EXECUTIVE SUMMARY

BHP Billiton Iron Ore (BHPBIO) is seeking approval under Part IV of the *Environmental Protection Act 1986* for the dredging component of the Rapid Growth Project 5 (RGP5) expansion at Harriet Point on Finucane Island. The project involves the dredging of approximately 3.9 million cubic metres (Mm^3) of material for berth pockets and a departure channel to accommodate vessels of approximately 250,000 dead weight tonnes (DWT). The management of dredged material for the proposal has been tailored to its characteristics. Dredged material that is characterised as potentially acid sulphate soil material (PASS) will be disposed offshore at the Port Hedland Port Authority Spoil Ground 'I'. Remaining dredged material is proposed to be pumped to a number of Dredged Material Management Areas (DMMA).

The key characteristics of this proposal are outlined below in **Table ES.1**.

Table ES.1 – Project Key Characteristics

Element	Description
Proponent	BHP Billiton Iron Ore
Duration of Dredging	Approximately 40 weeks
Volume of material to be dredged	Approximately 3.9 Mm^3
Area of marine disturbance for dredging	Not more than 25 ha at Harriet Point & Stanley Point
Area of land disturbance for dredging	Not more than 4 ha at Harriet Point & Stanley Point
Offshore disposal of dredged material	Not more than 800,000 m^3 offshore disposal of material to PHPA Spoil Ground 'I'
Onshore disposal of dredged material	Dredged Material Management Area B1: Area of not more than 26 ha Dredged Material Management Area B2: Area of not more than 19 ha Dredged Material Management Area A: Area of not more than (70 ha settlement area)
Final height of Dredge Material Management Areas B1 and B2	Seawalls: not more than 7 m AHD Berms:not more than 17 m AHD

The proposal, as described in this Environmental Referral Document (ERD), has been developed to avoid, minimise, manage and mitigate environmental impacts. In determining the preferred options for management of the dredged material, an option assessment was completed based on social, environmental and economic criteria to ensure the project achieved its overarching principles of biodiversity and sustainability. Full details of the site selection process are provided in **Section 2.3**.

In addition, specific decisions made early in the project pre-feasibility stage, which significantly reduced both the environmental and social impacts, are as follows:

- Field surveys were conducted early in the pre-feasibility phase of the project, to identify potential sites for spoil disposal which minimise direct impacts to mangrove habitats. The decision was made to reclaim DMMA B1 and B2, thereby avoiding having to clear an equivalent land area and corresponding impacts on mangroves. The site (and shape) of DMMA A was designed to minimise disturbance of mangroves.

- The early decision to use to offshore disposal for the PASS material has ensured that ASS will not become an environmental legacy in the future. However, the onshore disposal of non-PASS material recognises that if the dredged material is appropriately managed, it represents a valuable commodity for use in future developments.

BHPBIO has adopted a risk based approach to determine the relevant environmental and social factors for the Harriet Point Dredging proposal. The overarching principles of sustainability and biodiversity have been considered within the context of this proposal and have been incorporated into the assessment of the identified environmental factors. These environmental and social factors (**Table ES.2**) have been identified through existing information, findings of investigative studies, consultation with the EPA and other stakeholders.

A preliminary impact assessment was used to categorise the inherent risk of the environment factors as critical, major, moderate, minor or low depending upon the potential significance of the impacts and required management (**Table ES.2**). Inherent risk is determined as the risk without consideration of any management controls. There are no environmental or social factors identified with critical or major inherent risks.

Table ES.2 – Environmental Factors & Inherent Risk

Moderate	Minor	Low
Marine water quality	Marine habitat disturbance (non-mangrove)	Waste management
Acid sulphate soils	Marine fauna	Hydrocarbons and hazardous materials
Marine habitat disturbance (mangroves)	Marine pest species	
Land use	Coastal processes	
	Terrestrial flora and fauna	
	Construction dust	
	Construction noise	
	Visual amenity	
	Indigenous heritage	
	Recreation	

This ERD provides a detailed assessment of the moderate risk factors as they are considered to be 'key' to the project. For each of the 'key' factors the ERD discusses the objective and potential impacts. Subsequent assessment, as detailed in **Section 8**, demonstrates that through incorporation of management controls the potential impacts can be managed so that residual risk is minimised.

