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Ports North

CAIRNS SHIPPING DEVELOPMENT PROJECT

Revised Draft Environmental Impact Statement

APPENDIX BA: CSDP Landscape and Visual Impact Assessment Report (2017)

Landscape and Visual Impact Assessment

Cairns Shipping Development Project

WE16066

Prepared for
Ports North

June 2017

Cardno
Shaping the Future

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Abbreviations	
Abbreviation	**Definition/Qualities**
CSD Project	Cairns Shipping Development Project
DEM	Digital Elevation Model
DMPA	Dredge Material Placement Area
DSM	Digital Surface Model
DTM	Digital Terrain Model
EIS	Environmental Impact Statement
GBR	Great Barrier Reef
GBRMP	Great Barrier Reef Marine Park
GBRWHA	Great Barrier Reef World Heritage Area
LiDAR	Laser Imaging, Detection and Ranging
OUV	Outstanding Universal Value
ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organization
ZVI	Zone of Visual Influence
Glossary	
Term	**Definition/Qualities**
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, refers to 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 viewing location.
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)*

Executive Summary

The Cairns Shipping Development (CSD) Project is located in the Cairns region, on the Far North Queensland Coast and comprises a number of project components. The CSD Project revolves primarily around the proposal to accommodate larger shipping vessels, including cruise liners, and includes the proposed shipping channel, including associated dredging and port facilities, wharf upgrades and land-based infrastructure, plus additions to the existing Fuel Farm for the provision of Intermediate Fuel Oil (IFO). The proposed dredge material placement areas (DMPA's) for both soft clay and stiff clay deposits, at the Northern Sands site and Tingira Street site respectively, also form part of the study areas. The soft clay is proposed to be transported from Yorkeys Beach via pipelines and both marine and land-based boosters to the Northern Sands DMPA, while the stiff clays will be transported via barge to the Tingira Street DMPA.

The Port itself has been operating in Trinity Inlet since the 1900's, and is approximately 2 kilometres south east of the city of Cairns CBD. The CSD Project is located within Trinity Bay and adjoins the offshore areas of the Great Barrier Reef World Heritage Area (GBRWHA) and the Great Barrier Reef Marine Park (GBRMP).

The methodology adopted for this study is based on a review of approaches to scenic quality assessment, landscape character evaluation and assessment of World Heritage aesthetic values. This approach has been to:

> to establish the scenic amenity and existing visual environment as a context for the areas affected by the proposed developments, including the extent to which these areas contribute to the aesthetic values of the GBRWHA;

> rigorously assess the impact of the proposed developments on the visual environment, in the context of landscape character and in terms of a viewpoints approach to analyses; and

> assess the potential for impacts on the aesthetic values of the GBRWHA.

A visual study area was defined for the assessment encompassing the areas affected by both the developments at the Port of Cairns, the DMPA's and associated increase in activities proposed as part of the shipping channel design within the GBRWHA. The study area was described in terms of four Landscape Character Context areas which cover the regional area of Cairns defined by both geographical and landscape character areas.

The landscape characteristics, scenic amenity and other aspects of the visual environment were described for each Landscape Character Context based on desktop review and field assessment. The proposed development was then assessed using a variety of analytical methods such as visibility modelling, and assessment. Representative viewpoints were selected and photographed, and viewsheds modelled from some points, and viewer groups were in some instances identified according to scenic expectations. This information formed an input to develop desired visual outcomes to inform the visual impact assessment and mitigation measures.

Visual Impact of the CSDP

Visibility analysis indicate there are few, if any, new land or marine areas within potential view of the proposed developments, which are not already within view of the existing port facilities or part of the shipping channel. The visual impacts of the proposed development components are generally attenuated by distance, topography, existing vegetation and the generally low profile of the facilities upgrade, including the pipelines, wharf upgrades and the proposed material placements on both the Tingira Street and Northern Sands DMPAs. One exception during the construction phase is a bund to 7.5m AHD around the Northern Sands DMPA, which will be glimpsed by passing highway motorists as well as seen locally, but this is a temporary impact affecting a site which is currently disturbed by sand extraction, and within the context of a surrounding district with a mosaic of different land uses and activities. Dredges will also be visible at an offshore mooring point, and booster pump stations will also be seen during the construction phase.

Another exception is the increased frequency and size of cruise ships using the channel and the Cairns Cruise Liner Terminal, although such changes are unlikely to be noticed by most observers, because large cruise ships are presently visible in the shipping channel and the port on a regular basis

Overall, the impact on visual amenity arising from the increase in visibility of the proposed development is considered to be minor due to the following factors:

> The mainland close-range views are from within strategic port land and Cairns CBD and the industrial wharfside suburbs of Portsmith and Woree and the designated port waters of the shipping channel. The visual presence of ships and maritime activity in the Inlet is typical, including fishing boats, naval warships, tourism boats, maritime safety, recreational boats and large cruise liners. The latter attracts visitors and locals alike as part of the sight-seeing experience;

> Although dredging will be visible in the shipping channel, this is already a common sight in the Port waters and will be of short duration;

> The visual impacts on the scenic amenity values of viewpoints with views over the shipping channels or on identified viewer groups who may see larger ships using the shipping channel are considered to be minor, because GBRWHA users at these viewpoints currently see large ships in the channel on a regular basis hence the change will not represent a new visual intrusion or unexpected changes to character. In this context the additional visual impact of distant ships on the horizon is considered minor.

