Site Characteristics and Issues Matrix Site Name Maret Islands

Terrestrial Biophysical Attributes		**Extent and Condition**			**Level of Confidence**	**Potential for Significant Risk / Hazard and Impact of Development at this Site**
Rainfall : 1000 mm (Estimate)		**Extent** 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	**Key Coastal and Ecological Processes** 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	**Site Condition / Disturbance Factors** Includes factors such as weed cover, apparent erosion (on ground or visible in aerial photography), excessive fire frequency	**High**: from site visit /survey, good map based knowledge, **Medium**: inferred from other good information sets, **Low**: limited information.	
Geological Province	**Site Geology, Substrate Characteristics & Diversity**	**Extent in local area and region**	**Key Coastal / Ecological Processes**	**Site Condition / Disturbance Factors**		**Altered Drainage and Stormwater Management** **H**: Site area or substrate restricts effective on site management of storm water, erosion, potential pollution issues **M**: Site size and / or substrate allows for some retention of stormwater **L**: Site size and substrate allows for retention and managed discharge of stormwater.
Kimberley Plateau	Laterite on Carson Volcanics Basalt (Exposed/soil covered)	Laterite developed on weathered basalt geology is the dominant substrate on the Maret Islands, often as massive exposed laterite, particularly on North Maret Island. Regionally, the great majority of Kimberley Islands and the Kimberley Plateau are on sandstone geology, very few other Kimberley islands larger than about 45 ha have a laterite surface.	Key coastal erosion and sedimentation processes are driven by cyclones, storm surge, the tidal regime and extreme monsoonal rainfall events. The massive laterite surface of the North Maret Island particularly is likely to reduce water penetration from rainfall and generate substantial stormwater flows and potential erosional forces on the cliff edge of the islands during heavy rainfall.	The Laterite and Basalt surfaces on the islands are in excellent condition.	**H**	**H:** A large proportion of both islands would be required to be graded and develop as hard surface in order to support a gas hub development and associated infrastructure. The proportionally large cleared, graded and developed surface of the island, combined with the existing water shedding characteristics of the laterite plateau establish a more challenging environment in which to effectively manage the potential impacts of stormwater, sediment erosion, potential pollution containment on site. This is exacerbated in an island situation with sensitive coastal environments on all sides.
	Carson Volcanics Basalt (Exposed/soil covered)	Approximately half the surface of South Maret Island and a smaller representation on North Maret Island is mapped as basalt surface. Basalt is also an uncommon substrate for Kimberley islands.	The basalt geology weathers to produce soils with a higher fertility and water holding capability than sandstones, which influences vegetation structure, species and terrestrial ecology.			
Coastal Deposits	Holocene coastal dunes	Sand beaches often but not always with foredune/storm ridges are a feature of bays on North and South Maret Islands	Key coastal erosion and sedimentation processes are driven by cyclones, storm surge, the tidal regime and extreme monsoonal rainfall events.	Undisturbed condition.	**H**	**M**: Significant proportion of the islands coastline.
Site Diversity/ Extent	**Total**	Low geological/substrate diversity, but two regionally rare substrates amongst Kimberley islands.			**H**	**H:** Hub on rare island substrates.

