### Environmental Impact Assessment Process Timelines

<table>
<thead>
<tr>
<th>Date</th>
<th>Progress stages</th>
<th>Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/11/2010</td>
<td>Referral of Proposal</td>
<td></td>
</tr>
<tr>
<td>2/12/2010</td>
<td>Proponent’s final draft API document received by EPA</td>
<td>4</td>
</tr>
<tr>
<td>9/12/2010</td>
<td>Level of Assessment set</td>
<td>1</td>
</tr>
<tr>
<td>24/12/2010</td>
<td>EPA Report finalised</td>
<td>2</td>
</tr>
<tr>
<td>5/1/2011</td>
<td>EPA Report to the Minister for Environment</td>
<td>2</td>
</tr>
<tr>
<td>10/1/2011</td>
<td>Publication of EPA report</td>
<td>3 days</td>
</tr>
<tr>
<td>24/1/2011</td>
<td>Close of appeals period</td>
<td>2</td>
</tr>
</tbody>
</table>

Timelines for an assessment may vary according to the complexity of the project and are usually agreed with the proponent soon after the level of assessment is determined.

*In this case, the Environmental Protection Authority did meet its agreed timeline objective of 10 weeks for the completion of the assessment and provision of a recommendation to the Minister.*

Dr Paul Vogel  
**Chairman**
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1. Introduction and background

This report provides the Environmental Protection Authority’s (EPA’s) advice and recommendations to the Minister for Environment on the proposal to expand port infrastructure in the Port Hedland Inner Harbour. The development would provide eight new berths in South West Creek, a tributary of the Port Hedland Inner Harbour estuary, and involves dredging with associated onshore and offshore disposal of dredged material. The proponent for this proposal is the Port Hedland Port Authority (PHPA).

Section 44 of the Environmental Protection Act 1986 (EP Act) requires the EPA to report to the Minister for Environment on the outcome of its assessment of a proposal. The report must set out:

- the key environmental factors identified in the course of the assessment; and
- the EPA’s recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may include in the report any other advice and recommendations as it sees fit.

The proponent has submitted a referral document setting out the details of the proposal, potential environmental impacts and proposed commitments to manage those impacts.

The EPA considers that the proposal, as described, can be managed to meet the EPA’s environmental objectives, subject to the EPA’s recommended conditions being made legally binding.

The EPA has determined under Section 40 of the EP Act that the level of assessment for the proposal is Assessment on Proponent Information (API). The EPA’s decision was made on 15 December 2010 and advertised on 20 December 2010. This report provides the EPA advice and recommendations in accordance with Section 44 of the EP Act.
2. The proposal

The proposal involves the dredging of up to 14.2 million cubic metres (Mm$^3$) of material for eight new berth pockets and a swing basin. The layout of the new berths and extent of the dredging footprint is shown in Figure 1. The new berth pockets will accommodate a ship size of up to 300 metres in length and 50 metres wide. This will require the widening and deepening of South West Creek and includes the removal of mangroves.

PHPA has advised that five of the proposed new berths have been allocated to Roy Hill Iron Ore Pty Ltd (RHIO), North West Iron Ore Alliance and Fortescue Metals Group Pty Ltd. Three of the berths have yet to be allocated but at this stage PHPA has advised they are likely to have a role in supporting the Boodarie Industrial Estate.

The EPA has recently completed its assessment of RHIO’s port infrastructure proposal to utilise two of the new berths in South West Creek (EPA Report 1377, December 2010) and considered that the proposal can be managed to meet the EPA’s environmental objectives subject to the EPA’s recommended conditions being made legally binding. RHIO’s proposal includes the construction and operation of port infrastructure and iron ore facilities in Boodarie and South West Creek for which the EPA identified dust and noise emissions, and mangrove loss to be the key environmental factors that required assessment. As the South West Creek development would need to be dredged prior to the implementation of the RHIO’s proposal, mangrove loss has been accounted for and assessed by this proposal to the extent that it falls within the boundary of the disturbance footprint shown in Figure 1.

The construction and development of wharves and other land based infrastructure (rails, conveyors, unloaders etc.) by mining companies to utilise the new berth pockets does not form part of this proposal. Although not part of this proposal, the EPA has provided advice regarding the consequential impacts of developing future berths and increasing the throughput of iron ore through the Port Hedland Inner Harbour in Other advice, in Section 5 of this report.

As part of this proposal, dredged material will be disposed of both onshore and offshore with approximately 5.5 Mm$^3$ to be disposed of at an established offshore disposal ground in Commonwealth waters, and 8.7 Mm$^3$ at the land-based dredged material management areas (DMMAs), as shown in Figure 2.

PHPA has submitted an application for a sea dumping permit with the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) for the offshore disposal of material.

The dredging program is comprised of the following:

- dredging of berth pockets SP1 to SP4 (see Figure 1) to design depths of -19 m chart datum (CD), and AP4 to -19.3 m CD. Locations of berths are shown in Figure 2.1 of the referral document;
• dredging of berth pockets AP5 to AP7, the departure channel, and the 400 m turning circle to -14.8 m CD;
• dredging of a 200 m x 200 m area adjacent to the turning basin to -21 m CD which will act as a silt trap;
• batters at 1:10 for marine muds (i.e. from 0 up to +6 m CD) and 1:2.5 for the deeper consolidated material below 0 m CD; and
• associated over-dredging of approximately 0.7 m due to dredging tolerances.

Based on construction and dredging activities being continuous to completion, the duration of the dredging would be 2.7 years. However, PHPA has advised it is more likely that the dredging of South West Creek would be staged depending on availability of dredge plants and customer requirements.

The dredge footprint is approximately 112 hectares (ha) and includes the top of the dredge batters. A 20 m corridor on the outside of the dredge footprint has also been set to capture future land based construction disturbance. The total area of the dredge footprint and future construction footprint is 116 ha and is shown in Figure 1.

Surficial sediments down to -6 m CD, including material where potential acid sulphate soils may be present, would be dredged using a mechanical dredge and disposed offshore in Commonwealth waters at the PHPA Spoil Ground One. The remaining material from -6 m CD to design depths would be dredged using a cutter suction dredge and pumped onshore to five designated DMMAs, of which three have been approved and of these, two have been constructed (Figure 2). DMMAs A and B have been constructed and were used as a settlement pond for material generated from FMG’s third berth proposal at Anderson Point. The footprint and use of the area as a settlement pond was assessed by the EPA (EPA Reports 1173 and 1286) and approved under Ministerial Statements 690 and 771, respectively. DmMA B-south has not been constructed but has received environmental approval as a change to the proposal (Section 45C of the EP Act) under Ministerial Statement 771.

The construction of the other two DMMAs, G and B-north, are proposed as part of this proposal. The dredge material is proposed to be circulated through existing and proposed new DMMAs for management of the material and to meet the water quality guidelines for discharge. The PHPA has advised that the construction of DMMA B-North would only be constructed and used to obtain sufficient material capacity, or for sufficient settlement pond periods to meet water quality guidelines.

The area of the land-based footprint to be disturbed, including batters, is approximately 227 ha. Capital works for the development of DMMAs G and B-north will involve the following:

• construction of perimeter earth bunds to +12.0 m AHD;
• construction of pipeline corridor from the floating dredge pipeline to the DMMA G (up to 30 m wide) to allow the installation of two 900 mm internal diameter steel pipelines (one live, one as spare). The slurry pipeline to DMMA B will run along the existing road to Anderson Point; and
• a 20 m wide construction boundary is proposed around all disturbance areas.
Excess water, for which the fines content has been sufficiently reduced, will be released via outfall weirs. Discharge locations from the DMMAs are into South West Creek and South Creek.

The main characteristics of the proposal are summarised in the table below:

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume of material to be dredged</td>
<td>Not more than 14.2 Mm$^3$ based on</td>
</tr>
<tr>
<td></td>
<td>• Approx 5.5 Mm$^3$ offshore disposal</td>
</tr>
<tr>
<td></td>
<td>• Approx 8.7 Mm$^3$ onshore disposal</td>
</tr>
<tr>
<td>Duration of dredging</td>
<td>Approximately 2.7 years</td>
</tr>
<tr>
<td>Area of marine disturbance for dredging. (Includes 20 m corridor for future land based construction disturbance)</td>
<td>Not more than 116 hectares (ha) at South West Creek</td>
</tr>
<tr>
<td>Area of land disturbance for onshore disposal</td>
<td>Not more than 227 ha</td>
</tr>
<tr>
<td></td>
<td>Dredge Material Management Area (DMMA) G construction footprint: not more than 139 ha</td>
</tr>
<tr>
<td></td>
<td>DMMA B north construction footprint: not more than 81 ha</td>
</tr>
<tr>
<td></td>
<td>Construction corridors for access and pipelines: not more than 7 ha</td>
</tr>
</tbody>
</table>

The details of the proposal are discussed by PHPA in section 2 of the referral document, *South West Creek Dredging and Reclamation Proposal*, Rev 2 December 2010.

