FLANAGAN CONSULTING GROUP
Trusted Advisor to Northern Australia

Ports North

CAIRNS SHIPPING DEVELOPMENT PROJECT

Revised Draft Environmental Impact Statement

Chapter B12: Landscape and Visual

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B12.1 Introduction

B12.1.1 Scope

The purpose of this chapter is to identify the potential impact of the Cairns Shipping Development (CSD) Project on the landscape and visual amenity of the Study Area in general and of the Project Areas and their surrounds in particular. These terms are defined in **Section B12.1.2**.

This involves describing the existing situation regarding landscape and visual amenity, assessing potential impacts using a risk-based methodology, developing mitigation measures that can be incorporated into the design and future management of the project, and assessing the residual impacts following mitigation.

The ToR / EIS guidelines require that the work includes the following:

- Describe, in general terms, the existing character of the landscape and the general impression that would be obtained while travelling through and around it.
- Outline:
  - existing landscape features, panoramas and views that have, or could be expected to have, value to the community
  - major views, view sheds, outlooks, and features contributing to the amenity of the area, including assessment from private residences
  - focal points, landmarks, waterways and other features contributing to the visual quality of the area and the project site
  - character of the local and surrounding areas including vegetation and land use
- Include any relevant World Heritage and National Heritage values of the area.

B12.1.2 The Study Area and Project Areas

The ‘study area’ for the EIS varies depending on the issue at hand while the ‘project area’ is the immediate footprint of the proposed works. For the consideration of landscape and visual amenity issues the following definitions apply:

The Study Area is shown on **Figure B12-1** and encompasses:

- The township of Cairns.
- Surrounding land uses and residents (e.g. boat owners in Trinity Inlet, nearby accommodation, neighbours of the placement sites and pipeline route) which may experience impacts to visual amenity.
- The marine environment including the Trinity Inlet, Trinity Bay and surrounding waters including:
  - all waters of Trinity Bay
  - the tidal waters of Trinity Inlet, including landward areas to the boundary of the Fish Habitat Area
  - Double Island
  - the coastline and nearshore waters of Cairns’ Northern Beaches
  - Mission Bay
  - the coastline extending to Cape Grafton.
- The Great Barrier Reef World Heritage Area (GBRWHA) / National Heritage Area including both nearshore and offshore areas.
- The Great Barrier Reef Marine Park (GBRMP).

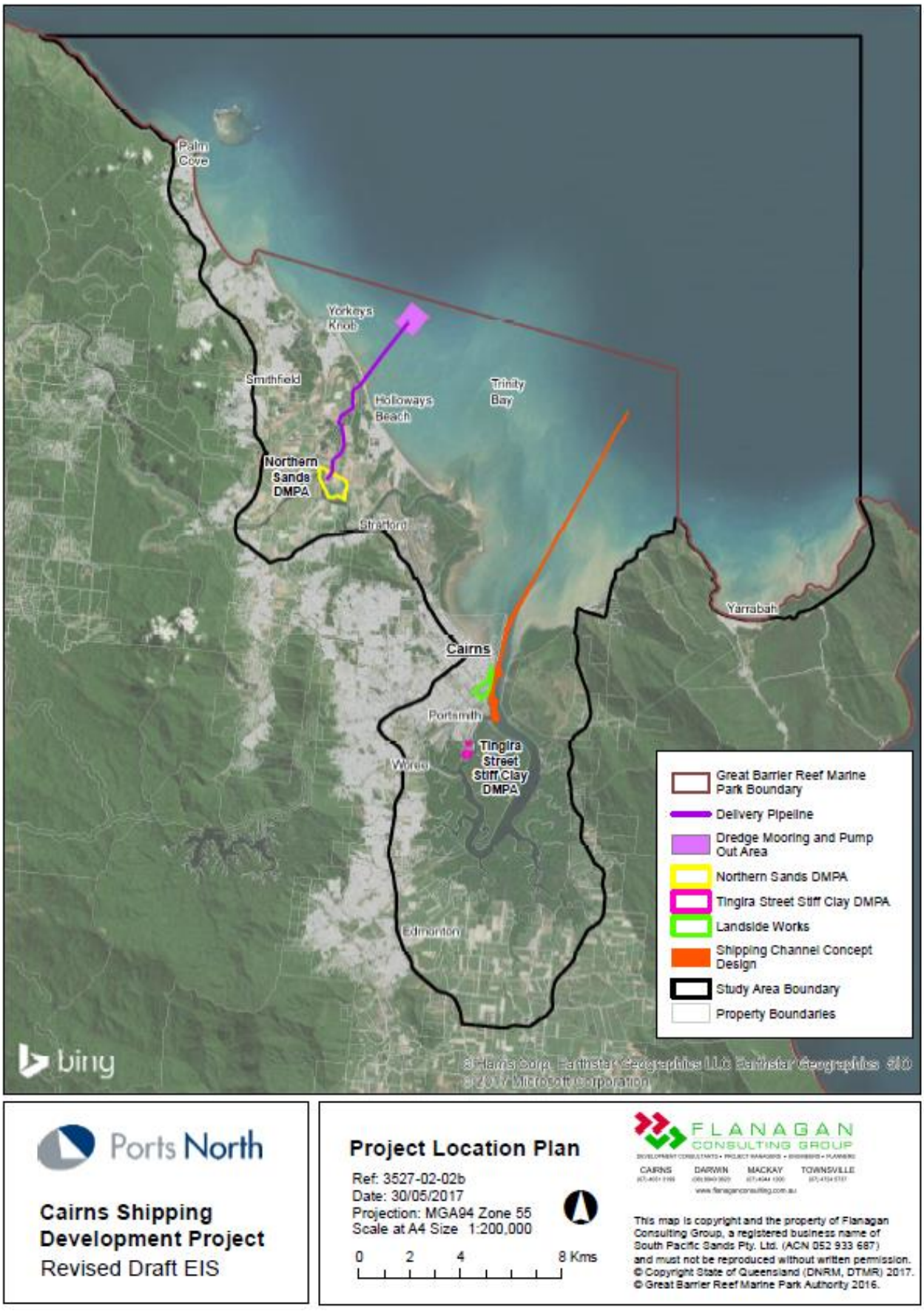

Figure B12-1 Study Area and Project Areas.

Project areas are also shown on **Figure B12-1** and encompass:

- Channel Project Area including the shipping channel, the preferred marine placement area for maintenance material – described as Option 1A Dredge Material Placement Area (DMPA) and the route to the pump out point at the seaward end of the pipeline to the Northern Sands DMPA.
- Landside Works Project Area for wharf upgrades and berthing of cruise ships.
- Northern Sands Project Area including the Northern Sands DMPA, dredge material delivery pipeline from the offshore pump out facility to the DMPA via the delivery pipeline corridor, and tailwater outlet zone.
- Tingira Street Project Area (essentially the Tingira Street Stiff Clay DMPA).

The specialist nature of this assessment has required the development of a 'landscape and visual assessment study area' that provides the contextual areas for consideration of all components of the project (see **Figure B12-2**). Coastal mountain ranges typically define the boundary of the visual catchment which includes the urban area of Cairns, surrounding lands, waterways, beachside towns, residences and businesses and extends offshore into Trinity Inlet, Trinity Bay and the nearshore and offshore waters of the Great Barrier Reef Marine Park (GBRMP) and GBRWHA.

Figure B12-2 Landscape and Visual Impact Assessment Study Area.

Source: Appendix BA (Figure 1-5).

B12.1.3 End Use of DMPAs

End uses of the DMPAs are described below because an appreciation of these is critical to the assessment of impacts.

B12.1.3.a Northern Sands DMPA

The Northern Sands DMPA contains an operating sand mine and a 25 ha water-filled void that is to be enlarged and used for the placement of soft clays pumped to the site. The current void contains fresh water from groundwater seepage and rainfall.

The soft clay placement campaign will fill all or most of the void over a period of some three months. Once this filling is complete, the DMPA will revert to the control of the owner who will then determine subsequent uses. No assumptions can be made about this use although current approvals imply that at some time the void is to be completely filled.

B12.1.3.b Delivery Pipeline

Soft clay will be delivered to the DMPA via the dredge material delivery pipeline which commences at the offshore pump out facility located approximately 2.8 km offshore from Yorkeys Knob. The marine section of the pipeline will be submerged, while the landward section will be constructed above ground and suspended on low (<0.5 m) earthen plinths. Up to three booster stations may be necessary because of the pipeline length. Booster stations will be placed in cleared grassland areas or cane headlands in consultation with landowners, to minimise interference with farming operations.

After the completion of the soft clay placement campaign, the inlet pipeline (landward and marine sections) and booster stations will be disassembled and removed. The disturbed area will be restored and the small amount of natural vegetation cleared for its construction will be rehabilitated using appropriate native species. A specific Restoration Plan will be prepared and implemented for this purpose.

B12.1.3.c Tailwater Discharge Pipeline(s)

Similarly, the tailwater discharge pipelines will be disassembled and removed and the disturbed area restored rehabilitated as part of the Restoration Plan.

B12.1.3.d Tailwater Ponds

When no longer required, the tailwater ponds will be filled and the disturbed area restored such that the area can be re-used for future uses such as quarry operations, growing sugar cane or the like. No rehabilitation will be necessary.

B12.1.3.e Tingira Street Project Area

The Tingira Street DMPA is currently cleared (although marine plants have recolonised some of the area not covered by anthropogenic grasslands) and in its past has been filled to above Highest Astronomical Tide.

The placed stiff clay will be used to fill and preload the site to accelerate settlement. As a separate project, Ports North intends to import additional fill and construct industrial hardstands and other infrastructure. This project has been under consideration for many years and most of the necessary approvals have already been obtained. Of relevance to the consideration of landscape and visual impacts is the fact that no rehabilitation will be possible following the stiff clay placement, and the site will become progressively prepared and developed as a port-related industrial land use.

Site landscaping will be undertaken on the DMPA once placement is complete and future site use is better defined. In the interim, the area will be maintained as per existing Ports North management, including mowing.

B12.2 Methodology

B12.2.1 Detailed Technical Assessments

Several detailed technical assessments of landscape and visual issues were undertaken in support of both the concept design of the project (documented in **Chapter A2** (Project Background)) and this chapter. These are listed in **Table B12-1** below. The final column shows where these reports are located in this Revised Draft EIS.

TABLE B12-1 DETAILED TECHNICAL ASSESSMENTS

STUDY	DETAILS	APPENDIX NO
Landscape and Visual – Existing Environment	Existing situation of the Northern Sands and East Trinity DMPAs and the Northern Sands pipeline corridor	**Appendix T**
Landscape and Visual Impact Assessment	Existing situation and impact assessment of the CSD Project (i.e. the whole CSD Project)	**Appendix BA**

Appendix T is relevant to the extent that it assisted in the relative assessments of the Northern Sands DMPA and the formerly considered East Trinity DMPA. This chapter is based almost entirely on **Appendix BA**

These studies are referred to where appropriate. In addition, many of the maps used in this chapter are extracted from **Appendix BA** where larger versions are presented.

While all relevant findings have been incorporated into this chapter, readers are referred to the original reports for further details if required. Together these technical studies involved:

- literature reviews to gather relevant information from previous studies
- desktop assessments including review of air photos, topographic data and information from previous studies undertaken in the region
- field work
- review of operational guidelines.

B12.2.2 Literature Review

Key documents accessed in the preparation of **Appendix BA** and referred t in this chapter are:

- Cairns Regional Council CairnsPlan 2016 Version 1.0 (Cairns Regional Council 2016)
- Cairns Region Scenic Amenity Study (Cardno Chenoweth 2012)
- CSD Project Draft EIS (Ports North 2014)
- Defining the Aesthetic Values of the Great Barrier Reef: Final Report for SEWPaC (Context 2013)
- Great Barrier Reef Region Strategic Assessment: Strategic assessment report (Great Barrier Reef Marine Park Authority (GBRMPA) 2014)
- Great Barrier Reef Coastal Zone Strategic Assessment 2014: supplementary strategic assessment report (State of Queensland 2014).
- Land Use Plans for Strategic Port Land (Seaport Volumes 1, 3 and 5; Ports North, amended 2013)
- Landscape and Visual Assessment – Existing Environment – Cairns Shipping Development Project – Revised Draft EIS (Cardno 2016)
- Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO 2015)
- Reef 2050 Long-Term Sustainability Plan (Commonwealth of Australia 2015)
- State of Queensland 2013, Great Barrier Reef Coastal Zone Strategic Assessment: strategic assessment report (State of Queensland 2013)

B12.2.3 Key Aspects of Methodology

B12.2.3.a Overall Approach

Structure

Visual impact assessment is a complex task due to the subjective nature of many of the issues involved. The overall approach taken in this chapter follows industry best-practice as follows:

- Existing Situation (**Section B12.3**). This describes and assesses the existing landscape and visual environment of the Study Area in terms of landscape character and scenic values, views, view corridors, and 'landscape sensitivity'. This includes a description of the Study Area in terms of its contribution to character, scenic integrity and natural landscape values as well as aesthetic contribution to the Outstanding Universal Value (OUV) of the GBRWHA. Specifically it addresses:
  - landscape character context
  - viewer groups (i.e. who could see the various project elements and from where)
  - visibility (i.e. the modelled Zone of Visual Influence)
  - 'visual sensitivity' of affected areas (i.e. the number of viewers, the duration of their views, and their expectations of scenic significance).
- Assessment of Potential Impacts (**Section B12.4**). This assessment addresses the elements of the CSD Project and their potential impact on the existing situation as defined above. This phase includes an assessment of the potential beneficial and adverse impacts of the project on the landscape character and visual qualities of the surrounding area, using the risk-based methodology described in **Chapter A1** (Introduction).
- Recommended Mitigation (**Section B12.4**). Recommendations are made for visual impact mitigation or management methods where applicable. For convenience the recommended mitigation is combined with impacts to produce a summary table of unmitigated and mitigated impacts.
- Residual Impacts and Assessment Summary (**Section B12.6**). A summary is provided of the overall residual impacts.

Important Terms

Some important terms used in this assessment are defined below and described in more detail throughout this chapter:

- Landscape Character Context: a grouping of the landscape into areas that have broadly similar patterns of landform, vegetation, land use or settlement.
- Landscape Sensitivity: visual sensitivity of affected areas based on the number of viewers, the duration of their views, and their expectations of scenic significance.
- Viewpoint: a fixed viewing location.
- Viewshed: the component of the landscape that is visible to the human eye from a fixed viewpoint.
- Visual Amenity: the value of a particular area or view in terms of what can be seen (The Landscape Institute and the Institute of Environmental Management and Assessment 2002).
- Zone of Visual Influence: area within which a proposed development may have an influence or effect on visual amenity (The Landscape Institute and the Institute of Environmental Management and Assessment 2002).

B12.3 Existing Situation

B12.3.1 Policy Context and legislative Review

Cardno (2017b) includes a detailed assessment of the policy context for the assessment of the landscape and visual impacts of the CSD Project. This material is presented in **Appendix BA**. The matters discussed are:

- the Great Barrier Reef World Heritage Area and its Outstanding Universal Value
- the FNQ Regional Plan 2009-2031
- Cairns Regional Council's CairnsPlan 2016
- the Cairns Region Scenic Amenity Study (Cardno Chenoweth 2012).

While the material presented is too detailed to be included in this chapter, it is referred to below where relevant in regard to either the landscape and visual values of the Study Area, or the assessment of impacts.

B12.3.2 Regional Landscape Values

The Cairns Region in tropical north-east Queensland is a coastal band of varying width, framed by the mountains and rainforests of the Great Dividing Range (Macalister and Lamb Ranges) the Daintree in the north, and the Malbon Thompson, and Bellenden Ranges to the south, and the Coral Sea to the east (**Figure B12-1**. The Russell, Mulgrave, Barron, Mowbray and Daintree Rivers are the main river systems within the region with the Bloomfield River forming the northern boundary. To the east of the City of Cairns is the Murray Prior Range and the Malbon Thompson Range.

In between the mountain ranges and the shoreline, a narrow terrestrial band of fertile lowlands is intensively farmed, punctuated by mangrove inlets and headlands along the coastline, and by nodes of urban development. The city of Cairns is on the coast at Trinity Inlet, with its suburbs nestling in to the foothills of the Ranges to the west, while the Captain Cook Highway and the Barron Delta provide inter urban breaks between Cairns and the northern beach settlements.

