

**Site Characteristics and Issues Matrix**

**Site Name**

**Gourdon Bay – Cape Latouche Treville**

Terrestrial Biophysical Attributes		Extent and Condition			Level of Confidence	Level of Potential for Significant Risk / Hazard and Impact of Development at this Site
<b>Rainfall:</b> 507mm (Bidydanga)		<b>Extent</b> Extent in the local area and regional context. Coastal area extent may be described as either alongshore and cross-shore length. Non-coastal extent could include; highly restricted to landform or habitat, locally common but regionally restricted, or widespread	<b>Key Coastal and Ecological Processes</b> Key coastal processes are defined by NCCOE (2004) and should be interpreted in the context of coastal landform description. Ecological processes relate to terrestrial ecology	<b>Site Condition / Disturbance Factors</b> Includes factors such as weed cover, apparent erosion (on ground or visible in aerial photography), excessive fire frequency	<b>High:</b> from site visit /survey, good map based knowledge, <b>Medium:</b> inferred from other good information sets, <b>Low:</b> limited information.	
<b>Geological Province</b>	<b>Site Geology, Substrate Characteristics &amp; Diversity</b>	<b>Extent in local area and region</b>	<b>Key Coastal / Ecological Processes</b>	<b>Site Condition / Disturbance Factors</b>		<b>Altered Drainage and Stormwater Management</b> <b>H:</b> Site area or substrate restricts effective on site management of storm water, erosion, potential pollution issues <b>M:</b> Site size and / or substrate allows for some retention of stormwater <b>L:</b> Site size and substrate allows for retention and managed discharge of stormwater.
Canning Basin Sandplains	Emeriau Sandstone (Exposed/soil covered); Broome/Frezier Sandstone (Exposed/soil covered)	Localised coastal (mostly intertidal) exposures and low coastal cliffs at Cape Du Boulay (and at Cape Gourdon)	Provides the structural support for Cape De Boulay. Provides rock substrate for intertidal benthic communities.		<b>H</b>	<b>L</b>
	Pindan Red Earths Quaternary sands and silt	The dominant substrate across the site and region. Exposed as Pindan Cliffs along the coastline of this site, and elsewhere in the region	Tropical cyclones and storm surge episodic erosion of coastal cliffs. Relatively stable very gently sloping surface, subject to erosion if vegetation removed or water flow concentrated	Repeated extensive fire, previous pastoral grazing, coastal tourism access road has caused localised erosion, weeds.	<b>H</b>	<b>L- M:</b> Drainage design and management would need to account for concentrated runoff and potential erosion. Space available provides options.
Coastal Deposits	Coastal dunes	Prominent but local dune system near the tip of Cape Latouche Treville	Stable vegetated orange sand dunes. Support local Swale Thicket Vegetation		<b>H</b>	<b>M:</b> Local elevated dunes potential instability if disturbed. Avoid disturbance cultural significance. Localised vegetation community.
	Bossut Formation	Low coastal calcareous sandstone cliffs form the dominant coastal landform along most of the Gourdon Bay Coastline and the coast south of Cape Latouche Treville to Port Smith and beyond.	Relatively low cliffs subject to wave overtopping under high tide storm conditions. Elevated landform prevents development of extensive-supra tidal habitat	Robust stable cliff system.	<b>H</b>	<b>L:</b> Stable coastline feature.
	Tidal Flat/ mangrove swamp sediments	South of the Site at Port Smith south of Cape Latouche Treville	Tropical cyclones, storm surge		<b>H</b>	<b>M-H:</b> Sensitive environment, but located at a distance from the potential hub site in Gourdon Bay.
<b>Site Diversity/ Extent</b>	<b>Total</b> Five geological surfaces.	Moderately diverse. Hub site on regionally widespread Pindan surface				<b>L</b>
<b>Coastal Geomorphology, Geomorphological Processes &amp; Landform Stability</b>  The geomorphological features constitute the secondary		<b>Extent in local area and region</b> Site is on Pindan landform adjacent to Gourdon Bay.	<b>Key Coastal / Ecological Processes</b>  Primary processes are of high	<b>Site Condition / Disturbance Factors</b>  Secondary processes are significant	<b>Level of Confidence</b>  <b>H</b> from site visit good map and aerial	<b>Potential for Coastal impacts from altered coastal wave / energy regime, or concentrated stormwater flows</b>  <b>M</b> - within Gourdon Bay

