3.1 obtained 15/1/2020 from <https://datasets.seed.nsw.gov.au/dataset/7a1658be-a632-4d4c-8e94-5f9b3be31055>
- Biodiversity Values Map accessed 16/1/20 (and 26/2/20 post BV Map update) from (<https://www.environment.nsw.gov.au/biodiversity/biodiversity-values-map.htm>)
- Interim Biogeographic Regionalisation (IBRA) Regions and Subregions zip files obtained from Department of Agriculture, Water & Environment May/ August 2019: <https://www.environment.gov.au/fed/catalog/search/resource/downloadData.page?uuid=%7B8B9E3F42-9856-4487-AE9E-C76A322809A1%7D> and <https://www.environment.gov.au/fed/catalog/search/resource/downloadData.page?uuid=%7B4A2321F0-DD57-454E-BE34-6FD4BDE64703%7D>
- Geology Map: Kempsey Area Coastal Quaternary Geological Map (2008) M258 accessed 16/1/20 from <https://search.geoscience.nsw.gov.au/product/36>
- Acid Sulfate Risk Map accessed from SEED via WMS service https://mapprod1.environment.nsw.gov.au/arcgis/services/Soil/AcidSulfateSoilRisk_EDP/MapServer/WMServer?request=GetCapabilities&service=WMS
- SEPP (Coastal Management) 2018 accessed from SEED via WMS service https://mapprod3.environment.nsw.gov.au/arcgis/services/Planning/SEPP_Coastal_Management_2018/MapServer/WMServer?request=GetCapabilities&service=WMS
- Directory of Important Wetlands (DIWA) Third Edition (EA, 2001) accessed from Department of the Environment (2015) DIWA Spatial Database (Public) <https://data.gov.au/data/dataset/6636846e-e330-4110-afbb-7b89491fe567>
- Hydrology: Surface Hydro Lines Regional <https://www.ga.gov.au/scientific-topics/national-location-information/national-surface-water-information>
- Connectivity: NSW Department of Planning, Industry and Environment" (2020) Fauna Corridors for NE NSW. Bioregional Assessment accessed 20/1/20 <https://datasets.seed.nsw.gov.au/dataset/fauna-corridors-for-north-east-nsw> NPWS Estate Accessed 9/1/2020 from <https://mapprod.environment.nsw.gov.au/arcgis/services/EDP/Estate/MapServer/WFS/Server?request=GetCapabilities&service=WFS>
- Existing vegetation mapping: Kempsey LGA (Eastern Portion) Vegetation. VIS_ID 243 A polygon shapefile 1:25,000 vegetation mapping dataset combining 1999 CRAFTI and Forest Ecosystem mapping undertaken by Kendall and Kendall Ecological Consultants and GECO Environmental for Kempsey Shire Council. Revised 4/8/2011. Accessed 10/2/20 from https://datasets.seed.nsw.gov.au/dataset/kempsey-lga-eastern-portion-vegetation-vis_id-243ebc18/resource/b08e33f0-88ec-456a-a474-4b0dd85f0892.
- Land tenure: accessed 20/2/20 NSW Department of Planning ArcGIS REST Services Directory https://mapprod3.environment.nsw.gov.au/arcgis/services/Planning/EPI_Primary_Planning_Layers/MapServer/WMServer?request=GetCapabilities&service=WMS

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- Elevation data: Geoscience Australia ELVIS - Elevation and Depth - Foundation Spatial Data (Version 0.6.5) accessed 14/2/20 from <https://elevation.fsd.org.au/>. The DEM dataset was converted in QGIS to contours.
- BAM - Important Areas for a small number of species of threatened fauna: NSW Department of Planning, Industry & Environment Map viewer accessed 27/3/20 at https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas

Field survey methodology

Following preliminary desktop assessments, an initial site inspection was undertaken on the 1st of September 2019 in order to gain a background understanding of the resource recovery area, subject property and the nature of the proposed resource recovery per se. Subsequent to follow-up comprehensive desktop assessments encompassing preliminary identification of potential PCTs and vegetation zones, field surveys were undertaken on the 1st to the 3rd of September 2019.

These surveys were focused on vegetation plot sampling and plant species identification, both these tasks contributing to the compilation of a flora species list for the resource recovery area and subject property. Subsequent site inspections were undertaken on the 2nd to the 5th of December 2019 primarily to conduct fauna surveys but also to complete BAM flora plots. In order to address the requirements of the CKPoM, a SAT survey was undertaken on the 7th February 2020, in addition to vegetation zone boundary waypoint descriptions.

Native Vegetation Communities and Target Threatened Plant Species / Determination of Vegetation Zones and Extent of Vegetation Plot Sampling: The results from desktop assessments and the initial site inspection were used to determine the likely vegetation zones for the subject property. The key criteria for determining zones were native vegetation cover, the extent of existing clearing and observed/previously recorded tree species.

The results from the plot sampling data subsequently were used to confirm and amend as appropriate, the boundaries of vegetation zones.

The extent of vegetation plot sampling required was determined according to the determination of the vegetation zones as described above and the size of these zones, with the number of plots required in accordance with the criteria provided in Table 4 of the BAM.

Plot Sampling and Target Threatened Plant Species Surveys: Six sample plots, comprising a 20 x 20 m quadrat within a 20 x 50 m plot, initially were established as per the procedures prescribed by the BAM. These plots included two plots beyond the stockpile and/or impact area, surveyed in part for the purpose of comparing the respective vegetation types with the vegetation within the impact area and/or stockpile area. An additional purpose was to allow for the potential for indirect impacts on these vegetation communities/habitats. Descriptions of each vegetation zone are provided in **Section 4.2.2 (APPENDIX THIRTEEN)**.

The full criteria considered in the placement of the sample plots comprised the following:

- In general, the areas surrounding the stockpile were proposed for retention;
- In general, the proposed resource recovery /impact area was limited to the stockpile;
- The stockpile contained patches in the north and a small patch in the south of vegetation supporting preferred Koala Food Trees and old growth/large mature trees;
- Potential TEC's existed in the areas beyond the stockpile; and
- The area of the access track could require very limited impacts comprising primarily clearing of Lantana and possibly lopping of overhanging branches, within three very small patches. Given the size and disjunct nature of these patches, establishing a plot within this zone was considered impractical.

Based on the above factors:

- Plots 1, and 3 were placed within the main stockpile regrowth area of low condition, but varying in the regenerating vegetation present (refer to **Section 4.2.2** for further details)
- Plot 2 was placed in close proximity to Plot 1, but within the larger patch of remnant vegetation supporting preferred Koala Food Trees and old growth trees in the north of the stockpile
- Plot 4 was located to sample a patch of regenerating Swamp Oak (*Casuarina glauca*) occurring on the stockpile.
- Plot 5 and 6 were placed outside the impact area to survey more naturally occurring communities within the subject property. All plots are indicated in **APPENDIX THIRTEEN – FIGURE FOURTEEN**.

In conjunction with the vegetation plot sampling procedures, general walking transects and fauna surveys, as well as target searches, were undertaken to assess for any threatened plant species potentially occurring on the subject property, and particularly within the impact area.

These searches followed grid transect lines (as per the NSW Guide to Surveying Threatened Plants, Office of Environment and Heritage 2016), although both within and outside the impact area, minor deviations from transect alignments were necessary at times, owing to physical constraints from dense weed infestations.

The general locations of survey transects for threatened flora are indicated on **FIGURE FOURTEEN**, but the actual extent of surveying over the impact area and subject property is greater than could be clearly shown, given the extent of intersecting/criss-crossing movements undertaken.

Additional procedures for vegetation surveys included the following:

- Documentation of all plant species observed, both within plots, within the impact area and within the subject property as a whole;
- Collection of a small number of plant specimens for subsequent taxonomic confirmation; and
- Photographing of representative areas of the vegetation zones and of the vegetation plots.

Fauna surveys:

On the basis of the desktop review process, encompassing consideration of the habitats present, threatened species records for the IBRA Subregion, and the potential for threatened species to utilise the stockpile habitats, fauna surveys were undertaken based on the following factors:

- The stockpile area per se had been both cleared and substantially altered in landform structure some decades previously;
- There has been varying degrees of natural regeneration of native plant species on the stockpile, in combination with varying extents of exotic weed infestation; and
- The stockpile is bounded to the south/south-east by relatively natural vegetation communities, and to the north/north-east/east by relatively advanced regeneration of post-mining native vegetation communities (refer to **FIGURE ELEVEN**), albeit supporting varying extents of exotic weed infestation. These communities represent suitable habitat for a range of fauna species.

For some species to be considered as candidate species for assessment according to BAM requirements, potentially suitable habitat was either absent or too highly degraded or marginal to render it likely to support the threatened species in question. Consideration of this aspect also took into account amendments made to the extent of the proposed impact area, based on the identification of higher habitat values for some sectors. This applied particularly to areas supporting both KFTs and old growth and/or large mature trees. The reasons for removing candidate species from the list of species requiring further assessment/surveys are provided for each species in **APPENDIX THIRTEEN**.

Details on specific fauna survey procedures undertaken in 2019/2020 are provided below and the locations of surveys are indicated on **FIGURE FOURTEEN in APPENDIX THIRTEEN**. The majority of specific surveys were undertaken in December 2019, but additional Koala surveys were undertaken in February 2020 and general observations and some opportunistic bird surveys were undertaken during all survey sessions.

Field survey procedures were as follows:

- Habitat Assessments: Site habitats were assessed generally to determine their value for native fauna species, the assessment process being undertaken on an ongoing basis through the study period in conjunction with both flora and target fauna surveys. Key habitat features, for both threatened species and other native fauna groups, considered for the assessment process included:
 - The presence of mature trees with hollows, fissures and/or other suitable roosting/nesting places;
 - Presence of old growth trees/large mature trees;
 - The presence of KFTs;
 - The presence of preferred Glossy Black Cockatoo feed trees (Forest oak and/or Black she-oak);
 - Areas of dense vegetation;
 - Presence of hollow logs/debris and areas of dense leaf litter;
 - Presence of drainage lines/swampy areas;
 - Presence of fruiting flora species;
 - Presence of blossoming flora species, particularly winter-flowering species;
 - Vegetation connectivity and proximity to neighbouring areas of intact vegetation;
 - Presence of any man-made structures suitable as microchiropteran bat roost sites.

The locations of a number of specific habitat features, such as native figs representing a food resource, were recorded previously (**APPENDIX SEVENTEEN**), using a handheld GPS unit and subsequently mapped.

Small Mammal Trapping: Trapping surveys, using Elliott Type A traps, were undertaken in order to target any small mammals utilising the stockpile and adjoining habitats, and particularly the threatened species, the Common Planigale (*Planigale maculata*) and Eastern Pygmy Possum (*Cercartetus nanus*), both of which have been trapped previously in Elliott traps (A. Martin, 1995, 1996 unpubl. data). Although pitfall traps

ideally would be used in addition to Elliott traps, the very dense, soft nature of the ilmenite substrate severely hindered the installation of effective pitfall traps. The traps for this survey also were set on a very fine trigger level to maximise the chances of capture of small fauna species. A total of 450 trap nights was sampled along two trap lines, with the location of each trap lines designed to sample habitats both on and off the stockpile. Traps were set with a standard bait mixture of peanut butter, rolled oats, honey and vanilla, checked each morning and rebaited if the bait had been eaten or soiled by a captured animal. All trap locations were marked with labelled flagging tape in the field.

Hair Tube Trapping: Hair tube trapping was conducted in conjunction with Elliott trapping, with hair tube traps set along portions of each Elliott trap line. This trapping procedure was aimed at both small mammals, which have been effectively sampled using this method during long term monitoring programmes (Greenloaning Biostudies 2003), and medium weight range species (e.g. bandicoots, Rufous Bettong [*Aepyprymnus reufescens*]). A total of 120 hair tube trap nights were sampled. Hair specimen analysis was conducted Dr David Read.

Camera Trapping: Three Browning 'no-glow' infrared Trail Cameras (BTC 6HDE) were set at strategic locations within the subject property, one each near the start of each trap line and one to the north of the stockpile directed along a drainage line and potential movement corridor. A total of 27 camera trap nights was sampled, with all images checked once by an ecologist and re-checked by the principal ecologist for any signs of fauna activity. The locations of the camera traps are indicated on **FIGURE FOURTEEN**.

Koala SAT Plot Surveys: Although it was determined during the course of the project studies that the areas supporting KFTs were potentially to be retained, in the absence of complete certainty, initial checks of such areas were undertaken in December 2019 for signs of Koalas in the form of pellets at the base of trees. Spotlighting surveys also were undertaken over two nights in December 2019 (see **Section 3.3.3.iv**). A formal SAT Plot survey according to the procedures detailed in Phillips and Callaghan (2011) subsequently was undertaken in February 2020, focusing on the northern remnant forest/woodland vegetation supporting the majority of KFTs within the stockpile area.¹ The location of the central tree for the SAT Plot and spotlighting transects are indicated on **FIGURE FOURTEEN**.

Spotlighting Surveys: Spotlighting surveys were undertaken by two personnel on two nights in December 2019, with two spotlighting transects sampled each night. The conditions on each night were fine and mild to warm. The primary aim of these surveys was to target nocturnal arboreal species, including the Koala, as well as any other nocturnal ground fauna or bird species. A total of approximately eight person hours was spent spotlighting. Opportunistic spotlighting also was undertaken within the stockpile area during the course of checking harp nets after dusk (refer to **Section 3.3.3.viii** below).

Microbat Surveys: Microbats were surveyed using two harp nets, located at two suitable flyways within the stockpile area, as shown on **FIGURE FOURTEEN**. One species credit species requiring surveys under the BAM is the Southern Myotis (*Myotis macropus*). Harp nets were set at each location over three nights, total trap nights equalling nine. Two bat detectors also were set at the same locations, with sampling continued over nine consecutive nights. Call analysis was carried out by specialist Greg Ford from Balance Environmental.

¹ Although this remnant occurs within the mapped boundaries of the stockpile, the age of some trees also exhibiting tree hollows suggests the stockpile material was built up around the old growth trees present. Younger trees within this forest/woodland patch would have grown since the establishment of the stockpile.

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Opportunistic Sightings: All observations of fauna species observed during the course of flora surveys and other fauna survey procedures were recorded. Any locations of threatened or migratory species were documented separately and the GPS coordinates recorded.

Active Searching: Active searches for reptiles were undertaken whilst traversing the site, with logs, or any potential shelter site overturned as part of the search process. Any diggings, scats and bones observed during these searches also were recorded. These searches generally were opportunistic as logs and suitable shelter habitat were poorly represented over most of the stockpile habitats.

Desktop review results

Threatened Species, Populations and /or Ecological Communities with Potential to Occur on the subject property:

The initial desktop assessment process yielded a total of 38 threatened species and nine threatened ecological communities (TECs) listed under the BC Act and occurring within the subregion. Of the total threatened flora species listed, 18 also are listed as threatened under the EPBC Act. Refinement of the list of potential threatened species and communities subsequently was undertaken, following a preliminary site inspection and detailed consideration of the ecological data on threatened species provided in BioNet 2019/2020. This process reduced the list of candidate 'species credit species' to a total of 8 threatened flora species. However, species such as those associated with estuarine or wetland habitats, which could not be expected to occur on the stockpile/impact area habitats, were excluded from the final candidate species list.

Four TECs also were considered likely or potentially to occur, these being:

1. Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions;
2. Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;
3. Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion;
4. Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;

Community 1 and 2) above are also listed under the EPBC Act as Critically Endangered Ecological Communities (CEECs), viz: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia; and Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community.

It is noted that desktop studies indicated that the Goolawah National Parks contains a number of communities with potential relevance to the project site and stockpile environs. These communities include:

- Coastal swamp forests (including three different Broad-Leaved Paperbark (*Melaleuca quinquenervia*) communities;
- Wallum sand heaths, dominated by coastal wattle (*Acacia longifolia* ssp. *sophorae*);
- Coastal dune dry sclerophyll forests dominated by Pink Bloodwood (*Corymbia intermedia*) and Coast Banksia (*Banksia integrifolia* ssp. *integrifolia*), found on sandy dunes and coastal plains;
- Two distinct littoral rainforest communities, one is dominated by Coast Banksia and Tuckeroo (*Cupaniopsis anacardioides*), found in the more protected fore dune areas, and another, more diverse community occurring on Racecourse Headland (DPIE, 2014).
- Two threatened plant species also have been recorded from the national park: Austral Toadflax (*Thesium australe*) and White-flowered Wax Plant (*Cynanchum elegans*). An additional three have been recorded in the locality, these being:
 - Scented Acronychia (*Acronychia littoralis*),

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- Dwarf Heath Casuarina (*Allocasuarina defungens*) and
- Milky Silkpod (*Parsonsia dorrigoensis*) (DPIE, 2014).
- The park contains three endangered ecological communities:
- Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions;
- Themeda Grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions; and
- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (DPIE, 2014).

The full lists of threatened species and communities generated from the database searches are provided in **APPENDIX THIRTEEN** but summarised in the table below.

