bhpbilliton

resourcing the future

Appendix A5

Introduced Marine Species Management Plan

Table of Contents

1 INTRODUCTION 1

1.1 PROJECT OVERVIEW 1

1.2 OBJECTIVE AND STRUCTURE 1

1.3 STAKEHOLDER CONSULTATION 2

1.4 PLAN APPROVAL, REVISION AND DISTRIBUTION 2

1.5 SCOPE OF PLAN 2

1.5.1 IMSMP Exemptions 2

1.6 ROLES AND RESPONSIBILITIES 3

2 LEGAL REQUIREMENTS AND GUIDELINES 5

2.1 OVERVIEW 5

2.2 INTERNATIONAL LEGISLATION AND GUIDELINES 5

2.3 COMMONWEALTH LEGISLATION AND GUIDELINES 5

2.3.1 Department of Agriculture, Fisheries and Forestry 5

2.3.2 Australian Quarantine and Inspection Service 6

2.3.3 Department of Sustainability, Environment, Water, Population and Communities 6

2.4 STATE AND TERRITORY LEGISLATION AND GUIDELINES 7

2.5 WESTERN AUSTRALIAN LEGISLATION AND GUIDELINES 7

2.5.1 Department of Fisheries 7

2.5.2 Western Australian Port Authorities 7

2.6 THE NATIONAL SYSTEM 8

3 EXISTING ENVIRONMENT 9

3.1 OVERVIEW 9

3.2 INVASIVE MARINE SPECIES OF CONCERN 10

3.2.1 Existing Invasive Marine Species within the Management Area 10

3.2.2 Additional Species of Concern 11

3.2.3 Microscopic Planktonic Organisms 11

3.2.4 Species of concern relevant to the Outer Harbour Development 12

4 DEFINING A MANAGEMENT AREA 13

5 RISK ASSESSMENT PROCEDURE 14

5.1 RISK CATEGORIES 14

5.2 IMS RISK STATUS 14

5.2.1 Risk Assessment Scoring Factors for Vessel Infection 15

5.2.2 Risk Assessment Scoring Factors for Immersible Equipment 16

6 RISK MANAGEMENT STRATEGIES 18

6.1 RISK MANAGEMENT MEASURES 18

6.1.1 Vessels Risk Reduction and Management Procedures 18

6.2 IMMERSIBLE EQUIPMENT 23

7 INSPECTION PROCEDURES 25

7.1 VESSELS 25

7.2 IMMERSIBLE EQUIPMENT 26

8 MANAGEMENT MEASURES 28
8.1 HIGH SECONDARY OR TERTIARY BIOFOULING 28
8.2 KNOWN OR SUSPECTED IMS OF CONCERN 28
8.3 ANZEEC CODE OF PRACTICE 32
8.4 BALLAST WATER MANAGEMENT REQUIREMENTS 32
8.4.1 AQIS Mandatory Ballast Water Requirements 32
9 REPORTING REQUIREMENTS 34
10 CONTINGENCIES 35
11 GLOSSARY 36
12 ACRONYMS 39
13 REFERENCES 40

Appendices

VESSEL TYPES
IMS INSPECTION CRITERIA AND PREPARATION REQUIREMENTS.
AQIS QUARANTINABLE PESTS (DAFF 2008B)
REVISED CCIMPE TRIGGER LIST (2006)
IMS ASSESSMENT - VESSEL AND IMMERSIBLE EQUIPMENT QUESTIONNAIRE
VRASS DESCRIPTION
VESSEL AND IMMERSIBLE EQUIPMENT CHECKLIST AND INSPECTION FORMS
ANZECC IN-WATER CLEANING AND MAINTENANCE APPLICATION FORM
GLOBAL CLIMATIC REGIONS

Tables

Table 1.1 – Key Roles and Responsibilities 3
Table 3.1 – Existing introduced marine species within Port Hedland 10
Table 3.2 – Invasive marine species: microscopic planktonic organisms 11
Table 3.3 – List of relevant invasive marine species of concern 12

Figures

Figure 1.1 – Outer Harbour Development Invasive Marine Species Management Area (IMSMA) 4
Figure 4.1 – Risk of IMS establishment relative to distance from shore 13
Figure 5.1 – Vessel Risk Assessment Score Sheet for Invasive Marine Species 16
Figure 5.2 – Immersible Equipment Risk Assessment Score Sheet for Invasive Marine Species 17
Figure 6.1 – IMS Assessment Response Flow Chart for LOW RISK Dredges and Associated Vessels 20
Figure 6.2 – IMS Assessment Response Flow Chart for UNCERTAIN RISK Dredges and Associated Vessels 21
Figure 6.3 – IMS Assessment Response Flow Chart for HIGH RISK Dredges and Associated Vessels 22
Figure 6.4 – IMS Assessment Response Flow Chart for UNCERTAIN/HIGH RISK Immersible Equipment 24
Figure 7.1 – Vessel and Immersible Equipment Assessment and Inspection Format 27
Figure 8.1 – Lead IMPS Inspector Response Procedure Following Detection of Known or Suspected IMS of Concern 30
Figure 8.2 – BHP Billiton Iron Ore Response Procedure Following Detection of Known or Suspected Invasive Marine Species of Concern 31
Figure 10.1 – Illustration of the terms primary, secondary and tertiary fouling 38

1 INTRODUCTION

1.1 PROJECT OVERVIEW

BHP Billiton Iron Ore is seeking parallel approval under the State *Environmental Protection Act 1986* (EP Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to undertake the Outer Harbour Development, located in Port Hedland, Western Australia.

The Outer Harbour Development will provide an export capacity of approximately 240 Mtpa of iron ore. This will be established in four stages, with incremental expansions brought on line to reach the maximum capacity. Expansion stages will occur through four separate modules, each with a nominal capacity of up to 60 Mtpa. Regulatory approvals are being sought for the infrastructure required to deliver the total capacity of 240 Mtpa.

The Outer Harbour Development will involve the construction and operation of landside and marine infrastructure for the handling and export of iron ore. Landside development will include:

- rail connections and spur from the existing BHP Billiton Iron Ore mainline to proposed stockyards at Boodarie;
- rail loops at Boodarie;
- stockyards at Boodarie; and
- an infrastructure corridor (including conveyors, access roadway and utilities) from the stockyards to the proposed marine jetty.

Key marine structures and activities will include:

- an abutment, jetty and wharf;
- mooring and associated mooring dolphins;
- transfer station and deck;
- associated transfer stations, ore conveyors and shiploaders;
- dredging for berth pockets, basins and channels; and
- navigation aids.

This project description is based on the engineering investigation and design completed to date (December 2008) and incorporates alternatives and/or options which are still being considered. Alternatives will be evaluated as BHP Billiton Iron Ore continues with the detailed engineering and design process prior to construction commencing.

An overview of the project's location, layout and footprint is shown in **Figure 1.1**.

1.2 OBJECTIVE AND STRUCTURE

The objective of this Invasive Marine Species Management Plan (IMSMP) is to provide a framework for managing the risk of introducing invasive marine species (IMS) throughout the term of the Outer Harbour Development. This IMSMP presents the management measures; including management objectives and management actions that will be implemented throughout the project. This includes implementation of a number of marine quarantine measures, including inspections (IMS inspections) and ballast controls as per ANZECC (1997) and AQIS (2008), proposed to reduce the likelihood of the introduction of non-indigenous marine species.The Plan details response options and the associated responsibilities necessary to address the identified level of risk. It considers key activities requiring management attention, key invasive species of concern and existing invasive species within the area. The risk assessment approach to the identification and control of invasive species is described in detail including the associated risk management measures which are targeted towards vessels and immersible equipment.

This document supersedes the 'Non-Endemic Marine Species Management Plan' as referenced in the Outer Harbour Development Environmental Scoping Document.

1.3 STAKEHOLDER CONSULTATION

The stakeholder engagement completed as part of BHP Billiton Iron Ore's Pilbara expansion projects (of which the Outer Harbour Development is a component) is detailed in Section 4 of the Public Environmental Review (PER)/Environmental Impact Statement (EIS) document. The results of consultation undertaken for this proposal and previous projects within the Port Hedland Harbour have been considered in the development of the management measures identified within this IMSMP.

1.4 PLAN APPROVAL, REVISION AND DISTRIBUTION

The IMSMP has been prepared, to be appended to the Dredging and Spoil Disposal Management Plan (DSDMP) and for use by the marine construction contractors. On completion of the environmental approvals process, this plan will be finalised to meet the requirements of the:

- relevant Ministerial Statement to be issued by the State Minister for the Environment; and
- relevant Sea Dumping Permit to be issued by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).

The DSDMP will be made publicly available.

In the event of a significant change in the timing or duration of the dredging works, this plan will be reviewed by BHP Billiton Iron Ore. The review will include a reassessment of the environmental risks presented by the works and the corresponding management strategies being implemented.

1.5 SCOPE OF PLAN

This IMSMP addresses the risk of introducing IMS from vessels and immersible equipment associated with the proposed Outer Harbour Development. This IMSMP is to be applied to all construction vessels and immersible equipment engaged at the direction of BHP Billiton Iron Ore, as part of the construction of the proposed Outer Harbour Development that enter the Invasive Marine Species Management Area (IMSMA). This includes all dredging vessels to be mobilised from outside Port Hedland prior to commencement of activities; with necessary controls implemented.

This IMSMP describes and justifies the IMSMA to which this plan will be applied. The IMSMA is defined in accordance with relevant regulatory requirements (**Figure 1.1**). The methodology used to establish the boundaries of the IMSMA is discussed in **Section 4**.

This IMSMP is also to be applied to previously assessed vessels or immersible equipment, if the vessel or immersible equipment:

- has moved out of the IMSMA; and
- remains stationary or at slow speeds (less than 3 knots); and
- is in waters less than 50 metres deep for a period totalling greater than 14 days prior to returning to the IMSMA.

In all cases where this IMSMP applies, vessel[1] and immersible equipment assessment should be undertaken using the Vessel Risk Assessment Score Sheets (VRASS) (**Section 5.2.1**) and the Equipment Risk Assessment Score Sheets (ERASS) (**Section 5.2.2**). Both of these assessment tools provide a consistence approach to vessel and equipment risk assessment.

This IMSMP also details response options and the associated responsibilities necessary to address the identified level of risk. This approach has been developed in the absence of guiding environmental Ministerial Conditions however it adopts the accepted structure and tools developed previously in conjunction with State and Commonwealth Governments to manage biosecurity risks represented by similar activities previously undertaken by vessels and immersible equipment.

1.5.1 IMSMP Exemptions

This IMSMP and associated IMS risk assessment processes are **not** required to be applied to:

[1] While dredges have been identified as a type of vessel with a high biofouling risk rating (**Appendix A.1**) the term vessel used throughout this document refers to all vessel types including those identified in (**Table A.1.1**).

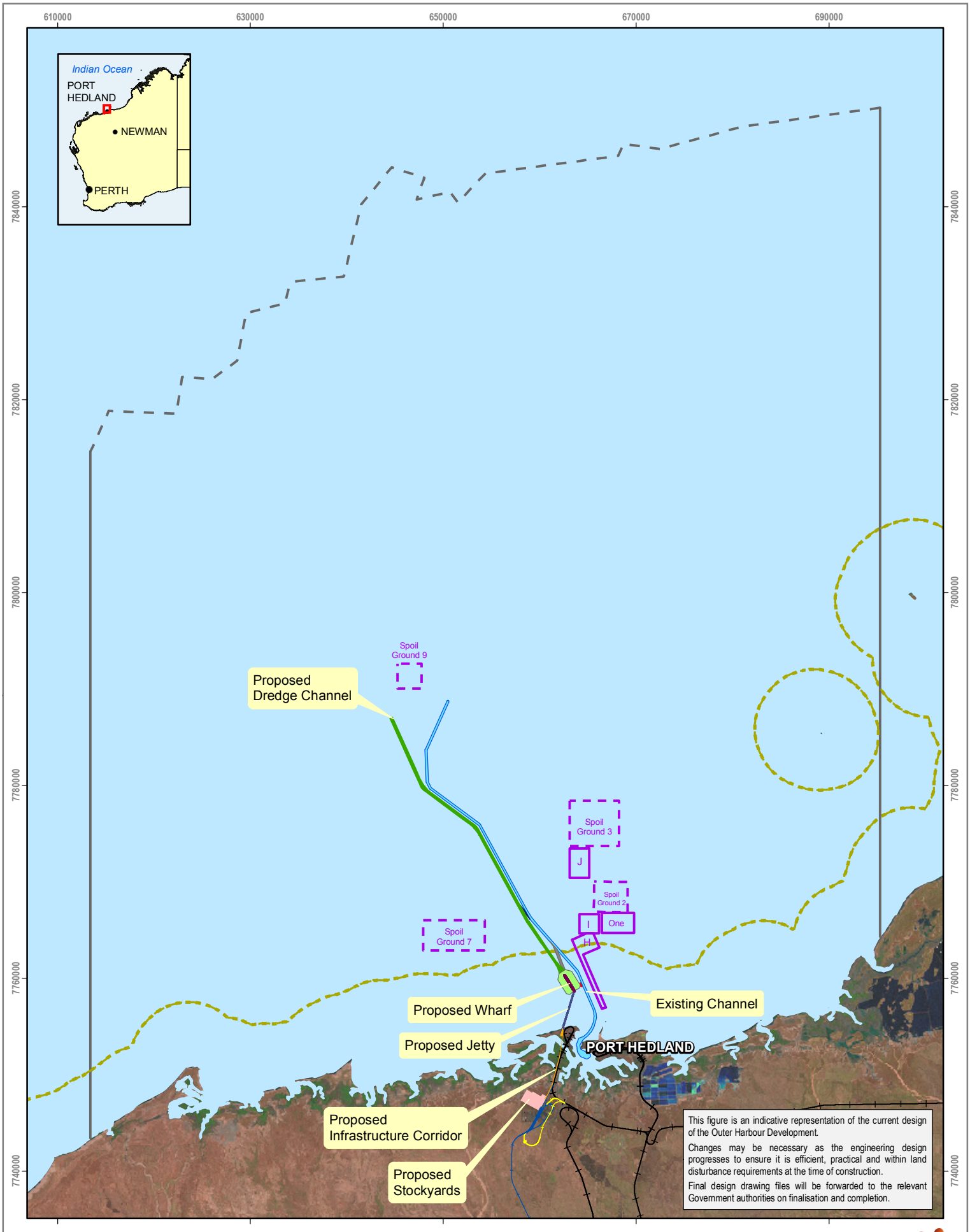
- vessels or immersible equipment that do not plan to enter the IMSMA; or
- locally sourced vessels or immersible equipment where (i) their use has no identifiable increase in local IMS translocation risks; and (ii) where documented history demonstrates that the prior activities have been limited to the IMSMA.

1.6 ROLES AND RESPONSIBILITIES

A breakdown of the key roles and responsibilities for personnel are detailed in **Table 1.1**.

Table 1.1 – Key Roles and Responsibilities

Role	Responsibility
BHP Billiton Iron Ore Site Environmental Superintendent	Accountable for implementation of this IMSMP. Completion of a risk assessment using the VRASS and/or ERASS. Coordination and implementation of management measures identified by the risk assessment. Collection and review of relevant vessel/immersible equipment documentation to ensure accuracy.
Lead IMS Inspector	Ensuring IMS inspections are conducted as per the procedures outlined in this IMSMP. Provision of advice to BHP Billiton Iron Ore as appropriate.
Vessel Master	Ensuring AQIS Ballast Water Management Requirements are met. Preparation of vessels for inspection as outlined in **Appendix 0**.
Vessel Master/Equipment Operator	Preparation of immersible equipment to 'deployment condition' prior to immersible equipment inspection.



Legend

- IMSMA Boundary (50m contour)
- IMSMA Boundary (12 nm limit)
- Spoil Ground (Existing)
- Spoil Ground (Proposed)
- Proposed Jetty
- Proposed Wharf
- Proposed Infrastructure Corridor
- Proposed Stockyards
- Proposed Goldsworthy Rail Loop
- Proposed Western Spur Railway
- Existing Railway
- State/Commonwealth Jurisdiction Boundary
- Proposed Departure Channel
- Proposed Berth Pockets and Swing Basins
- Proposed Link Channel
- Proposed Crossover Channel
- Existing Shipping Channel

0 5 10
kilometres

Scale @ A4: 1:500,000

Datum: GDA94
Map Grid: MGA94 Zone 50

bhpbilliton
resourcing the future

Source:
Imagery: Landsat (2005)
Jurisdiction Boundary: AMBIS (2001)
Topography: Geoscience Australia, GEODATA Topo 250K V3

Figure 1.1 Outer Harbour Invasive Marine Species Management Area (IMSMA)

015\g127_WV05024_Rev0

2 LEGAL REQUIREMENTS AND GUIDELINES

2.1 OVERVIEW

Current legislation and guidelines that relate to the management and control of IMS have been established at all governance levels to include international, national and state requirements. The following sections provide a summary of the current and proposed legislation and management arrangements applicable to IMS in Western Australian waters.

At the time of writing this IMSMP (June 2009), key Commonwealth and state legislation applicable to IMS was in the process of development and detailed approved regulations were not available for inclusion in this IMSMP. It is proposed that this IMSMP be reviewed in response to major changes in governance requirements, to ensure inclusion and compliance with applicable new Commonwealth and state legislation and associated guidelines.

2.2 INTERNATIONAL LEGISLATION AND GUIDELINES

There is a range of international legislation, conventions and guidelines relevant to IMS management either through general environmental or biodiversity protection requirements, or through more specific IMS management requirements. These include:

- International Maritime Organisations (IMO) –'International Convention for the Control and Management of Ships' Ballast Water and Sediments';
- Convention on Biological Diversity - specifically identifies the need to "control or eradicate those alien species which threaten ecosystems, habitats or species";
- United Nations Convention of the 'Law of the Sea' -specifically "*protection and preservation of the marine environment*"; and
- ANZECC Code of Practice for Antifouling and In-water Cleaning and Maintenance.

The Commonwealth has overall responsibility for coordinating and implementing Australia's obligations under international law. Any breach of international law caused by inconsistent or inappropriate legislation or government management arrangements, is the responsibility of the Commonwealth, regardless of whether the actual breach was as a result of Commonwealth or state/territory action or inaction.

International requirements are only considered further within this document in relation to Commonwealth, state and territory management arrangements or legislation, that have been developed to meet these international requirements.

2.3 COMMONWEALTH LEGISLATION AND GUIDELINES

The aim of the Australian Government biosecurity policies and practices are to minimise the risk of the introduction, establishment and spread of invasive species. In relation to IMS, the Commonwealth responsibilities relate to the protection of the Australian territorial seas (seas within a 12 nm limit of the Australian coastline) and the Australian Exclusive Economic Zone (seas within a 200 nm limit of the Australian coastline), as per the *Seas and Submerged Lands Act 1973.*

2.3.1 Department of Agriculture, Fisheries and Forestry

The Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) is the lead Commonwealth agency responsible for the adoption of international arrangements and the development of national legislation for preventing the introduction establishment and spread of IMS. Its key legislation is the *Quarantine Act 1908.* Other relevant legislation includes the *Environmental Protection and Biodiversity Conservation Act (1999)* (EPBC Act), *Fisheries Act 1952* and the *Protection of the Sea Act 1981.*

The risks of IMS incursion from international shipping are managed by DAFF, with policy development the responsibility of its Invasive Marine Species Program (IMSP). The main focus of the IMSP is the management of the vectors that may introduce known or suspected marine pests to Australia, such as the trading ships and non-trading commercial vessels.

2.3.2 Australian Quarantine and Inspection Service[2]

The Australian Quarantine and Inspection Service (AQIS) is the operational counterpart of DAFF and is responsible for the implementation of national quarantine arrangements, as per the *Quarantine Act 1908*, including import and export inspection and certification requirements.

On 1 July 2001, Australia introduced mandatory ballast water management requirements to reduce the risk of introducing IMS through ship ballast water. AQIS is the lead agency responsible for the management of internationally sourced ballast water to ensure that no high risk ballast water is discharged within Australia's territorial seas. These requirements incorporate a Ballast Water Decision Support System (BWDSS) which provides risk assessment capabilities necessary to establish ballast water management options. The use of the BWDSS is not mandatory and any ballast water exchanged at sea by an approved method is deemed to be acceptable by AQIS for discharge in Australian waters.

The AQIS ballast water management requirements are aligned with the International Convention for the Control and Management of Ships' Ballast Water and Sediments. As legislated under Regulation B-4 Ballast Water Exchange, all ships using ballast water exchange should:

- whenever possible, conduct ballast water exchange at least 200 nm from the nearest land and in water at least 200 m in depth, taking into account Guidelines developed by IMO; and
- in cases where the ships are unable to conduct ballast water exchange as above, this should be as far from the nearest land as possible, and in all cases at least 50 nm from the nearest land and in water at least 200 m in depth.

AQIS is also the lead agency for the implementation of the Australian Biofouling Management Requirements, which are due for implementation in 2009 (DAFF 2008). These requirements will specifically manage international arrivals operating within waters less than 50 m depth and/or within 12 nm of land. While these requirements are currently not in place, it is anticipated that AQIS will undertake pre-arrival risk-based management assessments of international non-trading commercial vessels arriving in Australian waters based on vessel history. Ultimately these arrangements will require all vessels to be free of identified quarantinable biofouling pests (**Appendix 0**).