(habitat) variables considered in the NCCOE (2004) assessment of potential responses of the coast to climate change.	The area of interest includes the northern half of a promontory approximately 19 km along its seaward margin and projecting approximately 8 km seaward of the general trend of the coast. Two tidal creeks, False Cape Creek and Port Smith penetrate the coast behind a sandstone and calcilutite barrier. Unconsolidated dunes overly the barrier.	importance around the coast and within Gourdon Bay. The processes include: 1. Mean Sea Level changes 2. Ocean Currents 3. Wind Climate 4. Wave Climate 5. Rainfall & Runoff	disturbance factors in Port Smith and include: 1. Local sea level 2. Local currents 3. Local winds 4. Coastal flooding 5. Sediment transport 6. Tidal creek hydraulics  Ecology of mangals and mudflats The Port Smith tidal creeks, mangal and vegetated mudflats are exposed to sea level fluctuations, high water levels and seas associated with onshore winds generated by tropical cyclones.  Debris lines along parts of the landward shores of the mudflats mark the extent of water intrusion during extreme high sea levels and storm surge events; the effect of rising sea levels is indicated by recent mangrove colonisation of silty tidal channels crossing the vegetated mudflats.  Evidence of vehicle tracking and graffiti in sensitive areas, such as around Cape du Boulay indicates a need for management.	photograph based knowledge	Changes to the coast have potential to alter processes and barrier conditions affecting surge inundation of coastal lowlands immediately landward of the primary dune ridge around the coast and to exacerbate erosion of Pindan in the vicinity of Cape du Boulay Structure is an important consideration for the remainder of the coast in the south west of the bay. The potential effect of littoral currents is masked by the high tidal range as well as by sedimentary infill under current conditions.  <b>H</b> – within Port Smith
<b>Inshore features</b> (a) Ebb-tide deltas	Port Smith: A large ebb-tide delta is located at the entrance to Port Smith	Tidal currents; extreme winds and waves from the NW and storm surge	Port Smith is part of a larger tidal creek and wetland complex extending from False Cape Bossut to Port Smith. Processes such as tidal and sea level inundation through False Cape Creek may affect recirculation of sediment between the delta and inshore sand flats.		<b>H:</b> Port Smith Subject to natural variability & recirculation of sediment with variation in the coastal energy regime
<b>Rocky shores</b>					
(a) Stable cliffs – sandstone (Calcareous)	Extensive cliffs are located along the northern shores of Saddle Hill promontory; Cape Latouche Treville to Port Smith entrance.	Extreme winds and waves; Storm surge	Wind erosion and possible wave overtopping along the seaward crest of low cliffs indicates a need for setback of development away from the cliff edge.		<b>L to M:</b> Elevated rocky topography (>10m)
<b>Rocky headlands</b>					
(a) Localised outcrops & reefs	Rock outcrops in the vicinity of Cape du Boulay (East of Site) include ironstone sheets and what appear to be rhizomorphs.	Extreme winds and waves; Storm surge	Run off from high rainfall events has produced gully erosion. Erosion of Pindan has exposed mounds of ironstone gravels and large sandstone boulders. These are an unusual feature of the landscape.		<b>H:</b> Erodable or eroding cliff, gully formation; and surface run-off during high rainfall events
(b) Localised outcrops – talus	Storm deposits flank cliffs and rocky headlands in Gourdon Bay	Local sea levels, currents and waves	Local sea levels, currents and waves will affect sediment transport. Fluctuations in sea level, and oceanographic changes associated		<b>M:</b> Boulder deposits on the upper part of the beach in Gourdon Bay may be subject to movement during tropical cyclones.