TABLE SIX: CANDIDATE THREATENED FLORA SPECIES FOR WHICH SURVEY WAS REQUIRED, EXTENT OF POTENTIAL HABITAT AND BIODIVERSITY RISK WEIGHTING

Species		Habitat Features Suitable for the Species and Present on the subject property*	Feature Present in Impact Area	Extent of Potential Habitat within Impact Area (ha)	Biodiversity Weighting Risk
Scientific Name	Common Name				
<i>Acronychia littoralis</i>	Scented Acronychia	Regenerating Littoral Rainforest	Some elements	0	3
<i>Alexfloydia repens</i>	Floyd's Grass	Moist understorey of Swamp Oak Forest	Regenerating patch of Swamp Oak	0.08	3
<i>Allocasuarina defungens</i>	Dwarf Heath Casuarina	Tall heath on sands – also on clay soils and sandstone, coastal hills/headlands	Regenerating dry woodland areas with some heath elements	1.28	2
<i>Dendrobium melaleucaphilum</i>	Spider Orchid	Grows commonly on <i>Melaleuca styphelioides</i> and sometimes on rainforest trees	Very scattered rainforest Trees	Scattered Trees only within Zone 3c (Total zone -1.14 ha)	2
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	Damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Minimal – one small ditch within PCT 1235	Approx. 150 sq. m	2
<i>Peristeranthus hillii</i>	Brown Fairy-chain Orchid	Rainforest trees and occasional vines in Littoral Rainforest and t Lowland	Only very scattered Littoral Rainforest trees	Scattered Trees only within Zone 3c (Total zone -1.14 ha)	3

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		Rainforest on Floodplain			
<i>Eucalyptus seeana</i> – endangered population	Eucalyptus seeana population in the Greater Taree local government area	Occurs as scattered individuals in woodlands and open forests on low, often swampy, sandy soils.	Slight possibility of an isolated specimen	If any mature specimens are present in forest/woodland habitats, a young seedling/sapling could occur in regenerating areas, mainly zone 2c (0.14 ha)	2

*Office of Environment and Heritage 2017a, 2017b, 2017c, 2018a, 2018b, 2019a, 2019b

Vegetation Cover and Communities:

Desktop assessments determined that the percentage cover of native vegetation within the 1500m buffer zone was 62%, whilst the patch size was 380 ha.

The extent and broad type of existing vegetation mapping depicted in **FIGURE SIX** is based on Kempsey LGA (Eastern Portion) Vegetation VIS_243, a polygon shapefile 1:25,000 vegetation mapping dataset combining 1999 CRAFTI and Forest Ecosystem mapping undertaken by Kendall and Kendall Ecological Consultants and GECO Environmental for Kempsey Shire Council and encompassing the resource recovery area and subject property.

The existing mapping as shown on **Figure 15** is very broad scale and importantly was noted by the report authors, was not subject to further ground truthing. “Limited ground truthing was conducted along roads providing access to the study area and no systematic flora survey was undertaken” (Telfer & Kendall, 2006).

Therefore, vegetation communities within the resource recovery /impact area and subject property were subsequently refined for the purposes of the BDAR.

Review of desktop assessments:

The initial desktop assessment process yielded a total of 98 threatened species listed under the BC Act and occurring or predicted to occur within the subregion. Of the total threatened fauna species listed, 29 are also listed as threatened and/or migratory under the EPBC Act. Refinement of the list of potential threatened species subsequently was undertaken, in conjunction with detailed consideration of the ecological data on threatened species provided in BioNet 2019.

Species such as those reliant on marine, estuarine or wetland habitats, which could not be expected to have any reliance on the subject property habitats, were excluded from the candidate species list. Whilst recognising that some marine species are known to use Littoral Rainforest for shelter, it was considered that the likelihood of the resource recovery area and subject property being used for this purpose was very low, based on the following factors:

- The location being somewhat removed from the vegetation immediately adjacent to the ocean; and,
- The disturbed nature of the subject vegetation and associated interrupted canopy cover.

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The full lists of threatened species generated from the database searches are provided in the full report in **APPENDIX THIRTEEN**. The list of candidate species requiring survey is provided in **TABLE SEVEN** below. Preliminary comments on the likelihood of occurrence also are provided in report, along with the justification for discounting 'ecosystem credit species' from the list of species predicted to occur, and 'species credit species' from the candidate species list is provided.

TABLE SEVEN: CANDIDATE THREATENED FAUNA SPECIES FOR WHICH SURVEY WAS REQUIRED, EXTENT OF POTENTIAL HABITAT AND BIODIVERSITY RISK WEIGHTINGS

Species		Habitat Features Suitable for the Species and Present on the subject property*	Feature present in Impact Area	Extent of Potential Habitat within resource recovery area (ha)	Biodiversity Risk Weighting
Scientific Name	Common Name				
<i>Burhinus grallarius</i>	Bush-stone Curlew	Occurs in open forests and woodlands with a sparse grassy ground layer and fallen timber	Small areas of grassy groundcover	0.19	2
<i>Cercartetus nanus</i>	Eastern Pygmy Possum	Generally prefer woodlands and heath except in NE NSW where mostly in rainforest. Feeds largely on nectar and pollen from Banksias, eucalypts and bottlebrushes	Very scattered food resources in Zones 2c and 3c	Total zones area 1.28 ha, but very little food resources in zone 3c.	2
<i>Lichenostomus fasciolaris</i>	Mangrove Honeyeater	Mangrove woodlands and shrublands are primary habitat - also range into adjacent forests/ woodlands/ shrublands, including Casuarina and paperbark swamp forests/ associations dominated by eucalypts or banksias.	Regenerating Swamp Oak forest	0.08	2
<i>Carterornis leucotis</i>	White-eared Monarch	Occurs in rainforest, especially drier types, such as littoral rainforest, and wet/ dry sclerophyll forests, swamp forest and regrowth forest. - appear to prefer ecotone between rainforest and other open vegetation types/ rainforest edges, such as along roads.	Regenerating Swamp Oak forest/edges of regenerating 1230 near remnant forest/woodland	Approximately 0.1	2
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	Prefers dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter, but also inhabits heath, swamps, rainforest and wet sclerophyll forest.	Could use Zones 2c/3c/4c and 5c for foraging	1.37	2

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Species		Habitat Features Suitable for the Species and Present on the subject property*	Feature present in Impact Area	Extent of Potential Habitat within resource recovery area (ha)	Biodiversity Risk Weighting
Scientific Name	Common Name				
<i>Phascolarctos cinereus</i>	Koala	Known to use Forest Red Gums and Swamp Mahogany as Preferred KFTs	Known to occur in habitat adjacent to Impact Area. Potentially would move through Zone 2c, 3C and 4c to Zones 1R, 3R supporting KFTs	No Preferred Habitat within Impact Area but movement area 2 comprises 1.37 ha	2
<i>Planigale maculata</i>	Common Planigale	Inhabit rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water.	Could use Zones 2c, 3c, 4c	1.3	2

* Office of Environment and Heritage 2017d, 2017e, 2018c, 2018 d, 2018e, 2018f, 2019f, 2019 g

Field flora results

Vegetation Communities and PCTs:

The 2019/20 field inspections and surveys, in conjunction with the desktop assessment processes, yielded the following key findings in relation to the occurrence and distribution of vegetation communities and PCTs occurring on the resource recovery area and subject property:

- The stockpile/impact area which was abandoned and left to regenerate naturally and is generally in low condition with infestations of Lantana, was determined to best fit PCT 1230 *Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion*, although the PCT classification confidence level is very low (OEH, 2020b). This community as it occurs on the stockpile is not considered to be a TEC (refer below for further details);
- Patches of vegetation in the north and a small patch in the south of the stockpile containing old-growth and or Koala food trees within the same community are to be retained;
- In addition, PCT 1230 fringes the stockpile/Point Plomer Road margins and the northern perimeter of the subject property and is conservatively considered a TEC in sectors that may conform to the TEC definition of occurrence on a floodplain (refer below for further details);
- The low-lying areas south, south west and south east of the stockpile dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*) were classified as PCT 1064 *Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion*. This community represents a modified and regenerating form of TEC (refer below for further details);
- A small area on the northeast margin of the stockpile and a more extensive area north east of the stockpile on the western subject property boundary dominated by Swamp Oak (*Casuarina glauca*) was determined to fit PCT 1235 *Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion* and also represents a modified and regenerating form of TEC off the stockpile only (refer below for further details);
- The subject property to the east of the aforementioned communities comprises PCT 686 Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion, not considered to be a TEC (refer below for further details) and PCT 1536 Tuckeroo - Lilly Pilly - Coast Banksia littoral rainforest which is a modified and regenerating form of TEC (refer below for further details);

The distribution of the vegetation communities within the subject property and on the resource recovery area, is indicated on **FIGURE SIX**. Descriptions of the five PCTs referred to above are detailed below;

Community 1 - PCT 686 - Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion:

Community Attributes and Condition

Vegetation Class: North Coast Wet Sclerophyll Forests

Percentage Cleared: 50%

The vegetation description of this PCT is “Other Diagnostics Features: Tall to very tall open forest (12 – 35m). Landscape Position: In low lying areas on the coast from Kendall north to Coffs Harbour. Upper Stratum Species: *Eucalyptus pilularis*; *Corymbia intermedia*; Mid Stratum Species: *Breynia oblongifolia*; *Callistemon salignus*; *Glochidion ferdinandi*; *Melaleuca linariifolia*; *Rubus hillii*; Ground Stratum Species: *Entolasia marginata*; *Eustrephus latifolius*; *Lomandra longifolia*; *Oplismenus imbecillis*; *Pratia purpurascens*; *Pseuderanthemum variable*; *Pteridium esculentum*; *Imperata cylindrica* var. *major*”(OEH, 2020b).

The determination of this community as Wet Sclerophyll Forest and PCT 686 has been based on the following key attributes and as evidenced by Plot CHBAM6:

- The occurrence of upper stratum (*Eucalyptus pilularis*, *Corymbia intermedia*), mid stratum (*Breynia oblongifolia*, *Glochidion* spp.) and ground stratum (*Lomandra longifolia*, *Imperata cylindrica*) species characteristic of this PCT;
- The location of the community in low lying areas on the coast from Kendall north to Coffs Harbour.

As stated in the VIS Classification - Community Profile Report (OEH, 2020b) the classification confidence of this PCT is very low with neither the lithology nor landform patterns having been assessed.

Plot CHBAM6 presented in the report and provided as fully formatted tables separately in excel format, provides an example of the variation in composition and structure of the community.

Importantly, the presence of other species not occurring in the PCT description, such as *Casuarina glauca*, *E. robusta*, *Melaleuca quinquenervia* and vines including *Parsonsia* spp., *Smilax australis* and *Geitonoplesium cymosum* indicate the transitional or ecotonal nature of the community, as could be expected when considering the community is surrounded by other PCTs.

The photographs provided below and, in the report, also illustrate the nature of this area and the level of disturbance. A comparison of the benchmark conditions for the PCT and the condition of the representations of the PCT within the resource recovery /impact area and subject property is provided in **TABLE FOUR**. A full list of flora species recorded in the community is provided in the report.

Plant Community Type 686 is associated with the following TECs, which are listed as Endangered under the BC Act: River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part) and the Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion (Part).

This PCT does not appear to conform to the listing advice for the first TEC as “The combination of features that distinguish River-Flat Eucalypt Forest on Coastal Floodplains from other endangered communities on the coastal floodplains include its dominance by either a mixed eucalypt canopy or by a single species of eucalypt belonging to either the genus *Angophora* or the sections *Exsertaria* or *Transversaria* of the genus *Eucalyptus* (Hill 2002); the relatively low abundance or sub-dominance of *Casuarina* and *Melaleuca* species; the relatively low abundance of *Eucalyptus robusta*; and the prominent groundcover of soft-leaved forbs and grasses. It generally occupies central parts of floodplains and raised levees; habitats where flooding is periodic and soils

are rich in silt, without deep humic horizons and show little or no influence of saline ground water” (NSWSC 2011-2012a).

There were no Angophora or Red Gum (*Exsertaria*) species recorded in this community and only one recording of *Transversaria* (*E. robusta*) at the BAM Plot. In addition, the soils were sandy, rather than soils rich in silt as described in the listing advice.

Community 2 - PCT 1064 - Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion

Community Attributes and Condition
Vegetation Class: Coastal Swamp Forests
Percentage Cleared: 75%

This PCT is described in the VIS Classification - Community Profile Report (OEH, 2020b) as “Low to very tall woodland and forest in which Broad-leaved Paperbark (*Melaleuca quinquenervia*) commonly dominates the overstorey, or occasionally another paperbark (e.g. *M. alternifolia*, *M. sieberi*, *M. linariifolia*, *M. styphelioides*). Associates include Swamp Mahogany (*Eucalyptus robusta*), Swamp Oak (*Casuarina glauca*) and Swamp Box (*Lophostemon suaveolens*). Understorey and ground layer composition varies with substrate, depth and extent of waterlogging, and water quality. Sawsedges (*Gahnia spp.*), twig-rushes (*Baumea spp.*), *Carex spp.*, Bungwahl Fern (*Blechnum indicum*), Feather Plant (*Baloskion tetraphyllum*), Tea-tree (e.g. *Leptospermum juniperinum*), Bottlebrush (e.g. *Callistemon pachyphyllus*) and certain grasses (e.g. *Hemarthria uncinata*, *Ischaemum australe*) may dominate, or alternatively rainforest trees, shrubs and vines such as Cabbage Tree Palm (*Livistona australis*), Cheese Tree (*Glochidion ferdinandi*) and Common Silkpod (*Parsonsia straminea*) can be common. This ecosystem is widespread on the coastal lowlands”. Additional species such as Forest Red Gum (*E. tereticornis*) are listed in the Species per Stratum section of the Profile.

The determination of this community as PCT 1064 has been based on the following key attributes as evidenced by Plot CHBAM5:

- The dominance of *M. quinquenervia* in the upper stratum and presence of *E. tereticornis* and *Glochidion spp.* in the upper and mid stratum;
- The dominance of the ground stratum by *Gahnia sieberiana* and occurrence of other species characteristic of this PCT, including *Parsonsia spp.* and Fern species.

As stated in the VIS Classification - Community Profile Report (OEH, 2020b) the classification confidence of this PCT is medium, however neither the lithology nor landform patterns have been assessed.

Plot CHBAM5 presented in the report, provides an example of the variation in composition and structure of the community, with the presence of other species not occurring in the PCT description such as *Ficus spp.*, *Corymbia intermedia*, *Guioa semiglauca* and vines *Smilax australis* being indicative of the influence of adjoining PCTs.

The photographs provided below and, in the report, also illustrate the nature of this area and the level of disturbance. A comparison of the benchmark conditions for the PCT and the condition of the representations of the PCT within the resource recovery /impact area and subject property is provided in **TABLE FOUR**. A full list of flora species recorded in the community is provided in the report at **APPENDIX THIRTEEN**.

Plant Community Type 1064 is associated with the following TECs, which are listed as Endangered under the BC Act: River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part) partially subset of and the Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Equivalent)

wholly subset of this PCT does not conform to the listing advice (see PCT 686 for description) for the *River-Flat Eucalypt Forest* TEC as it is dominated by Paperbark. It does appear to conform to the listing advice for Swamp Sclerophyll Forest on Coastal Floodplains which is “associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains, generally below 20m” (NSWSC 2011-2012b).

This BAM plot occurs on alluvial soils, at an elevation of < 20m and includes “areas of fernland and tall reedland or sedgeland” (NSWSC 2011-2012b). The presence of *Ficus* spp. (eg Sandpaper Fig) at the plot also conforms to the determination as does the “relatively infrequent occurrence of other eucalypts, *Casuarina glauca* or *Lophostemon suaveolens*” (NSWSC 2011-2012b).

Community 3 - PCT 1230 - Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion:

Community Attributes and Condition
Vegetation Class: Coastal Swamp Forests
Percentage Cleared: 75%

This PCT is described in the VIS Classification - Community Profile Report (OEH, 2020b) as “Mid-high (rarely low) to very tall woodland and forest; Landscape Position: In drainage lines and open depressions mainly on the coastal lowlands, but occasionally further inland. Upper Stratum Species: *Eucalyptus robusta*; *Melaleuca quinquenervia*; *Casuarina glauca*; *Eucalyptus resinifera*; *Eucalyptus tereticornis*; *Corymbia intermedia*; *Lophostemon suaveolens*; Mid Stratum Species: *Acacia maidenii*; *Baeckea frutescens*; *Callistemon pachyphyllus*; *Cordyline stricta*; *Glochidion ferdinandi*; *Leptospermum juniperinum*; *Livistona australis*; *Melaleuca* spp.; *Melicope elleryana*; *Parsonsia straminea*; Ground Stratum Species: *Balioskion tetraphyllum*; *Blechnum camfieldii*; *Blechnum indicum*; *Gahnia* spp.; *Hypolepis muelleri*; *Ischaemum australe*; *Sporadanthus interruptus*; *Xanthorrhoea fulva*;

The determination of this community as PCT 1230 has been based on the following key attributes as evidenced by Plot CHBAM1, 2 and 3 and additional waypoint descriptions CHF1, 6, 7, 8, 13, 14:

- The dominance of old growth *E. tereticornis* in the upper stratum with *C. intermedia* at Plot 2 which must have already been in existence but was partially buried by the stockpile in the north of the stockpile. The presence of old growth *E. robusta* and *E. tereticornis* in a patch on the south of the stockpile (CHF14);
- The presence of *E. tereticornis* *C. intermedia*, *M. quinquenervia*, *C. glauca* at CHF1, 6, 7, 8, 13, 14;
- Despite the dominance by regenerating pioneer species in Plot 1 and 3 which are effectively cleared areas created by the stockpile, in particular, *Pteridium esculentum* at Plot 3 and *Imperata cylindrica* at Plot 1, species characteristic of this PCT were recorded at Plot 1 (*E. tereticornis* and *Glochidion ferdinandi*) and therefore was considered to be part of this PCT;
- PCT 1230 was considered the best match for Plot 3 owing to the occasional occurrence of *C. intermedia* as an emergent above the dense *Pteridium esculentum*/*Lantana* dominating the lower stratum, as well as isolated *Glochidion ferdinandi* and *Leptospermum juniperinum* small trees/shrubs.