> Port facilities, wharf upgrades and associated infrastructure proposed upgrade of facilities at the existing fuel farm will be appreciable from close-range views during construction. However, this work, including night activity, will be visually compatible with the industrial activity of the port and the suburb of Portsmith;

> The Tingira Street DMPA and the placement of stiff clay to 1.5m height will not be noticeable from receptors, including from Smiths Creek, although the movement of barges to and from the site will be apparent, including during night works. However, this will be seen in the context of existing industrial maritime activity and will be temporary in nature;

> The temporary bund around the Northern Sands DMPA will be visible from elevated viewpoints, including Skyrail and Henry Ross Lookout, from planes departing or arriving at Cairns airport, and from elevated residences located in foothill suburbs. However, the operational activities will be similar to the current sand extraction and landfill operations, and will not introduce additional visual impacts, and will be seen as part of a wide panorama which includes both a natural and urban mosaic of the Barron Delta, framed by forested mountain ranges and the offshore waters of the GBRWHA.

The proposed DMPAs and the pumping or dumping of material will operate at night, requiring an increase in the location and extent of lighting. This may increase the intensity of lighting and the night-time glow in general, however, given the separate locations of the DMPAs and their respective locations in existing areas of night time activity, the overall increase is considered minor and can be mitigated through the use of lower intensity directional lighting.

Assessment of GBRWHA Aesthetic Values

The assessment of adverse visual impacts on the GBRWHA aesthetic values is structured around criterion (vii) of the World Heritage Convention, this being the 'superlative natural phenomena or areas of exceptional natural beauty'. The GBRWHA includes many areas which exhibit these attributes, but Trinity Inlet and Trinity Bay (including the project areas) are not areas of exceptional natural beauty, and do not include representation of the seven identified attributes of the World Heritage Area aesthetic values, but rather are representative of coastal features which are already impacted by both industrial and urban development most of which was present at the time when the GBR was inscribed as a WHA.. Accordingly, the proposed developments will not impact the World Heritage criterion of 'exceptional natural beauty'.

Trinity Bay and the associated waters of Trinity Inlet do however support some 'superlative natural phenomena'. These include the extensive mangrove systems of the adjoining Admiralty Island, and the potential for migrating whales and the presence of other threatened and migratory species such as turtles, inshore dolphins and dugongs. The proposed CSD Project will not affect mangrove systems of exceptional beauty, and although there is potential for extra project-related lighting to be visible from parts of the Trinity Inlet estuarine mangroves, any such impacts (additional to those of existing Port lighting) can be mitigated by directional lighting.

While there may be some minor temporary visual impacts during construction the operation of the CSD Project will not have a negative visual impact as GBRWHA users in or near the shipping channel currently see large ships on a regular basis hence the change will not represent a new visual intrusion or unexpected

changes to character. In this context the additional visual impacts of larger and more frequent cruise ships are considered minor.

1 Introduction

1.1 Purpose

This study forms part of a suite of Revised Draft EIS documents prepared with respect to the Cairns Shipping Development (CSD) Project, originally conceived to upgrade the infrastructure for the Port of Cairns to accommodate larger cruise ships and future expansions of HMAS Navy base operations. The project initially proposed disposal of capital dredge material at sea. A Draft EIS (2014) was referred to the Queensland Government in relation to this proposal.

The CSD Project has subsequently been amended (recalibrated) to redefine the extent of channel dredging and reduce dredge volumes, and to incorporate land based placement options for dredge spoil material. The revised EIS relates to the recalibrated project.

This Landscape and Visual Impact Assessment report responds to the relevant Terms of Reference (ToR) for 'Scenic amenity and Lighting' (**Appendix A**) and assesses the recalibrated project with respect to all temporary and permanent components of the CSD Project including the capital dredge material placement area (DMPA) sites.

Specifically, this report identifies the existing landscape and scenic attributes of the study area, including the Outstanding Universal Values (OUVs) of the Great Barrier Reef World Heritage Area (GBRWHA), assesses the landscape and visual impacts, impacts on World Heritage Values and their presentation, and recommends impact mitigation measures (where appropriate) as required by the ToR.

1.2 Project Description

The objective of the CSD Project is to accommodate larger cruise ships and a potential expansion of HMAS Cairns Navy Base through widening and deepening of the Cairns Shipping Channel and improvement of navigation and wharf facilities.

The CSD Project was recalibrated in 2015/16 to redefine the extent of channel dredging to target cruise ships and reduce dredge volumes. In addition, the land based placement options were confirmed as two placement sites for soft and stiff capital dredge spoil material, which will be pumped and barged to these sites respectively. The project includes inlet pipelines and tailwater management.

Soft clay dredge material is to be transported to a shore based DMPA at the Northern Sands sand extraction operation on the Barron Delta. Stiff clay dredge material is to be transported to previously reclaimed Ports North land at Tingira Street, Portsmith, by barge and will be transferred to shore in split hopper barges via a temporarily moored barge mounted excavator, loading heavy haulage vehicles at the two barge ramps along Smiths Creek.

The soft clays are to be dredged via a Trailer Suction Hopper Dredge (at an offshore dredge mooring point) discharging to a temporary floating pump out facility between approximately 2.6 and 3.6 kilometres NE of Yorkeys Knob.

Dredge material will be pumped from the pump out facility via a submerged steel pipeline, which will make landfall near the Richters Creek mouth, thence to the Northern Sands DMPA via cane farm headlands and Captain Cook Highway culverts (Figure 1-2). Due to the 8 kilometre pipeline distance from pump out to the Northern Sands DMPA, up to three pipeline booster pumps will be required, depending on Trailer Suction Hopper Dredge pumping capacity.