2.3.3 Department of Sustainability, Environment, Water, Population and Communities

Through the *EPBC Act*, DSEWPaC also provides Commonwealth protection of matters of national environmental significance which include marine Commonwealth waters. This Act is applicable to IMS given the potential detrimental impact of IMS on Commonwealth marine areas. Commonwealth requirements in relation to the management of IMS are usually established as conditional requirements, as an outcome of an environmental assessment of a particular project under the *EPBC Act*.

Specifically the *EPBC Act* prohibits a person from undertaking an action in a Commonwealth marine area that has, will have, or is likely to have, a significant impact on the environment. The *EPBC Act* further prohibits a person from undertaking an action outside a Commonwealth marine area (but inside Australian jurisdiction) that has, or will have, a significant impact on the environment in a Commonwealth marine area. In addition, the Administrative Guidelines of the *EPBC Act* require approval from the Environment Minister where an activity is considered likely to have such impacts.

The *EPBC Act* Administrative Guidelines, state that an action has, will have, or is likely to have a significant impact on the environment in a Commonwealth marine area if it does, will, or is likely to, result in a known or potential pest species becoming established in the Commonwealth marine area. Note, however, an Appendix to the Administrative Guidelines state that:

- 'ballast water operations from vessels in Australian waters undertaken in accordance with an approved Commonwealth Government arrangement for the management of ballast water are not likely to have a significant impact on the Commonwealth marine environment'.

DSEWPaC also takes a lead role in the ongoing management and control of any introduced marine pests which have established populations within Australia.

[2] Further information can be obtained by contacting AQIS - www.aqis.gov.au/shipping or AQIS Seaports Program direct: seaports@aqis.gov.au.

2.4 STATE AND TERRITORY LEGISLATION AND GUIDELINES

The *Coastal Waters (State Powers) Act 1980* gives the states and territories legislative power over Australian territorial seas within the first 3 nm from the shoreline. Each state and territory has developed its own legislative arrangements to manage this area, resulting in an inconsistent state/territory approach to IMS management. At the state and territory level, management arrangements may be the responsibility of one or more government agencies and subject to a number of Acts and Regulations.

It should be noted that for every vessel entering and operating within Australian waters, it is the vessel Master's responsibility to ascertain if any State/Territory ballast water or biofouling management requirements (over and above the AQIS requirements) need to be met prior to entry at any Australian port on their vessel's itinerary.

2.5 WESTERN AUSTRALIAN LEGISLATION AND GUIDELINES

The lead state agency for preventing the introduction and spread of IMS in Western Australian (WA) waters is the Western Australian Department of Fisheries (DoF). In the case of WA port waters, the Harbour Masters of the State Public Ports have salient powers with respect to reducing introduction risks in port waters.

2.5.1 Department of Fisheries

The WA DoF is responsible for developing and implementing the necessary management arrangements and biosecurity control activities to restrict the introduction and translocation of IMS in the aquatic environment (Government of Western Australia 2007) where possible. Its legislative basis is the *Fish Resources Management Act 1994* (WA), *Pearling Act 1990* (WA) and *Fisheries Act 1952* (Cwth), the latter for purposes prescribed under Commonwealth-state Government arrangements.

The State Acts provide regulations for the protection of the marine environment, governing quarantine control and the management of other activities to include, aquaculture, pearling, commercial fishing and recreational fishing. As an example, Regulation 176 under the Fish Resources Management Regulations (1995) states:

- 'A person must not bring into the State, or a particular area of the State, a live fish of a species not endemic to the State…'

Within the relevant Act the broad definition of 'fish' is:

- 'an aquatic organism of any species (whether alive or dead) and includes: (a) the eggs, spat, spawn, seeds, spores, fry, larva or other source of reproduction or offspring of an aquatic organism; and (b) a part only of an aquatic organism (including the shell or tail), but does not include aquatic mammals, aquatic reptiles, aquatic birds, amphibians or pearl oysters'.

This definition relates to all species likely to be considered relevant to managing IMS.

Under state legislation, the inspection of Australian and foreign-registered vessels may be carried out by DoF Inspectors in the State's internal waters, coastal (within 3 nm of the shoreline) waters and also in Australian Territorial waters (within 12 nm of the shoreline).

More recently, the *Biosecurity and Agriculture Management Act 2007* (*BAM Act*) was implemented as the State's primary biosecurity legislation to manage biosecurity threats to humans, the environment, commercial activities and industry. This legislation will not come into effect until subsequent regulation proclamation has been achieved.

2.5.2 Western Australian Port Authorities

The *Ports Authorities Act 1999* (WA) and its associated Port Authorities Regulations 2001 empower the Harbour Masters of Western Australia's Public Ports (such as Port Hedland, Dampier and Broome), to control all vessels and maintenance activities within Port Limits with respect to navigational safety and environmental protection. The Port Authorities have, to date, demonstrated a willingness to use their legislative powers to minimise IMS risk and actively manage hull and propeller cleaning activities, in accordance with the ANZECC Code of Practice for In-water Cleaning and Maintenance. 'Port Limits' are the defined boundaries of a port within which a Port Authority may exercise its powers, functions and duties.

2.6 THE NATIONAL SYSTEM

The Australian Government has acknowledged that current IMS management regulations are insufficient, and additional IMS management in the form of regulations, guidelines or codes of conduct for all marine sectors are required (Neil et al. 2005). As a result, in 2005 all States and Territories (except NSW) signed an Intergovernmental Agreement (IGA) with the Australian Government and committed to the development of a 'National System for the Prevention and Management of Marine Pest Incursions' (the National System). The aim of the IGA was to ensure an integrated, practical and cost effective approach towards the cross sector implementation of IMS management under the National System.

The core elements of the National System include:

- prevention - systems and measures that will effectively reduce the risk of introduction and translocation of marine pests.
- emergency response - a system to ensure coordinated emergency responses to any new incursions and translocations.
- ongoing management and control - a coordinated management system for the ongoing management and control of introduced marine pests already in Australian waters.

These elements are to be applied across the following sectors through the development and application of relevant guidelines, voluntary protocols and/or regulations for managing IMS introduction risk:

- aquaculture;
- aquarium trade;
- commercial and recreational fishing;
- commercial shipping;
- non-trading commercial vessels;
- petroleum industry;
- recreational vessels;
- ports, marinas, slipways, shipyards and dry docks.

The Australian Government IMSP has been coordinating the development of the National System with key stakeholder representation through the National Introduced Marine Pests Coordination Group (NIMPCG). NIMPCG comprises representatives from all State Governments and the Northern Territory Government, plus relevant Australian Government agencies, marine industry stakeholders, researchers and conservation groups.

Future management arrangements under the National System will include a risk-based approach for the implementation of appropriate IMS management requirements, which will include a compliance and inspection regime. There have been significant delays in the development and implementation of the National System (including port surveys and state, Territory and Commonwealth Legislation) and the current estimate is that domestic biofouling and domestic ballast water arrangements will not be in place until late 2009.

As part of the National System, the Consultative Committee on Introduced Marine Pest Emergencies (CCIMPE) is responsible for managing IMS once introduced into Australian waters. CCIMPE was established in 2000 with representatives from relevant Commonwealth, State and Territory agencies and is the national body for determining whether or not an IMS incursion represents a marine pest emergency in a national context. Where incursions are considered to be of national concern, the CCIMPE subsequently assists with emergency response requirements, to include technical advice and access to national emergency funding arrangements.

To facilitate incident response timelines and access to national funding arrangements a list of priority species was established in 1999. The list, now commonly referred to as CCIMPE Trigger List, has since been revised (**Appendix 0**). The CCIMPE response capabilities also include unlisted IMS that meet the criteria for inclusion on the list, and thus may also be managed through existing CCIMPE emergency response arrangements.

3 EXISTING ENVIRONMENT

3.1 OVERVIEW

IMS are organisms that have been introduced into a region beyond their natural range and have the ability to survive, reproduce and establish founder populations. Not all marine species introduced into an area will thrive and therefore not all introduced marine species will have the potential to establish themselves as a pest. IMS are those that are:

- not native to the region;
- are likely to survive in the region; and
- are able to spread by human mediated or natural means.
- IMS vary from one region to another depending on environmental factors such as water temperature, salinity, nutrient levels and habitat type. These factors dictate their survival and invasive capacity.
- IMS have been introduced and translocated around Australia by a variety of natural and human means The most common sectors responsible for the introduction of IMS have been shipping (biofouling, entrapment and ballast water), aquaculture (Carlton 2001; Taylor and Rigby 2002; Kinloch et al 2003;URS 2006; URS 2007a) and the aquarium industry.
- In the case of BHP Billiton Iron Ore activities, the key vectors requiring management attention include:
- biofouling on vessel hulls and other external niches (such as propulsion units, steering gear and thruster tunnels);
- biofouling of vessels' internal niches (such as sea chests, strainers, seawater pipe work, anchor cable lockers and bilge spaces);
- biofouling on equipment that routinely becomes immersed in water (including but not limited to dredging equipment, cutters, ladders, and deck mounted tender vessels), and
- discharge of high risk ballast water[3].

The ability of IMS to spread by natural and/or human-mediated means poses a potential risk to social, economic and environmental values. Once established, eradication of populations is often impossible, limiting management options to ongoing control or impact minimisation (URS 2007a). Reducing the risk of IMS introduction and establishment represents by far the most effective and cost-efficient means of managing the threat of IMS introduction.

The introduction of known or suspected IMS to an area requires four key steps:

- Infection at a 'source', such as a port, harbour or within coastal water where IMS are present and reproducing. This includes both native and non-native species, such as populations of the exotic Asian green mussel and the non-native Caribbean black-striped mussel, that are present in Singapore and other ports in Asia.
- Survival of the unwanted organism during their transfer to an area located beyond their natural range.
- Activities undertaken that enable a successful inoculation by the surviving members of the transferred organism.
- Water temperatures, salinities and habitat(s) that are sufficiently environmentally 'matched' to permit their survival, establishment, growth and reproduction.

Whether or not the introduced organism and their propagules manage to establish a viable, long-term population at the new site depends on many factors. The levels of uncertainty associated with these

[3] "The AQIS deems all salt water from ports (or coastal waters) outside Australia's territorial sea to present a "high-risk" of introducing exotic marine pests into Australia" (AQIS 2008)

factors cannot be reliably modelled or quantitatively predicted because of the current knowledge gaps concerning the marine bio-invasion process.

3.2 INVASIVE MARINE SPECIES OF CONCERN

In developing this management plan, IMS of concern have been identified through the consideration of:

- revised CCIMPE Trigger List (Appendix 0);
- environmental tolerances of those IMS identified on the revised CCIMPE Trigger List;
- IMS already present within the IMSMA (Section 3.2.1);
- additional IMS of concern identified since the establishment of the revised CCIMPE Trigger List (Section 3.2.4); and
- species eliminated due to existing alternative vector management (Section 3.2.3).

3.2.1 Existing Invasive Marine Species within the Management Area

Considering the level of commercial activity that occurs within Port Hedland, the number of known IMS and cryptogenic species (a species of unknown origin) currently present (**Table 3.1**) is lower than expected (CSIRO 1999). The species that are known to be present are either well known cosmopolitan fouling species, species with less obvious impacts or species which are inconspicuous by nature. **Table 3.1** provides a summary of known IMS confirmed within Port Hedland (Huisman et al. 2008).

Table 3.1 – Existing introduced marine species within Port Hedland

Species	Common name/ Species type	Distribution
Beania mirabilis (Johnston 1840)	Bryozoan	A widespread inconspicuous species, occurring throughout warm-warm temperate seas.
Bulgula neritina (Linnaeus 1758)	Bryozoan	Distribution worldwide, in warm water ports and harbours. Common fouling species.
Bulgula stolonifera (Ryland 1960)	Bryozoan	Similar fouling species to *B neritina,* with lower tolerances to warmer waters.
Tricellaria inopinata (Hondt and Occhipinti 1985)	Bryozoan	Cosmopolitan* species, previously overlooked in many cases due to the existence of similar closely related taxa.
Synnotum aegyptiacum (Audouin 1826)	Bryozoan	Cosmopolitan bryozoans distributed throughout warm waters. Distribution in Australia is from Vic to NSW and recorded in Port Hedland (West Australian Marine voucher specimen (WAM) 30551).
Savignyella lafontii (Audouin, 1826)	Bryozoan	Widely distributed in warmer waters (WAM 30556; 32310)
Amathia distans (Busk 1886)		Cosmopolitan species known to occur at various locations in warmer waters around Australia including Port Hedland.
Amathia vidocici (Heller 1867)	Bryozoan	Cosmopolitan species recorded in Port Hedland (WAM 30629)
Bowerbankia gracilis (Leidy 1855)	Bryozoan	Cosmopolitan species known to occur from South Australia recorded in Port Hedland (WAM 30552)
Zoobotryon verticillatum (Della Chiaje 1828)	Bryozoan	Cosmopolitan species, known in Australia from various location from South Australia, NSW to Port Hedland
Amphibalanus Amphitrite (Darwin 1854)	Barnacle	Cosmopolitan species, recorded from WA, SA, Vic, NSW, Qld and the NT.
Amphibalanus reticulates (Utinomi 1967)	Barnacle	Cosmopolitan fouling species.
Megabalanus rosa (Pilsbry 1916)	Barnacle	Known to occur at various locations around Australia often associated with international shipping locations.

Species	Common name/ Species type	Distribution
Megabalanus tintinnabulum (Linnaeus, 1758)	Barnacle	Cosmopolitan species, well established throughout Australia, distribution associated with shipping activities.
Gymnangium gracilicaule (Jaderholm 1903)	Hydroid	Widely distributed in the tropical and subtropical Indian Ocean and Indo-West Pacific
Antennella secundaria (Gmelin 1791)	Hydroid	Cosmopolitan in temperate and tropical seas, widely distributed throughout Australia.

**(Cosmopolitan species are those species known to have a wide global distribution. Part or all of their distribution may be considered to be of unknown origin.)*

3.2.2 Additional Species of Concern

Carijoa riisei, Chthamalus proteus, Megabalanus coccopoma, Australomegabalanus krakatauensis, and Brachidontes striatulus are not listed in the revised CCIMPE Trigger List, but have since been considered potential pests and/or nuisance foulers by other researchers. Cases for their inclusion within this IMSMP, with respect to the origin and movements of non-trading vessels in Australia's tropical north, are in Russell et al. (2003), Neil et al. (2005) and URS (2007a, c).

In the case of the Western Atlantic orange soft coral (*Carijoa riisei*), which has a native distribution that extends from the east coast of Florida to Brazil, is now regarded as an invasive marine pest in Hawaii (Kanhng and Grigg 2004). Similarly, the Caribbean star barnacle (*Chthamalus proteus*) has achieved high densities in the high intertidal zone of rocky and artificial shorelines in Hawaii. This barnacle is a rapid coloniser of both artificial and natural hard substrates and has an invasive distribution that includes harbours, marinas and rocky shorelines in the eastern, central and west Pacific Ocean (URS 2007a; 2007c).

In the case of the giant barnacles such as *Megabalanus coccopoma* and *Australomegabalanus krakatauensis*, the former is native to the western American seaboard from Mexico to Ecuador but has been on the Brazilian coast for several decades and has now recently invaded the Caribbean Sea, Gulf of Mexico and the Western Atlantic Ocean. It is considered a nuisance fouler in Brazilian ports, both north and south of Rio de Janeiro (URS 2007a; 2007c). Recent investigations indicate it may already be present in some Australian ports (URS 2007a). In the case of *A. krakatauensis* this barnacle was believed to be restricted to the Indo-Malay archipelago but it was found at Ashmore Reef in 2002, a first record for northern Australia and it has since been identified from a few other north-west Australian sites (WAM data, cited in URS 2007a).

As with other ports in South-East and South Asia, Singapore hosts three significant mussel pests (*Mytilopsis*, *Perna*, *Musculista*) as well as the recently-reported *Brachidontes strialatulus*. The Bengal mussel (*B. striatulus*) has recently been discovered along creeks in Singapore where, together with *Mytilopsis sallei*, it is regarded as a potentially highly invasive marine pest (Morton 1996, Morton and Tan 2006, as cited in URS 2007a).

3.2.3 Microscopic Planktonic Organisms

The species listed in **Table 3.2** are microscopic planktonic organisms which will not be managed under this IMSMP. These species are currently managed by the Commonwealth through the application of the AQIS Ballast Water Management Requirements. As such, there are no direct management measures for these species identified in this IMSMP, aside from ensuring vessel operator compliance with the AQIS Ballast Water Management Requirements, which will occur through the VRASS assessment process.

Table 3.2 – Invasive marine species: microscopic planktonic organisms

Common name	Species name
Planktonic algae	
Toxic dinoflagellate Toxic dinoflagellate Toxic dinoflagellate	*Alexandrium monilatum* *Dinophysis norvegica* *Pfiesteria piscicida*
Diatoms	

Centric diatom	*Chaetoceros concavicornis*
Centric diatom	*Chaetoceros convolutus*
Pennate diatom	*Pseudo-nitzschia seriata*

3.2.4 Species of concern relevant to the Outer Harbour Development

Without exception, the final IMS list (**Table 3.3**) only includes species with demonstrated invasive/pest characteristics. Should their presence be suspected, management action is required.

The following list of IMS of concern to the Outer Harbour Development has been established to clarify response requirements. It is important to note the list is complete as of the issue date of this IMSMP but other IMS may exist which have not been identified or listed to date. Therefore, further actions may need to be developed to manage previously unlisted or unknown organisms where IMS risks are suspected or identified.

Table 3.3 – List of relevant invasive marine species of concern

Species name	Common name
Mytilopsis sallei	Black Striped Mussel
Perna viridis	Asian Green Mussel
Perna perna	Brown Mussel
Caulerpa taxifolia (exotic strains only)	Green Macroalga
Didemnum spp. (exotic invasive strains only)	Colonial Sea Squirt
Neogobius melanostomus	Round Goby
Siganus rivulatus	Marbled Spinefoot, Rabbit Fish
Musculista senhousia	Asian Bag Mussel, Asian Date Mussel
Grateloupia turuturu	Red Macroalga
Womersleyella setacea	Red Macroalga
Bonnemaisonia hamifera	Red Macroalga
Balanus eburneus	Ivory Barnacle
Hydroides dianthus	Limy Tubeworm
Siganus luridus	Dusky Spinefoot
Hemigrapsus takanoi/penicillatus	Pacific Crab
Rhithropanopeus harrisii	Harris Mud Crab
Hemigrapsus sanguineus	Japanese/Asian Shore Crab
Caulerpa racemosa (exotic invasive strain only)	Green Macroalga
Carijoa riisei	Western Atlantic orange soft coral
Chthamalus proteus	Caribbean star barnacle
Megabalanus coccopoma	Megabalanid barnacle
Australomegabalanus krakatauensis	Megabalanid barnacle
Brachidontes striatulus	Bengal Mussel

4 DEFINING A MANAGEMENT AREA

Invasive Marine Species Management Areas are typically defined as all nearshore waters, extending from the lowest astronomical tide mark to at least 12 nm from land (including Australian territorial reefs and islands) and in all waters less than 50 m deep (at lowest astronomical tide). These criteria are based on current legal frameworks, IMS risk interpretations and existing management arrangements applied by Commonwealth and state regulatory agencies.

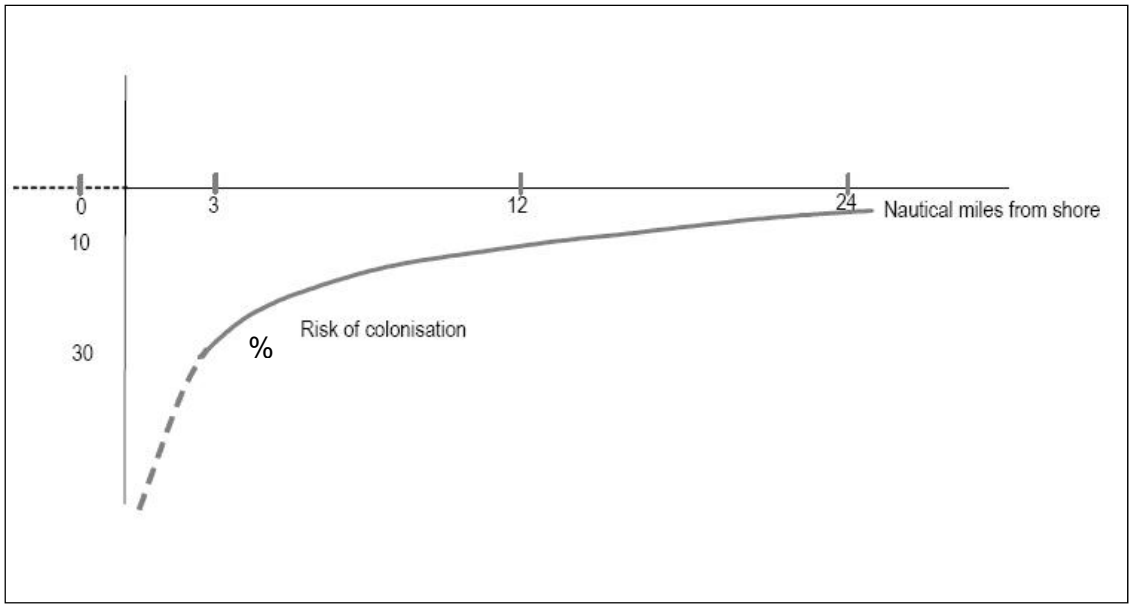
Nearshore waters that are within an area extending from the lowest astronomical tide mark out to the 12 nm limit are those waters referred to as 'Territorial Seas' that are the sovereign jurisdiction of a nation or state. These jurisdictional arrangements have been adopted by the AQIS in relation to the management of ballast water (Australian Ballast Water Requirements 2001 [ABWR]) and by DAFF for managing the Australian Biofouling Management Requirements. These biofouling requirements, due for implementation by DAFF in 2009, propose management arrangements for international vessel arrivals operating within waters less than 50 m deep and/or within 12 nm of land[4].