As stated in the VIS Classification - Community Profile Report (OEH, 2020b) the classification confidence of this PCT is very low with neither the lithology nor landform patterns having been assessed. The community as it occurs on the stockpile has been substantially disturbed from past clearing and the regenerating areas have developed on a totally man-modified substrate of ilmenite. The designation of this community thus is quite

problematic and the confidence level for PCT determination is very low. Weed infestations have further influenced the regenerating areas and there is considerable variation in species composition, canopy cover and extent of weed cover over the subject property. This variation has led to the designation of vegetation zones as shown in the report (**APPENDIX THIRTEEN**).

Plot CHBAM1, 2 and 3, provide examples of the variation in composition and structure of the community, with the presence of other species not occurring in the PCT description such as *Pteridium esculentum*, *Imperata cylindrica* and *Banksia integrifolia* due to the anthropogenic nature of the stockpile.

The photographs provided below and, in the report, also illustrate the nature of this area and the level of disturbance. A comparison of the benchmark conditions for the PCT and the condition of the representations of the PCT within the resource recovery /impact area and subject property is provided in **TABLE FOUR**.

Plant Community Type 1230 is associated with the following TECs, which are listed as Endangered under the BC Act: Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion (Part); Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part); Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part)

Importantly, the communities on the stockpile **do not** meet the criteria for any of these TECs due to the geomorphological nonconformity of the stockpile. All of these TECs require the communities to reside on coastal floodplains and associated soils (NSWSC 2011-2012b, c) whereas the stockpile is anthropogenic and composed of black ilmenite sand.

While the communities off the stockpile may comply with the vegetation descriptions, there is doubt regarding the floodplain status of the lower-lying land surrounding the stockpile, however from a precautionary approach, they would be considered as TECs.

Community 4 - PCT 1235 - Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion:

Community Attributes and Condition
Vegetation Class: Coastal Swamp Forests
Percentage Cleared: 75%

This PCT is described in the VIS Classification - Community Profile Report (OEH, 2020b) as "Low to very tall woodland and forest. Widespread on poorly drained sites in coastal areas. Upper Stratum Species: *Casuarina glauca*; *Melaleuca quinquenervia*; *Eucalyptus tereticornis*; Mid Stratum Species: *Goodenia ovata*; *Hibiscus diversifolius*; *Melaleuca ericifolia*; *Melaleuca styphelioides*; *Parsonia straminea*; Ground Stratum Species: *Baumea juncea*; *Enydra fluctuans*; *Fimbristylis ferruginea*; *Gahnia clarkei*; *Ischaemum australe*; *Juncus kraussii*;

The determination of this community as PCT 1235 has been based on the following key attributes as evidenced by Plot CHBAM4 and additional waypoint descriptions CHF4, 9 and 12:

- The dominance of old growth *C. glauca* in all stratum with *E. tereticornis* also present in the upper stratum.

This community also occurs off the stockpile to the east as documented by waypoint descriptions CHF4, 9 and 12. As stated in the VIS Classification - Community Profile Report (OEH, 2020b) the classification confidence of this PCT is very low with neither the lithology nor landform patterns having been assessed.

Plot CHBAM4 provides an example of the variation in composition and structure of the community, with the presence of other species not occurring in the PCT description such as *Corymbia intermedia* and *Imperata cylindrica* indicating an ecotonal area. The varied elevation drops down into dense *Smilax australis* and *Hibbertia scandens* at the eastern end indicating a more recently cleared and disturbed area.

The photographs provided below and, in the report, also illustrate the nature of this area and the level of disturbance. A comparison of the benchmark conditions for the PCT and the condition of the representations of the PCT within the resource recovery /impact area and subject property is provided in **TABLE FOUR**.

Plant Community Type 1235 is associated with the following TECs, which are listed as Endangered under the BC Act: Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part); Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part); Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part).

Importantly, the communities on the stockpile **do not** meet the criteria for any of these TECs due to the geomorphological nonconformity of the stockpile. These TECs require the communities to reside on coastal floodplains and associated soils (NSWSC 2011-2012b, c), whereas the stockpile is anthropogenic and composed of black ilmenite sand.

However, the patch situated to the east of the stockpile does conform to the Swamp Oak listing with regard to both vegetation and soils which are mapped as alluvial (**Figure 5**) and is therefore considered to be a TEC.

This community also is listed as Vulnerable under the EPBC Act, and occurrences of the community on the low-lying areas surrounding the stockpile are likely to conform to the definition of *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community*.

Under this definition however, the community is associated with such landscape features as low-lying alluvial plains and unconsolidated sediments and 'occurrences of swamp oak trees on rocky headlands or other consolidated substrates are not considered to be a part of the ecological community' (Department of the Environment and Energy 2018) The small pocket of regenerating Swamp Oak Forest occurring within the Impact Area on a dry man-modified stockpile of ilmenite thus does not conform to the definition of the community.

Community 5 - PCT 1536 - Tuckeroo - Lilly Pilly - Coast Banksia littoral rainforest:

Community Attributes and Condition

Vegetation Class: Littoral Rainforest

Percentage Cleared: 78%

The vegetation description of this PCT is "Low open forest to closed forest with a canopy characterised by *Cupaniopsis anacardioides* and *Banksia integrifolia*. The mid-storey is composed mainly of shrubs and climbers. The ground layer consists of ferns; graminoids and scattered forbs. Near coastal areas on coastal lowlands of the lower North coast and Central Coast mainly on sands. Upper Stratum Species: *Cupaniopsis anacardioides*; *Acmena smithii*; *Banksia integrifolia*; Mid Stratum Species: *Myrsine variabilis*; *Breynia oblongifolia*; *Pittosporum revolutum*; *Polyscias elegans*; *Notelaea longifolia*; *Glochidion ferdinandi*; *Smilax australis*; *Marsdenia rostrata*; *Pandorea pandorana*; *Cissus hypoglauca*; *Cissus antarctica*; Ground Stratum Species: *Pteridium esculentum*; *Lomandra longifolia*; *Viola hederacea*; *Oplismenus imbecillis*" (OEH, 2020b).

The determination of this community as PCT 1536 has been based on the following key attributes (recorded at waypoint description CHF2, CHF3, CHD16):

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- The occurrence of species characteristic of this PCT, viz: Cupaniopsis anacardioides, Notelaea spp., Persoonia spp., Guioa semiglaucula, Glochidion ferdinandi, Acmena smithii (var. major), Lomandra longifolia, Geitonoplesium spp., Imperata cylindrical, Breynia oblongifolia, *Monotoca* elliptica, Melaleuca quinquenervia, Eucalyptus tereticornis, Corymbia intermedia;
- The location of the community within 2 km from the ocean;
- The presence of salt tolerant species such as Tuckeroo; and
- The sandy nature of the topsoil.

As stated in the VIS Classification - Community Profile Report (OEH, 2020b) the classification confidence of this PCT is high with lithology described as Mudstone and Sandstone but landform patterns not having been assessed.

The photographs provided below and in the report also illustrate the nature of this area and the level of disturbance. A comparison of the benchmark conditions for the PCT and the condition of the representations of the PCT within the resource recovery /impact area and subject property is provided in **TABLE FOUR**.

Plant Community Type 1536 is associated with the following TEC which is listed as Endangered under the BC Act: *Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part)*.

This community conforms to the determination with regard to both vegetation and soils (NSWSC 2011-2012d). It should be noted that, although this site is not mapped as Littoral Rainforest in the recent Coastal SEPP (which amalgamates SEPP 26 Littoral Rainforest), the determination states “The areas mapped for inclusion in SEPP 26 Littoral Rainforest are examples of the ecological community, but the mapping is not exhaustive and stands of this community occur at locations not mapped under SEPP 26. Some stands may be regrowth or in the process of regenerating”.

PCT 1536 also conforms to the Commonwealth *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia*, listed as Critically Endangered under the EPBC Act, as the representation of the PCT within the subject property meets all of condition thresholds prescribed by the Listing Advice for the community (DAWE, 2015), The patch must have:

- 1) at least 25% of the native plant species diversity characteristic of this ecological community in that bioregion (Attachment A) [of the Listing Advice];

OR

- 2) at least 30% canopy cover of one rainforest canopy (either tree or shrub) species (Attachment A, excluding Banksia and Eucalyptus species that may be part of the ecological community).

FIGURE SIX: BAM PLOT LOCATIONS, PCT'S AND VEGETATION ZONES SUBDIVIDED BY CONDITION, INTENT AND TEC STATUS ON THE SUBJECT PROPERTY

Crescent Head Ilmenite Stockpile PCT's and Vegetation Zones (including TEC's and BAM plots)



Prepared by Fiona Dawson 27/3/2020 MGA Zone 56 (GDA 94)

Native Plant Species Occurrence

A full list of flora species recorded on the subject property is provided in **APPENDIX THIRTEEN** (and **APPENDIX SEVENTEEN**), including species listed as High Threat Exotics (HTEs) under the BAM (referred to as 'Transformer Weeds' under the Commonwealth).

A total of 78 flora species has been recorded, the majority of which occurring within the resource recovery /impact area, and Subject Property as a whole, are native species (90%). The proportion of HTEs and other weed species however, in terms of cover, is quite high.

Plot data suggests that, even within the moderate condition vegetation in Zone 3R for instance, weed species can represent up to almost 50% of the total species richness. In the low condition vegetation sampled in Zones 3c, weed/exotic species outnumber native species and also provide the majority of cover.

Threatened Plant Species Occurrence

No threatened species have been recorded on the subject property to date, and particularly within the resource recovery/impact area.

It is always possible however, that an occasional specimen of a threatened plant species may occur, particularly in the areas of the property as a whole that are beyond the impact area and were not subject to detailed surveys and plot sampling.

The likelihood of such occurrences also would be expected to increase as the natural regeneration process continues. The likelihood of occurrence of threatened species within the resource recovery /impact area is very low, given the level of existing clearing and mown landscape.

Justification for Threatened Flora Species Determined to be Unlikely to Occur within the Impact Area

The following species, although known to be associated with PCT 1230 and/or PCT 1235, have been discounted from the candidate species list for reasons specified under each species heading. The justification for exclusion is based on a number of the provisions of the BAM, viz:

6.4.1.3 The assessor must first use the following criteria to predict the threatened species that require assessment at the site:

- (a) the distribution of the species includes the IBRA subregion which the subject land is, in the opinion of the assessor, mostly located within.

6.4.1.14 If the species is a vagrant in the IBRA subregion, the species is considered unlikely to occur and no further assessment is required. The assessor must record in the BAR the reasons for determining that the species is unlikely to occur on the subject land.

6.4.1.17 A candidate species credit species will be considered unlikely to occur on the subject land (or specific vegetation zones) if:

- (a) after carrying out a field assessment of the habitat constraints or microhabitats on the subject land, the assessor determines that the habitat is substantially degraded such that the species is unlikely to utilise the subject land (or specific vegetation zones).

The following species were assessed for the site.

Asperula asthenes Trailing Woodruff: The Trailing Woodruff is a 'low trailing perennial herb' that 'occurs in damp site, often along river banks (Office of Environment and Heritage (2019c). Potential habitat for this species within the Impact Area is highly marginal and degraded and the species is considered 'unlikely to utilise the subject land' comprising the Impact Area vegetation zones.

Lindernia alsinoides Noah's False Chickweed: This species is a delicate wetland fringe herb known from only a few locations in NSW, one of which has been subject to long term monitoring by one of the authors of this report (Cumberland Ecology and Greenloaning Biostudies 2014). The species also is currently subject to further monitoring by Greenloaning Biostudies under the 'Saving our Species Program' (SOS). Given the man-modified status and elevated topography of the Impact Area, there is no suitable habitat occurring for *L. alsinoides* on the stockpile, the species is 'unlikely to utilise the subject land' comprising the Impact Area and target searches therefore were not warranted.

Maundia triglochinooides: *Maundia triglochinooides* is found 'in swamps, lagoons, dams, channels, creeks or shallow freshwater 30 - 60 cm deep on heavy clay, low nutrients' (Office of Environment and Heritage 2019d). Considering that these types of habitats are not characteristic of the Impact Area (there is only one small ditch within the Impact Area, which was dry during field surveys), the species is 'unlikely to utilise the subject land' comprising the impact area and target searches, therefore, were not warranted.

Oberonia titania Red-flowered King of the Fairies: This orchid species 'occurs in littoral and subtropical rainforest and paperbark swamps Office of Environment and Heritage (2017c), true representations of which do not occur within the Impact Area (refer to **Section 4.2.2**. Additionally, there are no records for this species in the Macleay Hastings IBRA Subregion (BioNet Atlas, 2020). The species therefore is unlikely to utilise the subject land' comprising the Impact Area and target searches therefore were not warranted.

Phaius australis Southern Swamp Orchid: *Phaius australis* is a large terrestrial orchid that typically is associated with swampy grassland or swampy forest (Office of Environment and Heritage 2019e). Given the man-modified status and elevated topography of the Impact Area, with associated communities not representing swampy conditions, there is no suitable habitat occurring for *Phaius australis* on the stockpile, the species is unlikely to utilise the subject land' comprising the Impact Area and target searches therefore were not warranted.

On the basis of the above factors and consistent with section 6.4.1.17 (a) of the BAM, it was determined that, for all of the above species, 'the habitat is substantially degraded such that the species is unlikely to utilise the subject land' comprising the Impact Area.

Weed Species

A total of 10 exotic species has been recorded within the subject property, with five of these species known to occur on the proposed resource recovery area.

Of the total weed species recorded, seven are listed as HTEs under the BAM. The most dominant species in terms of cover and general representation through all vegetation zones comprises Lantana (*Lantana camera*).

This species is most consistently prevalent within the regenerating Zone 3c, which visually is dominated by Bracken Fern, but has Lantana distributed throughout at varying levels of cover. Thickets of Lantana also tend to occur around much of the edges of the stockpile, such as at the eastern end of Plot BAM4, and beside the existing access track to the site in the north.

Another HTE, the Slash Pine (*Pinus elliotii*), only occurs as scattered individuals, but a small number of specimens in the south-eastern sector are very large trees, representing an ongoing seed source. Bitou Bush (*Chrysanthemoides monilifera*), also listed as an

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HTE, occurs in scattered clumps, particularly in regenerating areas. Other HTEs recorded tend to be represented as scattered individuals, clusters.

Fauna Habitats

Key habitat features of the subject property, as identified during the on-site surveys, in conjunction with desktop assessments, comprise the following (features associated specifically with the resource recovery /impact area are noted in additional comments in **bold**):

- Good general and direct connectivity with adjoining habitat to the north, east and south-east, with good connectivity for more mobile species also to the west. Point Plomer Road, which is a sealed and well-used local road, represents a break in connectivity for species such as small ground mammals, whilst the gravel access tracks to the beach and reservoir in the north of the subject property would represent a more minor break in connectivity for such species. **Overstorey cover is sparse over most of the impact area, but the existing regenerating areas provide vegetated connectivity with adjoining y habitat;**
- Some connectivity with habitat to the south, although the connecting habitat is somewhat fragmented immediately adjoining the subject property;
- Scattered occurrence of rainforest fruiting tree species, particularly figs that would provide foraging resources for a range of fructivorous species. **There are occasional occurrences of such trees within the impact area;**
- Occasional Banksias providing food resources for nectivorous species known to occur in the locality, such as the Common Blossom Bat (*Syconycteris australis*).
- Very limited occurrence of small tree hollows. Trees with hollows, as well as any large native trees with potential for hollows, fissures or decortivating bark, have been excluded from the Impact Area;
- Occasional very large trees that would provide good shelter and nesting potential. Habitat supporting large trees within the stockpile area have been excluded from the Impact Area;
- Small patches of dense understorey/grassy ground cover that would provide cover for some fauna species, such as bandicoots and the Rufous Bettong. The majority of the regenerating vegetation within the Impact Area supports such habitats;
- Stands of Swamp Oak that provided potential foraging resources for the Glossy Black Cockatoo (*Calyptorhynchus lathami*). **A small patch of young mature Swamp Oak trees occurs within the Impact Area;**
- Variable occurrence of ground debris, with very limited occurrence of hollow logs. **Ground debris is very sparse to lacking over most of the Impact Area;**
- A variety of microhabitats likely to provided suitable foraging resources for a range of microbat species. Some microbats would be likely to forage across sectors of the Impact Area as part of much broader foraging habitat; and
- A sandy loam substrate, potentially suitable for burrowing species. The Impact Area also has sandy soils, but these primarily comprise dense, very soft ilmenite, which would be expected to have limited potential as suitable burrowing substrate.

As part of an identified wildlife corridor and key fauna habitat area, in conjunction with the features listed above, the Subject Property habitat has recognized value to fauna, albeit the habitat being in a disturbed state, particularly in relation to the Impact Area.

The features of the resource recovery area per se, provide far less value to most fauna species, with minimal upper strata habitat available for arboreal species and mobile

species such as many bird and microbat species that forage and/or roost/nest at higher levels. The main habitat attribute of the Impact Area is the relatively continuous ground cover, providing good shelter/foraging shelter for small ground fauna. The overall value of the resource recovery area to fauna species is considered to be low.