Three geological surfaces.					
Coastal Geomorphology, Geomorphological Processes & Landform Stability	**Extent in local area and region**	**Key Coastal / Ecological Processes**	**Site Condition / Disturbance Factors**	**Level of Confidence**	**Potential for Coastal impacts from altered coastal wave / energy regime, or concentrated stormwater flows** **H**: Low lying topography; Proximity to tidal creeks; Cheniers, narrow barrier dunes & associated extensive wetlands; Extensive mudflats; considerable longshore sand drift regime with significant potential for impact **M**: Moderately elevated topography (to 10 m); Sandy & silty beaches limited longshore sand movement; Moderate to wide barrier dunes and wetlands; Erodable or eroding cliff. **L**: Elevated topography (>10m); rocky coast and landward landform with little evidence of recent erosion; low longshore sediment drift
Rocky shores					
(c) Stable cliffs - Other (eg. Basalt)			Frequent fire induced accelerated erosion of unconsolidated sediments from upland areas	**H**	**M**: Regionally restricted rock type
(f) Unstable cliffs - other (laterite developed on Carson Volcanics)	Carson Volcanics. Derived lateritic surface. Dominant here but relatively small proportion of surfaces in the region	Erosion of lateritised basalt through cyclonic wind and waves and storm surge and extreme meteorological events.	Intact condition. Tropical cyclones and extreme monsoonal events	**H**	**M:** Basalt is a relatively rare substrate compared to Sandstone in the region.
Rocky headlands					
(b) Localised outcrops – talus	Localised talus slopes	Erosion of lateritised basalt and underlying palid zone through cyclonic wind and waves and storm surge and extreme meteorological events.	Intact		**M:**
(d) Localised outcrops – coral reef	Localised to extensive fringing coral reef development.	Reef building, episodic damage and recovery from cyclonic waves and storm surge.	Intact excellent condition	**H**	**H:** Coral reef is sensitive to potential impacts from hydrocarbon contamination, development of foreshore, potential contaminants in storm water, sediment
Embayments					
Intertidal beach	Beach backed by cliff structure without dune formation	Cyclonic waves and storm surge. macro-tidal regime	Intact system	**H**	**L**
Barrier dune ridge & vine thicket					
(b) Vegetated dunes	Significant local features in a largely rock dominated coastline	Cyclonic waves and storm surge. Macro-tidal regime, extreme monsoonal rainfall events	Excellent condition	**H**	**M:** Vine thicket TEC's, depend on stormwater discharge and monsoonal rains held in the Barrier Dune Ridge for dry season moisture. Development of the island would likely change storm. water regime. Important beaches for turtle breeding on the Island.
Site Diversity	Moderate to high diversity - 6 Coastal geomorphological landforms present on the islands				**M**
Diversity of Vegetation Communities - on site and regional context	**Extent in local area and region**	**Key Coastal / Ecological Processes**	**Site Condition / Disturbance Factors**	**Level of Confidence**	**Potential for Significant Impacts from Site Clearing** **H**: Conservation Significant communities, high physical / biological diversity, or restricted community/s. **M**: Moderate physical / biological diversity. **L**: Low diversity, communities widespread regionally
Coastal Vegetation Communities					
Foredune vegetation	Present and widespread coastal landform on the islands.	Influenced by Cyclonic wind / wave and storm surge conditions. Likely regionally consistent species.	Intact subject to periodic natural disturbance.	**M**	**L**
Rocky coast community	Likely present on available habitat	Limited information	Intact	**L**	**L**
Upland Vegetation Communities					
(a) Upland on Volcanics					

Spinifex/ tussock grassland	Present and widespread, particularly on North Maret Island. Restricted occurrence of this environment in Kimberley islands makes this a potentially significant community.	Dominant on areas where Massive laterite is at or close to the surface. Likely to support wet season ephemeral herbs.	Intact	**M**	**H:** Potential for restricted community and species
Low open woodland-low woodland on laterite over Carson Volcanics	Common vegetation on South Maret Island and to a lesser degree on North Maret Island	Present particularly on South Maret Island, where it is presumed the laterite is less massive and more fissures or ponding allows greater access to soil moisture		**M**	**M-H:** Regionally rare substrate on Kimberley Islands
Low open woodland on Carson Volcanics	Common vegetation community on South Maret Island,			**M**	**M-H:** Regionally uncommon Kimberley Island substrate
Communities on Cliff / outcrop, or exposed rock surfaces, inc ephemeral pools	Cliff top communities fringing the lateritic plateau on the islands			**M**	**L**
Vine Thicket/Rainforest TEC					
(a) Volcanics	Dominant vegetation on the cliff and scree slopes surrounding both islands.	Presumed to be dependent on soil moisture obtained from the palid zone clays below the laterite cap, which are exposed on the cliff and lateritic scree slopes surrounding both islands. Important habitat for a range of fauna species.	Intact	**H:** (presence) **L-M:** (implications of development on soil moisture)	**H:** TEC. Significant potential for the soil moisture regime that is believed to support the vine thicket communities to be impacted by modification to existing water infiltration and stormwater flows if a substantial portion of the island surface is developed.
(b) Dune swale	Present and well developed in sheltered environments behind beach storm ridges	Particularly in sheltered environment below the cliff escarpments, where local drainage line runoff from the plateau surface is retained behind a storm ridge formation.	Intact	**H**	**M-H**: TEC. Potential risk implications from changes to stormwater flow and sedimentation conditions.
Site Diversity	High vegetation diversity- 8 vegetation communities known / inferred present on islands. All in vicinity of potential hub site due to small size of the islands.			**M**	**H:** Diversity and threatened ecological communities
Threatened, Priority, Significant Flora (Population) (Species/status)	**Extent in local area and region**	**Key Coastal / Ecological Processes**	**Site Condition / Disturbance Factors**	**Level of Confidence**	**Potential for Significant Impacts from Site Clearing** **H**: Threatened species recorded, High quality/extensive suitable habitat for threatened species, high physical / biological diversity, or restricted community. **M**: Limited representation of restricted habitat type/s, or habitats suitable for priority/significant species, moderate physical / biological diversity. **L**: Low habitat diversity, Habitats widespread regionally, limited potential to support threatened/priority or other significant species.
DRF (Wildlife Conservation Act) / Endangered (EN)/Vulnerable (VU) EPBC Act Species/Habitat	None recorded			**M**	**L**
Priority flora	*Pittosporum moluccanum* P4 associated with monsoon vine thicket vegetation and with white sand.		Excellent condition	**M:** Survey information not available	**M-H**
Other significant flora. (eg Unnamed species, Range end/outlying populations)	Unnamed species recorded (Inpex presentaton)			**L-M** Survey information not available	**M-H**
Habitat specialist restricted taxa, restricted habits	Potential for ephemeral herb species to occur on Massive	Rare island surface, some similarities to elevated massive		**L-M** Survey information not	**M-H**