Management plans have been developed for each of the 'key' environmental factors, outlining the management controls that will be implemented to ensure potential impacts are minimised. These plans include:

- Dredging Management Plan;
- Acid Sulphate Soil Management Plan;
- Mangrove Management Plan; and
- Land use Management Plan.

The minor and low environmental risk factors are assessed as 'other' relevant factors within the ERD **(Section 9)**. These factors are considered to a lesser extent as the key factors.

In summary, this document describes the impacts of the proposal, and for each factor discusses:

- The EPA objective for that factor;

- The potential impact;
- The management of impacts; and
- The outcome.

For all factors assessed, it is considered that with appropriate management and mitigation, the EPA's objectives can be met. BHPBIO's full list of Environmental Commitments to achieve this are outlined in **Section 10**.

The following table summarises BHPBIO's evaluation of each the environmental factors, potential environmental impacts and discusses proposed management actions to reduce the environmental risk.

Table ES.3 – Potential Environmental Impacts

Over-arching Principles

Key Environmental Factor

Other Relevant Environmental Factor

Factor	Environmental Objective	Potential Impacts	Proposed Management and Mitigation	Relevant Guidance
Over-arching Principles				
Biodiversity	To minimise adverse impacts on biological diversity, comprising the different plants and animals and the ecosystem they form, at the levels of genetic diversity, species diversity and ecosystem diversity.	• Reduced distribution or geographical extent in local and regional context; • Reduced species and ecosystem diversity; • Cumulative loss of vegetation communities, flora and fauna species and habitats within the region; • Cumulative loss of marine BPPH within the region; and • Invasive species (e.g. marine pest species).	• Avoid disturbance of critical habitat/s; • Use of endemic or suitable species in rehabilitation where substrates can be re-established to support these species; and • Maintenance of biodiversity within the project area will be managed in accordance with BHPBIO's standard operating practices construction Environmental Management Plan (EMP).	• BHPBIO Biodiversity Strategy; • EPA PS No. 3; • EPA GS No. 51; and • EPA GS No. 56.
Sustainability	To ensure, as far as practicable, that the proposal meets or is consistent with the sustainability principles in the National Strategy for Ecologically Sustainable Development (Ecologically Sustainable Development Steering Committee 1992).	• Poor design and management of the project may impact on important economic, environment and social attributes on local and regional scales.	• Project design and management will consider sustainability principles outlined in the National Strategy for Ecologically Sustainable Development and the WA State Sustainability Strategy.	• BHP Billiton Sustainability Development Policy 2005; • EPA GS No. 55; • Hope for the future: The Western Australian State Sustainability Strategy (Govt. WA 2003); and • National Strategy for Ecologically Sustainable Development (Ecologically Sustainable Development Steering Committee 1992).