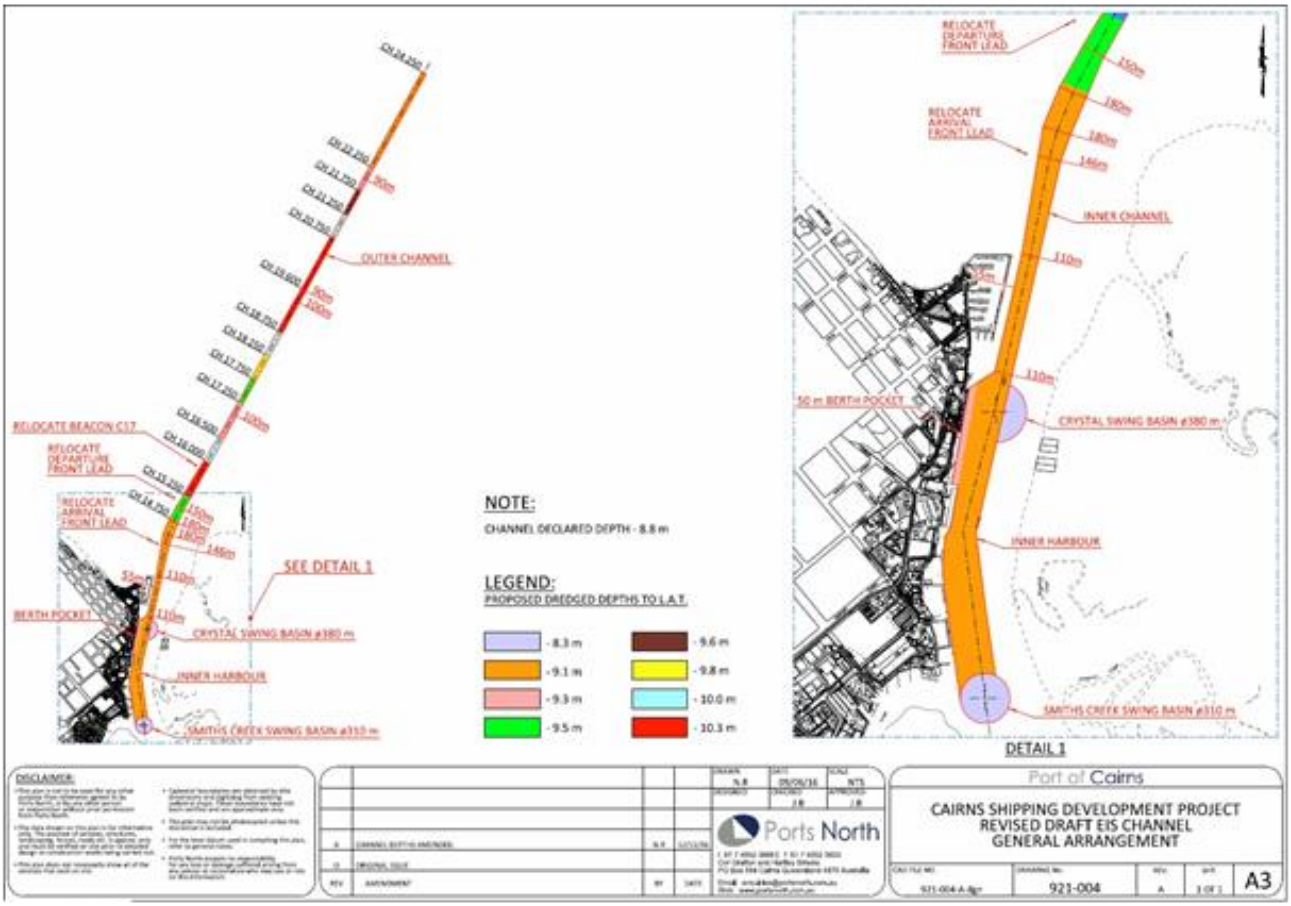


Figure 1-1 CSD Project Channel

Figure 1-2 Northern Sands DMPA Location and Pipeline Concept

The Northern Sands DMPA (Figures 1-2 and 1-3) will consist of the following elements:

> Facility capacity as required for the nominated soft clay placement.

> Temporary bunding to at least 100 year Flood immunity plus freeboard (7.5m AHD), which will minimise risk of sediment remobilisation in the event of event exceedance.

> Water level (maximum) during placement to allow 300mm free board from top of bund.

> Sheet pile wall at Reedy/Snake Island to separate DMPA from southern sand pit.

> Tailwater is proposed to be discharge adjacent to site or pumped to an outfall at the Barron River highway bridge.

The Tingira Street DMPA includes two areas proposed for the placement of stiff clay material, including a 1.3 ha area, and a 4 ha area adjoining the future barge ramp facility, as shown in Figure 1-4. It is proposed that the stiff clays will be transferred to shore in barges via the two existing barge ramps. Minor earthworks including temporary piles may be necessary at the ramps to facilitate unloading and haulage. The proposal is to stockpile the stiff clay spoil to a nominal height of approximately 1.5m, compacted and shaped with a free-draining crest.