PHPA is also the proponent of a proposal for the dredging and development of a tug and small vessel cyclone protection facility which was referred to the EPA in October 2010. The tug pen proposal is located within the South West Creek dredging footprint shown in Figure 1 and involves the dredging of material from the surface to a depth of -6 m CD. Approximately 2.5 Mm$^3$ would be generated for offshore disposal in Commonwealth waters. The tug pen proposal would therefore need to be dredged prior to the commencement of the South West Creek Development. This proposal would target the remainder of the material vertically from -6 m CD down to the design depths as mentioned above. Beyond the footprint of the tug pen proposal, but within the South West Creek dredging footprint, PHPA would dredge from the surface down to the design depths.
The environmental impacts associated with the tug pen proposal were evaluated by the proponent separately including water and sediment quality and loss of benthic primary producer habitats. PHPA predicted that mangrove communities would not be impacted by the proposal either through direct or indirect impacts. Based on the information in that referral the EPA decided not to assess this proposal and provide public advice on 15 November 2010. No appeals were received on the EPA’s decision.
Figure 1: South West Creek dredging footprint and layout of new berths
Figure 2: Locations and layout of existing and proposed dredge material management areas
3. Key environmental factors

It is the EPA’s opinion that the following key environmental factors relevant to the proposal require evaluation in this report:

(a) Benthic primary producer habitat;
(b) Water quality; and
(c) Rehabilitation.

The key environmental factors are discussed in Sections 4.1-4.3. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

3.1 Benthic primary producer habitat

Description

The benthic primary producer habitat (BPPH) community types that are considered relevant to the proposal include mangroves, coral communities, samphire and cyanobacterial algal mats. These communities will be impacted by the proposal to widen and deepen South West Creek for the new berths and the construction of dredge material management areas (Figure 2).

Mangroves

Mangroves in the Port Hedland region are part of a suite of species that occur in the arid Pilbara coastal region. The mangrove habitats in the vicinity of the proposal area are considered typical of arid coastal areas with intertidal zones being dominated by dense stands of mangroves. These are typically on the banks of creeks and coastal areas that are frequently inundated by tidal water. Mangrove communities are the dominant BPPH recorded in the Port Hedland region, and function as part of the regional biological productivity and contribute to the coastal ecosystem of the region. The direct loss of mangroves has the potential to impact marine fauna and avifauna that inhabit mangrove areas.

Existing mangroves contained within the proposal footprint contain species that are well represented elsewhere with no unusual assemblages or species associations. Further information on the individual mangrove species that will be impacted is provided in Table 3 below:

Table 2: Estimated mangrove clearing (ha) necessary for project construction

<table>
<thead>
<tr>
<th>Mangrove community</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Rhizophora stylosa</em> scrub</td>
<td>3.14</td>
</tr>
<tr>
<td><em>Avicennia marina</em> open heath</td>
<td>8.44</td>
</tr>
<tr>
<td><em>Avicennia marina</em> scrub</td>
<td>25.36</td>
</tr>
<tr>
<td><em>Rhizophora stylosa</em> low forest</td>
<td>2.99</td>
</tr>
<tr>
<td>Maximum total</td>
<td>40</td>
</tr>
</tbody>
</table>
Figure 3: Location of mangroves in relation to the proposal
PHPA has undertaken an evaluation of options for the berth layout and configurations to minimise the level of direct and indirect impact on mangroves. This includes PHPA commissioning a study that evaluated a number of alternative port layouts and configurations in South West Creek to provide for 8 shipping berths. These options were considered and evaluated against the criteria of minimising both dredge volumes and impact on mangroves. PHPA considers that the orientation and layout of berths for the current proposal represents the best outcome in terms of minimising mangrove loss in the context of meeting the proposal requirements.

In addition, PHPA has also designed the layout and orientation of both DMMAs to minimise impacts to mangroves in South West and South creeks. The EPA also notes that PHPA are sharing the RHIO’s proposed infrastructure corridor to accommodate its dredging pipeline to DMMA G to avoid creating new corridors through mangroves. The impact to the mangrove in this corridor was accounted for in the EPA’s assessment of the Roy Hill Infrastructure proposal (EPA Report 1377).

Despite this, the proposal would result in the direct loss of up to 40 ha of mangroves, out of a total development footprint of 343 ha. Of this, 31.5 ha will be high value, closed canopy (low forest and/or scrub) habitat while the remaining 8.4 ha would be scattered, open heath habitat. Most of the loss is attributable to the dredging footprint where approximately 26 hectares will be lost.

Previously reported losses of mangroves within the Port Hedland area, as defined within the agreed Port Hedland Industrial Area Local Assessment Unit, comprise approximately 297 ha. This is equivalent to approximately 11% cumulative mangrove loss as calculated from the original historical mangrove extent estimated at 2,676 ha.

As mentioned above, the EPA recently completed its assessment of the proposal by Roy Hill Infrastructure to construct and operate iron ore loading infrastructure located within the Boodarie Multi-user stockyard (EPA Report 1377, December 2010). In its assessment the EPA noted the proposed loss of 5 ha mangroves, which would increase the level of potential cumulative loss in Port Hedland to 11.3%, and concluded that the proposal could proceed subject to conditions being imposed on the proposal that limits the loss of mangroves to a maximum of 5 hectares.

This proposal will further increase the estimated total mangrove loss figure to 342 ha which equates to a percentage figure of 12.8% cumulative loss within the Port Hedland Industrial Area Local Assessment Unit. It is PHPA’s view that the additional loss of 1.5% of mangroves is highly unlikely to represent a significant loss in terms of overall contribution to primary productivity and ecological function of the area in the context of the local assessment unit, or the region as a whole.

In addition to the above direct impacts, a number of potential indirect impacts were identified by PHPA which include:

- sedimentation from dredging and reclamation;
- changes in patterns of erosion or accretion which can lead to undermining or burial of mangrove pneumatophores;
- turbid water discharge from DMMA dewatering;
- reduced mangrove health due to dust deposition; and
• alteration to fresh water surface drainage or changes in groundwater flow pattern.

However, through the modelling of cumulative sedimentation and water levels, the PHPA predicts that the existing mangroves outside the development footprint will not be impacted by sedimentation from dredging, dewatering or change in tidal conditions.

Other benthic primary producer habitats

In addition to mangroves, other BPP communities exist within and adjacent to the proposal area and in the Port Hedland Inner Harbour estuary. These include coral, saltmarsh, macroalgae, cyanobacterial algal mats and sub-tidal microphytobenthos habitats.

Previous benthic habitat surveys in the Port Hedland inner harbour area and creek systems have identified hard and soft coral communities in Stingray Creek, South East Creek and South West Creek. These coral communities have been described as consisting of small, sparsely distributed individuals and are comprised of species tolerant to high levels of turbidity and sedimentation.

The proposal would not result in the direct loss of coral communities. However, PHPA predicts that a small coral community located in a side arm of South West Creek would be impacted by the proposal from chronic increases in turbidity and sedimentation over the duration of the dredging campaign. This is considered to be an unavoidable impact due to its close proximity to the proposal. Based on turbidity and sedimentation modelling over the duration of the dredging campaign, the proponent does not predict any impacts to the other coral communities in South East and Stingray creeks, and the coral communities outside the harbour along Finucane Island.

In relation to the predicted indirect losses of corals in South West Creek, the PHPA proposes to either relocate the corals to a nearby area where a similar community occurs or expect impacts at this site which would include mortality. If there are impacts, PHPA expects that the coral community would recover over time or new coral larvae would settle here once the water quality improves after dredging.

