



# PORT OF BROOME

## STRATEGIC PORT MASTER PLAN EXECUTIVE SUMMARY

Rev: 1

June 2017

Prepared by GHD for Kimberley Ports Authority



# 1. Background

The Port of Broome (**Port**) has been facilitating trade in north west Australia for more than 125 years. It currently supports a range of offshore and onshore activities including:

- Oil and gas exploration and commissioning
- Fuel import and export
- Live cattle export
- Large and small cruise ships
- Fishing and Pearling
- Project cargo
- Dry bulks

Kimberley Ports Authority (**KPA**) is a statutory trading enterprise created under the Port Authorities Act 1999 (WA) and is responsible for managing the Port of Broome and the green fields Port of Browse commonly known as James Price Point.

KPA's Directors and management team identified the development of a 50 year Master Plan for the Port of Broome (**PMP**) as a key strategic initiative which would provide long term benefits to KPA, the State Government and other stakeholders.

To assist it in developing the Master Plan, KPA retained experienced port planners from GHD Pty Ltd. The project brief was to develop a Master Plan for the Port in keeping with Ports Australia's guidelines: "Leading Practice: Port Master Planning – Approaches and Future Opportunities" published in August 2013.

In keeping with the Ports Australia guidelines, this PMP will steer the future development of the Port and assist the KPA Board and management team to:

- Clarify and further define KPA's strategic planning for the Port over a 50 year period
- Guide and facilitate future development
- Reserve land for future development and identify land suitable for expansion outside of the lands currently vested in KPA
- Identify sufficient marine and land-side infrastructure for common use and dedicated use by KPA and port users
- Provide for consistency of planning by aligning the PMP with other planning instruments prepared for Broome, the region and the State of Western Australia
- Effectively consider opportunities, constraints and risks
- Allow for flexibility within identified areas

The PMP provides a planning guidepost that the KPA Board, management team and Port stakeholders can use to inform their future actions and enable the Port of Broome to achieve its full potential.

Like all plans, this plan will be reviewed regularly to ensure that it continues to assist KPA and its stakeholders achieve their objectives.

## 2. KPA Vision & Mission

### Vision

**“To be the safest and most competitive ports network in regional Australia.”**

The Vision recognises KPA’s key role in the region reaching its potential. All of our planning, operations, decision making, and influence, are directed toward sustainable trade and regional development.

### Mission

**“The facilitation of maritime trade to deliver sustainable economic and social benefits for stakeholders across our region.”**

The Mission outlines why KPA exists, and reflects its key functions under the Port Authorities Act 1999. It recognises the primary obligation upon KPA to operate its ports in a safe and professional manner to bring benefits to the State of Western Australia and other stakeholders.

### 3. Port Master Planning Process

The port master planning process adopted for this study is aligned with the UNCTAD and Ports Australia Leading Practice: Port Master Planning - Approaches and Future Opportunities guidelines and has followed a series of phases tailored to suit the unique requirements of this project.

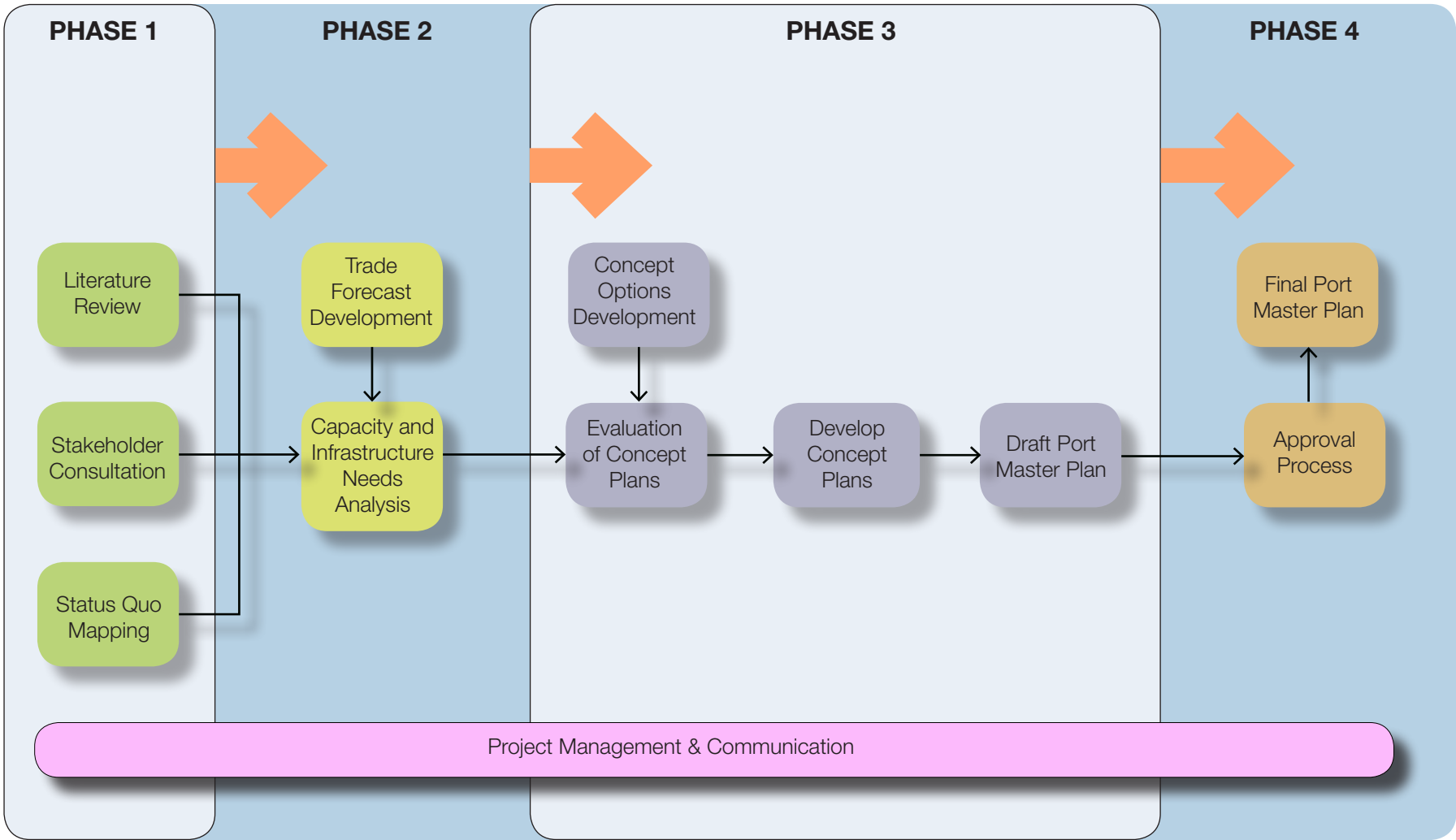
**Phase 1** is focused on a desktop literature review, status quo assessments, and opportunity and constraint identification. Stakeholder consultation helps to improve the accuracy level of this phase.

**Phase 2** consists of developing the trade forecast, assessing the infrastructure required to facilitate projected trade and developing, evaluating and making recommendations on port layout options and associated integrated transport solutions.

**Phase 3** includes development of the concept layouts through the evaluation of various possible concepts, applying an appropriate evaluation method such as Multi Criteria Analysis (MCA) and drafting the plan.

**Phase 4** consists of incorporating all stakeholder feedback elicited in the approval process into the Port Master Plan.

The phases are depicted in Figure 1.



**Figure 1**  
Port Master Planning Process

Source: GHD



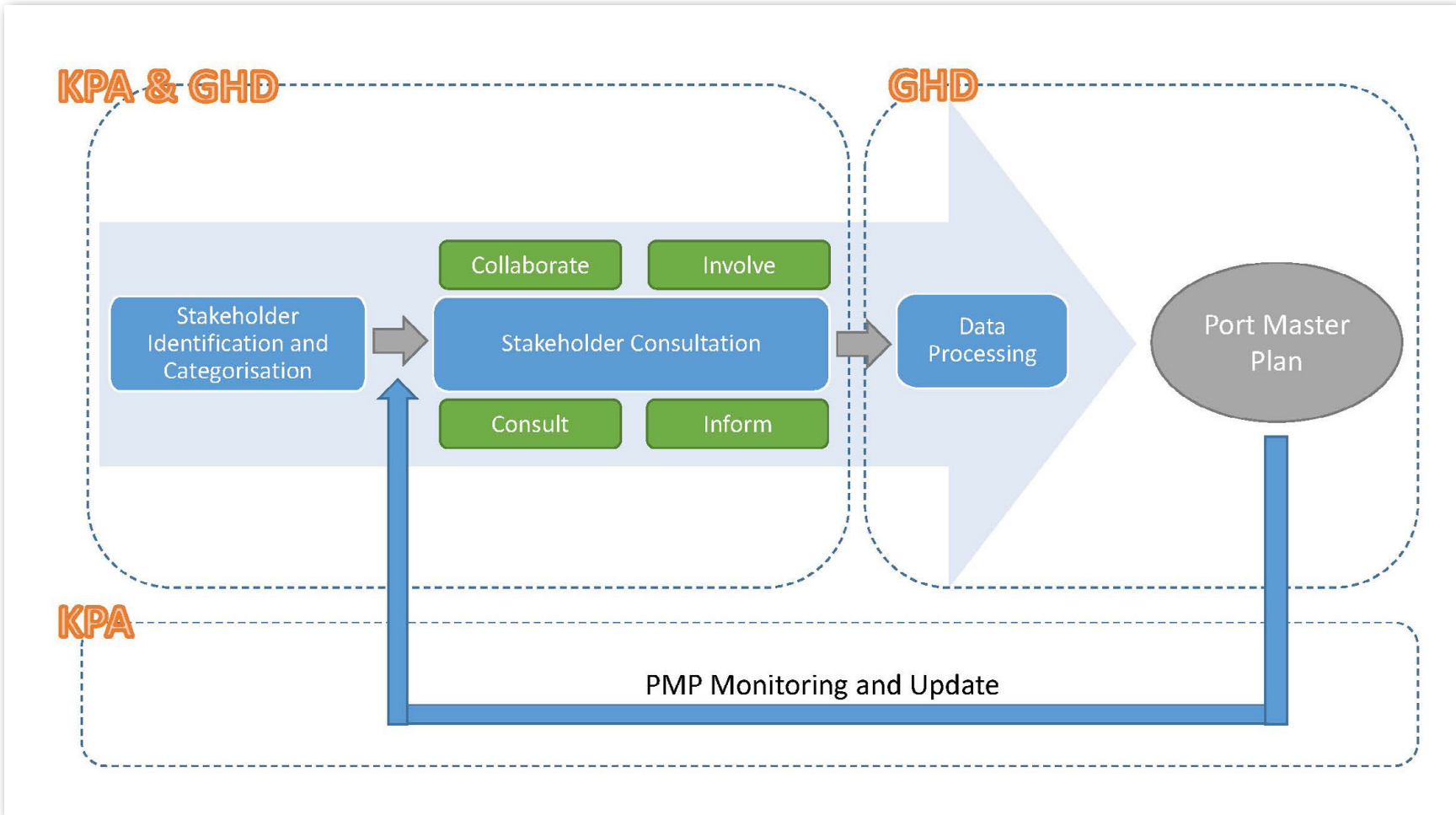
## 4. Stakeholder Consultation

Efficient communication, consultation and engagement of stakeholders and potential proponents are critical steps toward achieving a comprehensive PMP. The communication process allows balance between the various and sometimes conflicting interests, concerns and considerations of key stakeholders to be reached.