Factor	Environmental Objective	Potential Impacts	Inherent Risk	Proposed Management and Mitigation	Relevant Guidance	Residual Risk
Biophysical - Marine						
Marine Water Quality	To protect the environmental values of the Port including: • Maintaining the structure and functions of marine ecosystems; • Ensuring water quality is safe for recreational activities; • Ensuring water quality is sufficient that any seafood caught or grown in the area is of a quality safe for human consumption; and • Minimising the risk to the environment arising from ASS and dredged sediment by maintaining an acceptable water and sediment quality.	• Increased turbidity caused by suspended sediments released into the water column; • Increased sedimentation caused by particles settling out of the water column during dredging and disposal; • Mobilisation and release of contaminants caused by the disturbance or relocation of sediments; • Oxidation of PASS material • Changes to water quality from excess water discharge from DMMA.	Moderate	Implementation of a Dredging Management Plan (DMP) and the management measures therein including: • The employment of experienced operators for dredging works; • Overflowing of the split hopper barge will be minimised; • Maintenance of dredging equipment to minimise leakage; • Baseline water quality monitoring and monitoring for the duration of dredging activities; • Monitoring of coral communities at north-eastern Finucane Island; • Development and employment of water quality trigger levels; and • Contingency water quality mitigation measures including increased water retention times in DMMA.	• Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC / ARMCANZ 2000); • Australian and New Zealand National Ocean Disposal Guidelines for Dredged Material (ANZECC 2002); • Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (DoE 2006); • Environmental Quality Criteria Refernce Document for Cockburn Sound (2003 – 2004) (EPA 2005); and • State Water Quality Management Strategy Document No. 6 (DoE 2004).	Minor
Acid Sulphate Soils	To minimise the risk to the environment resulting from ASS and to maintain and protect water quality for existing environmental values and	• Acidity generated and potential for heavy metal release from acid-producing soils or sediments adversely affecting soil and water	Moderate	Primary Management is the selective cutting and disposal of PASS offshore under saturated	• Acid Sulphate Soils Guideline Series (DoE 2006);	Minor

Factor	Environmental Objective	Potential Impacts	Inherent Risk	Proposed Management and Mitigation	Relevant Guidance	Residual Risk
	ecosystem function.	quality; and • Impacts on marine biology including fish kills resulting from excess water discharge from ASS dredged material.		conditions. An Acid Sulphate Soil Management Plan (ASSMP) will be implemented. The plan will include: • Disposal of identified PASS within Spoil Ground 'I'; • Saturation of PASS dredged material throughout dredging, transport and disposal to Spoil Ground 'I'; • Weekly monitoring of dredge material within DMMA and of discharge waters; • Dilution of residual PASS within NASS material; • Utilisation of the neutralisation capacity of the calcarenite material and seawater; and • Excess water discharge to be managed via diversion to alternative DMMA and neutralisation processes if required.	• DEC guidelines for management of acid sulphate soils; and • National Strategy for the Management of Coastal Acid Sulphate Soils (ANZECC / ARMCANZ 2000).	
Marine Habitat Disturbance (Mangroves)	To limit the direct loss of mangroves associated with the dredging activities and the construction of DMMA and to ensure the protection of the mangrove ecosystem of the Port Hedland Harbour from indirect impacts associated with the project.	• Direct loss of approximately 6.5ha mangroves associated with dredging at Harriet Point and the development of DMMA A and B1; • Indirect impacts to surrounding mangroves from increased sedimentation and turbidity; and • Indirect impacts to surrounding mangroves from dust deposition.	Moderate	A Mangrove Management Plan will be implemented. The plan will include; • Clear physical and geographical delineation of areas to be directly disturbed; • Monitoring and inspection of site works to ensure no clearing or disturbance outside the construction footprint; • Measures to reduce dust	• Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC / ARMCANZ 2000); • EPA GS No. 1; • EPA GS No. 29; • Environmental Quality Criteria Refernce Document	Minor