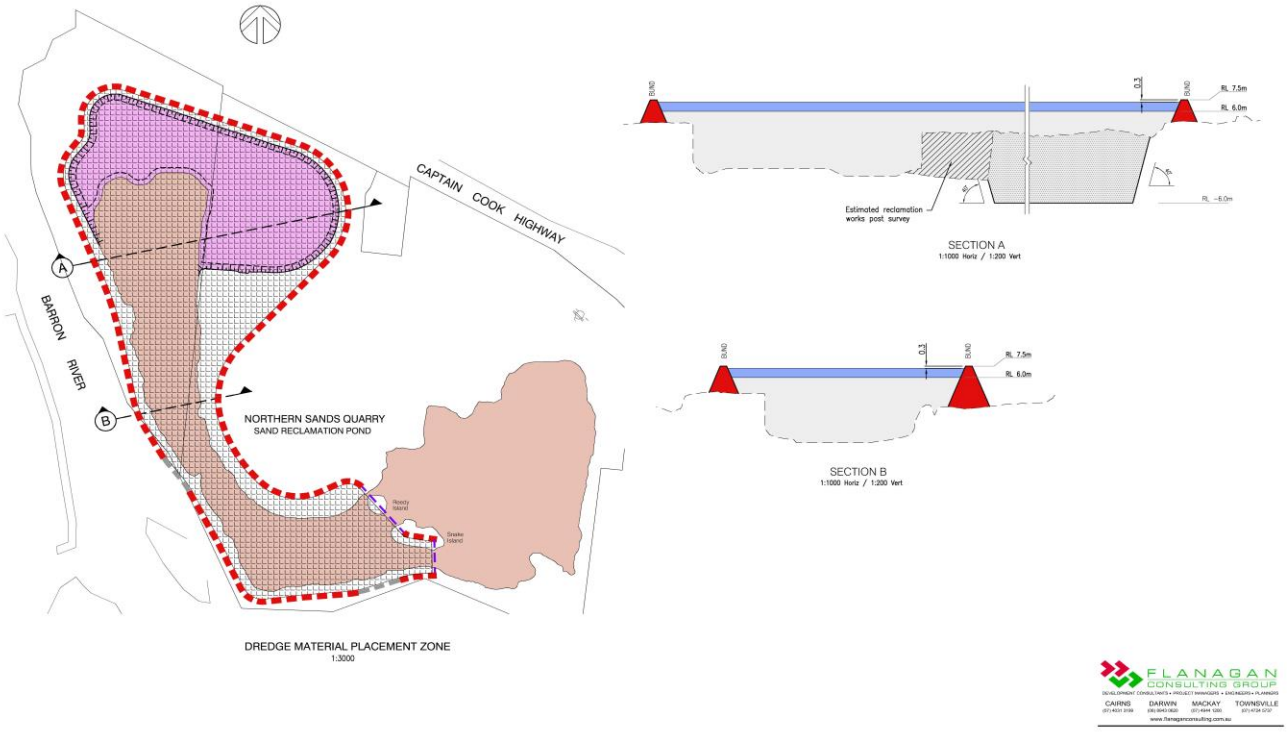


Figure 1-3 Northern Sands DMPA Concept Design

Figure 1-4 Tingira Street Stiff Clay DMPA

The structural upgrade of the existing shipping wharves requires removal of the existing concrete beam and installation of four racking steel piles and an in-situ reinforced concrete pile cap. New works will comprise 21 independent berthing structures with 84 piles required during construction. Berthing structures will be constructed using land-based equipment except for the northern structure, which will be constructed from a barge.

As part of the wharf upgrade, and the provision and upgrade of berthing services, the following elements and infrastructure are required as part of the wharf upgrade and the proposed landside infrastructure works (including the IFO area):

> Construction equipment including cranes, barges, heavy vehicles, concrete pump trucks and hydraulic excavators;

> Site office, crib hut and equipment storage structures, and construction of associated services (sewage, potable water, fire-fighting services); and

> Storage tanks, pump stations, feed pipelines and containment bunds associated with the IFO.

The construction period for the wharf upgrade will be approximately seven to eight months, in addition to three weeks mobilisation and de-mobilisation. The land-side infrastructure works are expected to take approximately eight to 10 months and will be undertaken simultaneously with the wharf upgrade. The capital dredging works will take approximately 60 days and will occur 24 hours a day, seven days a week for the duration of the project.

1.3 Landscape and Visual Impact Assessment Study Area

The landscape and visual assessment study area provides the contextual areas for consideration of all components of the project (Figure 1-5). Coastal mountain ranges typically define 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 1-5 Landscape and Visual Impact Assessment Study Area

2 Approach and Methodology

2.1 Introduction

As required by the ToR, this study describes and identifies the existing landscape and visual qualities as well as identifying and assessing possible visual impacts of the project. This includes significant views, panoramas and focal points, landmarks, waterways and other features which contributes to the amenity of the area, scenic integrity and landscape character values, as well as the aesthetic values of the GBRWHA.

The approach to this study comprises two parts as described in s.5.2.2 of the ToR:

> **Existing Landscape and Visual Environment**

  The first part of this technical study describes and assesses the existing landscape and visual environment of the study area including the onshore and offshore works areas, in terms of landscape character and scenic values, views, view corridors and landscape sensitivity. This includes description of the Trinity Bay study area in terms of its contribution to character, scenic integrity and natural landscape values as well as aesthetic contribution to the OUV of the GBRWHA.

> **Future Landscape and Visual Environment**

  The second part of this assessment addresses the elements of the CSD Project and their potential impact on the existing landscape and visual environment. 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, and includes recommendations for visual impact mitigation or management methods where applicable, including assessment of night lighting (and light horizon impacts) and marine transport, and effects on the mainland and as seen from offshore waters (within the GBRWHA). A risk assessment has also been undertaken in accordance with s.8.3.1 of the ToR.

This study is based on a combination of desktop review of air photos, topographic data and information from previous studies undertaken in the region, in addition to field work and operational guidelines, including:

> Landscape and Visual Assessment – Existing Environment – Cairns Shipping Development Project – Revised Draft EIS (Cardno, 2016);

> Tingira Street – Landscape and Visual Impact Assessment – Cairns Shipping Development Project (Cardno, 2017);

> CSD Project Draft EIS (Ports North, 2014);

> Land Use Plans for Strategic Port Land (Seaport Volumes 1, 3 and 5; Ports North, amended 2013)

> Cairns Regional Council CairnsPlan 2016 Version 1.0 (Cairns Regional Council, 2016);

> Cairns Region Scenic Amenity Study (Cardno Chenoweth, 2012);

> Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO, 2015);

> Defining the Aesthetic Values of the Great Barrier Reef: Final Report for SEWPaC (Context, 2013);

> Reef 2050 Long-Term Sustainability Plan (Commonwealth of Australia, 2015);

> Great Barrier Reef Region Strategic Assessment: Strategic assessment report (Great Barrier Reef Marine Park Authority (GBRMPA), 2014);

> State of Queensland 2013, Great Barrier Reef Coastal Zone Strategic Assessment: strategic assessment report (State of Queensland, 2013); and

> Great Barrier Reef Coastal Zone Strategic Assessment 2014: supplementary strategic assessment report (State of Queensland 2014).