Prior to European settlement, it is likely to have been a mosaic of lowland rainforest, wetlands and coastal dune vegetation, with much of the area periodically inundated. The mouth of the Barron River and other creeks would have been estuarine areas of mangroves, similar to parts of Trinity Inlet. These fertile low lying plains were suitable for agriculture and grazing, and early settlement was associated with clearing and drainage of extensive areas close to the growing towns and ports such as Cairns.

As the City of Cairns developed and expanded, several small coastal settlements to the north of the city grew in popularity as residential suburbs, driven by the desire for a beach lifestyle within easy driving distance to the City along the Captain Cook Highway. The city has also expanded westwards and northwest, and suburban development can be seen to nestle into the foothills of the ranges, evidence of people's desire to maximise views across the coastal plains to the waters of the Great Barrier Reef in the distance.

Expansion north is limited by the Barron Delta, which separates Cairns from its northern beach suburbs (Machans Beach to Palm Cove) with an interurban break of largely rural land. Similarly, to the south, the Mulgrave River provides another inter urban break separating the Cairns to Gordonvale conurbation and rural townships further south. Most of these inter urban breaks including the Barron Delta is dominated by rural production and cane, which still characterise the coastal plains in Far North Queensland. This combination of canelands set against a backdrop of rainforest and mountain ranges, coastline, rivers and creeks form particularly attractive patterns of rural and natural landscapes, and significantly contribute to the character and scenic landscape qualities of the region generally.

The region also offers a world-class scenic driving experience with panoramic views of the Coral Sea from many roads and lookouts along the Captain Cook and Kennedy Highways (to name a few) featuring ocean views on one side and rainforested mountains on the other, representing a unique juxtaposition of two World Heritage Areas – the Wet Tropics, and the Great Barrier Reef. This dramatic combination of geomorphology and rainforest creates a diverse and spectacular landscape, and a high scenic quality which contributes in part to its popularity as a major tourist and visitor destination in Far North Queensland.

B12.3.3 Landscape Character of Project Areas

B12.3.3.a Introduction

A landscape character and scenic amenity assessment was undertaken in the region as part of the Cairns Region Scenic Amenity Study (Cardno Chenoweth 2012). This identified places and features of regional significance in terms of their contribution to either scenic amenity or their character contribution to the identity of the region. As such it provides a critical basis of the landscape and visual values of the Study Area for this assessment.

Distinguishing features of the region include combinations of tropical-forested mountain ranges as a background 'frame' to the coastal plains, the river deltas and the tracts of caneland, and the iconic combination of white, sandy coastal beaches and the clear waters of the Great Barrier Reef. These characteristics (in combination with other more common character types such as 'urban' areas, grassy hillsides and lowland areas or watercourses) formed the base Landscape Character Types (LCTs) used in the 2012 study to help map and quantify the value or scenic preference of visual elements.

This study also identified the regional significance of views:

> …'of rural landscapes which also include canefields, rivers or coastline with forested hills in the background are also a distinctive and attractive combination. Places and features which show or help define these elements and their edges, such as gateways, lookouts and view corridors are significant for scenic amenity and character and require consideration in planning and development control.

A review of Cardno Chenoweth (2012) shows that the LCTs of the various project areas are as follow:

- Channel Project Area – mapped as 'Coast'
- Land-side Project Area – mapped as 'Urban'
- Northern Sands Project Area – mapped as 'Canefield' adjoining the 'Inland Creeks and Watercourses' LCT of the Barron River and Thomatis Creek
- Tingira Street Project Area – mapped as 'Urban'.

These are described in more detail below. See also **Section B12.3.4** for a more detailed discussion of Landscape Character Context of the original assessment units.

B12.3.3.b Channel Project Area

The shipping channel is within the designated Port Limits, within the boundary of the Cairns local government area, and is within the inshore waters of the GBRMP. Although the Scenic Amenity Study was mainly land-based, the shipping channel was included in the 'coast' land cover classification.

All coastal waters were categorised as having High Landscape Values.

B12.3.3.c Landside Project Area

As Strategic Port land, the Landside Works Project Area includes the land-based infrastructure areas of the fuel farm including tank infrastructure for the IFO, and was not identified as a valued landscape.

B12.3.3.d Northern Sands Project Area

The Northern Sands DMPA was mapped as 'Canefield' adjoining the 'Inland Creeks and Watercourses' LCT of the Barron River and Thomatis Creek.

At the broad mapping scale of the Scenic Amenity Study, the Northern Sands DMPA was identified as a part of the 'Gorges and Semi Secluded Valleys' LCT (and hence a 'significant landscape feature'). At a more site-specific scale, the crossing of the Captain Cook Highway over the Barron River was identified as a 'Gateway' of local significance. The Northern Sands DMPA was accordingly part of an area with High Landscape Values. However, this designation is due to the mapping scale and does not reflect the specific landscape characteristics of the site, as a disturbed site with a history of sand and gravel extraction, and landfill. The

nearby coastline and offshore waters are highly rated both as landscape features and in terms of scenic amenity values, and any offshore booster pumps, coastal earthworks or marine pipeline will potentially impact on these features depending on their form, proximity to the shoreline and visibility from the ocean.

B12.3.3.e Tingira Street DMPA

The Tingira Street DMPA is also Strategic Port Land, and was also categorised in the Scenic Amenity Study as part of the 'Urban' LCT. Although adjoining the 'Inland Creeks and Watercourses' of Smiths Creek, this DMPA was not *per se* identified as high or medium landscape value, nor as a valued landscape feature, although it is surrounded by the High Landscape Value areas of the waters of Trinity Inlet and the mangroves of Admiralty Island and around the tributaries of the surrounding waterways.

B12.3.4 Landscape Character Context

The project visual catchment comprises several Landscape Character Context areas as defined by Cairns Region Scenic Amenity Study (Cardno Chenoweth 2012):

- the Barron Delta (including the Barron River, the Captain Cook Highway, Smithfield and the cane farms)
- the Cairns coastline (including the whole coastline of the Study Area as well as Trinity Inlet, Smiths Creek, Admiralty Island, and the tributary creeks)
- the urban and industrial precincts of Cairns (including the CBD, suburbs and Port)
- offshore waters include the GBR as well as the inshore waters of Trinity Bay, offshore islands, and the mudflats fringing Cairns
- mountains and hillslopes include the Macalister, Lamb, and Malbon Thomson Ranges and Mt Whitfield.

These are shown on **Figure B12-3** and described below. Viewpoints are defined and discussed in **Section B12.3.8**.

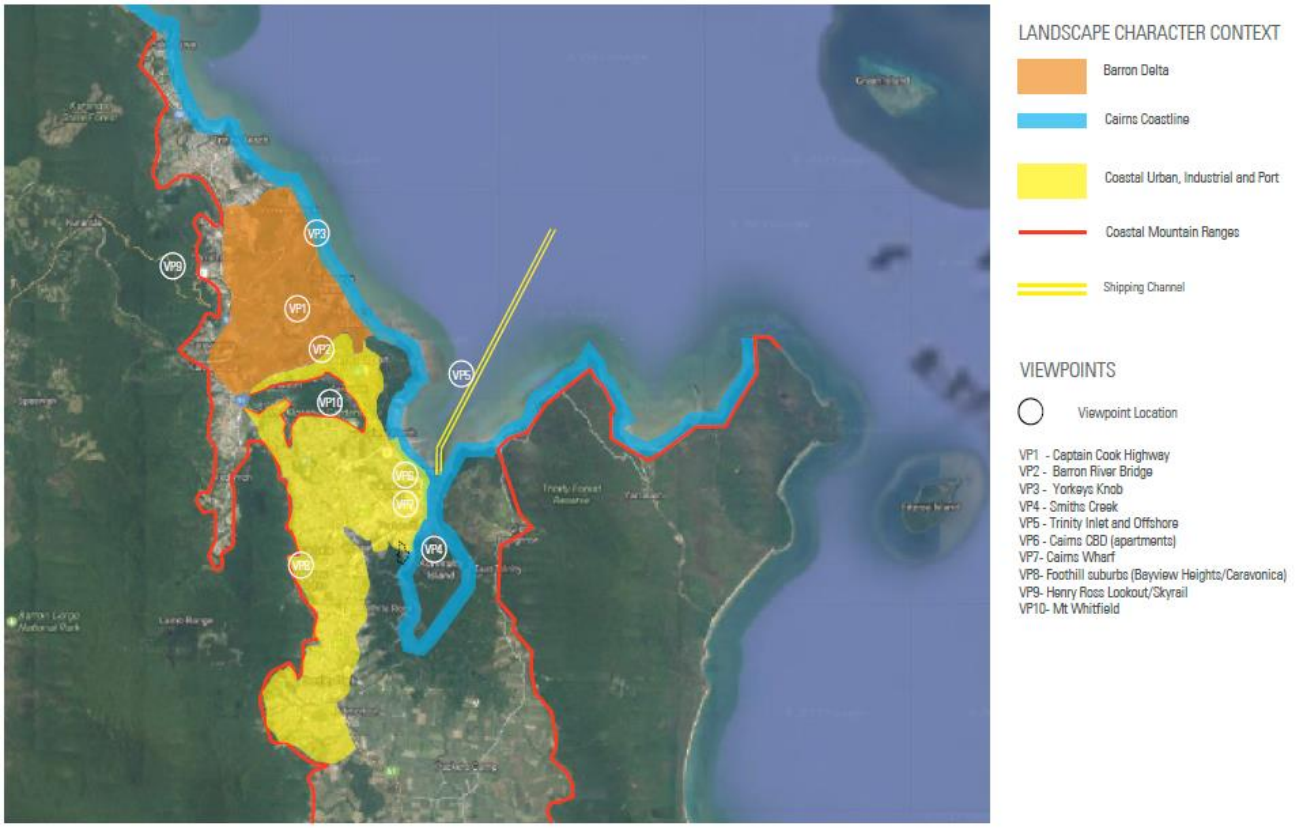

Figure B12-3 Landscape character context and viewpoints.

Source: Appendix B12-2 (Figure 4-1).

B12.3.4.a Barron Delta

This is relevant to the Northern Sands Project Area (i.e. DMPA and delivery pipeline corridor).

The Barron River is the largest river in the Cairns region, passing through the Barron Gorge to meet the sea south of Machans Beach 15 kilometres north of Cairns near the airport. The low-lying area around the Barron River and between the coastline and the Macalister Ranges is known as the Barron Delta, which provides an inter-urban break between Cairns and the northern beach settlements. The Barron Delta covers a large area from Kamerunga at the foot of the range, to the coastline between Yorkeys Knob in the north, and Ellie Point to the south. Thomatis Creek, a distributary of the Barron River), snakes across the Barron Delta in a north-easterly direction towards the coast, feeding into Richters Creek which joins with Yorkeys Creek and enters the Coral Sea between Holloways Beach and Yorkeys Knob.

The alluvial lowlands of the Barron Delta are typically characterised by rural production areas, specifically cane growing, but there are also a number of other commercial operations including the Ponderosa Prawn Farm, a Go-kart track, and sand and gravel extraction activities such as the Pioneer North Queensland facility and landfill operations at Barron Sands (Lemura Sand Co, Lake Placid Road), and the Northern Sands extraction and landfill area (the site of the Northern Sands DMPA).

The scenic qualities of the distinctive cane fields along the Delta contribute to the iconic character and appeal of the region generally (**Photo B12-1** and **Photo B12-2**) with sprawling farm houses and sheds associated with the landscape character of the area. On higher ground, pockets of urban development have proliferated along the foothills of the hillslope suburbs of Stratford, Freshwater, and Caravonica affording long views over the coastal plains of the Delta. The riparian vegetation along the banks of the Barron River includes tall littoral rainforest in parts, and helps to trace the meandering course of the river from long distance views. The broad flat expanse of the Barron Delta, and its pattern of existing land uses, is best appreciated from elevated viewpoints such as Skyrail, as well as from aircraft approaching or departing Cairns Airport and is also visible from Henry Ross Lookout on the Kuranda Range on a clear day.

Photo B12-1 View over the Delta from Kuranda track (arrow indicates existing Pioneer Quarry and Lemura operations).
Source: Cardno (2016) Plate 1. Northern Sands DMPA not in frame.

Photo B12-2 Canefields in the Barron Delta with Barron Gorge in the background.

Source: Cardno (2016) Plate 2.

B12.3.4.b Cairns Coastline

This is relevant to the delivery pipeline corridor component of the Northern Sands Project Area and to a lesser extent the Tingira Street Project Area.

The Cairns coastline includes Trinity Inlet (and creek tributaries), the inshore waters of Trinity Bay, islands, and the mudflats fringing Cairns, as well as offshore and GBRWHA waters.

The estuarine fringe of Trinity Inlet and its tributaries defines the edge between land and water and separates the city of Cairns from East Trinity and Yarrabah. Mudflats and mangroves characterise the Inlet at low tide and form a distinctive view from the city, while the Murray Prior Range and the Malbon Thompson Range, including May Peak, provides a landmark frame for the waterway.

B12.3.4.c Cairns Urban, Industrial and Port

This is relevant to the Landside Works Project Area and Tingira Street Project Area.

The coastal suburb of Portsmith runs along the western side of Trinity Inlet and its tributary creeks. Only patches of riparian vegetation remain along the western edge of Trinity Inlet and Smiths Creek, which is typically characterised by port and industrial marine buildings and structures including wharves, warehouses, boat ramps and other hardstand areas. Portsmith features a mix of old and new industrial estates as well as Strategic Port Land designations, and includes the historic Cairns Port wharves as well as the recent construction of large new warehouses in Redden and Walter Streets, and parts of Tingira Street. Maritime industries include a range of low to high impact activities, such as boat building and fisheries support, seafood distribution, steel manufacturing, and cargo. A variety of marine vessels can be seen berthed or in transit along the waterways, including cruise ships, navy boats, and commercial fishing and tourist boat operations, as well as the many recreational fishing boats and moored yachts.

While parts of Portsmith are seen mainly from boats along Trinity Inlet or its tributary creeks, other parts can be seen from elevated buildings in the Cairns CBD and potentially from large cruise liners docked at the Cairns Wharf. Elevated views take in an expansive panorama overlooking the Inlet and the mangroves, with the warehouses of Portsmith beyond and the mountains behind, while moored boats in the Inlet contribute to tropical landscape character and scenic appeal.

B12.3.4.d Coastal Mountain Ranges

This is not relevant to any project area although the adjacent coastal mountain ranges do contain some vanatge points.

The Cairns region is characterised by its tropical mountain ranges, which define and separate geographical and visual catchments between the coast and the hinterland and forms a prominent backdrop to the city. The coastal mountain ranges include the Macalister and Lamb Ranges, the Malbon Thomson Range (**Photo B12-3**), and Mt Whitfield. A number of viewing opportunities are available from scenic route sections, including designated lookouts offering panoramic views of the region and the offshore waters of the Great Barrier Reef.

Photo B12-3 View over Cairns Port to False Cape and Malbon Thomson Range.
Source: Appendix B12-2 (Figure 4-2).

B12.3.4.e Great Barrier Reef World Heritage Area

Not included in the Landscape Character Context areas (**Figure B12-3**) is the GBRWHA. This is relevant to the Channel Project Area.

The Great Barrier Reef and its waters are among the most aesthetically scenic natural areas in the world, as summarised in the GBRWHA citation:

> The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth. It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast. From the air, the vast mosaic patterns of reefs, islands and coral cays produce an unparalleled aerial panorama of seascapes comprising diverse shapes and sizes.

As detailed further in **Section B12.3.10.e**, there are seven Criterion (vii) attributes recorded in the World Heritage citation of the Great Barrier Reef (GBRMPA 2011). However these attributes and features of the GBRWHA are present in the Trinity Bay project area to only a limited extent, if at all, as discussed in **Section B12.3.10.e**.

B12.3.5 Scenic Amenity

Scenic amenity (SA) is a combination of visual exposure and scenic preference. In terms of the Cardno Chenoweth (2012) Scenic Amenity ratings:

- The Northern Sands DMPA site is assessed and mapped as low scenic amenity (Rating 1-5), notwithstanding that the Barron Delta was modelled as having generally high visual exposure. However this is misleading as the 2012 visual exposure modelling was based on topography alone (the DTM used in 2012 did not include trees and vegetation), and conservatively modelled the flat delta area close to the Captain Cook Highway as highly visible. Field survey confirms that most long views from the highway across the delta (and indeed Northern Sands) are screened by roadside vegetation, except for a gap at the entrance, and some opportunistic glimpses through planting.
- The Tingira Street DMPA site, on the other hand, is not regionally significant in terms of its scenic amenity and landscape character. The site is assessed and mapped as low scenic amenity (rating 2) and low scenic preference (rating 2-3), notwithstanding that the area was similarly modelled in the Scenic Amenity Study as having very high visual exposure. The surrounding mangroves and Admiralty Island and in- and offshore waters are highly rated both in terms of scenic amenity and as valuable landscape features.
- The Scenic Amenity study also identified regionally significant scenic routes (including parts of the Captain Cook Highway) and also important 'gateways' (such as the Barron River bridge), but the DMPAs do not form part of any designated scenic route.