			with extreme meteorological conditions will affect the exposure and transport of storm deposits along the beach  Any cross-shore development would need to consider the potential impacts of boulder transport during extreme wind, wave and sea level conditions.		
Barrier dunes & salt flats					
(b) Vegetated dunes	Dunes overly a lithified barrier along the northern shore of Saddler Hill promontory	Severe weather conditions	Vehicle access tracks have caused damage in some locations, particularly where ORVs access the beaches		<b>L to M:</b> Could be exacerbated by drainage along vehicle tracks..
Storm ridge (bar)					
(b) Vegetated ridge	High dune ridges with lithified cores are apparent in the vicinity of Cape Latouche Treville.	Tropical cyclones.	Severe weather conditions, especially storm surges and high waves may cause some erosion of the cliffed face of the barrier; strong winds and fire may remove vegetation cover.		<b>L:</b>
<b>Cheniers</b>					
(b) Lithified – coastal wetlands	Port Smith area Lithified and unconsolidated chenier spits extend into Port Smith	Longshore and tidal currents; extreme winds and waves; and storm surge	The unconsolidated spits are affected by longshore and tidal currents; extreme winds and waves; and storm surge  Processes such as tidal and sea level inundation through False Cape Creek may impact on the landforms within Port Smith		<b>M</b> Destabilisation of structures at the mouth of Port Smith would affect inlet and tidal delta stability
<b>Mud Flats &amp; Tidal Creeks</b>					
(c) Tidal creek – vegetated tributaries	Port Smith is part of a larger tidal creek and wetland complex extending from False Cape Bossut to Port Smith	Tropical cyclones, sea level fluctuation and storm surge.	There is evidence of salt water intrusion and the extension of tidal creeks and mangals into the mudflats of Port Smith		<b>H:</b> Destabilisation of mudflats and wetlands may occur with projected rise in sea level
<b>Stream Mouths</b>					
Permanently Open					
(b) Drains mangrove wetlands	Tidal creeks in Port Smith drain mangrove wetlands and vegetated mudflats.	Extreme winds and waves; Storm surge. Natural changes include sediment reworking between the inshore and offshore components of the tidal creeks, as well as changes to floodplain elevation.	Sea level fluctuations and storm surge associated with severe weather conditions impact on the upper reaches of the tidal creeks. Terrestrial runoff may cause dieback of mangal.		<b>H:</b> The tidal creeks and mudflats are responsive to fluctuations in sea level and conditions associated with extreme weather conditions.
Intermittently Open					
(a) Drains vegetated uplands	Breaks in the lithified dunes between Cape Latouche Treville and Cape du Boulay drain low lands landward of the dune ridge.	Extreme winds and waves; Storm surge	Sea level fluctuations, and storm surge associated with severe weather conditions have some impact on low lying mudflats landward of the barrier		<b>L to M:</b> Occasional breaching and /or overwash of the barrier
<b>Site Diversity</b>	Low diversity on the potential hub site, but high in adjoining areas of study site, particularly at Port Smith to the south.			<b>H</b>	<b>L</b>
Two landform types					
<b>Diversity of Vegetation Communities</b>	<b>Extent in local area and</b>	<b>Key Coastal / Ecological</b>	<b>Site Condition</b>	<b>Level of Confidence</b>	<b>Potential for Significant Impacts from Site Clearing</b>