2.2 Assessment Approach

The selection of an appropriate method has been influenced by characteristics of the study area and proposed development, and the landscape and visual assessment previously undertaken for the Draft EIS. The methodology adopts a viewpoint-based approach to the identification of existing landscape and visual conditions (within a broad character context), followed by analysis of project visibility, assessment of visual impacts and likely changes to landscape character.

The sensitivity of viewsheds (a combination of scenic quality, view corridor extent and expectations of viewers) is an important consideration, particularly in the context of the Great Barrier Reef (GBR) and Wet Tropics World Heritage Area.

The modelling undertaken to support this assessment is provided in Appendix B.

2.2.1 Landscape Character Context

The existing environment of the Trinity Bay study area provides the landscape character and scenic amenity context and baseline conditions, against which the effects of the proposed development can be assessed. Several Landscape Character Context areas are identifiable (Figure 4-1):

1. Barron Delta – including the Barron River, the Captain Cook Highway, Smithfield and the cane farms.
2. Cairns Coastline – including the coastline to False Cape, Trinity Inlet and the waters of the GBRMP.
3. Cairns Urban, Industrial and Port – including the Cairns CBD, suburbs and the Port.
4. Coastal Mountain Ranges – Macalister and Lamb Ranges, Malbon Thomson Range, Mt Whitfield and lookouts.

2.2.2 Viewer Groups

The viewer groups potentially affected by the proposed developments comprise mainly residents of Cairns 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.

2.2.3 Visibility - 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 Digital Surface Model (DSM) of the Cairns Region, based on a combination of LiDAR and a Digital Terrain Model (DTM) derived from 10m and 5m contours. The DSM includes terrain and heights of vegetation and structures (refer to Figure 1 in Appendix B).

With respect to the proposed project, the ZVI models a number of ‘visibility points’ placed virtually on each component of the project (a stockpile, fill, a building or 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). During impact assessment, care was taken to distinguish impacts during the construction and operation phases.

2.2.4 Viewpoints

Viewpoints identified from the ZVI mapping (Figure 4-1 and Table 2-1) 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 2-1 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

2.2.5 Visual Sensitivity

The 'visual sensitivity' of affected areas, in the sense used by in the 2014 EIS (ie. National, State, Regional, Local or Neighbourhood), refers to the number of viewers, the duration of their views, and their expectations of scenic significance.

2.2.6 Combined Impact Assessment

In terms of visual impacts, 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, convey, when combined, an impression that the Cairns Port area and adjacent coastline are changing and coming under increased pressure. These whole of project impacts are addressed in terms of rate and visible extent of change, rather than by modelling and analysis.

2.3 Outstanding Universal Values

The assessment of impacts to the GBRWHA has been informed by a literature review and the following key sources:

> The Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO, 2011);

> The Matters National Environmental Significance - Significant Impact Guidelines 1.1 (DEWHA, 2009); and

> The GBRWHA Statement of Outstanding Universal Value (GBRMPA, 2012).

In particular, the UNESCO Guidelines define the concept of 2.3 Outstanding Universal Value (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"*.

For a World Heritage Property to be considered to have OUV, it must meet one or more of ten criteria listed in the Guidelines, as well as meeting several other requirements. The GBRWHA is defined in the Statement of OUV (GBRMPA, 2012) as meeting all four of the natural environment criteria. The key criterion of

relevance to this VIA is criterion (vii) “to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.”

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 their presence / expression within the CSD Project area, as the basis for considering visual impacts.

3 Policy Context and Legislative Review

3.1 Great Barrier Reef World Heritage Area – Outstanding Universal Values

In 1981 the GBR was added to the World Heritage List in recognition of its OUV.

The GBR was considered to meet three of the criteria for World Heritage listing, one of which relates to its aesthetic quality:

> *(vii) To contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance*

The summary statement describes how the GBR meets the requirements of this criterion:

> *"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."*

These values are addressed further in Section 6 of this report.

3.2 Great Barrier Reef

The OUV of the GBR has been addressed to varying degrees in a number of government documents (Table 3-1).

Table 3-1 Great Barrier Reef Related Policy

Document	Applicability to Project and Values Present
Reef 2050 Long-Term Sustainability Plan (2015)	The Reef 2050 Long-Term Sustainability Plan provides an overarching strategy for management of the Great Barrier Reef and was prepared in response to the 2011 World Heritage Committee request for a coordinated and comprehensive long-term plan for the Great Barrier Reef. The plan is an overarching strategy for the management of the Great Barrier Reef with funding for its implementation provided by the Australian and Queensland governments. One of the principles of decision making is *Maintaining and enhancing outstanding universal value in every action*, incorporating: > *Protecting the outstanding universal value of the World Heritage Area is the prime consideration when planning development and management decisions are made; and* > *Economic growth is sustainable and consistent with protecting outstanding universal value.*
Great Barrier Reef Region Strategic Assessment – Strategic Assessment Report (2014)	This Strategic Assessment Report has been prepared in conjunction with the State Coastal Zone Strategic Assessment to improve *effectiveness in managing existing and emerging risks to the Great Barrier Reef*. This report addresses aesthetics of the marine component of the Great Barrier Reef linking it with community benefits of the environment. Port activities are identified as activities adjacent to the region with the report identify potential impacts to the marine environment from port and associated activities include *diminished aesthetic values for users and nearby communities*. Impacts on the values of the region are addressed more fully in Section 6 of the report and in particular for aesthetics, Section 6.7 Impacts on community benefits of the environment. These include: *The benefits derived by people understanding, appreciating, enjoying and admiring the Region's environment are most*