B12.3.6 Viewer Groups

The viewer groups potentially affected by the proposed developments comprise mainly residents of Cairns, recreational users, and visitors to the region, with the latter including tourists travelling by road, rail, air or sea.

Community appreciation of scenery (both landscape and seascape) is based largely on the extent, diversity, integrity and naturalness of landscape features and characteristics visible from public viewpoints (such as lookouts, parks and beaches), tourist or recreation sites, or while travelling. While landscape appreciation from private residences is also important, the location of the proposed shipping development project areas limits the number of nearby residents likely to be affected. Assessment of views from private residences has not been undertaken for this assessment, but the visual impacts will generally be similar to those from public viewpoints.

The visibility of the CSD Project has been assessed by adopting a view corridor approach (based on points located within the site) in addition to analysing the viewsheds of selected viewpoints, such as from important view corridors, scenic route sections or sensitive receptors.

B12.3.7 Visibility

B12.3.7.a Viewshed Modelling and View Corridors

The selection of an appropriate methodology has been influenced by the scope of the CSD Project and the characteristics of the placement sites and surrounding topography. The two DMPAs are low and flat, adjoining watercourses in rural or industrial areas, and separated from residential areas. In terms of sensitive visual receptors (major roads, public areas, tourist places and residences) there are several elevated places which will have views over either Northern Sands or Tingira Street. Elevated lookouts such as from Skyrail and Henry Ross Lookout will have views over Northern Sands (the Tingira Street DMPA is unlikely to be visible), while some of the taller buildings in the Cairns CBD might have views to Tingira Street, and taller cruise ships docked at the wharf might also have views (depending on their size).

Planes either departing from or arriving at Cairns Airport will invariably have views to all project elements, including the dredging operation itself given the close proximity of the airport to all project areas.

However, the visibility of the DMPAs from land-based viewpoints generally depends on intervening hills, buildings and/or vegetation. Such lines of sight are more effectively analysed by a view corridor approach, in addition to analysing the viewsheds of selected viewpoints.

The above approach is similar to that undertaken for the Draft EIS landscape and visual assessment, and relies on preliminary desktop analyses in identifying the visibility and visual sensitivity of the project sites and receptors. However, the availability of Light Detection And Ranging (LiDAR) data for this study enables mapping of areas within view of the project sites, and areas within important view corridors, through digital contour information to prepare a Digital Surface Model (DSM) of the project sites and the Cairns Region. A DSM uses a combination of LiDAR, Digital Elevation Models (DEM) and Digital Terrain Models (DTM) derived from 10 m and 5 m contours.

The DSM includes both terrain plus heights of vegetation and buildings (see **Figure B12-4**) and provides a more accurate model for viewshed and other mapping than the Draft EIS assessment.

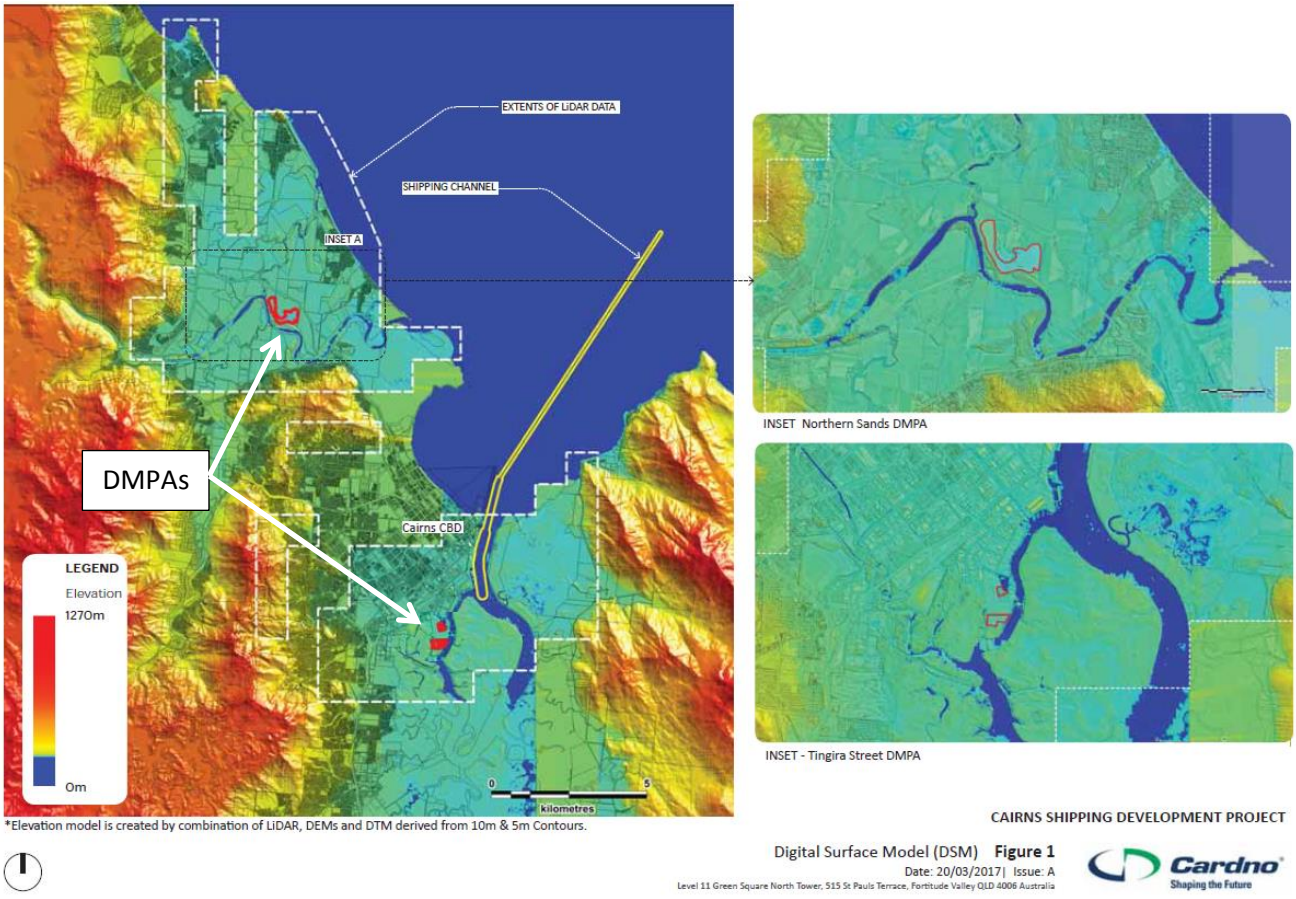

Figure B12-4 Digital Surface Model.

Source: Appendix BA (Figure 1). For a larger version of this figure refer to Appendix B of **Appendix BA**.

B12.3.7.b Zone of Visual Influence

Visibility is a key consideration in assessing the sensitivity of a site to development or change, and the visual impacts of developments. Preliminary desktop assessment of places within view of the project sites (by topographic maps and air-photos) was followed by Zone of Visual Influence (ZVI) modelling and field verification as seen from roads and selected viewpoints. ZVI maps areas within view of the existing sites and the proposed project within a DSM of the Cairns Region.

The ZVI models a number of 'visibility points' placed virtually on each component of the project (e.g. a bund, a building, or a ship). The ZVI map for each project component shows, by graded colours, the proportion of development visible from different parts of the surrounding areas (refer to Appendix B of **Appendix BA**). During impact assessment, care was taken to distinguish impacts during the construction and operation phases.

B12.3.8 Viewpoints

Viewpoints selected were from the ZVI mapping (**Figure B12-3**) as shown in **Table B12-2**. These were inspected and photographed as reference points for viewshed assessment, sampling the direction and distance of affected views. Archived photographs from previous studies in the region were also relied upon including from offshore tourist ferry routes to Green Island, from the Kuranda train, Skyrail and aerial photos from aircraft flying into or out of the Cairns airport.

Although the ToR (s.5.2.2) requires assessment from private residences, preliminary modelling and inspections indicated that the selected viewpoints from public places also represented views of importance or sensitivity with respect to residential areas. While there are several residences with potential views to a DMPA or ships (or both), views from nearby roads were selected and photographed as representative of such views.

TABLE B12-2 VIEWPOINTS

Landscape Character Context	Viewpoints
Barron Delta	VP1 Captain Cook Highway VP2 Barron River Bridge
Cairns Coastline	VP3 Yorkeys Knob VP4 Smiths Creek VP5 Trinity Inlet and Offshore
Cairns Urban, Industrial and Port	VP6 Cairns CBD (apartments) VP7 Cairns Wharf VP8 Foothill Suburbs – Bayview Heights/Caravonica
Coastal Mountain Ranges	VP9 Henry Ross Lookout/Skyrail VP10 Mt Whitfield

Source: Appendix BA (Table 2-1).

No specific GBR viewpoints were selected. Refer to **Section B12.3.10.e** for a discussion on the appropriate assessment of landscape and visual aspects of the GBRWHA.

B12.3.9 Visual Sensitivity

The 'visual sensitivity' of affected areas, in the sense used by in the 2014 EIS (i.e. National, State, Regional, Local or Neighbourhood), refers to the number of viewers, the duration of their views, and their expectations of scenic significance. This is assessed in **Section B12.3.10** for each of the selected viewpoints.

B12.3.10 Viewpoints and Context

The 10 viewpoints identified in Figure B12-3 and grouped according to Landscape Character Context, have been selected on the basis of ZVI modelling, which indicates potential areas of visibility.

B12.3.10.a Barron Delta

Aerial view of Barron Delta and the Barron River

Rural land uses

Cane lands and farms form part of the land use mosaic of the Delta

Existing Context

The Barron River Delta includes low-lying coastal plains dominated by floodplains, waterways, wetlands and extensive cane fields, and traversed by the Captain Cook Highway. Urban development is contained in precincts such as Smithfield, and northern beach suburbs of Machans Beach, Holloways Beach and Yorkeys Knob.

Visual Features

> Wetlands adjacent to coastline and waterways
> Broad flat Barron Delta floodplain with cane fields
> Clusters of quarries, areas of extraction
> Views framed by forested Kuranda Range (west) and Malbon Thomson Range (south east)

Key Viewing Locations

> Scenic route sections along Highway
> Gateway locations: Barron River bridge and Thomatis Creek

Nominated Viewpoints

> VP1 - Captain Cook Highway
> VP2 - Barron River Bridge

At Night

Low district brightness area

> Predominantly dark, scattered lights from ships
> Northern Beaches suburban lights

Visual Sensitivity

> The coastal plains are an important landscape feature in the region. Overlooked by the Macalister and Lamb Ranges, the flat, low-lying floodplains of the Barron Delta are moderately to highly generally sensitive to change, in that new built form is visible from the Macalister and Lamb Ranges, although existing development, extractive industries, and changes are part of the existing mosaic of land use.

B12.3.10.b Cairns Coastline

View south east from Holloways Beach

Smiths Creek

Location of existing channel beacons

Existing Context

The Cairns coastline is characterised by a combination of natural features, including mudflats, sandy beaches and mangroves, and urban pockets, such as the coastal settlements of the northern beach suburbs.

The waters of Trinity Inlet and Trinity Bay are defined by the mangroves fringing the eastern side of the Inlet and East Trinity and form the inshore waters of the Great Barrier Reef.

Visual Features

- Trinity Inlet and the inshore and offshore waters of Trinity Bay and the GBR
- Significant mangroves fringing the coastal edge with isolated sections of beach on Pine Creek Road
- The forested mountains form a dominant backdrop from many view angles.
- Recreational, fishing and commercial vessels as well as cruise ships, navy ships, cargo ships, reef fleet and barges

Key Viewing Locations

- Views from the CBD and Esplanade.
- Views from beaches and offshore from boats

Nominated Viewpoints

- VP3 - Yorkeys Beach
- VP4 - Smiths Creek
- VP5 - Trinity Inlet and Offshore

At Night

Varies:

CBD Esplanade and Port brightly lit; Northern Beaches and airport area with nodes of coastal lights;

Trinity Bay is intrinsically dark apart from navigation beacons and lights from recreation, fishing and commercial vessels

Visual Sensitivity

Cairns' coastline and its northern beaches make significant contribution to the character of the city and region, and accessible parts of the coast are of regional sensitivity. The view is an essential part of the experience of Cairns as a 'gateway' and highly valued by residents and tourists.

Trinity Bay, in common with all coastal waters below low water, and most estuarine inlets, is a part of the GBR World Heritage Area.

B12.3.10.c Cairns, Industrial and Port

Cairns Esplanade

Views from apartments

View towards Wharf (April 2017) with 'Rhapsody of the Sea' berthed

View towards fuel tanks from Kenny Street (ARUP)

Existing Context

Cairns is characterised by both natural and man-made features including the CBD and the mudflats along the Cairns Esplanade. The man-made features include the strong grid of wide streets, examples of regional architecture, both historic and contemporary, and the Esplanade parkland.

Suburban Cairns extends along a linear corridor defined by the mountain ranges and the coastline, and include North Cairns, and industrial suburbs such as Portsmith-Woree and hillslope suburbs such as Bayview Heights, Freshwater, Edge Hill, Kanimbla and the lower slopes of Mt Whitfield.

The Port and airport are included within this context area. Significant mangrove areas are present along the airport and port edges

Visual Features

> Established residential communities;
> Urban area with a strong grid of wide streets, historic and contemporary architecture
> The Port of Cairns and major rail and road freight terminals;
> Fuel tanks and other wharf side industry
> HMAS Cairns ships
> Recreational, fishing and commercial shipping
> Cairns International Airport
> Cruise ships, reef fleet and fishing vessels at berth

Key Viewing Locations

> Cairns Esplanade Parkland
> Cairns Wharf boardwalk
> Views from hotels and apartments

Nominated Viewpoints

> VP6 - Cairns CBD (apartments)
> VP7 - Cairns Wharf
> VP8 - Foothill Suburbs - Bayview Heights/Caravonica

At Night

High district brightness areas

> Lights from recreational fishing, commercial vessels and boats moored within Trinity Inlet
> Lighting along Esplanade frontage and parkland
> Street lighting along surrounding roads, including Esplanade and Wharf Street
> Lighting from high rise residential and commercial buildings
> Lighting from cruise ships and fishing vessels at berth
> Lighting from wharf side industrial activity

Visual Sensitivity

This viewpoint is considered to be of local visual sensitivity

B12.3.10.d Coastal Mountain Ranges

View from Henry Ross Lookout

View of Cairns with mountain backdrop from Trinity Bay

Existing Context

The Cairns region is characterised by its forested mountain ranges, and forms an iconic backdrop to the city and suburbs including from offshore views looking back to the mainland.

The coastal mountain ranges include the Macalister and Lamb Ranges, the Malbon Thomson Range, and smaller peaks such as Mt Whitfield. The high elevation of these ranges offer a number of viewing opportunities, from informal walking tracks, scenic route sections of roads, or designated lookouts offering panoramic views of the region and the offshore waters of the Great Barrier Reef.

Visual Features

> Natural, forested and undisturbed upper hillslopes, with treed ridgelines ('skylines')
> Lower foothills are characterised by urban sprawl and residential development of Cairns (with the exception of the Yarrabah Malbon Thomson Range)
> May Peak forms a prominent part of the Malbon Thomson Range, as seen from Cairns CBD, Esplanade and apartments, across Trinity Inlet.

Key Viewing Locations

> Henry Ross lookout (Macalister Range)
> Red and Blue Arrow Circuits (Mt Whitfield)
> Ivans Evan Walk (Ellen Close Reserve, part of Lamb Range)
> No known viewing locations from Malbon Thomson Range

Nominated Viewpoints

> VP9 - Henry Ross Lookout/Skyrail
> VP10 - Mt Whitfield

At Night

Low district brightness area

> Predominantly dark
> Scattered lights from residences

Visual Sensitivity

Views from Henry Ross Lookout and Skyrail are experienced daily by tourists and visitors, as well as by locals, and are regionally sensitive viewpoints; as is Mt Whitfield.