While the 12 nm/ 50 metre depth boundary has a very clear legal basis, it also provides a natural buffer area between offshore areas and the nearshore habitats that are susceptible to IMS establishment. Many of the IMS identified within this plan have a planktonic larval stage that facilitates the dispersal of IMS through the water column. By maintaining the 12 nm /50 m depth criteria, the effects of dispersal and dilution of IMS larvae significantly reduces the risk of successful establishment in the nearshore susceptible environments. For example, the Australian Government Bureau of Resource Sciences (BRS) established that the relative risk of an IMS incursion around the Australian coastline decreases with distance from the shoreline, specifically the BRS estimates:

- a 33% chance of colonisation at 3 nm;
- an 8% chance at 12 nm; and
- a 2% chance at 24 nm (**Figure 4.1**).

Specifically in relation to the Outer Harbour Development, the application of the 12 nm/ 50 m depth criteria towards the establishment of an appropriate IMSMA has resulted in the northern boundary being based entirely on the 50 m depth contour, which in this case far exceeds the 12 nm limit. Boundaries to the west and east have been based on 12 nm either side of the proposed development footprint.

Figure 4.1 – Risk of IMS establishment relative to distance from shore



Note: Figure an Interpretation from BRS 2007.

4 50 metres depth is measured at lowest astronomical tide and "land" is defined as "all exposed land areas to include reef and reef systems exposed during periods of low tide".

5 RISK ASSESSMENT PROCEDURE

This section describes the risk assessment methodology utilised to assess the likelihood of a particular contracted vessel and/or immersible equipment being infected by IMS prior to undertaking BHP Billiton Iron Ore activities within the IMSMA.

This risk assessment methodology uses a consistent, transparent, semi-quantitative scoring approach that has been developed to help determine what mitigating actions or further assessments are warranted. Conversely it also provides a basis for justification for when management measures are assessed as not required.

The information required to complete the risk assessment is presented as a questionnaire (**Appendix 0**). This form should be completed by the vessel/immersible equipment operator and returned to the BHP Billiton Iron Ore Site Environmental Superintendent to complete the risk assessment as described below.

The objective of the risk assessment is to identify the inherent level of IMS threat a contracted vessel or its immersible equipment poses. This will allow BHP Billiton Iron Ore to select the most appropriate vessels and immersible equipment and establish management measures to mitigate the identified threats to an acceptable low level.

The application of the risk assessment procedure will be undertaken in consultation with the DoF. Completed Vessel / Equipment Risk Assessment Scoring Sheets (VRASS or ERASS) will be provided to the DoF, and consultation will occur with respect to the determined IMS risk status and any required management measures prior to the vessel / equipments mobilisation.

5.1 RISK CATEGORIES

The risk assessment procedure, as described in **Section 5.2.1** and **Section 5.2.2**, establishes three risk categories as described below.

- LOW – low likelihood of IMS (no additional management measures required).
- UNCERTAIN – likelihood of IMS is not apparent (precautionary approach adopted, additional management measures required).
- HIGH – identified as a potential risk (additional management measures required).

5.2 IMS RISK STATUS

Risk scoring procedures have recently been trialled by AQIS for assessing the biofouling risk posed by yachts and other small vessels (less than 25 m in length) arriving from overseas ports (AQIS 2006; URS 2007b). These and similar approaches provide a practical, consistent and transparent approach to help determine and justify what precautionary management actions are required if the unmanaged threat is assessed as high, uncertain or low.

This risk-based approach has been supported by the West Australian DoF and this IMSMP is a further evolution of that approach. The key factors considered by this IMSMP which may influence the IMS risk status of a vessels or immersible equipment are explained in **Appendix 0**.

The adoption of this risk assessment approach facilitates consistent IMS risk establishment, communication and management. Where the assessment evaluates an activity as medium or high risk, appropriate risk management measures may then be applied to address the identified areas of risk. This approach ensures the efficient allocation of resources in relation to areas of identified risk. The alternative approach is to apply standard risk management measures across all activities, to address potential biofouling and ballast water risks which are otherwise unquantified.

In some situations it may be considered that the established risk assessment processes have omitted to consider some specific, possibly unique factor(s) pertaining to a vessel's or immersible equipment's risk profile. Where it is considered by BHP Billiton Iron Ore that risk management actions are not necessary, a case by case risk assessment should be undertaken (separate to the existing VRASS and ERASS) and documented. The case by case risk assessment and supporting documentation will be required to support consultation with the lead regulatory agency, necessary to gain support for either reduced or no management actions

5.2.1 Risk Assessment Scoring Factors for Vessel Infection

In order to effectively evaluate these key factors a VRASS (**Figure 5.1**) has been developed (and is also provided as an excel spreadsheet assessment tool) to score, evaluate and where necessary reduce the IMS transfer risk, posed by each vessel contracted to undertake activities within the IMSMA.

The key risk assessment factors considered by the VRASS include:

- vessel type;
- inspection history;
- internal treatment/inspection history;
- vessel desiccation period during mobilisation;
- presence and age of fouling control coating;
- presence or absence of internal treatment systems;
- internal treatment history;
- climatic region of operation;
- stationary or slow periods of operation and climatic region;
- type of vessel activity; and
- adherence to AQIS ballast water requirements.

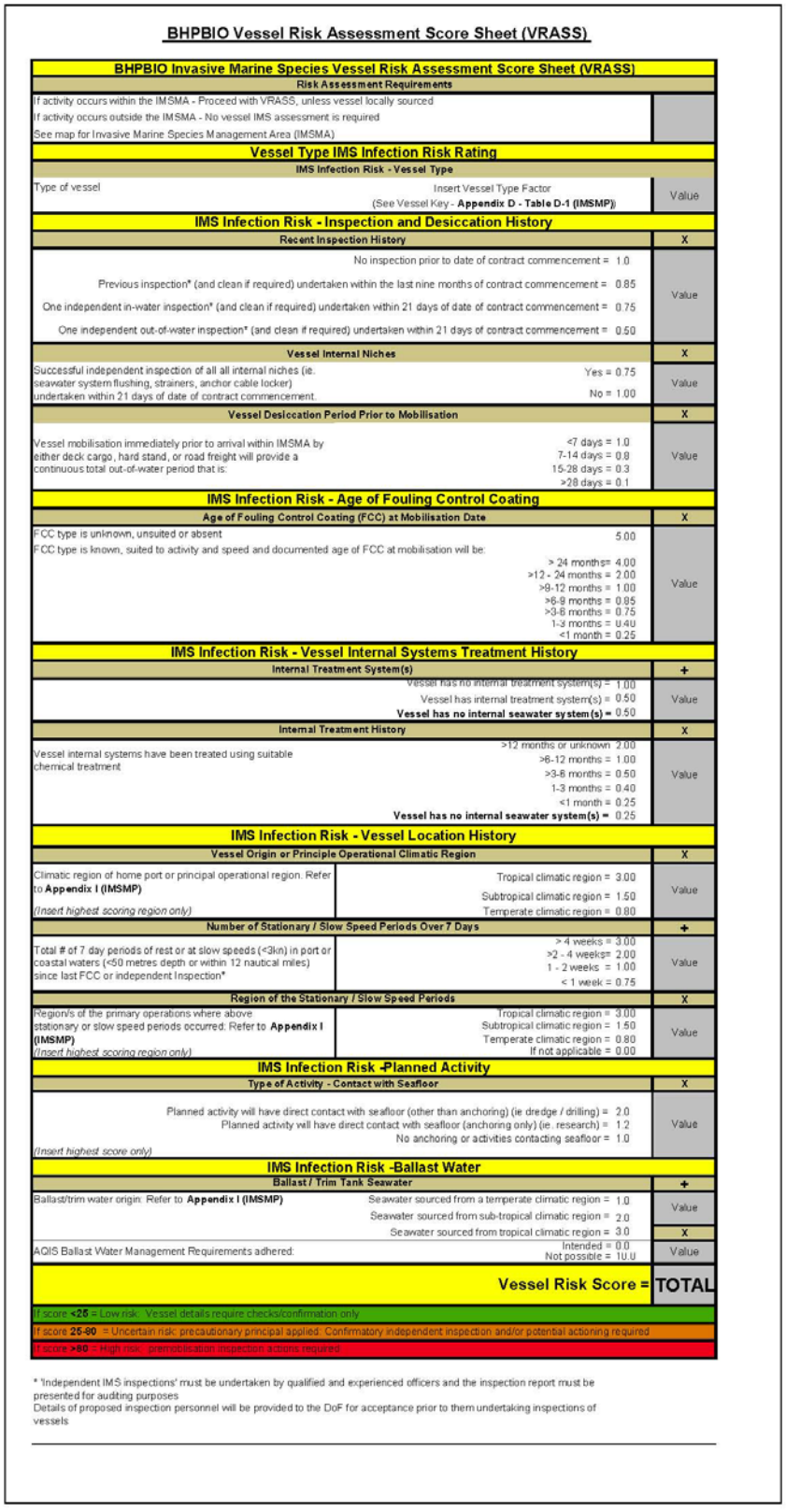
Appendix 0 provides a detailed description of these risk assessment scoring factors.

Note: Where there is no intention to operate the vessels and/or immersible equipment within the IMSMA, or the vessel and immersible equipment has been sourced locally[5] then there is no requirement to proceed with this risk assessment procedure.

Due to their mode of operation and design (number of external/internal niches and dredging equipment that is periodically submerged), dredges present potential the highest risk with respect to IMS of the vessels and equipment to be used on the project. However, the vessel risk assessment factors presented in **Appendix 0** are for a range of vessel types so as to provide flexibility throughout to cater for various vessel types that may be engaged as part of the Outer Harbour Development.

[5] Sourced locally, that is the vessel history demonstrates that the vessel has only operated within the proposed area of activity.

Figure 5.1 – Vessel Risk Assessment Score Sheet for Invasive Marine Species



BHPBIO Vessel Risk Assessment Score Sheet (VRASS)

BHPBIO Invasive Marine Species Vessel Risk Assessment Score Sheet (VRASS)		
Risk Assessment Requirements		
If activity occurs within the IMSMA - Proceed with VRASS, unless vessel locally sourced If activity occurs outside the IMSMA - No vessel IMS assessment is required See map for Invasive Marine Species Management Area (IMSMA)		
Vessel Type IMS Infection Risk Rating		
IMS Infection Risk - Vessel Type		
Type of vessel	Insert Vessel Type Factor (See Vessel Key - **Appendix D - Table D-1 (IMSMP)**)	Value
IMS Infection Risk - Inspection and Desiccation History		
Recent Inspection History		X
	No inspection prior to date of contract commencement = 1.0 Previous inspection* (and clean if required) undertaken within the last nine months of contract commencement = 0.85 One independent in-water inspection* (and clean if required) undertaken within 21 days of date of contract commencement = 0.75 One independent out-of-water inspection* (and clean if required) undertaken within 21 days of contract commencement = 0.50	Value
Vessel Internal Niches		X
Successful independent inspection of all all internal niches (ie. seawater system flushing, strainers, anchor cable locker) undertaken within 21 days of date of contract commencement.	Yes = 0.75 No = 1.00	Value
Vessel Desiccation Period Prior to Mobilisation		X
Vessel mobilisation immediately prior to arrival within IMSMA by either deck cargo, hard stand, or road freight will provide a continuous total out-of-water period that is:	<7 days = 1.0 7-14 days = 0.8 15-28 days = 0.3 >28 days = 0.1	Value
IMS Infection Risk - Age of Fouling Control Coating		
Age of Fouling Control Coating (FCC) at Mobilisation Date		X
FCC type is unknown, unsuited or absent	5.00	
FCC type is known, suited to activity and speed and documented age of FCC at mobilisation will be:	> 24 months= 4.00 >12 - 24 months = 2.00 >9-12 months = 1.00 >6-9 months = 0.85 >3-6 months = 0.75 1-3 months = 0.40 <1 month = 0.25	Value
IMS Infection Risk - Vessel Internal Systems Treatment History		
Internal Treatment System(s)		+
	Vessel has no internal treatment system(s) = 1.00 Vessel has internal treatment system(s) = 0.50 **Vessel has no internal seawater system(s) =** 0.50	Value
Internal Treatment History		X
Vessel internal systems have been treated using suitable chemical treatment	>12 months or unknown 2.00 >6-12 months = 1.00 >3-6 months = 0.50 1-3 months = 0.40 <1 month = 0.25 **Vessel has no internal seawater system(s) =** 0.25	Value
IMS Infection Risk - Vessel Location History		
Vessel Origin or Principle Operational Climatic Region		X
Climatic region of home port or principal operational region. Refer to **Appendix I (IMSMP)** *(Insert highest scoring region only)*	Tropical climatic region = 3.00 Subtropical climatic region = 1.50 Temperate climatic region = 0.80	Value
Number of Stationary / Slow Speed Periods Over 7 Days		+
Total # of 7 day periods of rest or at slow speeds (<3kn) in port or coastal waters (<50 metres depth or within 12 nautical miles) since last FCC or independent Inspection*	> 4 weeks = 3.00 >2 - 4 weeks= 2.00 1 - 2 weeks = 1.00 < 1 week = 0.75	Value
Region of the Stationary / Slow Speed Periods		X
Region/s of the primary operations where above stationary or slow speed periods occurred: Refer to **Appendix I (IMSMP)** *(Insert highest scoring region only)*	Tropical climatic region = 3.00 Subtropical climatic region = 1.50 Temperate climatic region = 0.80 If not applicable = 0.00	Value
IMS Infection Risk -Planned Activity		
Type of Activity - Contact with Seafloor		X
(Insert highest score only)	Planned activity will have direct contact with seafloor (other than anchoring) (ie dredge / drilling) = 2.0 Planned activity will have direct contact with seafloor (anchoring only) (ie. research) = 1.2 No anchoring or activities contacting seafloor = 1.0	Value
IMS Infection Risk -Ballast Water		
Ballast / Trim Tank Seawater		+
Ballast/trim water origin: Refer to **Appendix I (IMSMP)**	Seawater sourced from a temperate climatic region = 1.0 Seawater sourced from sub-tropical climatic region = 2.0 Seawater sourced from tropical climatic region = 3.0	Value X
AQIS Ballast Water Management Requirements adhered:	Intended = 0.0 Not possible = 10.0	Value
	Vessel Risk Score =	**TOTAL**
If score **<25** = Low risk. Vessel details require checks/confirmation only		
If score **25-80** = Uncertain risk: precautionary principal applied. Confirmatory independent inspection and/or potential actioning required		
If score **>80** = High risk: premobilisation inspection actions required		

* 'Independent IMS inspections' must be undertaken by qualified and experienced officers and the inspection report must be presented for auditing purposes
Details of proposed inspection personnel will be provided to the DoF for acceptance prior to them undertaking inspections of vessels

5.2.2 Risk Assessment Scoring Factors for Immersible Equipment

The ERASS is designed to assess immersible equipment used during BHP Billiton Iron Ore operational activities such as dredge cutters, ladders and tender vessels. The scoring system for the

ERASS is similar to the VRASS but has fewer risk factors to consider (**Figure 5.2**), due the difference in risk profiles i.e., the absence of internal systems and frequent periods out of water between deployments.

The key risk assessment factors considered by the ERASS include:

- climatic region;
- nearshore/offshore deployment;
- duration of deployment;
- out of water mobilisation period; and
- maintenance regime.

Figure 5.2 – Immersible Equipment Risk Assessment Score Sheet for Invasive Marine Species

BHPBIO Invasive Marine Species Immersible Equipment Risk Assesment Score Sheet		
IMS Infection Risk - region of deployment since last thorough clean		
Climatic relationship of previous operational region since last thorough clean (Refer to SHEET '**Figure E1**' or **Appendix I** *(Insert highest scoring region only)*	Tropical climatic region = 3.0 Subtropical climatic region = 2.0 Temperate climatic region = 1.0	Value
IMS infection risk - coastal location of deployments since last thorough clean		**x**
Locations of deployment since last thorough clean have included: *(Insert highest scoring region only)*	Nearshore waters <50m and <12nm) = 3.0 Offshore waters (either >50 or >12nm) = 2.0	Value
IMS infection risk - duration of deployments		**x**
Duration of deployment since last clean:	Has exceeded 7 days = 3.0 Always less than 7 days = 2.0 Always less than 24 hours = 1.0 Always less than 7 hours = 0.1	Value
IMS infection risk - duration of time out of water since last deployment		**x**
Duration of time out of water since last deployment is:	<7 days = 1.0 7-14 days = 0.8 >14-28 days = 0.5 >28 days = 0.1	Value
IMS survival risk during mobilisation - transport conditions		**+**
Equipment is packed dry and/or stored in dry, well ventilated space with low humidity	Packed and/or stored dry = 0.2 Stored in damp conditions = 1.0	Value
IMS survival risk - post-retrieval maintenance regime		**x**
Post-retrieval maintenance includes	Routine washing + cleaning = 0.2 No routine clearning = 1.0	Value
	Equipment Risk Score =	**TOTAL**
If score <5 = Low Risk: Equipment details require checks/confirmation only		
If score > 5 = Uncertain Risk: Premobilisation inspection		

6 RISK MANAGEMENT STRATEGIES

6.1 RISK MANAGEMENT MEASURES

A number of effective risk management measures can be applied during vessel or immersible equipment pre-mobilisation and post-mobilisation phases to reduce the chances introducing IMS.

The most effective risk management measures for biofouling comprise of specific IMS inspections by suitably qualified marine scientist with experience in biofouling inspections and treatment (if required). If the risk reduction measures are planned and their outcomes formally documented, then the results of inspections, treatments and associated field evidence can be used to support and justify the risk reduction scores and outcomes, as determined by the VRASS and ERASS assessment processes.

6.1.1 Vessels Risk Reduction and Management Procedures

As detailed in Section 5, the DoF will be consulted with respect to the determination of the IMS risk category. As part of this consultation, the completed VRASS/ERASS forms will be provided. In the event of a vessel being determined to be of uncertain or high risk, the DoF will be consulted with respect to the decision on which, if any, management measures should be applied.

The risk management procedures for vessels will use the following response criteria as determined by the VRASS.

For vessels assessed as a **LOW RISK** (**Figure 6.1**):

Low Risk Management Option: Confirmation of Vessel History Documentation.

- Vessel information will be submitted to a BHP Billiton Iron Ore Site Environmental Superintendent prior to arrival of the vessel within the IMSMA, to confirm that the vessel's operational history, fouling control coating and ballast/trim water details, as used by the VRASS, are accurate and reliable.

For vessels assessed as an **UNCERTAIN RISK** apply one of the following risk management measures (**Figure 6.2**):

Uncertain Risk Management Option 1: Limited Exposure

- Apply a project limit of a maximum of two entrances into the IMSMA and a maximum residence time within the IMSMA not exceeding a cumulative total of 48 hours. This option allows for those vessels that are assessed as 'Uncertain Risk' and are planning to operate largely outside the IMSMA.

Uncertain Risk Management Option 2: Reject Vessel

- Subject to availability the vessel may be rejected and replaced with a more suitable vessel.

Uncertain Risk Management Option 3: Inspection

- One in-water inspection or one out-of-water vessel inspection will be undertaken in accordance with Section 7, at a port or other location nominated by the Vessel Operator. The inspection is to occur within seven days prior to final departure to the IMSMA, either directly or via supply port(s). If the vessel is required to visit any supply ports during transit to the IMSMA, the duration at any one port must not exceed a continuous period of seven days (Note: additional management requirements may be necessary as a result of this inspection); or

Uncertain Risk Management Option 4: Treatment of Internal Systems

- Vessels with fouling control coating (FCC) applied within the last twelve months (immediately prior to arrival within the IMSMA), may treat internal system(s), where subsequent assessment through the VRASS process achieves a Low Risk Vessel Rating; or

Uncertain Risk Management Option 5: Alternative Approval

- The above management options (Options 1-4) have been previously accepted by state and Commonwealth regulators and provide an alternative to compulsory vessel and immersible

equipment inspection. Should an alternative approach be proposed, prior approval from the lead regulatory agency should be sought, detailing and supporting the proposed course of action.

For vessels assessed as a **HIGH RISK** apply the following risk management measure (**Figure 6.3**):

High Risk Management Option 1: Reject Vessel

- Subject to availability the vessel may be rejected and replaced with a more suitable vessel.

High Risk Management Option 2: Inspection.

- One in-water inspection or one out–of-water vessel inspection will be undertaken in accordance with Section 7, at a port or other location nominated by the Vessel Operator. The inspection is to occur within seven days prior to final departure to the IMSMA, either directly or via supply port(s). If the vessel is required to visit any supply ports during transit to the IMSMA, the duration at any one port must not exceed a continuous period of seven days (Note: additional management requirements may be necessary as a result of this inspection); or

High Risk Management Option 3: Alternative Approval

- The above management options (Options 1 and 2) have been established through the development of this IMSMP and provide an alternative to compulsory vessel and immersible equipment inspection. Should an alternative approach be proposed, prior approval from the lead regulatory agency should be sought, detailing and supporting the proposed course of action.