Stakeholder consultation was aimed primarily to achieve the following goals:

- To identify and classify stakeholders based on their interests, involvement and concerns in the future development of the Port of Broome
- To obtain vital input from stakeholders, where applicable, about their future trade, operational procedure, vessel sizes, project timing and other critical data which may dictate modification to the default master planning assumptions
- To obtain stakeholder views including governmental and community-based agencies on how the Port of Broome development is to be planned, funded and managed into the future

Figure 2 provides an overview of the overall stakeholder consultation process.



**Figure 2**  
Stakeholder Consultation Process

Source: GHD

## 5. Guiding Principles

The following guiding principles have been adopted for the development of the PMP:

- **Safety** – The PMP will consider development options that promote safety and efficiency within the port system
- **Alignment** – The PMP will consider and seek to align with federal, state, regional and local policies and legislation
- **Demand** – The PMP will be guided and developed based on the robust identification of potential trade demand and future port service requirements
- **Promotion** – The PMP will seek to establish areas that actively promote and attract development of trade and services within the port area
- **Scenarios** – The PMP must develop, consider and evaluate different demand and capacity options with their resultant impact on the future port development
- **Flexibility** – the PMP will promote development options that allow maximum development and operational flexibility
- **Relevance** – The PMP is a precinct level spatial planning tool that provides a clear overview of KPA's development vision and goals and facilitates future communication with interested and affected parties
- **Accessibility** – The PMP will guide the development of facilities that allow multi use operations in preference to dedicated operational port infrastructure
- **Holistic** – The PMP must consider the greater value chain in planning where possible (beyond port border approach)
- **Segregation** – The PMP will group and segregate facilities, cargoes and operations that have either beneficial or adverse impacts on each other
- **Streamline** – Consideration of operational change will be considered prior to capital investment. Fit for purpose development that meets the trade demand forecast scenarios will be sought to minimise capital investment
- **Logical** – The PMP will be based on sound logic and articulate the reasons for development options supported within the PMP
- **Respect** – The PMP will seek to respect and treat fairly (through provision of equal planning preference to various industries) users and operators within the port environment. This includes consideration of social, heritage, environmental and cultural items

These were based on discussions with KPA management and Board Members, the stakeholder engagement process with interested and affected parties, the review of federal, state, regional and local documents, reports and guidelines, and the established codes of practice for port planning.







## 6. Status Quo Review

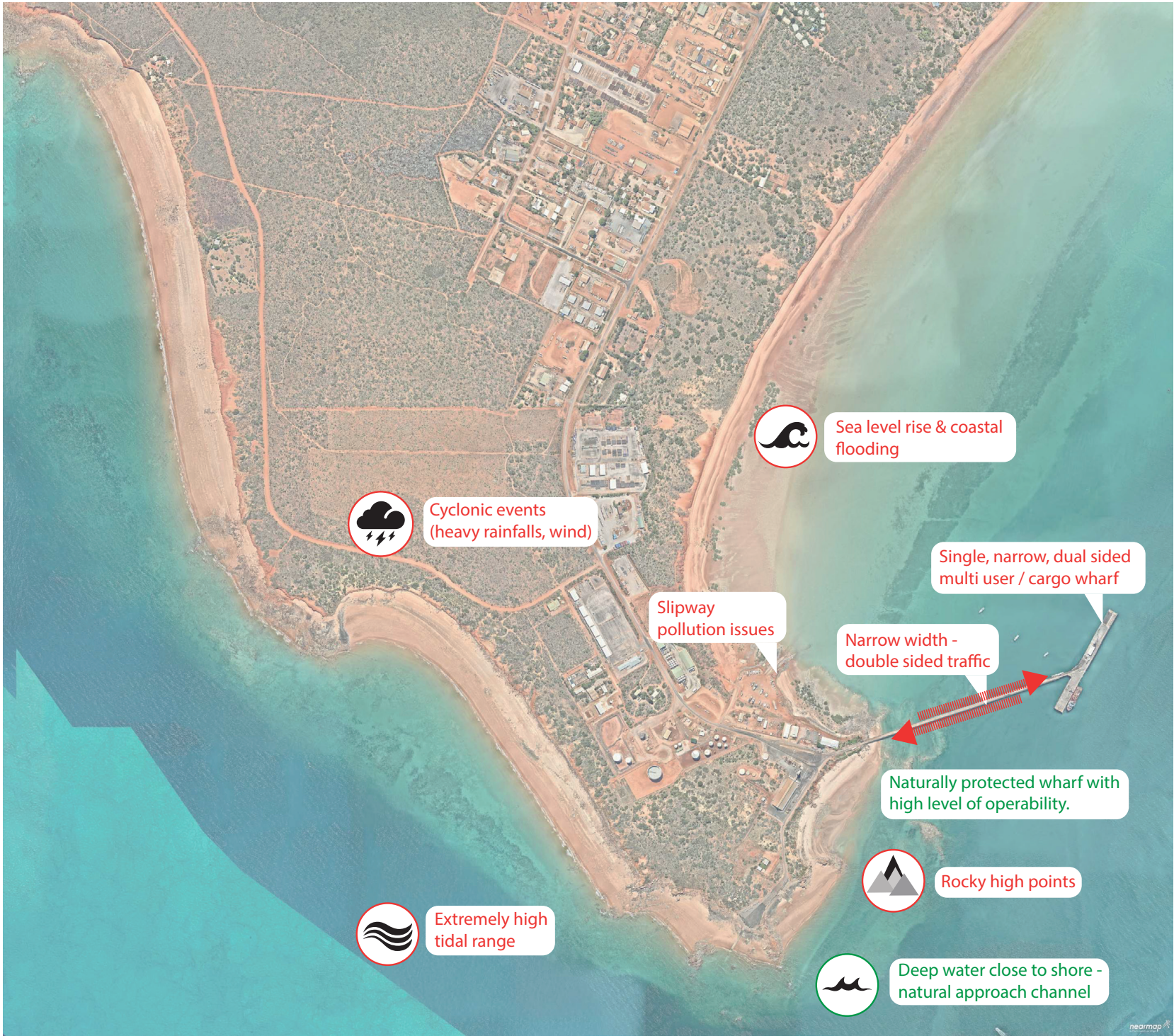
The development of the Port of Broome PMP involved the procurement, processing and presentation of a large amount of data. The characterising site features of the Port of Broome are divided into five categories:

- Physical Aspects
- Marine Infrastructure
- Land-Side Infrastructure
- Environmental
- Heritage / Cultural / Social

Key status quo site considerations within each of these categories and the identification of the associated opportunities and constraints are summarised in the following figures and tables:



Physical & Marine Infrastructure



**Figure 3**  
Opportunities and Constraints related to Marine Infrastructure

Source: GHD



**Table 1**

Opportunities and Constraints related to Physical Aspects and Marine Infrastructure

Aspect	Opportunities & Constraints
Climate and Met Ocean	<b>Opportunities</b> <ul style="list-style-type: none"><li>The wharf is located within the Roebuck Bay and is naturally protected against the waves coming from the ocean. This results in the port having a high level of berth operability without the need for a protective structure.</li></ul>
	<b>Constraints</b> <ul style="list-style-type: none"><li>Port area subject to extremely high tidal range and severe weather conditions. Cyclonic winds and rain conditions impact on port infrastructure and equipment design.</li><li>Sea level rise combined with increased incidence of cyclonic events can lead to higher risk and mitigation costs to protect port infrastructure and services.</li><li>High rainfall events lead to flooding and drainage issues.</li></ul>
Bathymetry / Approach Channel	<b>Opportunities</b> <ul style="list-style-type: none"><li>The deep water close to the shoreline provides a natural approach channel to the wharf without need for any capital or maintenance dredging.</li><li>The open water area presents opportunity for marine expansion e.g. various options for the location of the berths and access channel with reduced capital dredging.</li></ul>
	<b>Constraints</b> <ul style="list-style-type: none"><li>Presence of a local rock shelf (Channel Rock) and other high spots adjacent to the approach channel and turning areas are a natural barrier for safe navigation of wide vessels such as cruise vessels, on low tides.</li></ul>
Wharf Structure	<b>Opportunities</b> <ul style="list-style-type: none"><li>Wharf structure can be extended to the north or south with minimal constraint.</li></ul>
	<b>Constraints</b> <ul style="list-style-type: none"><li>Port infrastructure is not designed for smaller charter vessels which results in increased risk when berthing / mooring and access operations.</li><li>Extreme tidal range limits loading operations in some circumstances.</li><li>Single wharf and access jetty with narrow width.</li><li>Wharf is not land backed, which increases operational complexity.</li></ul>
Wharf Operations	<b>Opportunities</b> <ul style="list-style-type: none"><li>Port offers 24/7 services and berths.</li></ul>
	<b>Constraints</b> <ul style="list-style-type: none"><li>Single wharf facility caters for various port users / demands that require careful management e.g. livestock export versus cruise liner passenger transfer.</li><li>Wharf shed is a physical constraint for wharf operations e.g. truck / port equipment movements and vessel loading / unloading operations.</li><li>Limited space at the jetty entrance gate potentially leads to congestion that constrains port operations.</li><li>Potential limitations on the capacity of the existing cranes to handle variety of port cargo e.g. general cargo, project cargo and containers / tippler containers, etc.</li><li>Existing fenders limit maximum vessel load on wharf to 50,000 MT.</li></ul>

Source: GHD



## Land-Side Infrastructure



**Figure 4**

Opportunities and Constraints related to Land-Side Infrastructure

Source: GHD



**Table 2**

Opportunities and Constraints related to Land-Side Infrastructure

Aspect	Opportunities & Constraints
Infrastructure and Utilities	<b>Opportunities</b> Required Services: <ul style="list-style-type: none"> <li>Most of the required services for port activities, including power, water, telecom and fire water networks are already available within the port land-side area. A waste water collection and disposal network is planned to be developed in various stages to cover all the port land, as demand and finances permit.</li> <li>There are sufficient corridor reserves to accommodate additional development of services.</li> </ul>
	<b>Constraints</b> Water / Power Supply: <ul style="list-style-type: none"> <li>Misalignment of port and service provider strategic planning can lead to delays in investment by power and water providers to support port development and service provision.</li> <li>Water supply restrictions can limit and negatively impact on port water export to port clients or cost prohibitive charges.</li> <li>Water supply via trucks is sub-optimal, compared to piped water main supply.</li> <li>There may be additional costs if and when Horizon Power implements changes to metering.</li> <li>Additional tankage and pipelines may require to be developed in the future to address WaterCorp requirements.</li> </ul> Quarantine: <ul style="list-style-type: none"> <li>Lack of suitable Quarantine Approved Premises limits port service provision.</li> </ul> Segregation of KPA Staff: <ul style="list-style-type: none"> <li>Three separate administration offices presently used for KPA port marine operations, engineering and commercial / management functions creating a barrier to effective communications.</li> <li>Simultaneous use of port roads by recreational (e.g. recreational boat users accessing the boat ramp) and commercial port users leads to potentially dangerous conditions.</li> </ul> Port Buildings: <ul style="list-style-type: none"> <li>The port owns land but not buildings.</li> <li>Port not in control of leases of buildings on port land to non-core port businesses other than permitted use of leased land.</li> </ul>
Land Use	<b>Opportunities</b> <ul style="list-style-type: none"> <li>Approximately 15 hectares of land is available for immediate development.</li> <li>Geographic and spatial ability to segregate port land allocation to facilitate and service both commercial and recreational / tourism functions within the port land area.</li> </ul>
	<b>Constraints</b> Access to additional land for Port: <ul style="list-style-type: none"> <li>Complexity of securing additional land adjacent to existing port area i.e. heritage, environmental and planning approval.</li> </ul> Port Land Use: <ul style="list-style-type: none"> <li>Sub-optimal use of valuable port land adjacent to water-side. Extensive use of port land by non-core operations / facilities e.g. Border Control, Department of Fisheries, Restaurant that limits the port's ability to expand and attract port business.</li> <li>Existing land uses, including existing leases and licences and approved future plans, may provide constraints for allocation of land to specific activities.</li> </ul> Recreational / Commercial Port User Interface: <ul style="list-style-type: none"> <li>Lack of land-side port operational terminal within port security boundary and extensive mix of recreational and commercial port traffic and operations. This leads to a potentially unsafe environment that constrains port safety, efficiency, trade growth and port competitiveness.</li> </ul>