B12.3.10.e Great Barrier Reef World Heritage Area

The assessment of the values of the GBRWHA differs from that used for the terrestrial aspects of the CSD Project and is based on the concept of Outstanding Universal Value (OUV) as discussed below. While the Cairns Port area and the shipping channel are excluded from the Great Barrier Reef Marine Park, in the vicinity of the Study Area the GBRWHA generally lies seaward of low water, although it also includes all internal waters of the state and, of relevance to the CSD Project, follows low water up Richters and Thomatis Creeks, the Barron River, and Trinity Inlet to the low water mark. Regarding the various Project Areas:

- at the Northern Sands DMPA, the WHA runs up the Barron River to just opposite the south-west corner of the site (approximately 16.863085° S 145.718511°W)
- the pipeline crosses the WHA at the mouth of Richters Creek and again near the confluence of Richters Creek and Thomatis Creek
- at the Tingira St DMPA, the WHA runs immediately adjacent to the site at low water.

In addition, parts of the Cairns area also seen by World Heritage Area visitors, hence the aesthetic attributes which contribute to its OUV are relevant considerations.

The UNESCO (2015) Guidelines define the concept of OUV as 'cultural and/or natural significance, which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity.' The concept of OUV underpins the World Heritage Convention which:

> … provides the basis for listing properties on the World Heritage List and protecting and managing World Heritage properties. Broadly, the meaning of Outstanding Universal Value follows the common sense interpretation of the words:
>
> - Outstanding: For properties to be of outstanding universal value they should be exceptional, or superlative – they should be the most remarkable places on Earth.
> - Universal: Properties need to be outstanding from a global perspective. World Heritage does not aim to recognise properties that are remarkable from solely a national or regional perspective. Countries are encouraged to develop other approaches to recognise these places. Australia does this through National Heritage listing.
> - Value: What makes a property outstanding and universal is its 'value', or the natural and/or cultural worth of a property. This is based on standards and processes established under the World Heritage Convention's Operational Guidelines.' (p4).

The Great Barrier Reef has been World Heritage-listed because it meets all four of the natural environment criteria, namely:

- (vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance
- (viii) be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features
- (ix) be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals
- (x) contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

The seven Criterion (vii) attributes recorded in the World Heritage citation of the Great Barrier Reef (GBRMPA 2011) are that *The Great Barrier Reef provides some of the most spectacular scenery on earth and is of exceptional natural beauty. The World Heritage values include:*

1. *The vast extent of the reef and Island systems which produces an unparalleled aerial vista:*

   The vast mosaic patterns of reefs, islands and coral cays produce an unparalleled aerial panorama of seascapes comprising diverse shapes and sizes. It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast;

2. *Islands ranging from towering forested continental Islands complete with freshwater streams, to small coral cays with rainforest and unvegetated sand cays:*

   The rugged vegetated mountains and lush rainforest gullies that are periodically cloud-covered on Hinchinbrook Island;

3. *Coastal and adjacent Islands with mangrove systems of exceptional beauty:*

   The vast mangrove forests in Hinchinbrook Channel;

4. *The rich variety of landscapes and seascapes including rugged mountains with dense and diverse vegetation and adjacent fringing reefs:*

   The Whitsunday Islands provide a magnificent vista of green vegetated islands and spectacular sandy beaches spread over azure waters;

5. *The abundance and diversity of shape, size and colour of marine fauna and flora in the coral reefs:*

   Superlative natural beauty above and below the water. Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours; for example, spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes. Other superlative natural phenomena include the annual coral spawning. The internationally renowned Cod Hole near Lizard Island is one of many significant tourist attractions;

6. *Spectacular breeding colonies of seabirds and great aggregations of over-wintering butterflies:*

   On some continental islands, large aggregations of over-wintering butterflies periodically occur;

7. *Migrating whales, dolphins, dugong, whale sharks, sea turtles, seabirds and concentrations of large fish:*

   Other superlative natural phenomena include the migrating whales, nesting turtles, and significant spawning aggregations of many fish species. On many of the cays there are spectacular and globally important breeding colonies of seabirds and marine turtles, and Raine Island is the world's largest green turtle breeding area.

The seven aesthetic attributes and their presence or representation in GBRWHA waters in the CSD Project viewshed are addressed in **Table B12-3**.

TABLE B12-3 GBRWHA AESTHETIC ATTRIBUTES REPRESENTED NEAR THE CSD PROJECT

GBRWHA AESTHETIC ATTRIBUTES	REPRESENTATION IN THE CSD PROJECT AREA
1. The vast extent of the reef and Island systems which produces an unparalleled aerial vista:	There are no aerial vistas of reef and lagoon systems in or near Trinity Bay which could potentially be visually impacted by the CSD Project. The closest reefs which form the distinctive Great Barrier Reef patterns of reefs, lagoons and passages occur 25 to 30 km offshore, extending from Green Island northwards to Batt Reef.
2. Islands ranging from towering forested continental Islands complete with freshwater streams, to small coral cays with rainforest and unvegetated sand cays:	There are no islands immediately offshore, and the closest island is Fitzroy Island (approximately 9 km away) and Green Island (25 km distance). Ferries transport tourists and GBRWHA visitors to these two islands to appreciate the scenery and underwater experiences associated with GBRWHA islands.
3. Coastal and adjacent Islands with mangrove systems of exceptional beauty:	The extensive Trinity Inlet mangroves are representative of this OUV attribute (as well as being part of the landscape character of Cairns), and the regenerating and established mangroves along Smiths Creek and Admiralty Island are protected in the Estuarine Protection Zone of the Great Barrier Reef Coast Marine Park (Qld). However, given the level of disturbance and discontinuous distribution of mangroves in the Portsmith area generally, the mangrove system on the Tingira Street DMPA is disturbed and poorly representative of Attribute 3.
4. The rich variety of landscapes and seascapes including rugged mountains with dense and diverse vegetation and adjacent fringing reefs:	The flat landforms of the Cairns Port area and the two DMPAs, the lack of dense rainforest or diverse native vegetation, and the absence of fringing reefs indicate that Attribute 4 is not represented at the CSD Project sites.
5. The abundance and diversity of shape, size and colour of marine fauna and flora in the coral reefs:	The near-shore waters of Trinity Bay and Trinity Inlet do not support coral reefs, and are often naturally turbid due to tidal and current movement. These inshore waters include some diversity of marine fauna, but are not comparable to the abundance and diversity associated with GBRWHA coral reefs.
6. Spectacular breeding colonies of seabirds and great aggregations of over-wintering butterflies:	There are no known breeding colonies of seabirds or known aggregations of butterflies recorded on or near the CSD Project sites. While Trinity Inlet does provide habitat for seabirds and butterflies, the Tingira Street DMPA is a previously cleared site and the proposed works will not impact on habitat to a significant degree.
7. Migrating whales, dolphins, dugong, whale sharks, sea turtles, seabirds and concentrations of large fish:	Marine megafauna and large fish are most likely present in Trinity Bay, and Trinity Inlet near the port, and to that extent the CSD Project area is fairly representative of other inshore waters along the North Queensland coastline i.e. Attribute 7 of the OUV may be present, but to no greater extent than any other coastal and estuarine waters.

Source: Appendix BA (Table 6-1).

As indicated in **Table B12-3**, the parts of Trinity Bay and the Cairns coastline likely to be visually affected by the CSD Project have few if any of the attributes which contribute to the aesthetic OUV of the GBRWHA. Visitors seeking to experience the world-class outstanding scenery of the Great Barrier Reef (both above and below the surface of the ocean) travel from Cairns to the islands and coral reef lagoons further east. En route, they generally pass across Trinity Bay, which thereby forms part of the experience.

In the Cairns region, the iconic coral reefs and marine life of the Great Barrier Reef are experienced by (and presented to) tourists and World Heritage visitors mainly at offshore facilities such as Green Island, at several reef lagoons and on boats. The mainland is not part of the GBRWHA but forms a background element in the viewshed and experience of World Heritage visitors, seen from the ferry routes to the island and reef tourist attractions; and the Cairns waterfront is the gateway to the Great Barrier Reef. In this context, the CSD Project areas make little or no contribution to the World Heritage experience, although certain elements may be visible from offshore, and the DMPAs will be visible from mainland viewsheds or lookouts which include the GBRWHA waters of Trinity Bay.

B12.4 Assessment of Potential Impacts

B12.4.1 Impact Assessment Methodology

B12.4.1.a Risk-based Assessment

The following impact assessment has been undertaken for each of the matters described in the previous chapter. It uses the risk-based process adopted for the Revised Draft EIS as outlined in **Chapter A1** (Introduction) and includes an assessment of the following:

- the magnitude of impacts (consequence) (**Table B12-4**)
- the duration of impact (from **Chapter A1** (Introduction)
- the likelihood of impact (from **Chapter A1** (Introduction)
- risk level (from **Chapter A1** (Introduction).

These are considered together to determine the final level of impact risk, which is described in **Table B12-8**.

B12.4.1.b Impact Significance / Consequence Criteria

Impact consequence criteria are different for each matter under discussion. **Table B12-4** shows the criteria used for this chapter.

TABLE B12-4 IMPACT CONSEQUENCE CRITERIA

IMPACT CONSEQUENCE	DESCRIPTION OF SIGNIFICANCE
Very High	Catastrophic, Irreversible, Permanent Complete variance with the landform, scale and pattern of the landscape Permanent significant change to a very high quality landscape diminishing its quality and associated national or state visual sensitivity Bright lighting which permanently changes observer experiences of a previously-dark nightscape over an extensive area
High	Major, Long-term Considerable variance with the landform, scale and pattern of the landscape Substantially damaging to a high quality landscape diminishing its quality and associated national or state visual sensitivity Bright lighting which periodically (or for a limited period, or over a limited area) changes observer experiences of a previously-dark nightscape
Moderate	Moderate, Medium term Out of scale with the landscape and at odds with the current landform Adverse impact on a landscape of recognised quality Bright lighting which changes a previously-dark or poorly-lit nightscape in a localised area, or for a limited number of observers
Minor	Minor, Short Term, Manageable Minor impact on the current landscape and landform Minor impact on a landscape of recognised quality Noticeable change in the brightness or lit extent of areas previously enjoyed as dimly lit
Negligible	Temporary, Insignificant, Manageable Complements the scale, landform and pattern of the existing landscape. No perceivable change to the existing landscape character or night-time lighting No perceivable adverse or beneficial change is likely to be perceived by viewers

IMPACT CONSEQUENCE	DESCRIPTION OF SIGNIFICANCE
Beneficial	Impacts have a positive outcome on the existing situation. This could include, for example, an improvement in scenic amenity.

Source: Appendix BA (Table 5.1) – adapted from Guidelines for Landscape and Visual Impact Assessment (The Landscape Institute and the Institute of Environmental Management and Assessment 2002).

B12.4.1.c Duration of Impacts

Table B12-5 shows the general approach to classifying the duration of identified impacts.

TABLE B12-5 CLASSIFICATIONS OF THE DURATION OF IDENTIFIED IMPACTS

RELATIVE DURATION OF IMPACTS	
Temporary	Days to months
Short Term	Up to one year
Medium Term	From one to five years
Long Term	From five to 50 years
Permanent / Irreversible	In excess of 50 years

B12.4.1.d Likelihood of Impact

Likelihood of impact is described in **Table B12-6** below.

TABLE B12-6 LIKELIHOOD OF IMPACT

LIKELIHOOD OF IMPACT	RISK PROBABILITY CATEGORIES
Highly Unlikely	Highly unlikely to occur but theoretically possible
Unlikely	May occur during construction of the project but probability well below 50%; unlikely, but not negligible
Possible	Less likely than not but still appreciable; probability of about 50%
Likely	Likely to occur during construction or during a 12 month timeframe; probability greater than 50%
Almost Certain	Very likely to occur as a result of the proposed project construction and/or operations; could occur multiple times during relevant impacting period

B12.4.1.e Risk Matrix

Risk is described as the product of likelihood and consequence as shown in **Table B12-7** below.

TABLE B12-7 RISK MATRIX

LIKELIHOOD	CONSEQUENCE				
	Negligible	Minor	Moderate	High	Very high
Highly Unlikely/ Rare	Negligible	Negligible	Low	Medium	High
Unlikely	Negligible	Low	Low	Medium	High
Possible	Negligible	Low	Medium	Medium	High
Likely	Negligible	Medium	Medium	High	Extreme
Almost Certain	Low	Medium	High	Extreme	Extreme

B12.4.1.f Risk Rating

The rating of risk as assessed above is as shown in **Table B12-8** below for the topics covered by this chapter.

TABLE B12-8 RISK RATING LEGEND

RISK RATING	DESCRIPTION
Extreme Risk	The project is not to be undertaken without extensive mitigation measures in place prior to the commencement of works with controls maintained during construction and/or operation phases
High Risk	Significant mitigation measures need to be implemented before works commence and are to be maintained during construction and/or operation
Medium Risk	Requires project-specific measures to mitigate and manage impacts
Low Risk	Manageable by standard mitigation and operating procedures
Negligible Risk	No impact mitigation or management required
Beneficial	Likely to result in a net benefit (to landscape and visual values)

B12.4.1.g Risk Assessment

The detailed risk assessment is included in **Section B12.6** (**Table B12-10**) along with the results of mitigation.

B12.4.1.h The Role of Mitigation

The theoretical role of mitigation is described in **Section B12.5.1.a** while specific recommendations are included in **Table B12-10** along with the expected effect on the level of risk.

Certain actions (i.e. such as rehabilitation of cleared areas and standard construction management) are assumed to be in-scope (i.e. not a mitigation recommendation). See 'Assumptions' below.

B12.4.2 Assumptions

The following assumptions are used for the impact assessment process (not all of these are relevant to landscape and scenic issues):

- The marine pump out facility and mooring (and marine booster if required) will be located in deep water at the end of the delivery pipeline corridor as shown on **Figure B12-1**.
- The location of the Northern Sands DMPA, inlet and tailwater pipelines, and tailwater ponds will be micro-located to minimise the requirement to clear any native vegetation.
- The booster pumps and laydown areas associated with the inbound pipeline are located in areas with no natural vegetation (e.g. agricultural areas), and therefore have no direct impact on terrestrial ecology values.
- The maximum clearing width for both the inlet pipeline and the tailwater discharge outlet pipeline is 10 m (this will be minimised where possible).
- Areas of disturbance will be rehabilitated following decommissioning of the pipelines, meaning that any impacts will not be permanent. This is in-scope (i.e. not a mitigation recommendation).
- Standard construction management will be undertaken. This is in-scope (i.e. not a mitigation recommendation).
- There will be a 20 m buffer between the edge of the bunds and the mangrove vegetation at Tingira Street study area.
- End uses are as described in Sections **B12.1.3** and **B12.1.3.e**. These are critical to an appreciation of impacts.

B12.4.3 Visibility of the CSD Project

The following section provides an assessment of the visual impacts arising from the construction and operation of the CSD Project and/or the proposed DMPAs both during the day and night time operations. This impact assessment uses a viewpoint-based approach, identifying key viewpoint locations to determine the potential impacts on surrounding visual amenity. These views represent publicly accessible viewpoints from a range of locations and viewing situations. Particular attention was paid to coastal areas, scenic viewing locations, and places where viewers are expected to congregate such as lookouts, or scenic routes. Other areas or potentially sensitive receptors identified as being within view based on the ZVI modelling for the existing situation have also been selected for detailed assessment.

B12.4.3.a Shipping Channel and Ships

The visibility of the CSD Project to external viewers is modelled as a ZVI (**Figure B12-5** to **Figure B12-7** and Appendix B of **Appendix BA**). The visibility of large ships is modelled by 'extruding' (raising) the channel area to a height of either 52m (the height of *Legend of the Seas* which is the largest ship that currently uses the existing channel) or 63 m (the *Voyager of the Seas*, the largest ship proposed to use the channel in future). The visibility of dredges and the dredge mooring point during the construction phase was not separately modelled, but the ZVI will be a small proportion of the ZVI of a 52 m high ship.

Three further ZVIs have been produced representing cruise ship movements from three locations along the channel, the outer channel, middle of the channel and the inner channel. The visibility of a 63 m high ship (future) has been compared to that of the existing baseline situation (a 52 m high ship). The ZVIs model the extent of proposed change in ship size and visibility likely to facilitate to be facilitated by the CSD Project.

