BALLA BALLA EXPORT FACILITIES

FORGE RESOURCES PTY LTD

ASSESSMENT ON PROPONENT INFORMATION – SUPPLEMENTARY INFORMATION REPORT

Date: 10 May 2013

Prepared for
Forge Resources Pty Ltd
By Preston Consulting Pty Ltd
May 2013
Rev_1

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EXECUTIVE SUMMARY

Forge Resources Pty Ltd (Forge) proposes to construct and operate a small-scale, privately operated iron ore export facility at Balla Balla in the Pilbara region of WA (Figure E1). This document outlines key elements required for the construction and operation of the Proposal and updates the supporting document provided with the referral form.

The purpose of this document is to provide a detailed description of the Proposal and to enable assessment of the potential environmental impacts that may result, should the Proposal be implemented. The assessment will be completed by the Office of the Environmental Protection Authority (OEPA) under the provisions of Part IV of the *Environmental Protection Act 1986* (EP Act).

The scope of the Proposal presented in this document is limited to an iron ore export facility at Balla Balla, and associated infrastructure. The Proposal has been scoped to cover the requirements of Forge for the export of iron ore to overseas markets. A detailed description of the Proposal is included in Section 2. The Proposal does not include mining operations or the processing of iron ore at Forge's Balla Balla Magnetite Project (Balla Balla mine), which has already been approved under Part IV of the EP Act (Ministerial Statement 794).

The key elements of the Proposal will be constructed and operated within the Proposal Area boundary shown in Figure E2.

Table ES1: Key Characteristics of the Proposal

Summary of the Proposal		
Proposal Title		**Balla Balla Export Facility**
Proponent Name		Forge Resources Pty Ltd.
Short Description		The Proposal is to construct and operate an export facility at Balla Balla in the Pilbara region of WA to export iron ore. A low pressure slurry pipeline shall transport concentrate to a stockyard where it will be dewatered and stored. An overland conveyor shall transport the stockpiled material from the stockyard to a self-propelled barge via a causeway and trestle jetty across tidal flats. The barge will tranship the material to an ocean going vessel moored offshore in deep water.
Physical Elements		**Proposed Extent Authorised**
Total Disturbance Area		Total disturbance of up to 160 ha within the 515 ha Proposal Area boundary, including up to: • 3.5 ha of intertidal and subtidal benthic habitat disturbance for marine and intertidal facilities (including trestle jetty and loading wharf); and • 156.5 ha for terrestrial facilities (including dewatering plant/stockyard area, slurry pipeline corridor, causeway, laydown area).
Operational Elements		
Element	**Location**	**Proposed Extent Authorised**
Export Operations	Balla Balla	Loading of transhipment vessels from a conveyor on a trestle jetty, which shall transport the iron ore to ocean going vessels located offshore in Commonwealth waters. Ore is then loaded onto the ocean going vessels for export.
Water supply	Balla Balla	Water supply will be from approved sources within the Balla Balla mine site via above ground water pipelines.
Power supply	Balla Balla	Power will be supplied from approved sources within the Balla Balla mine site via overhead or buried power lines

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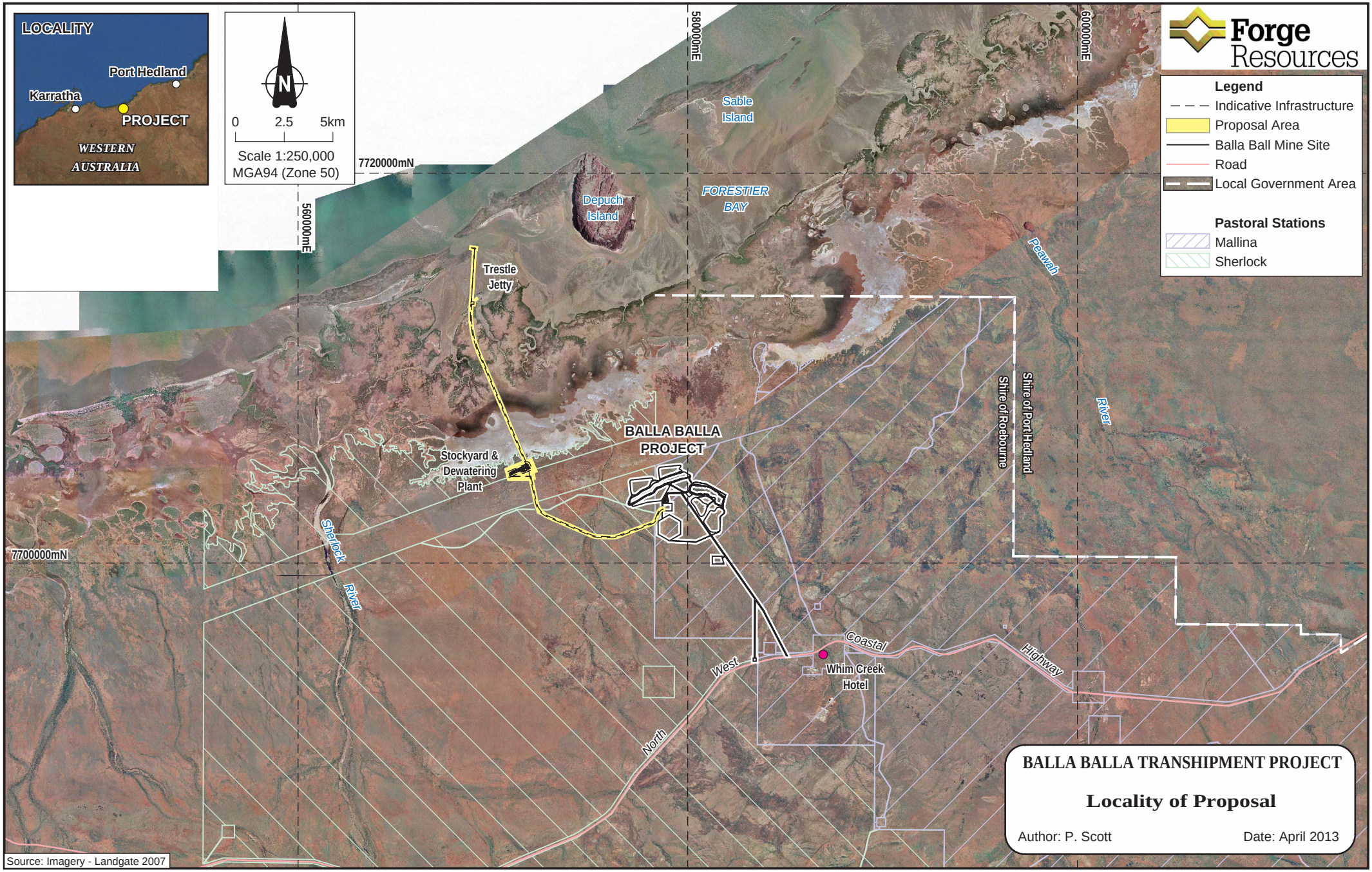

Figure E1: Location of Proposal

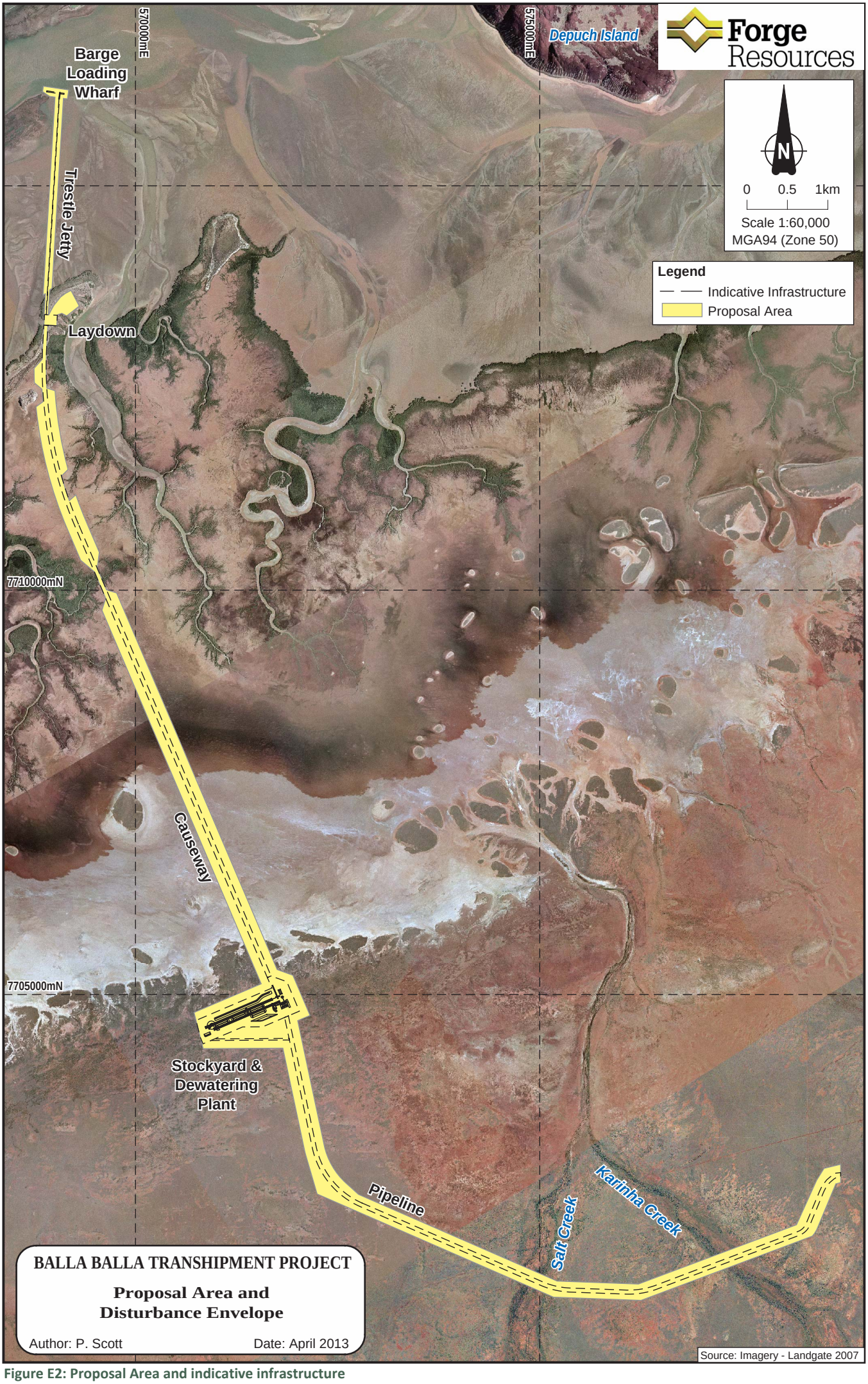

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Figure E2: Proposal Area and indicative infrastructure

The Proposal is for iron ore export facilities and does not require dredging, therefore it minimises impacts on mangrove communities. It utilises transhipping using barges to transport iron ore to be loaded into ocean going vessels offshore. The Proposal has been referred to the WA EPA for assessment under Section 38 of the EP Act. The EPA has indicated that the Proposal is suitable for assessment at the Assessment of Proponent Information (API) level of assessment (Category A) (EPA, 2013). The EPA also identified the factors requiring assessment as:

- Marine fauna;
- Marine benthic habitat;
- Marine environmental quality; and
- Flora and vegetation.

This document provides background information specific to these key environmental factors, describes the factors, the environmental impact assessment methodology (including relevant EPA objectives, policies, guidelines and standards), relevant aspects of the Proposal and their potential impacts and risks, proposed management actions, expected residual impacts and environmental outcomes. The review also provides information on other factors relevant to the proposal to inform the EPA as to how these factors will be managed.

A summary of the expected outcomes for each factor is presented in the sections below.

Marine Benthic Habitat

Potential impacts on marine benthic habitat from the implementation of the Proposal include:

- Direct disturbance;
- Introduced marine pests (IMP) resulting in alteration of habitat dynamics;
- Oil spill or other marine pollution resulting in contamination of marine benthic habitat; and
- Changes to tidal processes resulting in changes to intertidal habitat.

Based on discussions with the OEPA, only mangroves, algal mats, low intertidal flats and subtidal waters are expected to be BPPH or subsequently able to support BPPH.

The Proposal is expected to disturb 2 ha of mangroves, 21.05 ha of algal mat habitat, 0.47 ha of low intertidal flats and 0.3 ha of subtidal habitat. Of the 0.3 ha of low intertidal flats, some 0.22 ha is barren scoured coarse sand and gravel substrate and 0.01 ha is filter feeder habitat on gravel veneered limestone pavement.

In accordance with EAG3, a 46 km^2 Local Assessment Unit (LAU) has been defined for assessment of impacts (Figure 13). Areas of BPPH impact have been calculated in comparison to the total of that BPPH type found within the defined LAU. The proportion of BPPH impacted within the defined LAU are as follows:

- Mangroves - 0.35%;
- Algal mat – 2.12%;
- Low intertidal flat - 0.06%; and
- Sub-tidal waters - 0.09%.

The combined disturbance impacts listed here quantify above that of the 1% Cumulative Loss Guideline (CLG) specified in EAG3 (EPA, 2009). However, due to the abundance of algal mat habitat in the wider ecosystem, it is inevitable that this habitat is going to display a higher a percentage of disturbance and it is consequently unavoidable. When considered as a percentage of total algal mat habitat within the Balla Balla ecosystem, the habitat loss resulting from causeway construction equates to 0.89% (at the proposed 50m wide corridor).

Indirect impacts are not anticipated and expected to be minimised through the adoption of the identified control measures (i.e. culverts and causeway alignment).

The coarse sand and gravel substrates of the area indicate that propeller churn is most unlikely to be a source of recurring turbidity or sedimentation. Waters are naturally turbid during spring tides and occasional cyclone or river flood events.

Marine Fauna

Potential impacts on Marine Fauna and their habitat from the implementation of the Proposal include:

- Direct disturbance of benthic habitat;
- Marine noise leading to fauna behavioural changes, injury or death;
- Light spill resulting in disorientation of marine turtles;
- IMP resulting in alteration of habitat dynamics;
- Oil spill resulting in contamination of benthic primary producer habitat and injury or death of marine fauna;
- Vessel strike resulting in injury or death of marine fauna;
- Changes to tidal processes resulting in changes to intertidal habitat; and
- Marine pollution resulting in injury or death of marine fauna.

Marine conservation significant fauna identified as being of most relevance to the Proposal are whales, dolphins, turtles and dugong.

Potential impacts to marine fauna have been significantly reduced in the site selection and planning processes such that direct impacts on key habitats such as coral, seagrass and mangroves are avoided. The Proposal has been designed to avoid dredging which minimises the risk of significant direct and indirect impacts.

Indirect potential impacts from marine noise are expected to be limited to the construction phase (expected to be 9 months). Marine noise, vessel strike, light spill, oil spill and IMP risks and potential impacts are expected to be minimised to insignificant levels via a series of industry standard management actions.

Based on the above, it is expected that the implementation of the Proposal will not result in significant impacts to marine fauna or their key habitat. With the application of the proposed management actions the EPA objectives and applicable policies can be met.

Marine Environmental Quality

The Proposal is small scale compared to most Pilbara export facilities. Water quality risks are minimised by avoidance of dredging, the small scale of disturbance and the low levels of product handling. Potential impacts are expected to be minimised to insignificant levels via a series of industry standard management actions to control risks of fuel spillage, sediment creation, and waste material discharge.

Based on the above, there is a high degree of confidence that the implementation of the Proposal will not result in significant impacts to marine water quality.

Flora and Vegetation

The Balla Balla Proposal is small scale compared to most Pilbara iron ore export facilities. Development of the Proposal is expected to require the disturbance of approximately 156.5 ha of land variably and sparsely covered in native vegetation. The estimated 156.5 ha of terrestrial disturbance will occur within the 515 ha Proposal Area identified in Figure E2.

The total area of potential Priority Ecological Community (PEC) to be cleared based on current survey and mapping is small (82 ha). In proportion to the currently mapped boundary of the local PEC polygon intersected by the Proposal, the area to be disturbed represents less than 0.58% of that polygon. In addition to the 82 ha of potential PEC impacted locally, the Horseflat PEC is noted to extend to Cape Preston and have multiple occurrences across the Roebourne plains.

Forge proposes to undertake further botanical study to clarify the status and extent of Polygon 1878 and report this to DEC. The identified impacts are not expected to threaten the extent or conservation significance of the PEC.

The assessment above provides a high degree of confidence that the EPA objectives for this factor can be met and impacts are able to be managed with standard industry controls and regulatory mechanisms.

Other Environmental Factors

An assessment of the potential impacts on other factors provides a high degree of confidence that any impacts are minor and able to be managed with standard industry controls and regulatory mechanisms.

Stakeholder Engagement

Forge identified key stakeholders relevant to the establishment of a new iron ore export facility prior to completing site selection.

In addition to identifying individual stakeholders, Forge has also brought together multiple stakeholders where necessary to ensure there is alignment between key decision making authorities. Meetings between Forge and key stakeholders have been critical in progressing the Proposal.

It is through several meetings in Q4 2012 with this group of stakeholders that an acceptable method (between the State and Forge) to develop the Proposal was agreed and is now being implemented.

A record of all consultation efforts and inputs is maintained by Forge and will be used to support the government approvals process by demonstrating that key stakeholder issues have been identified and responded to appropriately.

Conclusion

The Proposal is not expected to cause a significant environmental impact. It is a relatively small scale proposal in a generally well understood environment. The Proponent has completed a suite of studies to focus the environmental planning and impact assessment for the Proposal. This information has been considered in detailed project planning and feasibility investigations. Forge acknowledges that there is a shortage of biological data on Pilbara dolphin and dugong populations to enable impacts at a population scale to be accurately predicted. Forge is currently investigating funding research to assist in increasing the knowledge base for dolphin species and dugong.

The Proposal has been prepared with management controls identified to avoid, minimise or manage the environmental impacts. Given the configuration of the Proposal to avoid significant impacts, its location in relation to significant environmental assets and values, the management actions and controls to protect the environment, the Proposal is expected to meet the EPA objectives.

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1 INTRODUCTION

Forge Resources Pty Ltd (Forge) proposes to develop iron ore export facilities on the Pilbara coast at Balla Balla, west of Whim Creek in the north west of Western Australia (WA) (the Proposal; Figure 1). The export facility will be privately operated by Forge and will be used to transport ore from a nearby mining operation to overseas markets.

This Assessment on Proponent Information (API) document is written in accordance with the Environmental Protection Authority's (EPA's) 2010 gazetted Environmental Impact Assessment Administrative Procedures for assessment number 1969 as identified in the weekly record of determinations for development proposals dated 14 March 2013. The document has been prepared to inform decision-makers and stakeholders about the Proposal and facilitate its assessment under Section 38 of the *Environmental Protection Act 1986* (EP Act). This API document identifies the potential environmental impacts from construction and operation of the Proposal and discusses how these will be managed and mitigated. Environmental outcomes are identified based on assessment of the impacts associated with the Proposal.

1.1 Purpose and Scope

Forge proposes to construct and operate a small-scale, privately operated iron ore export facility at Balla Balla in the Pilbara region of WA. This document outlines key elements required for the construction and operation of the Proposal and updates the supporting document provided with the referral form.

The purpose of this document is to provide a detailed description of the Proposal and to enable assessment of the potential environmental impacts that may result, should the Proposal be implemented. The assessment will be completed by the Office of the Environmental Protection Authority (OEPA) under the provisions of Part IV of the EP Act.

The scope of the Proposal presented in this document is limited to an iron ore export facility at Balla Balla, and associated infrastructure. The Proposal has been scoped to cover the requirements of Forge for the export of iron ore to overseas markets. A detailed description of the Proposal is included in Section 2. The Proposal does not include mining operations or the processing of iron ore at Forge's Balla Balla Magnetite Project (Balla Balla mine), which has already been approved under Part IV of the EP Act (Ministerial Statement 794).

Forge is currently assessing whether the Proposal will need to be referred under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

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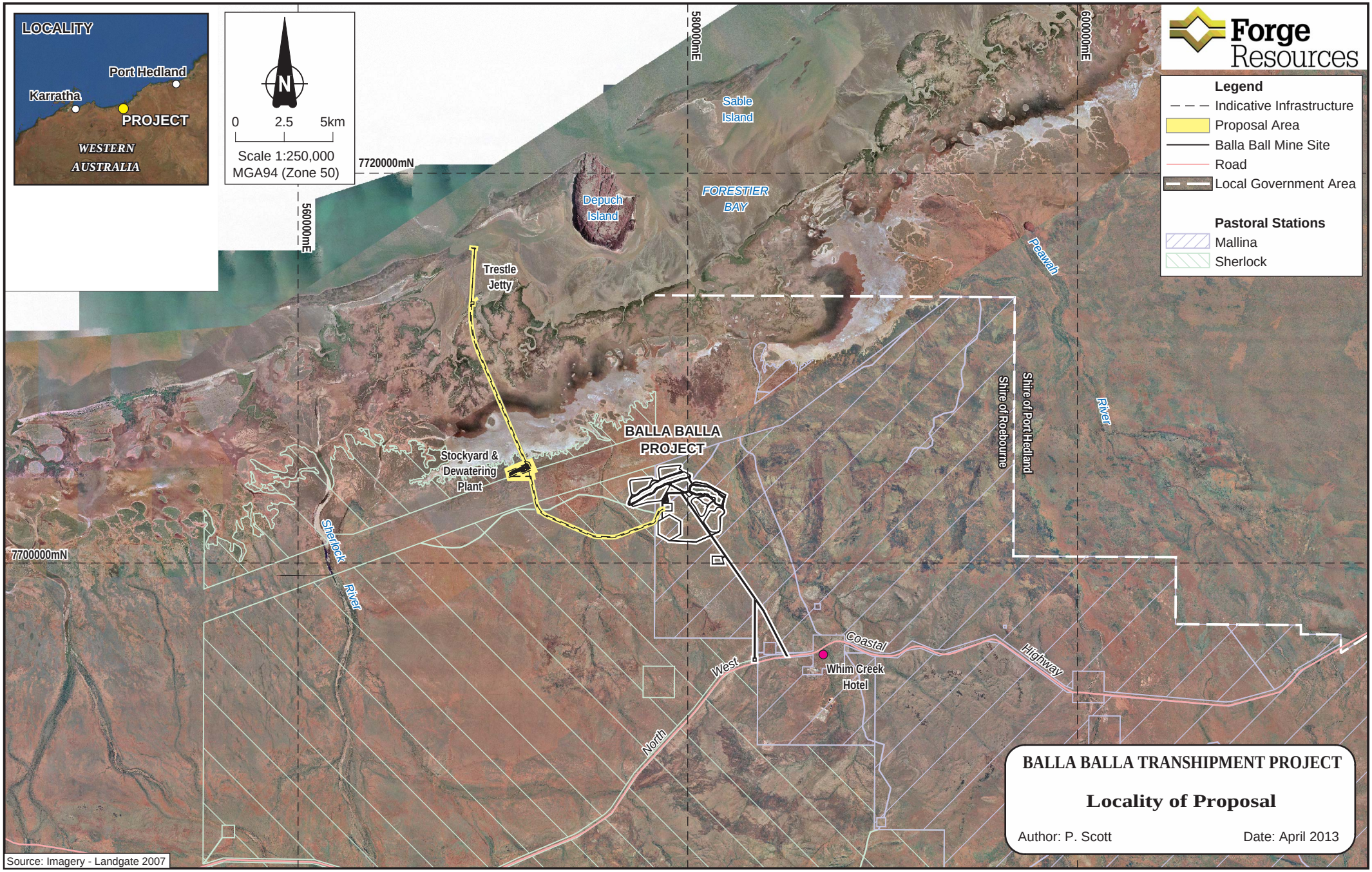

Figure 1: Location of Proposal

1.2 Proponent Details

Forge, established in 2009, owns a diverse portfolio of natural resource projects within Australia. Forge listed on the Australian Stock Exchange in September 2010.

During the second quarter 2012, Forge completed the acquisition (initially announced on 16 December 2011) to acquire a 100% interest in the Balla Balla Magnetite Project in WA from Atlas Iron Limited.

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2 PROPOSAL DESCRIPTION

2.1 Key Characteristics

Forge has considered *Environmental Assessment Guideline 1: Defining the Key Characteristics of a Proposal* (EAG1) (EPA 2012) - which focuses on how to define the key characteristics of proposals for the purposes of assessment and incorporation into Ministerial Statements. The objective of EAG1 is to assist proponents to identify and provide the key proposal characteristics that capture all key features of the proposal relevant to Part IV of the EP Act. The EPA has provided Forge with the required format for the Key Characteristics Table. The scope of the key characteristics is expected to allow an export capacity of approximately 6 million tonnes per annum (Mtpa) of iron ore.

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Operational Elements		
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Water supply	Balla Balla	Water supply will be from approved sources within the Balla Balla mine site via above ground water pipelines
Power supply	Balla Balla	Power will be supplied from approved sources within the Balla Balla mine site via overhead or buried power lines

2.2 Location, Tenure and Land Use

The Proposal is located in the Pilbara region, midway between Port Hedland and Karratha. The Proposal will be constructed and operated within a defined area which is located at Balla Balla, north-west of Whim Creek (Figure 2; the Proposal Area). The Proposal area is located within the Shire of Roebourne.

The Proposal will be largely contained within Miscellaneous Licence L47/690 that connects the approved mining areas to the area to be developed for barge loading.

Underlying tenure includes pastoral leases and unallocated crown land (Figure 1). The northern section of the Proposal is located on unallocated crown land. The southern section is largely within the Sherlock pastoral lease, with a small section in the Mallina pastoral lease.

The slurry pipeline is proposed to run above ground approximately 8.5 km west from the Balla Balla mine to the dewatering plant, stockyard area and water recovery ponds. The ore will then be transported via an overland conveyor approximately 13 km north to the barge loading wharf.

Surrounding the Proposal Area, pastoral, mining and recreation activities occur. Forge has approval under the EPA Act for mining and processing operations at the Balla Balla Magnetite mine (Figure 3).

Environmental survey work has been completed for this Proposal on an around the Proposal Area to provide baseline environmental data, allow project planning and environmental impact assessment. Infrastructure will be located within the Proposal Area. The indicative location of infrastructure has been identified within the Proposal Area (Figure 2). The clearing required to enable the construction and operation of these facilities is referred to as the Disturbance Area. Limiting the required disturbance to the amounts identified in the Key Characteristics Table, located within the Proposal Area provides identified boundaries for disturbance whilst allowing some flexibility for construction and operation.