Source: GHD

Aspect	Opportunities & Constraints
Trade	<p><b>Opportunities</b></p> <p>General:</p> <ul style="list-style-type: none"> <li>• The port is an important strategic regional asset that can facilitate development of the Kimberley region e.g. Browse oil and gas development.</li> <li>• Potential increase in pastoral / agricultural export cargo as live export and reefer container cargo.</li> <li>• Potential increase in proportion of chilled / frozen product due to abattoirs being established.</li> <li>• Increasing technology in slaughter and processing capability could potentially increase export cargo.</li> </ul> <p>Oil and Gas:</p> <ul style="list-style-type: none"> <li>• Potential export of crude oil from onshore development.</li> <li>• Potential support of offshore LNG platforms to support maintenance, providing fuel, re-provisioning etc.</li> <li>• Import, storage and supply of LNG to supply LNG-powered vessels.</li> </ul> <p>Livestock:</p> <ul style="list-style-type: none"> <li>• Feedlots: Increase in the number of cattle and/or beef exported associated with the development of intensive feedlot development.</li> <li>• Intrastate feed (across WA): Potential increase in import of feed to support interstate pastoral industry.</li> </ul> <p>Mine Development:</p> <ul style="list-style-type: none"> <li>• Potential development of various resource mines in Canning Basin area.</li> <li>• Potential import of project cargo to support the mining sector development and operations.</li> <li>• Potential export of low volume, high value mineral resources suitable for export via containers / bags e.g. Sheffield.</li> <li>• Potential import of materials / explosives to support onshore mining industry.</li> </ul> <p>Agriculture and Aquaculture:</p> <ul style="list-style-type: none"> <li>• Potential export of high value agricultural commodities e.g. Asparagus.</li> <li>• Potential import of product to support agricultural industry e.g. fertiliser; cartons, empty reefer containers.</li> <li>• Potential increase in chilled / frozen aquaculture product cargo through port e.g. Cone Bay aquaculture development.</li> <li>• Potential import of cargo to support aquaculture business e.g. fish feed, cartons, reefer containers.</li> <li>• Potential development and export of aquaculture seed product produced in Broome.</li> <li>• Potential increase / expansion of market e.g. bulk containers, fertiliser, bitumen, cattle / prawn food, cartons, building materials, project materials.</li> </ul> <p>Tourism:</p> <ul style="list-style-type: none"> <li>• Increased marketing of Broome / Kimberley region.</li> <li>• Growth in large cruise ship visits to WA - knock on effect to Broome.</li> <li>• Increased charter vessels to support the tourism industry development.</li> </ul>



Aspect	Opportunities & Constraints
Trade	<p><b>Constraints</b></p> <p>Access to Additional Land for Port Use:</p> <ul style="list-style-type: none"> <li>Complexity of securing additional land adjacent to existing port area.</li> </ul> <p>Port Land Use:</p> <ul style="list-style-type: none"> <li>Non-optimal use of valuable port land adjacent to water-side. Extensive use of port land by non-core facilities e.g. Border Control, Department of Fisheries, Restaurant that limits the port's ability to expand and attract port business.</li> <li>Existing land uses, including existing leases and licences and approved future plans, may provide constraints for allocation of land to specific activities.</li> </ul> <p>Recreational / Commercial Port User Interface:</p> <ul style="list-style-type: none"> <li>Lack of land-side port operational terminal within port security boundary and extensive mix of recreational and commercial port traffic and operations. This leads to a potentially unsafe environment that constrains port safety and efficiency and constrains trade growth and port competitiveness.</li> </ul>

Source: GHD







**Figure 5**  
Opportunities and Constraints related to Environmental and Social Aspects

Source: GHD



Table 3

Opportunities and Constraints related to Environmental and Heritage / Social Aspects

Aspect	Opportunities & Constraints
Environmental	<b>Opportunities</b> <ul style="list-style-type: none"><li>Port has established conservation areas which provide guidance to development boundaries.</li></ul>
	<b>Constraints</b> <ul style="list-style-type: none"><li>Presence of environmentally sensitive areas which contain rare flora, within and adjacent to the port land may provide constraints toward future expansions and developments.</li><li>Major infrastructure expansion on the marine-side including dredging works may negatively impact on the areas of environmental significance.</li></ul>
Heritage / Social	<b>Opportunities</b> <ul style="list-style-type: none"><li>Segregation of industrial and recreational / residential zones in the Broome township allows the expansion of the Port amenities in adjacent land (if required).</li><li>Existing concentration of points of interests and infrastructure supporting recreational activities, such as public boat ramps, fishing club, volunteer sea rescue and dinosaur foot prints at Entrance Point provides an opportunity to use the areas as the port tourism / recreational hub.</li></ul>
	<b>Constraints</b> <ul style="list-style-type: none"><li>Dinosaur footprints could constrain developments at Entrance Point.</li><li>Interest groups that can negatively impact on the development and use of port services / activities.</li><li>Native title has been extinguished on port lands. However, KPA is still required to meet its obligations under the Aboriginal Heritage Act.</li><li>Focusing on a variety of community projects dilutes KPA staff ability to focus on port services.</li><li>Indigenous heritage site is located within the port land. It is anticipated that the majority of heritage issues can be avoided / managed based on detailed research, archaeological and ethnographic surveys and consultation with required traditional owners. It is possible, however, that some of the currently listed sites (as well as others yet to be identified) will impact future developments.</li></ul>

Source: GHD

# 7. Market Demand Review

The Market Demand Review focused on establishing the short, medium and long term (20 years) market demand across various port trades and services. The market demand forecast is then used, in conjunction with KPA historical data, as the basis for estimating vessel activity and berth occupancy during the analysis period. Outputs of the analysis are then used to inform future infrastructure requirements for port planning purposes.

Three scenarios have been developed in order to assess potential future trade throughput and vessel numbers through the Port of Broome, comprising:

**Base Case** (realistic scenario) – Port opportunities that are considered likely be developed within the Port of Broome and have a form of verifiability to support this.

**Low Case** (pessimistic scenario) – Port opportunities that are characterised by existing trade with contractual obligations in place with KPA.

**High Case** (optimistic scenario) – Port opportunities that are defined and credible but not confirmed to develop within the Port of Broome.

These three scenarios provide the sensitivity analysis for the trade forecast. The results of the Base case trade forecast are as follows:

## Imports

Modelling of the Base case assumptions shows that imports through the Port of Broome are likely to decline in the aggregate, largely driven by a reduction in fuel (Figure 6). This is a result of slight reduction in the number of oil and gas development and exploration projects in the region, with a shift to operations for existing projects, and an expected uptake in LNG for oil and gas supply vessels. Despite the decrease from current levels, fuel and oil imports will continue to grow, and trend in line with longer term historical demand, driven by population growth and the consumption of fuel by motor vehicles, agricultural machinery and heavy freight vehicles, as well as ongoing support to oil and gas operations.

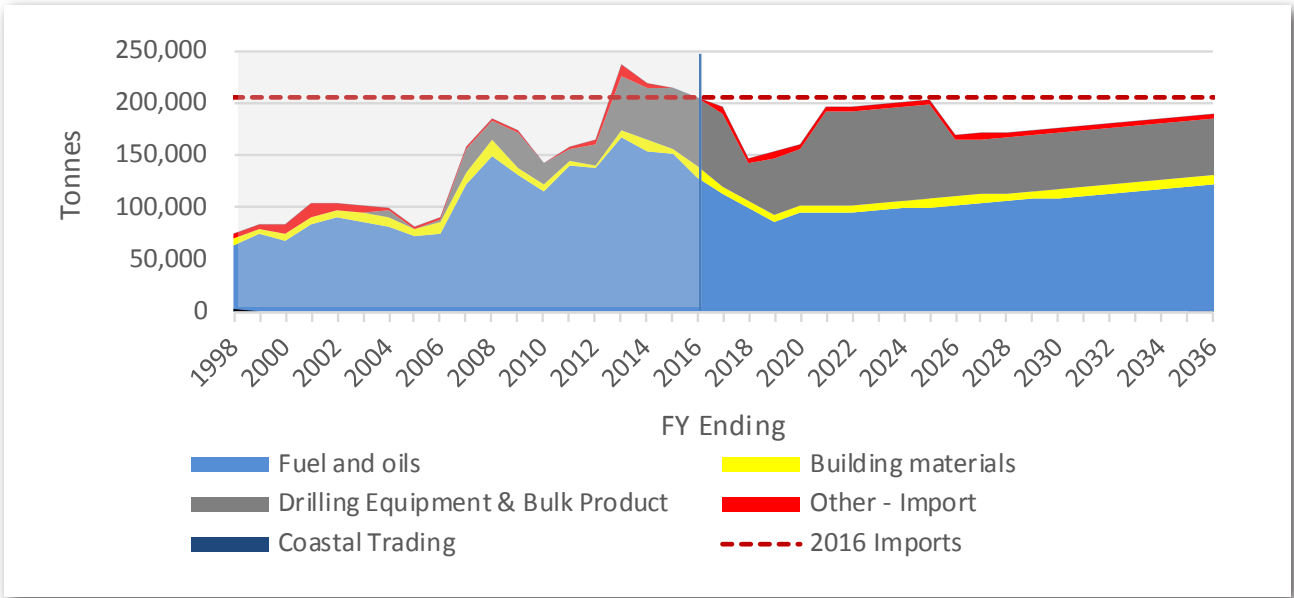


Figure 6

Port of Broome Forecast Imports (Base Case)

Source: GHD



Exports

Modelling of the Base case assumptions shows that exports through the Port of Broome will exceed existing aggregate volumes. This is driven by the introduction of new mining export product offsetting a reduction in transshipment cargo (imported and then exported) such as fuel and drilling equipment & bulk product (Figure 7). As with imports, the reduction of some exports is a result of reduced development of oil and gas projects in the region and exploration activities, with a shift to operations for existing projects, and an expected uptake in LNG for oil and gas supply vessels.

Despite the oil and gas related freight task decrease post 2024/25 FY, the supply of fresh water to the oil and gas industry is likely to remain strong over the long-term, as well as continued modest growth in live cattle exports, both of which form major export trades, and help to maintain export throughput levels close to or in excess of 2015/16 FY levels.