General Fauna Species

Fauna species recorded on the subject property are fully listed in **APPENDIX THIRTEEN**. As could be expected, the main species recorded were birds, with 21 species recorded to date on the subject property, with most surveys undertaken within the Impact Area. A much greater number of additional species would be expected to be recorded over time, more particularly in the adjoining swamp forest/woodland habitats. Species encountered include:

- **Reptiles:** Very few reptile species were observed or captured, and the lack of ground debris within the Impact Area would be expected to limit the suitability and use of the Impact Area by this fauna group. Lace Monitors (*Varanus varius*) were observed however, on a number of occasions, both within the Impact Area and in adjoining swamp forest habitat. Consistent use of the Impact Area by any amphibian species is considered unlikely, given the very dry nature of this area in general.
- **General mammals:** Thirteen native mammal species were recorded from the site surveys. Signs of bandicoots, likely to be the Northern Brown Bandicoot (*Isodon macrouris*), were observed during site surveys within the Impact Area and two other small ground mammals, the Bush Rat (*Rattus fuscipes*) and Brown Antechinus (*Antechinus stuartii*) were recorded during both the Elliott trapping programme. The latter two species also were recorded from the hair tube trapping surveys. These species were recorded both within the Impact Area and in adjoining forested habitats. A number of microbat species were recorded within the stockpile/resource recovery area, either through the harp trapping survey or by call detector surveys and subsequent call analysis. In total, at least five species were recorded, two species captured in harp traps and three species detected from call analysis. Calls from a sixth species potentially were recorded but the calls were not sufficiently distinctive to be confident of identification. Spotlighting surveys yielded very little in the way of fauna records with only one Common Brush-tail Possum recorded on one occasion in habitat to the north of the Stockpile/resource recovery area.

Threatened Fauna Species

No threatened fauna species were encountered during the survey periods. Likelihood of occurrences is outlined as follows:

- **Amphibians:** No threatened amphibian species was considered likely to occur on the stockpile limited.
- **Reptiles:** Reptile observations within the subject property and within the Impact Area were very few and potential habitat for any threatened species very limited due to the lack of suitable habitat or structure of the pile.
- **Birds:** No threatened bird species was recorded utilising the Impact Area during site surveys, although the Little Lorikeet (*Glossopsitta pusillaa*) was tentatively identified flying through the subject property and other species, such as the White-breasted Sea-eagle and Little Eagle, could be expected to fly over the area as part of their foraging range and,
- **Mammals:** A range of fauna survey procedures was undertaken to target threatened species with some potential to occur within the subject property, and particularly within the Impact Area. The majority of surveys yielded no threatened species listed

under the BC Act or the EPBC Act, or migratory species listed under the EPBC Act, utilising the Impact Area.

The Koala SAT Plot searches however, yielded one Koala pellet within the small pocket of remnant and regenerating woodland/forest habitat supporting KFTs in the north of the stockpile area. The sparse number of pellets detected renders the habitat as 'low use activity habitat (Phillips and Callaghan 2011). However, a precautionary approach has been taken in the context of the potential for 'otherwise...med-high carrying capacity Koala habitat [potentially being the]...result of contemporary population dynamics, landscape configuration and/or historical disturbances including ... mining....Such considerations should not necessarily detract from the potential importance of such habitat for longer-term conservation, particularly if preferred koala food trees are present and populations of *P. cinereus* are known to occur in the general area' (Phillips and Callaghan 2011). The Koala species was known previously to utilise the roadside KFTs and known and potential habitat for the Koala has been excluded from the Impact Area. As indicated in **APPENDIX THIRTEEN**, the subject property and stockpile have been mapped as primarily Primary and Secondary (A) Preferred Koala Habitat as mapped in the KSC KPoM. The extent of Koala habitat within the subject property and in relation to the Impact Area has been refined however, and as such, no Koala habitat will be impacted by the proposal.

No indications of use of Zone 5c, supporting potential Glossy Black Cockatoo food trees, were detected, with inspections of this habitat conducted in September and December 2019 and in February 2020. There is substantial habitat for the species however, within the broader subject property.

Elliott trapping did not yield any records of either the Common Planigale or Eastern Pygmy Possum, although was very successful in capturing two other small mammal species, **detailed above**.

Microbat trapping surveys also did not capture any threatened fauna species, particularly neither the Eastern Cave Bat (*Vespadelus troughtoni*) nor the Southern Myotis (*Myotis macropus*), both of which are 'species credit species.' The former species has however, been recorded in the nearby Goolawah National Park, as have a number of other threatened microbat species, viz: the Eastern/Large bent-winged Bat (*Miniopterus orianae oceanensis*), Eastern Cave Bat (*Vespadelus troughtoni*), Eastern Long-eared Bat (*Nyctophilus bifax*), Greater Broad-nosed Bat (*Scoteanax rueppellii*) and Little Bent-winged Bat (*Miniopterus australis*) (DPIE, 2014). Bat call detector surveys undertaken to supplement the trapping surveys, yielded one call file for the Little Bent-winged Bat for the stockpile/resource recovery area and it could be assumed that the species would use the Impact Area habitats of Zone 2c, 3c, 4c and 5c to some extent, in conjunction with more vegetated habitats beyond the Impact Area. The species however, tends to favour more timbered habitats (Office of Environment and Heritage 2020) and foraging over the more open habitats is less likely. The Grey-headed Flying Fox (*Pteropus poliocephalus*) also has been recorded within the Goolawah National Park and would be expected to forage through the subject property as part of general potential foraging habitat. Foraging within the Impact Area, however, would be expected to be limited to a very small number of individuals feeding on fruiting figs or other very scattered fruiting/flowering trees on a seasonal basis. No camps of the species occur within the subject property. This species also is listed as Vulnerable under the EPBC Act. Another mammal species, the Greater Glider (*Petauroides Volans*) also is listed as Vulnerable under the EPBC Act, but not under the BC Act. The species is considered unlikely to occur within the Subject Property and tends to favour tall moist montane forest. It requires large tree hollows for roosting (Threatened Species Scientific Committee 2016) and there is no suitable habitat for the species within the Impact Area.

Justification for Threatened Fauna Species Determined to be Unlikely to Occur within the Impact Area

The following species, although known to be associated with PCT 1230 and/or PCT 1235, have been discounted from the candidate species list for reasons specified under each species heading. The justification for exclusion is based on a number of the provisions of the BAM, viz:6.4.1.3

Invertebrates

- *Argynnis hyperbius* Laced Fritillary: The Laced Fritillary occurs in 'open swampy coastal habitat' (Office of Environment and Heritage 2017e), and relies on the presence of the food plant, the Arrowhead Violet (*Viola betonicifolia*). Neither swampy habitat, nor the Arrowhead Violet occur within the Impact Area. The original swampy habitat has been modified by the mining and associated stockpile development and it is considered that 'the habitat is substantially degraded such that the species is unlikely to utilise the subject land.'
- *Petalura gigantea* Giant Dragonfly: The Giant Dragonfly inhabits 'permanent swamps and bogs with some free water and open vegetation' (Office of Environment and Heritage 2017f). As for the Laced Fritillary, the original swampy habitat has been modified by the mining and associated stockpile development and it is considered that 'the habitat is substantially degraded such that the species is unlikely to utilise the subject land.'
- *Ocybadistes knightorum* Black Grass-dart Butterfly: The Black Grass-dart Butterfly is known only from an area of the mid north coast from Coffs Harbour to Scott's Head, well to the north of the subject property. Swamp sclerophyll forest dominated by Swamp Oak and/or Broad-leaved Paperbark tends to be the most favoured habitat. The species also is associated with patches of Floyd's Grass (Office of Environment and Heritage 2017g). As the original swampy habitat has been substantially modified by the mining and associated stockpile development, it is considered that 'the habitat is substantially degraded such that the species is unlikely to utilise the subject land.'

Amphibians

- *Crinia tinnula* Wallum Froglet: The Wallum Froglets occur in a wide range of habitats, usually in association with acidic swamps on coastal sand plains, including sedgeland and wet heathlands. The species also can inhabit 'drainage lines within other vegetation communities and disturbed areas, and occasionally in swamp sclerophyll forests' (Office of Environment and Heritage 2017h). There is no suitable habitat for the Wallum Froglet within the man-modified Impact Area and 'the habitat is substantially degraded such that the species is unlikely to utilise the subject land.'
- *Litoria brevipalmata* Green-thighed Frog: This species occurs in habitats ranging from rainforest and moist eucalypt forest to dry eucalypt forest and heath, favouring areas where surface water gathers following rain (Office of Environment and Heritage 2019g). As the Impact Area habitat represents substantially man-modified systems with very limited potential for suitable habitat for the Green-thighed Frog, it is considered that 'the habitat is substantially degraded such that the species is unlikely to utilise the subject land.'
- *Mixophyes iteratus* Giant Barred Frog: The Giant Barred Frog occurs in association with permanent or semi-permanent streams, typically with well vegetated stream edges (Office of Environment and Heritage 2017i, A. Martin, unpubl. data)). There is no suitable habitat for the species within the man-modified Impact Area and 'the habitat is substantially degraded such that the species is unlikely to utilise the subject land.'

- *Litoria aurea* Green and Golden Bell Frog: This species occurs in marshes, dams and stream-sides, with optimum habitat including unshaded waterbodies (Office of Environment and Heritage 2017j). There is no suitable habitat for the species within the man-modified Impact Area and 'the habitat is substantially degraded such that the species is unlikely to utilise the subject land.'

Reptiles

- *Hoplocephalus bitorquatus* Pale-headed Snake: This species is mainly found in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. The Pale-headed Snake is nocturnal and uses loose bark, tree-trunks, hollow trunks and limbs of dead trees for diurnal shelter (Office of Environment and Heritage 2017k). The only record for the species within the IBRA Subregion is in the very far north of the Subregion and would be considered a vagrant in the area, based on the current records.
- *Hoplocephalus stephensii* Stephens' Banded Snake: Stephen/s Banded Snake is a nocturnal species, occurring in rainforest, eucalypt forest and rocky habitat, sheltering under loose bark, amongst vines, or in hollow trunks, limbs, rock crevices or under slabs during the day shelter (Office of Environment and Heritage 2018g). Suitable shelter habitat for this species is minimal or absent over most of the Impact Area the habitat is considered 'substantially degraded such that the species is unlikely to utilise the subject land.'

Birds

- Species Requiring Hollows for Breeding: Although the following species may forage to a limited extent within/over the Impact Area, there are no hollows suitable for breeding for any of these species occurring within the Impact Area:
 - *Calyptorhynchus lathami* Glossy Black-Cockatoo;
 - *Ninox connivens* Barking Owl;
 - *Tyto novaehollandiae* Masked Owl;
 - *Ninox strenua* Powerful Owl.

None of these species therefore is likely to use the Impact Area for breeding purposes. Large hollows required by these species (Office of Environment and Heritage, 2019h): also, are very limited or absent from the subject property, owing to the combination of past clearing/mining disturbances and the prevalence of tree species not typically supporting many or large hollows.

- Regent Honeyeater *Anthochaera phrygia*: For a small number of species, the habitat constraint information in the Threatened Biodiversity Data Collection (TBDC) refers to a mapped important area (See **APPENDIX THIRTEEN**). Important areas have been determined for the Regent Honeyeater and eleven migratory shorebird species. Examination of the NSW DPIE Map viewer tool (DPIE, 2020c) determined that the subject property is not within the Important Area for the Regent Honeyeater or any migratory shorebirds.
- Species Nesting in Large Trees: The following species nest in large dead and/or living trees (Office of Environment and Heritage 2017 l, 2017m, 2018g, 2019i):
 - *Lophoictinia isura* Square-tailed Kite
 - *Hieraaetus morphnoides* Little Eagle

- *Haliaeetus leucogaster* White-bellied Sea-Eagle
- *Pandion cristatus* Eastern Osprey

Such habitat has been excluded from the Impact Area, with the Impact Area habitat thus 'substantially degraded such that the species is unlikely to utilise the subject land.'

- *Lathamus discolor* Swift Parrot: There is minimal foraging habitat for the Swift Parrot within the Impact Area and the species breeds in Tasmania (Office of Environment and Heritage 2019h). The species would be a vagrant in the area.

Mammals

- *Petaurus norfolcensis* Squirrel Glider: The Squirrel Glider requires hollows for shelter and breeding (Office of Environment and Heritage 2017n). There is no suitable habitat for the species within the Impact Area, with the habitat considered to be 'substantially degraded such that the species is unlikely to utilise the subject land.'
- Grey-headed Flying-fox (*Pteropus poliocephalus*) (breeding): Camps of the Grey-headed Flying-fox can sometimes contain thousands of individuals and the same sites can be used for very long periods of time (Office of Environment and Heritage 2017o). These camps are used for roosting and the annual breeding and rearing of young. Mating and conception occur within camps between January and May (DIPNR 2004). Inspection of the Impact Area did not result in any evidence of camps, either current or past and the Impact Area is not considered to represent known or potential breeding habitat by this species.
- Little Bent-wing-Bat (*Miniopterus australis*) (breeding): This species has been detected within the stockpile/resource recovery area, on the edge of the Impact Area and the species thus can be assumed to forage in the general area. In terms of breeding habitat however, the Little Bentwing-bat requires caves or similar structures such as tunnels, mines, or culverts (Office of Environment and Heritage 2019m). The occurrence of caves or similar structures is a habitat constraint for breeding purposes for this species. There are no caves or other breeding structures located in the Impact Area, or within the immediate vicinity. Therefore, the Little Bent-wing Bat is not likely to utilise the Impact Area for breeding purposes.
- Eastern Bent-wing-Bat (*Miniopterus schreibersii*) (breeding): As for the Little Bent-wing Bat, the Eastern Bent-wing Bat requires maternity and nursery caves for breeding (Office of Environment and Heritage 2019n). There are no caves within the impact area, nor are there any in the immediate vicinity. Therefore, the Eastern Bent-wing Bat is not likely to utilise the Impact Area for breeding purposes.
- *Myotis macropus* Southern Myotis: The Southern Myotis typically roosts near water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. The species also forages over water (Office of Environment and Heritage 2017p). Roosting habitat for the species within the Impact Area is minimal and there is no foraging habitat present and the living or the habitat is 'substantially degraded such that the species is unlikely to utilise the subject land.'

PLATE FIVE: STOCKPILE VEGETATION



PLATE SIX: STOCKPILE VEGETATION



PLATE SEVEN: HABITAT TREES OUTSIDE THE DISTURBANCE AREA



FIGURE SIX: HABITAT TREES ON THE POINT PLOMER ROAD VERGE - NOT TO BE DISTURBED



2.7. NPWS ESTATE

2.7.1. SEAR's requirements

The EIS should address the following with respect to land reserved under the National Parks and Wildlife Act 1974.

1. Where appropriate, likely impacts (both direct and indirect) on any adjoining and/or nearby NPWS estate reserved under the National Parks and Wildlife Act 1974 should be considered. Refer to the Guidelines for developments adjoining land managed by the Office of Environment and Heritage (OEH, 2013). The guideline is available at:

[http://www.environment.nsw.gov.au/resources/protectedareas/development-land-adjoining - 130122.pdf](http://www.environment.nsw.gov.au/resources/protectedareas/development-land-adjoining-130122.pdf)

Note: Proposals which may impact marine protected areas should be referred to the Department of Primary Industries to determine the assessment and approval requirements.

2.7.2. Response to SEAR's

GER's operations are a temporary land use of a portion of Lot 2281/DP 115793 (**FIGURE FIVE**). The extent of GER's operations are expected to span less than 12 months of operation with a number of years supervising the progress of the rehabilitation.

Taking the extent and nature of GER's activities into account, the risk to Goolawah National Park, specifically Lot 7302 / DP 1130597 is very low to negligible.

Following the suggested guideline issues for developments adjacent to NPWS estate, GER categorises the risks of its proposal in the following ways:

- **Erosion and sediment control, stormwater runoff** - GER have reviewed the risks associated with the project regarding stormwater, erosion and sediment generation and this is outlined in more detail in **APPENDIX TWENTY ONE**. The sandy nature of the site and the inert nature of the stockpile material result in negligible risks of erosion and sediment transport off site. During clearing and stockpile removal, any erosion potential will be low, and any potential stormwater runoff will be directed in pit. Once the area has been rehabilitated, erosion potential will be further reduced through the use of hydro mulch as a stabiliser with a working life of up to 12 months, by which time vegetation will be established.
- **Wastewater** - GER will not generate any wastewater as part of any stage of its activities. There will not be any servicing of vehicles or washing facilities established on site. All wastes generated will be collected on site for disposal off-site at the appropriate landfill. No wastewater will be generated by the earthworks component of the proposal as the material contains no clay or water dissolvable fraction.
- **Management of pests, weeds and edge effects** - A key objective of the proposal will be to remove the weed infestation on the stockpile location and return the disturbance footprint to native vegetation. The proposed activities have no potential to increase or add to the weeds and pests on the site. GER will also conduct the removal of the weed species from around the base of the Koala habitat trees on the completion of the project. Weeds and pests will be monitored and managed for the duration of the rehabilitation phase.
- **Fire and location of asset protection zones** - No permanent structures will be required during site activities, only a relocatable building for use as a site office and crib hut. A portable toilet will also be placed on site for the duration of the stockpile removal and this will be serviced regularly by an external contractor. No open fires will be permitted

during operations and, if burning of the cleared weeds is required, it will be carried out under strict fire permit conditions with full notification to neighbours and appropriate fire suppression equipment in attendance.