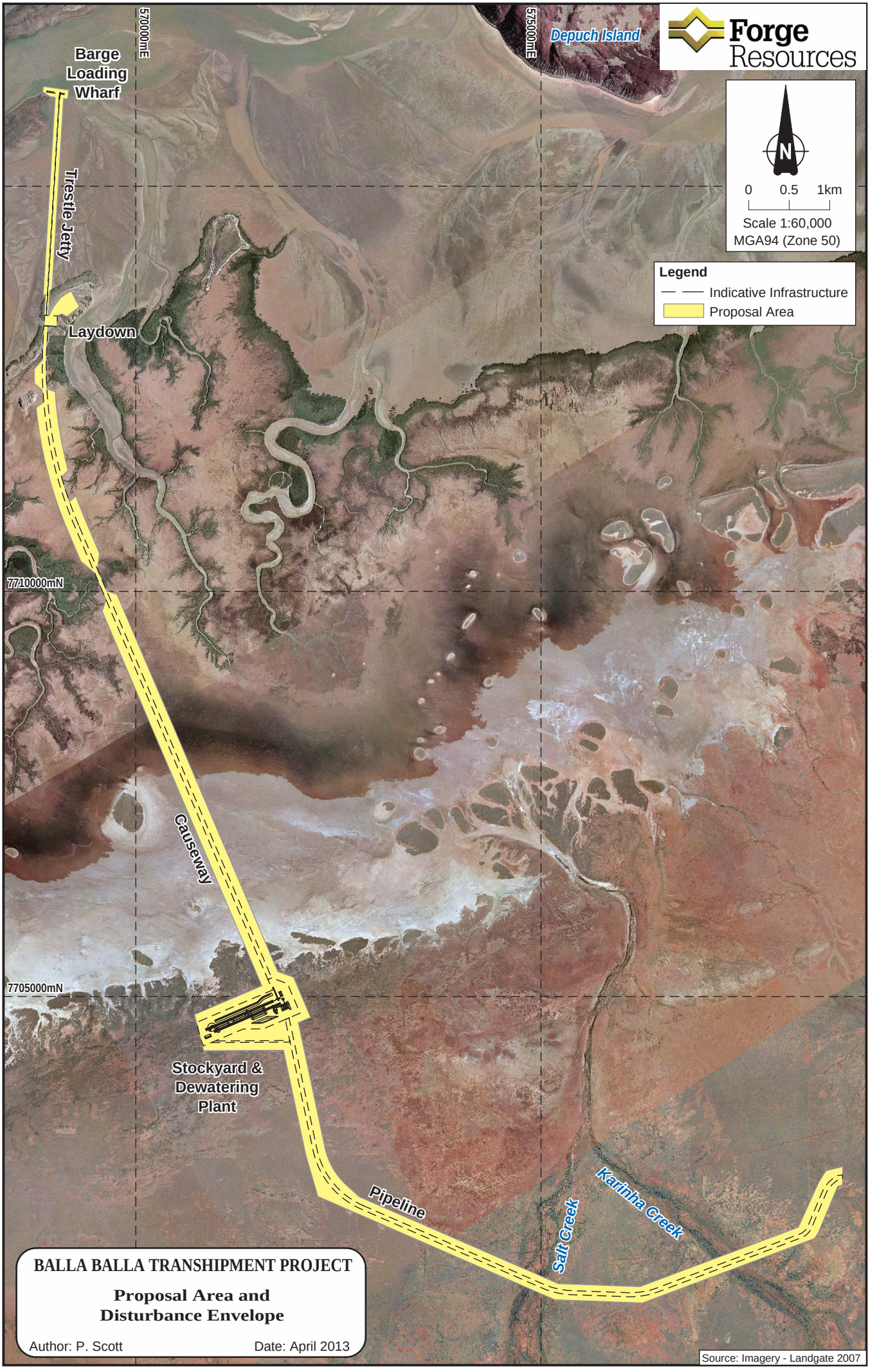

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Figure 2: Proposal Area and indicative infrastructure

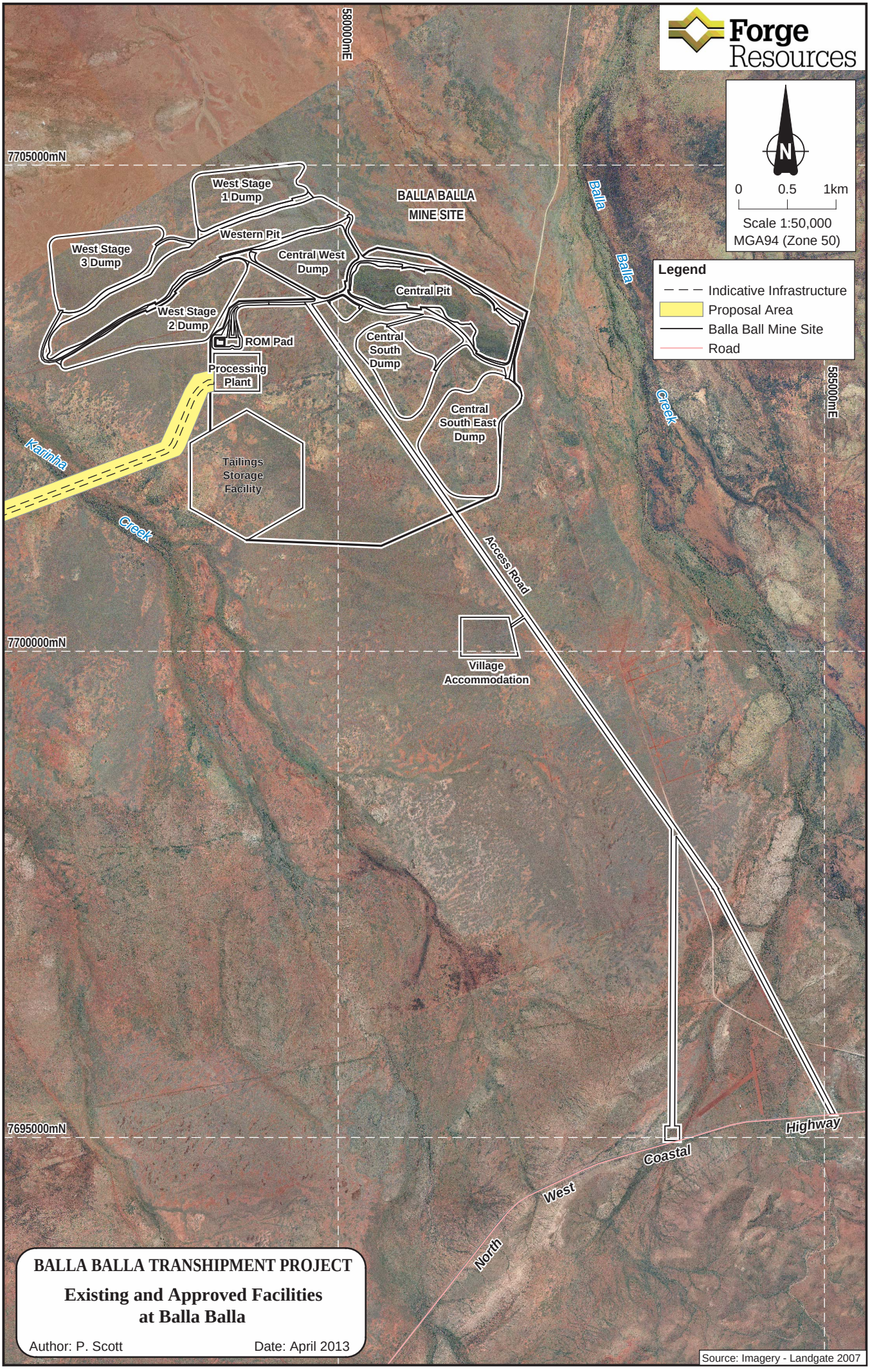

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Figure 3: Approved Infrastructure at Balla Balla

2.3 Relevant Studies

The Balla Balla area has been the subject of recent EPA assessment and approval (Ministerial Statement 794) for the Balla Balla Magnetite Project (magnetite mining and processing operations). The environmental survey work completed for the Balla Balla Magnetite Project provides regional context and some local information relevant to this Proposal.

Other recent proposals such as the Port Hedland Outer Harbour proposal (BHPB, 2011) and the Anketell Port Proposal (API, 2010) have also completed significant studies that have added to the body of knowledge of the existing environment and likely impacts of a range of infrastructure and activities associated with port construction and operation in the Pilbara. A tabulation of previous relevant studies and outcomes is provided in Appendix 1.

In preparation for this Proposal, Forge consulted, planned and implemented a series of studies to confirm specific aspects of baseline environmental information and likely impacts associated with the Proposal. The studies completed are listed below and presented in electronic format in Appendix 2:

- Air Quality Impact Assessment (SKM, 2013a);
- Balla Balla Causeway Impact Studies (GEMS, 2013a);
- Balla Balla Extreme Wave and Storm Surge Study (GEMS, 2013b);
- Balla Balla Transhipment Facility, Aerial Surveys (Pendoley Environmental (Pendoley), 2013a);
- Marine turtle sensitivity to underwater noise and recommendations for pile driving works associated with jetty construction at Balla Balla, WA (Pendoley, 2013b);
- Migratory shorebird survey for the Balla Balla Magnetite Project barge loading facility (Phoenix Environmental Sciences (Phoenix), 2013a);
- BPPH Loss Assessment, Barge Loading Facility near West Moore Island (LeProvost Environmental, 2013);
- Terrestrial fauna survey for the Balla Balla Magnetite Project barge loading facility (Phoenix, 2013b);
- Flora and Vegetation Survey (Mattiske, 2013) and
- Underwater Noise Assessment (SKM, 2013b).

Forge is also committed to completing the following further studies in the time frames identified in the lead up to construction:

- Detailed assessments suitable to support applications for Works Approvals and Licences as required under Part V of the EP Act (prior to construction);
- Additional inter-tidal BPPH survey (scheduled for June 2013);
- Winter aerial marine fauna surveys (scheduled for August 2013); and
- Additional studies on populations and distribution of dolphins and dugong in the Balla Balla area (prior to construction).

2.4 Project Facilities and Activities

The Proposal will include the following facilities and activities:

- Approximately 7 km long corridor from the Balla Balla mine site to the stockyard area located on the mainland at the base of the causeway. The corridor will contain an above ground slurry pipeline pumping magnetite concentrate, an above ground return water pipeline, an access road and an overhead power line;
- Stockyard area containing a dewatering plant, stockpiles, stacking and reclaim equipment and a stormwater pond designed to support approximately 6 Mtpa throughput;
- Approximately 9 km of rock causeway across tidal flats to a laydown area to the north. The causeway will support conveyors, an access road and buried services such as power and water;
- A laydown area at the head of the causeway to contain the conveyor drives, offices, a temporary workshop (during construction) and any other facilities required for operations or construction;
- Approximately 2.6 km long trestle jetty that extends north from the laydown area to a 100 m long barge loading wharf situated in 10 m depth of water (at low tide). The trestle jetty will contain conveyors and services. The conveyor will be enclosed if deemed necessary to minimise potential for dust emissions and have dust suppression water sprays installed at transfer stations. The conveyor will have an enclosed base to contain any carry back material from the conveyor;
- The loading wharf will have containment slabs and sumps to recover any spilled material;
- Barge loading wharf which will contain facilities to allow the loading of transhipment barge;
- A series of navigation aids to mark the limits of the shipping channel;
- A large self-propelled and self-unloading transhipment barge with a capacity of up to 15,000 deadweight tonnage (DWT) and a loaded draft of up to 8.5 m will be used for the export operation. Operation of the transhipment barge will involve the loading, transit and loading of ocean going vessels anchored in deep water offshore. The loading cycle between trips from the jetty is estimated to be between 10 – 16 hrs depending on the vessel location and wind and tide conditions. Only one barge is proposed to be used, plus a support vessel; and
- Marine safety and monitoring activities.

The facilities outlined above are to be located within the Proposal Area identified in Figure 2.

2.4.1 Slurry Pipeline Corridor

The slurry pipeline corridor will extend approximately 7 km from the approved area of the Balla Balla mine to the stockyard area located on the mainland at the base of the causeway (Figure 2). The corridor will contain an above ground slurry pipeline to pump magnetite concentrate, a return water pipeline, an access road and an overhead power line.

2.4.2 Dewatering Plant and Stockyard

The slurry pipeline will feed into the Dewatering Plant (located approximately 7 km west of the Balla Balla mine) (Figure 2), where the slurry will be dewatered and the ore stockpiled. The recovered

water will be sent to the mine site via a return water pipeline, although a portion of the water will be directed for use in export operations.

The Stockyard design is expected to contain up to four stockpiles with a total capacity of approximately 660,000 tonnes and will meet the capacity required to load 150,000 tonne Cape size vessels (Figure 4). Stockpiled product will be reclaimed using a bucket wheel reclaimer and transferred onto an overland conveyor.

The Dewatering Plant and Stockyard will be set back from the coastline, with disturbance occurring on dry land approximately 500 m south of the intertidal algal flats. Figure 2 shows the area where the Dewatering Plant and Stockyard will be located.

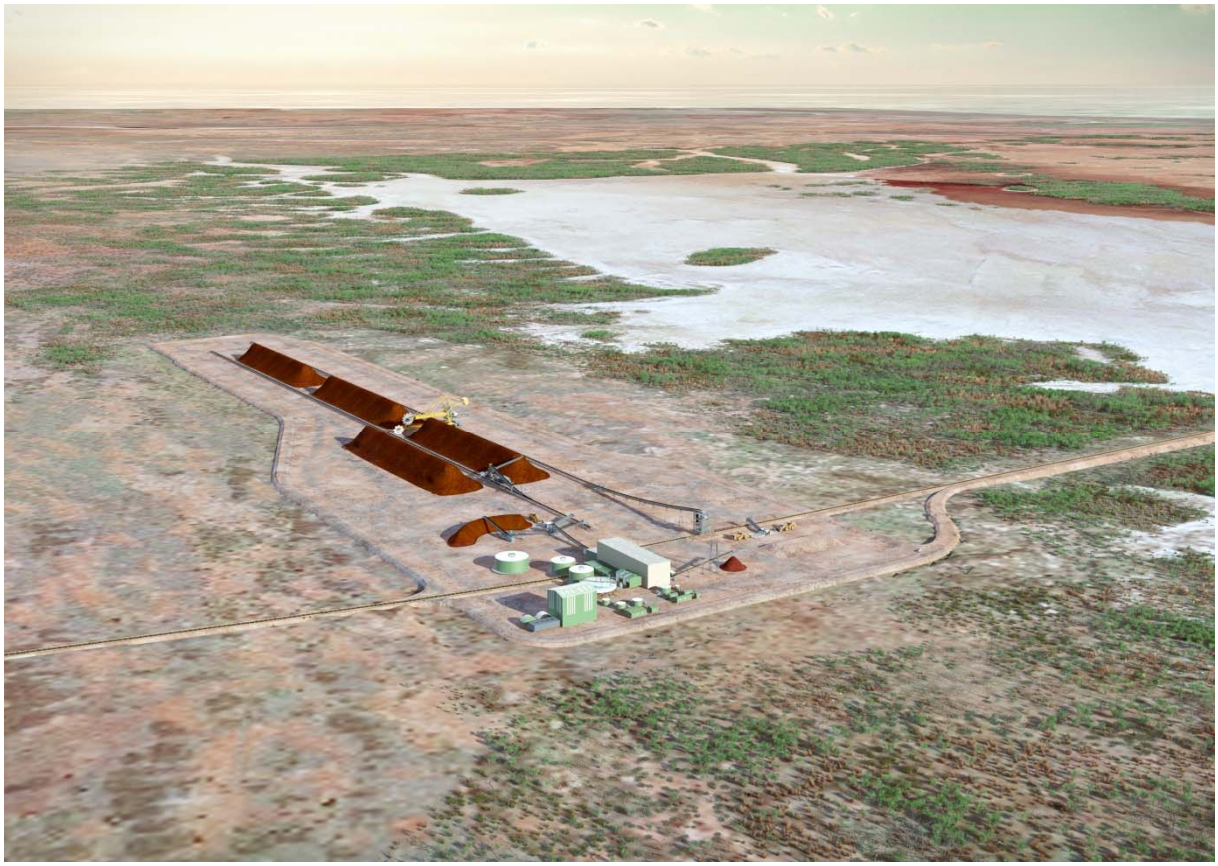

Figure 4: Design concept of the stockyard area at Balla Balla

2.4.3 Causeway

The overland conveyor will run along a rock causeway which will extend across the tidal flats from the stockyard to a laydown area located on a high point at the northern edge of the tidal flats (Figure 2). The causeway will be constructed from suitable overburden from the Balla Balla mine and will contain the overland conveyor, an access road and buried services (water, power, communications etc.). The typical width of the causeway will be 25 m, however there will be portions where this will be wider to allow for turning or passing bays (Figure 5).

The causeway will be built to raise the conveyor above the storm surge level (at approximately 10 m above chart datum) and it will be armoured where required to protect from erosion caused by storm surge events. Armour material will be sourced from the Balla Balla mine, or if suitable material is not

available, may be sourced from external quarries (i.e. not part of this Proposal) and hauled into the site.

The causeway is generally located at the top of the tidal catchment divide and hence provides minimal interference to normal tidal water movements. A series of small culverts (expected to be approximately 450 mm diameter) will be installed at regular intervals along the causeway (at natural low points or minimum 500 m spacing). This will allow general tidal events and small fauna to pass under the causeway. The causeway will cross one tidal creek. Appropriately sized culverts will be installed at this creek crossing to ensure that tidal flows are maintained.

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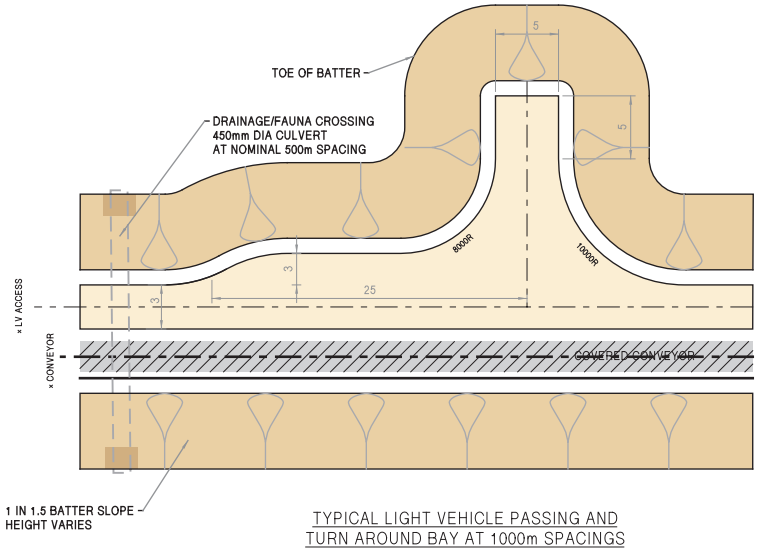
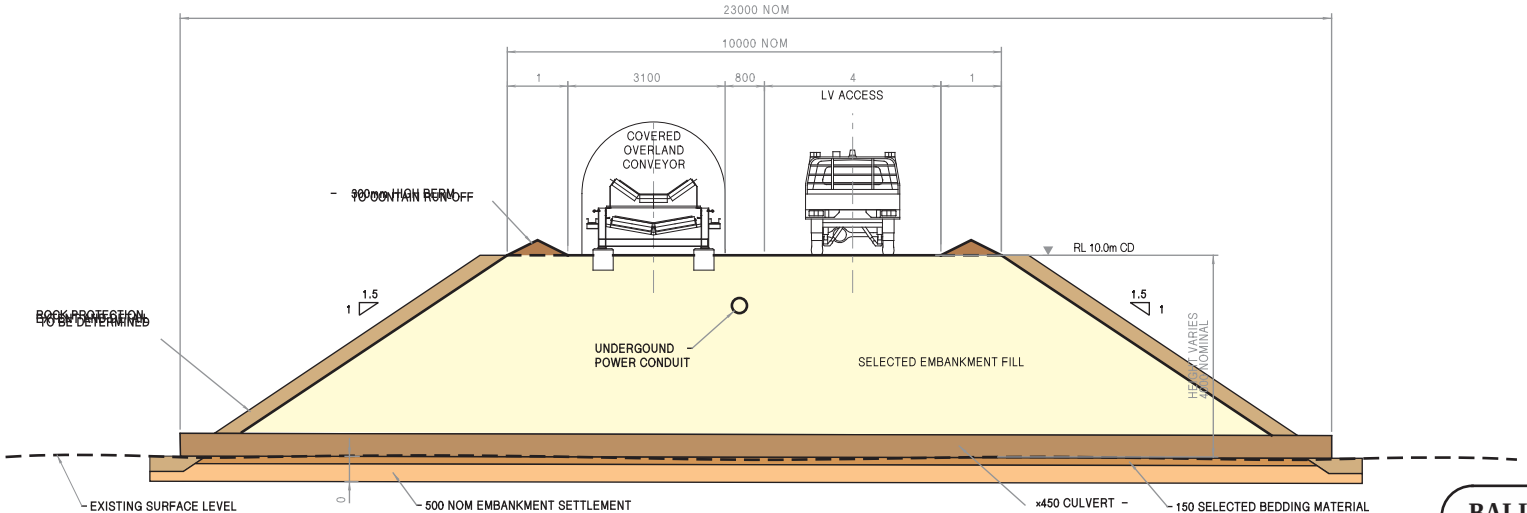


TYPICAL LIGHT VEHICLE PASSING AND
TURN AROUND BAY AT 1000m SPACINGS



SECTION A 001

TYPICAL CONVEYOR CAUSEWAY SECTION

BALLA BALLA TRANSHIPMENT PROJECT

Indicative Causeway Cross Section and Culvert Design

Author: P. Scott Date: April 2013

Source: Mintrex Pty Ltd

Figure 5: Design concept for causeway

2.4.4 Trestle Jetty

The proposed trestle jetty will be piled and extend north from the laydown area for approximately 2.6 km into sub-tidal waters (Figure 6).

The trestle jetty design is divided into two sections, the nearshore jetty section and the deepwater jetty section, each with a different design and method for construction. The nearshore jetty section will be located in shallow tidal and sub-tidal waters, extending north approximately 1,500 m from the shore. The nearshore jetty section will be comprised of two piles and a cross head spaced at 12 m intervals. This section will also support ground supported conveyor modules.

The remaining deepwater jetty section will extend from the nearshore jetty section, situated in up to 10 m water depth (at low tide) to allow adequate draft for the transhipment barge. The spacing between the trestles nearshore will be between 10-12 m and in deepwater approximately 36 m. The deepwater jetty section will be comprised of two piles and a cross head which will have 36 m spanned gantry sections. Figure 7 provides further detail of the concept conveyor trestle jetty sections proposed for Balla Balla.

The proposed trestle jetty will be narrow with no road access, however, it will be equipped for movement of small vehicles designed for maintenance purposes.

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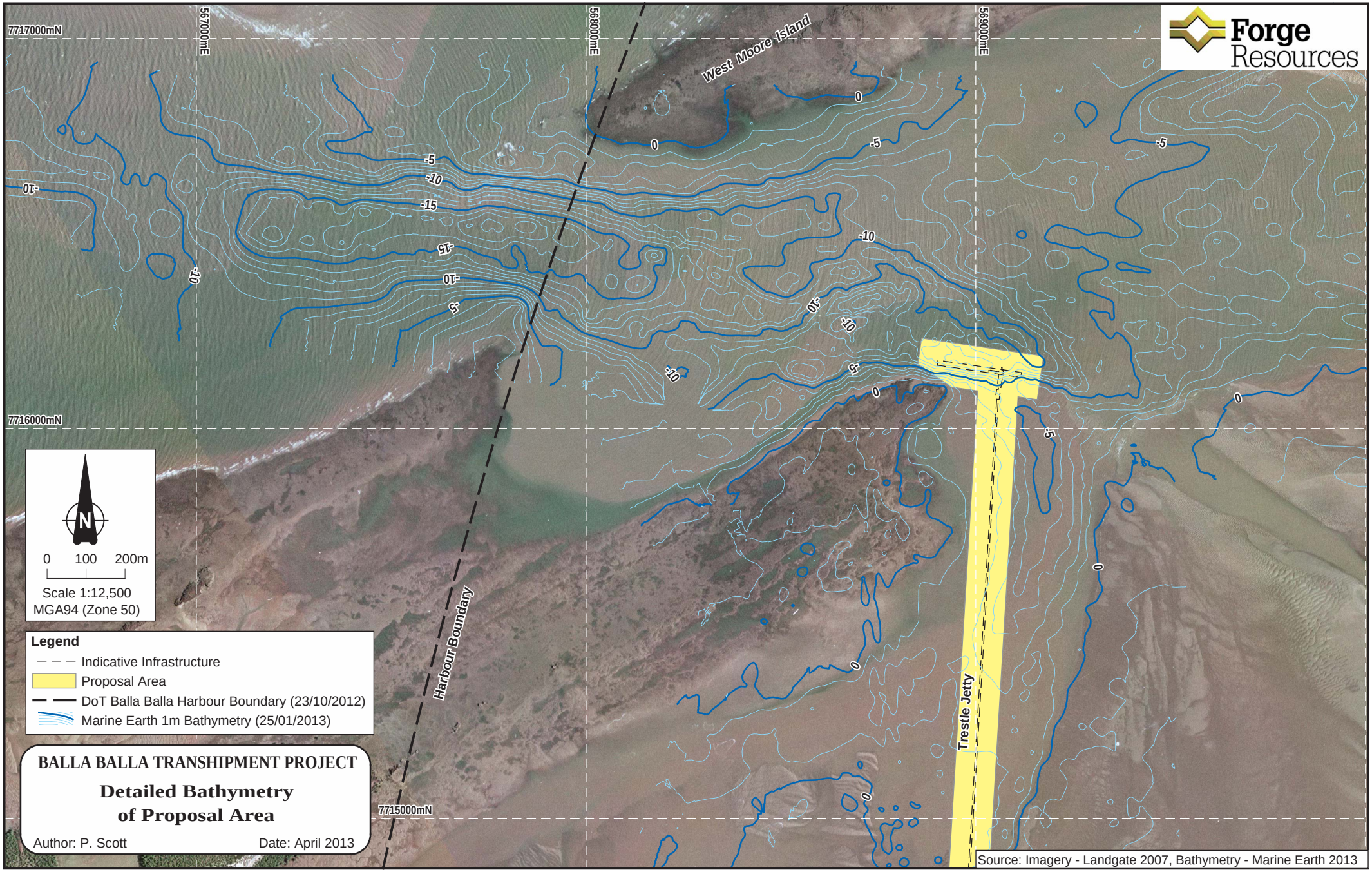

Figure 6: Bathymetry of Barge Loading Area

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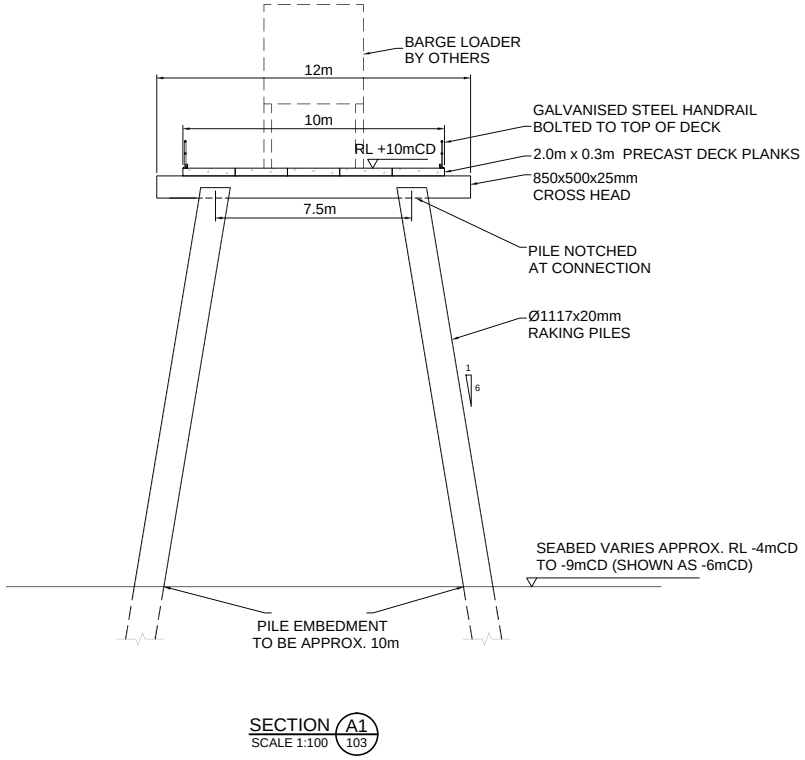