PHPA expects direct impacts to cyanobacterial mats and saltmarsh habitats through the construction of the proposal, however it has not predicted the extent and areas of the communities that will be permanently impacted. PHPA has advised that during a survey of the intertidal flats in study area, the presence of cyanobacterial mat formations were observed sporadically throughout the area. At the time of the field survey these mats appeared to be decayed. In the absence of mapping of communities, the PHPA estimates the potential impact to cyanobacterial mats and saltmarsh communities would be in the area of tidal flats that are considered to be habitat likely to support salt marsh and cyanobacterial mats. The area of DMMAs and corridor footprints that coincides with this area is approximately 140 ha. Of this total area, PHPA estimates only a small proportion of the tidal flats would support cyanobacterial mats and salt marsh communities.
Assessment
The EPA’s environmental objective for this factor is to maintain the abundance, diversity, geographical distribution and productivity of mangroves and other benthic primary producer habitat at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

The area for assessment is the Port Hedland Industrial Area Local Assessment Unit which includes the Port Hedland Inner Harbour, South West Creek and South Creek in accordance with EPA Environmental Assessment Guidelines, No.3, Protection of Benthic Primary Producer Habitats in Western Australia’s Marine Environment, December 2009 (EAG No.3).

Table 3: Potential direct impact on mangroves - calculations for the Port Hedland Industrial Area Local Assessment Unit

<table>
<thead>
<tr>
<th>Benthic Primary Producer Habitat (Mangroves)</th>
<th>Port Hedland Industrial Area Local Assessment Unit (ha)</th>
<th>Percentage impact (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total size of management unit</td>
<td>15,430</td>
<td></td>
</tr>
<tr>
<td>Historical area of mangroves as defined by the EPA</td>
<td>2,676</td>
<td></td>
</tr>
<tr>
<td>Current area of mangroves as defined by the EPA</td>
<td>2,378.9</td>
<td></td>
</tr>
<tr>
<td>Estimated historic mangrove loss by difference</td>
<td>297.1</td>
<td>11.10</td>
</tr>
<tr>
<td>Potential cumulative loss including RHIO port infrastructure as documented in EPA Report 1377 (up to 5 ha)</td>
<td>302.1</td>
<td>11.29</td>
</tr>
<tr>
<td><strong>Potential cumulative loss from this proposal (up to 40 ha)</strong></td>
<td><strong>342.1</strong></td>
<td><strong>12.8</strong></td>
</tr>
<tr>
<td>Resulting extent of mangroves</td>
<td>2333.9</td>
<td></td>
</tr>
</tbody>
</table>

The EPA notes that development of the proposal would result in the loss of up to 40 ha of mangroves within its footprint, which when compared to recently assessed proposals for dredging and construction of port infrastructure is a relatively large area of mangroves to be impacted. The predicted loss of 40 ha represents approximately 1.5% of the total mangrove habitat in the Port Hedland Industrial Area Local Assessment Unit.
As mentioned above, the cumulative loss of mangroves has been calculated to be 12.8% when combined with historical losses and also the potential loss from the Roy Hill Infrastructure proposal (EPA Report 1377). It is noted, however, that this assumes that the Roy Hill Infrastructure Project receives environmental approval and is implemented.

The proponent has provided information in its referral document which suggests there has been an increase in the spatial extent of mangroves in some areas and that the cumulative loss of mangroves might be lower. The EPA has provided advice on this issue under Other Advice, in Section 5 of this report.

Given that impact on mangroves is primarily determined by extent of clearing, earthworks and dredging, the EPA considers it important that PHPA implements ongoing and continuing management measures which focus on ensuring construction boundaries are adhered to and that offsite impacts (e.g. sedimentation, surface water drainage) which could result in the mortality of mangroves, are prevented.

PHPA proposes the following management measures to minimise indirect impacts on mangroves during construction and dredging:

- restricting access into mangrove areas outside the immediate disturbance area;
- demarcation of clearance boundaries prior to site clearing to avoid unnecessary disturbance of mangroves;
- where possible, scrub rolling mangroves rather than removing mangroves to provide opportunity for recovery along the boundary of the cleared areas. It is understood that in pockets of larger and denser mangroves this technique is not possible and it is needed to physically remove the trees. PHPA has advised that this method was recently used for the Utah Point Berth Project and is monitoring its effectiveness;
- use of a satellite based vessel monitoring system on the dredge to ensure that no dredging occurs outside the authorised area;
- use of suitable dredging plant and equipment to minimise turbidity, including well maintained floating pipelines to minimise leakage of turbid waters during pumping of material to DMMAs;
- undertake the following measures to control tailwater discharge associated with reclamation:
  o maximise residence time in the reclamation area to reduce the turbidity plume of the discharge;
  o suitable controls (eg. weir boxes) will be used at the discharge point to control water level and rate of discharge;
  o cease dewatering or use alternative discharge point when turbidity is excessive; and
  o regular inspection and maintenance of erosion and sediment control structures particularly following heavy rainfall events,
- implementation of a tiered monitoring framework for mangroves and sedimentation.
For mangroves outside the zone of permanent loss, the EPA considers that legally binding conditions should be imposed which require dredging to be actively managed based on a monitoring program which includes pre-determined trigger levels for mangrove health and net sedimentation to ensure impacts do not exceed the PHPA’s predictions.

Based on the PHPA’s predicted loss, the EPA considers that the proposal could be managed to meet the EPA’s objective for this factor provided that the following outcomes and measures are included in the conditions on the proposal:

- **Recommended Condition 5-1** prescribes the maximum level of mangrove loss to be 40 ha with no additional direct or indirect impacts outside the proposal footprint or zone of permanent loss.

- For mangroves outside the zone of permanent loss, the dredging campaign should be monitored and managed to ensure that impacts are no greater than predicted. The EPA recommends that the trigger levels for mangrove health and net sedimentation in the proponent’s draft Dredging Management Plan be conservatively set and be finalised based on baseline/pre-dredging surveys. These trigger levels would then apply to both during the dredging campaign and for a period following the completion of the proposal.

- Sedimentation is proposed to be measured using a fixed point to determine net changes in sediment deposition. It is noted that the proponent has identified 100 mm as the chronic health trigger level for indirect impacts to occur from sediment deposition over the life of the proposal, based on the species present, scientific literature and a review of previous stressors for projects. The EPA considers that trigger levels for net sedimentation should be conservatively set to ensure mangrove mortality does not occur. An exceedance of net sedimentation trigger levels should not only trigger mangrove health monitoring but also trigger management responses to reduce sedimentation related pressures and ensure mortality of mangroves does not occur outside the zone of permanent loss.

- There is a need to finalise the number of and locations for potential impact and reference monitoring sites before the commencement of dredging and reclamation. Potential impact sites shall be located as close as possible to the zone of permanent loss and where sedimentation is predicted to be greatest. The identification of suitable reference sites would assist in distinguishing impacts on mangroves caused by the proposal from those resulting from other activities and/or regional pressures.

- Mangrove health would need to be monitored using fixed relocatable quadrats before, during and after dredging. The proponent has proposed that mangrove health be monitored monthly during the dredging program.

- The PHPA implements management responses should mangrove health and net sedimentation triggers mentioned above be exceeded. These management responses are discussed in section 6.2 of the PHPA’s referral document.
• Ongoing monitoring of mangrove health following the completion of the proposal to confirm that both:
  o the losses caused by the proposal do not extend beyond the specified zones of permanent loss; and
  o that the health of mangroves outside the zones of permanent loss is not significantly affected.

The above will need to be reflected by PHPA in the finalisation of the draft Dredging Management Plan.

Noting that PHPA has undertaken an evaluation of options for berth layouts and configurations and selected the option with the least impacts on mangroves, the EPA considers that the predicted loss of 40 ha is considered to be a small proportion of the current extent of mangroves in the Port Hedland Local Assessment Unit and is not of itself, or cumulatively, unacceptable.

Noting the level of cumulative loss however, the EPA encourages the PHPA, together with proponents of other developments in the Port Hedland Inner Harbour, to examine opportunities within the port management area for mitigating the cumulative loss of mangroves in the Port Hedland Industrial Area Local Assessment Unit.

Coral communities

The EPA notes that the indirect impacts to a small coral community in the western arm of South West Creek are unavoidable. This is primarily due to its proximity to the dredging footprint and the potential for high and chronic levels of turbidity and sedimentation. While not specified in the recommended conditions, the EPA recommends that PHPA should monitor the health of this coral community during and following the completion of dredging to determine its potential recovery as predicted by the proponent, and therefore improve the knowledge and understanding of coral community response to dredge related pressures in Port Hedland.

Based on plume modelling, PHPA predicts that there should be negligible risk of significant impacts to the coral communities in South East and Stingray creeks. The EPA considers that the PHPA should undertake surveys of the coral communities in a manner which would assist the PHPA to confirm its predictions with respect to these communities. Accordingly, the EPA has recommended conditions 5-10 and 5-11. Condition 5-11 requires the PHPA to undertake coral surveys prior to the commencement of dredging to provide adequate baseline data, followed by further surveys after the completion of dredging to confirm the PHPA’s predictions that dredging has not impacted or resulted in the mortality of these communities.