Factor	Environmental Objective	Potential Impacts	Inherent Risk	Proposed Management and Mitigation	Relevant Guidance	Residual Risk
				emissions from DMMA; • Water quality monitoring and management; and • Procedures for monitoring and documenting mangrove habitat abundance, distribution and condition/health.	for Cockburn Sound (2003 – 2004) (EPA 2005); and • Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (DoE 2006).	
Marine Habitat Disturbance (Other)	To ensure that dredging and reclamation does not significantly impact on other subtidal and intertidal BPPH within the Port Hedland harbour.	• Direct loss of small area (~50-75 m^2) of mixed BPPH adjacent to DMMA B2; • Direct loss of 11.19 ha of samphires and seasonally variable cynobacterial algal mats within DMMA A and ; • Direct loss of a narrow band of seasonally variable cyanobacterial mat within DMMA B1 and B2; and • Indirect impacts to subtidal and intertidal BPPH as a result of altered water quality, turbidity and sedimentation associated with dredging and excess water discharge.	Minor	• Implementation of the construction EMP and measures to restrict disturbance of other BPPH to within the construction footprints of DMMA; and • Implementation of a DMP and the management measures therein for managing water quality.	• EPA GS No. 29; and • Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (DoE 2006).	Minor
Marine Fauna	To ensure that dredging, offshore disposal and reclamation activities do not impact on the marine fauna of Port Hedland Harbour and its surrounds.	• Disturbance to marine fauna through vessel collisions, entrapment, underwater noise, and light disorientation; • Potential impacts from excess water discharge; • Potential toxicity caused by hydrocarbon spills; and • Loss of mangrove habitat for marine fauna.	Minor	Implementation of DMP, including the following measures: • Marine mammal and turtle observation procedures; • Ceasing or minimising dredging and disposal activities in the event of an observation; • Limiting lighting to navigational lights and lights required for safe dredging operations; and	• EPA GS No. 1; • EPA Draft GS No. 8; • Environmental Quality Criteria Refernce Document for Cockburn Sound (2003 – 2004) (EPA 2005); and • Pilbara Coastal Water Quality	Minor

Factor	Environmental Objective	Potential Impacts	Inherent Risk	Proposed Management and Mitigation	Relevant Guidance	Residual Risk
				• Reporting of all incidents of injury or mortality of sea turtles or marine mammals to the DEC and DEWHA.	Consultation Outcomes: Environmental Values and Environmental Quality Objectives (DoE 2006).	
Marine Pest Species	To minimise the risk of marine pest species introduction establishment and spread into and within West Australian waters as a result of the dredging, reclamation and disposal activities.	Introduction of marine pests to the Port Hedland harbour as a result of dredging operations and subsequent impacts: • Establishment of non-indigenous marine species; • Marine pest competition for food and space with native species; • Removal of native species; • Predation of native species; and • Introduction of associated pests and disease.	Minor	Implementation of the DMP, including the following measures: • Dredging vessels will undergo inspection prior to commencement of dredging, in accordance with the PHPA Long Term Dredging Management Plan; • Reporting of suspected marine pests to the DEC and DoF; and • Development of a marine pest species monitoring program in the event that marine pest species are found.	• Australian Quarantine and Inspection Service (AQIS) guidelines for ballast water management; and • Australia and New Zealand Environment and Conservation Council (ANZECC) Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance (2000).	Minor
Coastal Processes	To maintain the integrity and stability of the coast, seafloor and tidal creeks.	• Alteration of coastal hydrodynamic and geomorphic processes; and • Alteration of natural movement of sedimentation (erosion and deposition rates) potentially leading to enhanced erosion and alterations to the coastline.	Minor	• Optimise design and layout of the marine infrastructure, including configuration of sea walls.	• Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (DoE 2006).	Minor
Biophysical – Terrestrial						
Land Use	To ensure the rehabilitation of the DMMA achieves an acceptable standard compatible with the intended	• Potential increases in dust generation from DMMA;	Moderate	Areas not required for on-going operations will be rehabilitated in accordance with the Land use	• EPA PS No. 6; • EPA PS No. 7; and	Minor