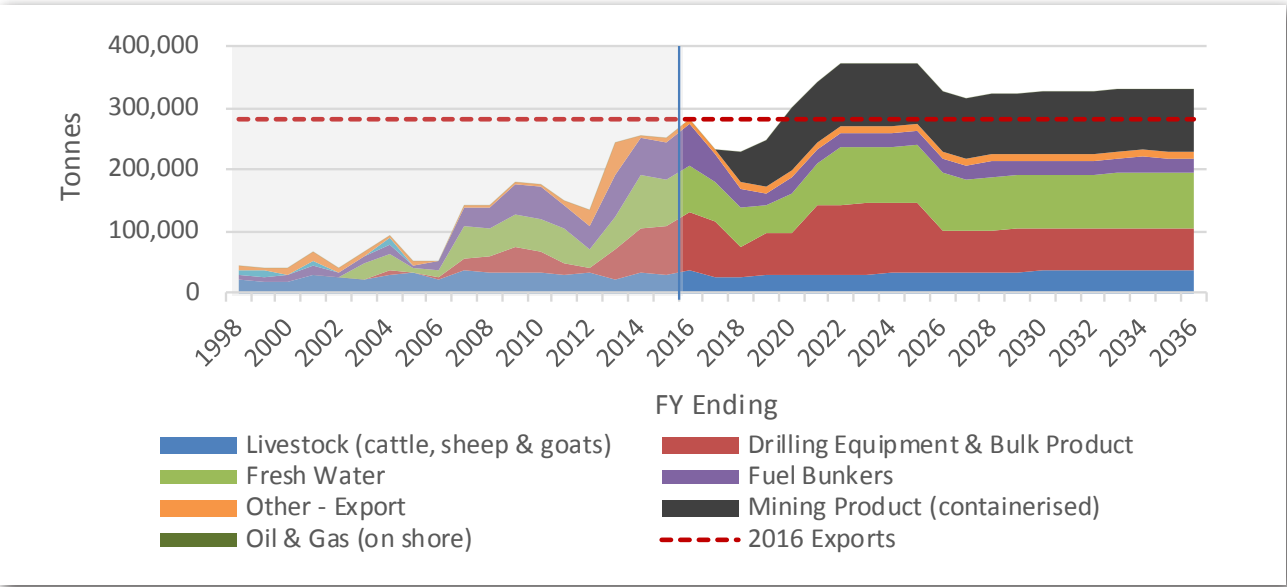


Figure 7  
Port of Broome Forecast Exports (Base Case)

Source: GHD

Containers

Modelling of the Base case assumptions shows that container trade is expected to increase, largely as a result of exported containerised Zircon and agricultural products (Figure 8). Further growth opportunities for containerised trade may be constrained by the lack of high frequency coastal or international liner service calls, resulting in a reliance on road transport in and out of the Kimberley catchment area.

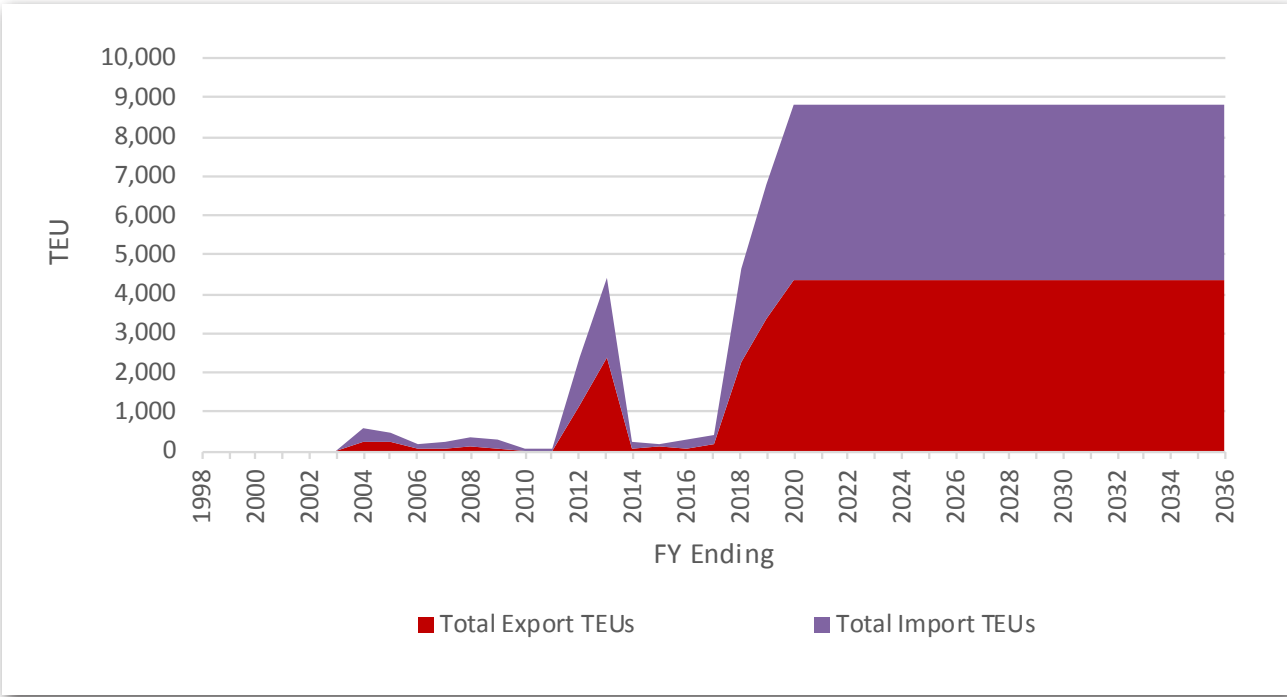


Figure 8  
Port of Broome Containerised Trade Forecast (Base Case)

Source: GHD

Vessel numbers

The number of vessels through the Port of Broome in the Base case is likely to increase. The increase in the number of vessels is a result of the increased activities of support vessels during oil and gas project operations, despite a decrease in the number of exploration and development vessels (Figure 9). Vessel numbers for other activities are expected to remain constant over the analysis period, with some increase in charter vessels, as well as large and small cruise vessels.

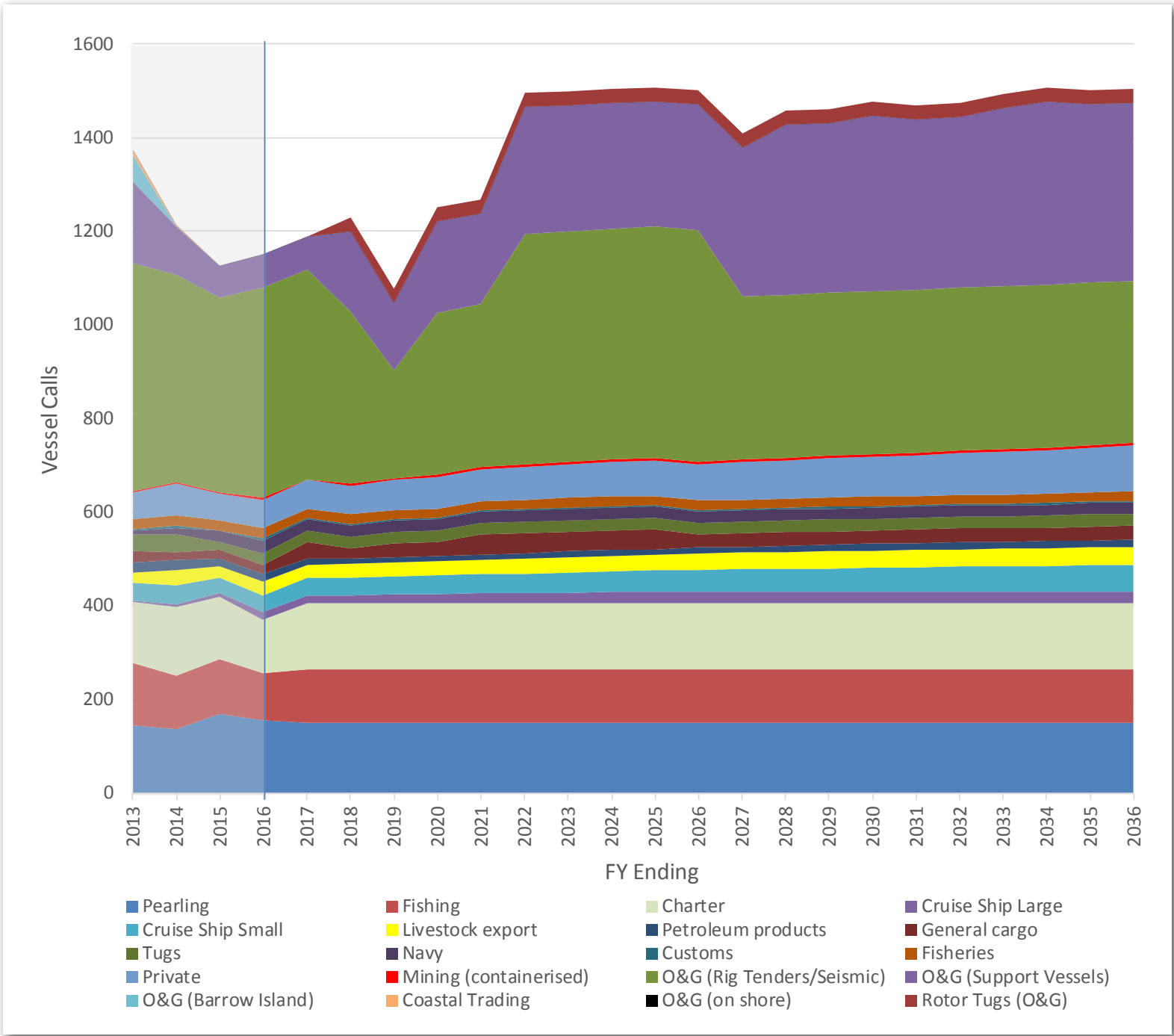


Figure 9

Port of Broome Forecast Vessel Numbers (Base Case)

Source: GHD



## 8. Capacity Analysis and Infrastructure Needs Assessment

The port infrastructure capacity analysis is a complex task due to the large number of variables and influencing factors. It provides the required inputs for determination of the quantum of additional land and marine infrastructure that are necessary to meet the forecast trade through the Port of Broome.

This section outlines the process and outcomes of the port capacity analysis and infrastructure needs assessment for both marine-side and land-side (area allocation and access corridor) components.

### Marine-Side

Berth occupancy is a measure of utilisation of the wharf infrastructure. Berth occupancy is affected by annual trade throughput, vessel load rates, vessel call numbers (including non-trade) and by vessel type.

Future berth occupancy levels were forecast in a model incorporating the historical average vessel time at berth and the number of berth slots required by each vessel type. The combination of both factors was then calibrated against historically observed berth occupancy levels.

Table 4 below provides a summary of the forecast berth occupancies for the Low, Base and High case trade scenarios. Based on the accepted berth occupancy threshold values, namely 60 percent for annual and 80 percent for peak monthly, it can be seen that for the Low and Base case scenarios, there is no requirement to increase wharf capacity to meet the demand forecast. However, for the High case scenario there is significant exceedance of the accepted threshold values for the annual and monthly berth occupancies. This would indicate that the wharf capacity would need to be increased to meet the demand in the High case scenario.