Document	Applicability to Project and Values Present
	affected by those impacts that significantly affect key values - in particular… the land and seascapes … *The aesthetic values of the Region may be diminished by development activities. For example the building of structures, industrial and port developments, and coastal reclamation could affect the natural scenic values of the coastal areas. Marine debris, along with oil and chemical spills, also affects the aesthetic value of seascapes and islands. Coastal reclamation may affect aesthetic qualities of the landscape and seascape. Increased turbidity diminishes the Region's underwater aesthetic values. Artificial light and noise pollution associated with coastal development and increased shipping activities and anchorage areas may diminish aesthetic attributes such as tranquillity, solitude and remoteness.* Table 7.8 addresses current condition and trend of community benefits of the environment and identifies aesthetics as being good which represents that there is *a valuable contribution to the wellbeing of local communities and the nation. The Region contributes to regional and national economies, and is valued, understood and enjoyed by catchment residents, the nation and the world community.*
Great Barrier Reef Coastal Zone Strategic Assessment – Strategic Assessment Report (2013)	This report along with the Great Barrier Reef Region Strategic Assessment, together informed the Reef 2050 Long-Term Sustainability Plan and *is a broad systems and landscape scale assessment of Queensland Government's policies, plans or programs that relate to the management and protection of matters of national environmental significance*.

3.3 Far North Queensland Regional Plan, 2009-2031

The Far North Queensland Regional Plan is the over-arching plan for the region and sets a clear vision, focusing on five keys themes for Queensland communities:

> Strong - create a diverse economy powered by bright ideas;

> Green - protect our lifestyle and environment;

> Smart - deliver world-class education and training;

> Healthy - make Queenslanders Australia's healthiest people; and

> Fair - support a safe and caring community.

The vision for the Far North Queensland region builds on these elements and defines the community's long-term aspirations for the region. The Regional Plan also includes specific policies relating to the protection and management of the region's landscape values and scenic amenity. Relevant extracts from these policies include:

"2.1 The region's landscape values are identified, protected and managed through an integrated planning approach." (page 46)

"2.3 The visual amenity of the region's natural landscapes, seascapes and productive rural lands is protected and enhanced." (page 50)

"2.3 The region's tropical outdoor lifestyle is valued, protected and managed to provide a range of experiences which enhance liveability." (page 50)

"2.3.1 The visual amenity of the region's landscapes and seascapes is protected and enhanced by assessing proposed developments on landscapes that are vulnerable to visual impact due to their prominence, topography or degree of naturalness." (page 50)

"2.3.4 Public access to significant popular viewpoints is retained, and views protected from development that diminishes the scenic values." (page 50)

The policy demonstrates a clear objective to retain and protect areas of high scenic amenity value within the Cairns Region.

3.4 Cairns Regional Council

3.4.1 CairnsPlan 2016

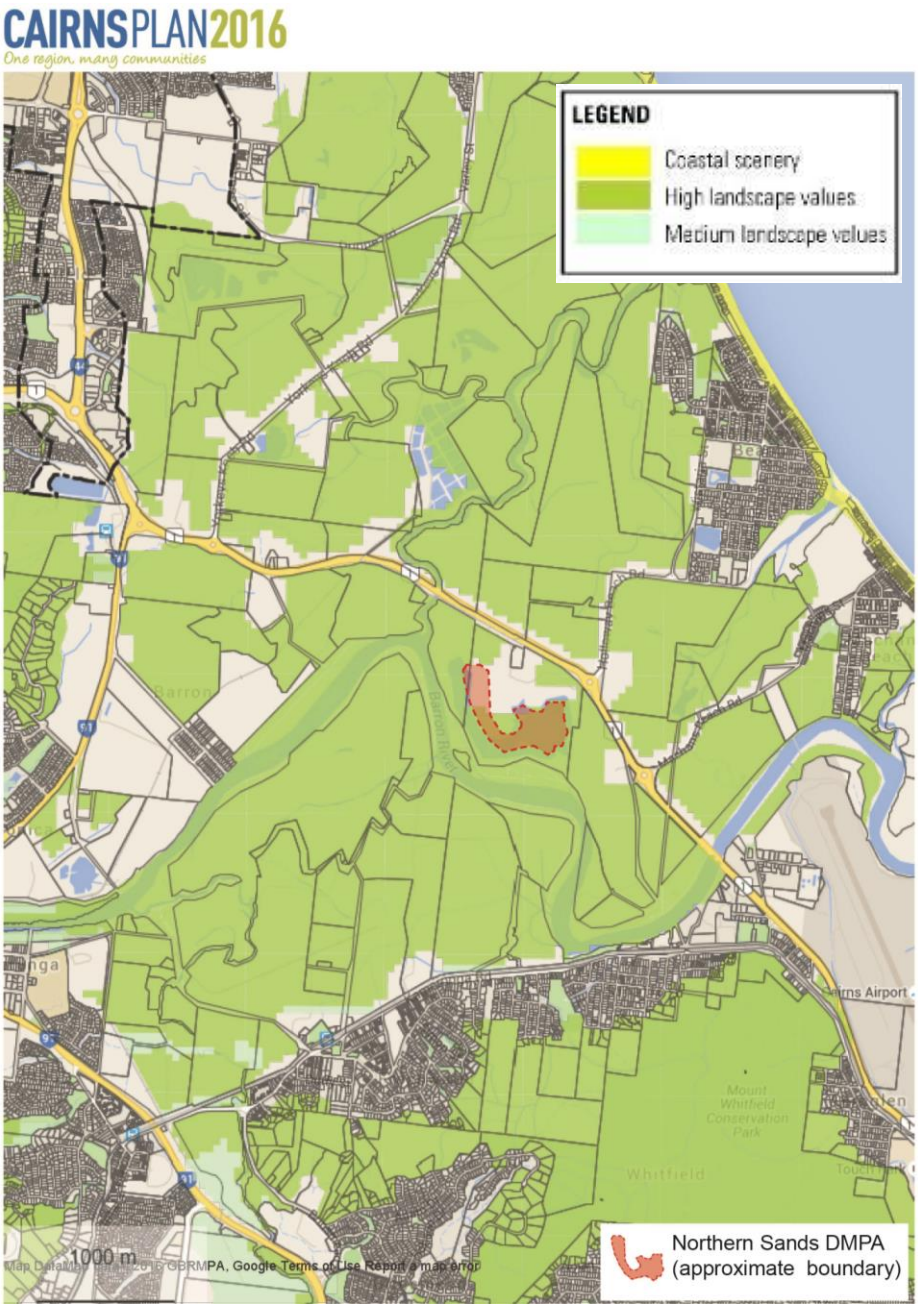
The relevant local government planning scheme (CairnsPlan 2016) incorporates specific provisions and an overlay relating to scenic amenity. However, while CairnsPlan 2016 applies only to the Northern Sands DMPA as Strategic Port Land, on which the wharf facilities and the Tingira Street DMPA are located, is not administered through the local government planning scheme.