<b>- on site and regional context</b>	<b>region</b>	<b>Processes</b>	<b>/ Disturbance Factors</b>		<b>H:</b> Conservation Significant communities, high physical / biological diversity, or restricted community/s. <b>M:</b> Moderate physical / biological diversity. <b>L:</b> Low diversity, communities widespread regionally
<b>Coastal Vegetation Communities</b>					
Foredune vegetation	Coastal communities on lithified calcareous sandstone pavement and sand surfaces, Widespread coastal vegetation	Calcareous pavement is largely bare of vegetation and exposed to salt scald and storm surge in cyclonic conditions. Sand covered areas are dominated by widespread <i>Acacia bivenosa</i> shrubland.	<i>Cenchrus ciliaris</i> (Buffel Grass) an introduced pasture grass is expanding into the dune vegetation. Vehicle tracks have caused localised disturbance.	<b>H</b>	<b>L:</b> Widespread community type locally and regionally
Supratidal Flats					
(a) Samphire (b) Saltwater couch (c) Bare surface-algal crust	Not on site but present at Port Smith south of the site.	Tidal cycle and storm surge. Wet season rains.	Generally intact apart from localised disturbance arising from vehicle access tracks and associated compaction and disruption to drainage.	<b>H</b>	<b>L:</b> Distant from potential hub site, no disturbance expected.
Mangrove –					
(a) closed forest,	Not on site but present at Port Smith south of the site.	Tidal cycle and storm surge. Wet season rains.	Intact and indications of some expansion.	<b>H</b>	<b>L:</b> Distant from potential hub site, no disturbance expected
<b>Wetland Vegetation Communities</b>					
Wetland vegetation					
(a) Seasonal	Localised ephemeral claypans behind coastal lithified dunes facing Gourdon Bay. Likely to be a reasonably rare feature in the region.	Wet season rains and particularly cyclonic rains and other extreme meteorological events. Erosion from Pindan cliffs surfaces behind the claypans, salt spray overtopping lithified dunes.	Generally intact.	<b>M-H</b>	<b>L-M:</b> Sites should be avoided.
<b>Upland Vegetation Communities</b>					
<b>(c) Upland on Pindan surfaces</b>					
Pindan Acacia Shrubland with emergent Eucalypts, to low open Eucalyptus dominated woodland.	Dominant vegetation on the site and widespread and characteristic vegetation of the region.	Fire frequency	Frequent widespread fire has changed vegetation structure and species dominance. History of pastoral landuse with some invasion of introduced pasture grasses.	<b>H</b>	<b>L:</b>
Thicket in Dune Swale	Local occurrence of thicket vegetation in dune swales with access to some additional moisture through dry season. Present widely in near coastal environments where dune habitat is present.	Cyclonic rains and Dependence on dry season moisture from dune sands and runoff in some situations.	Generally intact.	<b>H</b>	<b>L:</b> Main occurrence in dunes on Cape Latouche Treville is remote from potential hub site. <b>M:</b> Patch adjacent to Gourdon Bay.
Communities on Cliff/ outcrop, or exposed rock surfaces	Coastal heath in vicinity of Cape Du Boulay on eroding ferruginised gravels.	Erosion from cyclonic rains and extreme meteorological events.	Naturally eroding surface. Vehicle tracks have caused localised disturbance and concentration of runoff.	<b>H</b>	<b>L-M:</b> Not directly impacted by potential hub site. Hub largely outside local catchments.
<b>Site Diversity</b>	Moderate - High diversity in the locality, with 7 vegetation types present in the Study area.  Low diversity on site – two vegetation types only			<b>H</b>	<b>L:</b>
<b>Threatened, Priority, Significant Flora (Population) (Species/status)</b>	<b>Extent in local area and region</b>	<b>Key Coastal / Ecological Processes</b>	<b>Site Condition / Disturbance Factors</b>	<b>Level of Confidence</b>	<b>Potential for Significant Impacts from Site Clearing</b> <b>H:</b> Threatened species recorded, High quality/extensive suitable habitat for threatened species, high physical / biological diversity, or restricted community.

					<p><b>M:</b> Limited representation of restricted habitat type/s, or habitats suitable for priority/significant species, moderate physical / biological diversity.</p> <p><b>L:</b> Low habitat diversity, Habitats widespread regionally, limited potential to support threatened/priority or other significant species.</p>
DRF (Wildlife Conservation Act) / Endangered (EN)/Vulnerable (VU) EPBC Act Species/Habitat	None recorded			<b>M</b>	<b>L</b>
Priority flora	2 Priority species identified from recent survey- <i>Aphyllodium parvifolium</i> (P1) occurs on Pindan substrate and <i>Pterocaulon sp.</i> A Kimberley Flora (B.J. Carter 599) (P2) appears to be confined to saline margins of Pindan substrate.			<b>M</b>	<b>M-</b> species recorded in wider study area but not detected on potential hub site
Other significant flora. (eg Unnamed species, Range end/outlying populations)	9 species are or are likely to be range extensions. 1 species, <i>Acacia monticola x tumida</i> , is an undescribed hybrid form.			<b>M</b>	<b>M</b>
Habitat specialist restricted taxa, restricted habits	None recorded			<b>M</b>	<b>L</b>
<b>Threatened, Priority, Significant Fauna Population or Habitat (Species / status)</b>	<b>Extent in local area and region</b>	<b>Key Coastal / Ecological Processes</b>	<b>Site Condition / Disturbance Factors</b>	<b>Level of Confidence</b>	<b>Potential for Significant Impacts from Site Clearing</b> <b>H:</b> Threatened species recorded, High quality/extensive suitable habitat for threatened species, high physical / biological diversity, or restricted community. <b>M:</b> Limited representation of restricted habitat type/s, or habitats suitable for priority/significant species, moderate physical / biological diversity. <b>L:</b> Low habitat diversity, Habitats widespread regionally, limited potential to support threatened/priority or other significant species.
Threatened (Rare) Wildlife Conservation Act / Endangered (EN), or Vulnerable (VU) EPBC Act Species / Habitat (ie Turtle nesting beach)	Limited scope for Turtle nesting habitat on site. Records of Bilby observed by Traditional Owners. <i>Macrotis lagotis</i> (Bilby) VU was not recorded during survey (ENV 08) species likely to be widespread in low numbers in suitable habitat.			<b>M</b>	<b>M</b>
Priority listed sp / habitat	<i>Burhinus grallarius</i> (Bush Stone-curlew) P4 – wide ranging species, <i>Lerista separanda</i> P2 - associated with sandy substrates /leaf litter which is widely distributed on the Dampier Peninsula , <i>Mormopterus loriae cobourgiana</i> (Western Little Free-tailed Bat) P1 mangrove specialist coastal margins of Pilbara, SW Kimberley and Northern Territory, <i>Leggadina lakedownensis</i> (Lakeland Downs Short-tailed Mouse) P4 widespread in Australia known			<b>M</b>	<b>M</b>