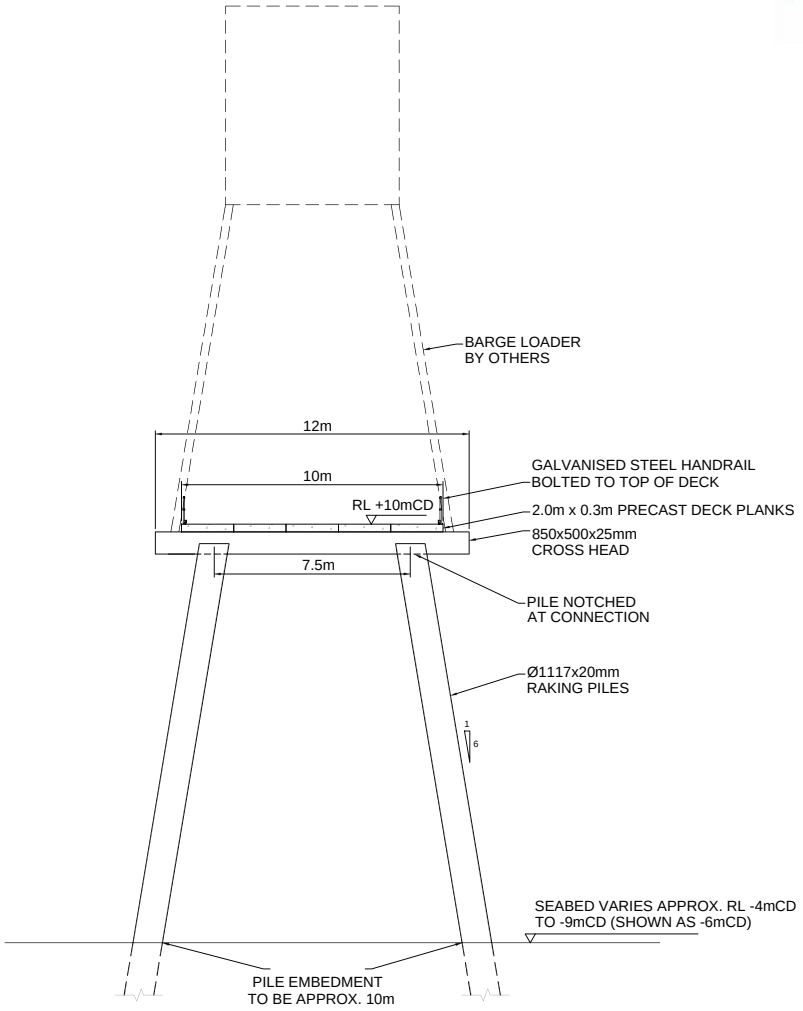

SECTION A1
SCALE 1:100 103

2 0 2 4 6 8 10
DIMENSIONS ARE IN METRES
1:100 (A1)

BALLA BALLA TRANSHIPMENT PROJECT

Concept Jetty

Head Sections

Author: P. Scott Date: May 2013

Figure 7: Trestle jetty concept design cross section

2.4.5 Transhipment Barge Loading Area

At the end of the jetty conveyor there will be a fixed shuttle type barge loader supported on a piled structure. The loader platform will provide support for the loader and substation.

The barge is loaded at a single point with the barge held securely in position during loading. It is envisaged that four independent berthing and mooring dolphins will be required to enable satisfactory loading of the transhipment barge. The design includes dolphins consisting of four piles with fenders and bollards.

Navigation markers will be installed at the edge of the navigation channel to mark the surrounding shallower seafloor.

The barge loader will shuttle out from the jetty and lower a telescopic chute into the barge loading point of the ocean going vessel. It is a self-unloading vessel (i.e. does not require grabs or cranes).

2.4.6 Transhipment Operations

A nominal 15,000 tonne payload self-powered transhipment barge (similar to that shown in Figure 8), will be loaded and continue on to transport ore to Cape or Panamax bulk cargo ships moored in deep water (>20 m) offshore (Figure 9). Two designated anchorage locations will be used, both outside of State waters, therefore the loading of the ocean going vessels is outside of the scope of this Proposal.

A vessel tracking system will be installed and electronic navigation aids such as radar will further assist vessel movements with a safe course and determining its distance and position with respect to loading and unloading points. Radio will be used as a means for two-way communication between the port-based personnel and the vessels and hence will assist further with navigation.

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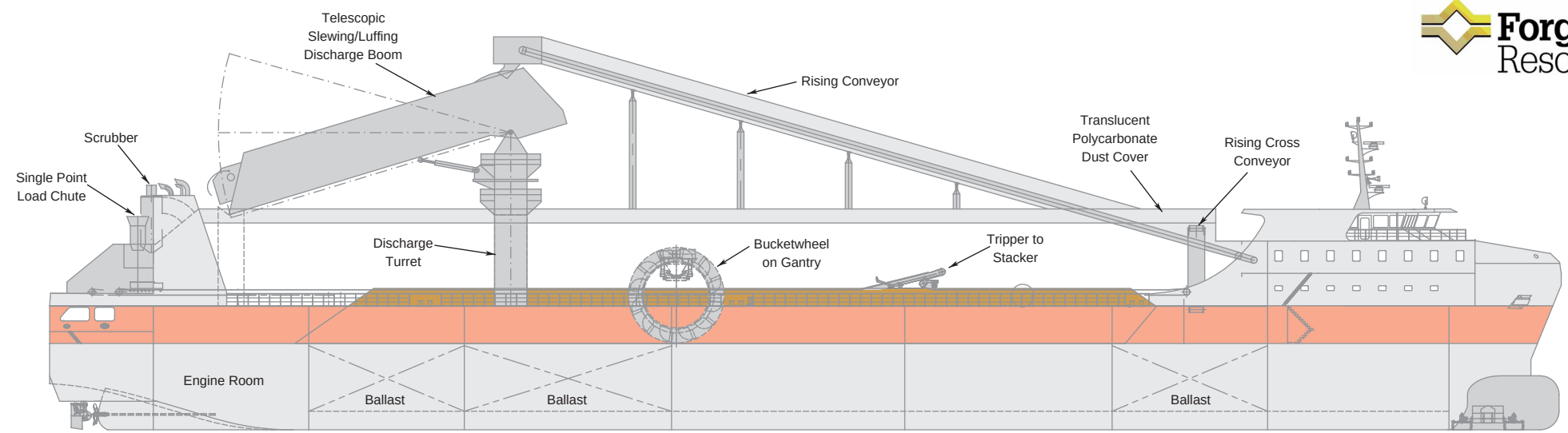
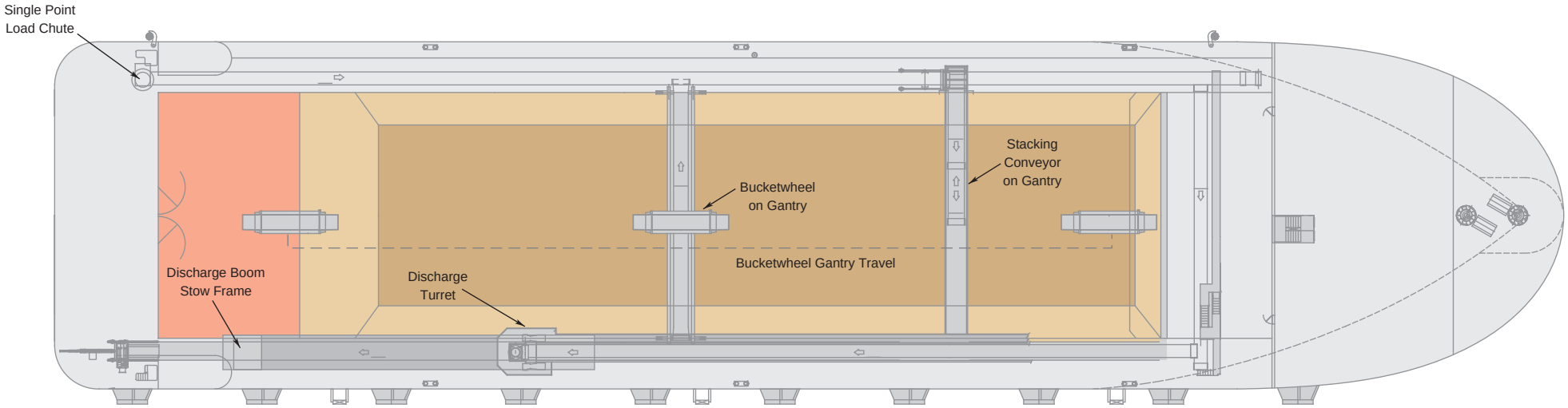


PROFILE



WELLDECK

Vessel Details

Length Overall	140.0m	Deadweight (Approx)	15,500 DWT
Length on Waterline	137.2m	Main Engines (Continuous)	2x 1040kW
Beam (Max Moulded)	32.2m		2x 1160kW
Depth (B-Deck)	11.5m	Pumpjet Thrusters	2x 300kW
Depth (Main Deck)	8.0m	Speed	10.0 Knots
Draft (Loaded)	6.0m	Long Rand FO Tanks	6000 T
Draft (Ballast)	3.0m		

Source: CSL Australia

BALLA BALLA TRANSHIPMENT PROJECT

Example of Transhipment Vessel

Author: P. Scott Date: April 2013

Figure 8: Example transhipment vessel

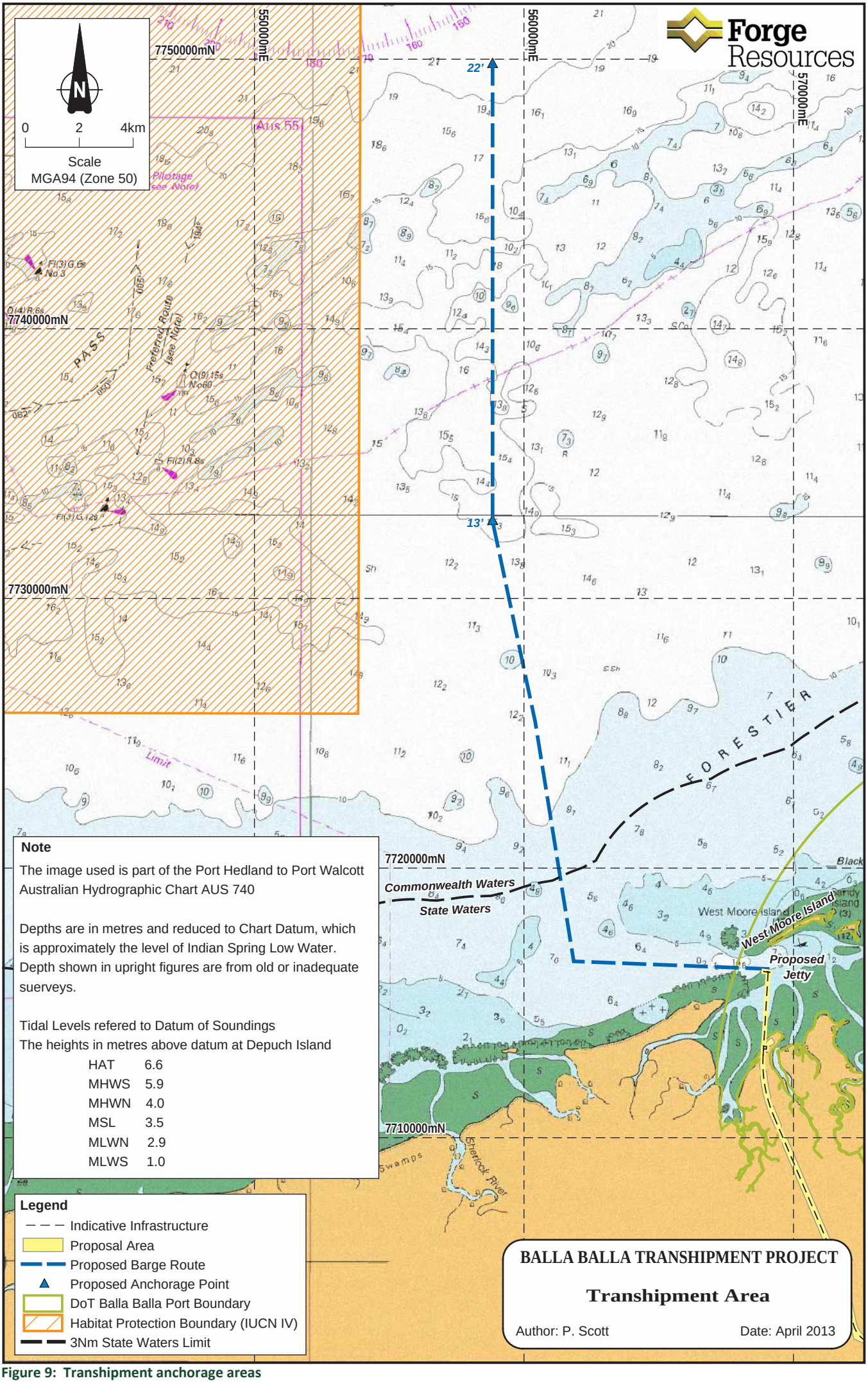


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Figure 9: Transhipment anchorage areas

2.4.7 Supporting Infrastructure

Forge does not plan to construct additional supporting infrastructure for the Proposal, with the exception of a laydown area situated at the northern end of the causeway. Forge will utilise the Balla Balla mine for most of the associated infrastructure required for the Proposal including:

- Administration/office buildings;
- Workshop facilities;
- Medical and emergency response facilities;
- Waste recycling & sorting station;
- Security gatehouse;
- Fuel farm;
- Warehouse and laydown areas;
- Accommodation village;
- Communications network and high-voltage switchboards;
- Borefield water pump stations;
- Reverse osmosis package plant(s);
- Wastewater treatment plants; and
- Landfill facility.

2.4.8 Construction and Associated Disturbance

Up to 156.5 ha of terrestrial disturbance and 3.5 ha of marine benthic habitat disturbance will be required to implement the Proposal. Forge has considered indirect impacts when calculating these maximum disturbance figures, such as:

- Benthic habitat underneath the trestle jetty that is not directly disturbed by piling operations, but will still be shaded by the trestle jetty; and
- A buffer on each side of the causeway to allow for subsidence impacts and disturbance during rock armouring works.

Figure 2 shows the boundary of the Proposal Area (the 515 ha polygon), within which all disturbance is expected to occur.

2.5 Alternatives Considered

Forge considered a number of alternatives to this Proposal for export of product from the Balla Balla mine including pipeline to Port Hedland (the existing Ministerial Statement 794 authorises this), to the potential new port facilities at Anketell and to alternative new port locations between Balla Balla and Port Hedland. None of these options is feasible and has forced Forge to look for alternatives.

Key factors that Forge considered during the assessment of alternative locations to the Proposal included:

- Cost;
- Development timeframe;
- Extent of Benthic Primary Producer Habitat (BPPH) impacts (direct and indirect) and terrestrial habitat loss;

- Location in relation to ore bodies (Balla Balla Mine and other areas of potential mineralisation);
- Department of Indigenous Affairs (DIA) - registered and other potential Aboriginal Heritage sites;
- Existing camping grounds and public use areas;
- Department of Transport (DoT) boundary limits;
- Access to deep water (no requirement to dredge); and
- Potential environmental and engineering constraints.

The search for a site for a barge loading facility began in mid-2011 when Forge engaged Marine Logistics Australia (MLA) to investigate and recommend potentially economically viable export solutions. MLA reported their findings in January 2012 (MLA, 2012) and indicated that the most economically viable solution was to construct a small barge loading facility in the vicinity of the West Moore Island/Depuch Island region at a site where dredging was not required. The only location believed to meet the no dredging requirement at the time was the seaward side of the un-named low-tide island which is located immediately to the south west of West Moore Island (Option 1 in Figure 10 below).

Initial investigations then focused on finding an acceptable route across the Sherlock River delta to the island and undertaking detailed bathymetric surveys in the vicinity of jetty options 1A and 1B (Figure 10). The environmental constraints on this route were substantial. Not only was it located in the middle of an active river delta, but at high spring tide it was completely flooded by seawater. The best practice construction approach required a substantial amount of trestle bridges and culverts to minimise impedance of both tidal flows and flood runoff during cyclones. The expense of such structures rendered this route marginally viable.

Consultation regarding option 1 with the Ports and Harbours Division of DoT indicated that the DoT would prefer that the barge loading facility was constructed inside the existing Balla Balla port boundary which terminated east of option 1B. Subsequent consultations with the owner of the West Moore Island Fishing Lodge confirmed that the pearling lease was no longer operational. Bathymetric surveys confirmed that depth in the channel area was adequate for the barge loading operation and as a result options 2 and 3 were developed as being the most direct routes to the nearest navigable water. Option 3 was subsequently selected as the preferred alignment after a field survey conducted in November 2012 by LeProvost Environmental. Option 3 supports more algal mat habitat indicating that it is flooded less frequently than option 2.

Options 3A and 3B both started at the same location on the mainland but ended at different locations for the barge loading wharf. These were the options presented to the OEPA in preliminary discussions earlier in 2013. Subsequently Option 4 was investigated in response to comments received from the OEPA but discarded because it encroached more substantially on mangrove habitat, required a transfer station to be constructed on a platform in a tidal creek and was located over limestone pavement thereby imposing substantial costs.

The final preferred option (proposed infrastructure on Figure 2) has involved relocation of the stockyards to the east and the barge loading wharf south of the limestone platform to enable construction of a single curved conveyor that avoids as much mangrove habitat as possible and is located on the tidal catchment divide down the centre of the peninsula. This minimises impact on normal tidal drainage. It is recognised that this alignment sits within the buffer boundary of a DIA-

registered Aboriginal Heritage site. The location of the alignment in this area will be finalised in consultation with the Traditional Owners.

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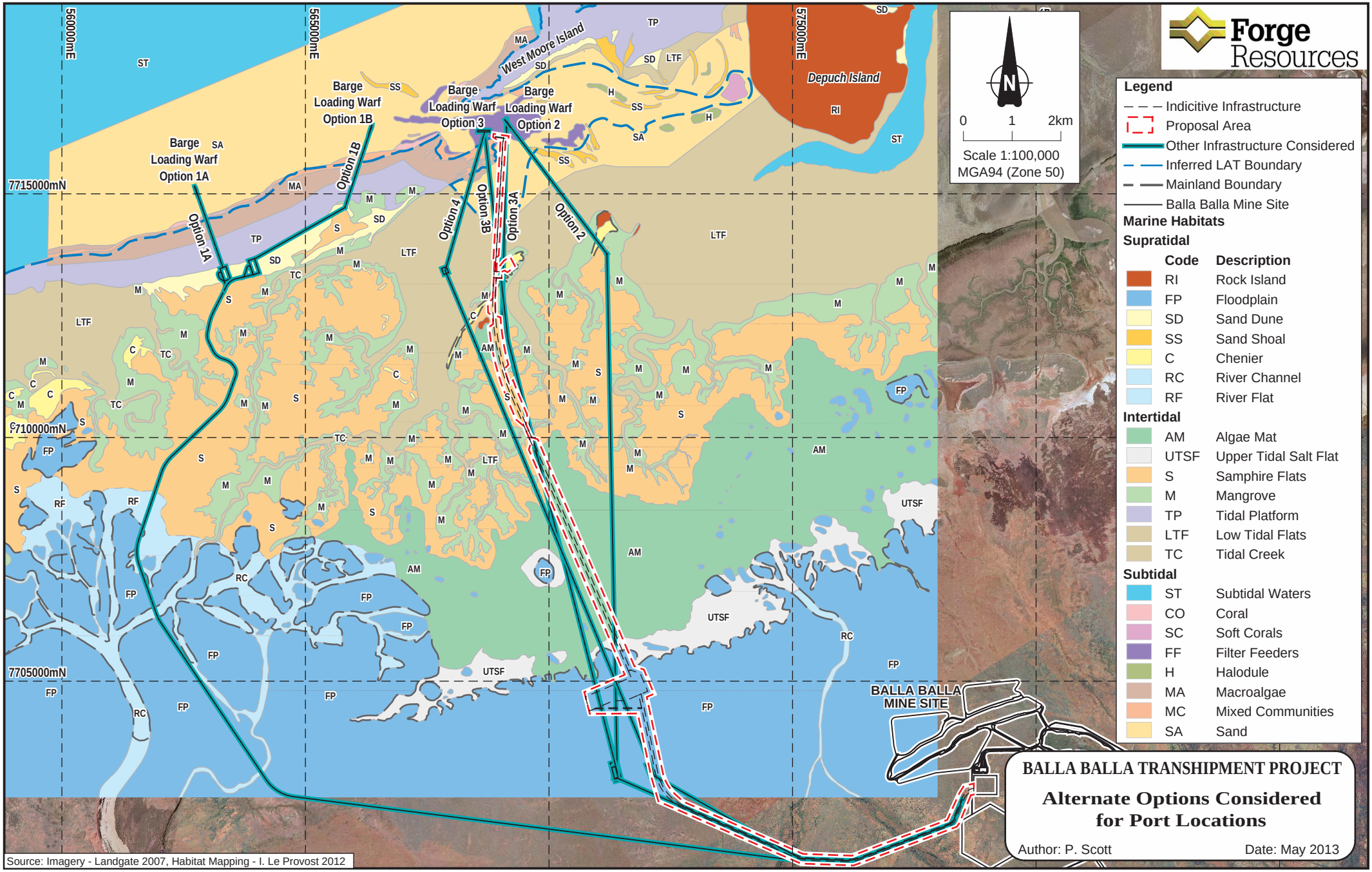

Figure 10: Alternative options considered for port location

2.6 Approval and Development Timeframes

Key approval milestone targets for assessment under Section 38 of the EP Act are shown in Figure 11 below. Key development milestones relating to the Proposal and the mining activity at the Balla Balla mine that will provide the initial ore are shown in Figure 12.

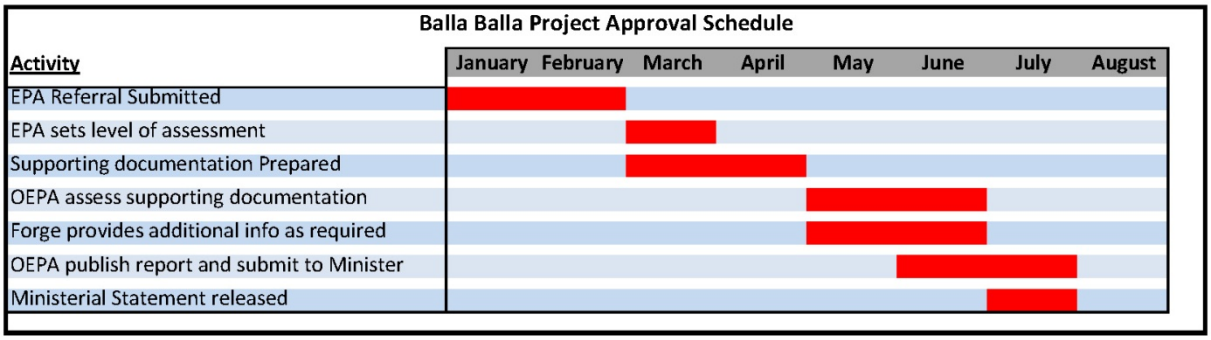

Figure 11: Approval schedule

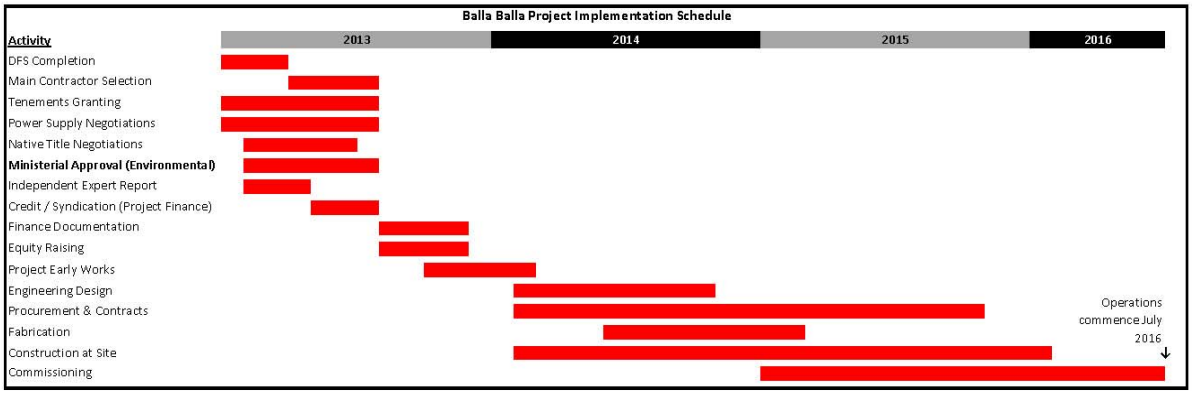

Figure 12: Development milestones

3 IMPACT ASSESSMENT APPROACH

3.1 Environmental Management

Forge is committed to designing, constructing, operating and closing the Proposal to minimise impacts on the environment. Control strategies for the mitigation of environmental impacts associated with the Proposal will ultimately be managed via a set of Environmental Management Plans (EMPs).

Forge regards environmental care as an integral part of its business and is committed to excellence in the management of environmental matters. The company understands that environmental management is essential to its own future and recognises that sound environmental management benefits all stakeholders. Forge aims to avoid and minimise environmental impacts where possible throughout all aspects and stages of the Proposal.

The implementation of this Proposal will negate the need for a pipeline to transport magnetite concentrate to Port Hedland and associated stockyard and outloading facilities there, avoiding the ground disturbance and ongoing operations and maintenance over a 110 km long corridor.

3.2 Identification of Key Environmental Factors

The EPA identified four key environmental factors that required assessment in this API document (EPA, 2013):

- Marine fauna – to address the potential impacts resulting from marine noise, Introduced Marine Pests (IMPs) and light spill;
- Marine benthic habitat – to address potential impacts resulting from loss of BPPH (directly or indirectly) and changes to coastal processes;
- Marine environmental quality – to address potential marine water quality risks and impacts resulting from oil spills and other potential marine pollutants; and
- Flora and vegetation – to address the potential impacts resulting from the direct loss of flora and vegetation.

These factors are discussed and assessed in detail in Section 4. An assessment of other environmental factors has been included in Section 5.