	laterite surface of the islands to include restricted species	sandstone surfaces in the Kimberley that are considered to support local endemic species		available	
Threatened, Priority, Significant Fauna Population or Habitat (Species / status)	**Extent in local area and region**	**Key Coastal / Ecological Processes**	**Site Condition / Disturbance Factors**	**Level of Confidence**	**Potential for Significant Impacts from Site Clearing** **H**: Threatened (Rare) species recorded, High quality/extensive suitable habitat for Threatened species, high physical / biological diversity, or restricted community. **M**: Limited representation of restricted habitat type/s, or habitats suitable for threatened/priority species, moderate physical / biological diversity. **L**: Low habitat diversity, Habitats widespread regionally, limited value as habitat for threatened/priority or other significant species.
Threatened (Rare) Wildlife Conservation Act / Endangered (EN), or Vulnerable (VU) EPBC Act Species / Habitat (ie Turtle nesting beach)	*Chelonia mydas* (Green Turtle), *Natator depressus* (Flatbacked Turtle), *Eretmochelys imbricate* (Hawksbill Turtle) Maret Islands are recognised as one of the important turtle nesting locations in the Kimberley.	Beaches with foredune environments required for nesting conditions are present at a number of locations around the Maret Islands.	Minimal disturbance as remote Island location provides additional security for turtle nests and hatchlings.	**H:** Turtle nesting surveys (INPEX Presentation NDT Workshop Broome July 2008))	**H:** Significant nesting habitat for three threatened turtle species.
Priority listed sp / habitat	*Burhinus grallarius* (Bush Stone-curlew) P4 – wide ranging species	Habitat unlikely to be regionally significant		**M:** Fauna returns from survey	**L-M**
Ramsar/JAMBA/CAMBA/ ROKAMBA Migratory sp /	10 species recorded from the islands are protected under international agreements	Habitat unlikely to be regionally significant		**M:** Fauna returns from survey	**L-M**
Other significant fauna. (eg Unnamed species, Range end/outlying populations, species with declining range	Schedule 4 species *Crocodylus porosus* (Saltwater Crocodile) species is wide ranging there is limited habitat on the site.			**M:**	**L-M**
Potential habitat for Short Range Endemic inc subterranean fauna	**Extent in local area and region**	**Key Coastal / Ecological Processes**	**Site Condition / Disturbance Factors**	**Level of Confidence**	**Potential for Significant Impacts from Site Clearing** **H**: 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 **M**: 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. **L**: Common substrates and communities regionally widespread, without substrate characteristics normally favourable for subterranean fauna
Site environment likely to support restricted habit specialist fauna, SRE fauna Substrate/habitat potential suitability for subterranean fauna, (ie fractured rock, karst environment, springs etc)	The WA Museum has records of land snail and earthworm SRE species some recorded only from the Maret Islands, others from the Maret Islands and one other.	Fractured rock substrates, scree slopes and Vine Thicket environments present on the islands are known to have significant potential to support SRE species.	Intact environmental conditions	**H**	**H:** SRE's recorded, potential for other SRE species to be recorded with further survey.
Visual Landscape Significance	**Visual Landscape Significance Assessment**			**Level of Confidence**	**Potential significance of Landscape impacts from development of the site**