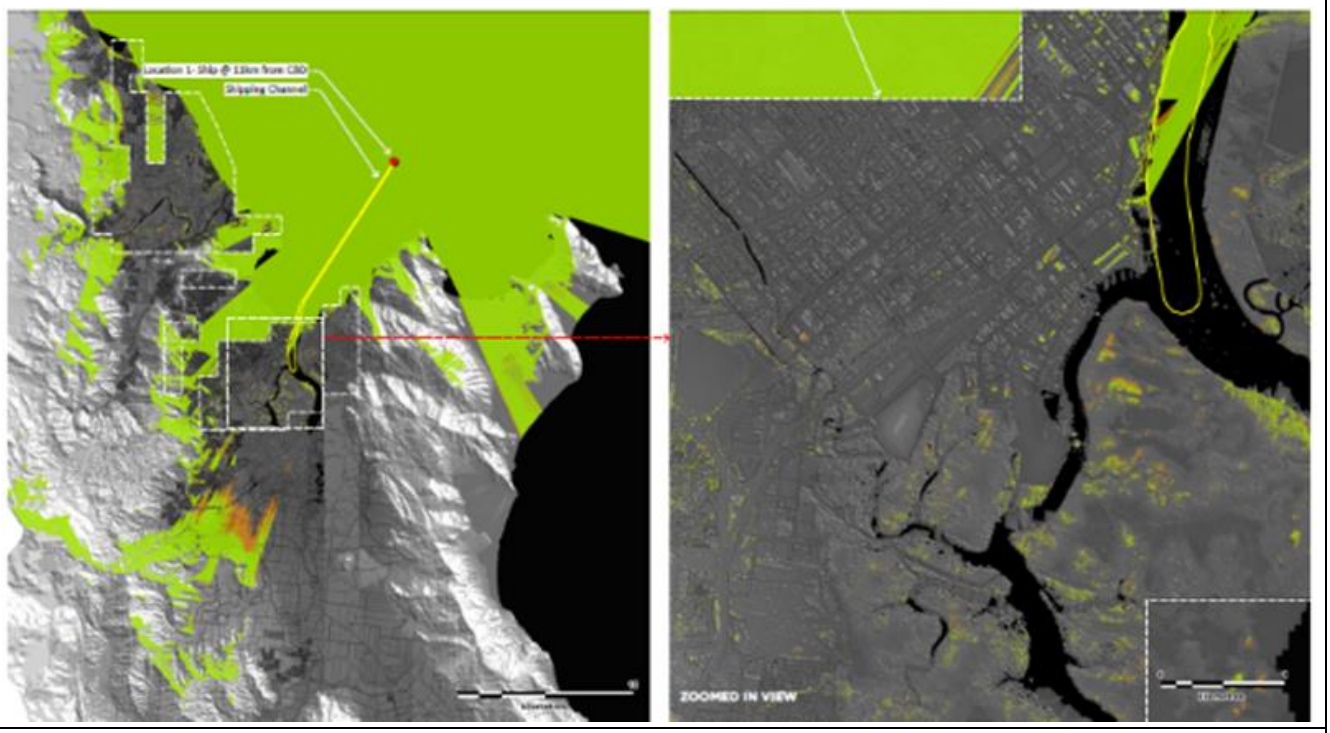

Figure B12-5 ZVI of Shipping Channel – Outer Channel.

Source: Appendix BA (Figure 5-2). For a larger version of this figure refer to Appendix B of **Appendix BA**.

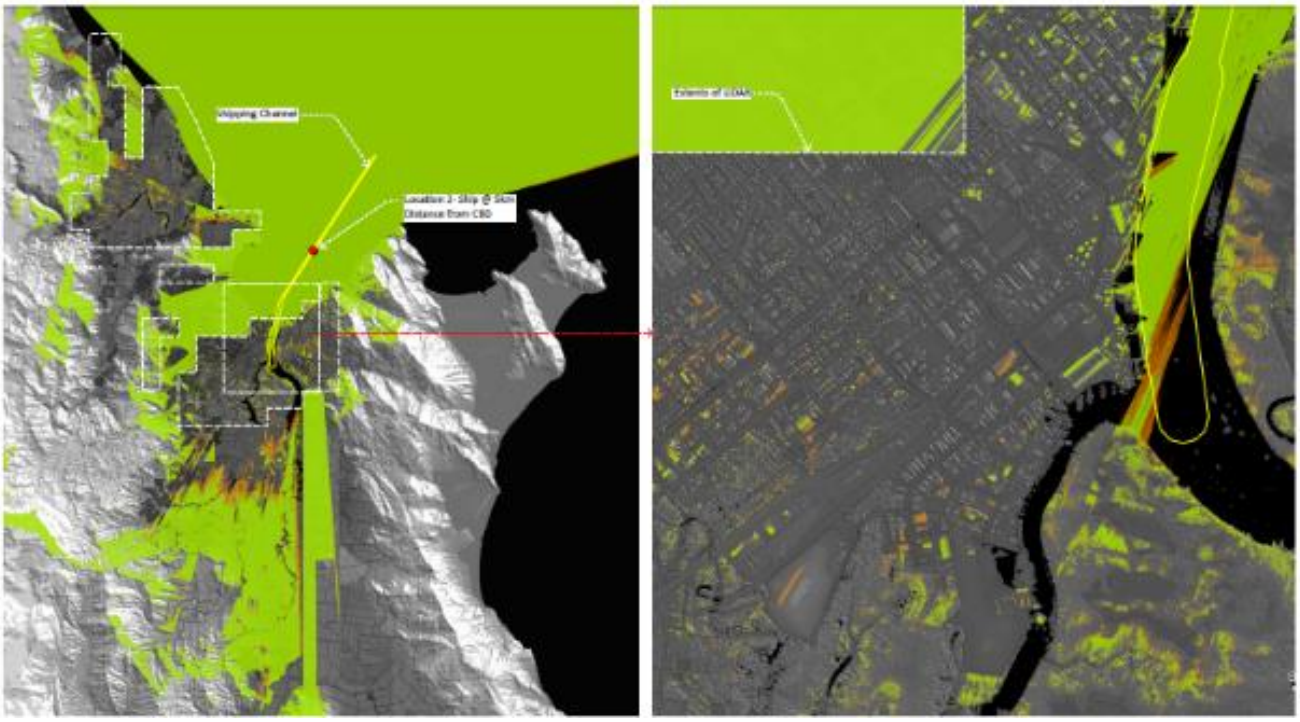

Figure B12-6 ZVI of Shipping Channel – Middle Channel.

Source: Appendix BA (Figure 5-3). For a larger version of this figure refer to Appendix B of **Appendix BA**.

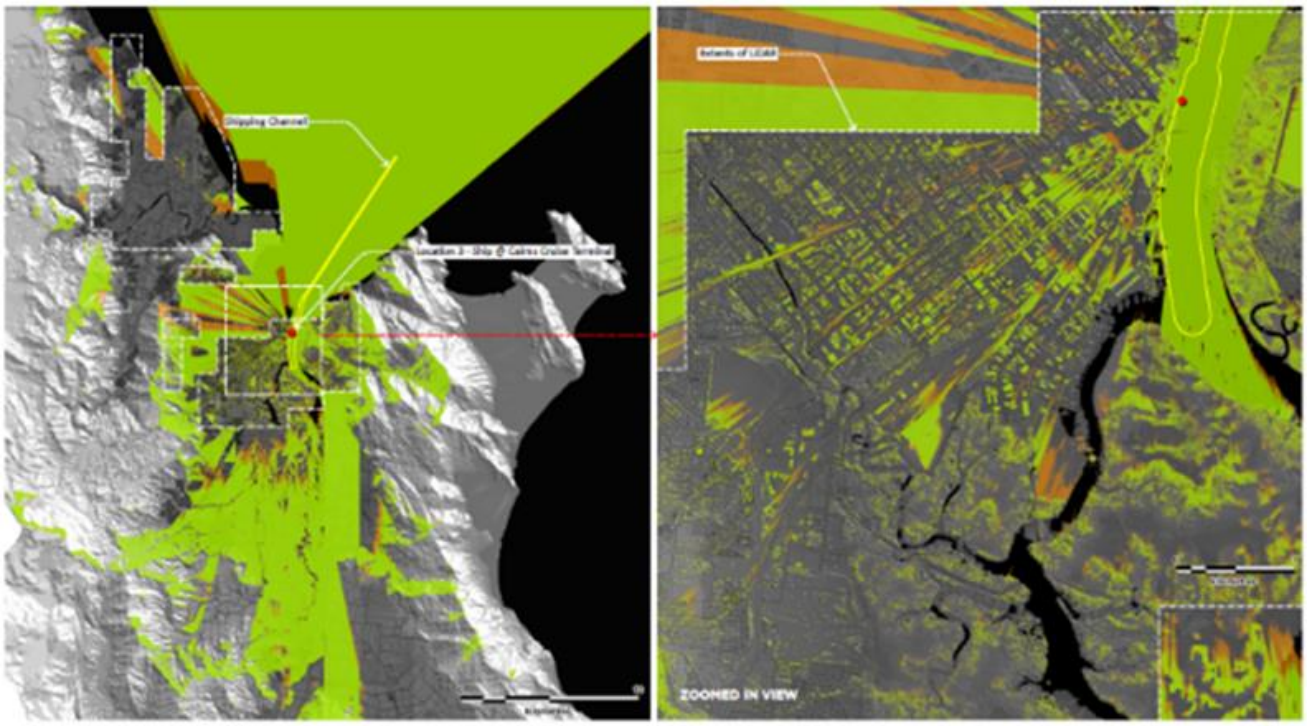

Figure B12-7 ZVI of Shipping Channel – Inner Channel.

Source: Appendix BA (Figure 5-4). For a larger version of this figure refer to Appendix B of **Appendix BA**.

B12.4.3.b Northern Sands DMPA

The visibility of the proposed Northern Sands DMPA has been modelled with a finished level in the void of -0.5m AHD, representing the existing situation (although in reality it is a lake with a minimum water surface at 0 m AHD) and also with the proposed temporary bund at 7.5m AHD, but with no pipeline options or other temporary construction details in the model, nor any of the associated pumps, booster stations options and laydown areas proposed at Yorkeys Beach,

To model the ZVI for this DMPA, 20 visibility points were located on the perimeter bund (shown as red dots on **Figure B12-8** and Appendix B of **Appendix BA**). This analysis indicates that the Northern Sands DMPA site is likely to be seen from only limited areas, mainly from elevated viewpoints, depending on existing vegetation or structures which obstruct such views. It should be noted that, while the modelling (**Figure B12-8** and Appendix B of **Appendix BA**) identifies extensive elevated parts of Caravonica and Kamerunga with potential views to the temporary bund, most of the places shown in yellow are not at ground level, but are tree tops or roof tops modelled in the DSM. Notwithstanding this, there may be some residences with views of the DMPA from habitable rooms or balconies, such as from the suburb of Caravonica.

The proposed pipeline option at Yorkeys Beach, despite its low elevation, is also likely to be visible from the elevated views and lookouts described above. Some of the associated infrastructure such as pumps may also be visible at these distances but are of similar scale to equipment and infrastructure currently used in rural activities, and have not been separately modelled. Any marine-based infrastructure which is on the surface of the water is more likely to be noticeable.

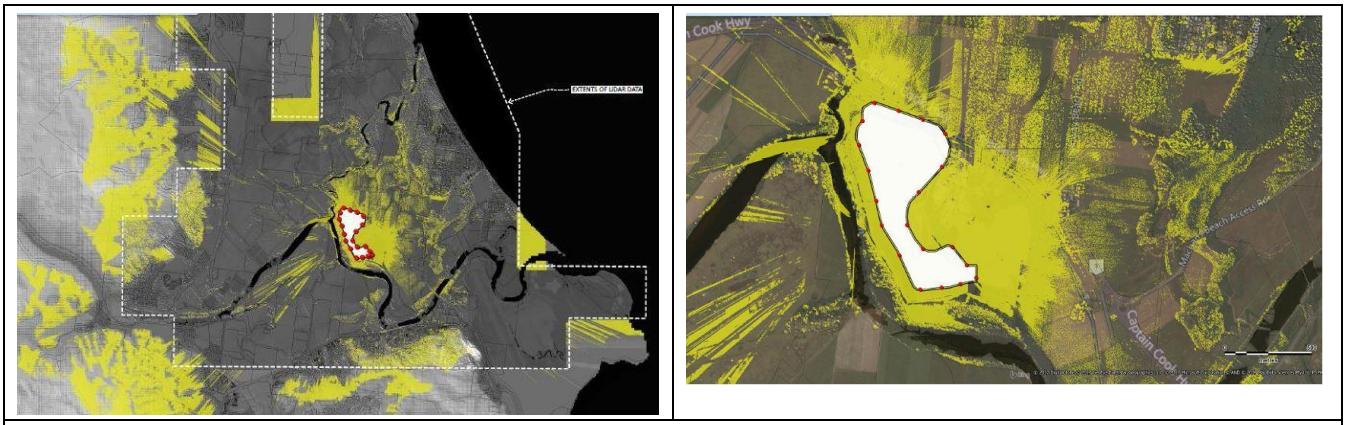

Figure B12-8 ZVI of Northern Sands DMPA (and detail).

Source: Appendix BA (Figure 5-5). For a larger version of this figure refer to Appendix B of **Appendix BA**.

Modelling indicates that the Northern Sands DMPA will be visible at a distance from a number of viewing locations in the Barron Delta region, mainly from elevated areas overlooking the plains, such as from Skyrail/Henry Ross Lookout. Other viewpoints for consideration include the Captain Cook Highway and the 'gateway' of the Barron River Bridge and river crossing. The modelling suggests a number of places as potentially within view which on closer examination proved to be tree canopies or roof tops.

B12.4.3.c Tingira Street DMPA

To model the ZVI for the two areas on the proposed Tingira Street DMPA, 10 viewpoints were located within the site at 1.5m above existing ground level, to represent the approximate height of the stiff clay placed on site (**Figure B12-8** and Appendix B of **Appendix BA**). This placed material is also intended as pre-load for future redevelopment of the site.

As with the Northern Sands DMPA, the ZVI modelling is based on LiDAR data (including vegetation and buildings) for parts of the Cairns CBD area and surrounding suburbs, and while this allows for visual screening, it conversely shows (in yellow) tree canopies and roof tops as being within 'view' of the site and/or placed dredge material.

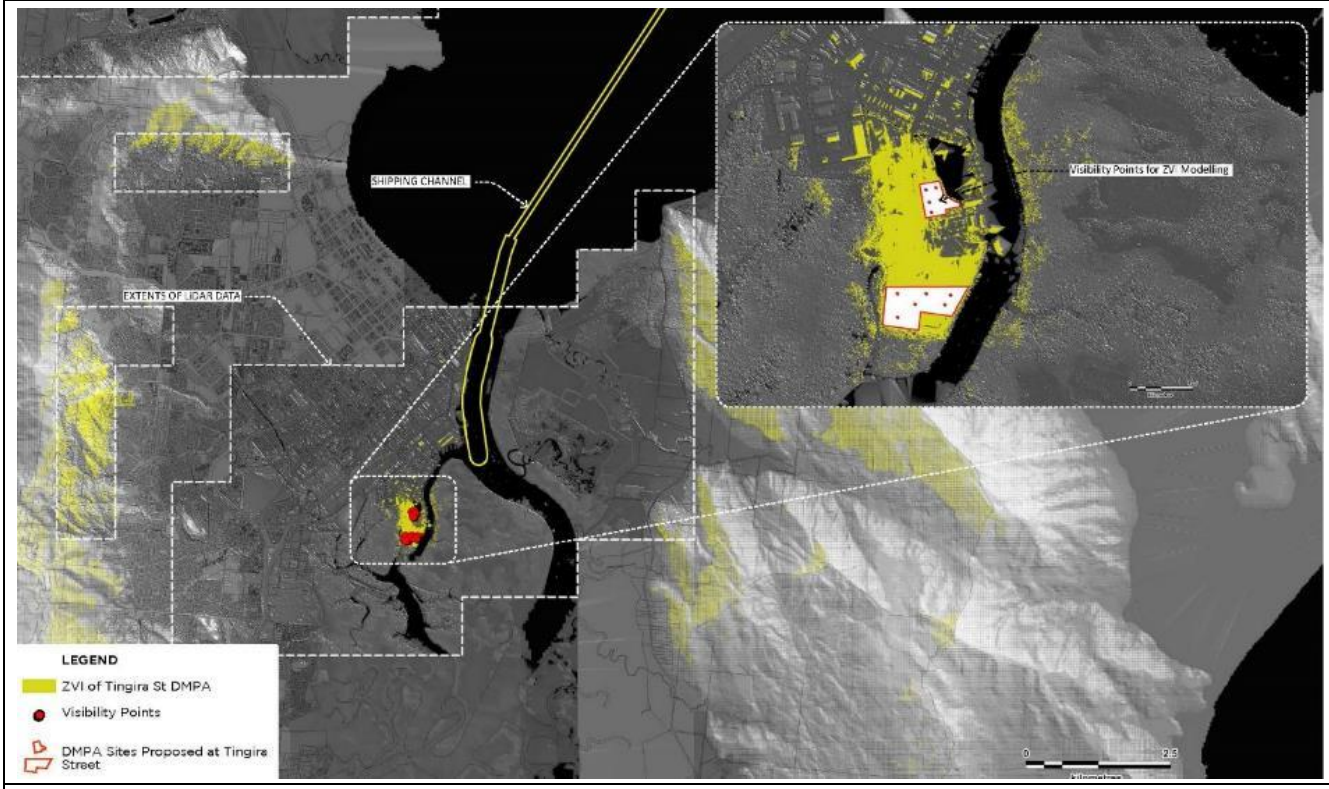

Figure B12-9 ZVI of Tingira Street DMPA (and detail).