- **Boundary encroachments and access through OEH land** - The project footprint is located on the western side of the lot and there is no potential for the project activities to encroach or access the NPWS tenures located to the east of the project site (see **FIGURE ONE**)
- **Visual, odour, noise, vibration, air quality and amenity impacts** - The proposal footprint is located well away from the NPWS estate and will not be visible from any vantage point within the estate at any stage of the project. The project will not generate any odours, with only diesel combustion emissions from the machinery on site. Due to the sand environment, vibration is not expected to be a site issue and certainly not expected to be felt in the NPWS estate. There will be some noise associated with the proposal and this is outlined in the traffic management and noise sections below and in **APPENDIX FOUR and APPENDIX EIGHTEEN**. The proposed control measures outlined in section 5 are deemed to be more than adequate to ensure no noise impacts from the short duration project will be incurred upon the NPWS estate.
- **Threats to ecological connectivity and groundwater-dependant ecosystems** - The small footprint of the proposed clearing area (**less than 2 hectares**) is not anticipated to act as a barrier to fauna movement or ecological connectivity of the adjacent NPWS estate. Groundwater is discussed in section 3.9 (**TWENTY ONE**) and is not expected to be impacted by the project.
- **Cultural heritage** - GER has addressed cultural heritage values in section 3.2, as well as the independent assessment found in **APPENDIX FIFTEEN**. No impacts on cultural heritage values is expected of the project footprint or the NPWS estate adjacent.

2.8. ACID SULPHATE SOILS

2.8.1. SEAR's requirements

The EIS should address the following:

1. The potential impacts of the proposal on acid sulfate soils must be assessed in accordance with the relevant guidelines in the Acid Sulfate Soils Manual (Stone et al. 1998) and the Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al. 2004).
2. Describe mitigation and management options that will be used to prevent, control, abate or minimise potential impacts from the disturbance of acid sulfate soils associated with the proposal and to reduce risks to human health and prevent the degradation of the environment. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.

2.8.2. Response to SEAR's

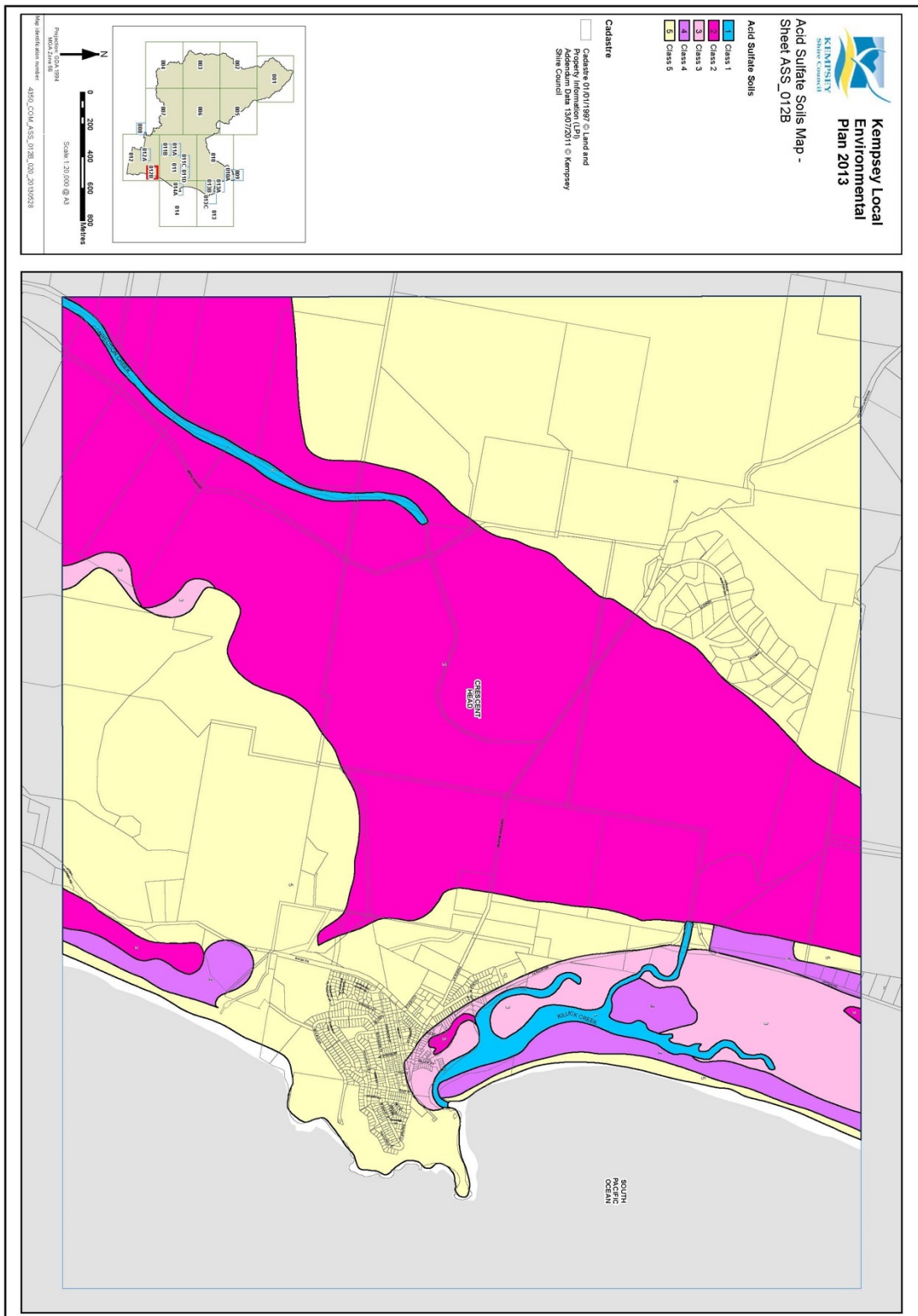
All soils present on the site have been highly modified by past mining and mineral processing activities. From site inspection, it appears that some attempts had been made to retain soil for rehabilitation activities and this is evidenced by remnant topsoil stockpiles and varying qualities of resulting rehabilitation.

Auger drilling conducted by GER indicates the ilmenite stockpile/dump sits on quartz sand and Acid Sulphate Soils (ASS) were not identified within the pile material or the original landform surface (**APPENDIX NINETEEN**). No disturbance of the underlying original soil surface will occur as part of the project. No excavation of natural ground will occur as part of the project.

In addition, Kempsey Shire Council has prepared ASS maps as part of Development Control Plan 30, indicating five classes of land based on the likely depth of ASS and works categories likely to result in disturbance. The map relevant to the project indicates that natural ground beneath the stockpile consists of Class 4 and 5, **FIGURE SEVEN**.

As GER intend to remove the stockpile back to natural ground level, there is little likelihood of any disturbance of Class 4 or Class 5 soils. Development Controls relating to ASS are therefore not required for the project.

FIGURE SEVEN- KEMPSEY LOCAL ENVIRONMENTAL PLAN 2013 ACID SULPHATE SOILS MAP – SHEET ASS_012B



2.9. FLOODING, STORMWATER AND COASTAL EROSION

2.9.1. SEAR's requirements

The EIS should include an assessment of the following referring to the relevant guidelines in Attachment 2:

1. The potential effect of coastal processes and coastal hazards including potential impacts of sea level rise:
 - a. on the proposal; and
 - b. arising from the proposal.
2. Whether the proposal is consistent with any coastal zone management plans.
3. Whether the proposal is consistent with any floodplain risk management plans.
4. Whether the proposal is compatible with the flood hazard of the land.
5. Whether the proposal will significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties.
6. Whether the proposal will significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.
7. Whether the proposal incorporates appropriate measures to manage risk to life from flood.
8. Whether the proposal is likely to result in unsustainable social and economic costs to the community as a consequence of flooding.
9. The implications of flooding over the full range of potential flooding, including the probable maximum flood, should be considered as set out in the NSW Government Floodplain Development Manual. This should include the provision of:
 - a. Full details of the flood assessment and modelling undertaken in determining any design flood levels (if applicable), including the 1 in 100-year flood levels.
 - b. A sensitivity assessment of the potential impacts of an increase in rainfall intensity and runoff (10%, 20% and 30%) and sea level rise on the flood behaviour for the 1 in 100-year design flood if applicable.
10. All site drainage, stormwater quality devices and erosion/ sedimentation control measures should be identified and the onsite treatment of stormwater and effluent runoff and predicted stormwater discharge quality from the proposal should be detailed.

2.9.2. Response to SEAR's

GER's proposal is a short-term land remediation project that will not alter the majority of Lot 2281, nor will it change the natural physical landscape.

The end goal of the project will be the complete removal of the ilmenite stockpile to natural ground level and then the rehabilitation of the site to natural bushland. The project will, therefore, have little short-term impact and no long-term impact on the coastal processes and coastal hazards on the lot or on adjacent land.

The proposal is not identified for any management action under either the coastal zone management plan or the floodplain risk management plans.

A flood search (**APPENDIX TWENTY**) was undertaken and project area is classified as flood prone. GER is not proposing any permanent structures on the site and this, coupled with the very short project time window, is not expected to create a significant risk with regards to removal of the stockpile.

GER commissioned Bravo Resources to investigate potential groundwater and stormwater impacts / erosion hazard of the Lot (**APPENDIX TWENTY ONE**).

2.9.2.1. Water influences on the project area

The ilmenite stockpile and the underlying quartz sand at the Project Site are both Group-A Soils. Group-A Soils have very low runoff potential and water is expected to move through the soil profile relatively quickly. High infiltration capacity at the Project Site is confirmed by the absence of drainage lines or areas of surface water ponding, even in low lying areas of the ilmenite stockpile.

Infiltration capacity is highest when the sand is dry and declines once it is saturated. Group-A Soils have both very high initial infiltration capacities, typically around 60mm/hour, and long-term infiltration capacities, typically ranging between 180 - 275mm/day.

For a 15 minute TOC and 10% AEP storm a depth of 30mm depth is predicted at the Project Site. This indicates that for the design storm event no runoff is expected at the Project Site, as the estimated initial infiltration capacity (60mm) is double the expected water depth (30mm).

For longer duration rain events, the data in Figure 2 shows only nine days since 1961 where daily rainfall has exceeded the estimated minimum long-term infiltration capacity of 180mm, and only one day in excess of the estimated maximum long-term capacity 275mm. This indicates that the Project Site will not shed runoff except during extreme long-duration rain events.

Hand auger drilling completed by GER (14 holes) suggests that, once the stockpile has been removed, the resulting gently undulating natural ground profile will be similar to surrounding natural topography (**FIGURE EIGHT** existing surface contours and **FIGURE NINE** expected surface contours).

Surface water is likely to infiltrate into the sand after rain, with little or no ponding or runoff. Erosion is unlikely to occur in the short term, due to the relatively flat natural topography and lack of runoff, and once the stockpile footprint has been revegetated, raindrop impact on the soil will be minimal.

There are no surface water features on the ilmenite stockpile. The main surface water feature in the vicinity of the Project Site is an existing shallow drainage trench, which is believed to have been cut when MDL operated the site (refer Figures 2 and 3). The drainage trench runs for about 230m on the eastern boundary of the stockpile. The

GreenCoast Environmental Rehabilitation – CRESCENT HEAD ENVIRONMENTAL IMPACT STATEMENT

southern end of the trench usually contains standing water, which is likely at a similar elevation as the local water table, while the remainder of the trench is normally dry.

GER's activities are restricted to removing and rehabilitating the stockpile only and will not affect the drainage trench. During removal of the stockpile material (over the 6+ month period), some site activities that could potentially impact on surface water and groundwater include:

- Disturbance resulting in soil erosion and sedimentation; and
- Spills of fuel, oil or chemicals resulting in contamination of surface waters and/or groundwater

Based on the soil type and meteorological data, it is expected that, for rainfall events up to a 1:10 year ARI, rainfall will infiltrate directly through the ground rather than leave the project area as runoff. Surface water runoff is therefore unlikely to leave the site. However, sediment erosion control measures should be installed by GER if required, and checked and maintained for duration of the site works and subsequent revegetation.

Surface water related erosion, sediment runoff or off-site water impacts are also considered unlikely to occur, due both to the nature of the project (i.e. site rehabilitation to near-natural conditions) and the high soil infiltration capacity.

The primary potential water issue identified at the project area relates to potential spills impacting groundwater due to the high infiltration capacity of the ilmenite and underlying quartz sand.

Section 5 includes a number of recommended control measures to protect groundwater, including measures to minimise the volumes of fuel, oil or chemicals used or stored at the Project Site, refuelling most vehicles off-site, and, when necessary, parking and refuelling on an existing impermeable concrete hardstand.

Control measures, should a spill occur, are listed in **APPENDIX TWO**, Project Execution Plan.

2.9.2.2.Expected impacts of climate change

GER understand that Kempsey, Nambucca and Bellingen Shire Councils collaborated to plan for climate change. The Draft Climate Change Risk Assessment and Draft Climate Change Adaptation Strategy was exhibited for comment in September 2010 and the reports were finalised in December 2010.

Reviewing both documents in the context of GER's proposal, we identify that the project area is outside of the mapping region for impacts of sea level rise and / or increase in erosion. Other impacts with potential to be caused by climate changes are the same as the remainder of the Kempsey shire.

FIGURE EIGHT- EXISTING SURFACE CONTOURS

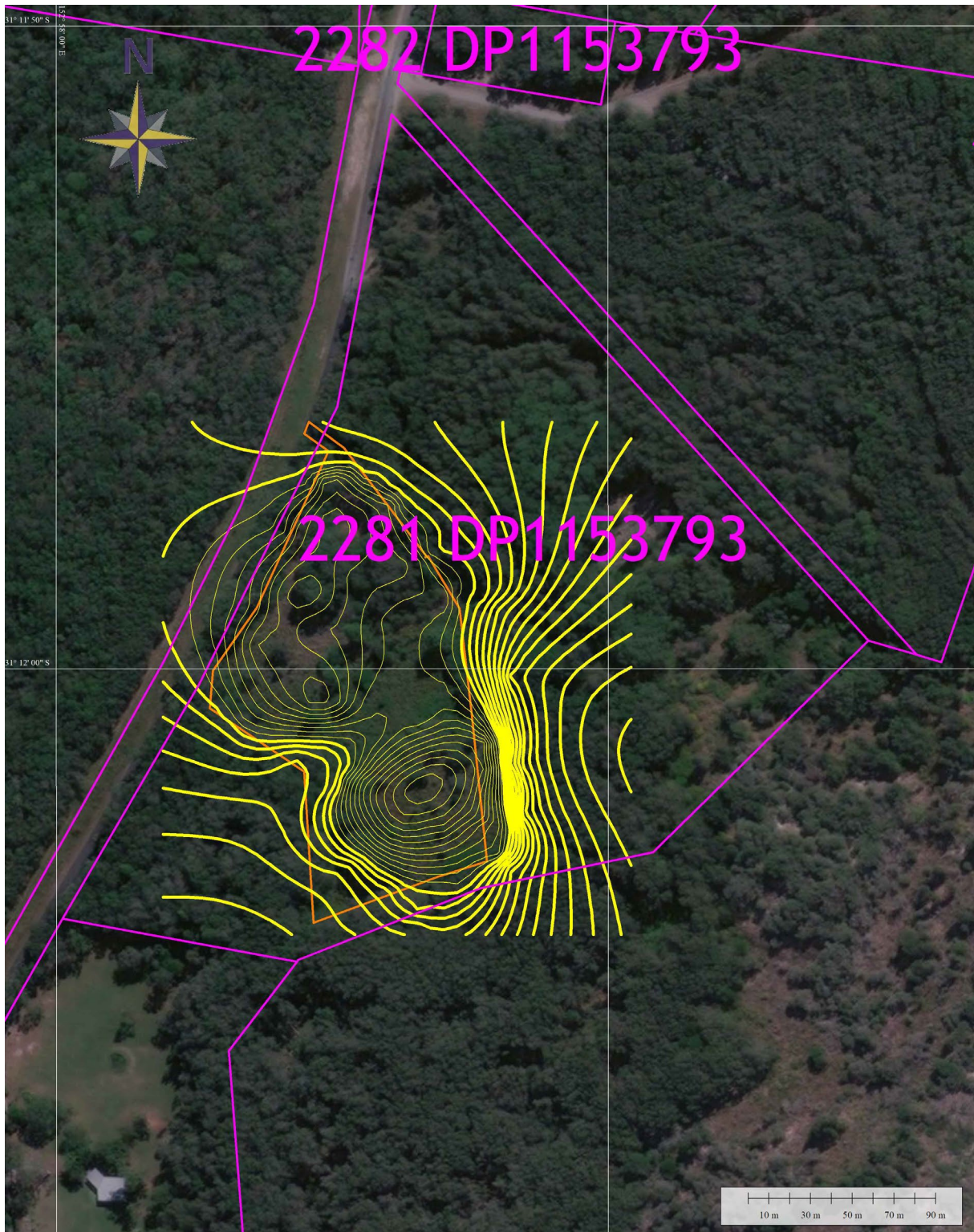
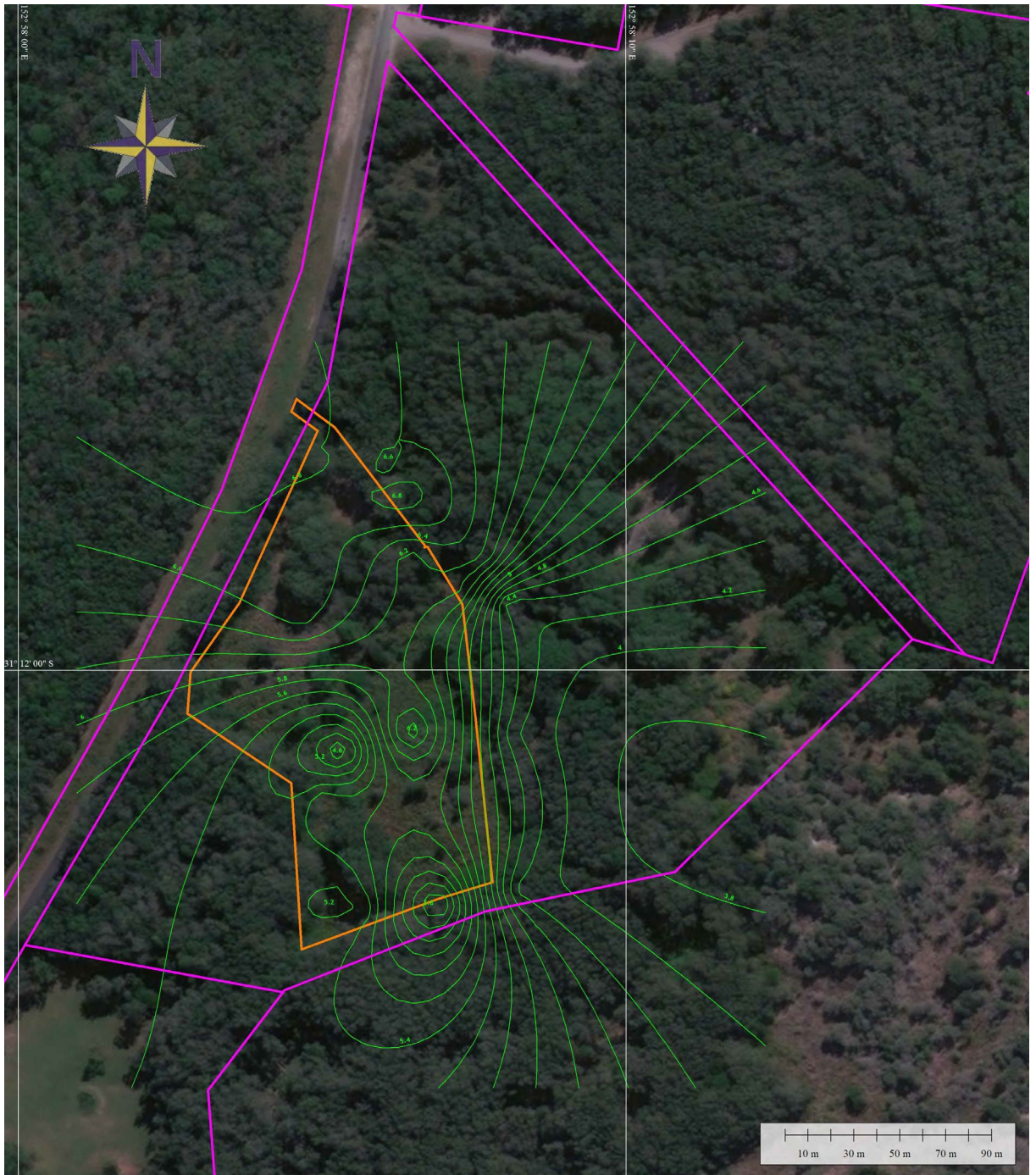