Landscape character of hub site and broader context	***Landscape Region**:* The Kimberley ***Character type***: Kimberley Plateau ***Landscape context***: This sub-type is an extremely complex and ancient dissected sandstone plateaux with undulating hills, well defined escarpments and laterite capped mesas with a predominant savannah grasslands and woodland land cover. A deeply dissected coastline features include headlands, cliffs and many off – shore islands with fringing mangroves, tidal mudflats and estuaries. Seasonal water courses flow into gulfs, swamps, deltas, mudflats of the Indian Ocean and Timor Sea. The visual effect is generally dramatic and rugged. Pastoral and mining leases occur in this sub-type and Aboriginal people use the area, however there is little evident alteration from the naturally established landscape character. ***View character of this development node***: The island landscape is characterised by a rugged rocky plateau with rocky terrain, a dramatic cliff perimeter and a sense of remoteness and naturalness. Diverse vegetation patterns result from mixed herblands, rock outcropping and shrubby savannah. ***Landscape Character Rating***: *High* ***Comments***: The dramatic landform and location of the Maret Islands ensure that they are a focal landscape of immense importance as viewed from marine viewer positions. Significant alteration to the visual character of the island would collectively impact on the perceived and actual character of the broader North Kimberley coastal landscape.		**Low to moderate**	***Suitability rating:*** Low ***Absorption Capability*:** Low ***Analysis (+ positive and - negative):*** - remote, high expectation of naturalness - proximity to marine tour boat routes and focal attractions - established marine user patterns
Degree of evident alteration or change from the 'naturally established' landscape character based on levels of 'naturalness'	***Degree of evident change from naturally established character*:** Low, no evident alterations exist in the naturally established landscape. ***Naturalness rating*:** High.			
Degree and sensitivity of views and seen areas from travel routes and use areas (duration, frequency, position in landscape, number of viewers, distance)	***Viewer position***: A relatively small number of very sensitive visitors on tour and cruise boats - often with a special focus on scenic assets and expert interpretation of bio-physical and landscape values and features. Some craft circumnavigate this Island. ***Distance zone***: Foreground, middleground and background. ***Duration of view***: Variable but long duration views provided by some operators. ***Viewer position***: Generally level, but can be 'below' as one approaches the shoreline of the Island. ***Sensitivity level***: Level 1 - seasonally variable. Visitor expectation of naturalness high. ***Implications***: Development of any of the islands of the Maret group would significantly alter the *natural image* of a large sector of the North Kimberley coast. It is projected that the impacts on the Island and regional landscape would be perceived and assessed as unacceptably negative by most viewers in tour boats. A large area of the north Kimberley coast currently valued for its naturalness, ruggedness and diversity would be visually compromised by development of even a small component of the whole landscape. Development on any prominent point or island would become an alien focal point as viewed by clients on tour boat that pass on their journey along the shoreline of the Kimberley region. While industrial development can be perceived as a 'feature' in some urban and semi-urban settings, the assessment of most viewers is likely to highly negative where a high degree of naturalness is anticipated.			
Special features and focal points within view of the hub site	North and South Maret Islands, Bigge Island, Berthier Island			
Remote Area - Quarantine Risks / Hazards from Construction / Operation of development Introducing new species	**Site Context**	**Site Condition and Disturbance Factors**	**Level of Confidence**	**Quarantine - Potential Hazard from Introduction of New Species** **H**: Island, or remote mainland area currently largely free of introduced species and distant from most human vectors **M**: Site has few weeds and limited vehicle access. **L**: Site some development / existing vehicle access / weeds are common and a stock grazing history
Relative quarantine risk from developing/operating Hub at the location	The Maret Islands sit within a remote region of outstanding natural, indigenous and historical heritage values that may meet criteria for national and possibly international heritage listing.	Excellent condition	**H**	**H:**
Remote area – potential for future development of Land-based transport or Infrastructure links.			**Level of Confidence**	**Potential for major impacts from off site transport / infrastructure links**

				H: Remote mainland area currently distant from most human vectors **M**: Mainland area currently not serviced by main road access. **L**: 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	Remote island setting	Excellent condition	**H**	**L**
Existing or proposed conservation reserve (inc marine) or Indigenous Protected Area			**Level of Confidence**	**Conservation Reserve Status** **H**: Existing reserve **M**: Recommended Reserve **L**: No reserve proposed
Existing / Proposed Conservation reserve	EPA and CALM recommended Nature Reserve			**M**:
Existing / Proposed Marine Reserve	No recommendation			**L:**
Existing / Proposed Indigenous Protected Area	No recommendation			**L:**

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