Forecast Scenario	Max No of Vessel Calls per year	Berth Unit	Peak Year	Peak yearly BO	Peak monthly BO
Low	903	1 to 2	2021	19%	32%
		3 to 4	2017	43%	62%
		5 to 8	2017	33%	48%
		9 to 10	2017	39%	50%
		11 to 12	2020	30%	45%
Base	1506	1 to 2	2036	31%	52%
		3 to 4	2025	56%	82%
		5 to 8	2036	44%	62%
		9 to 10	2025	58%	71%
		11 to 12	2036	42%	65%
High	2330	1 to 2	2036	43%	71%
		3 to 4	2036	84%	121%
		5 to 8	2036	78%	110%
		9 to 10	2029	94%	114%
		11 to 12	2036	55%	84%

**Table 4**  
Berth Occupancy (BO) Forecast Summary

Acceptable BO%	Non Acceptable BO%
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Source: GHD

The Port Master Plan is concerned with identifying and optimising, to a degree, the required physical infrastructure to satisfy the berth occupancy thresholds. This is achieved by allocating additional infrastructure within the capacity model environment and then analysing the resultant impact on the yearly and peak monthly berth occupancy outputs. The infrastructure is gradually increased until the yearly and peak monthly berth occupancies are within acceptable thresholds, i.e. 60 percent and 80 percent, respectively, which provides insight into what type of additional infrastructure is required. Additionally, a change in the vessel allocation protocols has been tested to further optimise the infrastructure development options. The result of this analysis is summarised below, in Table 5.

**Table 5**  
Required Infrastructure – Changed Vessel Allocation Rule

Berth Type	Length (m)	Depth (m CD)	Changed Vessel Allocation Rule						
			Earliest Year the Peak Monthly BO goes >80%	Peak Yearly BO (Across 20yr Period)	Peak Monthly BO (Across 20yr Period)	Increased Capacity Req. (Percentage-linked to Berth Type)	Required Infrastructure	Resultant Peak Yearly BO (Across 20yr Period)	Resultant Peak Monthly BO (Across 20yr Period)
1 to 2	80	-9	---	42%	70%	0.0%	---	42%	70%
3 to 4	90	-9	2021	177%	239%	200.0%	2 x 90m long berth 9m deep 100% utilisation	59%	80%
5 to 8	220	-11	2035	58%	83%	0.0%	---	58%	83%
9 to 10	110	-11	---	58%	68%	0.0%	---	58%	68%
11 to 12	100	-6	2033	54%	83%	0.0%	---	54%	83%

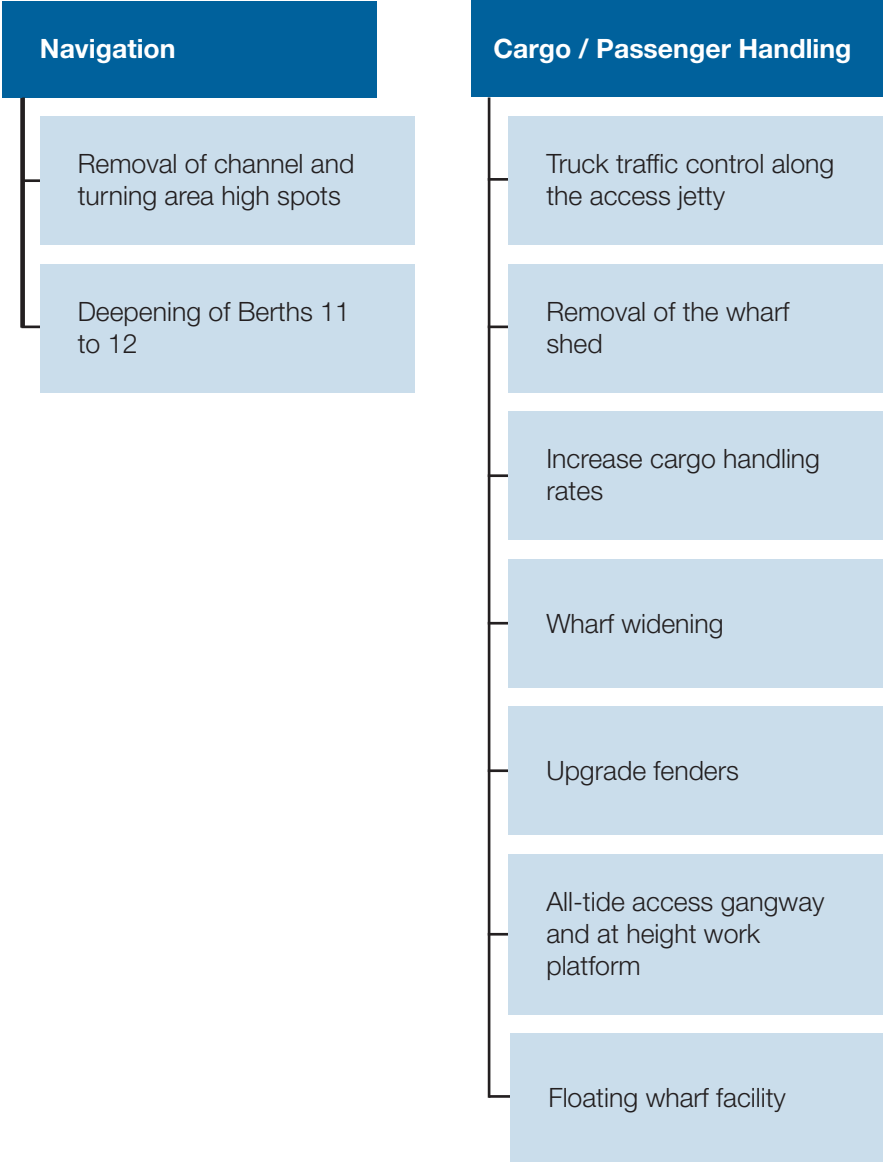
It should be noted that although Berths 5 to 8 and Berths 11 to 12 will exceed the 80 percent monthly berth occupancy threshold, this occurs in 2035 and 2036 respectively, which is very close to the end of the Port Master Plan forecast period and as such is considered acceptable.

Source: GHD

In summary, based on the High case market demand scenario, modelling and forecast of the resultant berth occupancy and capacity analysis, the Port of Broome will require an additional berth length of 180m with a depth of -9m CD by 2021.



The modelling of the marine-side capacity provides useful insight into the primary infrastructure requirements including for example, the number and parameters of berths required. During the extensive discussions with external and internal stakeholders of the Port, a number of items that could influence the marine-side efficiency, and thus capacity, at the Port of Broome were raised. The primary items are schematically represented in Figure 10 below.



**Figure 10**  
Marine-Side Efficiency Drivers

**Land-Side**

The trade forecast has also been used to determine the amount of the land necessary to support various types of trade and associated throughputs. Capacity, linked to the forecast market demand for trades requiring dedicated port area to support export / import / storage / staging operations was considered. These trades were:

- Container
- Liquid bulk
- Oil and gas support

The container storage area requirement is primarily a function of the number of containers, dwell time and stack height. This is summarised in Table 6 below.

**Table 6**

Overall Area Requirement for Container Terminal

Scenario	No of Containers (TEU)			Area Requirement (ha)		
	2021	2036	2066	2021	2036	2066
Low	751	751	751	0.2	0.2	0.2
Base	8,803	8,803	8,803	2.1	2.1	2.1
High	21,106	29,538	36,921	5	7.1	8.8

Source: GHD

Liquid bulk storage area requirement is primarily a function of product tonnage, density, and storage period. This is summarised in Table 7 below.

**Table 7**

Overall Area Requirement for Liquid Bulk Terminal

Scenario	Liquid Bulk Volume (tonnes)			Area Requirement (ha)		
	2021	2036	2066	2021	2036	2066
Low	77,328	96,677	130,307	1.2	1.5	2
Base	94,055	121,465	173,707	1.5	1.9	2.7
High	174,158	277,788	410,222	2.7	4.3	6.3

Source: GHD

The oil and gas support activities include loading, unloading and storage of a diverse range of cargo. This in turn can vary in size, type, dwell time and storage arrangement, as well as the nature and stage of the associated oil and gas projects e.g. exploration, development and operation. Due to this variability, it is not practical to use the same approach as that used in the container and liquid bulk terminal analysis to calculate the amount of land required to support this trade.

However, as the Port of Broome has been accommodating the proponents supporting oil and gas projects for many years, the historical and present arrangements provide a reliable baseline to base an approximate land requirement, and is considered to be sufficient for this master planning study. In addition, land allocation for the oil and gas projects in other ports of Western Australia and the Northern Territory were also considered to benchmark against the trends at the Port of Broome.

**Table 8**  
Overall Area Requirement for Oil and Gas Support Precinct

Scenario	Oil and Gas Cargo (tonnes)			Area Requirement (ha)		
	2021	2036	2066	2021	2036	2066
Low	131,731	133,521	75,596	3.8	3.9	2.2
Base	291,412	235,111	175,636	8.5	6.8	5.1
High	609,679	514,431	528,517	17.7	15	15.4

Source: GHD

An approximate area of land to be allocated for each main trade has been estimated for master planning purposes. Table 9 below shows the additional land, beyond that already allocated within the port, to be assigned to various trades.

**Table 9**  
Additional Area Requirement for Oil and Gas Support, Liquid Bulk and Container Trades

Scenario	Container			Liquid Bulk			Oil and Gas Support		
	2021	2036	2066	2021	2036	2066	2021	2036	2066
Low	0.2ha	0.2ha	0.2ha	---	---	---	---	---	---
Base	2.1ha	2.1ha	2.1ha	---	---	---	---	---	---
High	5ha	7.1ha	8.8ha	---	---	---	5.2ha	2.5ha	2.9ha

Source: GHD

Port Drive forms the main access corridor into the Port of Broome. Review of the access corridor capacity was undertaken as part of the PMP. A traffic modelling spreadsheet and a traffic modelling software package, SIDRA, were used to assess the future traffic at the Port Drive / Gubinge Road intersection, as a representative of the critical intersections on the Port Drive.

**Access Corridor**

The modelling results indicate that up until 2036, the intersection performs satisfactorily in both the morning and afternoon peak hours considering the forecasted additional vehicle movements. The Degree of Saturation is well within acceptable limits on all arms of the intersection and there is minimal queuing. All movements at the intersection show a Level of Service (LOS) of “A”, except for the right turn movement from Port Drive into Gubinge Road, which has a LOS of “B”. Given that the minimum acceptable LOS by Main Roads is “C”, this critical intersection is confirmed to have the acceptable Level of Service. The spreadsheet analysis and intersection modelling has shown that the increase in traffic flows in the future, resulting from increased activity at the port will have a minimal impact on the operation of the network from a capacity perspective. The results indicate that no additional capacity is required in order for the network to remain operational.

Although the Port Drive corridor has sufficient capacity to meet future traffic loads, there are various areas of concern regarding safety and operational efficiency. These specifically relate to controlling the mix of commercial and recreational traffic, speed and access point controls, drainage development and the separation of dedicated cyclist and pedestrian corridors.









## 9. Development and Evaluation of Concepts

The PMP documents the port concept development and evaluation process undertaken to determine the preferred marine and land-side infrastructure layout.