FIGURE NINE - EXPECTED SURFACE CONTOURS



2.10. CUMULATIVE IMPACTS

2.10.1. SEAR's requirements

The EIS should include an assessment of the following:

1. The cumulative impacts, including both construction and operational impacts, from all clearing activities and operations, associated edge effects and other indirect impacts on cultural heritage, biodiversity and OEH Estate in accordance with the Environmental Planning and Assessment Act 1979.
2. The cumulative impacts, including both construction and operational impacts, of the proponent's existing and proposed development and associated infrastructure (such as access tracks etc.) as well as the cumulative impact of the development in the context of other developments located in the vicinity.

2.10.2. Response to SEAR's

GER's proposal for the Crescent Head Ilmenite Stockpile Economic Rehabilitation Project is essentially a temporary land use and, as such, will only result in temporary impacts. The existing stockpile site is an abandoned legacy mining area left with little rehabilitation efforts and an ongoing legacy of the waste stockpile and over one and a half hectares of ilmenite stockpile.

GER's proposal will clear only the weed covered stockpile, retain all of the significant habitat trees and vegetation on the site, and rehabilitate the stockpile footprint to native vegetation. The removal phase of the project is expected to occur over a six-month period and, once completed, the resulting rehabilitation works will leave the site in an improved condition from that which is existing now. No ongoing impacts will occur as a result of GER's proposal and the site, upon acceptance of the rehabilitation by the underlying tenure holder (Crown Lands), will return to rehabilitated bushland status, with the stockpiled material, solid waste and weed infestation removed.

With the stockpile removal being a temporary land use, no ongoing impact is anticipated, therefore, no cumulative impact in line with the requirements of the Environmental Planning and Assessment Act (1979) is expected due to GER's project.

There are currently no impacts from construction or development in the adjoining land tenures and the one adjoining residence is established with extensive adjoining bushland and native vegetation. A search of the database of development applications and strategic planning documents for Kempsey Shire Council revealed no anticipated development in the area.

3. EXISTING ENVIRONMENTAL IMPACT ASSESSMENT - OTHER POTENTIAL IMPACTS

This section details other potential impacts on the environmental values of the site and surrounding sensitive receptors that were not specifically identified in the SEAR's assessment.

GER have recognised, as part of the initial project assessment process, that additional impacts and risks not fully explored in the initial SEAR's assessment were identified.

Namely, there were legislative changes to the regulatory framework in NSW which now, should the project be subjected to a new SEAR's assessment, would require addressing as part of this EIS.

GreenCoast Environmental Rehabilitation elected voluntarily to undertake a formal Biodiversity Assessment Mapping (BAM) process to ensure the project meets council and community expectations. This assessment was undertaken by an accredited consultancy, Greenloaning Biostudies and can be found in full in **APPENDIX THIRTEEN** and as summarised in the section below.

Additionally, following SWOT analysis of the predicted site impacts of the project, GER also undertook assessment of potential local environmental impacts including traffic, noise, air emissions and radiation.

3.1. BIODIVERSITY / BDAR IMPACT ASSESSMENT

The mitigation hierarchy of 'avoid, minimise, offset' has been adopted for the proposed resource recovery and the avoidance of impacts, as much as possible, has been integral to the project planning process. Key biodiversity components considered as part of this process included:

- Occurrence of remnant forest/woodland habitat;
- Occurrence of old growth/large mature trees; and
- Occurrence of Koala Food Trees (KFTs).

3.1.1. Potential Impacts

Direct Impacts

Sources of impacts that would have direct effects on potential threatened species' habitats and threatened ecological communities/ Threatened Ecological Communities (TEC's), comprise the following:

- Proposed clearing activities associated with the resource recovery process;
- Increased fragmentation of habitat to be retained within the general stockpile footprint until regeneration/rehabilitation works have progressed sufficiently to provide some cover;
- Inadvertent physical damage to habitat features/vegetation from machinery working adjacent to areas to be retained; and
- Injury to ground dwelling fauna or fauna roosting/nesting in trees to be cleared.

Clearing Impacts

The extent of proposed clearing of native vegetation is approximately 1.37 ha, with the clearing primarily comprising the removal of 1.3 ha of low condition regenerating vegetation and an additional 0.08 ha of moderate condition regenerating Swamp Oak forest. The resource recovery footprint (Impact Area), encompasses the majority of the identified ilmenite stockpile and access track.

The extent of clearing of trees is restricted to the small area of regenerating Swamp Oak forest and occasional small saplings of tree species may also be included in the clearing operations, such as along the edges of the access track. The majority of these trees are less than 20 cm diameter at breast height.

Two young Forest Red Gum trees (*Eucalyptus tereticornis*) are located on the edge of the project area and clearing of these trees will be avoided if possible. Scattered small trees or saplings occurring within the impact area are generally less than 20 cm, with two more mature trees recorded being less than 30cm diameter at breast height (dbh) and less than 50cm dbh respectively (refer to **APPENDIX THIRTEEN**).

The removal of the regenerating habitat is highly unlikely to cause significant adverse effects on any threatened species recorded in the general stockpile area. Key factors influencing this assessment are the general absence of KFTs within the regenerating habitats, lack of any potential breeding habitat for the Little Bent-winged Bat and minimal foraging resources for the Little Lorikeet. Thus, there also are no Serious and Irreversible Impacts (SAlls) associated with the proposed resource recovery operations.

Measures provided in the mitigation section will be employed to ensure direct impacts from the proposed clearing for construction purposes overall are minimised.

Habitat Fragmentation

The extent of increased fragmentation of habitat will be temporary and minor, given that the overall Impact Area is less than 2 ha and both patches of PCT 1230 to be retained are less than 50 m from nearby forest vegetation (which will not be disturbed). Connectivity similar or better than the existing level would be expected to be restored within a few years as a result of revegetation/rehabilitation processes.

Inadvertent Physical Damage to Habitat Features/Vegetation during Construction

The potential for inadvertent direct impacts beyond the resource recovery footprint have been incorporated into the site management planning. Sources of potential impacts, such as machinery damage to adjoining vegetation, soil compaction around trees to be retained, spillage/placement of fuel/oil on vegetation to be retained, or regular movement of resource recovery personnel outside the resource recovery footprint are addressed in the sections below.

Injury to Fauna

Pre-clearing surveys will be undertaken to ensure the risk of any injury to native fauna is minimised. The overall level of risk to fauna is considered to be very low, providing such surveys are undertaken.

Potential indirect impacts

Potential indirect impacts associated with the proposed resource recovery that could potentially adversely affect adjoining TECs and potential threatened species habitat include:

- Edge effects from clearing adjacent vegetation;
- Increased noise levels disturbing breeding/nesting activities of fauna species in adjacent habitats;
- Alteration of natural hydrology;
- Introduction of additional exotic weeds from contaminated machinery or footwear;
- Spread of weeds/disease through machinery movements; and
- Temporary increased levels of disturbance and noise associated with the resource recovery operations

These potential impacts will be addressed below, and measures have been incorporated into the site management plan and contractor induction.

3.1.2. Avoidance of Impacts

Avoidance of Impact on Endangered Ecological Communities and Known/Potential Threatened Species Habitat

Direct impacts on TECs will be avoided by the restriction of clearing and resource recovery operations to the defined resource recovery Impact Area, and the retention and protection of the remainder of the vegetation within the subject property. Although the PCTs defined as occurring within the Impact Area can represent remnant/regenerating forms of TECs, the representation of these PCTs within the stockpile and Impact Area do not represent TECs (refer to **APPENDIX THIRTEEN**).

No threatened flora was detected within these communities but protection of the vegetation zones adjoining the Impact Area and stockpile also will protect potential threatened flora species habitat in these areas. This also will serve to protect habitat considered to have some potential to provide temporary or occasional foraging or roosting habitat for some threatened fauna species which have been tentatively identified or assumed to occur on the subject property for the purpose of the BDAR.

The total area of vegetation for which any clearing is to be avoided totals approximately 10.9 ha.

Minimising Impacts on Biodiversity

The following procedures are proposed to ensure that all impacts, or potential impacts, are either avoided or minimised as much as possible, and any risks to individuals of fauna species that may be present during clearing activities and subsequent resource recovery operations are minimal:

- Maintenance and protection of all vegetation outside the impact area and thus within the designated area for conservation;
- Prior to the commencement of any construction works on site, clear marking of any trees to be protected in the immediate vicinity of clearing, and distinctive marking of trees to be removed, such that there is no room for confusion regarding tree removal/protection. KFTs will be a priority for this procedure;
- Clear visual delineation of total Impact Area to avoid any confusion by resource recovery machinery operator/s;
- Pre-clearing checks by a suitably qualified ecologist to be undertaken immediately prior to clearing activities to ensure there are no fauna issues, such as small ground fauna sheltering in dense grass/ground cover, nesting birds, roosting microbats, requiring specific procedures. In the unlikely scenario of an individual Koala being located in one of the trees adjacent or within the Impact Area immediately prior to clearing, a buffer of 10m will be established around the tree and the Koala left to move on of its own accord;
- Supervision of clearing operations by a suitably qualified ecologist/fauna spotter/wildlife carer if potential fauna issues are identified;
- Ongoing restriction of resource recovery operations to daylight hours; and
- Ongoing maintenance of best practice on-site biosecurity hygiene measures for machinery and on-site personnel to minimise the risk of introducing or spreading exotic weeds, pests or diseases.
- Implementation of the approved Rehabilitation Strategy (**APPENDIX FIVE**), which outlines the effective rehabilitation of the areas to be cleared. The strategy will prescribe management measures, including planting and weed control procedures. KFTs are a priority for proposed plantings post resource recovery.

3.1.3.Mitigation Measures - Offsets

The outcomes from the Biodiversity Assessment Calculator are summarised in the Calculator reports and vegetation integrity scores provided in **APPENDIX THIRTEEN**. As could be expected, the vegetation integrity score (overall condition) of the majority of the resource recovery /impact area, was very low.

A vegetation integrity score of 14.3 thus was below the threshold level requiring further assessment for a non-TEC or threatened species habitat, and no offsets would be required for the disturbance to this vegetation community.

The retirement of a small number of credits, however, is required for the other vegetation zones within the Impact Area.

As no threatened flora or fauna 'species credit species were detected within the Impact Area as a whole, no credit requirements were generated for 'species credit species.' The credit requirements for the proposed resource recovery operation are summarised in **APPENDIX THIRTEEN**.

A key objective of the final layout of the Impact Area was to avoid clearing of KFTs. If however, any KFTs are inadvertently damaged, or very young saplings hidden by dense weed growth are inadvertently removed, such trees will be replaced as part of the rehabilitation measures at a ratio of 10:1. Similarly, if any such young saplings are located within proposed clearing zones during pre-clearing surveys, a similar compensatory planting ratio will be followed.

Given that an integral component of the proposed resource recovery process is the retention and protection of the small pockets of remnant forest/woodland occurring on the property, management measures to ensure protection of these areas during the resource recovery operation are proposed, as outlined as follows:

3.1.4.General Mitigation Measures

To ensure appropriate management of the areas of vegetation to be retained during the resource recovery operations, and effective rehabilitation/revegetation of the areas to be cleared post removal, a Rehabilitation Strategy and Project Execution Plan have been prepared (see appendixes). These two documents prescribe the vegetation to be protected in the long term, vegetation management procedures to be employed, primarily comprising planting of KFTs, other suitable native species, weed control measures, desired outcomes to be achieved and measures of success.

Site rehabilitation works will be carried out by GER's team of well experienced and appropriately qualified contractors.

Other general management issues or factors requiring consideration, as identified for the subject property, and more particularly, the Impact Area to be rehabilitated/revegetated comprise:

- Ongoing weed control and potential for new weed infestations;
- Changed topography and associated changes to drainage patterns in the general environs of the stockpile;
- Variations in seasonal conditions inhibiting successful outcomes.

These are also addressed using the site operational plans whilst mineral removal is underway, and then, by the Rehabilitation Strategy (**APPENDIX FIVE**) once the removal of the ilmenite stockpile is complete.

3.1.5. Final Impact Analysis

Clearing of a total of approximately 1.37 ha of previously cleared and regenerating land, some of which has substantial HTE infestations (Zone 3c), is unavoidable if the proposed resource recovery process is to proceed. The extent of clearing has been minimised, however, by ensuring the resource recovery operations are to be located within the existing previously cleared area, and do not impinge on the remnant forest/woodland areas supporting KFTs, nor on the adjoining forested areas representing TECs.

Importantly, none of the trees to be removed within the Impact Area are in the large mature class, based on benchmark conditions for PCT 1230 and PCT 1235, and the majority are less than 20 cm dbh. The clearing operations trigger the requirement for a total of 3 ecosystem credits to be retired under the Biodiversity Offset Scheme. The full Credit Summary Report from the BAM calculator is provided in **APPENDIX THIRTEEN**. There are no SAls associated with the proposed resource recovery operations.

There will be some minor increases in habitat fragmentation within the ilmenite stockpile footprint for the duration of the resource recovery process and subsequent early stages of regeneration/rehabilitation of the Impact Area. There will also be some short term (approximately 36 weeks) increase in diurnal noise levels during weekdays, when machinery and trucks will be operating. However, no threatened flora or fauna species with potential to occur either within the Impact Area on the subject property, is considered likely to be significantly adversely affected by the clearing activities and subsequent works within the resource recovery area.

The potential for physical damage to KFTs and habitat to be retained, and injury to fauna species from clearing operations will be minimised by a range of mitigation measures, as provided in **SECTION FIVE**.

The proposed management measures, encompassing preparation and implementation of a site-specific Rehabilitation Strategy, are expected to improve the habitat value of the Impact Area and stockpile per se over time. The overall outcome will be protection of existing, albeit low use, Koala habitat within the subject property, a relatively short-term loss of the current limited biodiversity values within the Impact Area, and in the longer term, a net gain in biodiversity stockpile area.

3.2. HAULAGE IMPACTS - TRAFFIC AND HAULAGE NOISE

Aside from the initial clearing of the weed growth from the surface of the ilmenite stockpile, GER have identified that its primary potential impact on the Crescent Head community would come from the trucking of ilmenite off site for storage and sale.

Trucking impacts can be broken down into three components: noise of trucks, impacts on the road network (pavement) and potential impacts on traffic flow. A full assessment of the impacts of trucking on the road network and community can be found in **APPENDIX FOUR** and is summarised below.