Figure 6.1 – IMS Assessment Response Flow Chart for LOW RISK Dredges and Associated Vessels

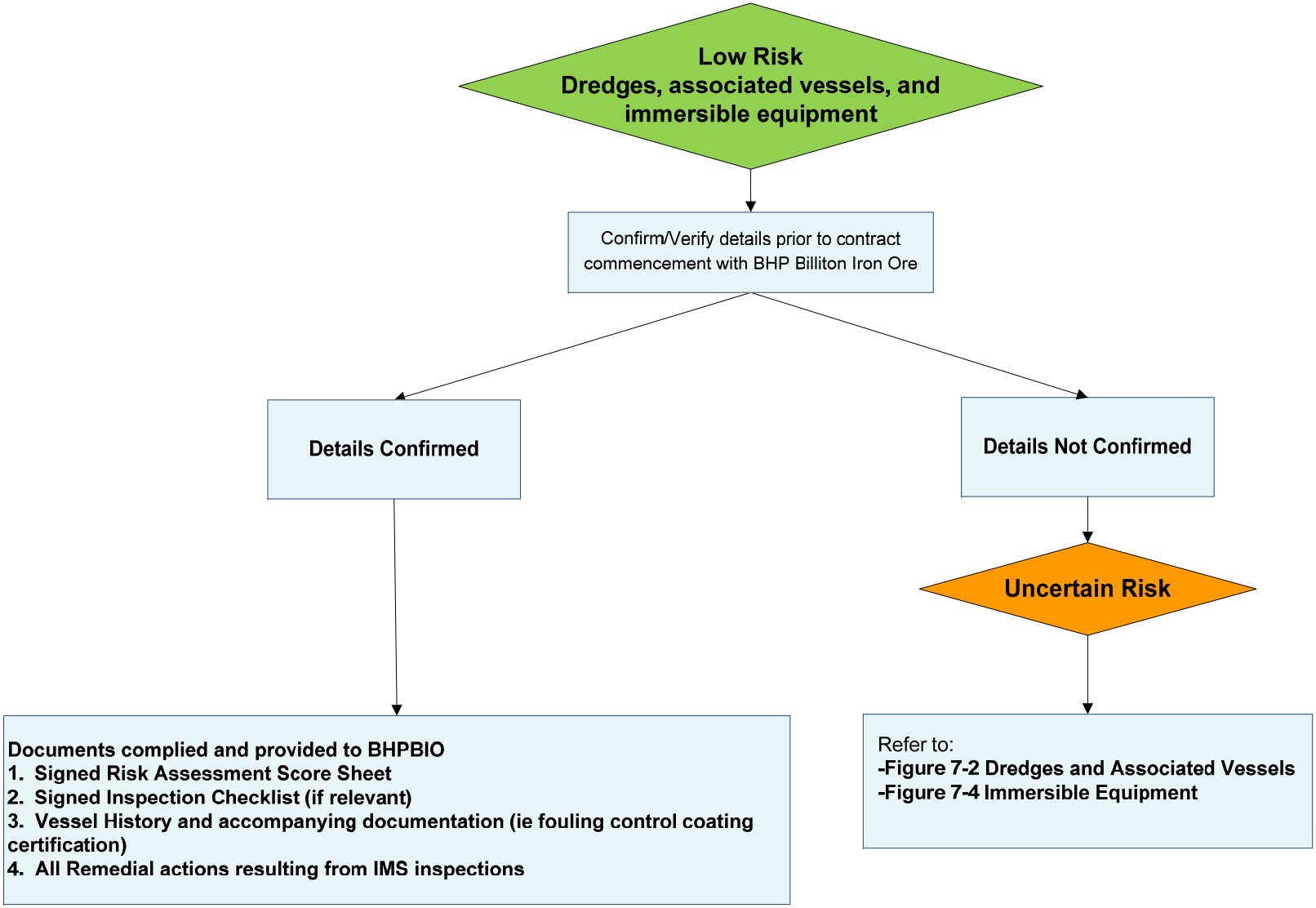


Figure 6.2 – IMS Assessment Response Flow Chart for UNCERTAIN RISK Dredges and Associated Vessels

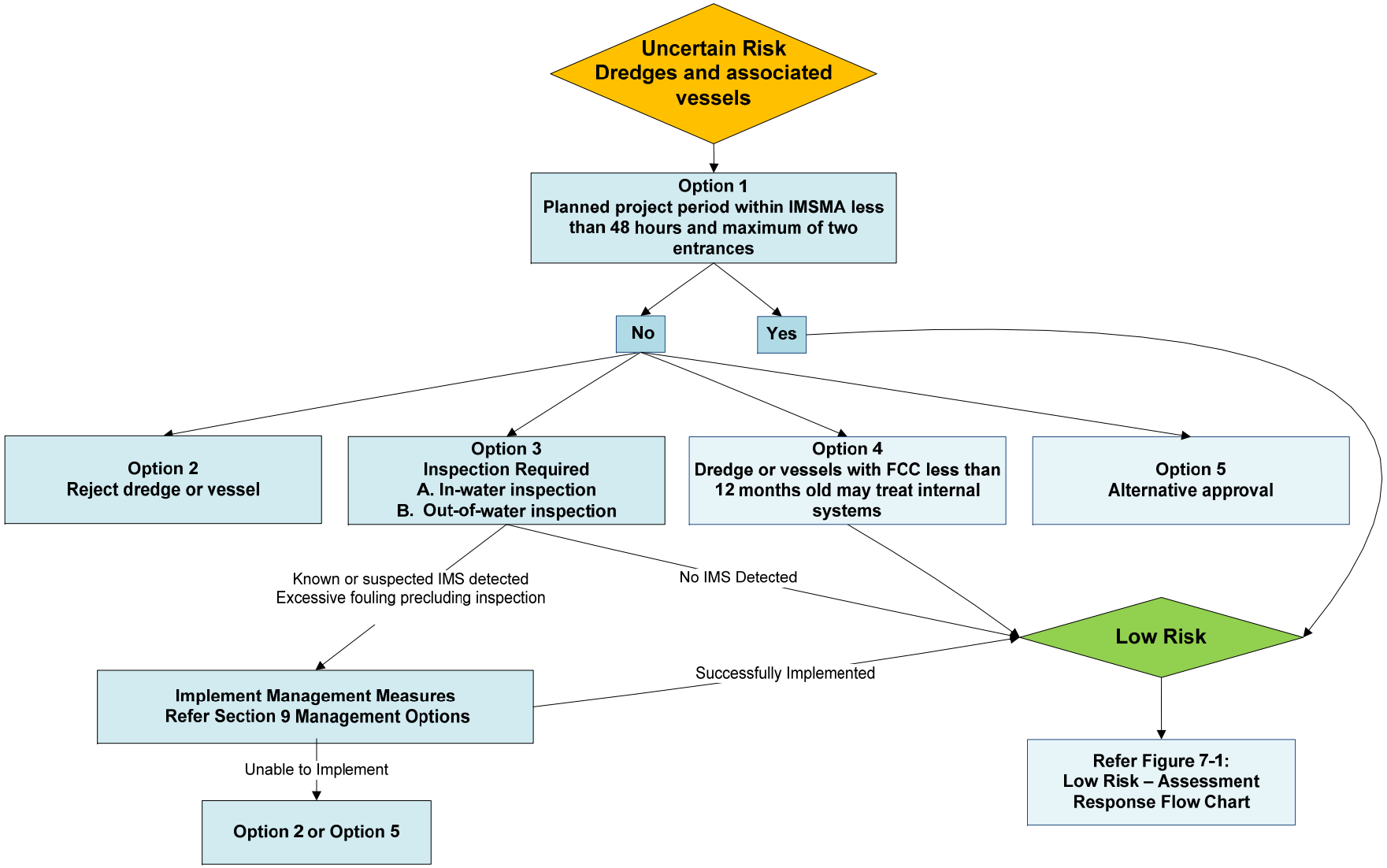
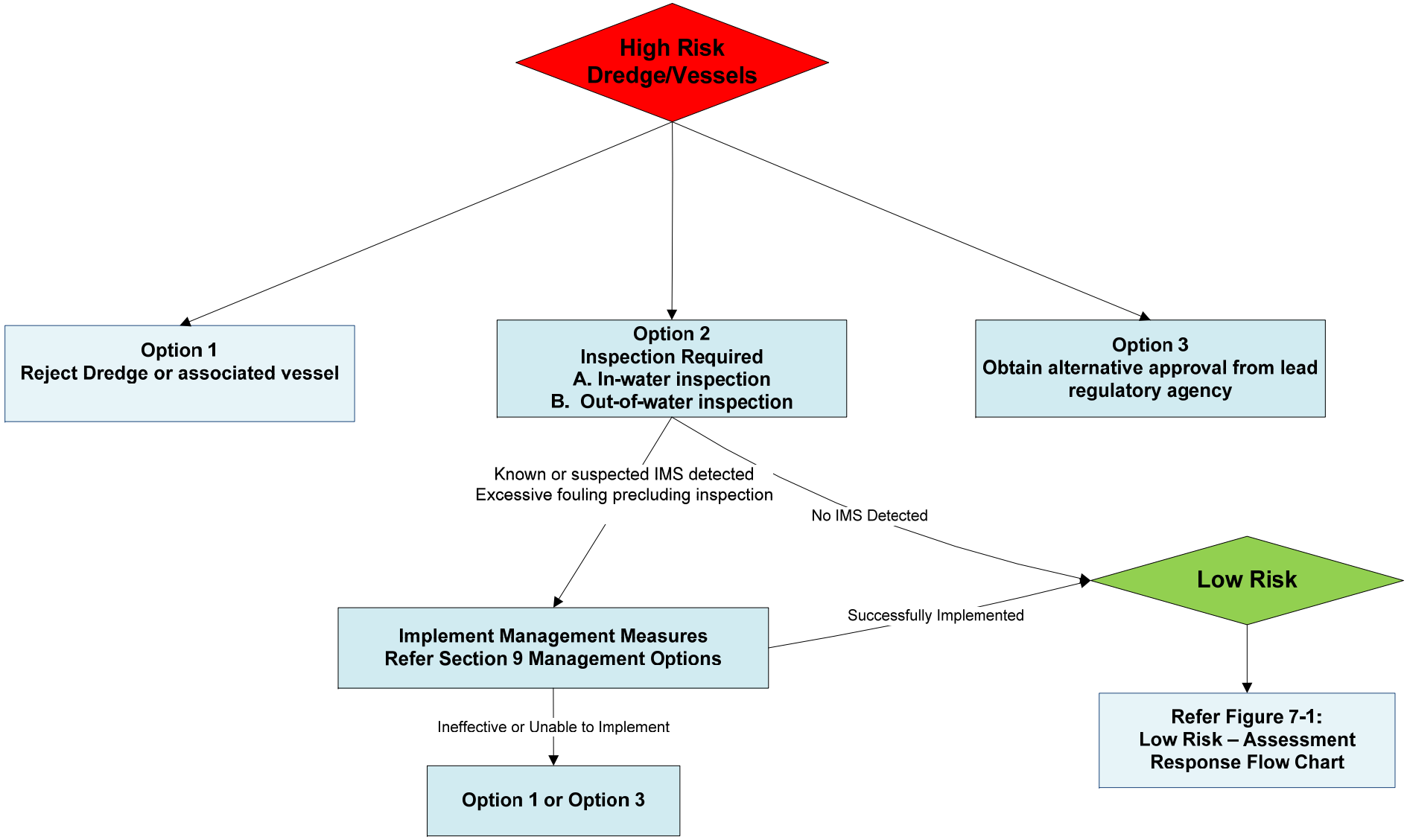


Figure 6.3 – IMS Assessment Response Flow Chart for HIGH RISK Dredges and Associated Vessels



6.2 IMMERSIBLE EQUIPMENT

Immersible equipment includes dredge cutters and ladders, on board tender vessels and any other equipment carried by the vessel that routinely becomes immersed in water. The risk management procedures for immersible equipment will use the following response criteria:

For immersible equipment assessed as a **LOW RISK**:

Low Risk Management Option: Confirmation of Immersible Equipment History Documentation.

- Immersible equipment information will be submitted to a BHP Billiton Iron Ore representative to confirm that all immersible equipment and supporting documents provide an accurate and reliable description of the immersible equipment's operational history and fouling control coating (as used by the ERASS).

For immersible equipment assessed as an **UNCERTAIN** or **HIGH RISK** (**Figure 6.4**):

Uncertain or High Risk Management Option 1: Reject Immersible Equipment

- Subject to availability the immersible equipment may be rejected and replaced with more suitable immersible equipment.

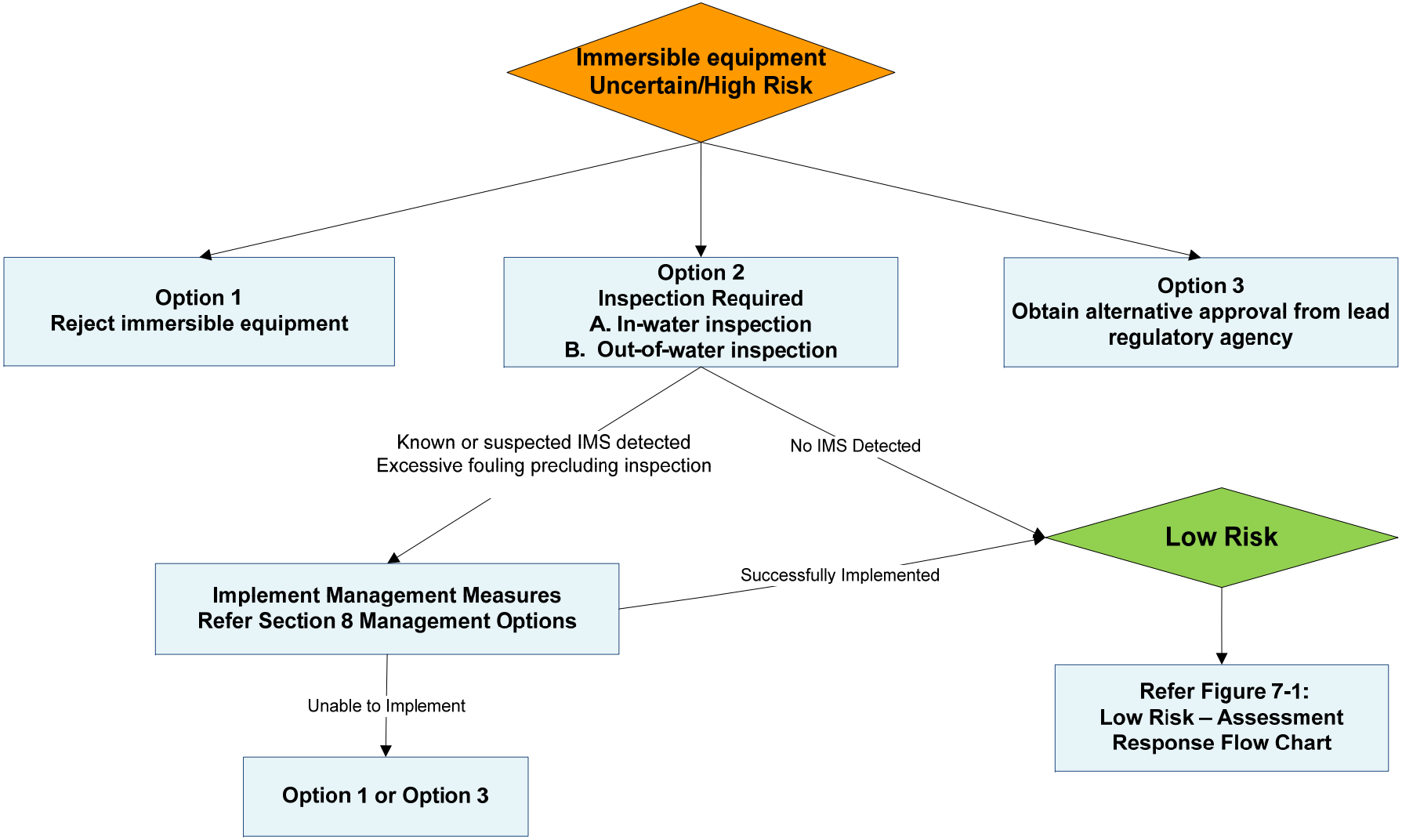
Uncertain or High Risk Management Option 2: Inspection

- An out-of-water or in-water inspection shall be undertaken in accordance with Section 7.2, at a domestic port or other location nominated by the immersible equipment operator and with this inspection occurring after completion of previous operations. A maximum continuous period of seven days exposure to conditions allowing the settlement of new fouling organisms must not be exceeded prior to the immersible equipment's final departure to the IMSMA, either directly or via supply port(s).

Uncertain or High Risk Management Option 3: Alternative Approval

- The above management options (Options 1 and 2) provide an alternative to compulsory vessel and immersible equipment inspection. Should an alternative approach be proposed, prior approval from the lead regulatory agency should be sought detailing and supporting the proposed course of action.

Figure 6.4 – IMS Assessment Response Flow Chart for UNCERTAIN/HIGH RISK Immersible Equipment



7 INSPECTION PROCEDURES

7.1 VESSELS

Vessel assessment and inspection should be undertaken following the general format provided in **Figure 7.1**. If inspection is established as the most appropriate course of action, a systematic out-of-water or in-water inspection of the vessel should be undertaken, to specifically inspect for sediment or biofouling containing both listed and unlisted IMS of concern. This inspection should be undertaken in accordance with the procedures described below.

Prior to the inspection taking place the vessel operator should be supplied with the inspection preparation requirements (**Appendix 0**). These outline the type of inspection procedure and describes the preparation recommended to be undertaken by the vessel operator, to ensure the inspection is undertaken in an efficient and safe manner.

The inspection should be undertaken within seven days of the final vessel departure for the IMSMA.

A suitably qualified marine scientist with experience in biofouling inspections will lead all IMS inspections. Details of the proposed inspecting personnel will be provided to the DoF for acceptance prior to them undertaken IMS inspections of vessels. In-water inspections must be conducted in water with adequate visibility (as determined by Lead IMS Inspector). The method for in-water inspections is at the discretion of the Lead IMS Inspector and may include, but is not limited to:

- the Lead IMS Inspector undertaking physical inspection;
- the Lead IMS Inspector remotely directing divers to undertake the inspection using live audio and visual communications; and
- the Lead IMS Inspector directing remotely operated vehicle (ROV) displaying live visual footage.
- Systematic inspections of the external and internal vessel areas will determine:
- presence, extent and condition of the FCC (external areas);
- presence and condition of internal fouling control systems;
- presence of sediment;
- extent of biofouling; and
- presence of IMS of concern.
- External hull inspections will include:
- vessel hull; and
- all external niche areas i.e. anodes, propellers, thrusters, sea chests.
- Internal vessel inspections will include:
- deck area and associated equipment (e.g. deck-borne tenders);
- bilge spaces;
- anchor cable lockers; and
- internal seawater cooling systems, to include strainers and strainer boxes.

Where possible video and/or still images will be taken of all key areas (including external and internal niche areas) of the vessel.

At the completion of the vessel inspection, the Vessel and Immersible Equipment Checklist and Inspection Form (**Appendix 0**) must be completed, signed by the Lead IMS Inspector and faxed/emailed to the BHP Billiton Iron Ore Site Environmental Superintendent as soon as possible but within 24 hours of completing the inspection.

In-water inspections may need to be followed by an out-of-water inspection or other management measures, where the in-water inspection detects high levels of secondary or tertiary biofouling (**Section 11**) to the extent that detection/identification of IMS of concern cannot be achieved to a satisfactory level of confidence. This requirement will be determined by the Lead IMS Inspector.