3.3 Impact Assessment Criteria

This section outlines the key EPA considerations (principles, objectives, criteria, procedures and policies) relevant to the environmental impact assessment (EIA) of the Proposal. Table 2 below provides cross references to sections of the document relevant to criteria.

Table 2: Impact assessment criteria

Criteria	Outcome	Location in API Document
EP Act Principles	The Proposal is consistent with the EP Act Principles.	The Proposal has considered the EP Act Principles. Assessment against them is presented in Appendix 3.
EPA Objectives	The Proposal has been assessed in detail against EPA objectives for both key and other environmental factors. The Proposal is consistent with the EPA objectives.	The Proposal has considered the EPA Objectives. Assessment against them is

Criteria	Outcome	Location in API Document
		presented in Appendix 3.
EPA Administrative Procedures 2012	The Proposal conforms to the criteria for API Category A as outlined in 10.1.1 of the Administrative Procedures. The Proposal has been prepared to address the information requirements identified in 10.1.3; the Principles of EIA for the Proponent identified in Section 5 and the assessment procedure for Category A identified in Section 10.1.2 of the Administrative Procedures.	Appendix 3
EPA Environmental Scoping Guideline	The Proposal has been prepared to address the information requirements identified in the EPA issued Environmental Scoping Guideline (EPA 2012). The guideline establishes the EPA's position on significant environmental factors.	The API document has been prepared in accordance with the guideline.
Relevant EPA Guidelines:		
Defining the key characteristics of a proposal (EAG1) (EPA 2012)	Key Proposal Characteristics that capture all key features of the proposal relevant to the EP Act discussed with OEPA.	Section 2.1
Environmental Assessment Guidelines for Protection of BPPH in WA's Marine Environment (EAG3) (EPA 2009)	BPPH are defined as seabed communities within which algae e.g. macroalgae, turf and benthic microalgae, seagrass, mangroves, corals or mixtures of these groups are prominent components. Forge has added to previous BPPH surveys in the Balla Balla area. Proposal design has negated the need to impact upon any significant coral areas or to dredge.	Section 4.1
Environmental Assessment Guideline for protecting marine turtles from light impacts (EAG5) (EPA 2010a).	Guidance on an array of approaches available for avoiding, reducing, managing and mitigating light impacts on marine turtles considered. Alternative methods for the avoidance and management of light impacts that can be applied using a risk-based approach and by applying best practice methods.	Section 4.2
Timelines for EIA of Proposals (EAG6) (EPA 2010b).	Consultation with OEPA and agreement on proposed assessment timeframes.	Section 2.6
EPA Position Statement 56: Terrestrial Fauna Surveys for EIA in WA	The Balla Balla baseline environmental surveys have been completed in accordance with this Statement.	Consultant Reports in Appendix 2
Position Statement 51. Terrestrial Flora and Vegetation Surveys for EIA in WA	The Balla Balla baseline environmental surveys have been completed in accordance with this Statement.	Consultant Reports in Appendix 2
Guidance Statement 19. Environmental Offsets - Biodiversity	The Proposal is not expected to result in any significant adverse impacts on biodiversity assets of 'high' or 'critical' value.	Not required
Environmental Quality Criteria Reference Document for Cockburn Sound (2003 – 2004)	Used as a reference document for consideration of marine water quality protection measures.	Section 4.3
Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (DoE, 2006)	Used as a reference document for consideration of marine water quality protection measures.	Section 4.3

4 KEY ENVIRONMENTAL FACTORS

Four key environmental factors for the Proposal were identified by the EPA in its response to referral information provided by Forge for the Balla Balla Export Facilities (EPA, 2013):

- Marine fauna;
- Marine benthic habitat;
- Marine environmental quality; and
- Flora and vegetation.

The key aspects of the Proposal and potential impacts on marine fauna identified are impacts on marine conservation significant fauna and their habitat from:

- Direct disturbance of benthic habitat;
- Marine noise leading to fauna behavioural changes, injury or death;
- Light spill resulting in disorientation of marine turtles, reducing nesting numbers and hatchling success;
- Introduced marine pests (IMP) resulting in alteration of habitat dynamics;
- Oil spill resulting in contamination of benthic primary producer habitat and injury to or death of marine fauna;
- Vessel strike resulting in injury to or death of marine fauna;
- Changes to tidal processes resulting in changes to intertidal habitat; and
- Marine pollution resulting in injury or death of marine fauna.

Marine conservation significant fauna identified as relevant to the Proposal are whales, dolphins, turtles and dugong.

There have been a number of studies completed to allow the assessment of the impacts listed above. Summaries of the findings of these studies are contained in Appendix 1 and recent studies completed for the Proposal are contained in Appendix 2.

This section provides background information specific to the key environmental factors, describes the factors, the environmental impact assessment methodology (including relevant EPA objectives, policies, guidelines and standards), relevant aspects of the Proposal and their potential impacts and risks, proposed management actions (consolidated into Appendix 7), expected residual/cumulative impacts and environmental outcomes.

4.1 Marine Benthic Habitat

4.1.1 Relevant EPA Objectives / Policies / Guidelines / Standards

EPA Objective:

- To maintain the integrity, ecological functions and environmental values of the seabed and coast.

Guidelines:

Forge has considered EPA Environmental Assessment Guideline No. 3 (EAG3) which specifically addresses the protection of BPPH in WA's marine environment (EPA, 2009). EAG3 supersedes

Guidance Statement No.29 (EPA, 2004) and previous draft revised versions of that document and sets out:

- The EPA's contemporary thinking on its approach to assessment of activities which, on their own or in the context of existing and approved developments, may directly or indirectly contribute to cumulative irreversible loss of, or serious damage to, BPPH;
- Overarching environmental protection principles and the expectations for their application;
- A risk-based assessment framework for considering cumulative loss of BPPH and the potential consequences for marine ecological integrity that recognises different ecological, conservation and social values of the marine environment and aims to preferentially steer development proposals away from 'vegetated' BPPH; and
- The EPA's expectations for minimum standards of information to be supplied by proponents for environmental impact assessment.

Forge has also considered the EPA's Guidance Statement No. 1: 'Guidance Statement for the Protection of Tropical Arid Zone Mangroves along the Pilbara Coastline' in assessing potential impacts to mangrove communities.

4.1.2 Impact Assessment

This section presents information relevant to assessing the likely impacts on marine benthic habitat and includes a summary of the existing environment, impact mechanism, potential impacts, proposed management controls (often the same for impacts on different ecosystem elements) and predicted outcomes.

Existing Environment

The export facilities are to be located in the western portion of Forestier Bay, which is a large shallow and protected intertidal embayment. The embayment is protected from ocean swell and storm waves by various islands of the Forestier Group, including Depuch Island (a large ironstone formation), and several limestone barrier islands. A relatively deep channel occurs to the west of West Moore Island through which tidal waters flow and ebb on a semi-diurnal basis. The tidal range is approximately 6 m (GEMS, 2013).

The benthic habitat located in proximity to the causeway, trestle jetty and loading facilities (Figure 13) are:

- Mangroves;
- Low tidal flats;
- Tidal platform; and
- Subtidal waters.

Further detail on the distribution of marine benthic habitats within the subtidal waters of the Proposal Area is provided in Geo Oceans (2013) and LeProvost Environmental (2013) and discussed in section 4.1.3. The principal habitat type within the deeper waters of the bay and channel is a filter feeder community comprised mainly of sponges and hydroids and scattered gorgonians (sea fans) at varying densities. The jetty wharf and barge mooring pylons sit within this habitat. The jetty itself is located over a relatively barren and scoured coarse sand and gravel lag substrate. There are no coral reefs within the Proposal Area, but small encrusting coral communities at low density were recorded fringing the shallow tidal limestone platforms. Sparse seagrasses (*Halodule* sp.) were recorded in low

abundance on the shallow sandy substrates which occur in the more protected and quiescent eastern part of the bay.

Table 3 summarises the potential impacts to marine benthic habitat and Section 4.1.3 provides additional information and assessment on any key issues identified in Table 3.

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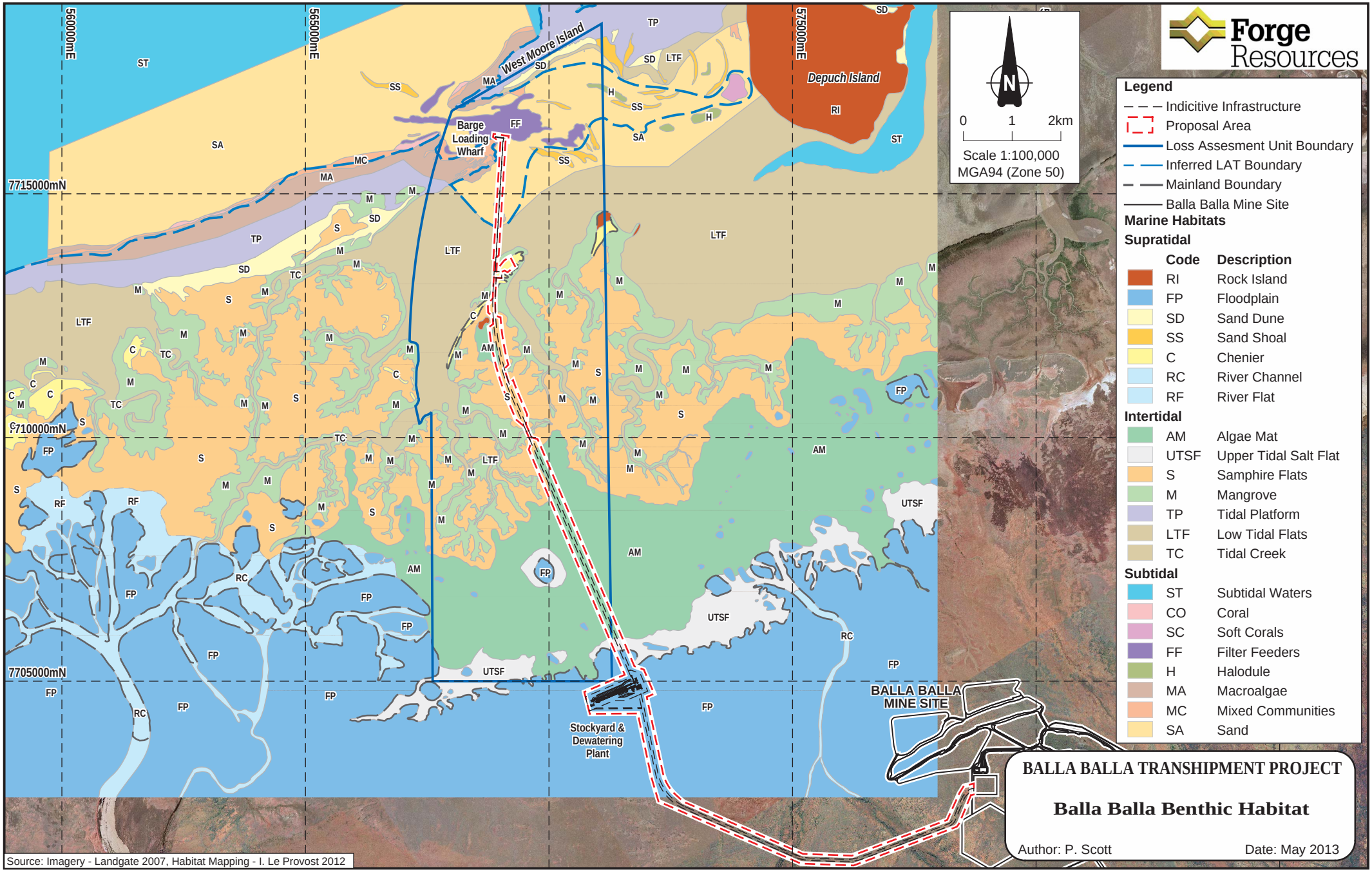

Figure 13: Marine benthic habitat

Table 3: Environmental assessment – marine benthic habitat

Existing Environment and Knowledge	Impact mechanisms	Potential Impacts	Proposed Management Controls	Predicted Outcomes
Key BPPH identified at Balla Balla include mangrove communities and filter feeder habitat. Most of the embayment supports extensive tidal flats which support mangroves, samphires and algal mats. Subtidally much of the bay supports a coarse sand and gravel substrate which in the protected parts of the bay support sparse seagrasses in low abundance. The seafloor in the channel and deeper parts of the bay is a gravel veneered limestone pavement which supports a diverse filter feeder community. Macroalgae are abundant on the tidal platforms which are fringed by small and sparse encrusting coral communities. Offshore the seafloor is predominantly sandy.	• Direct disturbance • Indirect impacts such as boundary effects, changes to hydrologic or sediment regimes • Contamination from oil spills (discussed further in Section 4.3)	• Construction of the causeway and trestle jetty is expected to require disturbance of 23.91 ha of benthic habitat, including the following: o 2.09 ha of mangroves o 21.05 ha of algal mats o 0.47 ha of low intertidal flats o 0.3 ha of subtidal habitats • Alterations to tidal flows resulting in impacts to mangrove health • Smothering of subtidal BPPH from sediment caused by propeller churn during vessel movements	• Causeway, trestle structure, dewatering plant and stockpile area have been re-located to minimise impacts on mangroves. Causeway has also been relocated to centre of peninsula to minimise impact on tidal drainage • Hydrodynamic modelling work to review tidal flows with revised alignment • Marine disturbance approval system to control and track disturbance areas • Corridor disturbance widths will be minimised through areas of significant BPPH (i.e. no passing lanes or turning areas) • Develop and implement Mangrove Management Plan which will include a monitoring programme established to confirm if there are any indirect impacts • Contingency measures identified in Mangrove Management Plan • Install appropriately engineered culverts under the causeway at the tidal creek crossing • Install regular culverts along the causeway at designated low points, or at least every 500 m, to allow tidal floodwaters to flow beneath the causeway	Based on discussions with the OEPA, only mangroves, low intertidal flats and subtidal waters are expected to be BPPH or able to support BPPH. The Proposal is expected to disturb 2.09 ha of mangroves, 21.05 ha of algal mats, 0.47 ha of low intertidal flats and 0.3 ha of subtidal habitat. Of the latter, some 0.22 ha is barren scoured coarse sand and gravel substrate, and 0.01 ha is filter feeder habitat on gravel veneered limestone pavement. In accordance with EAG3, a 46 km^2 Local Assessment Unit (LAU) has been defined for assessment of impacts (Figure 11). Areas of BPPH impact have been calculated in comparison to the total of that BPPH type found within the defined LAU. The proportion of BPPH impacted within the LAU are as follows: • Mangroves - 0.35% • Low intertidal flat - 0.047% • Sub-tidal waters - 0.09% The combined disturbance impacts listed above are well below the 1% Cumulative Loss Guideline specified in EAG3. Indirect impacts are not anticipated and expected to be minimised through the adoption of the identified control measures (i.e. culverts and causeway alignment). The coarse sand and gravel substrates of the area indicate that propeller churn is most unlikely to be a source of recurring turbidity or sedimentation. Waters are naturally turbid during spring tides and occasional cyclone and river flood events.

4.1.3 Key Issues – Marine Benthic Habitat

Intertidal benthic habitat mapping has been completed for greater Balla Balla area and is shown in Figure 10 below. Figure 10 shows BPPH habitat mapping completed to assist in site selection and used for impact assessment.

The most productive and environmentally significant BPPH areas in the Balla Balla Proposal Area are the mangrove communities. BPPH is shown in greater detail in Figure 14 and Figure 15 that also define the extent of the causeway and trestle structures. The proposed causeway extends approximately 9 km north from the stockyard area to the beginning of the proposed trestle jetty. The proposed trestle jetty then extends approximately 2.8 km from the end of the causeway to the north and has a projected disturbance area assumed to be approximately 10 m wide.

Detailed BPPH survey is scheduled to be completed in July 2013 on the Proposal Area. The objectives of this survey will be to:

- characterise the flora and fauna component of each of the habitats identified to date;
- confirm the reliability of the intertidal BPPH map;
- place the ecosystem into a regional perspective by comparison to other mangrove systems studied along this coast to date;
- demonstrate an understanding of the ecological role and value of the benthic primary producer habitat in the local context to enable evaluation of the significance of potential impacts on ecological integrity of the system; and
- provide a baseline description against which actual impact scale can be determined via future monitoring studies.

BPPH disturbance associated with the Proposal has been significantly reduced by site selection, realignment and scaling of the Proposal such that no dredging is required and direct disturbance of mangrove communities is minimised. Residual impacts to the following key benthic habitats are expected to be 23.91 ha of direct disturbance from trestle and causeway construction footprints over mangrove communities (2.09 ha), algal mats (21.05 ha), low intertidal flats (0.47 ha) and subtidal areas (0.3 ha).

Direct benthic habitat disturbance can be identified with a high degree of confidence and has been calculated using conservative assumptions (such as assuming full disturbance underneath the causeway and trestle jetty). Assessment suggests a moderate level of confidence in indirect habitat disturbance predictions as they are dependent upon events or processes that may or may not occur and to differing degrees. For example, a diesel fuel spill is unlikely to occur, but if a major spill did occur, in certain conditions, it could have significant consequences.

EAG3 sets out a framework for the assessment of proposals that may impact on BPPH, and identifies three principles that must be evaluated prior to impact assessment (EPA, 2009). These are listed in Table 4 below, along with a comment regarding how Forge has considered these principles in their planning and design.

Table 4: EAG3 Principles

No.	Principle	Comment
1	Demonstrate consideration of options to avoid damage / loss of BPPH	The Project preference for the export of ore from the mine originally was to utilise existing facilities at Port Hedland. As Port Hedland was fully allocated, alternative options were considered in proximity to the Balla Balla mine. Three different options were investigated for an export facility within Forestier Bay. The preferred location presented in this Proposal was chosen due to the following: • Access to deep sheltered water within a designated port boundary that avoided the need for dredging • Relatively direct route from mine • Major facilities (stockyards) could be located on adjacent mainland thereby minimising area of disturbance to marine habitat.
2	Design to minimise loss of BPPH and justify unavoidable loss of BPPH	Once the location for the loading facility was chosen, Forge reviewed a number of potential alignments to select one which avoided mangroves wherever practicable and minimised effects on tidal drainage. Consideration was also given to the location of Aboriginal heritage sites.
3	Best practicable design / construction / management to minimise BPPH loss	Best practice design has been utilised for the Proposal. The Proposal is a small scale project, and disturbance widths have been kept to the minimum required to safely operate the Proposal. Disturbance widths have also been minimised through mangrove communities (i.e. no passing lanes or turning areas). Appropriately engineered culverts will be used along the causeway to ensure that tidal flows are maintained. Construction is proposed in a manner such that disturbance is minimised. No separate construction access road is proposed alongside the causeway or trestle jetty to minimise the disturbance width. Post-construction monitoring of mangrove health will occur to determine if there are any indirect impacts to mangrove communities, and contingency measures will be developed to address any impacts if they occur.

EAG3 also requires that a Local Assessment Unit (LAU) be developed for the purposes of applying the guideline. EAG3 recommends the identification of an area of marine habitat in the order of 50 km^2 for BPPH LAUs (EPA, 2009). EAG3 also requires that the LAU be assigned a marine ecosystem category, based on defined criteria related to perceived conservation values (EPA 2009). Based on assessments conducted by LeProvost Environmental (2013), the LAU was assigned a Category 'B' rating (also confirmed during discussions with the OEPA), which has the following guidance:

- No development should take place that would adversely affect the ecological integrity of these areas;
- Minor loss may be acceptable where proponents can demonstrate that there are no feasible alternatives, and a LAU is used that is consistent with a State Government decision (Cumulative Loss Guideline of 1%); and
- The acceptability of any loss will be a judgement of the EPA.

In accordance with EAG3, a 46 km^2 LAU has been defined for assessment of impacts of the Proposal (Figure 13 and LeProvost Environmental, 2013)). Areas of BPPH impact have been calculated in comparison to the total of that BPPH type found within the defined LAU and is based in the assumption that the proposed causeway will result in disturbance of a 50 m wide corridor and the trestle structure a 10 corridor. The proportion of BPPH impacted within the LAU is as follows:

- Mangroves - 0.32%;
- Algal mats – 2.12%;
- Low tidal flats - 0.06%; and
- Sub-tidal waters - 0.09%.

The disturbance impacts percentage for BPPH losses for the designated 46 km2 LAU are in all instances well below the cumulative loss guideline of 1% of the LAU for Category B as specified in EAG3 (EPA, 2009) with the exception of the algal mat category (2.12% of whole project LAU).

At 0.32%, mangrove habitat loss is well below the EPA cumulative loss guideline and the project location and design have been driven by minimising impacts on mangroves. The mangrove loss is considered to be unavoidable as little scope remains to further avoid this habitat type.

It is noted that the algal mat habitat loss exceeds the EPA cumulative loss guideline (for the selected whole of project LAU) of 1%. Forge is committed to avoiding impacts and has achieved this outcome for mangroves. Attempts to minimise loss of algal mat habitat will necessitate increased impacts on mangroves and has therefore not been pursued further. It should also be noted that the 50 m width allowance for disturbance of this unit may not be fully required at construction. More detailed survey of the Proposal Area intertidal BPPH will assist in detailed design of the causeway structure. Selection of an LAU more relevant to geomorphology and extent of the causeway (the presented LAU includes causeway and trestle) and algal mat habitat would see this proportion reduced below 1%. The ecosystem boundary contains approximately 24 km^2 of algal mat habitat. When considered as a percentage of total algal mat habitat within the Balla Balla ecosystem, the habitat loss resulting from causeway construction equates to 0.89% (at 50m wide). Similarly, the percentage loss of low tidal flat habitat beneath the jetty is a very small percentage of available habitat within the LAU (0.06%).

Based on the information provided above, (i.e. Forge's efforts to minimise mangrove habitat loss to well below the 1% cumulative loss guideline specified in EAG3), it is expected that the Proposal is not at variance to the guidance contained in EAG3.

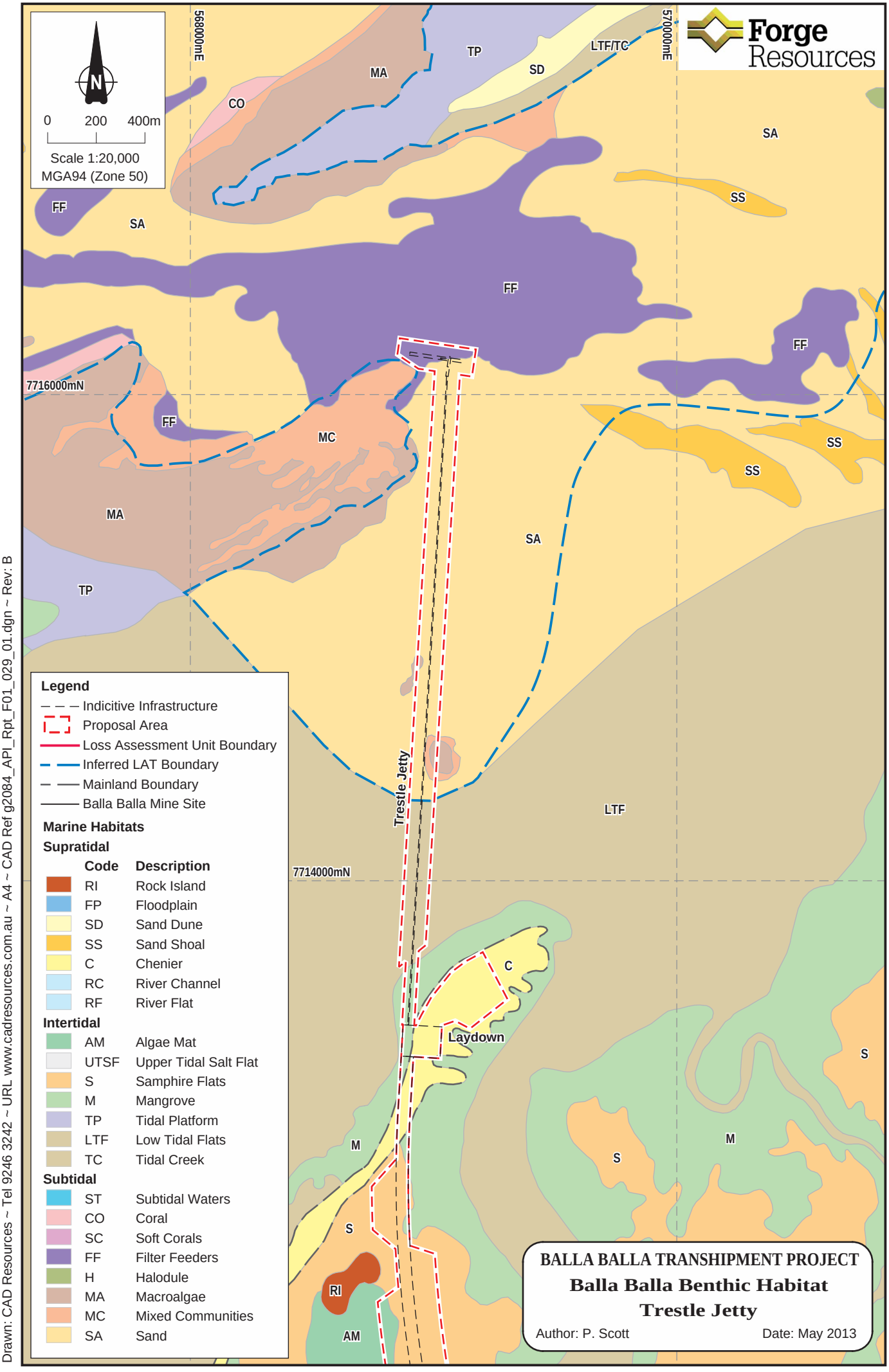

Figure 14: Benthic habitat map in Trestle Jetty area

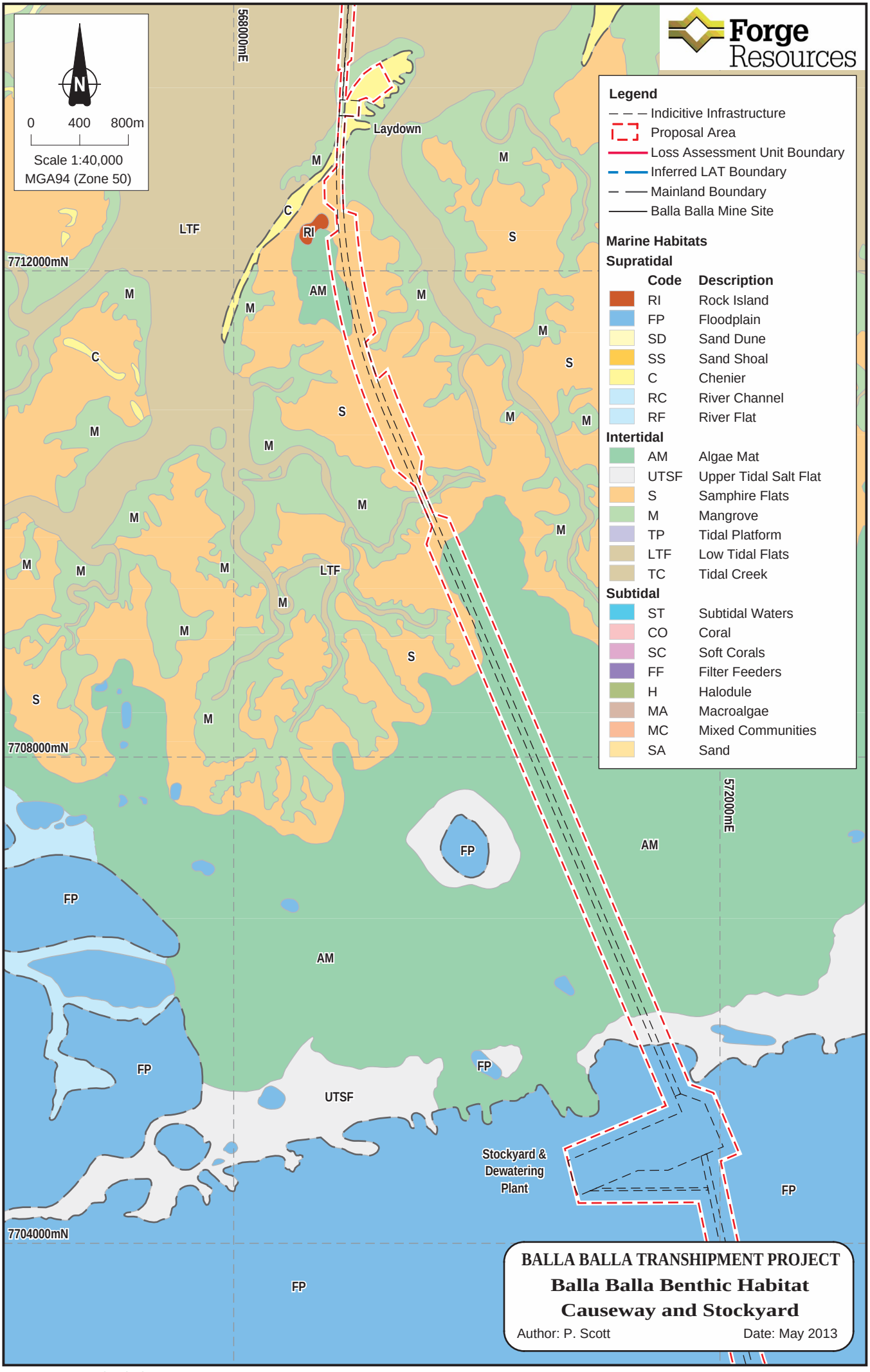

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Figure 15: Benthic habitat map in Causeway area

Changes to Tidal Processes

Changes to tidal processes may indirectly affect marine benthic habitat by restricting flows downstream of the causeway and pooling of tidal waters upstream. The vegetation associated with tidal flats is reliant on tidal flows and therefore any alterations could affect the dynamics of vegetation communities. Tidal process changes associated with the Proposal may potentially be caused by the construction of the rock causeway.