In addition, the EPA recommends that a water quality monitoring program to apply during dredging be prepared prior to commencement of dredging aimed at avoiding impacts on coral communities caused by dredging and reclamation. Water quality trigger levels to apply during dredging should be developed based on sub-lethal trigger levels for corals that have been previously utilised for other dredging projects in the Port Hedland inner harbor. The PHPA should undertake appropriate management actions should water quality trigger levels be reached to ensure coral
mortality does not occur at South East and Stingray creeks as a result of the proposal.

Other benthic primary producer habitats

The EPA notes that PHPA’s referral document does not discuss or assess the direct and indirect loss of cyanobacterial mat, salt marsh, macroalgae and benthic microalgae (or microphytobenthos (MPBs), micro-algae which live amongst or on sediment particles) habitats within the context of EPA Environmental Assessment Guideline No. 3. These communities would be directly impacted by the proposal.

In relation to microphytobenthos, the EPA has set out in Environmental Assessment Guideline No. 3 that it is important to recognise the roles and functional importance of subtidal sandy seabed areas that support MPBs and that the EPA expects proponents to understand the extent of impacts of their proposals on MPB dominated habitat. However it does not expect impacts on these BPP communities to be a significant consideration for most assessments.

The EPA notes that there has been limited research into the ecosystem function and productivity of salt marshes, cyanobacterial mats and microphytobenthos in the Port Hedland Local Assessment Unit. Several proposals have been assessed by the EPA in recent years that have utilised significant areas of these habitat types which support these communities without a cumulative impact assessment being undertaken. A potential consequence from the cumulative loss is a significant reduction in the proportion of primary production coming from shallow water benthic primary producers.

As part of the assessment of other proposals in the Port Hedland inner harbour, the EPA has previously provided advice on the cumulative loss of benthic primary producer habitats. In its assessment of the Nelson Point RGP6 Port Development proposal (EPA Report 1337), the EPA advised of the need for proponents to be moving towards an improved understanding of cumulative impacts and loss of these communities and to describe the impacts of further losses on ecosystem integrity.

In view of the EPA’s previous advice and the fact that PHPA has not evaluated the impacts of the proposal on benthic primary producer habitats in the context of the EPA Environmental Assessment Guideline No. 3, the EPA is recommending conditions which require PHPA to determine the project specific and cumulative impacts on the following benthic primary producer habitat types: cyanobacterial mats; saltmarsh; macroalgal and sub-tidal microphytobenthos. Conditions 5-13 and 5-14 require PHPA to survey the distribution of cyanobacterial mats, saltmarsh, macroalgal and sub-tidal microphytobenthos communities and potential habitats in the intertidal and subtidal areas to be disturbed by the proposal. The information from this survey, along with existing and historical information about potential habitats would then be used to estimate the cumulative impacts on each benthic primary producer habitat type in the context of the agreed Port Hedland industrial area local assessment unit.

The EPA recommends that this information should be finalised and submitted within 12 months of the commencement of construction.
Summary
Having particular regard to the:

- PHPA’s evaluation of options for the configuration of the shipping berths and design consideration for the DMMAs to identify opportunities to minimise the level of direct impacts on mangroves, wherever practicable;
- predicted loss of up to 40 ha of loss and the EPA’s recommended Condition 5 which aims to restrict permanent loss of mangroves to this amount;
- proposed extent of mangrove clearing for the proposal is not regarded by the EPA to be unacceptable both by itself, or cumulatively;
- EPA’s recommended conditions to ensure mangrove health and sedimentation are monitored against pre-determined management trigger levels during the dredging and reclamation and for a period after the completion to demonstrate that mangrove impacts from sedimentation do not occur outside the designated footprint; and
- EPA’s recommended conditions which requires the PHPA to undertake a benthic habitat survey to determine the proposal specific and cumulative impacts on each benthic primary producer habitat types including cyanobacterial mats, saltmarsh, macroalgal and sub-tidal microphytobenthos,

it is the EPA’s opinion that that the proposal can be managed to meet the EPA’s environmental objectives for this factor.

3.2 Water quality

Description
The key marine water quality issues associated with the proposal are:

- increased Total Suspended Sediment (TSS) levels in the water column – caused by suspended sediments released into the water column during dredging and/or spoil disposal, and resuspending following deposition;
- increased sedimentation rates – caused by particles settling out of the water column during dredging and disposal;
- potential increase in the levels of dissolved contaminants in the surrounding waters caused by the release of contaminants from the disturbed and suspended sediments during dredging; and
- potential impacts on receiving water quality caused by the return water discharge from the DMMAs G and B North.

PHPA has undertaken plume dispersion modelling and predicts that the main water quality impacts from dredging and dewatering are expected within South and South West Creek areas. Average TSS values are predicted to be no greater than 20 mg/L for surface and up to 35 mg/L for bottom waters. Water quality is expected to be influenced by slight increases in TSS concentrations throughout the creek systems and in the harbour itself for the duration of the dredging project.
PHPA has proposed to monitor water quality at key receptor locations for a range of physio-chemical parameters continuously for the duration of the project and undertaken contingency measures based on a tiered monitoring and management framework.

In relation to the potential increase in the levels of dissolved contaminants PHPA has undertaken sediment sampling of the material to be disposed offshore in support of its sea dumping application to the Commonwealth DSEWPaC. Results of sampling and analysis show that sediments were clean and suitable for unconfined ocean disposal with the 95% upper confidence limit for all parameters below the National Assessment Guidelines for Dredging (NAGD, 2009). The application is currently being assessed by DSEWPaC.

With respect to the deeper unconsolidated sediments (dredged material below -6 m CD and down to design depths) the sediment analysis shows nickel and chromium concentrations to be elevated across all depths when compared with the NAGD screening levels. Based on results of previous sediment studies in the Port Hedland Inner Harbour, the proponent advises that nickel and chromium have been reported to be naturally elevated throughout the region.

The implication for potential impacts to the receiving water quality of South and South West creeks from placing the dredged materials in the DMMAs were investigated by PHPA by way of elutriates testing. This investigation showed that for one sample, the 99% species protection levels for nickel was exceeded, but below the 95% species protection level. All other elutriate samples were below the 99% species protection levels. The 99% species protection level is applicable for this proposal as the head waters in South West and South creeks which are to receive discharge from the DMMAs are assigned a high level of ecological protection.

Assessment
The EPA’s environmental objective for this factor is that the environmental values of ecosystem health, fishing and aquaculture, recreation and aesthetics, and industrial water supply are protected.

The area for assessment includes the waters of the Port Hedland inner harbour, including South West and South creeks (the receiving environments for DMMAs G and B tailwater discharge). The offshore Spoil Ground ‘1’ is not included in the EPA’s area for assessment as it is located in Commonwealth waters and the proponent will conform with appropriate Commonwealth policies and standards for sea dumping of dredged material.

The Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (Department of Environment, 2006) establishes an environmental quality management framework for the Pilbara region to help manage and protect the marine environment from the effects of waste inputs and pollution. The plan establishes environmental values to be protected, the environmental quality objectives (EQOs) that should be met and spatially defines the levels of ecological protection (LEPs) for the harbour. The environmental values to be protected in the harbour are:

- Ecosystem health
• Cultural and spiritual;
• Fishing and aquaculture;
• Recreation and aesthetics; and
• Industrial water supply.

The EQO for maintenance of ecosystem integrity has two different LEP that apply in Port Hedland harbour – high and moderate. Most of the working areas of the inner harbour at Port Hedland have been assigned a ‘moderate’ LEP in recognition of existing and approved proposals as at 2006. This allocation of a moderate LEP recognises that in areas about wharves, jetties and ship turning basins there is enhanced potential for a range of uncontrolled contaminant inputs (eg. shedding of antifouling paints) in addition to turbidity and sediment mobilisation during ship berthing.

The dredging footprint including the new berth pockets for this proposal extends into an area assigned a ‘high’ LEP. As a consequence of this proposal, the PHPA has proposed revised LEPs from ‘high’ to ‘moderate’ as shown in Figure 6-1 of the PHPA’s referral document. The revised boundaries would capture future berth facilities associated with the proposed berth pockets and are a maximum of 250 m from the edge of the berth pockets. This is modification is consistent with the guidance provided in the Pilbara Coastal Water Quality Consultation Outcomes (DoE, 2006).