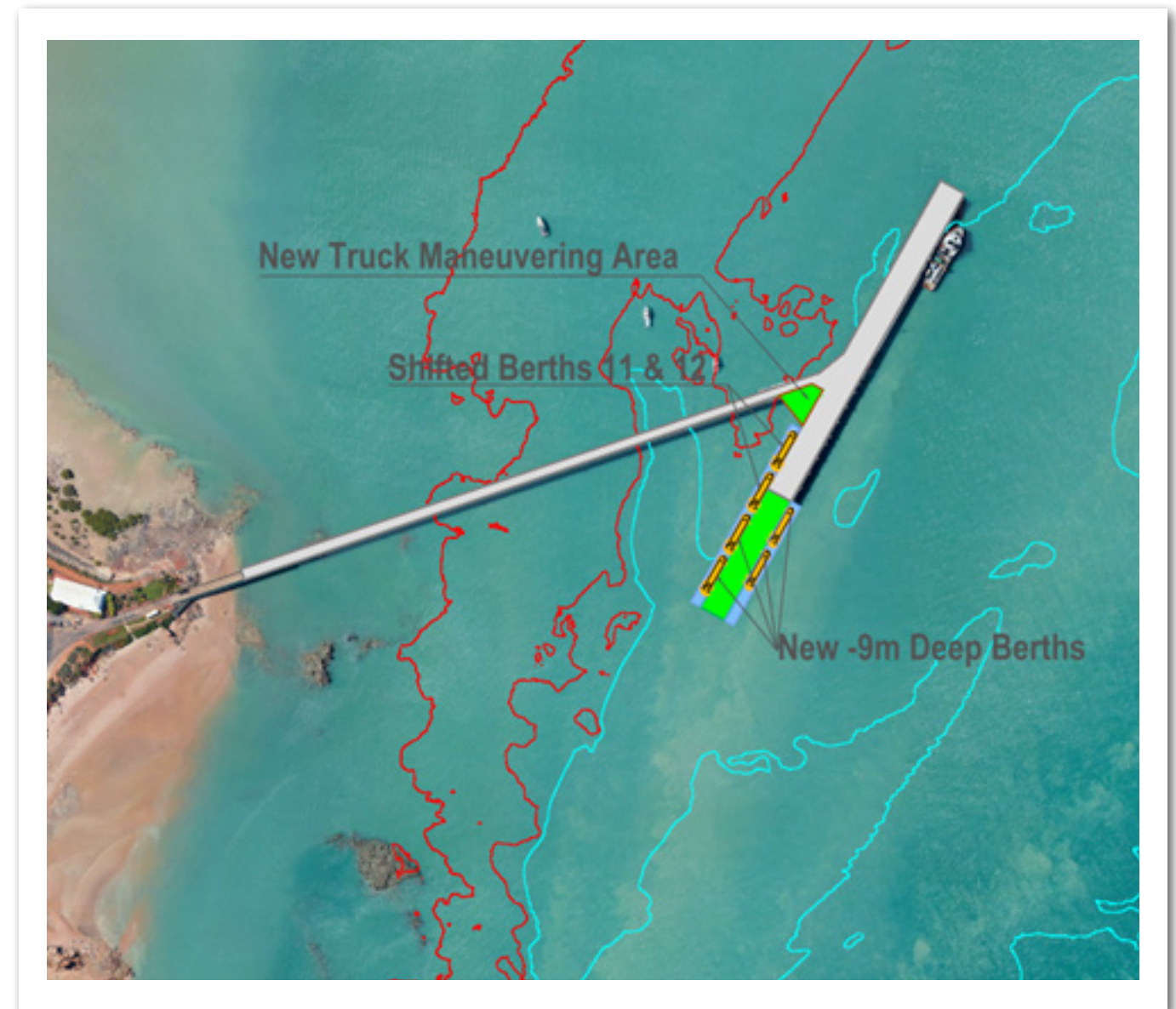
### Marine-Side Concept Development

The concept development process resulted in the four concept layouts as outlined in this section.



**Figure 11**  
Option 1 - Expansion of the Existing Wharf Toward North

Source: GHD



**Figure 12**  
Option 2 - Expansion of the Existing Wharf Toward South

Source: GHD



Table 10

Options Characteristic - Option 1 and Option 2

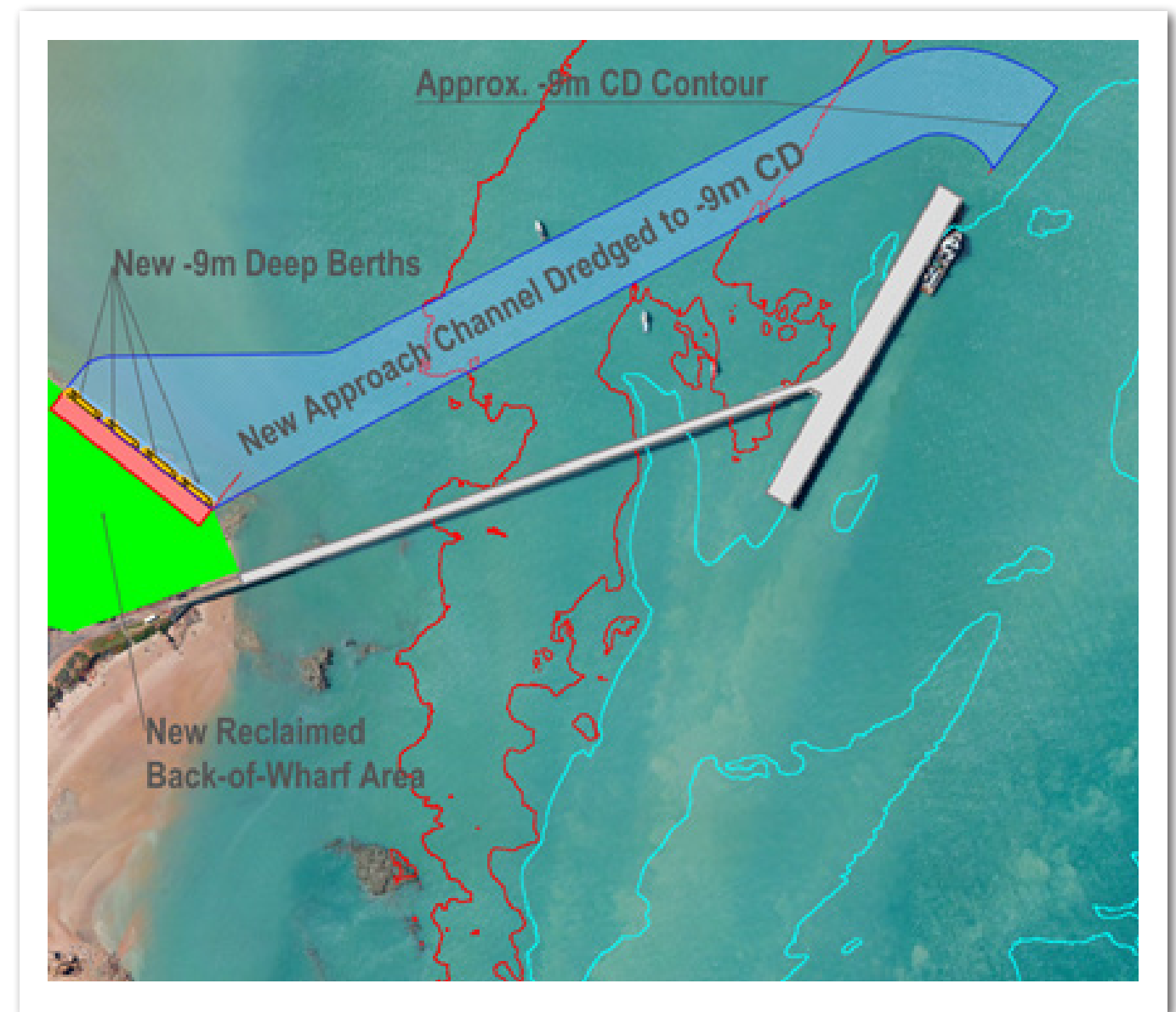
Option	Option 1	Option 2
	Berths on the wharf extension toward the North	Berths on the wharf extension toward the South
Description	<ul style="list-style-type: none"><li>• The concept includes 180m berthing face extension in the form of a 90m long double sided berth, to accommodate up to 4 vessels (-9m deep), typically facilitated at Berth 3 to 4</li><li>• The position of the new berths is aligned with the existing wharf to minimise changes in navigation operations and to retain the continuous berthing face along the wharf</li><li>• Considering the seabed contours, dredging will be required at the berth pockets to provide the required depth at the berth pockets and the access channel to the north side berths</li></ul>	<ul style="list-style-type: none"><li>• The concept includes:<ul style="list-style-type: none"><li>○ A truck manoeuvring platform on the south side of the access neck-wharf intersection, to improve truck turning efficiencies</li><li>○ 180m berthing face extension, in the form of a 90m long double sided berth, to accommodate up to 4 vessels (-9m deep), typically facilitated at Berth 3 to 4</li><li>○ 40m further extension to comprise partial loss of Berth 12, due to inclusion of the truck manoeuvring platform</li></ul></li><li>• Improving truck turning efficiencies is more important in this option than Option 1, as vehicular traffic on the south side deck will significantly increase following the proposed expansion toward the South</li><li>• The position of the new berths is aligned with the existing wharf to minimise changes in navigation operations and to retain the continuous berthing face along the wharf</li><li>• Considering the seabed contours, minimal dredging will be required at the berth pockets to provide the required depth and the access channel to the north side berths</li></ul>

Source: GHD



**Figure 13**  
Option 3 - Berths on the Southside of the Wharf Access Jetty

Source: GHD



**Figure 14**  
Option 4 - Berths on the Reclaimed Back-of-Wharf Area at the Slipway

Source: GHD

Table 11

Options Characteristic - Option 3 and Option 4

Option	Option 3	Option 4
	Berths on the Southside of the wharf access jetty	Berths on the reclaimed back-of-wharf area at the slipway
Description	<ul style="list-style-type: none"><li>• The concept includes:<ul style="list-style-type: none"><li>○ 180m berth face extension to accommodate 4 berths (-9m deep), typically facilitated at Berth 3 to 4</li><li>○ 50m wide wharf deck (double the width of the existing wharf deck) to facilitate truck manoeuvring and loading / unloading operations on the wharf</li></ul></li><li>• The berths have been positioned next to the deep area adjacent to the access jetty, however, the concept still requires dredging works in order to provide sufficient depth at the new berths</li></ul>	<ul style="list-style-type: none"><li>• The concept includes:<ul style="list-style-type: none"><li>○ New -9m deep navigational channel for the vessels</li><li>○ New 180m long land back wharf on the proposed reclaimed land at the slipway location to accommodate 4 berths (-9m deep), typically facilitated at Berth 3 to 4</li><li>○ Sufficient back-of-wharf area to accommodate traffic movements, loading / unloading operations and transient cargo laydown</li></ul></li><li>• The concept requires significant dredging works for provision of the approach channel</li></ul>

Source: GHD



A multi criteria analysis (MCA) method was used in workshops with KPA management in order to determine the preferred concept option for the marine-side infrastructure expansion. The MCA process resulted in an overall ranking of marine-side concepts as presented in the table below.