The causeway traverses over primarily algal mat and samphire habitat, along with a small area of mangrove habitat. Based on modelling conducted by GEMS (2013a), the causeway will generally follow the tidal catchment divide, which reduces the likelihood of any tidal flow restrictions occurring (Appendix 2). Culverts will also be installed at minimum 500 m spacing along the causeway, targeted at low points in the tidal flats. There is one tidal creek that will be crossed by the causeway, and in that location culverts will be installed to maintain flows under the causeway. The culverts will be engineered such that flows are maintained during normal tidal ebb and flood events.

GEMS (2013b) have also modelled the potential storm surge heights in the area (Appendix 2) and determined that the causeway will not cause significant inundation of areas that would not normally be inundated during storm surge events. The modelling also determined that the proposed 10 m causeway height is sufficient to prevent overtopping during 1 in 100 year Annual Recurrence Interval (ARI) storm events.

Forge will develop a Mangrove Management Plan prior to construction which will contain management controls, responsibilities, monitoring and contingency actions. This plan will be used to ensure any indirect impacts on mangrove communities are discovered early, and actions are taken to address the impacts.

There is a high degree of confidence that tidal flows can be maintained such that impacts to marine benthic habitat are minimised.

4.1.4 Expected Environmental Outcomes

Based on the information provided, the Proposal is not expected to have a significant impact on marine benthic habitat on a local or regional scale. Disturbance of the most environmentally significant mangrove unit has been minimised by route selection and design and equates to 2.09 ha or 0.35% of LAU, well below the 1% CLG. Loss of the algal mat unit is above the 1% cumulative loss guideline for the selected LAU but is noted to be unavoidable and less than 1% when an LAU is selected based on assessing impacts of the causeway on the surrounding ecosystem units. Indirect impacts can be minimised using management controls.

4.2 Marine Fauna

4.2.1 Relevant EPA Objectives / Policies / Guidelines / Standards

Objectives:

- To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

- To avoid or manage potential impacts from light overspill and comply with acceptable standards.

Guidelines:

Forge has considered the EPA's EAG5 which specifically addresses approaches to Proposal design and implementation to protect marine turtles from the adverse impacts of light (EPA, 2010a). EAG5 sets out:

- Guidance on an array of approaches available for avoiding, reducing, managing and mitigating light impacts on marine turtles to be considered when preparing documentation relevant to the EIA process and during the implementation of proposals or planning schemes; and
- Alternative methods for the avoidance and management of light impacts that can be applied using a risk-based approach and by applying best practice methods.

Forge has also considered the EPA EAG3 for the protection of BPPH (discussed in Section 4.1).

4.2.2 Impact Assessment

This section presents information relevant to assessing the likely impacts on marine fauna and includes a summary of the existing environment, impact mechanism, potential impacts, proposed management controls (often the same for impacts on different ecosystem elements) and predicted outcomes.

An assessment of distribution and habitat has identified that the following marine fauna species listed under the *Wildlife Conservation Act 1950* (WC Act) may potentially be found within the Proposal Area:

- Short-nosed Sea Snake (*Aipysurus apraefrontalis*);
- Loggerhead Turtle (*Caretta caretta*);
- Green Turtle (*Chelonia mydas*);
- Hawksbill Turtle (*Eretmochelys imbricata*);
- Leatherback Turtle (*Dermochelys coriacea*); and
- Flatback Turtle (*Natador depressus*).

Bird species listed under the WC Act that may potentially be found within the Proposal Area are discussed in Section 5. Whales, dolphins and other species listed under the EPBC Act may also occur in the Proposal Area.

Table 5 summarises the potential impacts to key marine fauna and Section 4.2.3 provides additional information and assessment on any key issues identified.

Table 5: Environmental assessment – marine fauna

Existing Environment and Knowledge	Impact mechanisms	Potential Impacts	Proposed Management Controls	Predicted Outcomes
Disturbance of benthic habitat – refer to Section 4.1				
Whales No quantitative survey data currently exists for Humpback Whales specific to Balla Balla. General patterns of whale migration are well understood. Humpback Whales are generally expected to pass Balla Balla in deeper waters offshore, particularly during the northern migration. Some whales, often with calves will stay close to shore on the southern migration. The waters between Depuch Island and the shore are very shallow and mostly intertidal. Whales have been observed ~ 1.5 km offshore near West Moore island during their southern migration. Other whale species may pass in close proximity to the proposed offshore mooring area but are unlikely to regularly pass close to the barge loading facility at Balla Balla. Little detail is known about their distribution, populations or behaviours in the local area.	Marine noise from pile driving activities	Potential impacts on Humpback Whales passing through the area during southern migration include: • Permanent Threshold Shift (PTS); equivalent to permanent loss of hearing sensitivity (refer to Glossary) within 50 m of pile driving • Temporary Threshold Shift (TTS); equivalent to temporary loss of hearing sensitivity (refer to Glossary) within 500 m of pile driving • Avoidance of area/behavioural response within 2-5 km of pile driving. Humpback Whales are not expected to enter the area close to shore that would be affected by marine noise due to a very narrow entrance between the mainland and West Moore Island, and the very shallow tidal and sub-tidal waters. They would be easily visible should they do so. Potential impacts on other whale species are expected to be similar to those identified for Humpback Whales, assuming the animals could possibly be present and are within the noise affected area. Other whale species should also be easily visible.	Marine noise controls are defined to mitigate the risk of the impacts to avoid the risk of PTS and make the risk of TTS negligible. Avoidance and behavioural responses are expected should any whales travel within a direct 2-5 km of pile driving activities. These responses will be difficult to detect. The controls identified are as follows: • Verification of marine noise predictions in first month of pile driving • Modification of proposed controls in consultation with DEC if required based on verification • Pile driving only during conditions that allow visual monitoring • Soft start to pile driving activities to prevent sudden increases in noise • 1000 m marine mammal management area around pile driving barge whilst operating. Slow down the rate of pile driving activities if marine mammals enter this area • 500 m marine mammal exclusion area around pile driving barge whilst operating. Shut down pile driving activities if marine mammals enter this area • Suitably qualified observer operating for at least 10 mins before and during pile driving • Contingency measures will be considered if required: o Restricting piling to avoid high tide o Reducing the strike rate of piling o Pre-boring of holes o Source noise controls	Pile driving will occur using 2 – 3 pile drivers (1 based on the jetty and up to 2 barges), operating predominantly during daylight hours for up to 9 months (avoiding the cyclone season). Pile driving will cease during location shifts and according to the management controls identified. Pile driving may extend across two seasons if required. Most of the jetty structure is in or surrounded by shallow water and fringing reef so marine noise propagation is expected to be less than predicted - particularly during the lower tide phases. Verification of noise levels will be used to modify management protocols if required. Extremely low likelihood of whales experiencing PTS or TTS. Whales (should they pass within 1 – 3 km of pile driving and at an angle that marine noise is propagated directly) may seek to avoid the area, and/or may reduce their usage of calls and soundings in response to anthropogenic noise. The outcomes identified above are not expected to have any effect on long term population dynamics for whales.
	Vessel Strike	Vessel strike may result in injury or death. Potential causes of vessel strike include: • Transhipment barge movements • Construction vessel movements • Small emergency or maintenance craft movements	The risk of vessel strike cannot be eliminated. The likelihood and severity of vessel strike can be reduced with the following controls: • All vessel crews to undertake site induction to include details of risks, impacts, management controls, communications and reporting regarding vessel strike • Whale sightings to be communicated to all vessels in area • Vessel speed reduction below 8 knots if whale sightings are within vessel movement areas • Reporting of any vessel strike to DEC	The application of controls will reduce the likelihood of vessel strikes. The severity of vessel strike on whales is markedly reduced at speeds between 8 – 15 knots (Vanderlaan and Taggart (2007).
Dolphins Dolphins were noted during aerial surveys of the area (Pendoley, 2013; Appendix 2), although not identified to species level. Humpback, bottlenose and snubfin dolphins are expected to occur in the waters surrounding and including the Proposal Area. Studies have been completed on dolphin noise sensitivity, mainly on the common bottlenose dolphin. Vessel strike for some species of dolphins has been researched.	Marine noise from pile driving activities	No species specific noise sensitivity data for humpback or snubfin dolphins. Potential impacts on dolphins include: • PTS within 50 m of pile driving • TTS within 500 m of pile driving • Avoidance of area/behavioural response within 2-5 km of pile driving. General pattern is reduced use and scope of communications and echolocation during noise episodes	Implement marine noise controls as identified for whales. Additional controls include: • Survey of dolphin populations and movements prior to construction • Possible modification of marine noise controls if dolphin activity from survey work suggests this is required • Any modifications to noise controls in consultation with DEC	Pile driving will occur using 2 – 3 pile drivers (1 based on the jetty and up to 2 barges), operating predominantly during daylight hours for up to 9 months (avoiding the cyclone season). Pile driving will cease during location shifts and according to the management controls identified. Pile driving may extend across two seasons if required. Most of the jetty structure is in or surrounded by shallow water and fringing reef so marine noise propagation is expected to be less than predicted by simple modelling - particularly during the lower tide phases. Verification of noise levels will be used to modify management protocols if required. Predicted outcomes are an extremely low likelihood of dolphins experiencing PTS. Low likelihood of dolphins experiencing TTS. Dolphins passing within 1 km of pile driving (and at an angle that marine noise is propagated directly) may seek to avoid the area, or be curious and investigate, and/or may reduce their usage of calls and soundings in response to anthropogenic noise. The outcomes identified above are not clear in terms of effects on long term population dynamics for individual dolphin species. The scale and length of the impact period suggests that impacts would be minor and reversible. No population data is currently available for the dolphin species likely to occupy the waters surrounding Balla Balla. Population impacts cannot be accurately estimated based on current knowledge however Forge is investigating funding dolphin population research prior to construction to inform this issue further.
	Vessel strike	Same potential impacts as for whales (discussed above).	Same management controls as for whales (discussed above).	The application of controls will reduce the likelihood of vessel strikes. The severity of vessel strike on whales is markedly reduced at speeds between 8 – 15 knots (kn) (Vanderlaan and Taggart (2007), and dolphins are expected to be more mobile and quicker to respond to oncoming vessels.
Dugong	Marine Noise	Due to the lack of specific noise sensitivity data for dugong, the exposure guidelines used for other marine	Marine noise controls as identified for whales. Additional controls to include: • Inclusion of dugong (presence / absence) in the survey of dolphin population and	Pile driving will occur using 2 – 3 pile drivers (1 based on the jetty and up to 2 barges), operating predominantly during daylight hours for up

Existing Environment and Knowledge	Impact mechanisms	Potential Impacts	Proposed Management Controls	Predicted Outcomes
Dugong have been recorded in the Balla Balla area mostly in nearshore waters outside the embayment in which the Proposal is based (Pendoley Environmental 2013, Appendix 2). Dugong key feeding habitat is tropical seagrass. A recent subtidal habitat survey (Geo Oceans, 2013) recorded sparse seagrasses (*Halodule* sp) occuring in low abundance in the more protected eastern part of the bay on shallow intertidal sand flats (Figure 12). Dugong population density data is limited. Existing impact data for Dugong is focused on vessel strike rather than marine noise.		mammals are proposed to be used to provide some contingency. Potential impacts on dugong therefore include: • PTS within 50 m of pile driving • TTS within 500 m of pile driving • Avoidance of area/behavioural response within 2 - 5 km of pile driving	movements prior to construction • Possible modification of marine noise controls if dugong activity from survey work suggests this is required • Any modifications to noise controls in consultation with DEC	to 9 months (avoiding the cyclone season). Pile driving will cease during location shifts and according to the management controls identified. Pile driving may extend across two seasons if required. Most of the jetty structure is in or surrounded by shallow water and fringing reef so marine noise propagation is expected to be less than predicted - particularly during the lower tide phases. Verification of noise levels will be used to modify management protocols if required. Predicted outcomes are an extremely low likelihood of Dugong experiencing PTS. Low likelihood of dugong experiencing TTS. Dugong passing within 1 km of pile driving (and at an angle that marine noise is propagated directly) may seek to avoid the area. Due to the lack of population data, the outcomes identified above are not clear in terms of effects on long term population dynamics for Dugong. The scale and length of the impact period suggests that impacts would be minor and reversible. Only the result of one flyover survey is available to assess Dugong numbers likely to occupy the waters surrounding Balla Balla. Population impacts cannot be accurately estimated based on current knowledge however Forge commits to including dugong presence / absence surveys in the dolphin research discussed previously. This information will determine whether a modification in noise controls is required.
	Vessel Strike	Same potential impacts as for whales (discussed above).	Same management controls as for whales (discussed above).	The application of controls may reduce the likelihood of vessel strikes, and lower vessel speeds may reduce the consequence if a vessel strike occurs.
Marine Turtles (water column) Flatback and green turtles are relatively abundant in shallow nearshore waters both inside and outside the bay. Very little is known about sound levels and frequencies that cause physical injury or behavioural response in marine turtles (Pendoley, 2013b & BHPB, 2011). Based on limited information, BHPB reported that physical injury and/or permanent hearing damage to adult turtles is likely to occur at 240 dB re 1 µPa and behavioural and masking changes are likely to occur at levels above 120 dB re 1 µPa. Juvenile loggerhead turtles were shown to react to sound in water and the reaction was dependant on distance from the source (Pendoley, 2013b).	Marine noise from pile driving activities	Potential impacts on turtles possibly include PTS, TTS or an avoidance of area/behavioural response. Noise impacts on marine turtles are not well understood, however it is generally accepted that turtles are less likely to be significantly impacted by marine noise than marine mammals.	• Verification of marine noise predictions in first month of pile driving • Modification of proposed controls in consultation with DEC if required based on verification • Pile driving only during light conditions that allow visual monitoring • Soft start to pile driving activities to prevent sudden increases in noise • 50 m turtle exclusion area around pile driving barge whilst operating. Shut down pile driving activities if turtles enter this area • Suitably qualified observer operating for at least 10 mins before and during pile driving • Contingency measures will be considered if required: o Restricting piling to avoid high tide o Reducing the strike rate of piling o Pre-boring of holes o Source noise controls.	Pile driving will occur using 2 – 3 pile drivers (1 based on the jetty and up to 2 barges), operating predominantly during daylight hours for up to 9 months (avoiding the cyclone season). Pile driving will cease during location shifts and according to the management controls identified. Pile driving may extend across two seasons if required. Most of the jetty structure is in or surrounded by shallow water and fringing reef so marine noise propagation is expected to be less than predicted by modelling - particularly during the lower tide phases. Verification of noise levels will be used to modify management protocols if required. Pendoley (2013b) has recently reviewed the likely impact of marine noise on turtles for the Balla Balla Proposal, and provided the following findings: • Turtles may become acclimated to low-level background noise • Reproductive activity in the trestle jetty construction area and surroundings is low • It is unlikely that the internesting females of any species will be present in the creek systems • The highest concentrations of turtles were found toward the outer edge of the tidal platform, which is generally protected from marine noise by the fringing islands and limestone platforms With a slow start procedure, a 50 m turtle exclusion area around piling operations is expected to be practical and adequate based on the advice provided by Pendoley, 2013a (Appendix 2).
	Vessel Strike	Same potential impacts as for whales (discussed above).	Same management controls as for whales (discussed above).	The rate of vessel strikes for the Proposal is not expected to be higher than for any other Pilbara port – for which this issue has not been considered significant. The relatively low vessel speeds and numbers are expected to minimise the risk of marine turtle injuries or fatalities from vessel strike. Turtle nesting and inter-nesting activity in the surrounding area is also very low (Pendoley 2013).
Turtle nesting The Balla Balla Port area does not have sandy beaches suitable for turtle nesting immediately adjacent. Very low-levels of marine turtle nesting have been observed within the survey area only on Beach 2 (Pendoley, 2013a). Beach 2 is 4 km away from the jetty and not directly in line of sight.	Light Spill	Key sensitivity of marine turtles to light is during hatchling emergence and migration back to the sea, however nesting females may also avoid beaches with high light levels. Potential impacts on turtles therefore include: • Avoidance of the Beach 2 by adults looking for suitable nesting beaches • Disorientation of hatchlings on Beach 2 due to exposure to glow from shore based lighting. This	Proposed management controls include: • Compliance with applicable portions of EAG5 • Educate personnel on the need to minimise light spill and the controls in place; • Minimise light intensity to as low as reasonable practicable along shoreline areas; • Avoid use of white lights (mercury vapour, metal halide, halogen and fluorescent) where practicable on stockpile and jetty; • Reduce light spill using shielding, directional alignment and behavioural controls (use of blinds, need for lighting) • Assess if there are any jetty lights visible from Beach 2 and adjust as required	Given the 4 km separation between the jetty and Beach 2, the jetty being out of sight because of a high dune, and the low level of nesting activity in the area, light from the Proposal is unlikely to adversely affect local populations. The application of light controls is expected to further reduce the likelihood of adult avoidance and hatchling disorientation. Light spill surveys may trigger adjustments to lighting which will provide further control.

Existing Environment and Knowledge	Impact mechanisms	Potential Impacts	Proposed Management Controls	Predicted Outcomes
Potential light spill impacts on marine turtles are well documented.		may reduce the chance of successful hatchling transfer to the sea		
Other species	Marine Noise	Potential impacts on other marine species include pressure injury to swim bladders, resulting in fauna injury or death.	Additional controls for other species to include: • Slow start procedure to include recording marine fauna visible within 50 m of piling location prior to start and during start-up of piling • Reporting to DEC any animals noted to remain within 50 m of piling activity	Pile driving will occur for approximately 9 months. Piling will migrate from near shore into deeper water over the duration of construction. To minimise construction time, two construction fronts are proposed – one starting from wharf end, the other from shore. Possibility of animals experiencing PTS, with some animals likely to experience TTS. Few sedentary animals expected to live in 50 m zone of piling activity due to lack of significant benthic habitat.
	IMPs	Vessels and vessel related activity during construction and operation introducing IMPs via mechanisms including: • De-ballasting • Biofouling dislodgement from vessel hulls and equipment particularly during anchoring, mooring, berthing and pile driving Greater risk posed during construction phase due to use of non-trading vessels potentially sourced from areas hosting IMPs. Construction vessels often endure longer periods of slow speeds or are stationary. The disturbance and creation of new hard substrates provides new colonisation opportunities.	Prepare and implement hull fouling and ballast water management plan in consultation with AQIS and DoT based on existing industry standards. The plan shall include: • Risk assessment of IMP introduction • Standard protocols for ballast water management for construction and operations phases • Vessel inspection and hygiene protocols for construction and operations phases • Record keeping and communication requirements • Roles and responsibilities Prepare and implement IMP Management Plan based on existing industry standards. The plan shall include: • IMP monitoring and reporting requirements • Roles and responsibilities in responding to any IMPs	No IMP survey has been completed at Balla Balla. IMP risk can be managed to keep risks low via a series of management actions. Adherence to these actions is considered likely to maintain the low risk of IMPs at Balla Balla.
	Improved access of coastal areas to feral species	• Impacts on native fauna and habitat • Impacts on heritage (Indigenous and European)	Consult with Traditional Owners, DEC and WA Museum about the values and controls for visitation of surrounding areas such as offshore islands. Implement workforce education about preventing feral species and to discourage visiting offshore islands.	The risk of introduction of additional feral species is relatively low. Visitation to offshore islands managed.
	Recreational fishing by workforce	Additional pressure on local fish stocks.	Implement workforce education to include information relevant to recreational fishing.	Negligible impact on local fish stocks. Workforce will be small in scale compared to other projects in the Pilbara.

4.2.3 Key Issues – Marine Fauna

Marine Noise

The impacts of marine noise will arise from two main sources; pile driving during construction and vessel movements.

Marine piling is expected to be more significant due to the intensity of the source and potential to cause physical injury to marine fauna. The key points relevant to the assessment of marine piling noise are:

- The current planning for pile-driving activities is over an 8-9 month work period, using up to three pile rigs (two barges and one shore-based rig). If deemed to be required the piling may extend over two seasons;
- Pile driving activities will predominantly occur during daylight hours over shallow water out to the barge loading area;
- Noise may propagate for several kilometres from the source, however the fringing limestone platforms and islands will act as barriers in most directions;
- Literature review has been used to select threshold Sound Exposure Levels (SELs) for TTS and PTS. Relevant thresholds selected for TTS are:
    - 183 dB re: 1 µPa $^{-2}$ s for dolphins; and
    - American National Marine Fisheries Service noise management criteria for avoidance of tissue damage in fish is 187 dB re: 1 µPa $^{-2}$ s.
- As a conservative estimate based on previous studies, PTS levels are estimated at 50 m and TTS at 500 m.

The likelihood of exposure and potential impacts on conservation significant marine fauna have been considered and are summarised below:

- Humpback whales migration paths generally understood, but no site specific study;
- Humpbacks whales are not normally expected to approach within 1,500 m of the seaward side of the island so are not likely to be of significant concern;
- Humpback population now well understood, other species of whale not studied;
- Risk of TTS or PTS for whales able to be almost eliminated with controls, although potential behavioural changes not known;
- Dolphins, dugong and turtles expected to be exposed to potential TTS and PTS risks, although controls will minimise likelihood;
- Dolphins, dugong and turtles expected to be exposed to SELs that could cause behavioural change. Impacts of behavioural change on populations is not well understood, but controls will minimise likelihood of exposure; and
- Fish and other smaller fauna may be exposed to tissue damage risks, controls will minimise likelihood.

In summary:

- Noise propagation is expected for several kilometres;
- A 1 km marine mammal management zone has been identified for marine spotter and piling slowdown - expected to be appropriate;
- Noise predictions to be verified in the field during initial pile driving activities;

- Marine noise controls as shown in Table 6 and Figure 16;
- Controls adequate to prevent TTS and PTS, risk of PTS in marine turtles in some locations due to lack of visibility and behaviour, behavioural changes may occur in marine mammals and turtles;
- Contingency controls if required include:
    - Amendment of exclusion zones;
    - Pre-boring of holes; and
    - Source controls (physical barriers, bubble curtains).

Table 6: Summary of marine noise management controls

Zone	Control
General	• Survey of dolphin population and movements prior to construction • Inclusion of dugong in the survey of dolphin population and movements prior to construction • Verification of marine noise predictions in first month of pile driving • Modification of proposed controls in consultation with DEC/the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) if required based on verification • Pile driving only during conditions that allow visual monitoring • Soft start to pile driving activities to prevent sudden increases in noise levels • Suitably qualified observer operating immediately before and during pile driving • Should noise verification or animal observations indicate further controls are necessary, the following contingency measures will be considered: o Restricting piling to avoid high tide o Reducing the strike rate of piling o Pre-boring of holes o Source noise controls
500 – 1000 m from piling	• 1000 m marine mammal management area around pile driving barge whilst operating • Slowdown of pile driving rate when marine mammals are observed to be between 500 - 1000 m of pile driving
50 – 500 m from piling	Shutdown of pile driving when marine mammals are observed to be less than 500 m from pile driving
<50 m from piling	• Shutdown of pile driving if sea snakes are observed to be less than 50 m from pile driving • Shutdown of pile driving if marine turtles are observed to be less than 50 m from pile driving

The range of potential outcomes of marine noise emissions on marine fauna is identified with high confidence, and with the adoption of the proposed noise management controls there is a high degree of confidence that TTS and PTS events can be avoided for marine mammals and turtles. There is a moderate degree of confidence that noise emissions from both pile driving and vessel movements may lead to some behavioural change in marine mammals and turtles, however, due to the lack of data on species distribution, movement and populations, there is low confidence in predicting exactly what behavioural changes might result, and upon which species. The assessment of consequences of predicted behavioural changes are therefore subject to a low level of confidence, except to acknowledge that the Proposal is relatively small scale for the Pilbara.