7.2 IMMERSIBLE EQUIPMENT

Immersible equipment assessment and inspection should be undertaken following the general format provided in **Figure 7.1**.If inspection is established as the most appropriate course of action, a systematic out-of-water or in-water inspection of the immersible equipment should be undertaken, to specifically inspect for sediment or biofouling containing both listed and unlisted IMS of concern. This inspection should be undertaken in accordance with the procedures described below:

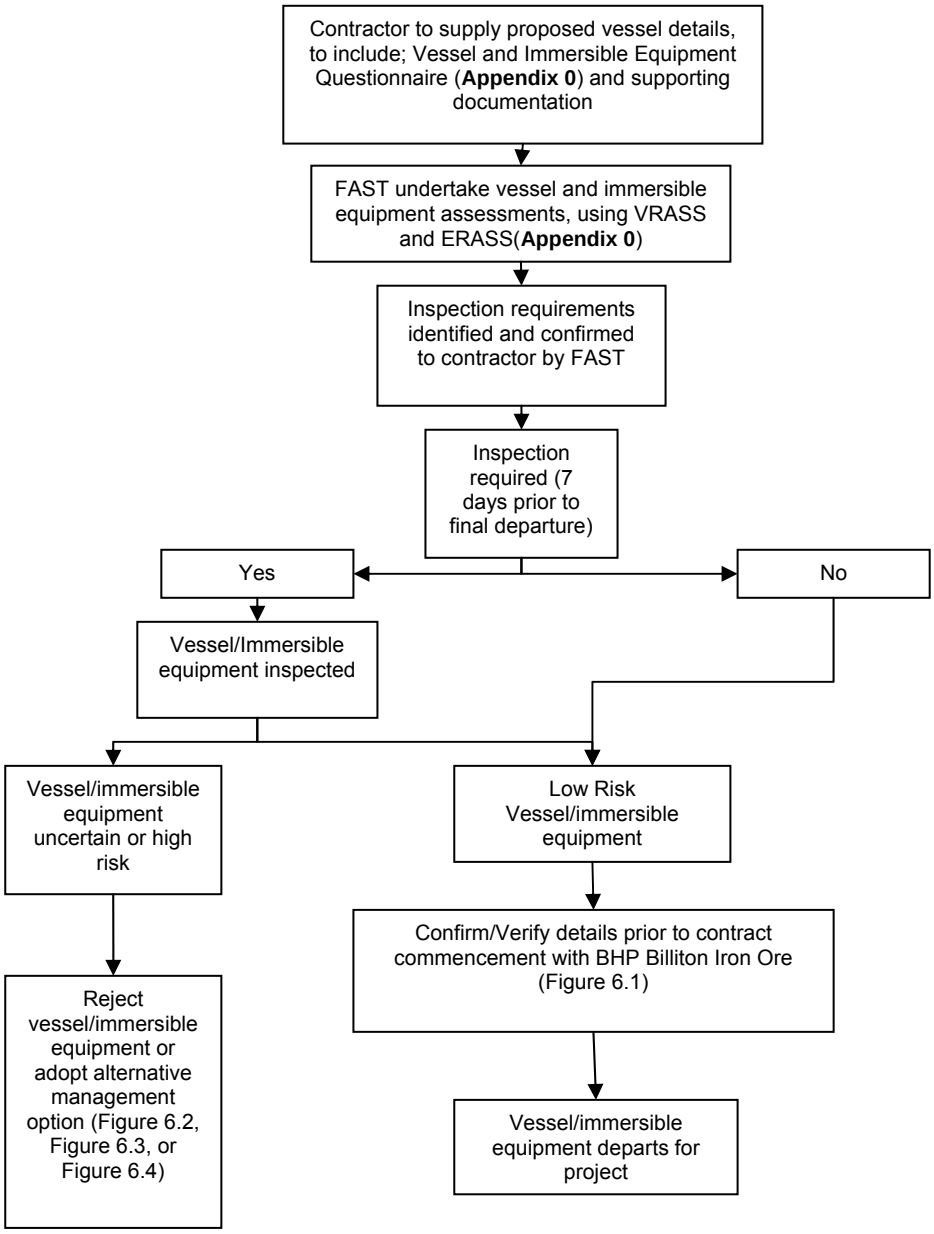
Prior to inspection all immersible equipment must be presented in a condition to be deployed by the contractor.

A suitably qualified marine scientist with experience in biofouling inspections will lead all IMS inspections. Details of the proposed inspection personnel will be provided to the DoF for acceptance prior to them undertaken IMS inspections of immersible equipment. In-water inspections must be conducted in water with adequate visibility (as determined by Lead IMS Inspector). The methodology for in-water inspections is at the discretion of the Lead IMS Inspector and may include but is not limited to:

- the Lead IMS Inspector undertaking physical inspection;
- the Lead IMS Inspector remotely directing divers through live audio and visual communications; and
- the Lead IMS Inspector directing ROV displaying live visual footage.
- Systematic immersible equipment inspections will include:
- presence, extent and condition of the FCC (external areas);
- presence of sediment;
- extent of biofouling; and
- presence of IMS of concern.
- Where possible video and/or still images will be taken of all key areas.

At the completion of immersible equipment inspection, the Vessel and Immersible Equipment Checklist and Inspection Form (**Appendix 0**) must be completed, signed by the Lead IMS Inspector and faxed/emailed to the BHP Billiton Iron Ore Site Environmental Superintendent as soon as possible but within 24 hours of completing the inspection.

Figure 7.1 – Vessel and Immersible Equipment Assessment and Inspection Format



8 MANAGEMENT MEASURES

8.1 HIGH SECONDARY OR TERTIARY BIOFOULING

If the vessel or immersible equipment is identified as being fouled to such an extent that detection/identification of IMS of concern (or other unusual species) cannot be achieved to a satisfactory level of confidence:

The Lead IMS Inspector will:

photograph/video the unclean area(s) ensuring the extent of fouling is clearly seen;

- immediately contact the BHP Billiton Iron Ore Site Environmental Superintendent with summary details;
- fax/email to BHP Billiton Iron Ore the Vessel and Immersible Equipment Checklist and Inspection Form (Appendix 0) describing the offending areas of hull or immersible equipment that require attention and the recommended actions;
- liaise with BHP Billiton Iron Ore and assist in providing advice on cleaning requirements and potential cleaning options so that appropriate methods are implemented to either:
- achieve an in-water inspection to a satisfactory level of confidence; or
- ensure the vessel and/or immersible equipment establishes a low risk status thus removing the need for additional management measures.

BHP BILLITON IRON ORE will:

Implement management measures which may include:

- Hull and External Niches –External biofouling to be removed from hull or immersible equipment. Material removed during hull or immersible equipment cleaning shall not be discarded in to the sea, but disposed of in an appropriate manner under local jurisdictional rules (e.g. licensed landfill). Note: Refer to Section 8.3 for a summary of the *ANZECC Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance*.
- Internal Niches – Internal biofouling to be treated or removed. Response actions may include destruction of the suspected living biofouling via treatment(s) using suitable commercial preparations (e.g. Rydlyme, Conquest or other agreed method), and/or replacement of any biofouled components.

8.2 KNOWN OR SUSPECTED IMS OF CONCERN

If a known or suspected IMS of concern is detected on the vessel or immersible equipment:

The Lead IMS Inspector will (Figure 8.1):

- photograph/video the unclean area(s) ensuring the organisms present are clearly seen;
- collect and preserve a sample of the known or suspected fouling organism(s) of concern to permit taxonomic confirmation. Note that if the inspection is undertaken outside of Australian waters, AQIS may need to be consulted to determine preservation techniques prior to any samples being allowed into Australia;
- immediately contact the BHP Billiton Iron Ore Site Environmental Superintendent with summary details including the name and extent of the IMS present;
- if agreed with the BHP Billiton Iron Ore representative, immediately alert the Vessel Master as to the presence of known or suspected IMS of concern;
- fax/email to BHP Billiton Iron Ore representative the Vessel and Immersible Equipment Checklist and Inspection Form (Appendix 0) describing the species of concern and the offending areas of hull or immersible equipment that require attention and any proposed management actions;
- liaise with BHP Billiton Iron Ore representative and assist in providing advice on cleaning requirements and potential management options. (Note that any management actions will

consider other key areas of the vessel and will not focus solely on the area(s) in which IMS of concern are found); and

- remain at the inspection area until further advice is received from BHP Billiton Iron Ore.

BHP BILLITON IRON ORE will (Figure 8.2):

- notify responsible Lead Regulatory Agency within 24 hours or as soon as practicable;
- implement appropriate response actions (see below) commensurate to the risk with agreement and approval from responsible Lead Regulatory Agency.
- Response actions may include:
- Vessels/immersible equipment located in Australian Waters – Vessels/immersible equipment in water will move offshore to a water depth of not less than 50 m deep and at least 12 nm offshore. They shall remain offshore until suitable management options have been identified through consultation with the responsible lead regulatory agency. Note: the 12 nm/50 m depth is not defined under legislation but has been determined in this IMSMP as the minimum distance and depth considered to effectively mitigate the risk of infection and should only be implemented as an immediate response to the identification of IMS.
- Vessels/immersible equipment located in dry dock or in international waters – Vessels/immersible equipment that are in dry dock or international waters will remain in dry dock or international waters until the organisms have been removed. An IMS inspector must verify that no further organisms of concern exist on the vessel/immersible equipment.
- Hull and External Niches – Hull or immersible equipment item(s) to be cleaned and then re-inspected as per Section 7. Material removed during hull or immersible equipment cleaning shall not be discarded to sea, but disposed in an appropriate manner under local jurisdictional rules (e.g. licensed landfill).
- Internal Niches – Niche to be cleaned and then re-inspected as per Section 7. Response actions may include destruction of the suspected living biofouling via treatment(s) using suitable commercial preparations (e.g. Rydlyme, Conquest or other agreed method), plus replacement of any remaining biofouled components.

Figure 8.1 – Lead IMPS Inspector Response Procedure Following Detection of Known or Suspected IMS of Concern

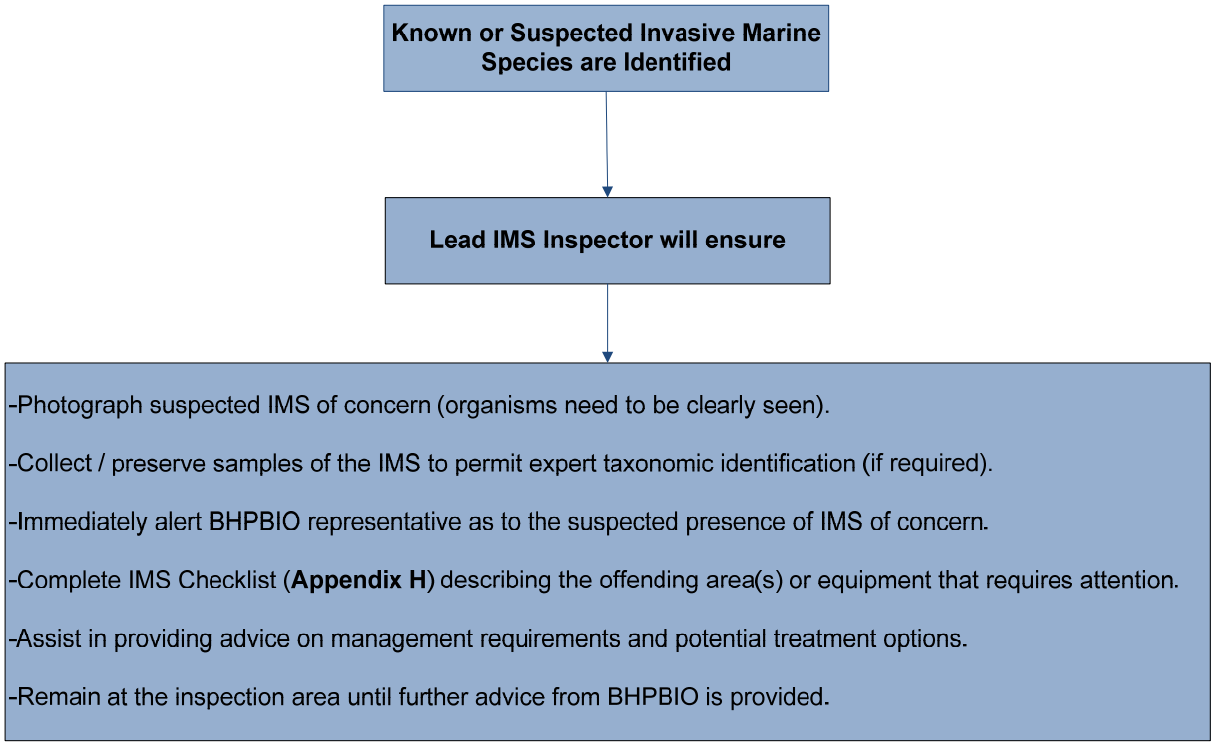
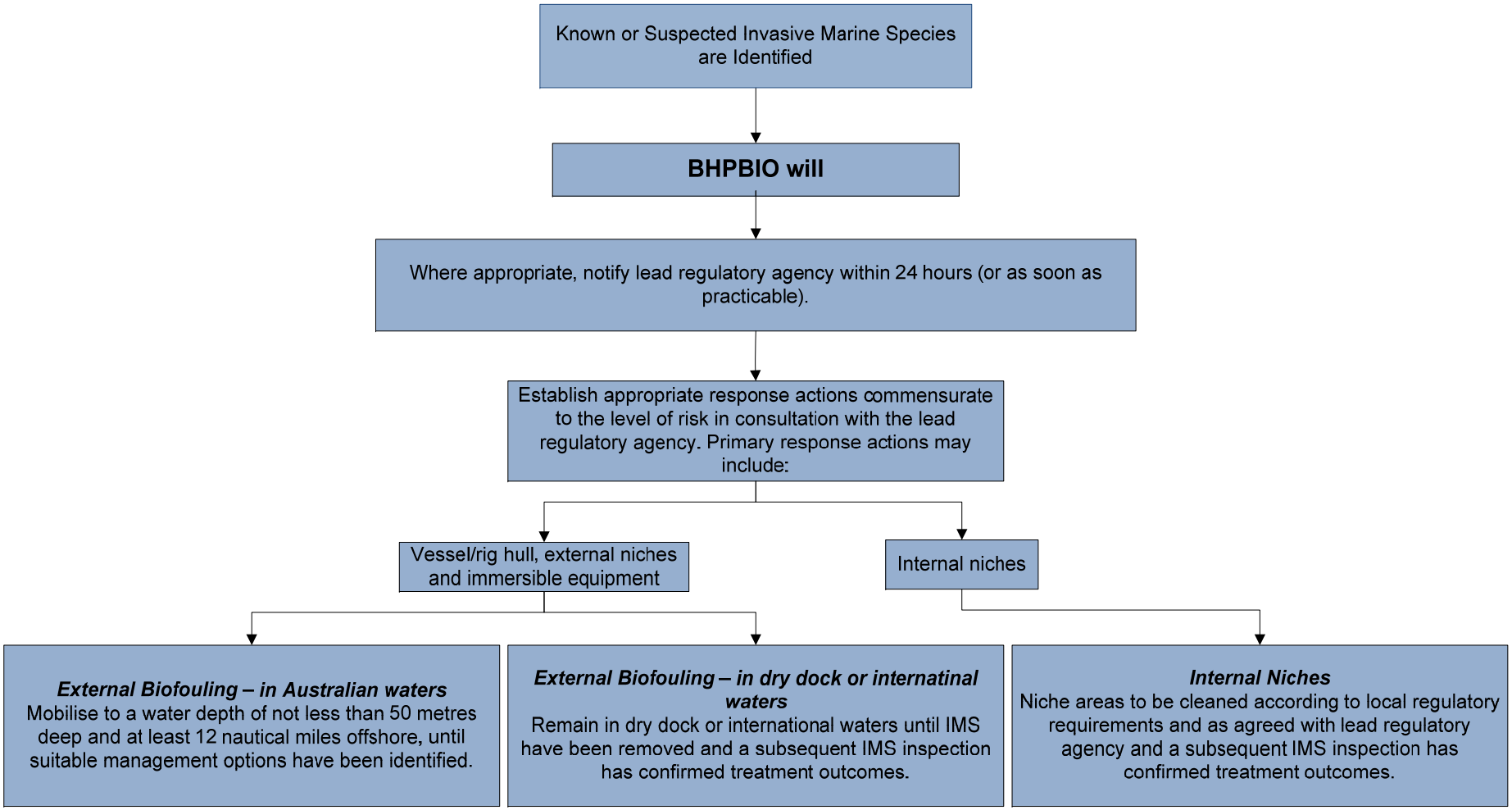


Figure 8.2 – BHP Billiton Iron Ore Response Procedure Following Detection of Known or Suspected Invasive Marine Species of Concern



8.3 ANZEEC CODE OF PRACTICE

To minimise the risk of further IMS establishing in Australian waters ANZECC in consultation with AQIS has established the Code of Practice for In-water Hull Cleaning and Maintenance; (*www.environment.gov.au/coasts/pollution/antifouling/code/pubs/code.pdf*).

The requirements that apply to Australian waters, are applicable to all commercial vessels and are to be used in conjunction with state requirements. The following is a summary of some of the more relevant conditions relating to this code of practice.

- no part of a vessel's hull treated with an antifoulant is to be cleaned in Australia without the written permission of the Harbour Master, local government or state environmental protection agency (administering authority);
- in-water hull cleaning is prohibited, except under extraordinary circumstances and permission will not normally be granted; and
- the cleaning of sea chests, sea suction grids and other hull apertures may be permitted provided that any debris removed (including encrustation, barnacles and weeds) is not allowed to pass into the water column or fall to the sea bed and subject to any other conditions attached to the permit. An application (Appendix 0) seeking permission to carry out this work must be lodged with the administering authority at least five working days prior to commencement of the anticipated start date. Such application will detail how encrustations, barnacles and other debris will be contained and or collected for disposal as well as the method of disposal.

8.4 BALLAST WATER MANAGEMENT REQUIREMENTS

Vessels arriving from outside Australian waters with the intention to discharge ballast water within Australian waters will adhere to the *AQIS Mandatory Ballast Water Requirements (*AQIS 2005, 2008*)*. A summary of the AQIS *Mandatory Ballast Water Requirements* are presented below, however it is the responsibility of all Vessel Masters to refer to the full management requirements for guidance.

8.4.1 AQIS Mandatory Ballast Water Requirements

All vessels that have travelled from international waters are required to manage their ballast water in accordance with AQIS requirements. These arrangements prohibit the discharge of high-risk ballast water within Australian territorial seas (within 12 nm of Australian territories) including Australian ports.

Before internationally sourced ballast water can be discharged within Australia's territorial seas, ballast water must be assessed and managed in accordance with AQIS requirements. While AQIS deems that all salt water from ports (or coastal waters) outside Australia's territorial sea represents a high-risk, there are three options available to manage high risk ballast water:

- no discharge of ballast water while in Australian territorial seas; or
- ballast water is to be exchanged by an approved method prior to entering Australian territorial seas; or
- a risk assessment is undertaken through the 'Ballast Water Decision Support System' (BWDSS) - a computer application that can provide vessels with a risk assessment of their ballast water and deem it to be acceptable for discharge or otherwise.
- Approved Ballast water exchange methods include:
- sequential exchange (empty/refill) method;
- flow through method; and
- dilution method.

It is also recommended that ballast exchanges be conducted as far as possible away from shore and in water at least 200 m deep (AQIS 2008).

Australia's ballast water management requirements are enforced under the *Quarantine Act 1908.* Further information in relation to AQIS ballast water requirement can be found at www.aqis.gov.au/shipping.

Starting in 2009, new ships will be required to have on-board ballast water treatment systems in place. Between 2009 and 2016, existing ships will progressively (based on ballast water capacity) be required to have on-board ballast water treatment systems in place. From 2016, all ships will be required to have on-board treatment facilities.

9 REPORTING REQUIREMENTS

At the conclusion of the vessel and immersible equipment risk assessment process, cleaning, treatment and re-inspection requirements, copies of completed assessment sheets, inspection forms and associated relevant documentation will be compiled by BHP Billiton Iron Ore and submitted to the lead regulatory agency. Documentation may include:

- Vessel History Questionnaire (including FCC certification and cleaning/maintenance history documentation);
- a copy of the completed Risk Assessment Scoring Sheet (VRASS or ERASS) for each vessel and immersible equipment item;
- a copy of the completed Vessel and Immersible Equipment Inspection Checklist and Inspection Form signed by the Lead IMS Inspector;
- a copy of the final IMS inspection report (including photographs); and
- correspondence detailing actions undertaken following the initial risk assessment.

As noted in Section 5, the DoF will be consulted throughout the IMS management process. As part of this consultation, Vessel History Questionnaires, Risk Assessment Scoring Sheets and premobilisation inspection reports (where applicable) will be provided to the DoF, prior to the mobilisation of the vessel or immersible equipment. Arrival IMS inspection reports will be provided to the DoF within 48 hours of competition of arrival inspections.

Management of invasive species in the project area may also be incorporated into Marine Fauna management reporting when required as by agreement with the EPA. As a minimum, detail may be incorporated into an annual report capturing key criteria.

10 CONTINGENCIES

Any observed breaches of the control measures detailed within this framework will be investigated fully and additional corrective measures devised to prevent any recurrences.

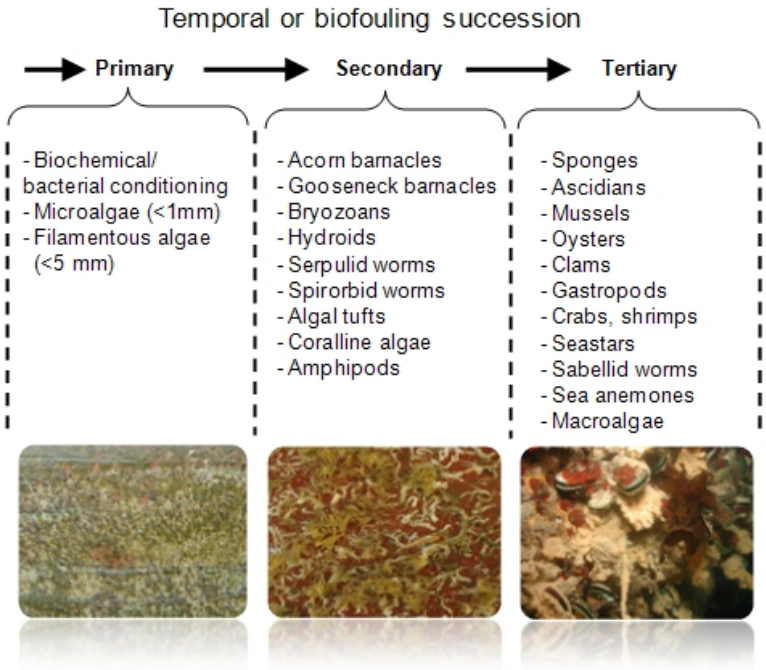
As outlined in reporting requirements, all incidents will be reported to the relevant statutory authority.