Source: Appendix BA (Figure 5-6). For a larger version of this figure refer to Appendix B of **Appendix BA**.

B12.4.3.d Wharf Upgrade Facilities

The proposed upgrade to the wharf facilities and land-based infrastructure in the Landside Works Project Area was not modelled because the changes proposed are minor, such that areas within view of the proposed works are likely to be currently within view of the existing port facilities.

B12.4.4 Visual Impacts in Landscape Character Context

B12.4.4.a Barron Delta

The ZVI mapping indicates that the proposed CSD Project and the DMPAs may be glimpsed from several viewing locations within the Barron Delta area, but are mainly screened from view.

Photo B12-4 View from Captain Cook Highway looking towards the existing Northern Sands site.

Source: Appendix BA (VP1).

Photo B12-5 View towards Northern Sands DMPA from the Captain Cook Highway, Barron River Bridge.
Source: Appendix BA (VP2).

Project Works

Shipping Channel and Ships

The increase in the size of ships (an 11 m increase in height from vessels currently using the channel) will be marginally more noticeable from isolated parts of the Barron Delta when the new channel is operational, but only when the larger ships are located either mid-channel or docked at the Cairns Cruise Liner Terminal (CCLT). The ZVI indicates that there will be negligible changes in visibility of larger ships located at the outer channel (approximately 11 km from the Cairns CBD).

During construction, dredging vessels and the mobilisation of ancillary equipment will be visible as part of both marine and land based activities. However this would be seen in the context of the current channel dredging (which currently takes place on a regular basis) as well as existing cruise ships, navy ships, cargo ships and recreational boat activity.

Northern Sands DMPA

The Northern Sands DMPA is currently visible from only the most elevated viewpoints, such as the Henry Ross lookout on the Kennedy Highway, the Kuranda Scenic Rail line and above the tree tops of the Skyrail Cableway; and from these viewpoints it is a small distant 'scar' in the landscape within a much wider panorama of the coastal plain. While ZVI modelling of the DMPA fill material (dredged soft clays) indicates widespread visibility from surrounding hillslopes, most of these modelled 'yellow' areas are the tops of tree canopies or house roofs. However some houses may be within distant view of the DMPA, including in Caravonica (Fig Tree Drive, Red Peak Boulevard), Kamerunga (Lomandra and Terminalis Close and surrounding estates) and the northern foothill suburbs of Mt Whitfield (Stratford and Freshwater); at viewing distances varying between 1.5 and 3.5 kilometres.

The ZVI modelling (confirmed by field inspection) also indicates that the DMPA temporary bunds may be glimpsed from the Captain Cook Highway through narrow gaps in roadside vegetation. As seen from a vehicle travelling at 80 km/h, the bunds will have the appearance of earth stockpiles, and will be generally less noticeable (as seen from the Highway) than the processing equipment and batching currently in use on the Northern Sands DMPA.

Dredge movements and the dredge mooring point will be visible during the construction phase, but most activity will be well offshore and scarcely noticeable amongst the other boating movements The proposed pipeline and associated infrastructure located at Yorkeys Beach will potentially be visible from elevated viewpoints, or coastal areas in close proximity to the landfall point and booster pumps. While any inshore marine-based infrastructure is likely to be noticeable, the pipeline will not be overt or apparent from elevated views, due to the viewing distance, intervening vegetation (including sugar cane), and the inherently low elevation of the infrastructure.

Tingira Street DMPA

This site will not be visible from the Barron Delta generally, nor from receptors VP1 and VP2.

Wharf Facilities Upgrade Works

Neither the wharves nor the land-based infrastructure, including the storage tanks at the proposed fuel farm will be visible from the Barron Delta areas Neither the wharves nor the land-based infrastructure, including the additional storage tanks at the existing fuel farm will be visible from the Barron Delta areas. No changes are proposed to the Cairns Cruise Liner Terminal itself.

Landscape and Visual Impact Assessment

During construction of the CSD project, the bunding around the Northern Sands DMPA will be glimpsed from viewpoints within the Barron Delta area, and will be visible from distant elevated viewpoints overlooking the area, but this site is already disturbed as an extraction site and the visible temporary DMPA bund is unlikely to change the local landscape character and amenity. Activity will be apparent when the bund is being constructed, but when the pumps are actively transferring material into the existing void, there will be little or no noticeable activity. When the CSD Project is operating and the Northern Sands DMPA bund has been removed, there will be no visible evidence or impact on external viewers. An existing extractive industry void and lake will have been converted into a shallower lake (or be completed filled, depending on the settlement of the soft clay). Also, the Northern Sands site forms a small part of a mosaic of varying land uses in various stages of development or disturbance. However, night time operations on the DMPA will introduce additional lighting and increased vehicle use, which may be apparent from Henry Ross Lookout, although it will not be inconsistent with the current night time environment of the study area (which currently includes the Highway, the airport, the Go-Kart track and Smithfield).

Notwithstanding any impacts or changes arising from the above, the temporary nature of the DMPAs and associated bunds, pipelines and infrastructure will not result in permanent or detrimental changes to the visual amenity or landscape character of the Barron Delta area.

B12.4.4.b Cairns Coastline

The ZVI indicates that the proposed CSD Project and associated works will be visible from a number of viewing locations along the Cairns coastline.

Photo B12-6 Yorkeys Beach (top image) and residences on Janett Street, Yorkeys Knob
Source: Appendix BA (VP3).

Photo B12-7 View from Smiths Creek.
Source: Appendix BA (VP4).

Photo B12-8 View toward Trinity Inlet.

Source: Appendix BA (VP5).

Photo B12-9 Cairns Port as viewed from Trinity Inlet.

Source: Appendix BA (VP5a).

Project Works

Shipping Channel and Ships

The difference in size between the largest ship currently using the channel (*Legend of the Seas* at 52 m above sea level, equivalent to a 16 storey hotel) and the largest ship likely to use the channel in future (*Voyager of the Seas* at 63 m height above sea level, equivalent to a 20 storey hotel) is 11 m, representing an increase of approximately 21%.

The ZVI mapping indicates that the larger ships will be marginally more noticeable from some coastal viewpoints, especially when a larger ship is docked. From offshore views, including from GBRWHA waters and ferries travelling to the islands or the Reef (VP5), a larger ship will be more noticeable, regardless of its location within the channel. However, any such ship(s) will be seen in the context of existing built form, in a location where cruise ships are already seen on a regular basis, and which *per se* represent an attraction for both locals and tourists. In this context, the changes in ship size and frequency facilitated by the CSD Project will not change the perceived character of the Cairns coastline.

Channel maintenance dredging is already a routine occurrence in Trinity Bay, and generates a turbidity plume which is visible, but not inconsistent with current variations in turbidity within the bay. The existing turbidity is a feature of the naturally turbid, north-facing coastal embayment and is unlikely to affect scenic perceptions. Any turbidity plume which may be visible during the dredging phase will be seen in the context of an already turbid bay environment, and is not expected to be readily distinguishable.

Northern Sands DMPA

During dredging, the pump out structure and delivery pipeline and booster stations proposed for the mouth of Richters Creek at the southern end of Yorkeys Beach will be visible from some boat-based viewpoints, looking back towards the mainland and from the southern beach itself at the landfall point. While the booster pump housings will be visible from their immediate surrounds, their scale and nature are likely to be perceived as similar to equipment and infrastructure used in rural activities. The marine booster will also be visible from Yorkeys Knob Beach, near Richters Creek (VP3), and from nearby parts of Holloways Beach. Although the pipeline will be either submerged or at low elevation and will not be overly apparent from offshore views (it will be seen as a 'sliver' on the surface of the water), it will be seen from the southern part of Yorkeys Beach. It is not envisaged that there will be any views of either the pipelines or infrastructure, nor towards the DMPA from GBRWHA waters due to the intervening distance.

Tingira Street DMPA

Fill material placed on the proposed Tingira Street DMPA may be visible from some localised coastal settings including Smiths Creek (VP4). Glimpses through gaps in the mangroves potentially permit some views through, however, viewshed modelling undertaken from Smiths Creek indicates that the existing mangroves which currently fringe both sides of the Creek provide effective screening between the stiff clay fill areas and the creek.

During construction and operation, the dredging vessels and movement of material to the DMPA via barge will be visible along Trinity Inlet and Smiths Creek, particularly near the entry to the 'Duck Pond' where the barge will be seen to enter, and depart, the site. This would be seen in the context of existing boat activity, including cargo barges, coastal ships, and recreational boats.

The DMPA site will also potentially be visible from any large cruise liners moored from time to time in the CCLT or in transit out to Trinity Bay.

Wharf Upgrade Facilities

The proposed wharf upgrade and service upgrades will be clearly visible from Trinity Inlet (VP5) as well as pedestrians and sight-seers walking along the waterfront, or as viewed from nearby buildings, particularly during the construction stages. Views of construction machinery and equipment will be evident during this time, including a piling rig and crane to install the proposed piles, concrete pump trucks, a site office and power generators. The movement of dredge vessels within the inlet will also be visible, as will the dredge mooring point, although at a considerable viewing distance.

This activity will occur both day and night and be seen in the context of a range of existing tourism, commercial and industrial maritime activities. However all such changes will be dwarfed by the presence of large cruise ships, which by their size and frequent presence, influence the perception of the port as seen from the Cairns CBD and waterfront. Given that large cruise ships are currently visible on a regular basis, the changes in ship size and frequency facilitated by the CSD Project will not change the perceived character of Trinity Bay and the port.

Landscape and Visual Impact Assessment

During construction and dredging, there will be views of boat and barge movements as stiff clay material is transferred to the DMPA. This will form a small part of any offshore views, seen in the context of the existing boating activities and will occur over a period of several months, following which there will be no ongoing activities at the DMPA associated with this project.

During night-time operations, there will be increased lighting in the channel and at the Tingira Street DMPA site, including perimeter lighting and increased vessel and vehicle movements. This will be experienced by other vessels using the immediate waters however will not be discernible from offshore waters including the GBRWHA.

Again, this activity will be of a temporary nature, occurring over two to three months, and given the nature of

maritime vessels already using these waters (including existing night time activities) in an industrial setting, the proposed project is unlikely to impact on the visual amenity of people on other vessels.

Although cruise ships will be seen in the inlet, this is consistent with the well-established precedent of berthed cruise ships and general maritime movement, there will not be a noticeable change in the amenity of views from coastal settings, including inshore and offshore waters. While the ships using the channel and port berths will be larger, the increased frequency of large cruise ships (with an estimated additional 31 such ships annually by 2026) is likely to affect the perception of Trinity Bay scenery more than an 11 m increase in ship height, as discussed above. Whilst moored, the ships will be seen adjacent to the existing built form in a location where smaller cruise ships are already seen regularly.

B12.4.4.c Cairns Urban, Industrial and Port

ZVI mapping indicates that the proposed CSD Project and the associated works will be visible from a number of viewing locations within the urban and industrial Landscape Character Context area, including the Port.

Photo B12-10 Views from Cairns apartments (arrows in top two images indicate approximate location of Tingira Street DMPA)

Source: Appendix BA (VP6).

Photo B12-11 Distant views of CBD from Bayview Heights (View Close).

Source: Appendix BA (VP7).

Photo B12-12 Cairns Wharf - View south along the heritage listed wharf and clock tower with the historic sugar sheds building to the west.

Source: Appendix BA (VP8).

Project Works

Shipping Channel and Ships

The proposed 11 m increase in height of ships able to use the shipping channel and port berths will be noticeable from the Cairns urban and industrial context area. A number of apartment buildings in Cairns have direct sightlines to the wharves (VP6) as do ground level observers at the Cairns Wharf (VP7), the marina, and the boardwalk which links the two areas.

While the increase in ship height is mappable (in terms of an expanded ZVI), the difference between a cruise ship equivalent (approximately) to a 16-storey hotel and one of 20-storey equivalent is unlikely to be noticeable in the context of Cairns CBD and port shipping movements, unless both ships are seen side-by-side.

According to the 2016 shipping demand update (AEC Group 2016), the total number of cruise ships visiting Cairns and Yorkeys Knob was reported to be 65 in 2016, so large vessels are already seen regularly, and form part of the tourist experience. Focusing on Trinity Wharf where the majority of growth in cruise shipping is expected to take place, the Business as Usual (BaU) situation is that by 2026 it is expected that 81 cruise ships will visit Trinity Wharf annually – see **Chapter A3** (Project Description). With the implementation of the CSD Project and based on the assumptions stated in **Chapter A3** (Project Description), the number will be 148. This represents a compound growth rate of approximately 6% annually. This small increase in frequency of cruise ships facilitated by the CSD Project, and to a lesser extent the increase in ship size, may be noticed by some observers but is unlikely to affect the perceived character of Trinity Bay and the port. From particular elevated views in outer suburbs such as Bayview Heights (VP8), Caravonica or Kanimbla, large ships are already visible on a regular basis from some houses and/or roads, and the proposed increases in ship size and frequency are unlikely to cause adverse visual impacts.

As discussed above, channel maintenance dredging is already a routine occurrence in Trinity Bay and will not significantly increase. Any turbidity plumes visible during the dredging phase will be seen within the context of an already turbid environment and are not expected to be readily distinguishable from any of the viewpoints within this context area.

Northern Sands DMPA

The temporary bund of the Northern Sands DMPA may be glimpsed between trees at distances of approximately 1.5 - 3.5 km from the surrounding hillslope suburbs, including some houses and streets in Caravonica (Fig Tree Drive, Red Peak Boulevard and surrounding estate), Kamerunga (Lomandra and Terminalis Close and surrounding estates) and the northern foothills of Mt Whitfield, including the suburbs of Stratford and Freshwater. However, the Northern Sands site is already disturbed, and forms a small part of a mosaic of varying land uses in various stages of development or disturbance, with the coastline, Northern Beach suburbs and Trinity Bay in the background.

The pipelines and booster stations proposed will potentially be visible from close-range residential areas of Yorkeys Knob and Holloways Beach, but will not be apparent from long distance viewpoints located within this context area, including VP9.

Tingira Street DMPA

As Tingira Street is located within the industrial suburb of Portsmith, the proposed DMPA will be visible from some viewpoints including CBD views (VP6), portside views (VP7) and possibly from longer distance viewpoints such as Bayview Heights (VP8). It will also be seen in aerial views, by passengers departing from or arriving at the Cairns airport. However, the DMPA will be low, flat clay profiled to 1.5 m height, and will not be apparent or inconsistent in the existing landscape character of the portside suburb. Although the existing site is covered partly by grasses and partly by recovering marine plants (all of which will be removed for the project), the use of this site as a DMPA is only short-term. Following completion of the CSD Project, further filling is proposed and industrial hardstands and other facilities constructed under an existing (committed and approved) project.

From these viewpoints, construction and operational activities (including dredging vessels and movement of material to the DMPA via barge) will be visible along Trinity Inlet and Smiths Creek. However this will be seen in the context of existing boat activity, including cruise ships, navy ships, cargo ships and recreational boating, and will not be inconsistent with current maritime activities or existing landscape character of the Landscape Character Context area.

Wharf Upgrade Facilities

The proposed wharf upgrade and service upgrades will be clearly visible from the portside viewpoints of VP6 and VP8, particularly during the construction stages. Views of construction machinery and equipment will be evident during this time, including the piling rigs and cranes to install the proposed piles and the concrete pump trucks. The movement of dredge vessels within the inlet will also be clearly visible from VP6 and VP8 and will occur both day and night and be seen in the context of a range of existing boating activity and industrial character uses in the background.