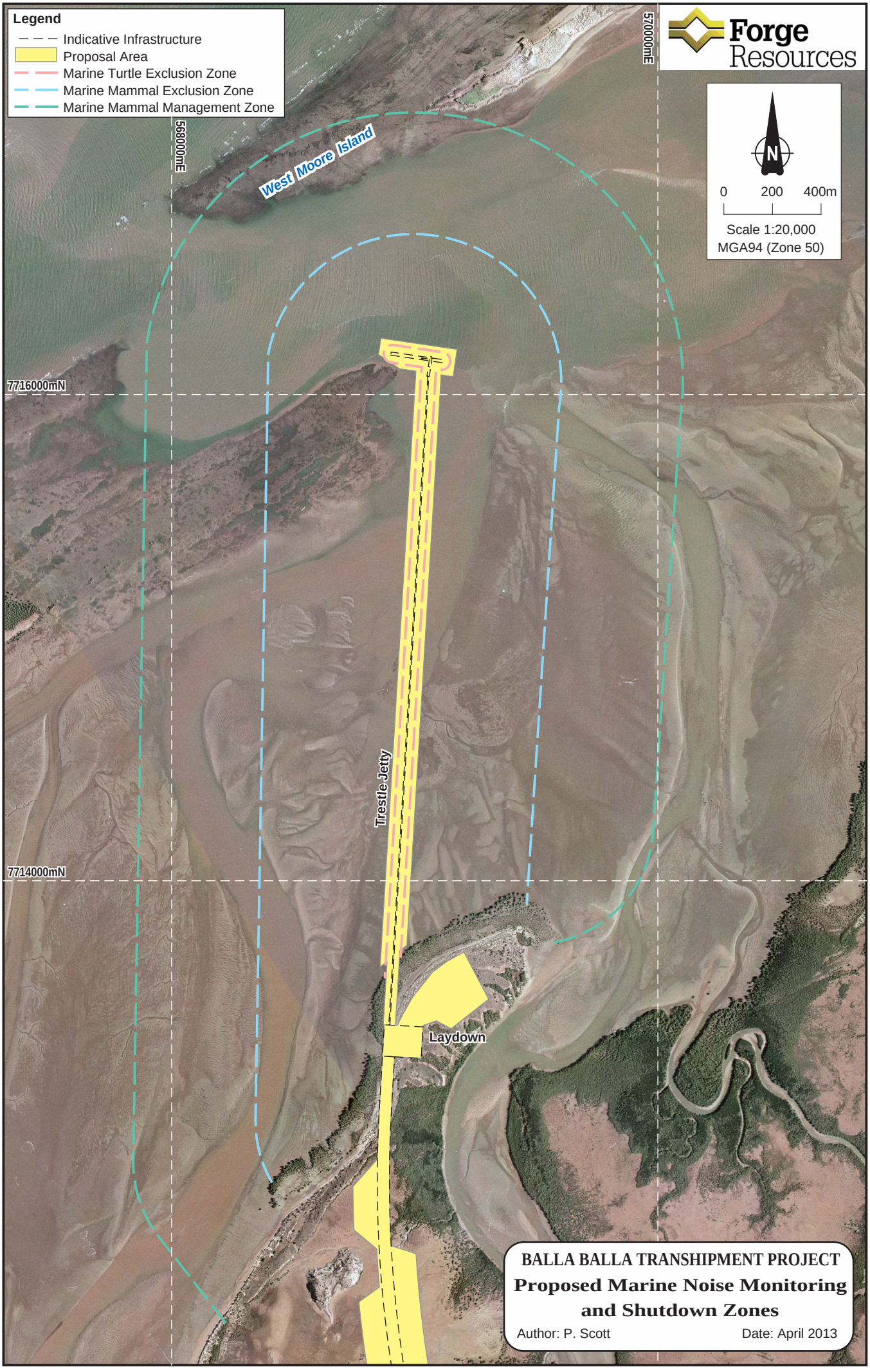

Figure 16: Proposed marine noise monitoring and shutdown zones

Light Spill Impacts on Turtle Nesting

All marine turtles are protected under the WC Act and six species are listed as Schedule 1 species. All species are listed migratory species under the Bonn Convention and are listed as either Endangered or Vulnerable under the EPBC Act. The five species that have been recorded at Balla Balla are presented in Table 7.

Table 7: Conservation status of marine turtle species occurring in WA waters

Species	WC Act	EPBC Act	Convention on Migratory Species Appendix (as at Feb 2012) (CMS 2012)	Convention on International Trade in Endangered Species of Wild Fauna and Flora Appendix (as at Sept 2012) (CMS 2012)	International Union for Conservation of Nature Status (as at Apr 2013)
Loggerhead Turtle *Caretta caretta*	Schedule 1	Endangered	I	Not listed	Endangered
Green Turtle *Chelonia mydas*	Schedule 1	Vulnerable	I	Not listed	Endangered
Hawksbill Turtle *Eretmochelys imbricata*	Schedule 1	Vulnerable	I	Not listed	Critically Endangered
Leatherback Turtle *Dermochelys coriacea*	Schedule 1	Endangered	I & II	I	Critically Endangered
Flatback Turtle *Natator depressus*	Schedule 1	Vulnerable	Not listed	Not listed	Data Deficient

A study containing a review of turtle nesting records, a survey of current (2013) nesting on five mainland beaches and Depuch, Ronsard, Sable and West Moore Islands has been completed (Pendoley, 2013a). The study found low level nesting activity on Beach 2, Ronsard Island and Depuch Island (Figure 17). All of these beaches are a significant distance from the Proposal and are shielded from light spill via the surrounding topography.

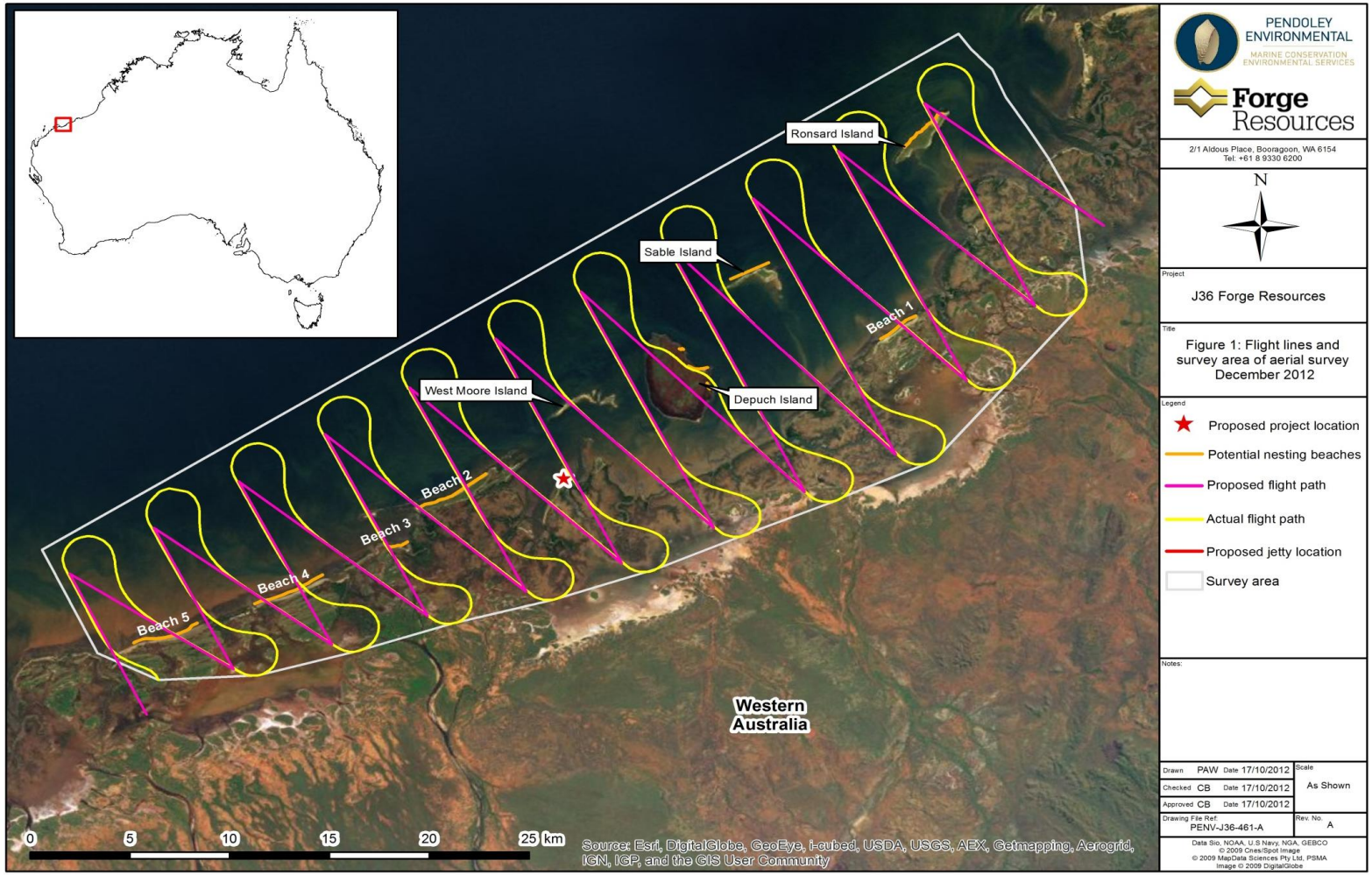

Figure 17: Marine turtle nesting records

Forge has considered the EPA's EAG5 with regards to best practice methods for avoiding, reducing, managing and mitigating light impacts on marine turtles. The guidelines will continue to be utilised during detailed design to provide best practicable lighting to minimise light spill.

The application of controls to limit light spill and the low usage of the beaches at Balla Balla for turtle nesting gives a high degree of confidence that the Proposal will not lead to significant population changes in marine turtles.

Vessel Strike

Historical records demonstrate that the most numerous, per capita, ocean-going-vessel strikes recorded among large whale species accrue to the North Atlantic Right Whale (*Eubalaena glacialis*) (Vanderlaan and Taggart, 2007). As vessel speed restrictions are being proposed to reduce the likelihood and severity of vessel collisions with Right Whales, we present an analysis of the published historical records of vessels striking large whales. The influence of vessel speed in contributing to either a lethal injury (defined as killed or severely injured) or a non-lethal injury (defined as minor or no apparent injury) to a large whale when struck was considered. Modelling demonstrated that the greatest rate of change in the probability of a lethal injury (P_{lethal}) to a large whale occurred between vessel speeds of 8.6 and 15 kn where P_{lethal} increases from 0.21 to 0.79. The probability of a lethal injury drops below 0.5 at 11.8 kn. Above 15 kn, P_{lethal} asymptotically approaches 1. The uncertainties in the logistic regression estimates are relatively large at relatively low speeds (e.g. at 8 knots the probability is .99 with a 95% CI of 0.03–0.6) (Vanderlaan and Taggart, 2007).

Turtles are less likely to flee a vessel that is travelling at high speed, and will flee at shorter distances from a fast-travelling vessel (Hazel *et al.,* 2007). The ability of the boat operator to see and avoid turtles is lessened in poor sea and/or weather conditions, water turbidity and safety restrictions for emergency stops (Hazel *et al.,* 2007). Turtles will not reliably avoid a vessel travelling at greater than 4 kph (2.2 kn) (Hazel *et al.,* 2007)."

There would be low confidence in any quantitative assessment of vessel strike (numbers of strikes, species involved, outcomes of strikes, population impacts) specific to the Proposal due to the lack of local species distribution data. The application of controls including observations, communications and vessel speed limitations reduces the likelihood and consequence of vessel strike for all species and reflects best industry practice.

Introduced Marine Pests

IMP surveys have not previously been conducted at Balla Balla. The introduction of non-native marine species in Dampier and Port Hedland is noted (Huisman *et al.*, 2008), although no IMP have been identified using the Marine Pests Interactive Map (Australian Government, 2013).

Ballast water and biofouling are expected to be the two most likely vectors for introduction of IMP at Balla Balla, given the construction of export facilities and then transhipping as a load out method.

Without the application of controls, the introduction of IMPs may occur. Standard industry controls (enforced by Australian Quarantine Inspection Service (AQIS)) relating to ballast water and vessel hygiene provide a moderate level of confidence that no IMPs will be introduced at Balla Balla. The development of a Hull Fouling and Ballast Water Management Plan is expected to reduce the risks of IMP introduction to acceptable levels.

4.2.4 Expected Environmental Outcomes

Potential impacts to marine fauna have been significantly reduced in the site selection and planning processes such that direct impacts on key BPPH (mainly mangroves) is minimised. The Proposal does not require dredging which can also have significant direct and indirect impacts.

Potential impacts from marine noise are expected to be limited to the construction phase (approximately nine months). The risks and potential impacts discussed are expected to be minimised to insignificant levels via a series of industry standard management actions described in Table 5, which will be addressed in more detail in associated management plans.

Based on the above, it is expected that the implementation of the Proposal will not result in significant impacts to marine fauna or BPPH and with the application of the proposed management actions the EPA objectives and applicable policies can be met.

4.3 Marine Environmental Quality

4.3.1 Relevant EPA Objectives / Policies / Guidelines / Standards

EPA Objectives:

- To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected.
- To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

4.3.2 Impact Assessment

This section presents information relevant to assessing the likely impacts on marine water quality from the Proposal and includes a summary of the existing environment, potential impact mechanisms, potential impacts, proposed management controls and predicted environmental outcomes. The existing environment description is summarised below in text rather than repeated for each potential impact mechanism.

Existing Environment

Pilbara marine water quality has recently become a greater focus due to the increasing development of port and marine based gas facilities in the Pilbara region of WA. In 2006 the Department of Environment (DoE, now DEC) completed a significant planning and consultation process regarding coastal water quality in the Pilbara. The resulting report (DoE, 2006) provides a framework for protection of water quality by identifying environmental values and water quality objectives for different areas in the Pilbara. The report indicates that a maximum level of ecological protection should be afforded to the waters surrounding the Proposal Area.

Pilbara marine waters are tidally dominated with a large semi-diurnal regime. Wind is also important to near shore water movement, resulting in long-term drift towards the east and north-east during spring and summer months (wet season). In autumn and winter (dry season) weaker and less persistent current reversals occur (BHPB, 2011).

The waters within Forestier Bay are relatively shallow and remain relatively turbid due to the large tidal flows in the area (LeProvost Environmental, 2013).

Key issues and management controls

Table 8 identifies the potential impacts, proposed management controls and the expected outcomes for water quality at Balla Balla. Key issues are discussed in more detail in Section 4.3.3.

Table 8: Impact assessment – marine environmental quality

Impact mechanism	Potential Impacts	Proposed Management Controls	Predicted Outcome
Oil spill	Oil spill risk is greatest during construction when spills may occur via vessel grounding or collisions. Diesel will be the primary fuel used for vessels in close proximity to the coast, with heavy fuel oil used for the ocean going vessels at a transhipment area located 18 - 34 km offshore. This reduces the likelihood and consequences of a spill relative to the risks associated with ocean going vessels coming in to harbour. Oil plume on water surface could result in oil coating: • BPPH (particularly mangroves) • Beaches • Marine fauna.	• Prepare and implement an oil spill contingency plan (OSCP) ensuring appropriate response capability to the satisfaction of the EPA. The plan will include details of: o Refuelling protocols o Emergency equipment to be stored on site o Response strategies and responsible persons • Ensure spill equipment is stored nearby to site and is available in the case of an oil spill. Typical spill response equipment may comprise of: o 300 m of solid buoyancy booms o 5 x 15 kg Anchor Kits o 1 x Foilex skimmer o 1 x Diesel powered spate diaphragm pump o 2 x Collapsible oil recovery tank (10,000 L) o 1 x Work boat suitable for deploying equipment o Various absorbent booms, pads and rolls o Various Personal Protection Equipment (PPE) • Workforce induction and training to include details of how to reduce the likelihood and consequence of spillage, and what the appropriate response actions are if a spill occurs.	Oil spill risk for the operational phase of the Proposal is considered low as vessels will be refuelled at existing facilities at Port Samson or Dampier. The risk of environment impacts from significant oil spills is limited as larger vessels will be located approximately 18 - 34 km offshore. Risks of a near-shore oil spill are limited to construction vessels, transhipment barges and any support vessels or activities on the trestle jetty. Forge will complete an assessment of oil spill risks prior to construction, and provide the OSCP to DoT for review and EPA for approval. The implementation of the proposed management controls is expected to reduce the likelihood of spills occurring, as well as minimising the potential consequences if a spill occurs.
Reduced marine water pH resulting from disturbance of Acid Sulphate Soils (ASS)	Water quality impacts affecting adjacent vegetation or fauna. Small potential areas of impact around causeway and trestle supporting piles.	• Defined area for Proposal implementation • Consistent with the ASS strategy documented in the Balla Balla Magnetite Project EMPs (OES, 2008), an investigation will be completed and site specific management controls developed in and ASS Management Plan with DEC approval prior to construction • Implement plan during construction and provide Closure Report to DEC documenting evidence of implementation on completion of earthworks.	Potential ASS is noted on the tidal flats. It is not intended to excavate ASS except perhaps where culverts need to be established at one small tidal creek crossing. With implementation of the ASS strategy, the risk of ASS causing impacts on water quality is considered low.
Elevated turbidity caused by disturbance of sediments during causeway and trestle jetty construction (piling, rock tipping)	Temporary reduction in water quality around construction areas. Small potential areas of impact around causeway and trestle supporting piles.	• Defined area for Proposal implementation • 5 m assumed buffer included in disturbance calculations for the causeway to account for potential sediment effects during construction • Visual monitoring of any significant plume that arises during construction and reporting to DEC regional office if required.	Turbidity is a regular natural occurrence within the surrounding waters. Balla Balla tidal flats are a highly mixed marine environment so plumes will quickly mix and disperse. The substrate along the alignment of the jetty and wharf is coarse sand and gravel lag. Hence potential for increased turbidity from construction operations and propeller churn is low.
Elevated turbidity from marine sediment disturbance during vessel movements (particularly at low tide)	• Smothering of nearby BPPH • Temporary reduction in water quality around vessel channel	• 200 m Moderate Ecological Protection Area (MEPA) defined around loading areas to identify water quality requirements for port operational areas • Fully laden barges not planned to depart on low tide • Vessel speed limits will be applied.	The transhipment barge approaching and departing at lower tides may result in a localised plume of natural sediments stirred up by vessel turbulence. High tides will be targeted for vessel departures, which will minimise this risk. Some minor smothering may occur on areas adjacent to the channel and berths as sediment settles out locally. Impacts are expected to be minor as the channel is located in areas of sand/gravel substrate with no high value BPPH nearby and the area supports naturally turbid water.
Elevated turbidity from product spillage	• Smothering of nearby BPPH • Temporary reduction in water quality around product handling areas (barge loading and unloading areas, conveyor route)	• Workforce induction and training to include details of how to reduce the likelihood and consequence of spillage • Spillage controls around conveyor transfer and loading points • Compliance with DEC licence • 200 m Moderate Environmental Protection Area (MEPA) defined around barge loading area to identify water quality requirements for port operation areas.	Product is non-toxic iron ore - magnetite concentrate. Small amounts of spillage may occur on occasion and will be cleaned up as required. DEC to regulate loading operations.
Contaminated runoff from shore based activities	Local impacts on water quality from hydrocarbon, product or other material spillage around the stockpiles, dewatering plant and on the causeway or trestle jetty. Note that the stockpiles and dewatering plant are located inland and well away from the sub-tidal zone.	• Develop and implement spill response procedures to ensure spills are responded to as soon as practicable • Report any spills internally as incidents • The stockyard will be surrounded by a perimeter bund, and runoff from within the stockyard will be directed to a sump. The internal drainage system will be designed to contain runoff from a 1 in 100 year ARI rainfall event • Sump to be cleaned out periodically to retain required capacity • Equipment to be available on site to clean up any residual hydrocarbon, product or other spillage • Workforce induction and training to include details of how to reduce the likelihood and consequence of spillage.	Any spills at the stockyard area that are not cleaned up immediately are expected to be contained by the perimeter bund and/or captured by the sump. Risks of spillage are reduced by workforce education and precautionary measures. Consequences of spillage are reduced by contingency measures.
Waste/refuse	Local impacts from incorrect disposal or storage of waste/refuse.	• Workforce induction and training to include details of waste management requirements • Implement the Waste Management Plan (OES, 2008) currently in use at the Balla Balla Magnetite Project	Risk of waste/refuse can be appropriately managed using the Waste Management Plan.
Contamination from anti-foulants	• Local impacts on water quality from use of inappropriate anti-foulants • Local impacts on water quality due to ship maintenance activities (sanding, sandblasting, painting)	• No Tributyltin based anti-foulants will be used • No marine maintenance activities (sanding, sandblasting, painting) to be undertaken at Balla Balla.	Anti-foulants used by vessels and infrastructure are industry standard. No inappropriate maintenance activities resulting in contamination will be conducted.

4.3.3 Key Issues – Marine Environmental Quality

A MEPA is proposed covering an area measuring 200 m from each point of the barge loading area as shown in Figure 18. In this operational area a lower level of water quality will be acceptable. This is consistent with other small scale export operations in the Pilbara. A MEPA allows for a level of ecological protection based on water quality that is expected to protect 90% of species. The MEPA will be surrounded by a Maximum Ecological Protection Area (water quality expected to protect 100% of species).

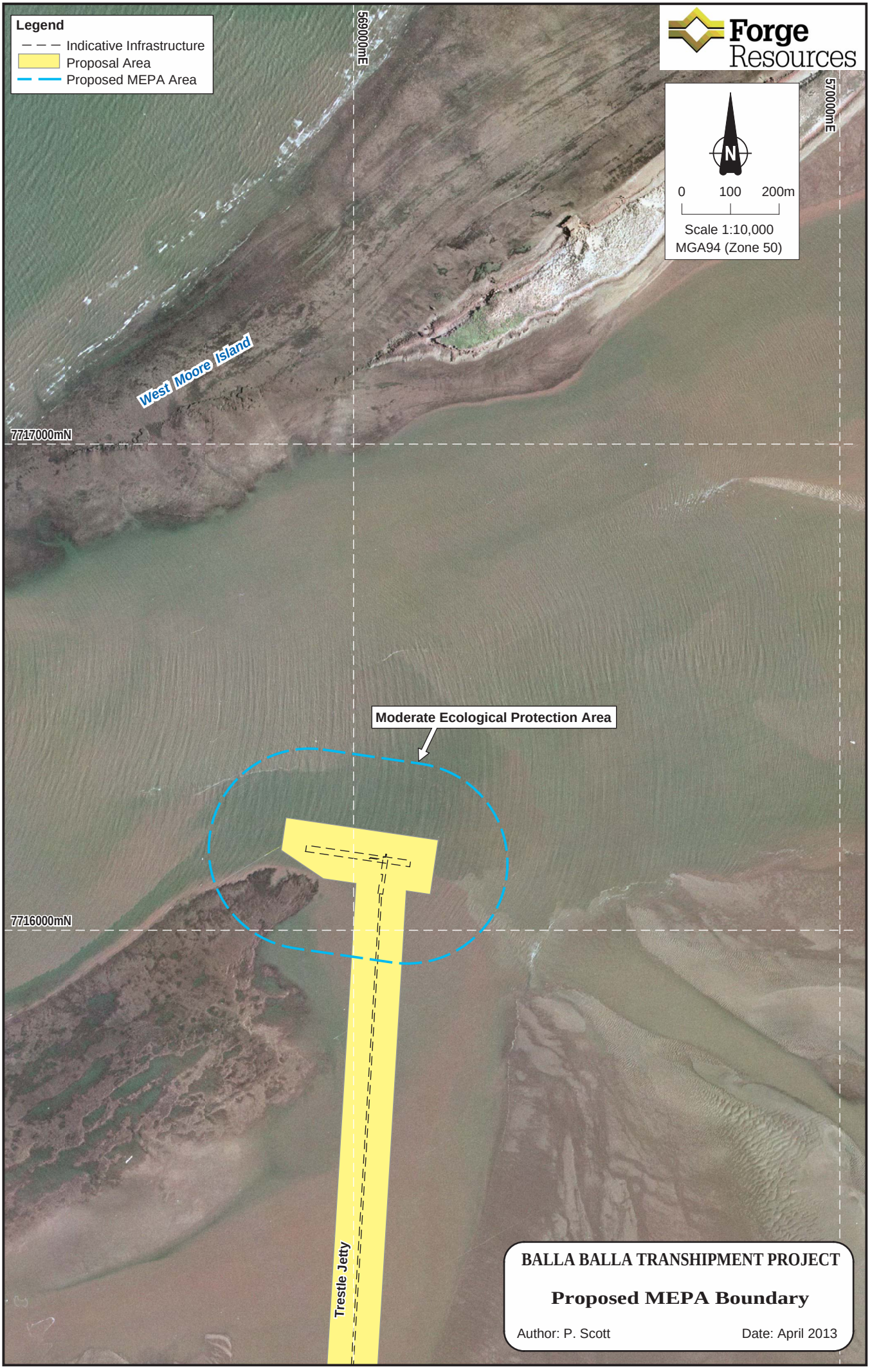

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Figure 18: Proposed MEPA Boundary

Oil Spill

In the absence of any marine dredging, and noting the small scale of the Proposal and hence risks of environmental harm from other activities such as vessel movements, the key management issue for marine environmental quality is expected to be the risk of an oil spill. This risk exists at most marine facilities and there are well developed systems for managing the risks that have been adopted as industry standards.

The risk of a significant scale heavy fuel oil spill from a large ocean going vessel occurring near the coastline is reduced by utilising transhipment to load the vessels approximately 18 - 34 km from shore. Any spills at this location are expected to largely dissipate or be controlled prior to reaching land or other more sensitive areas.

Vessel refuelling will not be conducted as part of the Proposal (barge refuelling will occur in Dampier), however there remains a low risk of diesel spills within operational areas as a result of vessel collision or grounding. Forge will undertake a risk assessment of oil spill scenarios for construction vessels prior to construction in consultation with DoT.

The inability to remove the risk of fuel spill completely means there is a moderate level of confidence that there will be no significant environmental impacts associated with the Proposal from fuel spillage. Continued, rigorous application of controls will give higher confidence levels.

4.3.4 Expected Environmental Outcomes – Marine Environmental Quality

The Proposal is small scale compared to most Pilbara iron ore export facilities. Water quality risks are minimised by the avoidance of dredging and refuelling activities, and the small scale of disturbance and product handling. Potential impacts are expected to be minimised to insignificant levels via a series of industry standard management actions to control the risks of fuel spillage, sediment disturbance, and waste material discharge.

Based on the above, there is a high degree of confidence that the implementation of the Proposal will not result in significant impacts to marine water quality.

4.4 Flora and Vegetation

4.4.1 Relevant EPA Objectives / Policies / Guidelines / Standards

EPA Objectives:

- To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge; and
- To maintain the integrity, ecological functions and environmental values of the soil and landform.

Guidelines:

Forge has considered EPA Guidance Statement No. 51 which specifically addresses terrestrial flora and vegetation surveys for environmental impact assessment in WA. This Guidance Statement:

- Provides the general standards and a common framework for terrestrial flora and vegetation surveys for EIA in WA, the quality and quantity of information that should be derived from these surveys, and the consequent analysis, interpretation and reporting; and
- Is primarily directed at the subset of biodiversity contained in all terrestrial vascular plants.

Forge has considered EPA Position Statement No. 2 – Environmental Protection of Native Vegetation in WA. This Position Statement provides an overview of the EPA's position on the clearing of native vegetation in WA with particular reference to clearing within the agricultural area. However, there is an array of additional information at both the National and State levels which is relevant to native vegetation clearing in other parts of WA.