Since the project was first assessed by SteetWise (**APPENDIX FOUR**), ilmenite will no longer be transported to Thurgoods holding yard. To avoid potential zoning issues, ilmenite will be directly transferred to either the port of Newcastle or the Port of Brisbane via the Pacific Motorway. This eliminates possible zoning issues with a secondary storage location in Kempsey Shire, as all material will be transported direct to ship holding yards at either port.

3.2.1. *Expected truck movements*

GER estimate the stockpile to contain approximately 47,500 m³ of ilmenite. The proposal is to load this material onto truck and dog semi-trailers and transport it from the site, via Point Plomer Road, Baker Drive, Pacific Street, Crescent Head Road, Macleay Valley Way and the Pacific Motorway direct to either the Port of Newcastle or Brisbane.

The haulage will be undertaken via truck & dog trailers with an average load of 30 m³ per trip – a total of 3,650 laden trips required. The haulage operator is proposing to provide 3 truck & dogs per day which would result in 20 laden trips a day on weekdays only – or a maximum of 100 laden trips (or 200 return trips) per week. This equates to an average of 2 laden trips per hour (or 4 return trips).

At an average of 20 laden trips per day for 5 days a week, the relocation of the 47,500 m³ of ilmenite from Crescent Head should take approximately 36 weeks (note: haulage will not occur on public holidays).

The 17.2 km haulage route is proposed via local roads under the control of Kempsey Shire Council.

3.2.2. *Existing road network usage and expected impacts*

Existing traffic volumes on the haulage route are relatively low, with each of the subject roads having adequate capacity to cater for an additional four trips per hour.

The most significant traffic impacts will result from the conflict between the low speed, slow acceleration heavy vehicles from the current ilmenite stockpile site at Crescent Head, and the existing traffic flows on the local roads. However, given the low number of proposed daily truck and dog movements, the relatively low volumes on the affected local roads, reasonably good road conditions and adequate sight distance at all intersections, the impacts of the ilmenite haulage on the local traffic flows are likely to be minimal.

A Road Safety Check of the proposed haulage route has been undertaken by StreetWise and is presented in **APPENDIX FOUR**. It lists a range of existing and potential hazards along the haul route, and a number of amelioration measures to reduce or negate those hazards which are as follows:

- Main Roads - Macleay Valley Way / Crescent Head Road: Macleay Valley Way was previously the Pacific Highway, and was the main Sydney – Brisbane route, catering for a high volume of B-doubles, semi-trailers and heavy vehicles. The western section

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of Crescent Head Road passes through an industrial precinct, which currently generates heavy vehicle movements daily. Also, Kempsey Council's waste management centre is located in Tip Road, which generates a significant number of heavy vehicle trips along Crescent Head Road every day. The majority of the proposed haul route therefore:

- currently experiences a high percentage (approx. 8.6%) of heavy vehicle movements every day
 - the existing roads and intersections can cater safely and efficiently for heavy vehicle movements
 - the additional 4 heavy vehicle movements per hour to be generated by the proposed haulage of ilmenite will not significantly increase the existing volumes of heavy vehicles utilising Crescent Head Road and Macleay Valley Way.
- **Intersections:** The existing intersections along the proposed haulage route have adequate capacity to cater for four additional truck & dog movements per hour. The layouts of the existing intersections also have adequate space to safely cater for the swept path of turning truck & dog trailers.
 - **Site access - Point Plomer Road:** Access proposed to and from the current stockpile site at Crescent Head is from a previous access road on the eastern side of the northern sealed section of Point Plomer Road. It is proposed to re-establish the access, which will have adequate sight distance in either direction. Point Plomer Road currently has low traffic volumes and adequate width to safely accommodate access to & from the site by truck & dog trailers with minimal impacts on existing traffic flows.
 - **Local Roads - Pacific Street and Baker Drive / Point Plomer Road:** Along the proposed 17.2 km haulage route, there are 2 current school zones and a day care facility. Crescent Head Public School is located at 44 Pacific Street, just west of the Baker Drive intersection (**PLATE EIGHT**). The school oval, pool and associated community buildings also fronts Baker Drive / Point Plomer Road (**PLATE NINE**), and Kempsey Adventists School is located at 108 Crescent Head Road, Kempsey, at the western end of Crescent Head Road, about 1km east of the intersection with Macleay Valley Road. Both schools include a 40 kmh school zone between 8:00 - 9:30 am in the morning and 2:30 – 4:00 pm each weekday afternoon.

In summary, if the haulage drivers are aware of the potential hazards, drive within the road rules, drive to the road and weather conditions, and ensure there is flexibility when scheduling haulage movements, the impacts of the proposed haulage trips can be minimised.

The existing hazards, and those relating to the proposed truck & dog movements, discussed above and in **APPENDIX FOUR**, can be removed or minimised by adopting the recommended amelioration methods. Road safety of the proposed haul route will be further increased by adherence to the Drivers Code of Conduct (see below).

This application proposes to relocate an existing ilmenite stockpile site from Crescent Head to the port. It does not involve quarrying of any new material. It is a limited life, once only haulage project, which GER and haulage operators wish to complete as safely and efficiently as possible.

It is also proposed to undertake the haulage works outside of school holiday periods, when traffic volumes within the Crescent Head township, and also Crescent Head Road, are generally high, particularly during the Christmas period. It should also be noted that the local roads included in the haul route safely cater for peak holiday traffic, and the haulage

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activities will be scheduled during off-peak months, when there are reduced volumes, adequate capacity and minimal impacts on local traffic.

In addition two further measures will be adopted to reduce potential traffic risk, these are:

- Additional signage will be installed in collaboration with Kempsey Shire Council along the proposed haulage route to warn motorists of potential truck movements in the vicinity.
- Scheduling of truck movements should include enough flexibility to minimise hauling at peak times, particularly through the 2 school zones along the proposed haul route.

PLATE EIGHT - SCHOOL ZONE ON PACIFIC STREET



PLATE NINE - SCHOOL ZONE ON BAKER DRIVE



3.3. SITE NOISE

An assessment of the potential noise impacts of the proposal was completed by Bravo Resource Solutions (**APPENDIX EIGHTEEN**). Currently the site is unoccupied, therefore the existing noise environment is dominated by traffic noise on Point Plomer Road.

The land zoning, the subjective assessment of the acoustic environment in the area, and the acquired background noise levels would support a rural residential land use category with reference to Table 2.3 in the Noise Policy for Industry.

The nearest receptor (House 1) is located approximate 205 m to the South West of the proposed site boundary (**FIGURE TEN**).

The amenity and intrusiveness noise levels (ANL) were determined for the project site and intrusive noise level was calculated for the project area. The intrusive noise level is determined using the following formula:

$$\text{Intrusive Noise Level} = \text{LAeq,15min RBL} + 5$$

Therefore, the project amenity noise level (ANL) is Rural ANL (Table 2.2: Amenity noise levels, Noise Policy for Industry 2017), minus 5dB(A) plus 3 dB(A) to convert from a period level to a 15-minute level dB(A) RBL.

The project noise trigger is the lower value of the intrusiveness and amenity noise levels. Therefore, the project noise trigger levels are as follows:

Daytime:	LAeq, 15min 45 dB(A)
Evening:	LAeq, 15min 40 dB(A)
Night:	LAeq, 15min 35 dB(A)

GER's primary noise source on site will be a Front-End Loader (FEL) or small excavator. The modelling is based upon a FEL being used 40% of the time at full power (period of highest noise generation).

This is considered worst case scenario for the site, given the long travel times between loading of truck and dog trailers and infrequency of trips per day (estimated to be four fully loaded trips per day).

Previous studies suggest the full power is only used when the loader bucket is entering the stockpile, approximately 20% of the time. Small excavator noise emissions are considered similar to those of a FEL.

Following the above constraints, the predicted noise level for the site loading and unloading activities exceeded the daytime project noise trigger level by 17.9 dB(A) (62.9 dB(A)).

However, based on site location and the layout of the project area, GER believe that a shielding effect of the stockpile itself plus the (+130m) of dense vegetation would reduce noise levels by more than 27 dB(A) at the nearest residential location (as outlined in **APPENDIX EIGHTEEN**). Consideration of these physical and natural measures already in place were determined to be both reasonable and realistic.

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With these measures incorporated, the following revised noise prediction was made:

Daytime: 35.9 LAeq, 15min dB(A)

The predicted noise level is well below the project noise trigger level (45 LAeq 15min dB(A)), and the sites RBL (40LAeq, 15min dB(A)).

Considering the conservative nature of RBL used and hence the conservative nature of the project trigger noise level, the distance from the receiver, daytime operations only, the natural attenuation provided by the stockpile itself, and the surrounding vegetation, noise impacts are not expected and proceed controls of investigations following neighbour complaints are acceptable.

3.4. AIR EMISSIONS

An assessment of the potential air quality impacts of the proposal was completed by Bravo Resource Solutions (**APPENDIX TWENTY TWO**). As above, with the site being currently unoccupied and vegetated, any potential air emissions are a result of activities on Point Plomer Road.

In the absence of a requirement for an EPA licence for removal of the stockpile material, the site has been considered in accordance with the NSW Protection of the Environment Operations (Clean Air) Regulations 2010, and GER believe site activities can be regarded as being an activity, under Division 3, Standards for non-scheduled premises.

Also, as the proposed activity is a subject of a development application made after 1 September 2005, it is classified as a Group C activity (see the NSW Protection of the Environment Operations (Clean Air) Regulations 2002)

GER's expert has recommended that the potential emission associated with the activity is dust generation during the loading of the ilmenite onto semi-trailer trucks.

However, a very small percentage of ultra-fine particles within the ilmenite stockpile would be expected as the stockpile contains already processed material (Ultra fine particles tend to remain suspended during wet separation techniques and would have most likely reported to the tails stream of any processing plant). From the analysis of the stockpile, GER believe that the actual fraction in the pile, as opposed to that calculated, would be significantly less than 6.1% of the total particle size will be in the PM10 Range.

In short, assuming the worst-case estimate of 6.1% of the stockpile is in the PM10 Range, the recommended PM10 emissions factor is:

$$0.025 \times 0.061 = 0.0015 \text{ kg/t.}$$
$$0.0015 \text{ kg/t} \times 1000 = 1.5252 \text{ mg/t}$$

Using a bulk density of 2.31 g/cm³ this equates to a PM10 emission of **3.53 mg/m³ well below the activity limit of 100 mg/m³**.

Despite the predicted air emission being well below the activity limit in the guidelines and it would be further reduced by the following site factors:

- The site is well shielded by dense surrounding trees providing a windbreak and giving it a high roughness factor (Wind Resistance)
- Based upon Bureau of Meteorology (BOM) data for Port Macquarie, prominent (9am) wind direction in all seasons is from the South West (Away from the noise receptor House 1) and the (3pm) afternoon/evening wind direction is from the North East (Towards the receptor House 1).
- The project will operate in daylight hours only, therefore, metrological conditions would appear to reduce the air emissions as measured at the nearest residence for the majority of daylight hours.

In conclusion, GER believe the proposed activity will not impact air quality and no specific mitigation methods are recommended.

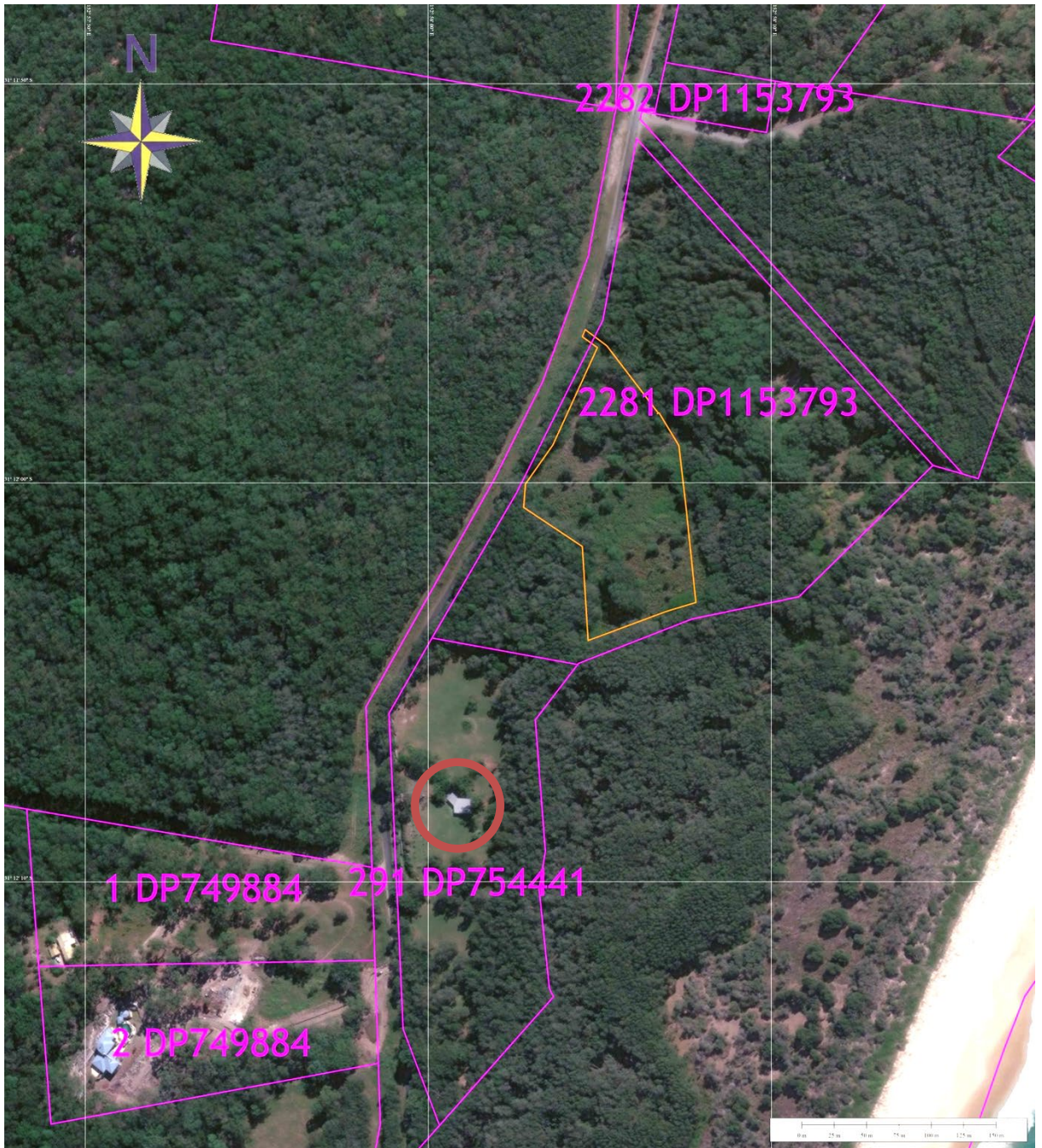
However, GER have included in its Project Execution Plan a commitment to minimising air emission risks during the proposed activity by undertaking the following:

- A requirement to ensure trucks leaving the activity area are clean of any ilmenite spillage.

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- Any air emission or dust complaints be formally recorded and investigated.
- Any dust monitoring conducted (as a result of a complaint or other), be completed as per NSW Protection of the Environment Operations (Clean Air) Regulations 2002.

FIGURE TEN – NEAREST NOISE SENSITIVE RECEPTOR



3.5. RADIATION

GER have commissioned an assessment of the potential radioactivity of the stockpile by Calytrix Consulting PTY LTD (**APPENDIX ONE**). Based on third party laboratory analyses (ALS laboratory services) of surface and drilling samples and a surface gamma radiation survey by Pandanus Solutions (**TABLE FOUR**) the assessment found that the ilmenite stockpile contains very low concentrations of thorium and uranium and is not classified as ‘radioactive ore’ in NSW.

Although no specific radiation measures are required in the process of dealing with the ilmenite during its removal, it was recommended by Calytrix that it not be used in any situations where it came into long term contact with the general public, for example it should not be used as landfill or in other construction activities. In addition, Calytrix recommended a gamma radiation meter should be used by GER to take regular readings during and after removal to establish that all ilmenite has been successfully removed, prior to placement of mulch or topsoil.

TABLE FOUR. GAMMA RADIATION SURVEY SUMMARY RESULTS

Location Description	Number of measurements	Gamma radiation level (µSv/hour)	
		Range	Average
Ilmenite stockpile	55	0.10 – 2.13	0.27±0.30
Background	20	0.08 – 0.26	0.14±0.05
Crescent Head township	2	0.11 – 0.80	0.46±0.49

GER acknowledge that there may be a historical perception by some members of the community that the area may contain “radioactive” material. GER will manage this perception through the community engagement plan, and through physical reduction in potential for stockpile material to leave the site through wind or falling from machinery leaving site. These additional controls are outlined in **SECTION FOUR** below.

4. CONTROL STRATEGIES - ACTION PLAN

This section describes GER's action program for addressing the environmental impacts as identified in the EIS and supporting documentation. The action plan details known control strategies or identifies possible control strategies if particular environmental values have the potential to be affected by the proposed works.

4.1. GENERAL CONTROL STRATEGIES

4.1.1. Bond for Ilmenite Pile Rehabilitation Activities

GER will lodge a bond with the state government to ensure that rehabilitation of the disturbed areas is provided for in the unlikely event of GER failing to complete the rehabilitation of the area. This bond amount will be determined by the state government on granting of a mining lease.

4.1.2. Storage and Handling of Flammable and Combustible Liquids

Storage of all flammable and combustible liquids will be within an on-site containment system and controlled in a manner that prevents environmental harm (other than trivial harm) and maintained in accordance with Section 5.9 of AS 1940 - Storage and Handling of Flammable and Combustible Liquids of 2004.