11 GLOSSARY

Term	Definition
Anchor cable lockers	Stores the anchor cables.
Ballast	Extra weight (seawater) taken on to increase a ship's stability to prevent rolling and pitching.
Barnacle	Invertebrate organism that lives in a hard shell attached to a rock, boat bottom or other hard surface.
Benthic	Relating to the seafloor, and includes organisms living in or on the sediment/rocks on the seafloor.
Bilge/bilge spaces	The lowest internal parts of a vessel where water and waste liquids accumulate.
Biofouling	Any organism attached to or nestling in a vessel hull, including the internal seawater pipe work, anchor well, cable locker, cargo spaces, bilges, etc.
Bryozoans	Tiny colonial marine organisms that build stony skeletons of calcium carbonate, superficially similar to coral.
Cryptogenic	A species that is not demonstrably native or introduced.
Dredge	Device that sucks or scraps the seabed in order to deepen or widen the seafloor.
Dredging	Deepening and/or widening of a waterway using a machine that removes materials by scooping or sucking the sediments.
Dry dock	Enclosed dock that can be dewatered to provide a stable, dry platform for the cleaning, repair, and/ or construction of vessels.
Eradicate	To remove entirely, completely destroy, extirpate, get rid of.
Fouling control coating (FCC)	A coating system designed to reduce the attachment and growth of fouling organisms. Includes biocidal coatings (with biocides - anti-fouling coatings), non-active coatings (with silicon or teflon - fouling release coatings) and surface-deterrent coatings (with microtopographic patterns).
Fouling organism(s)	Any plant or animal that attaches to natural and artificial substrates such as piers, navigation buoys, pilings or hulls. Includes crawling and nestling forms as well as sessile seaweeds, hydroids, barnacles, mussels, bryozoans, etc. (see Biofouling).
Hull(s)	The wetted surfaces of a vessel, including its propulsion and steering gear, internal cooling circuits, sea strainers, bow thrusters, transducers, log probes, anchors, anchor chains, anchor lockers and bilge spaces.
Hydroids	Small marine organisms. Attached to the branches are cup shaped feeding polyps with a central mouth surrounded by tentacles.
Immersible equipment	Equipment that can be submerged and operated underwater without suffering any damage.
Incursion	Unauthorised entrance or movement of a non-native species into a region or country where it is not already established.
Infection	When the hull of a vessel becomes fouled, or its trim tank/s are filled with untreated seawater.
Inoculation	A translocation of fouled material or ballast water that contains organisms not native to the receiving environment.
Introduced marine species	Marine species whose movement into a region beyond its native range; includes species making self-mediated range expansion because of a new canal, waterway or anthropogenic climate change.
Invasive marine species (IMS)	Marine organisms that could be introduced via vessels and immersible equipment and are likely to have the ability to survive and reproduce.
Invasive species	Introduced species that have spread throughout a range of non-native natural or semi-natural habitats and ecosystems by itself and/or human-assisted means.
Land	All exposed Australian land areas, to include reef and reef systems exposed during periods of low tide.

Term	Definition
Low risk status	A vessel or immersible equipment with a 'Low Risk' status has undergone an inspection, cleaning or risk assessment so that it is rendered sufficiently unlikely to contain sediment and/or biofouling containing marine species of concern.
Marine pests	An invasive marine species that threatens environmental, economic or social values.
Marine species of concern	Invasive non-indigenous marine species that have the potential to establish as marine pests.
Mitigate	To reduce, lessen, ameliorate or compensate negative effects and impacts.
Mollusca	Taxonomic phylum of invertebrates including snails and octopus.
Nearshore/coastal waters	Within 50 metre depth contour and/or within 12 nm from land (including Australian territorial reefs and islands).
Niche	Any location on a hull that facilitates the accumulation and growth of sessile or mobile fouling organisms by the absence of an intact fouling control coating or lack of turbulent flow.
Offshore waters	Greater than 12 nm from land (including Australian territorial reefs and islands) and outside the 50 metre depth contour.
Pathway	The route taken by one or more vectors from point A to point B.
Pest	Any troublesome, noxious or destructive organism; a bane, 'curse' or 'plague' species.
Primary fouling	A discernible layer or patch of biofilm, with or without green filamentous algae ('beard', 'grass', 'weed') (Figure 11.1).
Risk	The probability that a consequence will occur.
Risk assessment	Undertaking the various tasks required to determine the level of risk.
Risk management	The culture, organisational framework and activities which are directed towards identifying, evaluating and reducing risks.
Sea chest	Recess built into a vessel's hull, typically covered by a coarse grill, containing one or several intakes and designed to minimise cavitation and maximise pumping efficiency to internal vessel cooling and ballasting circuits. Located below the waterline and below the front bulkhead of the engine room.
Sea squirts	Marine organisms belonging to the subphylum 'tunicates' and have cylindrical bodies attached to a substrate by a base or stalk.
Seawater system	Seawater hydraulic or engine cooling lines.
Secondary fouling	The sessile and mobile biota that settles, grasps, nestles or is otherwise attracted to primary fouling or niches that provide protection from an intact fouling control coating and/or turbulent flow (Figure 11.1).
State Waters	Navigable waters within the limits of the State corresponding to the nearshore coastal waters out to – 3 nm.
Strainers and strainer boxes	Device that acts as a screen to filter out solids, allowing liquids to flow through.
Taxa	General name for a variety of different taxonomic categories—class, family, genus, species, sub-species, etc.
Translocate	Transfer of an organism or its propagules between disjunct sites.
Vector	The physical means, agent or mechanism which facilitates the transfer of organisms or their propagules from one place to another (see Pathway).
Vessel	Any type of ship, dredge barge, drilling unit, work boat, fishing vessel, yacht, launch, recreational boat, personal watercraft, dinghy, submersible, etc.

Figure 11.1 – Illustration of the terms primary, secondary and tertiary fouling



Note: Figure source DAFF, 2008a

12 ACRONYMS

Acronym	Definition
ABWR	Australian Ballast Water Requirements
ANZECC	Australia and New Zealand Environment and Conservation Council
AQIS	Australian Quarantine and Inspection Service
BAM Act	Biosecurity and Agriculture Management Act 2007
BRS	Government Bureau of Resource Science
BWDSS	Ballast Water Decision Support System
CCIMPE	Consultative Committee on Introduced Marine Pest Emergency
DAFF	Department of Agriculture, Fisheries and Forestry
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
DoF	Western Australian Department of Fisheries
DSDMP	Dredging and Spoil Disposal Management Plan
EPBC Act	Environmental Protection and Biodiversity Conservation Act (1999)
ERASS	Equipment Risk Assessment Score Sheets
FCC	Fouling control coating
IGA	Intergovernmental Agreement
IMS	Invasive marine species
IMSMA	Invasive Marine Species Management Area
IMSMP	Invasive Marine Species Management Plan
IMO	International Maritime Organisations
IMSP	Invasive Marine Species Program
Mtpa	Million tonnes per annum
NIMPCG	National Introduced Marine Pests Coordination Group
ROV	Remotely Operated Vehicle
VRASS	Vessel Risk Assessment Score Sheets
WA	Western Australia

13 REFERENCES

AQIS (2005) *Australian Ballast Water Management Requirements*, Australian Quarantine and Inspection Service (AQIS). 11 pp. http://www.daff.gov.au/corporate_docs/publications/pdf/quarantine/shipping/Australian_BW_Requirements.pdf

AQIS (2006) *Biofouling protocols for small vessels*, Pamphlets and downloadable materials from http://www.daff.gov.au/aqis/avm/vessels/less-25m/biofouling-protocols.

AQIS (2008) *Australian Ballast Water Management Requirements* 31 March 2008.

BRS (2007) *Designated Exchange Areas Project – Providing Informed Decision on the Discharge of Ballast Water in Australia (Phase II)*.

Carlton, JT (2001) *Introduced Species in US Coastal Waters, Environmental Impacts and Management Priorities*, Pew Oceans Commission Arlington, VA.

CSIRO (1999) *Introduced species survey – Port of Port Hedland, Western Australia*. Unpublished report by the Centre for Research on Introduced Marine Pests, CSIRO Marine Research, Hobart (54 pp. incl. Appendices).

Department of Agriculture Fisheries and Forestry (2008a) *Draft Overview of the Proposed Australian Biofouling Management Requirements*.

Department of Agriculture Fisheries and Forestry (2008b) *Draft Australian Biofouling Management Policy (Version 1)*.

Government of Western Australia (2007) *State of the Environment Report 2007*, Viewed 14 August 2007 http://www.soe.wa.gov.au/report/marine/introduced-marine-species.html

Huisman, JM, Jones, DS, Wells, FE, and Burton, T (2008). *Marine introductions into Western Australian waters*. Records of the Western Australian Museum 24: 323-366.

Kanhng, SE and Grigg, RW, (2004) *Impact of an alien octocoral Carijoa riisei, on black corals in Hawaii*. Coral Reefs. 24(4): 556-562.

Kinloch, M, Summerson, R and Curran, D (2003) *Domestic vessel movements and the spread of marine pests: Risks and management approaches*. Published report by Bureau of Rural Sciences (Department of Agriculture, Fisheries and Forestry) to the National Oceans Office, Canberra, November 2003 (168 pp. including Appendices).

Morton B (1996) 'The subsidiary impacts of dredging (and trawling) on a sub-tidal benthic molluscan community in the southern waters of Hong Kong', *Marine Pollution Bulletin*, 32(10): 701-710.

Morton B & KS Tan (2006). '*Brachidontes strialutus* (Bivalvia; Mytilidae) introduced to Singapore', *The Raffles Bulletin of Zoology* 54(2): 435-439.

Neil, KM, Hilliard, RW, Clark, P, Russell, B, Clark, R and Polglaze, J (2005) *Situation and Gaps Analysis of Introduced Marine Species, Vectors, Nodes and Management Arrangements for the Northern Planning Area*, Report published by the National Oceans Office (Marine Division, Department of Environment and Heritage), Canberra.

Russell, BC, Neil, K and Hilliard, R, (2003) *Marine and Terrestrial Introduced Species Prevention and Management Strategy: Ashmore Reef National Nature Reserve and Cartier Island Marine Reserve*. Published by the Department of Environment and Heritage, Canberra, December 2003.

Taylor, AH and Rigby, G (2002) *The Infection and Management of Vessel Biofouling Areas as Pathways for the Introduction of Unwanted Aquatic Organisms*. Department of Agriculture, Fisheries and Forestry.

URS Australia Pty Ltd., (2006) *Browse Basin Offshore Surveys; Risk Assessment Tool- Introduced Marine Species*. Prepared for WEL Energy 6 October 2006.

URS Australia Pty Ltd., (2007a) *Hazard analysis of marine biofouling pests in the Australian petroleum industry*. Review prepared on behalf of the Department of Agriculture, Fisheries and Forestry, Canberra, 2 July 2007.

URS Australia Pty Ltd., (2007b) *Port Walcott port survey for introduced marine species – Cape Lambert*. Survey report prepared for Pilbara Iron (Cape Lambert) by URS Australia Pty Ltd (Perth), June 2007.

URS Australia Pty Ltd., (2007c) *Review of the National Border Biofouling Protocol for apprehended and international vessels less than 25 m in length*. Report to the Australian Quarantine and Inspection Service (AQIS) Seaports Program, Department of Agriculture, Fisheries and Forestry, Canberra, by URS Australia Pty Ltd (Perth), March 2007.

Vessel Types

A.1.1 - Appraisal of the Vessel Types

A review of all types of non-trading vessel (including dredges) that operate in Australian waters was undertaken by Kinloch et al. (2003) to assess their relative potential to transfer IMS via biofouling and/or ballast water, as a consequence of the general characteristics of their hull, immersible equipment and operational duties. This hazard analysis ranked commercial fishing units, dredges, offshore support vessels and barges (generic) as posing the highest relative threat of introducing IMS (ranked 1st to 4th) of 23 vessels types assessed, while mobile drill rigs were ranked 6th.

A more industry-specific appraisal of the relative marine pest introduction threat, posed by the different types of non-trading vessel, used by the Australian petroleum industry, was recently undertaken by URS (2007a). This study also used a semi-quantitative approach to identify and rank, for the biofouling vector, the relative risk score of each vessel type, as compared to the risk posed by two types of trading ship (LNG carriers and general cargo ships). The risk rating scores were ascribed by identifying and quantifying the behaviour of the vessel types. This was undertaken on behalf of DAFF IMS Panel for the Offshore Petroleum Industry biofouling hazard analysis. This ranking has been modified to enable its use within the risk methodology in this IMSMP. To achieve this, parameters relating to specific vessel specifications and history were removed in order to eliminate duplication of risk vectors already covered within the VRASS process.

A.1.2 - Dredge Vessels

Dredges are flat bottomed, steel hulled vessels specifically constructed to excavate the seabed. Two common types of dredges are 1) grab bucket and 2) suction. While operational the dredging equipment is almost continuously in contact with seabed and the vessel is usually in shallow inshore marine environment frequently within port areas. Therefore there is the likelihood that the dredge will suck or grab benthic invasive marine species. The dredges themselves are rich in niche areas found among pumps, piping and hoppers, and there is the risk of heavy biofouling as the vessels work continuously, often in shallow productive inshore waters travelling at slow speeds. Based on the above Kinloch et al. (2003) ranked dredging vessels 2nd while URS (2007a) attributed a rank of 2.4.

A.1.3 - Mobile Offshore Drilling Units (MODU)

Three of the main MODU are jack-up drill rigs, semi-submersible drill rigs and drill ships. They are typically large semi submersible structures, thereby having large surface areas for fouling in addition to many low-flow, fluid filled spaces where organism can remain lodged during transit. Drill rigs come into direct contact with the seabed either through legs and spud cans (i.e. jack-ups) or anchoring and moorings (i.e. semi-submersibles) which also have thousands of metres of chains. These all provide opportunities for settlement of biofouling organisms. These MODUs are mobile and wide ranging typically towed between drill locations, which can be in different countries or even continents, at speeds of approximately 2 knots. These slow speeds allow fouling organisms to remain attached to the external hull during transit. While on occasion they undertake very long voyages, most movements are short ranged and they typically do not enter ports. Largely due to the fact that they are in constant contact with the seabed, as well as the substantial quantities of suitable settlement substrate drill rigs offer for attachment and refuge of marine pests Kinloch et al (2003) ranked MODUs 6th and similarly URS (2007a) found that drill rigs had the highest risk (2.4) however drill ships did have a lower risk (1.9)

A.1.4 - Offshore Support Vessels (PSV, AHT, AHTSV)

Offshore support vessel (OSV) is a term typically associated with the three main types of vessels that tend MODUs and seismic vessels during exploration, appraisal and development programmes. Thus OSV are namely platform supply vessels (PSVs), anchor handling tugs (AHTs) and anchor handling tug supply vessels (AHTSVs).

These are all relatively large working vessels that are equipped for rescue operations, fire fighting, oil spill recovery, and transfer of supplies and equipment. They can regularly uplift seawater for trimming and minor ballasting purposes (the largest volumes are typically carried by largest PSVs on their 'light' return voyages to a supply base during rough weather). OSVs operate on a 24/7 basis when tending a drilling/seismic operation, or transferring cargo and waste to and from the nearest supply base, with some 5 to10 per cent of their total time spent stationary in port (Kinloch et al. 2003, URS 2007a). Their towing and tendering speeds are slow (2 to 3 knots) while their cruising speeds during supply operations are typically held around 10 knots to optimise fuel consumption/range capability. Their slow towing and voyaging speeds permit retainment of fouling growth. For all of the above reasons, OSVs

as a group, have been recognised as posing a relatively high risk for transferring marine pests (e.g. ranked 3rd of 23 vessel types by Kinloch et al. 2003).

However, Kinloch et al. (2003) groups a broad variety and size of vessels as OSVs. URS (2006) suggests that there is a strong correlation between the amount of time an OSV spends in port and their associated risk of IMS infection. In Australia, OSVs associated with jack-up rigs and seismic vessels typically have a high utilisation rate and minimal port time thus the actual risk of IMS infection of this type of OSV is probably lower than that described for the OSVs as a group.

A.1.5 - Seismic Survey Vessels (SSV)

Seismic vessels are large and purpose built designed to carry out exploratory surveys of the seabed to search for potential new oil and gas reserves equipped with air gun arrays and hydrophone streamers. Streamers can range from 150 m to 6000 m in length. IMS can become entrained as fouling organisms on the hull, sea chests, and seawater intake pipes. In addition organisms can settle on the airguns, streamers and hydrophones as they are typically towed 24 hours a day at slow speeds. However seismic boats are regularly inspected and cleaned and typically do not spend extended periods in ports. In addition the seismic equipment, airguns and streamers, are typically thoroughly cleaned after each deployment. Based on the above, Kinloch ranked seismic vessels as 18th and URS (2007a) attributed them a risk rating of 1.7.

A.1.6 - Construction Barges (Barge)

Construction barges are flat bottom, square fronted vessels designed to carry freight. During loading and loading the hull is in close proximity and sometimes in contact with the seabed in inshore waters, this creates opportunities for organisms to settle on the hull. In addition construction barges can remain for extended periods in ports therefore acquiring biofouling.

Due to the relatively long periods spent in port or operating in inshore waters, as well as their occasional interaction with the seabed Kinloch et al. (2003) ranked barges (generic) as 4th and URS (2007a) attributed them a risk rating of 1.9.

A.1.7 - Diving Support Vessel (DSV)

DSVs are often contracted to offshore survey jobs as they are equipped with the diving spread, air bank compressor, decompression chamber, accommodation and the emergency medical equipment that are needed to support safe diving operations in remote locations.

A.1.8 - Fast Ferry/Crew Transfer Vessel (CTV)

These vessels provide regular shuttle service between mobilisation ports and area of operation, with relatively short predicted in-port turn around periods (18 – 36 hours).

A.1.9 - Research Vessels (RV)

Research vessels are involved in activities that have close interaction with the marine environment (including the water column and the seabed). Activities involve deploying instruments and sampling equipment that if left for long periods of time could become fouled, however it is standard practice to clean equipment between trips and even between sampling locations.

There is a dichotomy between small research vessels that typically have high home port fidelity and conduct short day trips within 30 nm versus large research vessels that have 2 to 3 week trip duration, traversing hundreds to thousands of kilometres and visiting other ports. Typically the smaller vessels are transported via trailer between trips allowing the vessels to dry out between trips. However the larger vessels remain in the water and can be stationary in ports for long periods of time. Therefore the larger vessels have a higher possibility of translocating IMS both between ports as well as from ports to offshore waters or islands and translocated between sample sites, rarely visited by other craft.

Kinloch et al. (2003) ranked research vessels as 14th due to the fact that the majority of research vessels are trailered and gear and vessel are cleaned and rinsed with freshwater after use.

A.1.10 - Utility Support Vessels (USV)

Utility support vessels (USV) typically support offshore operations including seismic and research programs. The vessels can vary in size but generally are ex-commercial fishing boats with cruising speeds of 10 to 20 knots. The vessels can have stationary periods during an operation however the duration will depend on the type of work, which can include accommodation, transport or work platforms, but typically would not exceed two weeks. URS (2007a) attributed them a risk rating of 1.4. However, when an USV is used only as an accommodation vessel (AV) the risk rating is 1.7.

Table A.1.1: Biofouling-meditated IMS transfer risk levels for non trading vessel types

Vessel type / Feature	Trading ship										MODU								
	LNG	GCS	SSV	AHT/ AHTSV	USV	PSV	DSV	AV	HLS	CTV	Jack-up	Semi-sub	Drill ship	Constr. barge	LC	Pipelay ship	RDS	FSO/ FPsO	Dredge
Long distance transfers between project sites	-	-	3	3	1	2	2	2	3	2	2	2	3	3	1	3	3	-	3
Number and range of niches	1	1	2	2	1	2	2	2	2	1	3	3	2	1	2	2	3	2	3
Transit or mobilising speed	1	1	2	3	2	2	2	2	2	1	3	3	2	2	2	2	2	2	2
Working speed at project site	-	-	3	3	3	3	3	3	3	1	3	3	3	3	2	3	3	3	3
FCC wear and tear rate	1	1	1	1	2	2	2	1	1	1	-	-	1	3	3	2	2	1	3
Hull cleaning constraints[#]	2	2	1	2	1	2	2	2	2	1	3	3	2	2	1	2	2	3	3
Mean value	1.1	1.1	1.7	2.0	1.4	1.9	1.9	1.7	1.9	1.0	2.4	2.4	1.9	1.9	1.6	2.0	2.1	1.9	2.4

** modified from URS (2007a)*

Table notes:

Two trading ships (LNG carrier, general cargo ship) are included to provide a comparison of the relative scores. LNG carriers are one of the lowest risk types of trading vessel owing to their consistent ocean-going time-charter trade, high level of hull maintenance level, speed and the relative isolation of LNG terminals for safety needs.

The deliberately simple scoring system does not weight particular factors such as FCC presence or wear/tear:

Score value 1 = Low frequency/low value /low risk; 2 = Medium or moderate frequency/default value/moderate risk; 3 = High frequency/high value/high risk.

Where a feature for a particular vessel type is uncertain, or is known to vary project-by-project or with particular vessel design, the moderate score value (2) was used as the default.

Where a nil score occurs (-), the denominator for calculating the mean value was reduced accordingly.