A ‘high’ LEP would continue to apply for the remainder of South West Creek, south of the proposal, and all of South Creek consistent with the Pilbara Coastal Water Quality Consultation Outcomes (DoE, 2006). This LEP allows for small changes in contaminant concentrations with no resultant detectable changes beyond natural variation\(^1\) in the diversity of species and biological communities, and ecosystem processes. Both these creeks are proposed to receive discharge from reclamation areas DMMA G and B.

**Reclamation**

As mentioned above, PHPA has undertaken investigations for the potential release of nickel and chromium during dewatering and reclamation. Based on its investigations the PHPA has concluded that nickel and chromium in the sediments pose a negligible risk to the environment and as such the material should be suitable for reclamation and dewatering. While it is noted that one sample of elutriate shows an exceedance of the 99% species protection level for nickel, the EPA considers that there is likely to be substantial dilution and mixing of sediments and water in the DMMAs to meet the trigger levels for a high LEP at the discharge outlet.

The EPA has recommended conditions (Condition 6) which require the PHPA to monitor water quality in the vicinity of the DMMA discharges against the water quality guideline trigger levels for a ‘high’ LEP in the South and South West creeks. Monitoring parameters include turbidity, salinity, pH and dissolved oxygen. Monitoring of nickel concentration will need to occur at the discharge outlets, when the DMMAs are discharging.

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\(^1\) Detectable change beyond natural variation defined by the median of a test site parameter being outside the 20\(^{th}\) and 80\(^{th}\) percentiles of the measured distribution of that parameter from a suitable reference site.
Water quality criteria for triggering the implementation of contingency measures for the DMMA G and B discharge waters will be determined prior to dredging based on the results of the baseline water quality monitoring program and will also be compared to reference sites. As set out in recommend condition 6, water quality criteria will need to be derived based on the 20th and 80th percentiles of the measured distribution from a suitable baseline and reference data.

PHPA has identified a number of available contingency measures in the event water quality trigger levels are reached including:

- maximising residence time in the DMMAs to reduce the turbidity plume of the discharge;
- using suitable controls (eg. weir boxes) at the discharge point to control water level and rate of discharge;
- cease dewatering or use alternative discharge point; and
- regular maintenance of erosion and sediment control structures particularly following heavy rainfall events.

Summary
Having particular regard to the:

- PHPA’s predictions on water quality during dredging and dewatering; and
- EPA’s recommended condition 6 which requires the PHPA to monitor water quality in the vicinity of the DMMA discharges against the water quality guideline trigger levels for a ‘high’ LEP and to undertake management actions when trigger levels have been reached,

it is the EPA’s opinion that the proposal can be managed to meet the EPA’s environmental objectives for this factor.

3.3 Rehabilitation
Following completion of the dredging and reclamation activities, the DMMAs will receive approximately 8.7 Mm$^3$ of dredged sediments. Due to bulking of materials as they are broken up from consolidated layers for transportation to the DMMAs, the final volume of material to be retained in the DMMAs will be greater than the volume actually dredged from the harbour. Taking into account bulking factors associated with previous dredging projects in Port Hedland, PHPA estimates that approximately 14.5 Mm$^3$ of material would need to be retained in the DMMAs.

The PHPA has committed to the ongoing management of the dredged material and is currently considering opportunities for re-use. The nature of the fill and its high salt levels would influence how it is managed and the ultimate land use by the PHPA.

While the final land use of the DMMAs has not been determined, PHPA has advised the following options have been identified:

- reclamation and reuse of the dredge material within the DMMA;
• development of the DMMAs areas into the future port facilities (eg. material handling, stockpiling and ship loading facilities); and
• rehabilitation of the DMMAs to provide stable and functioning landforms that are consistent with the surrounding landscape and other environmental values.

Potential impacts associated with DMMAs in the time between being reclaimed and being re-used or rehabilitated include:

• potential increases in dust generation from DMMAs following the completion of dredging;
• introduction and establishment of weed species; and
• modification of the landform resulting in altered local erosion and indirect impacts to vegetation communities.

Following the dredging program the PHPA has committed to stabilise the DMMAs to ensure any emissions to air and water are minimised and within acceptable limits. If the DMMAs and corridors are not re-used or developed within five years of completion of the dredge program, the PHPA will rehabilitate these areas.

Assessment
The EPA’s environmental objective for this factor is to ensure that rehabilitation achieves an acceptable standard compatible with the intended land use, ensure that the area does not contribute significantly to background dust levels and the visual amenity of the area and adjacent surrounds is not unduly affected by the proposal.

The EPA notes the PHPA’s options for the re-use and development of the DMMAs. Any further development or re-use of the material would be subject to separate assessment and approvals processes.

The area for assessment is the construction footprint of the DMMAs. Potential impacts associated with DMMAs in the time between being reclaimed and being re-used or rehabilitated include:

• potential increases in dust generation from DUMMA;
• introduction and establishment of weed species; and
• modification of the landform resulting in altered local erosion, stability and drainage.

PHPA has committed to stabilise and manage the DMMAs upon completion of dredged material disposal activities to protect visual amenity, reduce dust emissions from open areas and minimise impacts to underlying groundwater.

If material is not re-used or developed within five years from completion of dredging, the DMMAs would be rehabilitated in accordance with following:

• establishment of an effective vegetative cover so that dust generation from wind erosion is no greater than surrounding vegetated areas;
• surface water run-off from the DMMAs would be contained where appropriate and discharge controlled such that there is no significant, physical off-site impacts;
• the external batters of the DMMAs would be intercepted by tidal flows intermittently and may periodically receive large storm surge flows. Rock armour would be placed on exposed wall surfaces to manage potential erosion impacts from intermittent tidal influence;
• public access would be restricted and adequate signage and notification installed such that members of the general public could not inadvertently gain access to unsafe areas;
• declared weeds and significant environmental weeds would be controlled (including regular inspection and treatment);
• the surfaces of the DMMA would be revegetated with local native vegetation suitable to the characteristics of the area. Initially following dredging, the dredged material is likely to be unsuitable for the establishment of vegetation due to high salt levels. Natural rainfall infiltration processes would assist the flushing of salts from the surface of the dredged material;
• surface water would be collected and retained in settlement ponds within each DMMA to aid the natural salt flushing processes;
• structural integrity of the DMMAs would be maintained during cyclonic rainfall events by maintaining a combination of suitable internal wall height free-board above the stored dredge material, combined with a suitably sized stormwater emergency overflow structure and suitable engineering design of the tidal intercept zone; and
• a long-term systems-based monitoring approach would be used to track the trajectory of rehabilitated areas towards self-sustaining status.

The EPA has recommended a condition which incorporates the key components of the above commitments to ensure that this occurs (recommended condition 7-2).

As noted in the EPA’s Report 1311 (EPA, 2008) there are existing concerns regarding dust in Port Hedland and in particular, on the Wedgefield Industrial Estate. It is the EPA’s expectation that the DMMA areas will be managed so that they do not add significantly to background dust levels. This would require PHPA to monitor and demonstrate that it is not contributing significantly to background dust levels, and if it is, then PHPA will be required to undertake remedial actions such as additional stabilisation to reduce the contribution of this area to background dust levels.

Summary

Having particular regard to:
• PHPA’s options for the potential re-use for the dredged material disposed of on-shore;
• PHPA has committed to stabilise and manage the DMMAs upon completion of dredged material disposal activities to protect visual amenity, reduce dust emissions from open areas and minimise impacts to underlying groundwater; and
• the EPA’s recommended condition 7-2 for the area to be rehabilitated if re-use of material of development of the land is not established within 5 years of dredging,
it is the EPA’s opinion that the proposal can be managed to meet the EPA’s environmental objectives for this factor.

4. Recommended conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that it recommends be imposed if the proposal by PHPA to develop the South West Creek Dredging and Reclamation proposal is approved for implementation. These conditions are presented in Appendix 2.

Consultation

In developing these conditions, the EPA consulted with the PHPA in respect to the matters of fact and matters of technical or implementation significance.

5. Other advice

Cumulative loss assessment of mangroves within the Port Hedland Industrial Area Assessment Unit

The EPA has previously considered the loss of mangroves within the Port Hedland Industrial Area Assessment Unit in the context of EPA’s Guidance Statement 29, *Benthic Primary Producer Habitat Protection*. The EPA’s approach to assessment of the proposed loss of mangroves from referred proposals has been based on established data that defines the amount of mangroves present within the Port Hedland Industrial Area Local Assessment Unit, pre-European disturbance. The accepted data that has been utilised in previous EPA reports is a historical area of 2676 ha of mangrove cover.