During operation, the additional fuel storage tank may be visible from some locations within this setting, albeit seen in the context of existing fuel storage tanks and wharf side industry. During construction and operation, the proposed landside infrastructure construction works are considered to be consistent with the industrial character of the area. It is expected that there would be no perceived change to the amenity of this view, resulting in a negligible visual impact during the day and night.

Landscape and Visual Impact Assessment

During operation, the larger cruise ships and increased frequency of ship movement would be visible from this context area. With due regard to the short term, transient nature of the cruise ships, together with the existing precedent of cruise ships within this environment, the visual impact is assessed to be negligible during day and night.

Importantly, given the low sensitivity of viewer groups within this context area to change, the proposed increase in ship height will not significantly affect viewpoints VP6 - VP8, nor result in an altered landscape character or present unacceptable visual impacts. The proposed changes, including parts of the dredging and wharf construction, although noticeable, will be seen in the context of existing built form, in a location where

ships cruise and marine activity is already prevalent, and which forms an intrinsic part of the landscape character of this area.

Cruise ships are in character with the tourist focus of this area and would provide a transient and temporary point of interest in this view. The ships will be seen mainly during the day, however, may also be seen at night whilst navigating the shipping channel. At night, the cruise ships would be brightly lit and create interest in views from the mainland, from most viewpoints and viewer groups, rather than resulting in adverse impacts.

B12.4.4.d Coastal Mountain Ranges

The proposed CSD Project and the associated works will be visible from a number of viewing locations located within this landscape setting, many of which are elevated viewpoints or lookouts from the Macalister and Lamb mountain ranges.

Photo B12-13 View from Henry Ross Lookout over the Delta (daytime photo April 2017, night time 2013).

Source: Appendix BA (VP9).

Photo B12-14 Mount Whitfield Conservation Park - Elevated view across Cairns and the Trinity Inlet with distant views to Malbon Thomson Range.

Source: Appendix BA (VP10).

Project Works

Shipping Channel and Ships

Ships will be visible from Henry Ross Lookout (VP9) as they enter or depart the shipping channel, but Mt Whitfield obstructs most views from the lookout to the wharves and the shipping channel. Given the significant distance between the lookout and the shipping channel (approximately 15 km) the increase in ship height will

not be noticeable from this viewpoint, and will be seen in a location where cruise ships are already seen. The increased likelihood that cruise ships are seen from VP9 on any given day will likely be of interest to viewers, where the viewshed already includes a mosaic of land uses and a variety of elements, features and visible activities.

Views from Mt Whitfield VP10, include lookouts from the Red, Green and Blue Arrow walking circuits, some of which take in views of the CBD and Trinity Bay, including the shipping channel. Filtered views of the ships will be visible from the Red Arrow Walk (VP10) through existing vegetation. As with VP9, the larger size and increased frequency of ships seen from this viewpoint are likely to add to, rather than detract from, the viewer experience.

Although Mt Whitfield will obstruct most views from VP9 to the dredging areas, turbidity plumes may be visible on clear days from VP10 when surrounding waters are also clear, however, as dredging is already a routine occurrence, again this will be seen within the context of an already turbid environment and is not expected to be readily distinguishable from the viewpoints within this setting.

Northern Sands DMPA

As indicated by the arrow in VP9 the temporary bunding and some of the activities proposed for the Northern Sands DMPA will be clearly visible from elevated viewpoints. Although not within the view corridor of the Red Arrow walk (VP10) the Northern Sands DMPA will be visible from Mt Lumley, the northern peak of Mt Whitfield's Blue Arrow walk. In particular, the increase in vehicular activity will be noticeable in the operational stages of the DMPA, and in the construction of tertiary ponds and laying of pipelines.

Lighting and vehicular movement will also be visible at night from VP9 (VP10 closes at night) although it will be seen as part of cluster of lighting associated with the Captain Cook Highway, Smithfield and other commercial activities which either operate at night, or are lit, throughout the Barron Delta.

The pipeline and associated booster stations and pipe fabrication areas located behind Yorkeys Beach may be visible from VP9, although due to the distance (7 kilometres) and the low elevation of the infrastructure, it will not be particularly noticeable. Again, this will form a small part of the view as part of a wider panorama which takes in a mosaic of varying land uses (natural, rural, urban) in various stages of development or disturbance, with the GBRWHA in the background.

Tingira Street DMPA

From VP9, there may be some glimpses to the Tingira Street DMPA over the lower ridgeline of the Green Arrow Walk, south west of Mt Whitfield, in between vegetation. However, it is >15 km away, and is not a discernible part of the view, and will not cause any noticeable impacts during construction and operational activities (including nigh time activities) from VP9. Similarly, from VP10, the distance will reduce the potential for visual impacts and there will be no noticeable changes to landscape character given the existing industrial and maritime use associated with the Portsmith area.

Wharf Upgrade Facilities

The proposed wharf upgrade and associated service upgrades will not be noticeable from VP9 or VP10 due to the distance and intervening hills of Mt Whitfield and/or fringing vegetation.

Landscape and Visual Impact Assessment

Cruise ships are in character with the tourist focus of Cairns and VP9 provides a popular viewpoint for sight-seers to watch the passage of ships. The ships will be seen mainly during the day, however, may also be seen at night whilst navigating the shipping channel, and will be brightly lit. However, due to the existing visual precedence of cruise ships and general maritime movement, there will not be a noticeable change in the amenity of views from VP9 or VP10.

Although the Northern Sands operations will be visible from VP9, and will add additional lighting to the Barron Delta as seen from this lookout, it will not significantly change or impact on the amenity of this view given the

current use of this site as an area of sand extraction and quarrying. Although its use will change subtly, its operational requirements will not result in significant visual impacts or changes to landscape character, and the movement of vehicles and lighting at night will not be too dissimilar to the movement of vehicles along the Highway, at the Go-Kart Track or at the airport.

Both the Tingira Street DMPA and the proposed landside infrastructure works are consistent with the industrial character of the Portsmith area as seen from VP9 and VP10, and there will be no perceived change or visual impact on the amenity of either view due to distance.

B12.4.5 Great Barrier Reef World Heritage Area

The values of the GBRWHA have been discussed in **Section B12.3.10.e** and are based on the concept of OUV. The approach taken in assessing project impacts on GBRWHA scenic values is to identify the relevant aesthetic attributes listed in the GBRWHA Statement of OUV and, based on their presence / expression within the CSD Project area, assess likely changes.

Neither of the two DMPAs will be visible from offshore nor seen by most GBRWHA visitors, including tourists on ferry routes, although the Tingira Street DMPA will potentially be visible from large cruise ships docked at the Cairns Wharf and smaller tourist boats visiting the Trinity Inlet wetlands.

As indicated in **Table B12-3**, there are no aesthetic OUV attributes of the GBRWHA which are present in any of the project areas of the CSD Project or will be directly affected by activities undertaken in its construction or operation. Although dredging and barges may cause some localised turbidity as described **in Chapter B5** (Marine Water Quality) this is unlikely to impact significantly or noticeably on the landscape or visual amenity due to the short term nature of the activity, prevalence of natural turbidity generating events such as tides and the current once-per-annum maintenance dredging activities in the channel. Accordingly, it is considered that neither the aesthetic attributes of the GBRWHA, nor its integrity, will be affected by the proposed project, and that the OUV of this World Heritage property will not be affected.

B12.4.6 Risk Assessment

Table B12-9 summarises in standard risk matrix format, the unmitigated likelihood and consequences of visual impacts associated with the CSD Project.

TABLE B12-9 VISUAL IMPACT UNMITIGATED RISK ASSESSMENT

VIEWPOINT	POTENTIAL IMPACT	Duration	Consequence	Likelihood	Risk rating
Construction Stage					
Barron Delta					
Captain Cook Highway	Visual intrusion by pipeline construction and operation in association with the Northern Sands DMPA	Short Term	Minor	Unlikely	Low
Barron River Bridge	Visual intrusion by pipeline construction and operation and disposal works undertaken in association with the Northern Sands DMPA	Short Term	Minor	Unlikely	Low
Cairns Coastline					
Yorkeys Knob Yorkeys Knob beach (Note 1)	Visual intrusion of the delivery pipeline and associated infrastructure	Short Term	Minor	Almost certain	Medium
Smiths Creek	Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA	Short Term	Minor	Possible	Low
	Visual intrusion from dredge plumes and wharf construction works	Medium Term	Minor	Possible	Low
	Additional light glow during material placement operations	Short Term	Minor	Possible	Low
Trinity Inlet and Offshore	Visual intrusion from barge movements associated with moving material to the DMPAs	Short Term	Minor	Possible	Low
	Visual intrusion from dredging operations and dredge plumes	Short Term	Minor	Unlikely	Negligible
	Additional light glow from construction activities	Medium Term	Minor	Possible	Low
Cairns Urban, Industrial and Port					
Cairns High-Rise Apartments	Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA	Short Term	Minor	Likely	Medium
	Visual intrusion from dredging operations and dredge plumes	Short Term	Minor	Likely	Medium
	Additional light glow from construction activities	Medium Term	Minor	Likely	Medium
Foothill Suburbs - Bayview Heights and Caravonica	Visual intrusion from barge movements associated with moving material to the DMPAs	Short Term	Minor	Unlikely	Low
	Visual intrusion from dredge plumes and associated machinery	Short Term	Minor	Unlikely	Low
	Additional light glow from construction activities	Medium Term	Minor	Unlikely	Low

(Continued over)

VIEWPOINT	POTENTIAL IMPACT	Duration	Consequence	Likelihood	Risk rating
Cairns Foreshore and Cairns Wharf	Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA	Short Term	Minor	Likely	Medium
	Visual intrusion from dredge plumes and associated machinery	Short Term	Minor	Likely	Medium
Coastal Mountain Ranges					
Henry Ross Lookout/Skyrail Mt Whitfield	Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA	Short Term	Negligible	Possible	Negligible
	Visual intrusion from dredge plumes and associated machinery	Short Term	Negligible	Possible	Negligible
Henry Ross Lookout/Skyrail Mt Whitfield (cont.)	Additional light glow from construction activities	Medium Term	Negligible	Possible	Negligible
Outstanding Universal Value GBRWHA Aesthetic Attribute 3 (Coastal … Mangrove Systems of Exceptional Beauty) – see **Table B12-3**					
Mangrove Systems	Visual intrusion by barge movements, pipeline construction and operation of Tingira Street DMPA	Short Term	Negligible	Possible	Negligible
Operation Stage					
Barron Delta					
Captain Cook Highway Barron River Bridge	Visual intrusion due to increase in cruise ship size and frequency	Long Term	Negligible	Unlikely	Negligible
Cairns Coastline					
Yorkeys Knob Smiths Creek Trinity Inlet and Offshore	Visual intrusion and change in perceived character of Trinity Bay, due to increase in ship size and frequency, including ships anchored off Yorkeys Knob	Long Term	Negligible	Possible	Negligible
	Additional light glow from wharf and increased frequency of large ships	Long Term	Negligible	Possible	Negligible
Cairns Urban, Industrial and Port					
Cairns High-Rise Apartments Foothill Suburbs - Bayview Heights/ Caravonica Cairns Foreshore Cairns Wharf	Visual intrusion due to increase in ship size and frequency	Long Term	Negligible	Possible	Negligible
	Additional light glow from wharf and shipping activities	Long Term	Minor	Possible	Medium

VIEWPOINT	POTENTIAL IMPACT	Duration	Consequence	Likelihood	Risk rating
Coastal Mountain Ranges					
Henry Ross Lookout/Skyrail Mt Whitfield	Visual intrusion due to increase in ship size and frequency	Long Term	Negligible	Unlikely	Negligible
	Additional light glow from wharf and shipping activities	Long Term	Negligible	Possible	Negligible
Outstanding Universal Value GBRWHA Aesthetic Attribute 3 (Coastal … Mangrove Systems of Exceptional Beauty) – see **Table B12-3**					
Mangrove Systems	Additional light glow from wharf and shipping activities	Long Term	Minor	Likely	Medium

Source: Appendix BA (Table 5-6 part).

Note 1: The assessed risk of this impact has been revised from Negligible in **Appendix BA** to Medium following further investigations. This is discussed in **Section B12.6.2**.

B12.4.7 Summary of Landscape and Visual Impacts

B12.4.7.a Impacts on Viewers

Viewers in the Cairns Region generally, and in particular those at the nominated viewpoints (**Figure B12-3**) will be aware of at the CSD Project in the construction phase mainly through activity at and near the various project sites, in particular dredging in the shipping channel, project-related activity at the port, and pipes, pumps and barges taking dredged material to the DMPAs via the mooring / pump out point. However the first two of these (dredging and port activities) are extensions of activities and equipment currently seen to be associated with the Port of Cairns; and with respect to the two DMPAs, both are on flat coastal land capable of being screened from view. There will be little visible evidence or visual impacts of changes in the landscape associated with the placement of fill material.

The Northern Sands DMPA is currently a disturbed site with a sand extraction void, so initial filling will be below ground level albeit within a temporary bund to 7.5 m AHD height. The site is mainly screened and seen from the highway (if at all) only as high speed glimpses, and any views from elevated residential areas or the Skyrail are at long distance over a landscape with a mosaic of different land uses.

With respect to the Tingira Street DMPA, the visual impacts on most viewpoints are already mitigated through site selection: the location has relatively low visual exposure along a no-through road, and is located in an industrial area, with an existing band of mangroves screening views from the Creek. The future industrial use of the sites post-filling has already been determined and in essence, the placement exercise is an interim activity that will facilitate this planned use. Maintaining the health of the fringing mangroves will be critical in managing visual impacts from the creek. Although not considered a sensitive viewing location, buffer planting along Tingira Street frontage could help screen street level views into the DMPA.

Works in the shipping channel will not affect viewers to any extent greater than current maintenance dredging, and although air travellers may perceive sediment plumes in Trinity Bay, the bay is a generally turbid environment. However, when operational, the deepened channel will be capable of navigation by larger ships (up to 11 m taller than the largest cruise ship currently accessing Cairns) and it is anticipated that there will be a steady increase (5-10% per year) in the number of large cruise ship arrivals and departures per year. The visible presence of an increased number of larger ships is one of the potential visual impacts of the CSD Project, but even if this increase is noticed by some observers, it is unlikely to affect the perceived character of Trinity Bay and the Port area. Similarly, few viewers (if any) are likely to notice any long-term change to the character or scenic quality of the DMPAs and their surrounding areas.

B12.4.7.b Lighting

During construction, there will be some limited additional lighting associated with the DMPAs, but not significantly greater than occurs with their current land uses (in the case of the Northern Sands DMPA) or currently occurs in the surrounding area (in the case of the Tingira Street site). The lighting associated with the Tingira Street DMPA will contribute to the existing cluster of night time lighting in the Portside and Cairns Port area, but will be more muted than the nearby Port security lighting.

The main visible lighting impacts in the long term will be associated with the greater number each year of larger cruise ships (some will be the equivalent of a 20 storey hotel) at berth and in the shipping channel at night. While these ships will change the character of Trinity Bay at night, the shipping channel is not a dark nightscape but is currently lined with flashing beacons. Also, the large ships will be attractive features at night for many viewers.

B12.4.7.c Impacts on Landscape Character

The DMPAs are relatively small flat sites in the context of surrounding land uses (rural in the case of Northern Sands DMPA, industrial and mangroves in the case of Tingira Street). The proposed development will create a temporary bund to 7.5 m AHD (Northern Sands) or raise the ground level to 1.5 m above existing levels (Tingira Street DMPA) and booster pump stations are also likely to be visible. None of these will change the character of their context area in the long term, although during the construction phase the level of infrastructure and activity (where visible) may appear incongruous. The construction phase will not change the character of the shipping channel or port, although in the long term the more frequent presence of larger ships will cause a relatively minor change to the perceived character of the port and Trinity Bay.

B12.4.7.d Impacts on World Heritage Values

As noted above:

- There are no aesthetic OUV attributes of the GBRWHA that are present in any project area or will be directly affected by activities undertaken for the CSD Project.
- Although dredging and barges may cause some localised turbidity this is unlikely to impact significantly or noticeably on the landscape or visual amenity due to the short term nature of the activity.

Mitigation is feasible and would include management of dredging activities via implementation of the Dredge Management Plan (**Chapter C2**) to minimise the potential for turbidity plumes. This is also a recommendation of **Chapter B7** (Marine Ecology) and is a project commitment.