	to occur on sandy soils and cracking clays in Western Australia.				
Ramsar/JAMBA/CAMBA/ROKAMBA Migratory sp / habitat	45 species of birds listed under international treaties. Most of these are likely to be associated with the Port Smith area.			M	M
Other significant fauna. (eg Unnamed species, Range end/outlying populations, species with declining range)	<i>Falco peregrinus</i> (Peregrine Falcon) is a wide ranging species.			M	L
<b>Potential habitat for Short Range Endemic inc subterranean fauna</b>	<b>Extent in local area and region</b>	<b>Key Coastal / Ecological Processes</b>	<b>Site Condition / Disturbance Factors</b>	<b>Level of Confidence</b>	<b>Potential for Significant Impacts from Site Clearing</b> <b>H:</b> Restricted habitat with high potential for short range endemic species, or restricted community/s or restricted environment with substrate characteristics (high porosity, connectivity and high humidity/moisture) favourable for subterranean fauna <b>M:</b> Moderately restricted habitat with some potential for short range endemic species, or environment with substrate characteristics (high porosity, connectivity and high humidity/moisture) potentially favourable for subterranean fauna. <b>L:</b> Common substrates and communities regionally widespread, without substrate characteristics normally favourable for subterranean fauna
Site environment likely to support restricted habitat specialist fauna, SRE fauna Substrate/habitat potential suitability for subterranean fauna, (ie fractured rock, karst environment, springs etc)	Low Risk, Pindan soils on site are the dominant surface in the region and relatively uniform SRE are not expected, compact silt-sand substrate has limited potential to support subterranean fauna. Coastal calcareous sandstone of lithified dunes may have higher potential for SRE's as a more restricted environment regionally that has some history of SRE fauna occurrences elsewhere.				<b>L:</b> Pindan substrates  <b>L-M:</b> Coastal calcareous sandstone surfaces. Hub site would impact on small portion of this environment at coastal crossing.
<b>Visual Landscape Significance</b>	<b>Visual Landscape Significance Assessment</b>			<b>Level of Confidence</b>	<b>Potential significance of Landscape impacts from development of the site</b>  <i>Suitability Rating and Absorption Capability</i>
Landscape character of hub site and broader context	<p><b>Landscape Region:</b> The Deserts  <b>Character type:</b> Eighty Mile Plain  <b>Landscape context:</b> The Gourdon Bay node is located within a broad-scale landscape with a landform of gently undulating sand plains, dunes and estuarine mud-flats with sparse to dense vegetation cover dominated by grassland and woodland with pockets of pindan thicket. Mangrove communities occur on the coastal mudflats and the coastal interface is often dramatic and visually distinctive. Much of the sub-type has been grazed with evident signs of pastoral infrastructure – roads, fences and yards.  <b>View character of development node:</b> horizontal plain with diverse ocean fringe dominated by low rolling dunes of variable width, a prominent headland, rock outcropping, a long sandy beach strand with north orientation, smaller pocket beaches and a complex estuary inlet.  <b>Landscape character significance rating:</b> High coastal, moderate inland.  <b>Comments:</b> The coastal dunes and beaches in this node and adjacent mangrove association are of high visual</p>			<b>H</b>	<p><b>Suitability Rating:</b> Moderate   <b>Absorption Capability:</b> Low to Moderate   <b>Analysis (positive and negative):</b>  + built infrastructure and highly evident changes to landscape character  + relatively low level of visual landscape significance  + no marine tour boat routes  + landscape modifications part of public expectation</p>