In December 2009 the EPA released new guidelines for proponents that propose to remove BPPH as part of a proposal. This guideline, *Environmental Assessment Guideline, No.3, Protection of Benthic Primary Producer Habitats in Western Australia’s Marine Environment*, supersedes Guidance Statement 29.

More recently, the EPA has been made aware of information that may need to be considered in the assessment of cumulative mangrove loss within the Port Hedland Industrial Area Local Assessment Unit. This information relates to potential net gains that may have occurred since the recording of the pre-European historical mangrove cover.

The EPA considers that having an increased understanding of net mangrove gains within the Port Hedland Industrial Area Local Assessment Unit is desirable when assessing future proposals involving the clearing of mangroves.

Future export of iron ore through the Port Hedland Port

Whilst not part of this proposal, the dredging of South West Creek to create eight new berth pockets would clearly result in an increase in the iron ore throughput through the
Port Hedland inner harbor. It is expected that proposals by the mining companies to utilise the new berths to construct and operate port infrastructure for exporting iron ore would be subject to the regulation by the Department of Environment and Conservation (DEC) under Part V of the Environmental Protection Act 1986 and significant proposals would be referred to the EPA for consideration.

The EPA notes the formation of the ‘Port Hedland Dust Management Taskforce’ and the development of the Port Hedland Air Quality and Noise Management Plan, March 2010 (Department of State Development, 2010) (the Taskforce Report). The management plan provides an implementation strategy for ongoing air quality and noise management in Port Hedland, with an implementation strategy and governance framework. The development of the plan has been informed by a review of existing scientific reports and studies, including dust emission modelling for a range of development scenarios in Port Hedland including on the basis of full inner harbour development.

Based on advice from the DEC, the EPA notes that the dust modelling study which simulated a full inner harbor development scenario did not include full development and utilization of all eight shipping berths that would result from the South West Creek Development. It appears that only the RHI and FMG iron ore throughputs, which were then foreseeable iron ore projects, were taken into account. Hence the dust modelling studies that were used to inform the development of the Taskforce Report may have underestimated long term dust emissions primarily because forecast growth data for Port Hedland has changed since the studies were completed. The EPA notes that this is acknowledged in the Taskforce Report.

The EPA is therefore identifying this issue now for the attention of the Taskforce to determine whether:

- further dust modelling would need to be undertaken to predict the likely change to the maximum 24 hour PM$_{10}$ ground level concentrations at sensitive receptors in Port Hedland as a result of full development of South West Creek and the extent to which the interim dust guideline measure for 24 hour PM$_{10}$ can be met; and

- strategies and actions in the Taskforce Report will need to be revised or updated in line with recent information about foreseeable developments and iron ore export projects in South West Creek.

In view of the current and predicted dust levels from future expansions in Port Hedland, the EPA considers that all future proponents of the iron ore export facilities in South West Creek should seek to minimise the contribution of their proposals to the existing dust load. To limit dust emissions to the lowest practicable level, the EPA considers that future proponents of berth infrastructure will need to demonstrate the use of world’s best practice dust management and engineering solutions to minimise emissions. The EPA would therefore expect that the Taskforce, DEC, future proponents and the PHPA as the proponent of this proposal and as a member of the Port Hedland Dust Management Taskforce, would have ongoing roles in ensuring that world’s best practice dust management is applied to future iron ore export facilities.

The EPA also considers that the membership of the Port Hedland Industries Council should include future proponents of berth infrastructure and export facilities to ensure a coordinated approach to the implementation of the Taskforce Report’s actions.
Port Hedland Port Authority – Development Plan

During its assessment of the RHI Port Infrastructure facility the EPA advised in EPA Report 1377 that:

“As the Port Hedland Port continues to grow rapidly with existing proponents seeking to expand operations and new proponents seeking to utilise the port to export product, it is of concern to the EPA that there is a lack of a coordinated planning approach to effectively facilitate this growth. Furthermore, it is the opinion of the EPA that the absence of a coordinated plan has the potential to lead to more uncertainty regarding the environmental acceptability of future proposals within the Port Hedland Port.”

In view of the further cumulative loss of mangrove communities as a result of this proposal, the EPA reiterates this advice and strongly encourages the PHPA to submit a development plan that would provide the EPA with a strategic overview of the most likely development scenario for the Port Hedland Port, from which the potential significance of environmental impacts of future proposals may be identified and considered.
6. Conclusions

The EPA has considered the proposal by PHPA to undertake dredging of up to 14.2 Mm$^3$ of material for eight new berth pockets, a swing basin, the construction of two new DMMAs and associated pipeline and access corridors.

In conducting its assessment of the proposal the EPA has determined that the key environmental factors of Benthic Primary Producer Habitats (mangroves, coral communities and algal mats) and water quality required detailed assessment in this report.

The EPA notes that PHPA has undertaken an evaluation of options for berth layouts and configurations and selected the option which minimises mangrove impacts and dredge volumes, whilst still providing for the construction of eight berths. It has also designed the layout and configuration of the DMMAs to avoid impacts to closed canopy mangroves and minimise impacts to other mangrove habitats in South and South West creeks. Hence, PHPA has to some extent demonstrated that it has minimised the level of adverse impacts on BPPH, wherever practicable. The EPA considers that the predicted loss of 40 ha is considered to be a small proportion of the current extent of mangroves in the Port Hedland Local Assessment Unit and is not of itself, or cumulatively, unacceptable.

For mangroves outside the zone of permanent loss, the EPA has recommended conditions be imposed which requires dredging and reclamation to be actively managed based on a monitoring program which includes pre-determined trigger levels for mangrove health and net sedimentation to ensure impacts do not exceed the PHPA’s predictions.

In view of the EPA’s previous advice in its assessment of other proposals in the Port Hedland Inner Harbour and the fact that PHPA has not evaluated the impacts of the proposal on other benthic primary producer habitats in the context of the EPA Environmental Assessment Guideline No. 3, the EPA is recommending conditions which require PHPA to determine the project specific and cumulative impacts on other benthic primary producer habitat types. The recommended conditions requires the PHPA to undertake a benthic habitat survey to determine the proposal specific impacts on cyanobacterial mats, saltmarsh, macroalgal and sub-tidal microphytobenthos and using historical and existing information estimate the cumulative impacts on each of these habitat types.

In regards to water quality, the EPA considers that the key issue is the ongoing monitoring and management of discharge water from DMMAs into South and South West creeks. These creeks are designated as a ‘High’ level of ecological protection as shown in the Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives, DoE 2006. The EPA has recommended Condition 6 which requires the PHPA to monitor water quality in the vicinity of the DMMA discharges against the water quality guideline trigger levels for a ‘High’ level of ecological protection and to undertake management actions when trigger levels have been reached.
The EPA has also recommended conditions which provide for the rehabilitation of the reclaimed DMMAs in the event that they are not developed or identified for re-use.

The EPA has therefore concluded that the proposal can be managed to meet the EPA’s environmental objectives, provided there is satisfactory implementation of the proposal as outlined in the referral documentation by the PHPA and the recommended conditions set out in Appendix 2.

7. Recommendations

The EPA submits the following recommendations to the Minister for Environment:

1. That the Minister notes that the proposal being assessed is for proposal by PHPA to undertake dredging of up to 14.2 Mm$^3$ of material for eight new berth pockets, a swing basin, the construction of two new DMMAs and associated pipeline and access corridors.

2. That the Minister considers the report on the key environmental factors as set out in Section 4.

3. That the Minister notes that the EPA has concluded that the proposal can be managed to meet the EPA’s environmental objectives, provided there is satisfactory implementation of the proposal as outlined in the referral documentation by the proponent and the recommended conditions set out in Appendix 2.

4. That the Minister imposes the conditions and procedures recommended in Appendix 2 of this report.

5. That the Minister notes the EPA’s Other advice in Section 5 of this report in relation to future proposals for the export of iron ore through South West Creek and the need for the PHPA to finalise its Ultimate Port Development Plan.
Appendix 1

References

Environmental Protection Authority (EPA) 2009a, Environmental Assessment Guideline No. 3 Protection of Benthic Primary Producer Habitat in Western Australia’s Marine Environment, Environmental Protection Authority Perth Western Australia, December 2009.

Environmental Protection Authority (EPA) 2009b, Report and Recommendations of the Environmental Protection Authority – Nelson Point Dredging, RPG6 Port Development, Port Hedland (BHP Billiton Iron Ore), Environmental Protection Authority, Report 1337, Perth Western Australia September 2009.

Environmental Protection Authority (EPA) 2009c. Environmental Protection Bulletin No.2 – Port Hedland Noise and Dust, January 2009.