See **Section B12.6.2.d** for an assessment of the effect of mitigation on the level of risk.

B12.4.8 Combined Visual Impacts

There will be construction-related activity associated with the CSD Project at several sites, as well as future (post-construction) changes visible in the shipping channel and Port wharves, and also (although minor) at the DMPAs. In combination, these changes will be noticeable but dispersed, such that they are unlikely to be of sufficient scale, extent or rapidity of change to cause significant impacts on the scenic amenity, landscape values or character of the viewshed.

As indicated previously, the mainland DMPAs will cause impacts which are quite different in nature, extent and permanence to those associated with the port facilities (built form extensions to existing facilities) or shipping channel, where visual impacts are likely to be short-term (dredging) or transient (larger ships). These impacts are likely to be cumulative only in the sense that they convey, when combined, an impression that the Cairns Port area and adjacent coastline are changing and coming under increased pressure.

The main long-term outcome of the CSD project, in terms of visible changes within the viewshed, will be an increase in the number and size of cruise ships. The largest cruise ship which currently visits Cairns regularly is the approximate equivalent of 16 storeys high above the waterline, whereas in future (after channel deepening) the largest vessel will be the height equivalent of a 20 storey hotel (approximately). It is also significant that the number of large cruise ships visiting Cairns is likely to increase by an average of 5 -10%

additional trips per year to 2026. The likelihood that any observer will see a large cruise ship in the channel, berthed at the Port wharves or anchored at Yorkeys Knob on any given day or night, will increase slightly, but this increase is unlikely to be noticeable to most observers. This will not change the perceived character of Trinity Bay and the Port of Cairns, and is consistent with the character of Cairns as a tourist city, an access point for the Great Barrier Reef and a gateway to the tropical north.

Table B12-10 summarises in standard risk matrix format, the likelihood and consequences of visual impacts associated with the CSD Project and the overall risk rating. For convenience both mitigated and un-mitigated risks are presented in the same table.

B12.5 Recommended Mitigation Measures

B12.5.1.a Types of Mitigation

Mitigation can be thought of as 'risk treatment'. The national standard for risk management is AS/NZS ISO 31000:2009 Risk management—Principles and guidelines. AS/NZS ISO 31000:2009 defines risk treatment as a 'process to modify risk'. It notes that risk treatment can involve:

- avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk
- taking or increasing risk in order to pursue an opportunity
- removing the risk source
- changing the likelihood
- changing the consequences
- sharing the risk with another party or parties (including contracts and risk financing)
- retaining the risk by informed decision.

It also notes that:

- Risk treatments that deal with negative consequences are sometimes referred to as 'risk mitigation', 'risk elimination', 'risk prevention' and 'risk reduction'.
- Risk treatment can create new risks or modify existing risks.

B12.5.1.b Specific Mitigation Recommendations

Specific mitigation recommendations are included in **Table B12-10** below, along with the effect on risk level.

B12.6 Residual Impacts and Assessment Summary

B12.6.1 Assessment

Table B12-10 summarises in standard risk matrix format, the likelihood and consequences of visual impacts associated with the CSD Project. The unmitigated risk is as assessed in **Table B12-9**.

TABLE B12-10 VISUAL IMPACT MITIGATED RISK ASSESSMENT

VIEWPOINT	POTENTIAL IMPACT	Duration	Consequence	Likelihood	Risk rating	Mitigation	Post-mitigation consequence	Residual risk rating
Construction Stage								
Barron Delta								
Captain Cook Highway	Visual intrusion by pipeline construction and operation in association with the Northern Sands DMPA	Short Term	Minor	Unlikely	Low	Where feasible, construction plant, materials & machinery will be screened behind fencing or located to minimise visual impacts.	Negligible	Negligible
Barron River Bridge	Visual intrusion by pipeline construction and operation and disposal works undertaken in association with the Northern Sands DMPA	Short Term	Minor	Unlikely	Low	Lighting of compounds and works sites will be restricted to agreed hours and in accordance with a Construction Environmental Management Plan.	Negligible	Negligible
Cairns Coastline								
Yorkeys Knob Yorkeys Knob beach (Note 1)	Visual intrusion of the delivery pipeline and associated infrastructure	Short Term	Minor	Almost certain	Medium	Where feasible, construction plant, materials & machinery will be screened behind fencing or located to minimise visual impacts. Lighting of compounds and works sites will be restricted to agreed hours and in accordance with a Construction Environmental Management Plan. Directed lighting will be used at wharf construction site and the DMPAs to minimise glare and light spill. Regular maintenance of site hoarding and perimeter site areas will be undertaken, including the prompt removal of graffiti. Management of dredging activities	Almost certain	Medium
Smiths Creek	Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA	Short Term	Minor	Possible	Low		Negligible	Negligible
	Visual intrusion from dredge plumes and wharf construction works	Medium Term	Minor	Possible	Low		Negligible	Negligible
	Additional light glow during material placement operations	Short Term	Minor	Possible	Low		Negligible	Negligible
Trinity Inlet and Offshore	Visual intrusion from barge movements associated with moving material to the DMPAs	Short Term	Minor	Possible	Low		Negligible	Negligible
	Visual intrusion from dredging operations and dredge plumes	Short Term	Minor	Unlikely	Negligible		Negligible	Negligible

VIEWPOINT	POTENTIAL IMPACT	Duration	Consequence	Likelihood	Risk rating	Mitigation	Post-mitigation consequence	Residual risk rating
Trinity Inlet and Offshore (cont.)	Additional light glow from construction activities	Medium Term	Minor	Possible	Low	to minimise the potential for turbidity plumes.	Negligible	Negligible
Cairns Urban, Industrial and Port								
Cairns High-Rise Apartments	Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA	Short Term	Minor	Likely	Medium	Where feasible, construction plant , materials & machinery will be screened behind fencing or located to minimise visual impacts Lighting of compounds and works sites will be restricted to agreed hours and in accordance with a Construction Environmental Management Plan. Directed lighting would be used at wharf construction site and the DMPAs to minimise glare and light spill. Regular maintenance of site hoarding and perimeter site areas will be undertaken, including the prompt removal of graffiti. Management of dredging activities to minimise the potential for turbidity plumes.	Negligible	Negligible
	Visual intrusion from dredging operations and dredge plumes	Short Term	Minor	Likely	Medium		Negligible	Negligible
	Additional light glow from construction activities	Medium Term	Minor	Likely	Medium		Negligible	Negligible
Foothill Suburbs - Bayview Heights and Caravonica	Visual intrusion from barge movements associated with moving material to the DMPAs	Short Term	Minor	Unlikely	Low		Negligible	Negligible
	Visual intrusion from dredge plumes and associated machinery	Short Term	Minor	Unlikely	Low		Negligible	Negligible
	Additional light glow from construction activities	Medium Term	Minor	Unlikely	Low		Negligible	Negligible
Cairns Foreshore and Cairns Wharf	Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA	Short Term	Minor	Likely	Medium		Negligible	Negligible
	Visual intrusion from dredge plumes and associated machinery	Short Term	Minor	Likely	Medium		Negligible	Negligible
Coastal Mountain Ranges								
Henry Ross Lookout/Skyrail Mt Whitfield	Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA	Short Term	Negligible	Possible	Negligible	Where feasible construction plant/machinery will be located to minimise visual impacts.	Negligible	Negligible

VIEWPOINT	POTENTIAL IMPACT	Duration	Consequence	Likelihood	Risk rating	Mitigation	Post-mitigation consequence	Residual risk rating
Henry Ross Lookout/Skyrail Mt Whitfield (cont.)	Visual intrusion from dredge plumes and associated machinery	Short Term	Negligible	Possible	Negligible	Lighting of compounds and works sites will be restricted to agreed hours and in accordance with a Construction Environmental Management Plan. Directed lighting will be used at wharf construction site and the DMPAs to minimise glare and light spill. Management of dredging activities to minimise the potential for turbidity plumes.	Negligible	Negligible
	Additional light glow from construction activities	Medium Term	Negligible	Possible	Negligible		Negligible	Negligible
Outstanding Universal Value GBRWHA Aesthetic Attribute 3 (Coastal … Mangrove Systems of Exceptional Beauty) – see **Table B12-3**								
Mangrove Systems	Visual intrusion by barge movements, pipeline construction and operation of Tingira Street DMPA	Short Term	Negligible	Possible	Negligible	Where feasible construction plant/machinery will be located to minimise visual impacts.	Negligible	Negligible
Operation Stage								
Barron Delta								
Captain Cook Highway Barron River Bridge	Visual intrusion due to increase in cruise ship size and frequency	Long Term	Negligible	Unlikely	Negligible	Increase in ship size indistinguishable from the height and bulk of cruise ships currently using the port. No mitigation required.	Negligible	Negligible

(Continued over)

VIEWPOINT	POTENTIAL IMPACT	Duration	Consequence	Likelihood	Risk rating	Mitigation	Post-mitigation consequence	Residual risk rating
Cairns Coastline								
Yorkeys Knob Smiths Creek Trinity Inlet and Offshore	Visual intrusion and change in perceived character of Trinity Bay, due to increase in ship size and frequency, including ships anchored off Yorkeys Knob	Long Term	Negligible	Possible	Negligible	Increase in ship size indistinguishable from the height and bulk of cruise ships currently using the port No mitigation required.	Negligible	Negligible
	Additional light glow from wharf and increased frequency of large ships	Long Term	Negligible	Possible	Negligible	Only minor changes are proposed to the existing wharf with little change to the current light environment. Additional lighting associated with larger ships will be similar to (but more frequent than) current cruise ships using the port. If impacts from light become a concern, Ports North will identify suitable management options in consultation with cruise ship operators as and when the need arises.	Negligible	Negligible

(Continued over)

VIEWPOINT	POTENTIAL IMPACT	Duration	Consequence	Likelihood	Risk rating	Mitigation	Post-mitigation consequence	Residual risk rating
Cairns Urban, Industrial and Port								
Cairns High-Rise Apartments Foothill Suburbs - Bayview Heights/ Caravonica Cairns Foreshore Cairns Wharf	Visual intrusion due to increase in ship size and frequency	Long Term	Negligible	Possible	Negligible	Increase in ship size indistinguishable from the height and bulk of cruise ships currently using the port. No mitigation required.	Negligible	Negligible
	Additional light glow from wharf and shipping activities	Long Term	Minor	Possible	Medium	Only minor changes are proposed to the existing wharf with little change to the current light environment. Additional lighting associated from larger ships will be indistinguishable from current cruise ships using the port. No mitigation required.	Negligible	Negligible
Coastal Mountain Ranges								
Henry Ross Lookout/Skyrail Mt Whitfield	Visual intrusion due to increase in ship size and frequency	Long Term	Negligible	Unlikely	Negligible	Given the viewing distance and the nature of existing views, the increase in ship height will be indistinguishable from the height and bulk of cruise ships currently using the port. No mitigation required.	Negligible	Negligible
	Additional light glow from wharf and shipping activities	Long Term	Negligible	Possible	Negligible	Given the viewing distance and the nature of existing views, any minor change to the current light environment will not be detectable.	Negligible	Negligible

(Continued over)

VIEWPOINT	POTENTIAL IMPACT	Duration	Consequence	Likelihood	Risk rating	Mitigation	Post-mitigation consequence	Residual risk rating
Outstanding Universal Value GBRWHA Aesthetic Attribute 3 (Coastal … Mangrove Systems of Exceptional Beauty) – see **Table B12-3**								
Mangrove Systems	Additional light glow from wharf and shipping activities	Long Term	Minor	Likely	Medium	Only minor changes are proposed to the existing wharf with little change to the current light environment. Additional lighting associated with larger ships will be similar to (but more frequent than) current cruise ships using the port. If impacts from light become a concern, Ports North will identify suitable management options in consultation with cruise ship operators as and when the need arises.	Negligible	Negligible

Source: Appendix BA (Table 5-6).

Note 1: The assessed risk of this impact has been revised from Negligible in **Appendix BA** to Medium following further investigations. This is discussed in **Section B12.6.2**.

B12.6.2 Discussion

B12.6.2.a Unmitigated Risks – Terrestrial Issues

Construction Phase

The above analysis shows that the highest unmitigated risks for terrestrial issues during construction are (all Medium):

- Cairns High-Rise Apartments:
  - Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA
  - Visual intrusion from dredging operations and dredge plumes
  - Additional light glow from construction activities
- Cairns Foreshore and Cairns Wharf
  - Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA
  - Visual intrusion from dredge plumes and associated machinery.
- Yorkeys Beach
  - Visual intrusion of the delivery pipeline and associated infrastructure at the landfall site.

All other risks are Low or Negligible.

Operation Phase

The above analysis shows that the highest unmitigated risks for terrestrial issues during operation are (Medium):

- Cairns High-Rise Apartments' Foothill Suburbs - Bayview Heights/ Caravonica, Cairns Foreshore, Cairns Wharf:
  - Additional light glow from wharf and shipping activities.

All other risks are Low or Negligible.

B12.6.2.b Unmitigated Risks – OUV

Construction Phase

The above analysis shows that the highest unmitigated risks for OUV during construction is (Negligible):

- Mangrove Systems:
  - Visual intrusion by barge movements, delivery pipeline construction (Northern Sands Project Area), and operation of Tingira Street DMPA

Operation Phase

The above analysis shows that the highest unmitigated risks for OUV during operation is (Medium):

- Mangrove Systems:
  - Additional light glow from wharf and shipping activities

B12.6.2.c Mitigated Risks – Terrestrial Issues

Construction Phase

Following mitigation, all construction risks are reduced to Negligible with the exception of the visual intrusion of the delivery pipeline and associated infrastructure at the mouth of Richters Creek (southern part of Yorkeys Beach). This is considered to be an amenity issue and is addressed in **Chapter B1** (Land) where mitigation via a community engagement program is recommended.

Operation Phase

Following mitigation, all Operation risks are reduced to Negligible.

B12.6.2.d Mitigated Risks – OUV

Construction Phase

Following mitigation, all construction risks are reduced to Negligible.

Operation Phase

Following mitigation, all operation risks are reduced to Negligible.

Recommended mitigation in the form of management of dredging activities to minimise the potential for turbidity plumes will reduce both the consequence and likelihood of risk.

B12.6.2.e Recommended Mitigation

Recommended mitigation is detailed in **Table B12-10**. In summary, these involve the following actions (these apply to various project areas):

- Construction Stage
  - Directed lighting will be used at wharf construction site and the DMPAs to minimise glare and light spill.
  - Lighting of compounds and works sites will be restricted to agreed hours and in accordance with a Construction Environmental Management Plan.
  - Management of dredging activities to minimise the potential for turbidity plumes.
  - Regular maintenance of site hoarding and perimeter site areas will be undertaken, including the prompt removal of graffiti.
  - Where feasible, construction plant, materials & machinery will be screened behind fencing or located to minimise visual impacts.
  - A community engagement program to manage amenity impacts at the delivery pipeline landfall site at the mouth of Richters Creek (southern part of Yorkeys Beach). See **Chapter B1** (Land).
- Operation Stage
  - If impacts from light become a concern, Ports North will identify suitable management options in consultation with cruise ship operators as and when the need arises.

B12.6.3 Conclusion

In summary, the risks of adverse visual impacts associated with the construction phase of the CSD project are at worst Medium, even without project-specific management and mitigation measures, because the works are low-profile and consistent with the existing land uses and activities on and around the three sites (shipping channel, Northern Sands and Tingira Street DMPAs).

The only unmitigated risks of adverse visual impacts during construction which have been assessed as Medium are:

- Additional light glow from construction activities
- Visual intrusion from barge movements associated with moving material to the Tingira Street DMPA
- Visual intrusion from dredging operations and dredge plumes.
- Visual intrusion of the delivery pipeline and associated infrastructure at the mouth of Richters Creek (southern part of Yorkeys Beach).

With the exception of the delivery pipeline landfall site issue, these risks can all be reduced to Negligible by standard management and mitigation measures such as plume management, directed lighting and screen fencing of construction activities. These and other management tasks are documented in **Chapter C1** (DMPA Site Preparation and Post-placement Management Plan) and **C2** (Dredge Management Plan).

A community engagement program to manage amenity impacts at the delivery pipeline landfall site at the mouth of Richters Creek (southern part of Yorkeys Beach) is recommended in **Chapter B1** (Land).

Operational risks of adverse visual impacts (following removal of DMPA bunds) are also low, apart from a Medium risk of extra port lighting / shipping activities, but this too can be mitigated by directional lighting to be Negligible.

B12.7 References

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