	significance while the inland plain is of low to moderate significance. There are landscapes of cultural significance in this node. There is excellent potential to retain a buffer reserve around a central development within the node.			<ul style="list-style-type: none"> <li>- proximity to established caravan park and bird sanctuary</li> <li>- proximity to Great Northern Highway viewer positions</li> <li>- low to moderate visual absorption capability</li> <li>- cultural landscape sites of significance present</li> </ul>
Degree of evident alteration or change from the 'naturally established' landscape character based on levels of 'naturalness'	<b>Degree of evident change from naturally established character:</b> low to moderate; roads and tracks are present, but naturally established character is largely intact. <b>Naturalness rating:</b> Moderate		<b>H</b>	
Degree and sensitivity of views and seen areas from travel routes and use areas (duration, frequency, position in landscape, number of viewers, distance)	<b>Viewer positions:</b> Great Northern Highway, Port Smith Road and Caravan Park, local beach access tracks used by fishers, bird watches and sight-seers. <b>Distance zones:</b> foreground, middleground and background from all identified travel routes and use areas. <b>Duration of view:</b> long duration. <b>Viewer position:</b> viewer 'level'. <b>Sensitivity Level:</b> level 1 - highest concern for viewer sensitivity as viewed from all identified travel routes and use areas, except local tracks. <b>Implications:</b> The established caravan park would have a dramatically altered landscape, an industrial estate, as a neighbour. Travellers on the Great Northern Highway would have background views to the development through a 6-7km buffer of roadside vegetation.		<b>H</b>	
Special features and focal points within view of the hub site	Port Smith Bay, Cape Latouche Treville, Cape Du Boulay and Cape Gourdon		<b>H</b>	
<b>Remote Area - Quarantine Risks / Hazards from Construction / Operation of development</b> <b>Introducing new species</b>	<b>Site Context</b>	<b>Site Condition and Disturbance Factors</b>	<b>Level of Confidence</b>	<b>Quarantine - Potential Hazard from Introduction of New Species</b> <b>H:</b> Island, or remote mainland area currently largely free of introduced species and distant from most human vectors <b>M:</b> Site has few weeds and limited vehicle access. <b>L:</b> Site some development / existing vehicle access / weeds are common and a stock grazing history
Relative quarantine risk from developing/operating Hub at the location	Existing road access	Area has long history of pastoral land use Stock Route with weeds present and existing vehicular access		<b>L:</b>
<b>Remote area – potential for future development of Land-based transport or Infrastructure links.</b>			<b>Level of Confidence</b>	<b>Potential for major impacts from off site transport / infrastructure links</b> <b>H:</b> Remote mainland area currently distant from most human vectors <b>M:</b> Mainland area currently not serviced by main road access. <b>L:</b> Island with no potential for off site impacts. or mainland location close to major roads with existing vehicle access.
Degree of impact from potential future land-based transport or infrastructure links	Area has existing access and development, the Great Northern Highway is less than 10 km inland from the site.			<b>L:</b>
<b>Existing or proposed conservation reserve (inc marine) or Indigenous Protected Area</b>			<b>Level of Confidence</b>	<b>Conservation Reserve Status</b> <b>H:</b> Existing reserve <b>M:</b> Recommended Reserve <b>L:</b> No reserve proposed
Existing / Proposed Conservation reserve	None proposed		<b>H</b>	<b>L:</b>
Existing / Proposed Marine Reserve	None exist, Cape Latouche Treville is at NE edge of a CALM 1994 area recommended for consideration as potential marine reserve.		<b>H</b>	<b>M:</b>
Existing / Proposed Indigenous Protected Area	None proposed.		<b>H</b>	<b>L:</b>

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