Environmental Protection Authority (EPA) 2009d, Report and Recommendations of the Environmental Protection Authority – Utah Point Berth Project (Stage B), Port Hedland Port Authority, Environmental Protection Authority, Report 1311, Perth Western Australia September 2009.


*Report for Outer Harbour Concept, Fatal Flaw Analysis*, prepared for Port Hedland Port Authority by GHD, March 2009.


Appendix 2

Identified Decision-making Authorities
and
Recommended Environmental Conditions
Identified Decision-making Authorities

Section 44(2) of the *Environmental Protection Act 1986* (EP Act) specifies that the EPA’s report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA’s recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities, and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified for this consultation:

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<tr>
<th>Decision-making Authority</th>
<th>Approval</th>
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<tr>
<td>1. Minister for Indigenous Affairs</td>
<td>Aboriginal Heritage Act (1972) – Section 18 Clearances</td>
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The following have been identified as interested parties:

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<td>1. Minister for Transport</td>
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<td>2. Minister for Regional Development</td>
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<td>3. Minister for State Development</td>
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Recommended Environmental Conditions
RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(PURSUANT TO THE PROVISIONS OF THE
ENVIRONMENTAL PROTECTION ACT 1986)

South West Creek Dredging and Reclamation Project

Proposal: The proposal involves the dredging of not more than 14.2 million cubic metres (Mm³) of material for eight new berth pockets, a turning circle and a link to the existing shipping channel. The proposal also involves the construction of two new land based dredge management areas (DMMAs). Dredged material will be disposed offshore at an existing disposal ground in Commonwealth waters and the new and existing DMMAs, as documented in schedule 1 of this statement.

The proposal is further documented in schedule 1 of this statement.

Proponent: Port Hedland Port Authority

Proponent address: PO Box 2
Port Hedland  WA  6271

Assessment number: 1856

Report of the Environmental Protection Authority: Report 1380

The proposal referred to in the above report of the Environmental Protection Authority may be implemented. The implementation of that proposal is subject to the following conditions and procedures:

1 Proposal implementation

1-1 The proponent shall implement the proposal as documented and described in schedule 1 of this statement subject to the conditions and procedures of this statement.

2 Proponent nomination and contact details

2-1 The proponent for the time being nominated by the Minister for Environment under sections 38(6) or 38(7) of the Environmental Protection Act 1986 is responsible for the implementation of the proposal.
2-2 The proponent shall notify the Chief Executive Officer of the Office of the Environmental Protection Authority of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.

3 **Time limit of authorisation**

3-1 The authorisation to implement the proposal provided for in this statement shall lapse and be void five years after the date of this statement if the proposal to which this statement relates is not substantially commenced.

3-2 The proponent shall provide the Chief Executive Officer of the Office of the Environmental Protection Authority with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.

4 **Compliance reporting**

4-1 The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority.

4-2 The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority the compliance assessment plan required by condition 4-1 at least six months prior to the first compliance report required by condition 4-6, or prior to implementation, whichever is sooner.

The compliance assessment plan shall indicate:

1. the frequency of compliance reporting;
2. the approach and timing of compliance assessments;
3. the retention of compliance assessments;
4. the method of reporting of potential non-compliances and corrective actions taken;
5. the table of contents of compliance assessment reports; and
6. public availability of compliance assessment reports.

4-3 The proponent shall assess compliance with conditions in accordance with the compliance assessment plan required by condition 4-1.
4-4 The proponent shall retain reports of all compliance assessments described in the compliance assessment plan required by condition 4-1 and shall make those reports available when requested by the Chief Executive Officer of the Office of the Environmental Protection Authority.

4-5 The proponent shall advise the Chief Executive Officer of the Office of the Environmental Protection Authority of any potential non-compliance within seven days of that non-compliance being known.

4-6 The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority the first compliance assessment report fifteen months from the date of issue of this Statement addressing the twelve month period from the date of issue of this Statement and then annually from the date of submission of the first compliance assessment report.

The compliance assessment report shall:

1 be endorsed by the proponent’s Managing Director or a person approved in writing by the Chief Executive Officer of the Office of the Environmental Protection Authority, delegated to sign on the Managing Director’s behalf;

2 include a statement as to whether the proponent has complied with the conditions;

3 identify all potential non-compliances and describe corrective and preventative actions taken;

4 be made publicly available in accordance with the approved compliance assessment plan; and

5 indicate any proposed changes to the compliance assessment plan required by condition 4-1.

5 **Benthic primary producer habitat**

*Mangroves*

5-1 The proponent shall ensure that the implementation of the proposal does not cause the permanent loss of mangroves, either through direct or indirect impacts, other than the mangroves located within the zone of permanent loss in Figure 2 in Schedule 1 of this statement.

Note: ‘Permanent loss’ is defined as the mortality of, or long term serious damage to, mangrove communities.

5-2 The total area of mangroves within the zone of permanent loss shall not exceed 40 hectares.
5-3 To verify that the requirements of conditions 5-1 and 5-2 have been met, the proponent shall prepare a monitoring plan for mangrove health and sedimentation to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority prior to the commencement of construction.

The monitoring plan shall include:

1. mangrove health and net sedimentation monitoring locations at:
   a) Potential impact monitoring sites – at locations where mangrove communities are found and which are outside and as close as practicable to the zone of permanent loss in Figure 2. There shall be at least eight potential monitoring sites comprising at least two monitoring sites in South West Creek, two monitoring sites in West Creek, one site at the confluence of South West Creek and West Creek, two sites in South Creek and one site at Stanley Point; and
   b) Reference monitoring sites – at locations which are similar to each impact monitoring site in all respects including mangrove associations and which do not have the potential to be affected by the implementation of the proposal or any other activities that may affect mangrove health,

2. the use of permanent relocatable quadrats for repeat measures of mangrove health;

3. the methodology for baseline and subsequent surveys for mangrove health and net sedimentation at the impact and reference monitoring sites referred to in item 1 above;

4. the frequency for monitoring mangrove health and net sedimentation;

5. indicators of mangrove health, and management trigger levels for indicators of mangrove health; and

6. management trigger level for sedimentation.

5-4 The proponent shall implement the monitoring plan required by condition 5-3 prior to the commencement of construction until such time as the Chief Executive Officer of the Office of the Environmental Protection Authority determines that monitoring actions may cease.

5-5 Prior to the commencement of dredging, the proponent shall submit a report on the results of baseline surveys of mangrove health and net sedimentation from the potential impact and reference monitoring sites required by conditions 5-3.
5-6 In the event that monitoring required by condition 5-4 indicates a trigger level has been reached:

1. the proponent shall report such findings to Chief Executive Officer of the Office of the Environmental Protection Authority within seven days of the trigger level being reached being identified;

2. the proponent shall provide evidence which allows determination of the circumstance which caused the trigger levels to be reached;

3. if determined by the Chief Executive Officer of the Office of the Environmental Protection Authority to be project attributable, the proponent shall submit any actions to be taken to address the net increase in sedimentation or decline in mangrove health within 7 days of the determination being made to the Chief Executive Officer of the Office of the Environmental Protection Authority; and

4. the proponent shall implement actions to address the net increase in sedimentation or decline in mangrove health upon approval of the Chief Executive Officer of the Office of the Environmental Protection Authority and shall continue implementing the approved actions until such time as the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the approved actions may cease.

5-7 The proponent shall submit bi-annually, or at a frequency defined to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority, the results of monitoring required by condition 5-4 to the Chief Executive Officer of the Office of the Environmental Protection Authority, until such time as the Chief Executive Officer of the Office of the Environmental Protection Authority determines that reporting may cease.

5-8 The proponent shall make the monitoring reports required by condition 5-7 publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

5-9 The proponent shall undertake mangrove health surveys and report to the CEO of the Office of the Environmental Protection Authority the total permanent loss of mangrove communities caused by the proposal:

a) 2 months;
b) 12 months; and
c) 24 months, or

at a frequency defined to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority,

following the completion of dredging to verify the requirements of conditions 5-1 and 5-2 have been met.

The reports shall include coordinates and a map confirming the areas of mangrove losses caused by the proposal.
Coral communities

5-10 The proponent shall ensure that the implementation of the proposal does not cause the mortality of, or long-term serious damage to, the coral communities in South East Creek and Stingray Creek.