Forge has also considered EPA Position Statement No. 3 – Terrestrial Biological Surveys as an Element of Biodiversity Protection which recognises fundamental ecological importance of biodiversity protection and the requirements for EIA in WA. Forge has recently commenced a level 2 survey for flora and vegetation over the Proposal Area.

4.4.2 Impact Assessment

Table 9 identifies the potential impacts, proposed management controls and the expected outcomes for flora and vegetation at Balla Balla. Key issues are discussed in more detail in Section 4.4.3.

Table 9: Impact assessment – flora and vegetation

Factor & EPA Objective	Existing Environment	Potential Impacts	Proposed Management Controls	Relevant Legislation	Predicted Outcome
BIOPHYSICAL					
Terrestrial Flora & Vegetation To maintain the abundance, diversity, geographic distribution & productivity of flora at species & ecosystem levels through the avoidance or management of adverse impacts & improvement in knowledge.	• Two flora & vegetation surveys have been conducted around the Balla Balla Proposal Area. The first survey focused on the mining area and is reported in Mattiske (2006, 2008a and 2008b). • The second survey focuses on the Proposal Area and an interim report is provided in Mattiske (2013) and is summarised below. Disturbance is located within the Littoral, Horseflat, Cheerawarra and Mallina Land systems. **Flora** • A desktop survey did not identify any Threatened Flora species likely to be in the Proposal Area. • A total of 100 flora species have been recorded in the flora survey of the Proposal Area. • One priority flora species, *Heliotropium muticum* (Boraginaceae – P1) was previously recorded to the south-west of the proposed infrastructure corridor but not located in the corridor.Five introduced flora/weed species were recorded within the Proposal Area none of which are declared plants pursuant to section 37 of the *Agriculture and Related Resources Protection A*ct 1976. **Vegetation** • The vegetation of the survey area was comprised of a mangrove community, tidal flats with samphires, coastal sand dunes, and a mosaic of tussock and hummock grasslands with occasional Acacia spp. and mixed shrublands. • The Proposal will impact upon less than 1% of Beard vegetation units 127 and 589. • At a National and Regional level, marine and tidal communities are noted to provide habitat for significant fauna species. • No Threatened Ecological TECs have been recorded in or in close proximity to Project Area. • At a local and state level the most significant potential flora values relate to the Priority 3 'Horseflat land system of the Roebourne Plains' ecological community (Horseflat PEC). • The potential Horseflat PEC has a current locally mapped extent of 13,955 ha (Polygon 1878) for the area and of that approximately 82 ha (0.58%) may be impacted by the Proposal. • In addition to the small proportion of area potentially impacted locally, the Horseflat PEC is noted to extend to Cape Preston and have multiple occurrences across the Roebourne plains. • The current condition of the vegetation resembling the Horseflat PEC is heavily grazed and ranged from degraded to very good.	• No Threatened Flora or Priority Flora species is likely to be impacted. • Direct loss of other flora and vegetation as a result of clearing for construction. • The existing boundaries for the Horseflat PEC are noted to overlap the proposed infrastructure corridor and the maximum potential impact on the currently identified PEC is less than 0.58% of the locally identified polygon ID 1878. • Introduction or spread of weed species via earthmoving equipment or vehicles. • Smothering of leaves as a result of dust emissions, which may restrict growth. • Increase in fire risk due to increased human presence.	• Implement ground disturbance procedures to contain disturbance within approved boundaries • Strip and store vegetation and topsoil during ground disturbance for use in future rehabilitation • If necessary, conduct further survey on Polygon 1878 to determine its status and boundaries as a PEC and provide report to DEC • Rehabilitate any cleared area not required for operations • Implement a weed management procedure, which will include requirements for weed inspections and the cleaning of soil and plant matter from incoming earthmoving equipment • Map any weed infested areas within the Proposal Area and clean any vehicles or equipment leaving these areas • Implement dust management actions as identified in the Balla Balla Magnetite Project Environmental Management Plan (OES, 2008) • Maintain adequate fire response equipment on site • Maintain adequate fire breaks across the site as required.	• Native Vegetation Clearing Regulations able to address any additional clearing outside of authorised boundaries. API approval will provide exemption from these regulations within authorised boundaries • WC Act and EPBC Act can address impacts to Threatened Flora if found • Weed management will be in accordance with the requirements of the *Agriculture and Related Resources Protection Act 1976* (WA).	• Clearing of approximately 156.5 ha of terrestrial vegetation will be required to implement the Proposal • No disturbance of Threatened Flora, Priority Flora or TECs is expected as none have been found within the Proposal Area • Clearing of less than 0.58% of Polygon 1878 identifying the current local boundaries for the Horseflat PEC impacted by the Proposal. The Horseflat PEC is noted to be more extensive regionally. • Clarification of the status and extent of Polygon 1878 Horseflat PEC • Disturbance of areas of high local conservation significance will be minor: o 1.9 ha mangroves will be cleared representing 0.3% of the assessment unit area of mangroves (i.e. less than the 1% threshold) o 15.5 ha of scattered samphire habitat will be disturbed by the causeway o 21 ha of algal mat habitat will be disturbed by the causeway • Spread of weeds is expected to be able to be controlled using weed hygiene controls

4.4.3 Key Issues – Flora and Vegetation

The key flora and vegetation issues associated with the Proposal are:

- Clearing of coastal mangroves (treated as BPPH and discussed in Section 4.1); and
- Definition of and clearing of the currently identified Horseflat PEC (Figure 19).

The Horseflat land system PEC is broadly described as "gilgaied clay pans supporting tussock grasslands and minor grassy snakewood shrublands" (Mattiske, 2013). It occurs from Cape Preston to Balla Balla, surrounding Karratha and Roebourne (DEC 2012). Perennial tussock grasses including *Eragrostis xerophila* and other *Eragrostis* spp., *Eriachne* spp., and *Dichanthium* spp. are noted to be components (Mattiske, 2013). The community also supports a suite of annual grasses including *Sorghum* spp. and rare *Astrebla* spp. (DEC 2012). Threats include grazing, weed invasion and fragmentation.

The Horseflat land system is further described by Van Vreeswyk *et al.* (2004) and the PEC is understood to incorporate three units:

Unit 3 **Gilgaied plains** – self-mulching cracking clays with mostly tussock grasslands (*Eragrostis xerophila* with *Chrysopogon fallax* and *Eriachne benthamii*);

Unit 5 **Alluvial plains** – non-cracking, with some self-mulching cracking clays with tussock grasslands (*Eragrostis xerophila, Eriachne benthamii, Chrysopogon fallax, *Cenchrus ciliaris*); or tussock grasslands with *Atriplex bunburyana;* or occasionally *Triodia* spp. hummock grasslands; and

Unit 7 **Drainage depressions** (occasional) – deep red/brown non-cracking clays and red loamy earths with dense tussock grasslands (*Eriachne benthamii, Chrysopogon fallax*) with occasional eucalypt trees and shrubs.

Some sites surveyed in the southern section of the proposed infrastructure corridor resemble the PEC as described above. The tussock grasslands noted by Mattiske (2013) commonly support the species above and occur on red-brown cracking clays. However, these Poaceae (grass) species are not restricted to the PEC occurrence, and commonly occur within and outside the Pilbara bioregion. It was also noted during the field survey that the area falling within the PEC boundary included large areas of acacia shrublands and hummock grasslands not noted in the PEC description.

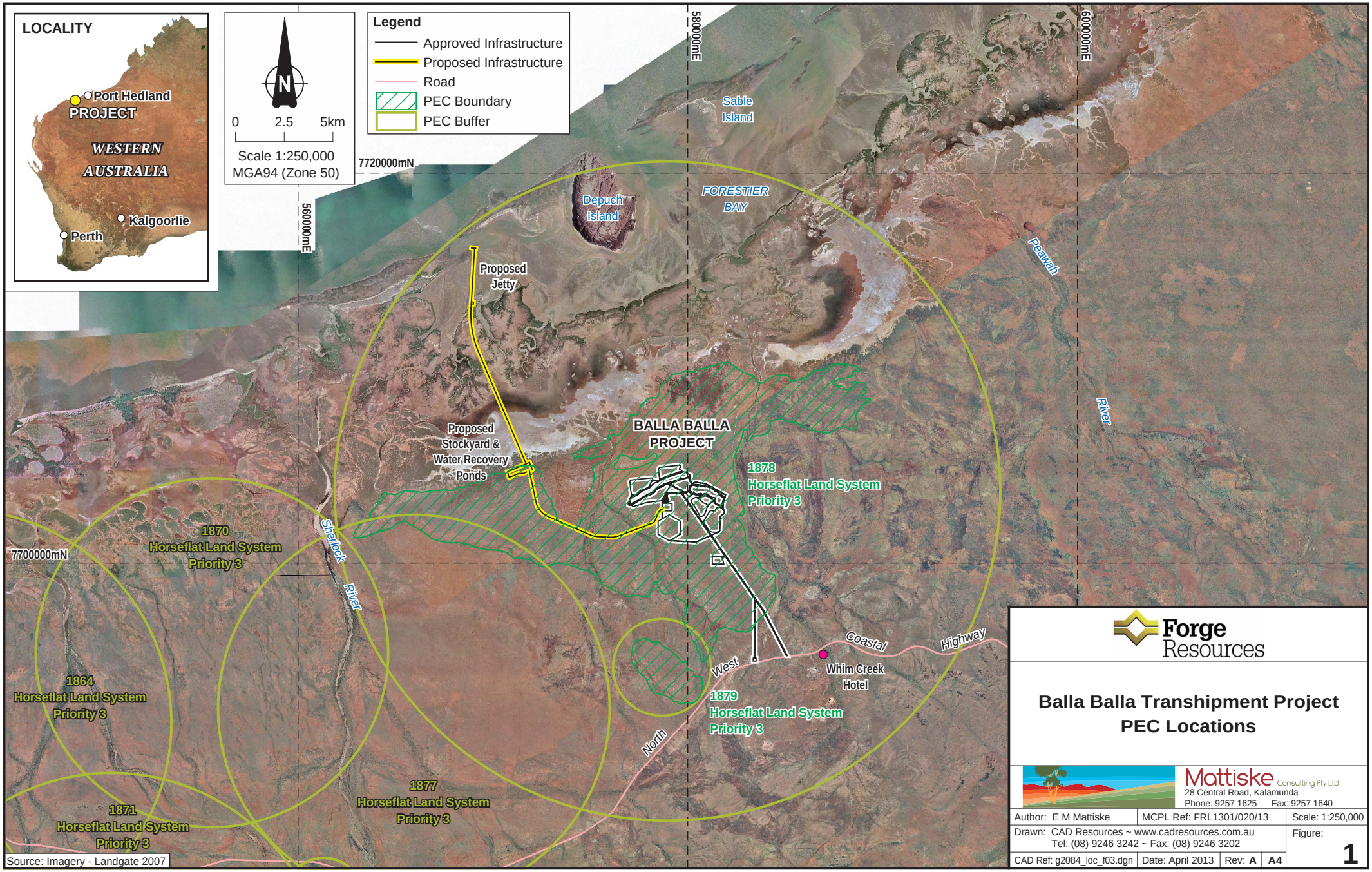


Figure 19: Proposal Area and currently mapped PEC areas

4.4.4 Expected Environmental Outcomes

The Balla Balla Proposal is small scale compared to most Pilbara iron ore export facilities. Development of the Proposal is expected to require the disturbance of approximately 156.5 ha of land variably and sparsely covered in native vegetation. The estimated 156.5 ha of terrestrial disturbance will occur within the 515 ha Proposal Area identified in Figure 2.

The total area of potential PEC to be cleared based on current survey and mapping is small (82 ha). In proportion to the currently mapped boundary of the local PEC polygon intersected by the Proposal, the area to be disturbed represents less than 0.58% of that polygon (Figure 19). In addition to the small proportion of area potential PEC impacted locally, the Horseflat PEC is noted to extend to Cape Preston and have multiple occurrences across the Roebourne plains.

Forge proposes to undertake further botanical study to clarify the status and extent of Polygon 1878 and report this to DEC. The identified impacts are not expected to threaten the extent or conservation significance of the PEC.

The assessment above provides a high degree of confidence that the EPA objectives for this factor can be met and impacts are able to be managed with standard industry controls and regulatory mechanisms.

5 OTHER ENVIRONMENTAL FACTORS

The following section provides a table of potential environmental impacts associated with other environmental factors, a succinct summary of the management of these impacts, other relevant approvals, legal management mechanisms and the expected environmental outcomes that will give the EPA confidence that these factors will be appropriately managed.

Forge understands the importance of compliance with the relevant statutes that will be used to manage these other factors.

5.1.1 Impact Assessment

Table 10 below presents information relevant to assessing the likely impacts on other environmental factors and includes a summary of the existing environment, potential impact mechanisms, potential impacts, proposed management controls and predicted environmental outcomes. Additional information on key issues is provided in Section 5.1.2.

Table 10: Impact assessment – other factors

Factor & EPA Objective	Existing Environment	Potential Impacts	Proposed Management Controls	Relevant Legislation	Predicted Outcome
BIOPHYSICAL					
Terrestrial Fauna and Fauna Habitat To maintain the abundance, diversity, geographic distribution & productivity of fauna at species & ecosystems levels through the avoidance or management of adverse impacts & improvement of knowledge.	**Recorded Species** • A total of 356 vertebrate fauna species were identified as potentially occurring within the Proposal Area during a desktop review by Phoenix (2013b), including 1 reptile, 6 mammal and 55 bird species of conservation significance • 25 species of conservation significance were recorded during Phoenix survey (2013a,b), of which 22 were migratory birds • 13 bird species are noted to be present in broader Forestier Bay in nationally significant numbers (Phoenix, 2013a) • No significant Short range Endemic (SRE) habitat or SRE species were identified within the expected Proposal disturbance area (Phoenix, 2013b). **Fauna Habitat** • 9 broad fauna habitats were recorded across a 11,828 ha study area as shown in Figure 15 (Phoenix 2013b): o Samphire plains o Tussock and hummock grasslands o Open shrubland o Rocky outcrops and boulder piles o Minor creeks and drainage lines o Salt flats o Coastal sand dunes o Mangrove thickets o Intertidal mudflats	• Direct loss of fauna habitat as a result of clearing for construction, as well as the potential to disrupt existing fauna linkages • Individual fauna deaths or injury as a result of vehicles or earthmoving equipment • Increase in introduced fauna as a result of additional food sources, resulting in additional predation and competition • Alteration of behaviour as a result of infrastructure, light spill, noise, human activity, feral animals and food wastes	• Proposal design minimises disturbance to high conservation value mangrove areas • Implement ground disturbance procedures to contain disturbance within approved boundaries • Implement workforce education about significant fauna habitat and prevent personnel from entering these areas where practicable (including offshore islands) • Workforce education about the risks of providing food and leaving waste for native and introduced fauna (directly or indirectly) • Feral animal control in consultation with DEC • Implement light spill controls (discussed in Section 4.2) • Investigate research / monitoring options for shorebird species • Implement fire prevention measures as discussed in Section 4.4	• Native Vegetation Clearing Regulations under Part V of the EP Act will address any unauthorised clearing of fauna habitat. API approval will provide exemption from these regulations within authorised boundaries. • WC Act and EPBC Act can address impacts to listed fauna.	• Disturbance to approximately 160 ha of fauna habitat within a mapped area of 11,828 ha will be required to implement the Proposal (1.35% of mapped area) • Disturbance of fauna habitat types all below 3% of the total areas of each habitat type mapped within the study area, with the exception of coastal sand dunes (up to 8%). No conservation significant fauna are dependent on the coastal sand dunes habitat (Phoenix, 2013b) • Disturbance of mangroves has been minimised through redesign (only 2.09 ha of 605.3 ha in the LAU (0.35%) will be disturbed) • The Proposal is a small scale operation and therefore indirect impacts (i.e. noise, vehicle movements, light spill) are commensurately small. Given the small footprint and baseline survey information, there is a high degree of confidence that there will not be any significant impact to conservation significant vertebrate fauna. Overall the Project is likely to result in minor, localised impacts to fauna assemblages and habitats.
Surface water To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected. To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.	• There are a number of local watercourses or drainage features in the area, including the Balla Balla River, Marnipurl Creek and Salt Creek, along with other relatively minor unnamed drainage lines • Forestier Bay contains tidal flats containing a system of tidal creeks and the Proposal Area is influenced largely by tidal inflows and outflows • The area is subject to extreme rainfall events from tropical cyclones and occasional thunderstorms.	• Potential restriction of creek flow as the pipeline corridor will traverse the upper reaches of one minor, un-named creek in two places • Contamination of this creek (i.e. sediment, hydrocarbons) • Potential impacts to marine waters have previously been discussed in Sections 4.1 (tidal flows) and 4.3 (water quality).	• Implement management controls listed in Sections 4.1 and 4.3 • Disturbance of the freshwater creek and its banks during the construction of the slurry pipeline corridor will be kept to the minimum practicable • The slurry pipeline will be raised and floodways will be used for the access road across the freshwater creek • Hazardous materials will be stored within bunded areas that are compliant with AS 1940 and in compliance with *Dangerous Goods Act 2004* (DG Act) • Hazardous materials will not be stored in close proximity to surface water bodies • The causeway design includes berms to minimise the risk of vehicle departure	• Part V of the EP Act can address any pollution of surface waters as a result of construction or operation of the Proposal (i.e. product or oil spills) • RIWI Act can manage unauthorised impacts to waterways	Tidal drainage flows will not be significantly impeded. The use of floodways and raised pipelines will ensure that surface water flows in the freshwater creek will not be significantly impeded. Assessment provides a high confidence level that impacts to surface waters will not be environmentally significant and can be appropriately managed under existing legislation.
Groundwater To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected. To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.	Groundwater in the Balla Balla Project Area is relatively shallow (typically less than 10 m below surface). In the mine site area, the groundwater depth is around 7 m below ground level, with water occurring in floodplain sediments, weathered rock and fractured rock zones.	• Hydrocarbon spills may affect groundwater quality. • No groundwater abstraction is proposed, mine dewatering will be used for water supply (not part of this Proposal).	• Hazardous materials will be stored within bunded areas that are compliant with AS 1940 and in compliance with DG Act • Spills will be cleaned up as soon as practicable in accordance with spill response procedures	• Part V of the EP Act can address any pollution of groundwater as a result of construction or operation of the Proposal (i.e. oil spills) • RIWI Act can manage any unforseen drilling and abstraction that may be required during construction or operation	Proposal does not require groundwater abstraction, or any activities that have the potential to significantly impact groundwater levels or quality. Assessment provides a high confidence level that impacts to groundwater will not be environmentally significant and can be appropriately managed under existing legislation.
Conservation Areas To protect the environmental values of areas identified as having significant environmental attributes.	There are no significant Conservation Areas close to the Proposal Area. A Federal Marine reserve is located 5 km to the west of the transhipment mooring area (Figure 7).	No potential direct or indirect impacts expected.	The controls proposed in Section 4.3 to manage impacts on marine fauna and water quality will be implemented, which may apply to this factor. No other management controls are proposed to manage this factor.	The *Conservation and Land Management Act 1984* (WA) manages activities and impacts within conservation areas.	No impacts to Conservation Areas.

Factor & EPA Objective	Existing Environment	Potential Impacts	Proposed Management Controls	Relevant Legislation	Predicted Outcome
POLLUTION MANAGEMENT					
Air and dust emissions To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards	• The site is remote; the nearest sensitive receptor outside the Proposal Area is the West Moore Island Lodge on West Moore Island, approximately 2.2 km to the north east of the barge loading area • Other sensitive receptors include: o An area along the banks of the Balla Balla River, approximately 6 km northeast of the Balla Balla mine, which is sometimes used by tourists and other recreational users as a camping area o Balla Balla camping area and boat ramp • The Balla Balla area has been set aside by DoT for port operations • The vegetation in the Proposal Area is expected to have some tolerance to dusty conditions given the area routinely exceeds the National Environment Protection Measures (NEPM) standards for fine particulates (SEWPaC 2013).	• Dust emissions may be produced during construction (initial ground disturbance, road traffic etc.) or operations (ore stockpiling and transfer) • No significant point source air emissions expected (power will be sourced from the mine site).	• Implement the emissions management plan for the Balla Balla Magnetite Project (OES 2008; Appendix 4). The following will apply as appropriate: o Regular application of water to roads, bare areas and stockpiles o Dust suppressants o Regular cleaning of spillage o Dust extraction and capture at conveyor transfer points o Telescopic chutes on shiploaders o Conveyor covers if required • Ore dust emissions during operation will be controlled by managing the moisture content of the material and covering the conveyor if required. meeting target moisture content is simpler with magnetite concentrate as it can be set during the dewatering process • Works approval will be sought from DEC for export operations.	• Part V of the EP Act will address any excessive dust leaving the premises. Licence for bulk material loading will address dust emissions from loading and stockpiling of ore • *Health Act 1911* will address any risks to worker safety from air emissions.	Given the remote location of the Proposal, and the general suite of control mechanisms to be implemented, air and dust emissions are not expected to cause significant impacts. Assessment provides a high confidence level that impacts from air emissions will not be environmentally significant and can be appropriately managed under existing legislation. Any emissions are not expected to impact sensitive receptors due to the remote location of the Proposal Area.
Noise To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring the noise levels meet statutory requirements and acceptable standards.	Site is remote (the nearest potentially sensitive receptors described above).	The operation of the Proposal does not include high noise activities such as ore crushing, screening or blasting. Noise emissions are therefore expected to be relatively minor and associated with ore transport, unloading and reclaiming. These emissions may cause nuisance for sensitive receptors and alteration of fauna behaviour.	• Commission noise modelling when final jetty and loading design has been completed • Ensure construction and operational activities comply with the Environmental Protection (Noise) Regulations 1997 (WA) • Locate conveyor drives at the laydown area to minimise noise sources on the trestle jetty • Cover conveyors to reduce noise emissions if required • Maintain operational equipment on a regular basis • Select low noise equipment where practicable.	Environmental Protection (Noise) Regulations 1997.	West Moore Island Lodge is located approximately 1 km to the north of the barge loading area, and some noise emissions may be experienced at this location. Forge will commission noise modelling when final design has been completed to assess compliance against the Noise Regulations. Forge has contingency measures available to reduce noise such as conveyor covers etc. and as a final contingency may elect to pursue an option to purchase the Lodge if required. Based on the above, it is expected that noise emissions will not have a significant impact on receptors.
Waste	No waste disposal facilities are located within or adjacent to the Proposal Area.	Waste will be collected and taken offsite (expected to be to Shire landfill). Potential impacts are therefore limited to the collection and temporary storage of waste prior to transport offsite.	• Workforce induction and training to include details of waste management requirements • Implement the Waste Management Plan (OES 2008) originally prepared for the Balla Balla Magnetite Project (Appendix 4).	• Part V of the EP Act can address any pollution resulting from waste collection and storage. • Controlled waste regulations can address the transport of controlled wastes.	Proposal is not expected to produce large quantities of hazardous wastes and waste is not proposed to be disposed of onsite. Based on the small scale of activity and ability to implement waste management controls, assessment provides a high confidence level that impacts from waste will not be environmentally significant and can be appropriately managed under existing legislation.
Recreation To ensure that existing and planned recreational uses are not compromised.	The Proposal Area is not frequented in large numbers by tourists. Key recreational facilities in the locality are the West Moore Island Lodge (approximately 2.2 km north east of the Proposal Area) and the Balla Balla Creek (located approximately 10 km east).	The Proposal will create a new source of light, noise and dust that may be visible/audible from recreational areas.	• Consult with Traditional Owners, DEC and WA Museum about the values and controls for offshore island visitation • Implement workforce education to discourage visiting offshore islands • Implement light spill controls as listed in Section 4.2 • Implement dust and noise controls as discussed above	• Part V of the EP Act can address any pollution resulting from the Proposal • Part V Licence for bulk material loading will address dust emissions from loading and stockpiling of ore • Environmental Protection (Noise) Regulations 1997	The Proposal Area is not extensively used for recreational activities; therefore a restriction of recreational access is not expected to be a significant impact for the community.
Aboriginal Heritage To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.	Previous surveys of the area surrounding the Balla Balla mine have identified a number of Aboriginal Heritage sites. The Proposal Area is planned to be surveyed prior to detailed design and construction. The Proposal will be configured within the Proposal Area to avoid sites where practicable.	The Proposal may require the disturbance of Aboriginal Heritage sites to allow the construction of infrastructure.	• Aboriginal Heritage surveys will be conducted prior to ground disturbance • Implement ground disturbance procedures to control disturbance within approved boundaries • Proposal design will take into account the location of Aboriginal sites and avoid them wherever practicable • Approval under Section 18 of the *Aboriginal Heritage Act 1972* (AH Act) will be sought for any sites that cannot be avoided	AH Act contains requirements for the protection of Aboriginal Heritage sites.	Forge is aware of its requirements under the AH Act. It is expected that the Proposal can be realigned to avoid Aboriginal Heritage sites. Based on the small scale of activity, experience from other Pilbara projects and agreements being negotiated with Traditional Owners, the assessment provides a high confidence level that Aboriginal Heritage can be appropriately managed under existing legislation.
European Heritage To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant	• The town of Balla Balla, gazetted in 1898, was once located near the river mouth. It acted as a port for the Whim Creek Copper Mine. • The port and town site included transhipping of copper from Whim Creek Copper Mine for export to Germany	None expected.	None required.	Not Applicable.	No impacts on European Heritage.

Factor & EPA Objective	Existing Environment	Potential Impacts	Proposed Management Controls	Relevant Legislation	Predicted Outcome
heritage legislation.					
Visual Amenity To ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonably practicable.	The Proposal Area is remote and not frequently visited by the public. No significant viewsheds are located nearby. The West Moore Island Lodge faces south, toward the Proposal Area.	The majority of the infrastructure will be mostly shielded from view from the mainland and the ocean. The jetty will be visible from the West Moore Island Lodge. No significant landforms are required for the implementation of the Proposal.	Implement light spill controls as listed in Section 4.2.	EP Act.	The area does not contain any significant viewsheds. Depuch Island forms a significant part of the landscape views in the area however this will not be impacted by the Proposal. Based on the small scale of activity (no landforms) and lack of significant viewsheds assessment provides a high confidence level that impacts will not be environmentally significant and can be appropriately managed under existing legislation.

5.1.2 Key Issues – Other Factors

Other factors have already been considered by the EPA through the referral process. Due to the low level of impact, application of industry standard controls and other regulatory mechanisms, these factors are not expected to be required to be assessed in detail by the EPA. This section provides information additional to that presented in Table 10 for selected "Other Factors". The additional information is considered relevant to the EPA being confident that the impacts are not significant and are manageable under other existing regulatory processes.