Factor	Environmental Objective	Potential Impacts	Inherent Risk	Proposed Management and Mitigation	Relevant Guidance	Residual Risk
	land use.	• Introduction and establishment of weed species; and • Modification of the landform resulting in altered local erosion, stability and drainage.		Management Plan (LMP). The plan will include: • Stabilising the surface of DMMA A, B1 and B2 upon completion of dredge spoil disposal activities; • Berns at DMMA B1 and B2 will be partially vegetated, partially rock armoured and also contained with surface sealants; • Management of the areas to minimise dust emissions; • Weed management and treatment measures; • Drainage controls; and • Rehabilitating and/or revegetating areas not required for operations (within five years of completion of the dredging program) using species which suitable for the Port Hedland region.	• EPA GS No. 55.	
Terrestrial Flora and Fauna	To maintain abundance, diversity, geographic distribution and productivity of flora and fauna at species levels through avoidance or management of adverse impacts and improvement in knowledge.	• Direct loss of flora and vegetation communities within DMMA A and B2; • Modification to and loss of fauna habitat; • Introduction and spread of weeds; • Injury and mortality of individual fauna; and • Direct disturbance affects to fauna from construction e.g. noise and dust.	Minor	Implementation of the construction EMP including the following management measures: • An environmental awareness training program; • Restriction of vegetation disturbance to within the approved construction footprints; • Management of weeds; and • Speed restrictions in construction areas and approach roads to reduce fauna injury and mortality.	• EPA PS No. 2; • EPA PS No. 3; • EPA GS No. 51; and • EPA GS No. 56.	Minor
Social						

Factor	Environmental Objective	Potential Impacts	Inherent Risk	Proposed Management and Mitigation	Relevant Guidance	Residual Risk
Construction 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.	Construction, dredging and reclamation activities will generate noise that has the potential to interfere with the amenity of nearby residents. These activities include: • Earthworks related to preparation of DMMA; • Creation of temporary laydown areas; • Dredging; • Pipelaying; and • General construction traffic.	Minor	The noise mitigation measures within the construction EMP will be implemented, including: • Undertaking construction activities in accordance with Environmental Protection (Noise) Regulations 1997; • Construction activities being managed according to weather conditions and proximity to noise sensitive areas; and • Regular monitoring and maintenance of equipment.	• AS 2436-1981: Guide to Noise Control on Construction, Maintenance and Demolition Sites; • Environmental Protection (Noise) Regulations 1997; • EPA Draft GS No. 8; and • EPA GS No. 55.	Minor
Visual Amenity	To ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape to as low as reasonably practicable.	The physical presence of DMMA and the associated change to the landscape has the potential impact on visual amenity values at sensitive receptor locations within the Port Hedland area, including residential areas and parks and recreational areas.	Minor	• Appropriate design including configuration and landforming of berms; and • use of vegetation screening where practicable.	• AS 4282-1997: Control of the Obtrusive Effects of Outdoor Lighting; • Guidelines for Landscape and Visual Impact Assessment (UK Landscape Institute / Institute of Environmental Assessment and Management 2002); and • Visual Landscape Planning in Western Australia: a Manual for Evaluation, Assessment, Siting and Design (WAPC 2007).	Minor
Indigenous	To ensure that changes to the	• Disturbance of culturally significant heritage	Minor	• BHPBIO will avoid disturbance of	• Aboriginal Heritage	Minor

Factor	Environmental Objective	Potential Impacts	Inherent Risk	Proposed Management and Mitigation	Relevant Guidance	Residual Risk
Heritage	biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.	sites; • Excavation of material of cultural significance during construction; and • Impacts on cultural associations to the site and surrounding areas.		Aboriginal heritage sites where possible; • Project design to minimise impacts to traditional hunting and fishing grounds; and • Section 18 approvals and the development and Implementation of a Cultural Heritage Management Plan.	Regulations 1974; • EPA GS No. 41; and • Heritage of Western Australia Regulations 1991.	
Recreation	To ensure that existing and planned recreational uses of the environment are not compromised.	• Short-term restricted access and exclusion of boating and fishing activities within the harbour during dredging activities; • Long-term restricted access to DMMA, particularly to the north-eastern beach within DMMA B2; and • Reduced amenity of immediate surrounding environment for recreational uses.	Minor	• Informing the local community of the scheduling of dredging activities and the establishment of a marine exclusion zone; • BHPBIO will continue to work with and support the Town of Port Hedland and Port Hedland Port Authority through the Community Partnership Program; • BHPBIO will work with the local community to identify opportunities for maintaining and/or enhancing coastal access for recreational use; and • Management of excess water discharge, noise, dust, waste, hydrocarbons and hazardous materials, will be addressed in the implementation of the DMP, construction EMP.	• Occupational Safety Regulations 1996; and • Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (DoE 2006).	Minor
Construction Dust	To ensure that dust 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.	Construction, dredging and reclamation activities may generate dust which has the potential to interfere with the health and amenity of nearby residents. Activities which may generate dust include: • Clearing and site levelling;	Minor	Construction dust will be managed in accordance with the construction EMP including the following measures: • Regular watering of unsealed roads and exposed surfaces;	• EPA GS No.18; and • Occupational Safety Regulations 1996.	Minor