The strategic framework and landscape provisions of CairnsPlan 2016 are however still of relevance to the project, as tabulated in Table 3-2.

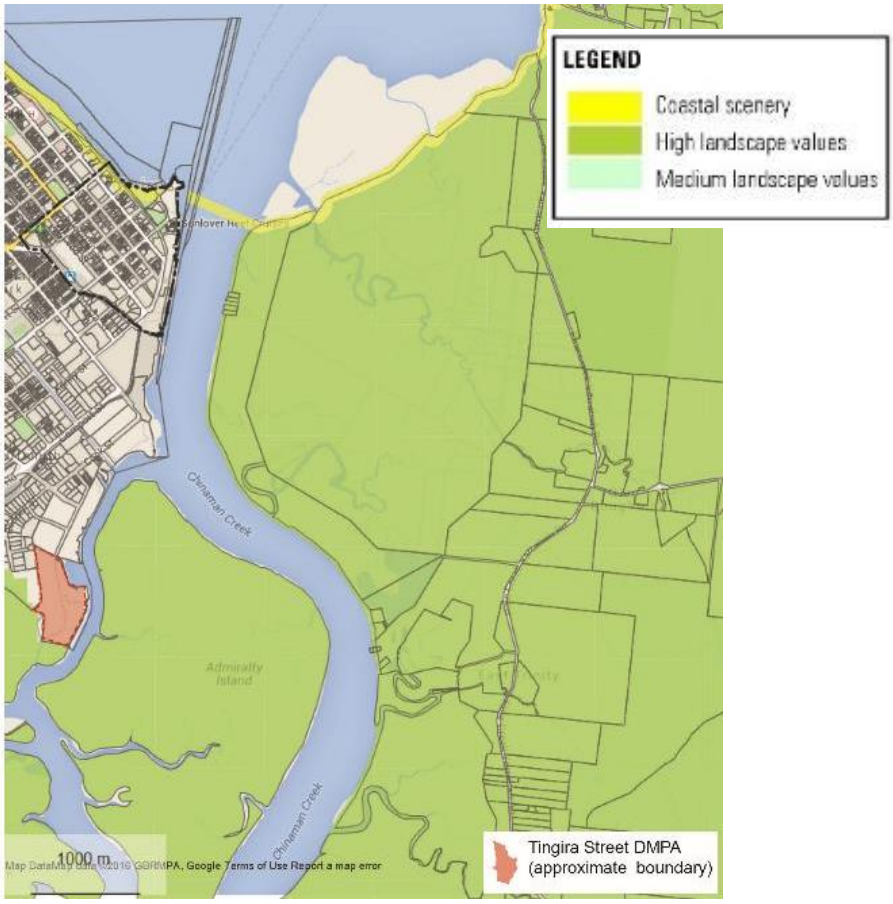
Table 3-2 CairnsPlan 2016

Planning Scheme		Applicability to Project and Values Present
Strategic Framework		
Strategic intent		***Provisions*** The Strategic Intent, Section 3.2, envisages that in 2031 '*the Cairns region is internationally renowned for its natural beauty….*' This is reflected in the strategic outcomes of the settlement pattern theme which identifies that the region grows and evolves in a way that '*(m) maintains and enhances the scenic amenity, tropical character and identity of the region*'
Settlement pattern theme	Element – Rural Areas	**Provisions** For Rural areas the specific outcomes include that '*Rural areas that provide an inter-urban break or have scenic landscape value are retained in their form for that purpose*'.
	Element – Industry areas and activities	**Provisions** For Industrial areas the specific outcomes include 'Uses that are sensitive to the impacts of industry activities do not establish within industry areas' and that 'Waterfront and marine industry areas are predominantly used for waterfront and marine industry and associated uses for which a location adjoining or near the waterfront is essential'
Natural areas and features theme	Strategic Outcomes	***Provisions*** Under the strategic outcomes of the natural areas and features theme ' *(2) The region's internationally renowned tropical landscapes incorporating the hillslopes and foothills, marine and freshwater wetlands, beaches, headlands, streams and rivers, rural lands and open spaces are valued economically, aesthetically, culturally and socially and are protected from development that diminishes their ecological, social and economic value.* *3) Development avoids areas of environmental significance. Where avoidance is not possible, development is designed, sited, operated and managed to mitigate adverse impacts on areas of environmental significance.* *(5) Development within the region's World Heritage Areas is sustainable and planned to conserve the ecological and scenic values of the area.*
	Element – Waterways, wetlands and water catchments	***Provisions*** The Strategic Framework contains an element relating specifically to waterways (Section 3.4.3.1). The specific outcomes are: *(1) The environmental values of waterways, wetlands and water catchments are protected.* *(2) Water quality of waterways, wetlands and water catchments is maintained and, where possible, enhanced.* *(3) Waterway and wetland health and aquatic biodiversity is conserved and*