Terrestrial Fauna and Fauna Habitat

The Balla Balla area has been surveyed and mapped to provide an overview of existing terrestrial fauna and fauna habitat (Phoenix 2013b). A Level 1 Fauna survey was completed in the form of a habitat assessment and reconnaissance survey. The fauna assessment was aimed at identifying habitat types and terrestrial vertebrate fauna utilising the Proposal Area (Phoenix 2013b; Appendix 2). This survey was carried out in November 2012. The key findings of the survey were:

- A total of 356 vertebrate fauna species were identified as potentially occurring within the Proposal Area during a desktop review by Phoenix (2013b), including 1 reptile, 6 mammal and 55 bird species of conservation significance;
- 25 species of conservation significance were recorded during Phoenix survey (2013a,b), of which 24 were birds (22 migratory);
- 13 migratory bird species present in broader Forestier Bay in nationally significant numbers (>0.1% of the East Asian-Australasian flyway (EAAF)), two of these were identified as having numbers that exceed the 1% EAAF:
    - Grey-tailed Tattler (*Heteroscelus brevipes*); and
    - Bar-tailed Godwit (*Limosa lapponica*).
- The Little North-western Mastiff Bat (*Mormopterus loriae cobourgiana;* DEC Listed - Priority 4) was the only non-bird conservation significant fauna recorded, however the following reptile and mammal species may also be potentially found within the study area:
    - Lined Soil-crevice Skink (*Notoscincus butleri* - DEC Listed - Priority 4);
    - Ghost Bat (*Macroderma gigas* - DEC Listed - Priority 4);
    - Orange Leaf-nosed Bat (*Rhinonicteris aurantia* – Schedule 1 under WC Act, DEC Listed - Vulnerable);
    - Water Rat (*Hydromys chrysogaster* - DEC Listed - Priority 4);
    - Short-tailed Mouse (*Leggadina lakedownensis* - DEC Listed - Priority 4); and
    - Western Pebble-mound Mouse (*Pseudomys chapmani* - DEC Listed - Priority 4).
- No significant SRE habitat or SRE species were identified within the expected Proposal disturbance area; and
- Nine broad fauna habitats were recorded across a 11,828 ha study area as shown in Figure 20:
    - Samphire plains;
    - Tussock and hummock grasslands;
    - Open shrubland;
    - Rocky outcrops and boulder piles;
    - Minor creeks and drainage lines;
    - Salt flats;

- Coastal sand dunes;
- Mangrove thickets; and
- Intertidal mudflats.

The Proposal is predominantly a linear feature and as such it has been able to be realigned to minimise the impacts to mangrove habitat. Only 2.2 ha (0.35%) of the 605 ha of mangrove habitat identified within the Local Assessment Unit will be impacted by the Proposal. Impacts to all other habitat types will be minor (below 3% of the total of any habitat type mapped within the study area) with the exception of Coastal sand dunes (up to 8%). No conservation significant fauna are dependent on coastal sand dunes habitat (Phoenix 2013b) and this unit is not considered to be environmentally significant.

Forestier Bay (the study area assessed by Phoenix (2013) has been identified as hosting an important diversity of shorebirds. On a regional scale however, the Proposal is not expected to result in a significant habitat loss. 61,770 ha of potential shorebird habitat was identified within Forestier Bay (Figure 21), of which only 160 ha is expected to be impacted (1.35% of the identified habitat area). Phoenix (2013) assessed the potential impacts of the Proposal on shorebirds and provided the following statement:

> *While some localised reduction in shorebird activity is likely in the vicinity of the conveyor, it is unlikely that habitat loss from the Proposal will lead to a decline in shorebird abundance or diversity in Forestier Bay. All habitats are well represented in the bay outside of the Proposal footprint*.

The application of controls identified in Table 10 will assist Forge to ensure that the impacts identified above are the maximum extent of fauna impacts. The impacts are considered to be at a local scale and not significant at a population or distribution level.

Remaining Other Factors

Given the alternative regulatory mechanisms and industry standard controls available, sufficient information on the remaining other factors is considered to be provided in Table 10 for the EPA to develop confidence that the impacts are manageable for each factor. A revised table of alternative regulatory mechanisms is presented in Appendix 5.

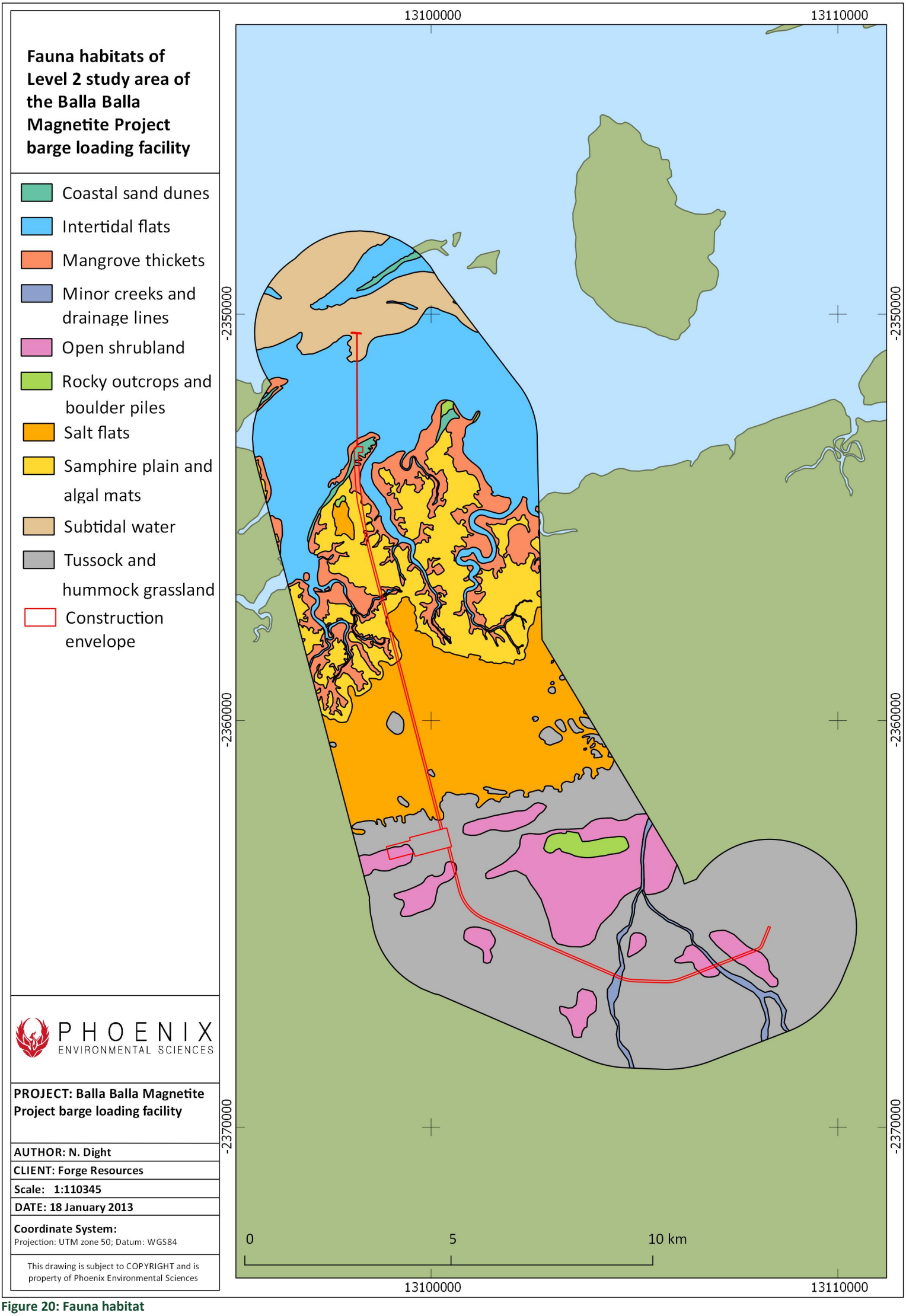
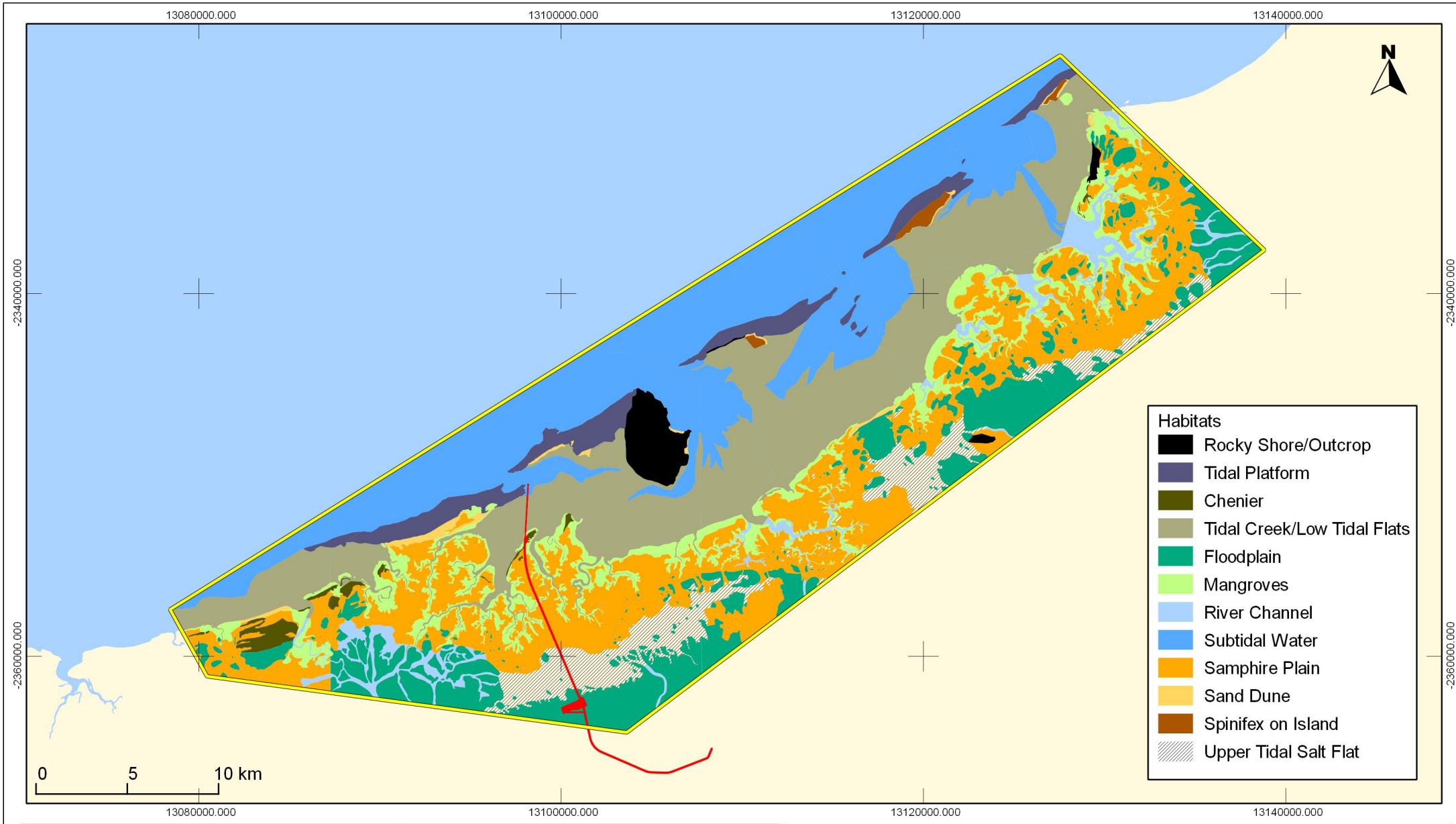


Figure 20: Fauna habitat



Habitats of the study area

PHOENIX ENVIRONMENTAL SCIENCES

AUTHOR: G. Bouteloup	CLIENT: Forge Resources
DATE: 15 April 2013	Scale: 1:280000
Coordinate System: Projection: Transverse Mercator; Datum: GDA94 MGA50	PROJECT: Migratory shorebird survey of the Balla Balla Magnetite Project barge loading facility

Construction envelope as of 20 March 2013

Study area

Figure 21: Shorebird Habitat

5.1.3 Expected Environmental Outcomes

The Proposal is small scale compared to most Pilbara iron ore export facilities. Development of the Proposal is expected to require the disturbance of approximately 156.5 ha of land variably and sparsely covered in native vegetation to enable the development of the terrestrial portion of the Proposal facilities. The estimated 156.5 ha of terrestrial disturbance will occur within the Proposal Area identified in Figure 2.

An assessment of the potential impacts on other factors provides a high degree of confidence that any impacts are minor and able to be managed with standard industry controls and regulatory mechanisms.

6 STAKEHOLDER CONSULTATION

Forge identified key stakeholders relevant to the establishment of a new iron ore export facility prior to completing site selection.

In addition to identifying individual stakeholders, Forge has also brought together multiple stakeholders where necessary to ensure there is alignment between key decision making authorities. Meetings between Forge and key stakeholders such as Department of State Development (DSD), Department of Mines and Petroleum (DMP), Ngarluma Aboriginal Corporation, OEPA (including the Marine Ecosystems Branch), Department of Fisheries (DoF), DEC, Department of Transport (DoT), Department of Indigenous Affairs (DIA), Department of Water (DoW), Mallina Station, Sherlock Station, West Moore Island Lodge (WMI) and Venturex Resources (Venturex) have been critical in progressing the Proposal.

It is through several meetings in Q4 2012 with this group of stakeholders that an acceptable method (between the State and Forge) to develop the Proposal was agreed and is now being implemented.

A record of all consultation efforts and inputs is maintained by Forge and will be used to support the government approvals process by demonstrating that key stakeholder issues have been identified and responded to appropriately. A summary of the key stakeholder consultation is provided in Table 11 below.

Table 11: Stakeholder consultation summary for the Proposal

Stakeholder	Issues Raised	Response
DEC	**Site Selection** Briefing of the area of interest and general intentions. Additional surveys would be completed by Forge.	N/A
	Concerns Dust, stormwater control and anchorage points. DEC requested to meet again prior to submission of the Works Approval for the Proposal.	Dust and storm surge modelling completed. Anchorages are outside of State waters so will not require licensing by DEC. Forge will continue to liaise with DEC prior to submission of Works Approvals.
	Proposed changes Briefing on the proposed change to the Project, provided a briefing note and a BPPH mapping figure.	Pendoley Aerial Survey (2013) provided to DEC Environmental Management Branch, the light survey to follow as completed.
	Status Update Status update of the Balla Balla Export Facility and the progress with: • Setting the preferred location within DoT port boundary • Preliminary habitat mapping complete • Pendoley to complete turtle studies.	N/A
Minister for Environment and Water	**Transhipment Area** The Minister had no problem with the concept of Transhipment.	Introductory high level consultation. No actions required.
Ngarluma Aboriginal Corporation	**Site Selection and Determination Area** No objections.	Meetings scheduled for Feb, April and May. Forge is expecting a final agreement by mid-June, 2013. Ngarluma Determination Area mapped by CAD Resources.
DSD	**Project Overview** Informative project overview.	N/A
DoT	**Transhipment Area** Proposed transhipping location falls within the DoT authority at the moment, however Govt has announced the Pilbara Ports Authority (PPA), so would fall under this Authority once formed	Forge will continue to liaise with DoT

Stakeholder	Issues Raised	Response
	(not expected before June 2014).	
	Footprint Access A miscellaneous licence under the Mining Act (1978) would be required from the mine to the mean tide mark to support the infrastructure. From the mean tide mark it would fall under the Port Authority (whether it be DoT or PPA) and this would require a Lease and a Jetty Licence.	Miscellaneous Licence required from the mine to mean tide mark has been applied for.
	Cyclone Safety Forge to submit anchorage location to DoT (Kim Davis) to check cyclone safety & proximity to other moorings. DoT need to re-proclaim an area under the Shipping & Piloting Act or if after June 2014 will fall under PPA (not DoT).	Forge showed proposed footprint which is now fixed & asked next steps in process with DoT.
	Cyclones Cyclone considerations essential. Marine safety training would be required due to the location being in the Pilbara's 'cyclone alley'.	N/A
DMP	**Project Overview** Informative project overview.	Forge will continue to liaise with DMP.
OEPA	**Significant Factors** Forge to prepare a "Significant Factors / Legislative Requirement' table for submission, the factors being: • Marine habitat • Marine fauna • Oil spill containment • Marine pests • Marine noise • Coastal processes • Turtles (lighting) • Dust • Terrestrial fauna • Surface water • Aboriginal heritage	Forge completed. Table appended in this document (Appendix 5). Forge planned and implemented studies including both desktop and field surveys.
	Briefing note provided for background on the proposed change, as well as the BPPH mapping completed by Ian LeProvost.	N/A
	Overview Forge provided overview of proposed change to the Project & asked for advice from the OEPA.	N/A
	Stakeholder Consultation Forge to maintain and present a "Stakeholder Consultation Table". DEC and DoT are critical consults.	This summary produced from stakeholder consultation records.
	EPA Guidance Address the applicable EPA guidance of: • Guidance Statement 1 for category 2 mangrove protection • EAG 5 for protection of turtles from light impacts • EAG 3 for protection of benthic primary producers and the applicable Cumulative Loss Guideline of 1% of LAU • Pilbara water quality consultation outcomes requirement of achieving maximum levels of ecological protection	• Ian LeProvost completed the mangrove and sub-tidal BPPH mapping and impact assessment • Pendoley is completing aerial surveys in Dec 2012 and mobilise in Apr 2013 for light assessment surveys • Baseline water and sediment testing planned for April 2013 • Ian LeProvost provided the officers with a copy of BPPH maps and summary description of environment, and subsequently forwarded his thoughts on the scope of works required to address the marine aspects of the Proposal
DoF	**Marine Pests** IMPs are a concern to DoF. All vessels mobilised from outside Australian or WA waters, as well as those moving around WA waters, must undertake appropriate measures to minimise the risk of translocating aquatic pests and diseases (*Fish Resources Management Act 1994* / Fish Resources Management Regulations 1995).	Recommendation for Forge to consult further with the peak industry bodies WA Fishing Industry Council (WAFIC), RecFishWest and DIA.
West Moore	**Feedback**	Further consultation planned, and

Stakeholder	Issues Raised	Response
Island (WMI)	• Concern regarding the potential visual impact of a jetty and barge facility to the aesthetic value of WMI to potential guests • Recognised the proposed location was a good/best location within the DoT port boundary.	agreement to be sought between West Moore and Forge in 2013.
	Background Information Dave Jackson was formerly a Manager of Norwest Pearls who established the pearl farm at WMI and lived on the Island for 5 years as the farm manager and seeder (2005-2010). He gave significant background information to Forge regarding temperatures, habitat types in the bay, dugong, dolphins, sawfish, whales, birdlife, tides and reliable contacts regarding further information.	Local knowledge used to design surveys. Further consultation with current WMI management and Point Samson Charters.
	Marine Fauna Dillan has dived and speared fish along shallow edges of channel, mainly on WMIs side and confirms that no coral reefs occur but occasional bommies do occur. Corals can sometimes be found in some of the low tide ponds in the tidal platform. He gave significant information regarding marine fauna including turtle nesting, dugong, whales, dolphins and sharks.	Local knowledge used to design surveys.
	Agreements Forge has reached an 'in principal' agreement with WMI and Tennereef Pty Ltd, resulting in support of the Balla Balla transhipment proposal.	N/A
Point Samson Charters	**Marine Fauna** Rick McGregor been based in Point Samson for 30 years, originally as a prawn fisherman, more recently as a charter fishing boat, lodge and restaurant operator. He gave significant information regarding marine fauna (including dugong, whales and turtles), distribution of marine habitats and location of historical trawling activities.	Local knowledge used to design surveys.
DoW	**Transhipping** Project update & briefing note given, focusing on transhipping variation. DoW commented that they appreciated the update but had no concerns with the Proposal. Only DoW request was to ensure that the FMA water licence for Balla Balla was transferred into Forge's name.	Water licence transfer documents were posted on Jan-10, 2013.
DIA	**Aboriginal Heritage** DIA did not raise any concerns for the Proposal & found it particularly attractive if Forge could manage to avoid all sites & not require Section 18s.	• Forge confirmed that the project strategy was to avoid heritage sites • Forge confirmed that it has commenced development of a relationship with the Ngarluma group, which will include progression toward a Project Specific Native Title Agreement & subsequent Heritage Survey Protocol.
Venturex	**Transhipment** Discussion regarding appropriate forms of tenure and location of facilities in relation to potential ore deposits and tenure held by Venturex.	N/A
Landowner	Consultation began in Q2 of 2012 when a Forge Resources delegation went to Balla Balla for a site inspection. Blair Culbertson has shown the current Sherlock station manager our plans, and has briefed Mr Cook on the proposed conveyor/causeway route. Mr Cook has no objections to any of the proposed infrastructure. Rather he supports the Transhipment proposal, as his prior major concern was the amount of ground water required for the slurry pipeline, which will be reduced by the conveyor and transhipping operation.	N/A

7 CONCLUSION

Forge proposes to develop iron ore export facilities at Balla Balla located mid-way between Port Hedland and Karratha in the Pilbara region of WA. The Proposal covers the iron ore export facilities – defined as the infrastructure connecting the Balla Balla mine site with export vessels offshore to enable export of iron ore. The mining and processing of ore into magnetite concentrate has been approved as a separate proposal that included a now redundant port option (export through Port Hedland).

The Proposal has been referred to the WA EPA for assessment under Section 38 of the EP Act. The EPA has indicated that the Proposal is suitable for assessment at the Assessment of Proponent Information (API) level of assessment (Category A) (EPA, 2013). The EPA also identified the factors requiring assessment as:

- Marine fauna;
- Marine benthic habitat;
- Marine environmental quality; and
- Flora and vegetation.

Preparation of the Proposal has considered the available information at Balla Balla, as well as similar recent proposals assessed and approved regarding the development of Port Facilities at Port Hedland, Anketell, Dampier, Cape Lambert, Oakajee and Ashburton North (Onslow). These projects provide a useful array of baseline environmental data, management approaches to key environmental issues and Ministerial Conditions.

The Balla Balla area is relatively well understood, with good general information regarding Pilbara ports and a number of specific baseline environmental studies completed for the Proposal. Studies have been implemented on all of the factors identified including:

- Marine fauna survey;
- Shorebird survey;
- Marine benthic habitat survey (subtidal);
- Marine benthic habitat loss;
- Marine noise;
- Coastal processes and storm surge;
- Terrestrial fauna survey; and
- Terrestrial vegetation survey.

The resulting information has been considered in detailed project planning and feasibility investigations and has resulted in a re-alignment of the proposed causeway, trestle structure and dewatering/stockyard to minimise direct impacts on mangroves. A series of controls are proposed for environmental management that are expected to ensure that environmental impacts are controlled so as to meet EPA objectives. Based on the revised alignment and the information gathered during these studies, the Proposal is not expected to cause significant environmental impacts and the impacts are able to be managed within existing condition setting frameworks and other legislation.

In the case of dolphins and dugong there is an acknowledged shortage of biological data to enable impacts at a population scale to be accurately predicted. Forge is currently investigating the funding of research to assist in increasing the knowledge base for dolphin species and dugong.

The Proponent has completed extensive consultation that will continue and develop further detail as the Proposal proceeds into detailed design, construction and operational phases.

The key and other environmental factors have been assessed against EPA objectives and relevant guidelines. The Proposal has been prepared with design, layout and management controls identified to avoid, minimise or manage the environmental impacts. Given the configuration of the Proposal to avoid significant impacts, its small scale, location in relation to significant environmental assets and values, and the management actions and controls to protect the environment, the Proposal is expected to meet the EPA objectives.

8 GLOSSARY

Term	Meaning
AH Act	*Aboriginal Heritage Act 1972*
API	Assessment on Proponent Information – the level of assessment relevant to this Proposal
ARI	Annual Recurrence Interval
AQIS	Australian Quarantine Inspection Service
BPPH	Benthic Primary Producer Habitat – marine sea floor habitat with high primary production capacity such as coral reef, algal and seagrass beds and mangroves
dB	Decibel
DEC	Department of Environment and Conservation
DG Act	*Dangerous Goods Act 2004* (WA)
DIA	Department of Indigenous Affairs
Disturbance Envelope	The envelope within which disturbance associated with the Proposal will occur. Essentially, the envelope provides the spatial extent to enable detailed engineering and construction some flexibility to implement the Proposal
Disturbance Area	The actual area of disturbance required to implement the Proposal. The Disturbance Area will be within the Disturbance Envelope
DMP	Department of Mines and Petroleum
DoF	Department of Fisheries
DoT	Department of Transport
DoW	Department of Water
DSD	Department of State Development
DWT	Deadweight tonnage
EAAF	East Asian-Australasian Flyway
EAG1	Environmental Assessment Guideline 1: Defining the key characteristics of a proposal
EAG3	Environmental Assessment Guideline 3: Environmental Assessment Guidelines for Protection of Benthic Primary Producer Habitat in Western Australia's Marine Environment
EAG5	Environmental Assessment Guideline 5: Environmental Assessment Guideline for protecting marine turtles from light impacts
EAG6	Environmental Assessment Guideline 6: Timelines for Environmental Impact Assessment of Proposals
EIA	Environmental Impact Assessment
EMPs	Environmental Management Plans
EPA	Environmental Protection Authority (WA)
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth)
Forge	Forge Resources Pty Ltd
GL/year	Gigalitres per year
ha	Hectare
hrs	Hours
IMPs	Introduced Marine Pests
km	Kilometres
kn	Knots
kpa	Kilopascals
LAU	Local Assessment Unit

Term	Meaning
m	Metres
MEPA	Moderate Ecological Protection Area – a level of ecological protection based on water quality that is expected to protect 90% of species
Mintrex	Mintrex Pty Ltd
MLA	Marine Logistics Australia
mm	Millimetres
Mtpa	Million tonnes per annum
MW	Megawatt
NEPM	National Environmental Protection Measures
OEPA	Office of the Environmental Protection Authority
OSCP	Oil Spill Contingency Plan
PEC	Priority Ecological Communities – plant communities listed as being potentially threatened under the *Wildlife Conservation Act* 1950
PPA	Pilbara Ports Authority
PPE	Personal Protection Equipment
Proposal	As defined under the EP Act - a project, plan, programme, policy, operation, undertaking or development or change in land use, or amendment of any of the foregoing, but does not include scheme.
the Proposal	Forge Resources Pty Ltd (Forge) proposes to develop iron ore export facilities on the Pilbara coast at Balla Balla approximately 10 km west of Whim Creek in the north west of Western Australia WA.
Proposal Area	The area that forms the basis for the Proposal. It is effectively the area within which baseline environmental data was acquired
PTS	Permanent Threshold Shift – the effect of a severe sudden or cumulative noise exposure, causing permanent loss of hearing sensitivity due to tissue damage within the auditory system
SELs	Sound Exposure Levels
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SRE	Short-range Endemic species
TEC	Threatened Ecological Communities – plant communities listed as being threatened and legally protected under the *Wildlife Conservation Act* 1950
TTS	Temporary Threshold Shift – the effect of sudden or cumulative noise exposure, causing temporary loss of hearing sensitivity
µPa	Micropascal
Venturex	Venturex Resources
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
WC Act	*Wildlife Conservation Act* 1950 WA
WMI	West Moore Island

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10 APPENDICES

The following Appendices are provided on the attached CD:

Appendix 1: Background information summary

Appendix 2: Study reports

Appendix 3: Impact assessment criteria

Appendix 4: Balla Balla Magnetite Project Environmental Management Plans

Appendix 5: Additional regulatory mechanisms

Appendix 6: Spatial datasets

Appendix 7: Consolidated list of management actions