#Hull cleaning constraints: this feature reflects difficulties in cleaning (and confirming cleaning adequacy) due to vessel size/hull area, amount of hard-to-reach surfaces and availability of suitable slipping locations and opportunities in Australia.

Rating of the mean values: <2.0 = Low to moderate biofouling propensity (green); 2.0 - <2.4 = Moderate biofouling propensity (yellow); 2.4 = High fouling propensity (orange).

Abbreviations: LNG: Liquefied natural gas carrier, GCS: General cargo ship, SSV: Seismic survey vessel, AHT: Anchor handling tug, AHTSV: AHT-support vessel, USV: Utility support vessel, PSV: Platform supply vessel, DSV: Diving support vessel, AV: Accommodation vessel (not barge type), HLS: Heavy lift ship, CTV: Crew transfer vessel, MODU: Mobile drilling unit, RDS: Rock dumping ship, LC: Landing craft (island base supply), FSO/FSOP: Floating storage off loader/Floating production storage ff-loader

IMS Inspection Criteria and Preparation Requirements.

BHP Billiton Iron Ore is planning to undertake dredging activities as part of the Outer Harbour Development. To manage the risk of introducing invasive marine species (IMS), BHP Billiton Iron Ore has developed an *Invasive Marine Species Management Plan (IMSMP).* The IMSMP has been developed as part of the environmental management commitments for the Outer Harbour Development. A risk assessment approach is utilised to identify those vessels or immersible equipment that may have a greater risk of infection with IMS. .

In part, the risk is managed through systematic vessel and immersible equipment inspections undertaken by qualified and experienced marine scientists. The following criteria and procedures have been established to assist vessel masters and immersible equipment operators prepare for IMS inspections. Inspection may be either in water or out of water dependent on the available facilities and inspection requirements.

A.2.1 - IMS Inspection Procedure

The procedure involves a visual inspection of the vessel and all immersible equipment which includes:

- either an in-water of out-of-water inspection of the vessel hull and associated niche areas (seawater intakes, rudder(s), thrusters(s));
- inspection of deck area, dredge cutters, deck-borne tenders and immersible equipment;
- inspection of vessel internal spaces (bilge spaces, anchor cable lockers and strainers); and
- the visual inspection includes the use of video and/or still shots in all key areas (including internal and external niche areas) of the vessel or immersible equipment for accurate assessment and future reference.

A.2.2 - Preparation for IMS Inspection

To minimise delays and ensure the inspection is undertaken in an efficient and safe manner, the Vessel Master is requested to prepare the vessel and immersible equipment prior to the inspection.

The preparation includes:

- ensuring access to and visual inspection of all bilge spaces and anchor cable lockers;
- preparing, in advance, strainer boxes for visual inspection;
- ensuring all immersible equipment such as strainer cables and airguns are presented in the condition required for future deployment and accessible for inspection;
- ensuring the chief engineer or other appropriate staff are available to assist with systems identification;
- ensuring the vessel is in a location that enables diver access to the entire hull; and
- ensuring access to elevated external areas to inspect niche areas during dry-dock hull inspections.

AQIS Quarantinable Pests (DAFF 2008b)

	Species Name	Common Name
1	*Eriocheir sinensis*	Chinese mitten crab
2	*Hemigrapsus sanguineus*	Japanese/Asian shore crab
3	*Crepidula fornicata*	American slipper limpet
4	*Mytilopsis sallei*	Black-striped mussel
5	*Perna viridis*	Asian green mussel
6	*Perna perna*	South African Brown mussel
7	*Corbula (Potamocorbula) amurensis*	Asian clam
8	*Rapana venosa*	Rapa Whelk
9	*Didemnum vexillum*	Colonial sea squirt
10	*Sargassum muticum*	Asian seaweed
11	*Mya arenaria*	Soft shell clam
12	*Ensis directus*	Jack-knife clam
13	*Hemigrapsus takanoi/penicillatus*	Pacific crab
14	*Charybdis japonica*	Lady crab

Revised CCIMPE Trigger List (2006)

Species still exotic to Australia		
	Species Name	**Common Name**
1 *	*Eriocheir* spp.	Chinese Mitten Crab
2	*Hemigrapsus sanguineus*	Japanese/Asian Shore Crab
3	*Crepidula fornicate*	American Slipper Limpet
4 *	*Mytilopsis sallei*	Black Striped Mussel
5	*Perna viridis*	Asian Green Mussel
6	*Perna perna*	Brown Mussel
7 *	*Corbula (Potamocorbula) amurensis*	Asian Clam, Brackish-Water Corbula
8 *	*Rapana venosa (syn Rapana thomasiana)*	Rapa Whelk
9 *	*Mnemiopsis leidyi*	Comb Jelly
10 *	*Caulerpa taxifolia* (exotic strains only)	Green Macroalgae
11	*Didemnum* spp. (Exotic invasive strains only)	Colonial Sea Squirt
12 *	*Sargassum muticum*	Asian Seaweed
13	*Neogobius melanostomus* (marine/estuarine incursions only)	Round Goby
14	*Marenzelleria* spp. (invasive species and marine/estuarine incursion only)	Red Gilled Mudworm
15	*Balanus improvises*	Barnacle
16	*Siganus rivulatus*	Marbled Spinefoot, Rabbit Fish
17	*Mya arenaria*	Soft Shell Clam
18	*Ensis directus*	Jack-knife Clam
19	*Hemigrapsus takanoi/penicillatus*	Pacific Crab
20	*Charybdis japonica*	Lady Crab
Species established in Australia, but not widespread		
	Species Name	**Common Name**
21 *	*Asterias amurensis*	Northern Pacific Seastar
22	*Carcinus maenas*	European Green Crab
23	*Varicorbula gibba*	European Clam
24 *	*Musculista senhousia*	Asian Bag Mussel, Asian Date Mussel
25	*Sabella spallanzanii*	European Fan Worm
26 *	*Undaria pinnatifida*	Japanese Seaweed
27 *	*Codium fragile* spp. *tomentosoides*	Green Macroalga
28	*Grateloupia turuturu*	Red Macroalga
29	*Maoricolpus roseus*	New Zealand Screwshell

Holoplankton Alert Species		
	Species Name	**Common Name**
30 *	*Pfiesteria piscicida*	Toxic Dinoflagellate
31	*Pseudo-nitzshia seriata*	Pennate Diatom
32	*Dinophysis norvegica*	Toxic Dinoflagellate
33	*Alexandrium monilatum*	Toxic Dinoflagellate
34	*Chaetoceros concavicornis*	Centric Diatom
35	*Chaetoceros convolutes*	Centric Diatom

Watching List		
	Species Name	**Common Name**
1	*Styela clava*	Clubbed Tunicate
2	*Euchone limnicola*	Sabellid Polychaete Worm
3	*Theora lubrica*	Asian Semelid Bivalve
4	*Polydora websteri*	Mudworm
5	*Polydora cornuta*	Spionid Polychaete
6	*Boccardia proboscidea*	Spionid Polychaete
7	*Alitta succinea*	Pile Worm
8	*Petrolisthes longatus*	New Zealand Half Shell Crab
9	*Ciona intestinalis*	Sea Vase
Notification/More Information List		
	Species Name	**Common Name**
1	*Womersleyella setacea*	Red MacroAlga
2	*Bonnemaisonia hamifera*	Red MacroAlga
3	*Balanus eburneus*	Ivory Barnacle
4	*Hydroides dianthus*	Limy Tubeworm
5	*Tortanus dextrilobatus*	Asian Copepod
6	*Tridentiger barbatus*	Shokihazy Goby
7	*Siganus luridus*	Dusky Spinefoot
8	*Pseudodiaptomus marinus*	Asian Copepod
9	*Acartia tonsa*	Asian Copepod
10	*Rhithropanopeus harrisii*	Harris Mud Crab
11	*Callinectes sapidus*	Blue Crab
12	*Beroe ovate*	Ctenophore
13	*Blackfordia virginica*	Ctenophore
14	*Caulerpa racemosa***	Green Macroalga

** Species on Interim CCIMPE Trigger List*

*** Caulerpa racemosa was nominated due to concern about an 'invasive strain' in the Mediterranean and it is unclear whether this strain originates from Australia. Recent evidence suggests that the 'invasive strain' occurs naturally in Australia therefore is likely to be removed from CCIMPE lists during the annual review.*

IMS Assessment - Vessel and Immersible Equipment Questionnaire

BHP Billiton Iron Ore is planning to undertake dredging activities as part of the Outer Harbour Development. To manage the risk of introducing invasive marine species (IMS), BHP Billiton Iron Ore has developed an *Invasive Marine Species Management Plan (IMSMP).* The IMSMP has been developed as part of the environmental management commitments for the Outer Harbour Development. A risk assessment approach is utilised to identify those vessels or immersible equipment that may have a greater risk of infection with IMS. BHP Billiton Iron Ore vessels or immersible equipment determined to present an uncertain or high risk will be required to undergo management measures, which may include inspections.

To facilitate the risk assessment, the below information is sought for each vessel and immersible equipment.

Immersible Equipment History

1) Describe the immersible equipment 2) Since the last thorough clean of the immersible equipment, where has the equipment been deployed (ports and/or climatic regions)?	1)_____ _____ _____ 2)_____ _____ _____
3) Location of deployment since last thorough clean?	☐ - Nearshore waters (less than 50m; less than 12nm) ☐ - Offshore waters (greater than 50m; greater than 12nm)
3) What is the normal duration of deployment during operations?	_____ _____
4) What is the duration of time out of water since last deployment?	_____ _____
5) How is the immersible equipment stored when not in operation?	☐ - Packed and/or stored dry ☐ - Stored in damp conditions Other_____
6) What is the post-retrieval cleaning/maintenance regime for the immersible equipment?	☐ - Routine washing and cleaning ☐ - No routine cleaning Other_____

Vessel History

1)Vessel name		
2) Type of vessel (Please indicate vessel type as per vessel summary below)		
3) Has the vessel undergone in - water or out–of- water inspection for IMS, by qualified officers[6]?	YES ☐ If Yes, go to (4). NO ☐ If No, go to (5).	
4a) How many IMS inspections were in-water; how many out-of-water'?	In water: Date: / / Date: / /	Out of water: Date: / / Date: / /
4b) Did the IMS inspections include internal niches, such as sea chests, anchor cable lockers and strainers etc?	YES ☐ NO ☐	YES ☐ NO ☐
Please provide a copy the most recent signed IMS inspection report when returning this Questionnaire.		
5a) Has the vessel undergone in-water or haul-out cleaning?	YES ☐ If Yes go to (5b). NO ☐ If No go to (6).	
5b) Date of last cleaning	Date: / /	
5c) Have all internal seawater systems been treated?	YES ☐ NO ☐	
5d) Type of treatment (Rydlyme, detergent etc.)	_____	
5e) Date of last treatment	Date: / /	
6a) Will vessels be mobilised by either deck cargo, hard stand or road freight immediately prior to arrival within the IMSMA?	YES ☐ If yes go to *(6b). NO ☐ If no go to (7) *(This factor cannot be considered in relation to risk management if the vessel has been exposed to port or coastal waters for a period in excess of seven days prior to arrival in the IMSMA)	
6b) What was the continuous period of time the vessel has been out-of-water prior to arrival within the IMSMA?	_____ _____	
7a) Has a Fouling Control Coating (FCC) been applied to the vessel hull	YES ☐ ? If Yes, go to (7**b**). NO ☐ If No, go to (8).	
7b) What type of FCC has been applied?	_____ _____	
7c) What is the documented date of the FCC application/renewal?	Documented Date of FCC: / / Please submit certified documentation.	
8a) Does the vessel have any internal seawater systems?	YES ☐ If Yes, go to (8**b**). NO ☐ If No, go to (9).	
8b) Has the vessel been fitted with an internal treatment system to prevent internal biofouling?	YES ☐ NO ☐	
9) Where is the vessel's principal home port and climatic region*, since the vessel's most recent FFC application or IMS inspection?; or Principal climatic region* of operation since the vessel's most recent FFC application or IMS inspection?	*(Climatic regions include, temperate, subtropical and tropical)	

[6] 'Independent invasive marine species inspections' must be undertaken by qualified and experienced officers and the inspection report must be presented for auditing purposes.

10) Since the most recent FCC application or independent IMS inspection, what is the number of weeks at rest or slow speed periods (i.e., less than 3 knots) in ports or coastal waters (i.e., at depths less than 50 m [LAT datum] and/or within 12 nautical miles of land)? And in which climatic region did this occur?	_____ _____ _____ _____ _____ _____
11) What is the vessel's planned activity?	☐ - Direct contact with sea floor (ie dredging). ☐- Direct contact with the sea floor is limited to anchoring. ☐ - No anchoring or other activities contacting the sea floor.
12a) Is the ballast or trim water aboard the vessel intended to be discharged during the planned activity. 12b) What is the climatic origin of the seawater being carried? 12c) Is the operator of the vessel familiar with the AQIS Ballast Water Management Requirements for international vessel arrivals? 12d) Will ballast or trim water discharge be in accordance with AQIS Ballast Water Management Requirements for international vessel arrivals?	YES ☐ If Yes, go to (12b) NO ☐ _____ _____ a) Yes ☐ b) No ☐ a) Yes ☐ b) No ☐

Vessel Summary

Dredge Vessels - Dredges are flat bottomed, steel hulled vessels specifically constructed to excavate the seabed. Two common types of dredges are grab bucket and suction dredges.

Offshore Support Vessels (PSV, AHT, AHTSV) - Offshore support vessel (OSV) is a term typically associated with the three main types of vessels that tend MODUs and seismic vessels during exploration, appraisal and development programs. Thus OSV are namely platform supply vessels (PSVs), anchor handling tugs (AHTs) and anchor handling tug supply vessels (AHTSVs).

Seismic Survey Vessels (SSV) - Seismic vessels are large purpose built vessels designed to carry out exploratory surveys of the seabed to search for potential new oil and gas reserves. These vessels are generally equipped with air gun arrays and hydrophone streamers.

Construction Barges (Barge) - Construction barges are flat bottomed, square fronted vessels designed to carry freight.

Diving Support Vessel (DSV) - DSVs are often contracted to offshore survey jobs to support diving operations. They are generally smaller vessels (less than 30 metres) and equipped with the diving spread, air bank compressor, decompression chamber, accommodation and the emergency medical equipment.

Utility Support Vessels (USV) - Utility support vessels (USV) typically support offshore operations including seismic and research programs. These vessels can vary in size but generally are ex-commercial fishing boats with cruising speeds of 10 to 20 knots.

Fast Ferry/Crew Transfer Vessel (CTV) - These vessels provide regular shuttle services between mobilisation ports and areas of operation, with relatively short predicted in-port turn around periods (18 to 36 hours). These vessels are similar to USVs however the nature of their activities and ability to cruise at speeds of greater than 20 knots generally reduces their risk of IMS infection.

Research Vessels (RV) - Research vessels are involved in activities that have close interaction with the marine environment (including the water column and the seabed). Activities involve deploying instruments and sampling equipment that if left for long periods of time could become fouled.

VRASS Description

BHPBIO Vessel Risk Assessment Score Sheet (VRASS)

BHPBIO Invasive Marine Species Vessel Risk Assessment Score Sheet (VRASS)		
Risk Assessment Requirements		
If activity occurs within the IMSMA - Proceed with VRASS, unless vessel locally sourced If activity occurs outside the IMSMA - No vessel IMS assessment is required See map for Invasive Marine Species Management Area (IMSMA)		
Vessel Type IMS Infection Risk Rating		
IMS Infection Risk - Vessel Type		
Type of vessel	Insert Vessel Type Factor (See Vessel Key - **Appendix D - Table D-1 (IMSMP)**)	Value
IMS Infection Risk - Inspection and Desiccation History		
Recent Inspection History		X
	No inspection prior to date of contract commencement = 1.0 Previous inspection* (and clean if required) undertaken within the last nine months of contract commencement = 0.85 One independent in-water inspection* (and clean if required) undertaken within 21 days of date of contract commencement = 0.75 One independent out-of-water inspection* (and clean if required) undertaken within 21 days of contract commencement = 0.50	Value
Vessel Internal Niches		X
Successful independent inspection of all all internal niches (ie. seawater system flushing, strainers, anchor cable locker) undertaken within 21 days of date of contract commencement.	Yes = 0.75 No = 1.00	Value
Vessel Desiccation Period Prior to Mobilisation		X
Vessel mobilisation immediately prior to arrival within IMSMA by either deck cargo, hard stand, or road freight will provide a continuous total out-of-water period that is:	<7 days = 1.0 7-14 days = 0.8 15-28 days = 0.3 >28 days = 0.1	Value
IMS Infection Risk - Age of Fouling Control Coating		
Age of Fouling Control Coating (FCC) at Mobilisation Date		X
FCC type is unknown, unsuited or absent	5.00	Value
FCC type is known, suited to activity and speed and documented age of FCC at mobilisation will be:	> 24 months= 4.00 >12 - 24 months = 2.00 >9-12 months = 1.00 >6-9 months = 0.85 >3-6 months = 0.75 1-3 months = 0.40 <1 month = 0.25	
IMS Infection Risk - Vessel Internal Systems Treatment History		
Internal Treatment System(s)		+
	Vessel has no internal treatment system(s) = 1.00 Vessel has internal treatment system(s) = 0.50 **Vessel has no internal seawater system(s) =** 0.50	Value
Internal Treatment History		X
Vessel internal systems have been treated using suitable chemical treatment	>12 months or unknown 2.00 >6-12 months = 1.00 >3-6 months = 0.50 1-3 months = 0.40 <1 month = 0.25 **Vessel has no internal seawater system(s) =** 0.25	Value
IMS Infection Risk - Vessel Location History		
Vessel Origin or Principle Operational Climatic Region		X
Climatic region of home port or principal operational region. Refer to **Appendix I (IMSMP)** *(Insert highest scoring region only)*	Tropical climatic region = 3.00 Subtropical climatic region = 1.50 Temperate climatic region = 0.80	Value
Number of Stationary / Slow Speed Periods Over 7 Days		+
Total # of 7 day periods of rest or at slow speeds (<3kn) in port or coastal waters (<50 metres depth or within 12 nautical miles) since last FCC or independent Inspection*	> 4 weeks = 3.00 >2 - 4 weeks= 2.00 1 - 2 weeks = 1.00 < 1 week = 0.75	Value
Region of the Stationary / Slow Speed Periods		X
Region/s of the primary operations where above stationary or slow speed periods occurred: Refer to **Appendix I (IMSMP)** *(Insert highest scoring region only)*	Tropical climatic region = 3.00 Subtropical climatic region = 1.50 Temperate climatic region = 0.80 If not applicable = 0.00	Value
IMS Infection Risk -Planned Activity		
Type of Activity - Contact with Seafloor		X
(Insert highest score only)	Planned activity will have direct contact with seafloor (other than anchoring) (ie dredge / drilling) = 2.0 Planned activity will have direct contact with seafloor (anchoring only) (ie. research) = 1.2 No anchoring or activities contacting seafloor = 1.0	Value
IMS Infection Risk -Ballast Water		
Ballast / Trim Tank Seawater		+
Ballast/trim water origin: Refer to **Appendix I (IMSMP)**	Seawater sourced from a temperate climatic region = 1.0 Seawater sourced from sub-tropical climatic region = 2.0 Seawater sourced from tropical climatic region = 3.0	Value
AQIS Ballast Water Management Requirements adhered:	Intended = 0.0 Not possible = 10.0	X Value
	Vessel Risk Score =	**TOTAL**
If score **<25** = Low risk. Vessel details require checks/confirmation only		
If score **25-80** = Uncertain risk: precautionary principal applied. Confirmatory independent inspection and/or potential actioning required		
If score **>80** = High risk: premobilisation inspection actions required		

* 'Independent IMS inspections' must be undertaken by qualified and experienced officers and the inspection report must be presented for auditing purposes
Details of proposed inspection personnel will be provided to the DoF for acceptance prior to them undertaking inspections of vessels

IMS Infection Risk - Vessel Location History		
Vessel Origin or Principle Operational Climatic Region		**X**
Climatic region of home port or principal operational region. Refer to SHEET **'Figure E1'** or **Appendix I (IMSMP)** *(Insert highest scoring region only)*	Tropical climatic region = 3.00 Subtropical climatic region = 1.50 Temperate climatic region = 0.80	Value
Number of Stationary / Slow Speed Periods Over 7 Days		**+**
Total # of 7 day periods of rest or at slow speeds (<3kn) in port or coastal waters (<50 metres depth or within 12 nautical miles) since last FCC or independent Inspection*	> 4 weeks = 3.00 >2 - 4 weeks= 2.00 1 - 2 weeks = 1.00 < 1 week = 0.75	Value
Region of the Stationary / Slow Speed Periods		**X**
Region/s of the primary operations where above stationary or slow speed periods occurred: Refer to SHEET **'Figure E1'** or **Appendix I (IMSMP)** *(Insert highest scoring region only)*	Tropical climatic region = 3.00 Subtropical climatic region = 1.50 Temperate climatic region = 0.80 If not applicable = 0.00	Value
IMS Infection Risk -Planned Activity		
Type of Activity - Contact with Seafloor		**X**
(Insert highest score only)	Planned activity will have direct contact with seafloor (other than anchoring) (ie dredge / drilling) = 2.0 Planned activity will have direct contact with seafloor (anchoring only) (ie. research) = 1.2 No anchoring or activities contacting seafloor = 1.0	Value
IMS Infection Risk -Ballast Water		
Ballast / Trim Tank Seawater		**+**
Ballast/trim water origin: Refer to **Appendix I (IMSMP)**	Seawater sourced from a temperate climatic region = 1.0 Seawater sourced from sub-tropical climatic region = 2.0 Seawater sourced from tropical climatic region = 3.0	Value **X**
AQIS Ballast Water Management Requirements adhered:	Intended = 0.0 Not possible = 10.0	Value
	Vessel Risk Score =	**TOTAL**
If score **<25** = Low risk: Vessel details require checks/confirmation only		
If score **25-80** = Uncertain risk: precautionary principal applied: Confirmatory independent inspection and/or potential actioning required		
If score **>80** = High risk: premoblisation inspection actions required		

* 'Independent IMS inspections' must be undertaken by qualified and experienced officers and the inspection report must be presented for auditing purposes

A.6.1 Risk Assessment Scoring Factors for Vessel

To determine the risk of vessel infection, the risk factors are scored by obtaining:

- Vessel risk categorisation: The risk of IMS infection varies depending on the type of vessel undertaking the activity. Dredging related vessels typically result in the highest risk rating for IMS infection [2.4]. This is due to aspects such as slow working speeds, hull cleaning constraints, and the large number and range of niches for IMS to become established. The full range of vessel IMS risk scores are provided in Appendix A.1.
- Recent vessel inspection and cleaning history: In the case of biofouling on external hull niches, different risk ratings are applied dependant on whether out-of-water or in-water inspections by qualified and experienced officers and cleaning (if required) have been undertaken prior to entry to the IMSMA. If out-of-water cleaning and inspection has not been undertaken prior to IMSMA entry, a risk factor of [1] is applied. The risk factor then lessens for vessels which have passed an inspection (and clean if required) within the last nine months, [0.85]. If an in-water inspection is undertaken (and cleaned if required) within 21 days of IMSMA entry then a further risk reduction factor of [0.75] is applied. Where the vessel has undergone an out-of-water inspection (and cleaned if required) within 21 days of IMSMA entry a risk reduction factor of [0.5] is applied.
- Vessel internal niches: A further risk reduction is applied [0.75] if the inspections include the internal niches, including the anchor cable lockers and strainers. Note – It is likely that inspections undertaken by other stakeholders including Commonwealth and State regulators may be used as a management measure for assessment under this IMSMP. For these independent inspections to be considered under the VRASS, the inspections must have been undertaken by an appropriately trained and experienced inspector, and an inspection report signed by the lead inspector must be submitted to BHP Billiton Iron Ore.