Evaluation Criteria	Unweighted Ranks				Importance Factor	Weighted Ranks			
	Option 1	Option 2	Option 3	Option 4		Option 1	Option 2	Option 3	Option 4
Operation efficiency/safety	1	2	3	4	13.6	2.7	5.4	8.2	10.9
Synergy between adjacent areas with different functions	1	2	3	4	7.6	1.5	3.0	4.6	6.1
Navigation	3.5	3.5	2	1	13.6	9.5	9.5	5.4	2.7
Impacts on heritage areas	3.5	3.5	2	1	10.6	7.4	7.4	4.2	2.1
Impact on the environmental aspects	3.5	3.5	2	1	12.3	8.5	8.5	4.8	2.4
Impact on the recreational amenities	3.5	3.5	2	1	0.0	0.0	0.0	0.0	0.0
Capital expenditure	4	3	2	1	4.5	3.6	2.7	1.8	0.9
Operational expenditure	3	4	2	1	4.5	2.7	3.6	1.8	0.9
Impacts on current operations	1.5	1.5	3	4	7.6	2.3	2.3	4.6	6.1
Construction fronts/schedule	3	4	2	1	4.5	2.7	3.6	1.8	0.9
Operational flexibility	4	3	2	1	13.6	10.9	8.2	5.4	2.7
Future capacity expansions	4	3	2	1	7.6	6.1	4.6	3.0	1.5
SUM	35.5	36.5	27	21	100	57.9	58.8	45.7	37.2

Table 12  
Marine-Side Concepts Ranking Outcome

Based on the MCA, the inline wharf expansion to the South is the preferred marine infrastructure development option. KPA will explore this option and other alternatives such as a floating pontoon.

Source: GHD







Land-Side Concept Development

The review of existing land use and development of future land use plans was based on a priority planning evaluation template that was developed for this PMP. The priority planning evaluation template consider land use and allocation based on the following categories in order of priority, namely:

- ① Efficiency
- ② Capacity
- ③ Opportunity

Efficiency, in this sense, relates to the optimal use of port land across a broad range of elements including safety, security, port operational practice, port land allocation and asset protection that must satisfied as a priority when considering existing and future port land use. These elements are shown diagrammatically in the accompanying Figure 15.



Figure 15  
Port Efficiency Elements

Source: GHD



Consideration of land area based on capacity requirements is set out in the capacity analysis section of this PMP. These areas are used as the minimum basis for allocation of land within the port to meet the port capacity requirements.

Opportunity, in this sense, relates to the allocation and development of port land to attract, encourage and facilitate trade and commerce. Port land is extremely valuable as it facilitates trade and offers many competitive benefits to users. The reservation and development of land with high potential value is a core function of the Landlord Port model. The following opportunities were identified for the Port of Broome and are illustrated in Figure 16.



**Figure 16**  
Port Land Opportunities

Source: GHD



# 10. Development and Evaluation of Concepts

This section of the PMP focuses on:

- Integration of marine-side and land-side preferred concepts based on the goals of optimising efficiency, capacity and opportunity
- Development of the Port in line with planning principles set out in Section 4, for example segregation, safety, efficiency, flexibility, capacity etc.

Where applicable, the allocated port land area within the PMP layout is sufficient to meet the anticipated area and infrastructure requirements based on the High case market demand forecast.

The PMP recommendations are represented graphically in Figure 17 and the summary descriptions of each component are set out below for the 50 year planning horizon.

**Figure 17**  
Port of Broome Port Master Plan



Source: GHD



## ① a. Wharf Operational Area

The Wharf Operational Area consists of the existing neck and wharf structure.

Future expansion of the wharf structure islet can occur either as fixed (e.g. conventional steel pile and concrete deck) or floating (e.g. steel pile with pontoon wharf) infrastructure. KPA will evaluate these options based on a variety of factors and determine the optimal solution.

As part of the wharf extension development, consideration could also be given to:

- The removal of restrictive high spots within the navigational channel and deepening (Berth 11 and 12) to better facilitate large vessel all tide entry and increase the usability of the shallower berths
- The widening of the southern corner of the intersection between the neck and the wharf to allow better turning of vehicles onto the southern portion of the wharf and provide for safer and more efficient operations

## ① b. Port Operational Terminal Area

The Port Operational Terminal (**POT**) area is typically found directly behind a wharf in a port and is located within the port security zone / boundary. This area facilitates the efficient and safe cargo handling operations as part of the cargo load and unload cycle. Presently, the Port of Broome has an offshore wharf accessed by a long neck (+600m) and is characterised by multi user, multi cargo, dual sided operations with a relatively narrow wharf width of 26m forming the existing POT area. The Port of Broome does not have any land-side POT area which when combined with the wharf restrictions negatively impacts on port efficiency and competitiveness.

The POT allows the future facilitation of various break bulk, project and containerised cargo.

The POT will:

- Allow the control of access, inspection, staging, consolidation and preparation of cargo to facilitate more productive cargo load rates and safer operations
- Function as a Multi-Purpose Cargo Terminal that allows the maximum operational flexibility for meeting and attracting present and future trade through the Port of Broome
- Form part of the Land-Side Restricted Zone, accessible to port operators under security controlled conditions e.g. Maritime Security Identification Card
- Be used to temporarily stage / store cargo as part of the import / export logistic process

Currently, the area allocated for the POT is mainly occupied by non-core operational, administration and recreational activities. These non-core functions should be relocated from this developed area first.

The POT will be developed in a staged process as the area becomes available. It is recognised and understood that the staged development of the POT will impact present port non-core port stakeholders e.g. Department of Fisheries, Office of Border Protection and Wharf Restaurant. However, the development of the POT needs to be considered in context of the potential development of the adjacent Recreational / Administration / Tourism Area (Refer Area 2), which forms the most optimal position for the relocation of the non-core port business activities.

Development of the existing port area, combined with the future maximisation of the POT area will require earth infill to raise the surface level to:

- A single level to facilitate operations
- A level adequate to protect the POT from predicted coastal inundation events linked to rising sea levels

The development of a protective seawall structure on the seaward side of the POT will contain the infill activity and additionally provide a suitable barrier to protect the port land adjacent to the jetty abutment area from future inundation and overtopping events.

## ① c. Marine Development Area

The Marine Development Area (**MDA**) covers an extensive seaward area and provides for the future development of marine infrastructure that could be required within the broader 50 year planning timeframe. This area allows KPA to address potential changes in market demand and vessel technology and have the ability to develop flexible and optimal infrastructure solutions.

## ② Recreational / Administration / Tourism Area

A key port planning principle is to develop the port in such a way as to provide safe and efficient port operations. The segregation of the core port commercial activities e.g. import and export functions to oil and gas industry, livestock export, fuel imports / exports and the non-core port activities e.g. administration facilities, workshops, recreational facilities and so forth, is considered essential at the Port of Broome. In conjunction with the development of the POT area, the development of the Recreational / Administration / Tourism area will allow for the necessary segregation while improving the safety and efficiency of the port functions.

The main characteristics of the Recreational / Administration / Tourism area are summarised below:

- It provides a logical centre for a variety of different functions and facilities, for example:
  - Fishing club, public boat ramps, car / trailer parking
  - Restaurant facilities
  - Tourism offices and visitor information centres e.g. Dinosaur Footprints, Indigenous Culture information centre and tour Operators
  - Cruise administration e.g. vessel charter offices, cruise passenger processing areas
  - Offices and administration e.g. KPA offices, Department of Fisheries, Office of Border Protection, Volunteer Sea Rescue, quarantine services
  - Viewing decks, grassed areas, picnic shelters and BBQ's and beach access



- It allows the non-core port users to develop “critical mass” in a centralised area that can promote the economic feasibility of the development
- It is located such that the users retain access to the iconic port beach and Entrance Point recreational node
- It aligns and supports the adjacent development of the proposed Small Boat Harbour (Area 7)
- Its development is in line with the Shire of Broome Local Planning Scheme No.6 which has as an aim and objective for the Port Reserve (Port Area) to “Provide for tourism and recreational activities associated with port activities”

The following access options to the Recreational / Administration / Tourism area were considered:

- Re-alignment of Kabbarli Road located between the existing water supply tanks and the old Sorghum shed
- Development of a new road extending from Kavite Road southwards between the western port conservation area and the aquaculture / liquid bulk area, past the proposed Small Craft Harbour

### ③ Port Security Gate

The port security gates controls access to the port security area defined as the Land-Side Restricted Zone (LRZ) within the Maritime Transport and Offshore Facilities Security Regulations 2003 Act and Regulations (2005). Initially, the re-alignment of the Kabbarli Road and the relocation of non-core business into the Recreational / Administration / Tourism area (Area 2) will allow the northwards shift of the port security gate to the boundary of the Port Operational Terminal. If the Kavite Road extension option is progressed to provide access to the Recreational / Administration / Tourism area (providing early segregation of core and non-core traffic on Port Drive) then the LRZ area and port security gate could shift further northwards.

### ④ Realigned Kabbarli Road

The Kabbarli Road re-alignment provides improved access to the Recreational / Administration / Tourism area and the Small Boat Harbour. It also provides for segregation potential of the core and non-core port traffic adjacent to the port water storage area.

### ⑤ Port Water Storage Area

Presently, water is supplied to the port via a pipeline and stored in the existing tanks and then distributed via a local pipe network to various buildings and the wharf. Water forms a large export commodity in support of the offshore oil and gas sector. The port water storage area will continue and allows for additional tankage to be developed, if necessary. It should be noted that the development of additional piped water main supply to the port will alleviate the need for further development of water storage tanks.

### ⑥ Port Conservation Area

The KPA has allocated significant portions of the port land on the east and west coastal margins to allow connectivity and the preservation of habitat consistent with the environmental, heritage and cultural interests in Broome. This includes for specific protection for the Keraudrenia Species B adjacent to the southern portion of Area 16. It should be noted that development of the Small Boat Harbour (Area 7) and the Recreational / Administration / Tourism Area (Area 2) would be best serviced by an alternate access route via a southwards extension of Kavite Road which would result in some impact on the western port conservation area.

### ⑦ Small Boat Harbour

Various and diverse proposals for the development of small boat facilities e.g. small boat harbour and marinas, have been considered in the Broome locale. Presently, a working group made up of the Shire of Broome, Nyamba Buru Yawuru, Department of Transport, Kimberley Development Commission, Landcorp and the KPA are in the process of evaluating existing proposals. These proposals include the following locations:

- Marina in China Town (Paspaley - dig out lock based marina)
- Marina between Entrance Point and Gantheaume Point (Broome Marina Group - dig out lock based marina)
- Small boat facility in West Roebuck Bay (DoT - offshore berths / boat ramp with breakwaters)
- Small boat facility close to Entrance Point (Shire of Broome – offshore berths / boat ramp with breakwaters)

It is recognised that each proposal has positive and negative attributes and that no clear and simple solution exists for this development. Although the PMP has not technically evaluated any of these proposals, development of offshore small boat facilities adjacent to the Recreational / Administration / Tourism area (Area 2) is preferred, should the proposed developments, e.g. Southwards extension of Kavite Road, occur close to the Port of Broome.

### ⑧ Commercial Small Boat Ramp/Slipway

The Port of Broome facilitates a large number and variety of small commercial and recreational craft. These vessels require adequate facilities to allow slipping and transfer to areas where repair and maintenance services can occur. This facility is also necessary to allow dry storage of vessels in cyclone season. The development of a commercial slipway adjacent to the POT with transfer of vessels into POT facilities and to the non-core service area contained within Port Drive West Precinct (Area 16) is envisaged.

### ⑨ Large Vehicle Staging / Temporary Laydown Area

The existing livestock export trade, the fuel trade and the future mineral export and container trades will continue and increase the number of heavy road vehicles accessing the port. Provision of a dedicated vehicle staging area, and temporary laydown area if required, is necessary to safely control and regulate heavy vehicle movement within the port area.