Spillages of flammable and combustible liquids will be contained within an on-site containment system and maintained in accordance with AS 1940.

4.1.3. Boundary of Ilmenite Removal Operations

The company will not cause an environmental impact, which amounts to environmental harm beyond the boundary of the "nominated ilmenite removal area" outlined in **FIGURE SIX**.

GER will implement the control strategies detailed in this EIS so as to not cause environmental harm beyond the nominated ilmenite removal area. Specific control measures may be implemented following any risk assessments, and monitoring systems may be modified as the likelihood of off-site impacts change.

As detailed in the Project Execution Plan (**APPENDIX TWO**) and in **SECTION 3.4.4**, a temporary site boundary barrier will be installed to limit access to site operations. Depending on the identified risk, this barrier may take the form of temporary fencing, portable traffic barriers or in already inaccessible heavily vegetated areas, barrier tape and signage, with a minimum of 6ft high portable cyclone fencing along the boundary with Point Plomer Road.

4.1.4. Environmental Management System

GER has an existing Environmental Management System (EMS) that substantially conforms to the international standard ISO 14001 (2004) criteria for Environmental Management Systems. The EMS provides a framework for managing environment risks. GER's risk assessment and management system includes the identification, assessment and ranking of potential risks associated with activities associated with operations. GER's Emergency Response Plan identifies and describes appropriate responses to those risks

identified by the risk assessment and management system in order to minimise hazards to personnel and the potential for environmental harm, respectively. The Crescent Head project will be managed as per GER's existing EMS system should GER be successful in its tender application.

4.1.5. Progress Reporting

GER will submit a monthly (4-week period) progress report that reports on progress of the EIS. The report must address:

- Status of compliance with the conditions of the DA;
- Monitoring results and their conformance with trigger levels if applicable;
- Performance in relation to the objectives, targets and performance indicators stated in the DA; and
- Details of environmental incidents and community complaints.

4.2. SPECIFIC CONTROL STRATEGIES

4.2.1. *Product Spillage and Cartage off Site*

As a key component of the trucking projects Drivers Code of Conduct a spill response procedure will be developed to address and potential product spillage. Spill clean-up equipment will be carried in each truck in the unlikely event that material is lost.

All trucks will have their loads covered, as is the general requirement of the road rules in NSW for such loads.

GER will establish a contact hotline for the operations and encourage all spills to be reported through community information on social media and through signage on the trucks.

4.2.2. *Air – Dust Nuisance*

The release of dust or particulate matter or both resulting from the ilmenite pile removal will not cause public or environmental nuisance at any sensitive place.

GER will utilise the following dust management strategies to reduce the risk of nuisance;

- Covering of all loads leaving the site
- The use of water suppressions on site access point, and
- Minimising the disturbance footprint.

It is not anticipated that there will be dust issues associated directly with the mineral stockpile due to the high specific gravity of the product and the sheltered nature of the site.

GER will conduct air quality monitoring in response to complaints from residents (i.e. sensitive places) or following a request from the regulator.

Should air quality monitoring undertaken in response to a complaint exceed the air quality limits as defined in the relevant EPA guideline, GER will implement a risk treatment process which either:

- a. Addresses the complaint including use of appropriate dispute resolution processes if required; or
- b. Implements dust abatement measures so that dust emissions from the activity do not result in further environmental nuisance.

4.2.3. *Noise – Noise Nuisance*

Noise from the Crescent Head Project is not expected to cause an environmental nuisance, at any sensitive or commercial place.

GER will utilise the following noise management strategies to reduce the risk of nuisance;

- Restriction of haulage and site works to the hours between 6 am and 6 pm, during weekdays.
- No haulage will occur on public holidays
- The use of low noise emission machinery (front end loader or equivalent) to load trucks

- Speed limiting of haul trucks within the built-up area of the Crescent Head community to 40 km/hr

GER will conduct noise monitoring in response to complaints from residents (i.e. sensitive places) or following a request from the regulator.

Should noise monitoring undertaken in response to a complaint exceed the noise limits as defined in the relevant EPA guideline, GER will implement a risk treatment process which either:

- a. Addresses the complaint including use of appropriate dispute resolution processes if required; or
- b. Implements noise abatement measures so that noise emissions from the activity do not result in further environmental nuisance.

4.2.4. Traffic Impacts

The potential impact of trucking of the project material from site and, to a lesser extent, the cartage of machinery to and from site may, if not managed appropriately, create traffic related risks. These will be managed by GER and its principle contractor using the following controls:

- **Additional advisory signage** - GER will work with Kempsey Shire Council to install appropriate advisory signage on the local roads within the project haulage route. Some signage already exists, however, GER will work with council to install additional truck advisor signs as required.
- **Improve site entrance visibility** - the current line of sight for the entrance to the project area is along a straight section of Point Plomer Road. However, the current entrance is lower than the road and shrouded in a heavy overgrowth of weeds. GER will build up the road access point to the stockpile using rock rubble (free draining) and clear weed undergrowth to improve visibility of truck leaving and entering site.
- **Hours of operation** - GER will work with the selected contractor to ensure haulage is scheduled so that trucks are not utilising the local road network during the school zone times (See **PLATE EIGHT** and **PLATE NINE**). Trucking will be prohibited on weekends and public holidays and minimised and / or stopped during school holiday periods.
- **Create and implement a Drivers Code of Conduct** - GER and the contractor will ensure all drivers are inducted to site, and that this induction includes drivers signing onto a driver's Code of Conduct prior to working on the project. A Code of Conduct sets out the principles and professional standards of conduct for employees of a particular company. The Code is not generally a comprehensive set of rules, but rather a set of principles that form a framework for conduct and behaviour in the workplace. It provides guidance for staff on how to:
 - Carry out their duties in a lawful and ethical way
 - Interact with staff and other road users in a fair and courteous manner

While a Code of Conduct may vary from workplace to workplace, the key principles should include:

- Accountability
- Leadership
- Openness and objectivity

- Honesty

The Code will cover all permanent, temporary, casual, skill-hire and contract staff. The Code of Conduct should be relevant to traffic movements generated by the transporting of ilmenite from Crescent Head to South Kempsey and can't be finalised until the conditions of approval are known.

GER will develop the drivers code of conduct with the successful contractor based on the sample code provided in **APPENDIX FOUR**.

4.2.5. Waste – General Waste Handling

All regulated waste removed from the site will be removed by a person who holds a current authority to transport such waste.

4.2.6. Waste – Potential Radioactive Materials Uncovered During Ilmenite Removal

GER has experience with the remediation of old ilmenite piles. Depending on the processing philosophy of the company operating at the time of the pile placement by MDL, there may be potential for some areas of higher radiation materials within in the pile.

4.2.6. Preserving Biodiversity During Ilmenite Removal

As indicated above, the disturbance footprint or Impact Area for the project has been kept within the boundaries of the ilmenite pile itself and its existing access track. As outlined in **SECTION 4**, the impacts of the project on the biodiversity values of the lot, if kept within the footprint outlined in **FIGURE FIVE** will be extremely low. To ensure all site personnel are kept within this boundary, the following measures will be undertaken:

- Maintenance and protection of all vegetation outside the impact area and thus within the designated area for conservation;
- Prior to the commencement of any construction works on site, clear marking of any trees to be protected in the immediate vicinity of clearing and distinctive marking of trees to be removed, such that there is no room for confusion regarding tree removal/protection;
- Clear visual delineation of total Impact Area to avoid any confusion by resource recovery machinery operator/s;
- Installation of boundary fencing (as outlined in **SECTION 5.1.3**)
- Pre-clearing checks by a suitably qualified ecologist to be undertaken immediately prior to clearing activities to ensure there are no fauna issues, such as small ground fauna sheltering in dense grass/ground cover, nesting birds, roosting microbats, requiring specific procedures. In the unlikely scenario of an individual Koala being located in one of the trees adjacent or within the Impact Area immediately prior to clearing, a buffer of 10m will be established around the tree and the Koala left to move on of its own accord;
- Supervision of clearing operations by a suitably qualified ecologist/fauna spotter/wildlife carer if potential fauna issues are identified;
- Ongoing restriction of resource recovery operations to daylight hours; and

- Ongoing maintenance of best practice on-site biosecurity hygiene measures for machinery and on-site personnel to minimise the risk of introducing or spreading exotic weeds, pests or diseases.
- Implementation of the approved Rehabilitation Strategy (**APPENDIX FIVE**), which outlines the effective rehabilitation of the areas to be cleared. The strategy will prescribe management measures, including planting and weed control procedures. KFTs are a priority for proposed plantings post resource recovery.

4.2.7. Land – Rehabilitation

The main objective behind the economic rehabilitation strategy employed by GER is the company's commitment to rehabilitation of the project area post pile removal. The Rehabilitation Strategy outlined in **Part One, Section Two** and in **APPENDIX FIVE** steps through the rehabilitation process from pile removal, hydromulching and establishment of native species from seeds. The strategy also outlines the importance of ongoing maintenance, especially weed control and supplementary planting to ensuring success.

4.2.8. Land – Infrastructure

All infrastructure, constructed by or for the company during the pile removal activities will be removed from the site prior to surrender of the area, except where agreed in writing by the post mining landowner/holder.

4.2.9. Community – Complaint Response

All complaints received will be recorded including details of complainant, reasons for the complaint, investigations undertaken, conclusions formed, and actions taken. These actions are detailed fully in the Community Engagement Plan (**APPENDIX FOURTEEN**)

All complaints/community concerns will be addressed in accordance with GER's public Comments and Complaints Procedure.

4.2.10. Community – Project Perceptions

For the duration of the project GER will engage in regular community consultation and engagement activities including the following:

- **Onsite community briefings** - GER will hold open briefings with the Community, held on the project site prior to commencement of on-ground works. These meetings, led by GER management, are intended to provide community stakeholders with information about the project, address any community issues or concerns, and provide information on any concerns raised from the Community Concern Hotline.
- **Website and Facebook Links** - Once operational, GER will establish a Website and Facebook page to provide updates on progress of the project and any site related issues that may arise. A "project days to completion" counter will be displayed on this page along with regular site photos and site contact numbers for the community concerns process (below).
- **Community Concerns Process** - GER will establish a community feedback process where comments and concerns are relayed back to GER senior management, the site supervisor/superintendent and the project environmental scientist directly via phone and/or email; depending on their nature. All calls received will be logged, tracked and responded to. The number and type of community concerns are reported on a weekly basis to GER management. The record of calls will include:

- a.** The date and time of the complaint.
 - b.** The method by which the complaint was made.
 - c.** Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect.
 - d.** The nature of the complaint.
 - e.** The action taken by GER in relation to the complaint, including any follow-up contact with the complainant.
 - f.** If no action was taken by GER, the reasons why no action was taken.
- **Signage** - GER will erect suitable signs on the site perimeter and entrance to the project site informing the public of the project, the environmental and community benefits, and GER management/project site superintendent/emergency contact details.

4.2.11. Cultural Heritage Values

In the unlikely event any artefacts of other items of potential Aboriginal significance are uncovered during the stockpile removal, the Site Operations Manager is responsible for immediately halting work in the area, taping the area off with danger tape, and contacting GER management. GER management will liaise with the Kempsey Aboriginal Land Council to arrange an assessment.

GER will also include in all site induction and training material, appropriate training in the identification and preservation of found items of cultural significance in line with relevant state and federal acts.

5. MONITORING AND REPORTING

5.1. CONTINUOUS MONITORING PROGRAM

GER will continuously monitor the site during site works (and any suspension of works). The site superintendent will oversee the collection of appropriate monitoring data, as set out in the control strategies above.

The continuous monitoring program will include:

- Weather - during operations, daily weather recordings will be undertaken at the start of the working day and on receipt of any community complaint or concern
- Noise - machinery used on site will be subject to regular noise checks using approved and calibrated equipment in accordance with the appropriate guideline
- Site security and access - at the start of each day, a perimeter check of site fencing and visual barriers (shade cloth or similar) will be undertaken to ensure the site has no unauthorised access and visual impact is minimised
- Dust - dust levels will be assessed each workday and dust mitigation measures implemented if required. A dust deposition gauge will be installed between the site and nearest residence to measure ambient dust levels and this will be checked on a daily basis to ensure it is operational and analysed on a quarterly basis or on receipt of a complaint
- Weeds - any outbreaks of emergent weeds or regrowth will be reported to the site superintendent and appropriate controls put in place to eliminate weeds on any rehabilitated areas

5.2. POST MINING REHABILITATION MONITORING

Following final rehabilitation works on site, a period of monitoring for indicators or rehabilitation success will be implemented to ensure the site restores ecosystem function back to native bushland, similar to what was there before.

5.3. COMPLAINT MONITORING

All external complaints will be assessed by the project management team and, if deemed to be credible and not vexatious, will be discussed with the relevant contact within council. GER, in conjunction with the relevant representative from council will then decide upon the most appropriate monitoring methodology to address the complaint.

5.4. CULTURAL HERITAGE MONITORING

The following 'Find Procedure' is considered GER's minimum response in the event of the identification of artefacts within the Development Area:

- Work in the surrounding area is to stop immediately;
- A temporary fence is to be erected around the site, with a buffer zone of at least 10 metres around the known edge of the site;
- In consultation with the local indigenous representative for the project, an appropriately qualified archaeological consultant is to be engaged to identify the material; and,
- Should the material be confirmed as an Aboriginal object or archaeological site, a salvage program put in place

5.4.1. Aboriginal Human Remains

Although it is unlikely that Human Remains will be located at any stage during earthworks within the Project Area, should this event arise it is recommended that all works must halt in the immediate area to prevent any further impacts to the remains.

The Site will be cordoned off and the remains themselves left untouched. The nearest police station (Port Macquarie), the Kempsey Local Aboriginal Land Council, and the OEH Regional Office (Coffs Harbour) will all to be notified as soon as possible.

If the remains are found to be of Aboriginal origin and the police do not wish to investigate the site for criminal activities, the Aboriginal community and the OEH should be consulted as to how the remains should be dealt with.

Work will only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations. GER will also ensure that all personnel use respectful language, bearing in mind that they are the remains of Aboriginal people rather than scientific specimens.

5.3. EXTERNAL REPORTING

GER understand that the regulator and other stakeholders will need to be kept informed of our progress on the above proposal, as well as council. Monitoring requirements for council are set out in section 6.1.5 above and all other stakeholders will be kept informed through external reporting on the following project milestones in the following ways:

- Letter notification of commencement of site works
- Monthly progress email on the removal of the ilmenite pile
- Annual returns to relevant department as per DA / Licensing requirements
- Letter notification of conclusion of pile removal and commencement of rehabilitation activities
- Letter notification on conclusion of rehabilitation activities, and
- Letter notification on conclusion of the Project

This reporting will also be detailed in the community engagement plan and distributed via the community engagement matrix in **SECTION 6.4** below.

5.4. COMMUNITY ENGAGEMENT

GER will continue to engage with the community post approval and update project status through the following ways:

5.4.1. Community Facebook Page

Once operational, GER will establish a Community Facebook page to provide updates on progress of the project and report any site related issues that may arise. A "project days to completion" counter will be displayed on this page, along with regular site photos, site contact numbers/email addresses for the community concerns process (below).

5.4.2. Community Concerns Process

GER will establish a community feedback process where comments and concerns are relayed back to GER senior management, the site supervisor/superintendent and the project environmental scientist directly via phone and/or email; depending on their nature. All calls received will be logged, tracked and responded to. The number and type of community concerns are reported on a weekly basis to GER management. The record of calls will include:

- The date and time of the complaint
- The method by which the complaint was made
- Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect.
- The nature of the complaint
- The action taken by GER in relation to the complaint, including any follow-up contact with the complainant, and
- If no action was taken by GER, the reasons why no action was taken.

1. APPENDIX ONE – RADIATION ASSESSMENT

2. APPENDIX TWO – PROJECT EXECUTION PLAN

3. APPENDIX THREE – RESOURCE ESTIMATE (JORC)

4. APPENDIX FOUR – TRAFFIC ASSESSMENT

5. APPENDIX FIVE – REHABILITATION STRATEGY

6. APPENDIX SIX – PUBLIC NOTIFICATION NOTICES

7. APPENDIX SEVEN – EXPLORATION LEASE GRANT

8. APPENDIX EIGHT – LANDOWNER ACCESS AGREEMENT

9. APPENDIX NINE – SECTION 11A APPLICATION

10. APPENDIX TEN – SEAR'S REQUIREMENT NOTIFICATION

11. APPENDIX ELEVEN – RENEWAL OF EXPLORATION LICENCE 8085

12. APPENDIX TWELVE – KEMPSEY SHIRE COUNCIL DA ADVICE

13. APPENDIX THIRTEEN – BIODIVERSITY ASSESSMENT

14. APPENDIX FOURTEEN – COMMUNITY ENGAGEMENT PLAN

15. APPENDIX FIFTEEN – CULTURAL HERITAGE REPORT

16. APPENDIX SIXTEEN – KEMPSEY ABORIGINAL LANDS COUNCIL SITE REPORT

17. APPENDIX SEVENTEEN – FLORA AND FAUNA SURVEY

18. APPENDIX EIGHTEEN – NOISE ASSESSMENT

19. APPENDIX NINETEEN – GEOLOGY AND MINERALOGY ASSESSMENT

20. APPENDIX TWENTY – FLOOD SEARCH RESULTS

21. APPENDIX TWENTY ONE – WATER AND SEDIMENT PLAN

22. APPENDIX TWENTY TWO – AIR QUALITY ASSESSMENT