- Vessel mobilisation: A further biofouling risk reduction factor can be applied for vessels that are hauled out and then mobilised as deck cargo or by road, therefore becoming air dried over an extended period. If the total air exposure period during a vessel's mobilisation is less than 7 days, a risk reduction factor of [1] is applied. If this exposure period is increased to between 7 and 14 days a risk reduction factor of [0.8] is applied. If this period of exposure is of a duration between 15 and 28 days a risk reduction factor of [0.3] is applied. Ultimately if the exposure period exceeds 28 days, a maximum risk reduction factor of [0.1] may be applied. Note – this factor only applies to vessels that are either launched at the intended area of operation within the IMSMA or depart for this location within seven days of launching after haul-out and mobilisation; e.g. vessels that are hauled out and mobilised as cargo.
- Age and suitability of fouling control coating (FCC) at mobilisation date: FCC manufacturers provide a range of coatings, each designed to avoid premature coating failure if it is correctly applied and matched to the vessel's normal speeds and activity profile (i.e. proportion of time spent stationary or below 3 knots), and its main operational region (i.e. tropical, sub-tropical or temperate). If the FCC type is deemed to be unknown, unsuited or absent, a risk value of [5] is given. If the FCC type is suitable, but is more than 24 months old, a risk value of [4] is applied. If application of the FCC occurred in the last 12 to 24 months, a [2] is applied; if FCC application is between 9 and 12 months old a [1] is applied; if FCC application is between 6 and 9 months old a [0.85] is applied. The aging factor lessens even further to [0.75], [0.40] and [0.25] if the documented date of FCC renewal is within 3 to 6 months, 1 to 3 months and less than 1 month, respectively.
- Internal treatment system(s): A risk reduction factor cannot be applied if there are no internal treatment system(s) in place. In such instances, a risk factor of [1] is applied. A risk reduction factor of [0.5] is applied if the vessel has an internal treatment system in place at the time of assessment. Where the vessel has no internal sea water systems then a similar risk reduction factor of [0.5] is applied.
- Internal treatment history: A risk factor is applied to the vessel based on the last time internal systems were treated using a detergent with the active ingredient quaternary ammonia (or other suitable products such as Rydlyme). If internal systems were treated more than 12 months or an unknown period prior to assessment, a risk reduction factor of [2.0] is applied, reducing to [1.0] if treatment was conducted between 6 - 12 months ago, and [0.5] in instances where treatment has occurred between 3 to 6 months prior. A risk factor of [0.4] and [0.25] is applied for systems which have been treated between 1 to 3 months, and less than 1 month prior to assessment, respectively. Note that this risk factor can be reduced down to [1], if an independent inspection of the internal systems is undertaken within 21 days prior to mobilisation. Where the vessel has no internal sea water systems then a risk reduction factor of [0.25] is applied.
- Vessel origin and proposed area of operation: Differing risk ratings are assigned in relation to the climatic region of origin. This factor scores a risk value of [3] if the origin is within a tropical climatic region, a [1.5] is applied where a subtropical climatic region is identified, and [0.8] is applied where a temperate climatic region is identified. If multiple ports or operational regions have been visited the highest risk rating will be used. Appendix 0 provides a representation of the global, temperate, sub-tropical and tropical bioregions. More specifically in relation to Australia, tropical regions are considered to be north of the Tropic of Capricorn 23°26'22"S, subtropical regions are south of Tropic of Capricorn to Fremantle 32°01'45"S on the west coast and Sydney 33°51'35"S on the east coast, and temperate regions are considered to be south of Fremantle or Sydney.
- The number of stationary/slow speed periods greater than 7 days: This risk assessment factor is calculated based on the number of continuous 7 day periods that the vessel has operated at stationary or at low speed (less than 3 knots) in port or coastal waters (depths less than 50 m or within 12 nm offshore). These periods are calculated from the time of the most recent FCC application or independent inspection by a qualified and experienced officer. This factor requires determination on the basis of the vessel's operational history, the total number of 7 day periods that were spent operating at stationary/slow speeds (not including 7 day periods spent within the IMSMA). A 7 day period is defined as a continuous period whereby the vessel is stationary or at slow speed (less than 3 knots) for 7 days continuously. The scoring adds a risk value of [3] if the total number of stationary/slow 7 day periods is greater than 4, a risk value of [2] if between 2 and 4 stationary/slow 7 day periods, a [1] if between 1 and 2 stationary/slow 7 day periods and a [0.75] for less than 7 days at stationary/slow speeds.

- Climatic region of stationary or slow periods: A further multiplier is applied to this factor depending on the location of the stationary/slow speed periods. A risk value of [3] is applied if the stationary/slow speed periods occurred within ports or coastal waters of a similar climatic region, [1.5] for ports or coastal waters of a neighbouring climatic region, or [0.8] if they occurred in a separate climatic region. If multiple climatic regions have been visited the highest risk rating will be used. All operational areas within any climatic region greater than 12 nm offshore and in depths greater than 50 m are considered low risk.
- Type of activity – contact with sea floor: The potential for the introduction of IMS varies on the planned vessel activity taking place. Those activities that come into contact with sediments and thus have the potential to accumulate and harbour IMS in areas such as hoppers (dredges) and spud cans (drilling rigs) are considered to have a greater risk of infection (Kinloch et al. 2003). With this in mind, a high risk rating of [2] is applied to those activities that come into contact with the seafloor (i.e. drilling or dredging related vessels). Activities that come into contact with the seafloor through anchoring are assigned a medium risk level [1.2], and activities that have no contact with the seafloor (i.e. seismic) a low risk level [1].
- Ballast/trim tank seawater origin: For ballast or trim water that is carried onboard the vessel during mobilisation, a risk score is applied dependent on the management applied and the seawater origin. If the water is not intended to be discharged during BHP Billiton Iron Ore operational activities or is sourced from an offshore area, a risk value of [0] is applied. Currently AQIS apply ballast water restrictions at the 12 nm limit and recommend that ballast exchanges be conducted as far away as possible from any land mass and in water at least 200 m deep.
- If the seawater carried has been sourced from a temperate climatic region and potentially requires discharge, a rating of [1] is applied. For seawater sourced from a subtropical climatic region requiring potential discharge, a high risk value of [2] is applied. For seawater sourced from a tropical climatic region requiring potential discharge, a high risk value of [3] is applied.
- An additional convenient and simple measure that reduces the risk from ballast water discharge is the adherence to the AQIS or draft domestic ballast water management guidelines (see Section 8.4). If the guidelines are not met, a risk factor of [10] is applied, whereas if met, a risk factor of [0] is applied.

BHPBIO Invasive Marine Species Immersible Equipment Risk Assesment Score Sheet		
IMS Infection Risk - region of deployment since last thorough clean		
Climatic relationship of previous operational region since last thorough clean (Refer to SHEET **'Figure E1'** or **Appendix I** *(Insert highest scoring region only)*	Tropical climatic region = 3.0 Subtropical climatic region = 2.0 Temperate climatic region = 1.0	Value
IMS infection risk - coastal location of deployments since last thorough clean		x
Locations of deployment since last thorough clean have included: *(Insert highest scoring region only)*	Nearshore waters <50m and <12nm) = 3.0 Offshore waters (either >50 or >12nm) = 2.0	Value
IMS infection risk - duration of deployments		x
Duration of deployment since last clean:	Has exceeded 7 days = 3.0 Always less than 7 days = 2.0 Always less than 24 hours = 1.0 Always less than 7 hours = 0.1	Value
IMS infection risk - duration of time out of water since last deployment		x
Duration of time out of water since last deployment is:	<7 days = 1.0 7-14 days = 0.8 >14-28 days = 0.5 >28 days = 0.1	Value
IMS survival risk during mobilisation - transport conditions		+
Equipment is packed dry and/or stored in dry, well ventilated space with low humidity	Packed and/or stored dry = 0.2 Stored in damp conditions = 1.0	Value
IMS survival risk - post-retrieval maintenance regime		x
Post-retrieval maintenance includes	Routine washing + cleaning = 0.2 No routine clearning = 1.0	Value
	Equipment Risk Score =	**TOTAL**
If score <5 = Low Risk: Equipment details require checks/confirmation only		
If score > 5 = Uncertain Risk: Premobilisation inspection		

A.6.2 Risk Assessment Scoring Factors for Immersible Equipment

In the case of potential IMS infection by immersible equipment, the following risk factors are considered:

- IMS Infection Risk - region of deployment since last thorough clean: Climatic region of use since last overhaul, thorough cleaning or prolonged period out of water (>28 day). This factor scores as a risk value [3] if the location of previous use was in a tropical climatic region, a risk value [2] if within a subtropical climatic region, and a risk value [1] if within a temperate climatic region (Refer to Appendix 0). Specifically in relation to Australia, tropical regions are considered to be north of the Tropic of Capricorn 23°26'22"S, subtropical regions are south of Tropic of Capricorn to Fremantle 32°01'45'/Sydney 33°51'35" and temperate regions are considered to be south of Fremantle and Sydney.
- IMS infection risk - coastal location of deployments since last thorough clean: Activities occurring in nearshore areas (less than 50 metres deep and/or within 12 nm from land) are given a rating of [3], whilst offshore activities (greater than 50 metres deep and at least 12 nm from land) a lower risk rating of [2] applies. These ratings reflect the lack of suitable conditions for exotic species, particularly suitable substrate, in offshore locations.
- IMS infection risk - duration of deployments: Maximum duration of deployment (maximum time in water), since last overhaul or thorough cleaning. A risk reduction factor of [0.1] is applied if duration is less than 7 hours, a risk reduction factor of [1.0] is applied if duration is less than 24 hours. For immersion periods up to 7 days the risk factor increases to [2] and a risk factor of [3] if one or more immersion periods exceed 7 days.
- IMS infection risk - duration of time out of water since last deployment: A further biofouling risk reduction factor can be applied for immersible equipment that has been out of the water for an extended period. If the total air exposure period is ≥28 days, a risk reduction factor of [0.1] is applied, decreasing to [0.5] if this period is 14 - 28 days, and [0.8] for 7 - 14 day periods. No reduction factor can be safely applied if the air exposure period is less than 7 days. In such a

situation, a risk factor of [1] is applied. Additionally, if the immersible equipment is not stored in dry and well ventilated (low humidity) conditions then a further risk factor of [0.2] is applied. If it is stored damp conditions then a risk factor of [1] is applied.

- IMS survival risk - post-retrieval maintenance regime: A risk reduction factor of [0.2] is applied if the immersible equipment/item of interest is routinely washed, cleaned, checked and/or dissembled between project sites. A risk rating of [1] applies where no routine cleaning occurs.

Vessel and Immersible Equipment Checklist and Inspection Forms

(To be completed by Qualified IMS Inspector)

Invasive Marine Species Checklist and Inspection Form			
Ref:		Lead IMS Inspector (name): Location:	
Date:		Vessel Name or Number: Vessel Type:	
Item	**Area**	**Description**	**Inspection results [Yes, No,%, N/A]**
1	Hull Surface	% of surface with primary fouling	
		% of surface with secondary fouling	
		% of surface with tertiary fouling	
		% of absent or damaged Fouling Control Coating	
2	Keel, Bilge Keels and Skeg	% of surface with primary fouling	
		% of surface with secondary fouling	
		% of surface with tertiary fouling	
3	Seawater Inlets and Outlets	Starboard inlets and gratings free of biofouling	
		Starboard outlets free of biofouling	
		Port inlets and gratings free of biofouling	
		Port outlets free of biofouling	
4	Sacrificial anodes/IC blocks/earthing plates	Starboard-side anodes/IC blocks free of biofouling	
		Portside anodes/IC blocks free of biofouling	
		Propellers/steering gear anodes/IC blocks clean	
		Earth plate/s free of biofouling	
5	Sounder and Speed Log	Echo sounder transducers free of biofouling	
		Speed log fairing/s free of biofouling	
6	Propulsion Units	A-bracket/rope guard/Azimuth housing free of biofouling	
		Propeller shaft/Azimuth centre free of biofouling	
		Propeller blades free of biofouling	
		Propeller boss/s free of biofouling	
		Bow/Stern Thrusters free of biofouling	
7	Rudder, Rudder Stock, Post	Rudder free of biofouling	
		Rudder stock free of biofouling	
		Rudder post free of biofouling	
8	Anchoring	Anchors, chain and lockers free of biofouling & sediment	
9	Internal Seawater Systems and Bilge Spaces	Strainer/s for starboard engine cooling free of biofouling	
		Strainer/s for port engine cooling free of biofouling	
		Strainer/s for auxiliary/generators free of biofouling	
		Strainer/s for fire main free of biofouling	
		Strainer/s for deck services free of biofouling,	
		Date of last pipe work flushing/chemical treatment	
		Date of bilge space cleanup for Topsides quarantine	
10	Other Wet Side Features or Items	Spud Cans free of biofouling	
		Legs free of biofouling	
		Leg hatches free of biofouling	
		Support roller free of biofouling	
		Ratchet mechanisms free of biofouling	

Invasive Marine Species Checklist and Inspection Form
This vessel has been inspected and its wet sides are: Low risk of containing Invasive Marine Species of Concern Low risk of containing Invasive Marine Species of Concern with the comments below noted Uncertain or high risk of containing invasive marine species of concern (refer to notes below) Areas requiring specific attention/cleaning include: Completed by: …… of …….. Signature:…….. Date …./…./……

PLEASE RETURN COMPLETED FORM TO THE BHP BILLITON IRON ORE SITE ENVIRONMENTAL SUPERINTENDENT

Immersible Equipment Checklist and Inspection Form			
Ref:		Inspected by (name): Location:	
Date:		Vessel name or number:	
Item	**Item**	**Description**	**Verified Clean [Yes, No, N/A]**
1			
2			
3			
4			
5			
6			
7			
8			
9			

The equipment has been inspected and it is:
Compliant and does not require cleaning
Not compliant and requires cleaning

Areas requiring specific attention/cleaning:

Completed by …… of ……..

Signature…… Date …./…./……

Vessel Representative/Delegate……

PLEASE RETURN COMPLETED FORM TO THE BHP BILLITON IRON ORE SITE ENVIRONMENTAL SUPERINTENDENT

ANZECC In-water Cleaning and Maintenance Application Form

Please note that the specific requirements for in-water cleaning and maintenance is presented in the Code of Practice for In-water Hull Cleaning and Maintenance and can be found at *www.environment.gov.au/coasts/pollution/antifouling/code/pubs/code.pdf*

Application for Permission to clean sea chests and/or other hull apertures and/or propeller polishing and/or in-water hull cleaning and/or maintenance

To administering authority: _____

Telephone: _____ Facsimile: _____

Port of: _____

From *(Master/Owner/Agent/Contractor)*: _____

Telephone: Facsimile:

Permission is requested to carry out the following work on: _____

Vessel: _____

From *(Time/Date)*: _____ To *(Time/Date)*: _____

At *(Berth, if known, or slipway)*: _____

Detail of Work: _____

Method of collection and disposal of encrustation, barnacles etc: _____

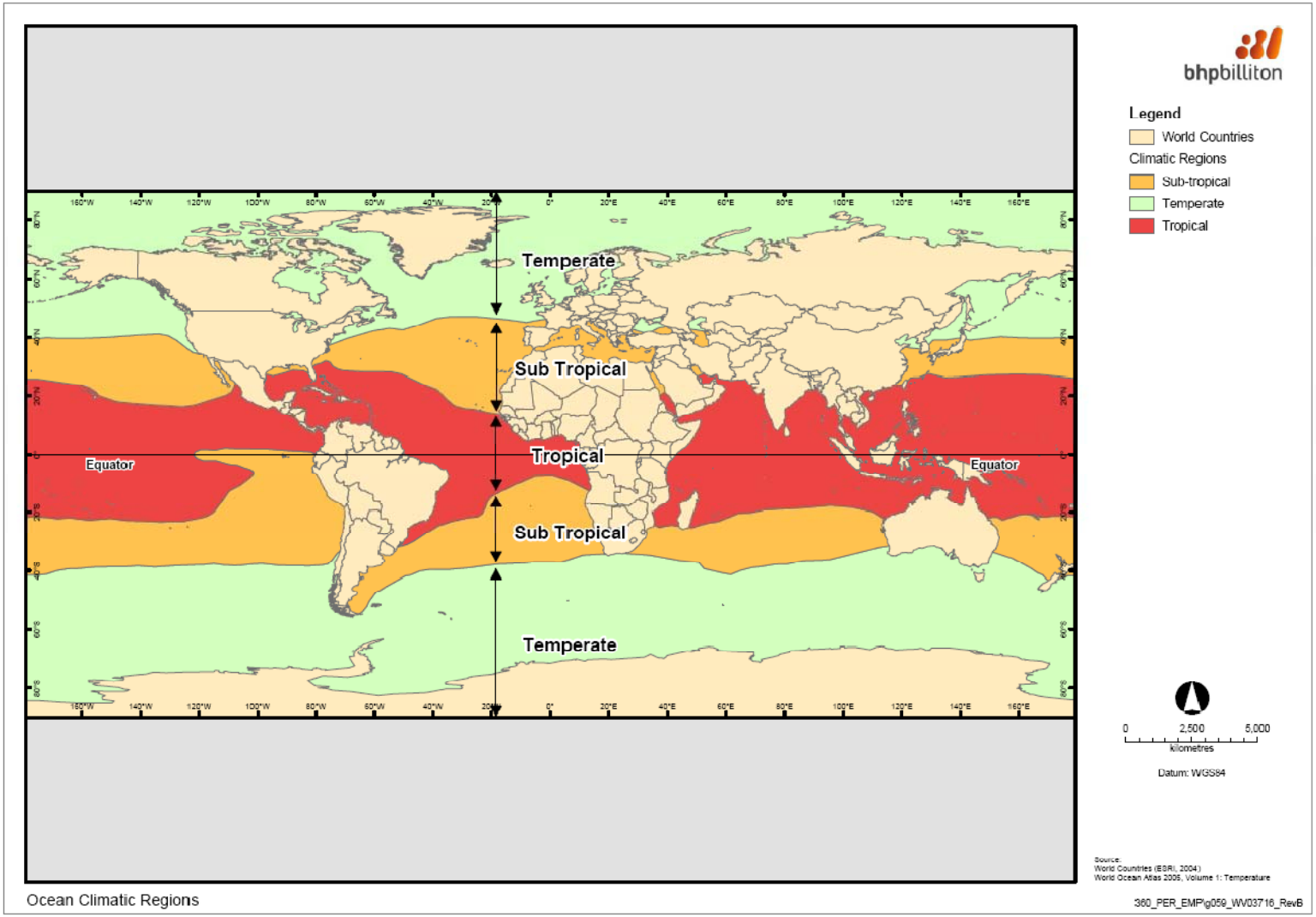
Office Use Only:

Application Denied **Approved**

Approved subject to: _____

Signature: Position: Date:

Global Climatic Regions



Ocean Climatic Regions