5-11 To verify that the requirements of condition 5-10 are met the proponent shall:
   a) submit a monitoring plan for water quality and coral health to the requirements of the Chief Executive Officer of the Office of the Environmental Protection Authority. The monitoring plan shall include water quality trigger levels for coral health to apply during dredging;
   b) undertake appropriate management actions should water quality trigger levels be reached during dredging;
   c) undertake baseline surveys of the health of coral communities prior to the commencement of dredging;
   d) undertake coral health surveys following the completion of dredging; and
   e) implement the monitoring plan prior to, during and following the completion of dredging.

5-12 The proponent shall submit a report of management actions undertaken if trigger levels are reached as required by condition 5-11 b) with results of the coral health surveys required by conditions 5-11 c) and d) to demonstrate that the requirements of condition 5-10 have been met.

Cumulative loss of benthic primary producer habitats

5-13 Prior to the commencement of dredging and reclamation, the proponent shall undertake surveys to determine the location and spatial extent of the following intertidal and subtidal benthic primary producer habitats to be impacted by the proposal:
   - cyanobacterial algal mats;
   - saltmarsh communities;
   - coral communities;
   - macroalgae communities; and
   - sandy (benthic microalgal) habitat.

5-14 Within 12 months following the commencement of construction of the proposal, the proponent shall submit a report to the Chief Executive Officer of the Environmental Protection Authority which determines the cumulative loss of each benthic primary producer habitat referred to in condition 5-13 resulting from human activities and developments in the Port Hedland Industrial Area Local Assessment Unit.
The report shall:

- estimate the historical distribution and extent of the benthic primary producer habitats referred to in condition 5-13 in the Port Hedland Industrial Area Local Assessment Unit, prior to European impact;
- estimate the historical and cumulative losses of the benthic primary producer habitats resulting from the human activities and developments in the Port Hedland Industrial Area Local Assessment Unit. Provide best, most probable and worst-case estimates of benthic primary producer habitat loss and assumptions used for each estimate; and
- determine the cumulative loss of the benthic primary producer habitat loss as a result of the proposal based on the survey required by condition 5-13.

Note: The Port Hedland Industrial Area Local Assessment Unit is shown in Figure 6-10 of the Environmental Referral Document: South West Creek Dredging and Reclamation, December 2010.

6 Water quality (dredge material management areas)

6-1 The proponent shall ensure that the quality of the return water discharge from the dredge material management areas shown in Figure 1 of schedule 1 does not reach the following water quality management trigger levels in order to meet a 'high' level of ecological protection in South West Creek and South Creek:

<table>
<thead>
<tr>
<th>Water quality parameter</th>
<th>Management trigger levels (High Protection Level Area)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity (NTU)</td>
<td>Median &gt; 80th percentile of baseline or reference site data</td>
</tr>
<tr>
<td>Temperature</td>
<td>Median &lt; 20th or &gt; 80th percentile of baseline or reference site data</td>
</tr>
<tr>
<td>pH</td>
<td>Median &lt; 20th or &gt; 80th percentile of baseline or reference site data</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>&lt; 60% saturation</td>
</tr>
<tr>
<td>Conductivity</td>
<td>Median &lt; 20th or &gt; 80th percentile of baseline or reference site data</td>
</tr>
<tr>
<td>Metals (Nickel)</td>
<td>&gt; or = 7 micrograms per litre</td>
</tr>
</tbody>
</table>

6-2 To ensure that the requirements of condition 6-1 have been met the proponent shall monitor water quality at the discharge outlets into South West Creek and South Creek as shown in Figure 1, in accordance with a water quality monitoring plan prepared by the proponent prior to the commencement of construction to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority.
The monitoring plan shall include:

a) procedures for daily monitoring of all parameters in condition 6-1 except nickel in South West Creek and South Creek, during discharge activities under a range of tidal conditions;

b) procedures for fortnightly monitoring of nickel at the discharge outlets during discharge activities; and

c) appropriate management actions should trigger levels be reached.

6-3 The proponent shall implement the monitoring plan required by condition 6-2 prior to commencement of any discharge from the dredge material management areas until such time as the Chief Executive Officer of the Environmental Protection Authority determines that monitoring actions may cease.

6-4 In the event that monitoring required by condition 6-3 indicates that any of the water quality management trigger levels for any of the parameters in condition 6-1 have been reached:

a) the proponent shall cease discharge of dewater to the environment immediately;

b) the proponent shall undertake further monitoring to determine the area over which the trigger level for that parameter has been reached and the values for that water quality parameter;

c) the proponent shall report such findings to the Chief Executive Officer of the Office of the Environmental Protection Authority within seven (7) days of the trigger level being reached;

d) the proponent shall provide evidence which allows determination of the cause of the trigger level to be reached;

e) if determined by the Chief Executive Officer of the Office of the Environmental Protection Authority to be project attributable, the proponent shall submit any actions to be taken in response to reaching the trigger level and any actions to prevent the trigger level being reached in the future, within seven (7) days of the determination being made to the Chief Executive Officer of the Office of the Environmental Protection Authority; and

f) the proponent shall implement management actions in response to reaching the trigger level upon approval of the Chief Executive Officer of the Office of the Environmental Protection Authority and shall continue until such time as the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the management actions may cease.

6-5 The proponent shall submit bi-annually, or at a frequency defined to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority...
Protection Authority, the results of monitoring required by condition 6-3 to the Chief Executive Officer of the Office of the Environmental Protection Authority, until such time as the Chief Executive Officer of the Office of the Environmental Protection Authority determines that reporting may cease.

6-6 The proponent shall ensure that dredged material is retained in the dredge material management areas, as shown in Figure 1, and no seepage or release of dredged sediments into the marine environment occurs.

7 Rehabilitation

7-1 Following the completion of dredging the proponent shall rehabilitate the dredge material management areas shown in Figure 1 so that their stability, surface drainage, resistance to erosion is managed to achieve the following:

a) minimal additional wind-born dust generated by the dredge material management areas during periods of high winds;
b) no uncontrolled erosion impacts beyond the dredge material management areas drainage system; and
c) sediment loads in drainage system stormwater flows cause minimal change to receiving water quality.

7-2 In the event dredged material is not utilised within five years following the completion of dredging, the proponent shall rehabilitate the dredge material management areas shown in Figure 1 to achieve the following:

a) minimal additional wind-born dust generated by the dredge material management areas during periods of high winds;
b) no uncontrolled erosion impacts beyond the dredge material management areas drainage system;
c) sediment loads in drainage system stormwater flows cause minimal change to receiving water quality;
d) vegetation cover of at least 50% average cover established over 80% of revegetation areas within two years of revegetation;
e) no more than 10% of dredge material management areas’ surface area and berm areas infected by weeds; and
f) no uncontrolled slumping of berm surfaces beyond geotechnical limits.

7-3 Rehabilitation shall continue as necessary until such time as the requirements of condition 7-1 and 7-2 are met, and are demonstrated by inspections and reports to be met, for a minimum of five years to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority.
Schedule 1

The proposal involves the dredging of 14.2 million cubic metres (Mm³) of material for the construction of eight new berth pockets and a turning circle. The new berth pockets will accommodate a ship size of up to 300 metres in length and 50 metres wide.

The proposal will require the widening of South West Creek and includes the clearing of mangroves.

Dredged material will be disposed of both onshore and offshore with approximately 5.5 Mm³ to be disposed at an established offshore disposal ground in Commonwealth Waters, and 8.7 Mm³ to the land-based dredged material management areas (DMMAs), as shown in Figure 1.

Table 1: Key characteristics

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume of material to be dredged</td>
<td>Not more than 14.2 Mm³ based on</td>
</tr>
<tr>
<td></td>
<td>• Approx 5.5 Mm³ offshore disposal</td>
</tr>
<tr>
<td></td>
<td>• Approx 8.7 Mm³ onshore disposal</td>
</tr>
<tr>
<td>Area of marine disturbance for dredging</td>
<td>Not more than 116 hectares (ha) at South West Creek</td>
</tr>
<tr>
<td>Area of land disturbance for onshore disposal</td>
<td>Not more than 227 ha</td>
</tr>
<tr>
<td></td>
<td>Dredge Material Management Area DMMA G construction footprint: not more than 139 ha</td>
</tr>
<tr>
<td></td>
<td>DMMA B north construction footprint: not more than 81 ha</td>
</tr>
<tr>
<td></td>
<td>Construction corridors for access and pipelines: not more than 7 ha</td>
</tr>
</tbody>
</table>

Figures

1. Location of proposal showing dredging area and dredging material management areas
2. Location of Zone of Permanent Mangrove Loss
Figure 1: Location of proposal showing dredging area and dredging material management areas
Figure 2: Location of Zone of Permanent Mangrove Loss