Factor	Environmental Objective	Potential Impacts	Inherent Risk	Proposed Management and Mitigation	Relevant Guidance	Residual Risk
		• Earthmoving activities; • Vehicular movement on unsealed tracks; and • Wind erosion on cleared/reclaimed areas.		• Restriction of vehicle movement and speeds; • Use of environmentally safe dust suppressants; • Monitoring of weather / wind conditions; • Reporting of any complaints regarding dust levels; and • Revegation/stabilisation of berms for DMMA B1 and B2 and rehabilitation of DMMA A.		
Waste Management						
Waste Management (Solid and Liquid Wastes)	To ensure that wastes do not adversely affect health, welfare and amenity of people and land uses and is managed in accordance with waste hierarchy.	• Contamination of marine, ground and surface water; • Potential harm to marine flora, fauna and human health; and • Increased landfill requirements.	Low	Solid and liquid wastes will be in accordance with BHPBIO's construction EMP and the DMP (where applicable) including: • A waste hierarchy program; • Clear signage and coverage of wastes; • Collection of domestic rubbish in bins and recycled or disposed of by a licensed contractor; • Return of empty oil and chemical containers such as metal or plastic drums to the supplier for reuse or recycling where possible; • No sewage disposal from dredging or support vessels to the marine environment while operating in the port; and • No discharge of materials into the marine environment unless approved.	• Environmental Protection (Controlled Waste) Regulations 2004; • International Convention for the Prevention of Pollution from Ships (MARPOL Convention) 1973/1978; • Litter Regulations 1981; and • Review of Waste Classification and Waste Definitions 1996 (as amended) (DoE 2005).	Low

Factor	Environmental Objective	Potential Impacts	Inherent Risk	Proposed Management and Mitigation	Relevant Guidance	Residual Risk
Hydrocarbon and Hazardous Wastes	To ensure hydrocarbons and any other hazardous wastes are handled and stored in a manner that minimises the potential for impact on the environment through leaks, spills and in emergency situations.	The potential for fuel or oil spillage during dredging operations may occur from: • Refuelling of the dredge; • Storage and handling of oils, grease and chemicals; and • Breakdown of grease on moving parts such as the cutter ladder and spud carriage. These spills may lead to: • Contamination of marine waters; • Damage to intertidal marine habitats; • Disruption to recreation activities; and • Reduced aesthetics.	Low	Hazardous materials will be managed in accordance with the construction EMP and the DMP, including the following measures: • Use of safe handling and storage practices; • Minimal generation of waste and associated contaminants; • Segregation of hydrocarbon waste from waters via closed systems; • Storage of oil, grease, chemicals, detergents, etc, below deck; • Oil spill contingency plans for refuelling, storage, handling and breakdown of oils, and • Locating spill kits in close proximity to storage and use areas.	• AS 1940-1993: The Storage and Handling of Flammable and Combustible Liquids 1993; • AS 3780-1994: The Storage and Handling of Corrosive Substances 1994; • Environmental Protection (Controlled Waste) Regulations 2004; and • Environmental Protection (Unauthorised Discharges) Regulations 2004.	Low