### ⑩ Liquid Bulk Terminal Area

This area is presently occupied by the bulk hydro carbon operators and utilised for the import, storage, distribution and export of fuel and oil products. The liquid bulk facilities are well developed and positioned within the port area and any future expansion, based on the growth within the offshore oil and gas sector and the future development of the Canning Basin will be adjacent to this area in a northwards direction. This will require the relocation of the residential buildings.

### ⑪ Drainage Area

Drainage areas are provided to support the development of port land in the Port Operational Terminal area (Area 1B), oil and gas support precinct (Area 13) on the East side of Port Drive and the Port Drive West precinct Area (Area 16).

## 12 Kavite Road Extension

The Kavite Road extension provides alternate access to the Recreational / Administration / Tourism area (Area 2) and the potential Small Boat Harbour (Area 7). This road is the preferred access to these areas as it allows the following:

- Earlier segregation of core and non-core port traffic on Port Drive
- Improves heavy vehicle access to and movements within the port core operational areas
- Improves the ability of the port to develop security controlled access to higher risk port core operations e.g. fuel tanks
- Provides an alternative access / exit to the port in case of an emergency situation on Port Drive.
- Dedicated access improves the economic and development opportunity of the Recreational / Administration / Tourism area and the potential Small Boat Harbour
- Provides for earlier segregation, better accommodation (separate road bike path and drainage) and more scenic utility for road bike and pedestrian users
- Development of Gantheaume Point to Entrance Point “Point to Point / Port Drive” corridor providing access to spectacular scenery and increasing tourism opportunities

It is recognised that the development of the Kavite Road extension will have some impact on the port conservation area and will have to be agreed with various stakeholders.

## 13 Oil & Gas Logistics Support / Supply Area

The present allocation and use of large proportions of the port land area to service the oil & gas sector will continue into the long term. Based on the High case market demand forecast and the resultant capacity analysis, there is a marginal requirement to increase land area allocation to the oil and gas sector within the Port of Broome. Requirements for temporary, short term lease period area (e.g. 1 to 12 months) can be accommodated in Area 1b. Future allocation of land requiring longer lease periods, in excess of 12 months, can ultimately be accommodated in Areas 16 and 19.

## 14 Aquaculture Area

Department of Fisheries presently leases this area and has an option to extend this lease into the longer term. Due to the present lack of demand for sub leases within this area, it is envisaged that the area could be consolidated or relocated to non-core areas should alternative port related requirements for port land develop.

## 15 Port Access Corridor

The Port Access Corridor is aligned with the Port Drive access road. The corridor provides for port core and non-core access to the port area and has sufficient capacity and suitable reserve width to accommodate future traffic load.

The development of drainage swales within the road reserve area is possible but could have implications on the provision of road (separated) public access walkways / bike paths. The development of the Kavite Road extension can also provide an alternative access to the port in future.

## 16 Port Drive West Precinct (PDWP)

The PDWP allows for the development of various core and non-core port functions that require good access to the port and to the activities requiring longer periods of lease. Typically, the area can be developed to facilitate the following:

- Oil and gas supporting activities requiring longer periods of lease
- Receival, processing into consignment (e.g. load to containers) and temporary storage of mineral concentrate products prior to export
- Repair, maintenance and storage to the small commercial / white boat sector that have utilised the commercial small boat ramp (Area 8)
- Container storage, cleaning, stuffing and de-stuffing activities
- Accommodation of port services, workshops, light industry, engineering services and supplies seeking short to longer term leases
- Cold storage facilities for temperature sensitive export cargo
- Potential development of Quarantine Approved Premises in conjunction with the Port Reserve Area (19)

The PDWP area, in conjunction with Areas 18 and 19, provides the space and opportunity for business and service developments that require strong linkages to the port, however, do not necessarily need to be close to the wharf.

## 17 Heritage Site

This area has been previously identified as a potential Aboriginal heritage site and as such will be protected from development until clarification on its status is confirmed.

## 18 Port Support Industrial Precinct

This area is zoned “Industry” within the Shire of Broome Local Planning Scheme No.6. This area, situated outside the port reserve area, functions to support the various port related services and industries. KPA recommends that this area be retained within the Shire of Broome Local Planning Scheme as Industry zone, as this will support the port future development and provide a buffer in conjunction with Area 19 on the port northern boundary.

## 19 Port Reserve (Special Control Area)

Pursuant to an Indigenous Land Use Agreement between the State of Western Australia, the Yawuru Prescribed Body Corporate (Yawuru) and others, the Yawuru is to sublease 50 hectares of near port land to KPA. This land is essential for the longer term development of the port and is zoned “Port Reserve”. This land allows the port to facilitate future trade and port related services that are not able to be readily identified. As this land falls outside the legislated port boundary set out in the Ports Authority Act, it is suggested that it be reserved within the Shire of Broome Local Planning Scheme as a “Special Control Area” to secure it for long term port related services and developments.

## 20 Port Services Corridor

The Port Services Corridor is aligned with the Port Drive access road and occupies the road reserve width. Future upgrade and development of services e.g. water, power, communications and so forth will occur within the reserve area.



## 11. Development Priority and Schedule

The potential schedule for the various Port development options is assessed in this section. It is suggested that the items that promote and are linked to the following key drivers will influence the priority and schedule of development:

- Safety (including security) – developments that increase safety of port users primarily by segregation
- Efficiency – developments that have the ability to optimise existing services and cargo handling rates
- Capacity – developments that increase service and cargo handling capacity
- Opportunity – developments that promote greater economic opportunity

**Table 13**

Development Priorities in Short Term

Short Term (0-5 years)	Description	Principle Driver
Develop Recreational / Administration / Tourism area (Area 2)	Identify and rezone area and develop as Recreational / Administration / Tourism area	Safety
Relocate existing non-core operations	Relocate existing non-core business and operations to Recreational / Administration / Tourism area e.g. Wharf Restaurant, Department of Fisheries, KPA harbour master etc	Safety
Develop new port related non-core operations	Market and lease high value land for non-core business and operations e.g. cruise tour operators, visitors centre, Recreational / Administration / Tourism area, etc	Opportunity
Realign Kabbarli Road (Area 4)	Realign road to develop improved access to Recreation / Administration / Tourism and core port area. Alternative (preferred option) is to extend Kavite Road southwards (see medium term development option)	Safety / Efficiency
Consolidate KPA office	Relocate and consolidate KPA commercial, engineering and Harbour Master resources in office at Recreational / Administration / Tourism area	Efficiency
Remove / relocate weighbridge facility	Remove / relocate the weighbridge facility from present position	Efficiency / Safety
Extend wharf (Area 1a)	Southward extension and development of dual sided wharf infrastructure by 130 m	Capacity
Remove wharf shed	Removal wharf shed adjacent to Berths 2 & 7	Efficiency / Capacity
Upgrade fenders	Replace and upgrade wharf fenders to accommodate larger vessels and increase wharf load limit to 70,000 MT	Efficiency / Capacity
All tide access platform	Development of all tide wharf access system to accommodate a range of vessels e.g. cruise liner tenders, small charter vessels etc	Efficiency / Capacity
Modify jetty / wharf intersection	Construct platform that increases the area of the southern intersection of the jetty and wharf to accommodate heavy vehicle turning onto southern portion of the wharf	Safety / Efficiency
Increase wharf width	Potentially increase width of the wharf, as part of the wharf extension of life project	Safety / Efficiency
Develop oil and gas support area (Area 13)	Development of additional oil and gas support facility/s in the available area (1.5 ha)	Capacity
Develop the Port Drive West Precinct (PDWP) area (Area 16)	Develop common user infrastructure e.g. roads, drainage, in full or partially to allow the PDWP to accommodate various port business and operations	Capacity / Efficiency / Opportunity
Relocate KPA maintenance workshop	Relocate KPA maintenance workshop to PDWP area	Opportunity
Relocate dry storage vessels to PDWP	Relocate slipway vessels from present storage facility to PDWP area	Efficiency / Opportunity
Develop Mineral Sands export facility	Development of facility to receive, consolidate and process for export as either bagged, container e.g. Sheffield Zircon export in PDWP area	Opportunity / Capacity
Develop oil and gas support facilities	Development of additional oil and gas support facilities in PDWP area	Capacity
Develop Port Operational Terminal (POT) area (Area 1b)	Develop the POT in a staged manner as area becomes available. Seek opportunity to maximise POT area as part of development. Lease POT facility to single / multiple port users / operators	Safety / Efficiency / Capacity / Opportunity
Develop liquid bulk terminal (Area 10)	Develop area adjacent to existing liquid bulk terminal to facilitate storage and export of oil from onshore sources	Capacity
Dredge navigational high spots	Dredge removal of channel high spot restrictions to facilitate larger vessel and increased all tide movements	Efficiency
Increase berth depth at Berth 11 and 12	Dredge berth 11 and 12 to -9m to accommodate greater range of vessels at the berth	Capacity

Source: GHD



Table 14

Development Priorities in Medium Term

Medium Term (6-20 years)	Description	Principle Driver
Extend Kavite Road (Area 12)	Extend Kavite Road southwards to develop alternative access to Recreation / Administration / Tourism area, the proposed Small Boat Harbour and the port operational area	Safety / Efficiency / Opportunity
Develop POT area (Area 1b)	Maximise the POT area	Capacity / Opportunity
Development of PDWP area (Area 16)	Additional development within the PDWP area e.g. container, oil and gas, engineering services	Capacity
Development of Port Reserve / Buffer Zone (Area 19)	Potential development of area to facilitate future port related trade, operations and services	Capacity / Opportunity

Source: GHD

Table 15

Development Priorities in Long Term

Long Term (20 year +)	Description	Principle Driver
Development of Port Reserve / Buffer Zone (Area 19)	Development of area to facilitate future port related trade, operations and services	Capacity / Opportunity
Additional wharf infrastructure extension	Potential extension of wharf infrastructure to accommodate larger number and size of vessels	Capacity
2nd access jetty	Potential development of 2nd access jetty to increase throughput efficiency and capacity	Capacity / Efficiency
Channel dredging	Potential deepening / widening of the navigational channel via dredge activity to accommodate larger vessels	Capacity
Wharf deepening	Potential deepening of the berth pocket adjacent to the wharf to accommodate larger vessels	Capacity
Wharf strengthening	Potential strengthening of the wharf infrastructure to accommodate larger vessels	Capacity

Source: GHD



## 12. Monitor & Review

This PMP is intended to be a living document that forms the basis for the articulation of the KPA Vision to a wide range of stakeholders. Through promoting greater understanding of the Port's needs, the PMP allows the integration of the Port into a broader network consideration with local, regional and state planning agencies and port related businesses.

Continued discussions with a broad range of Port of Broome interested and affected stakeholders and frequent presentation of the PMP will allow the KPA to also capture commentary that allows the necessary testing, review and future updating of the PMP.

The PMP is built on the foundation of the market demand assessment. Review of the actual trade volumes compared to the market demand forecast volumes and also the continuous testing and review of the assumptions that drive the market demand forecast is necessary.

It is suggested that the PMP market demand study be reviewed on a regular basis. The outputs of these reviews, combined with the key messages from the Port's ongoing stakeholder engagement program can then be used to test the potential impact on the PMP. Should a major change in assumptions be apparent then the PMP can be updated to accommodate such change.

It is also suggested, that every 5 years, the PMP be redeveloped from first principles. This allows that the PMP revision is rigorously undertaken from the ground up.





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