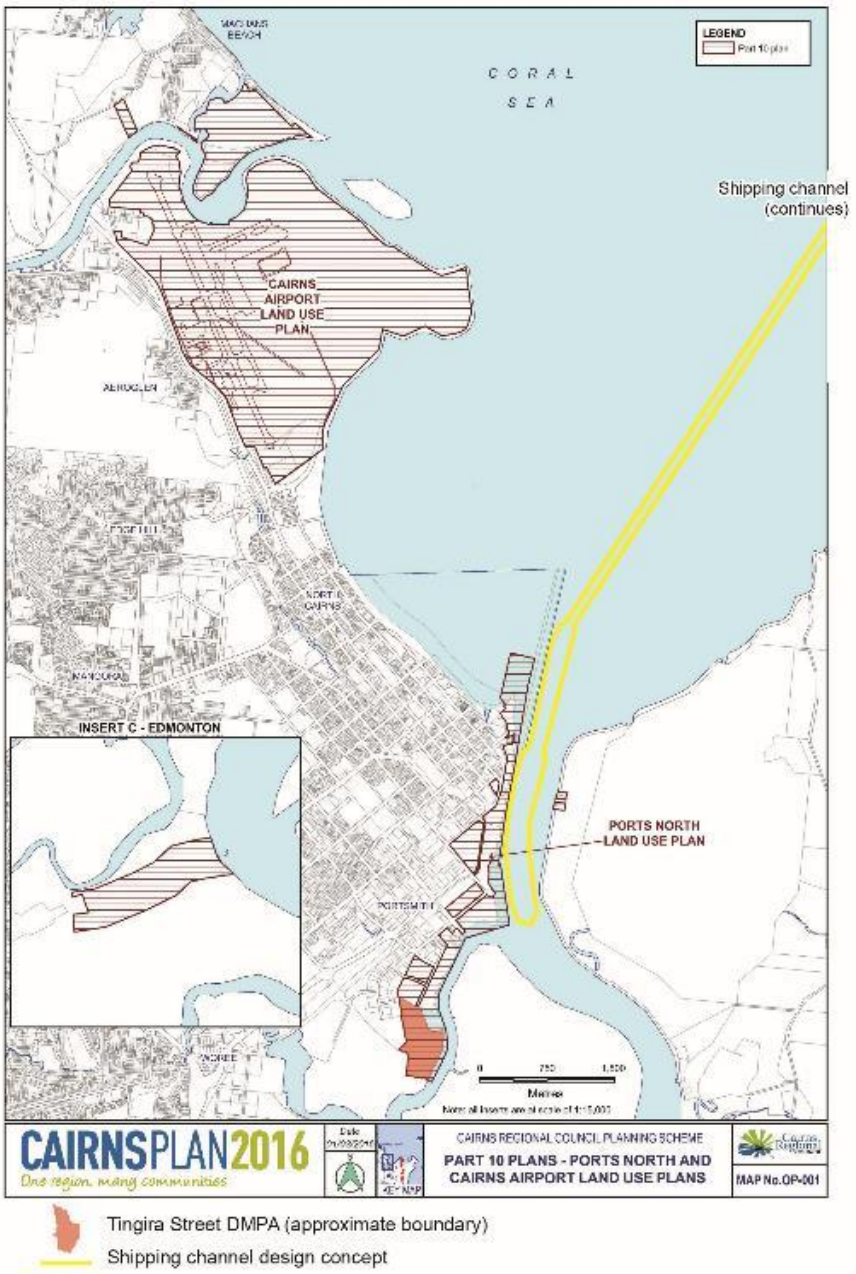
Planning Scheme		Applicability to Project and Values Present
		downstream adverse impacts on the Great Barrier Reef do not occur. *(4) The quality of riparian areas around waterways and wetlands are maintained or rehabilitated to a high standard for their ecology.* *(7) Development is planned, designed, constructed and operated to conserve water quality, in-stream and riparian waterway values, and recreational use of natural and modified waterways and wetlands and their catchments across the region.*
	Element - Landscapes	***Provisions*** The Strategic Framework contains an element relating specifically to landscapes (Section 3.4.4.1). The specific outcomes are: *(1) Development protects, maintains and enhances the region's landscape values.* *(2) Rural and inter-urban breaks are protected from visual intrusion.* *(3) Major scenic routes and scenic outlooks are protected from both the detrimental visual impacts of development and inappropriate vegetation clearing that may detract from the scenic qualities of the scenic route or outlook.* *(4) The hillslopes are retained as the scenic backdrop to the region and the ecological values and landscape character of the hillslopes are protected from inappropriate development.* *(5) Development on hillslopes and potential landslip hazard areas responds to the constraints of the land including vegetation, gradient and slope stability.*
	Element – Coastal Areas	***Provisions*** Specific Outcomes *(2) The scenic amenity of the coastal areas is protected from inappropriate development that is visually dominant or visually intrusive.*
Landscape Values Overlay		

Planning Scheme	Applicability to Project and Values Present
Application	This code applies to assessing development within the Landscape values overlay. **Northern Sands DMPA** – part High Landscape Values  **Tingira Street DMPA** - although not designated as a valued landscape per se, it is surrounded by the high landscape value areas of Admiralty Island,

Planning Scheme	Applicability to Project and Values Present
	East Trinity and the extensive mangroves ecosystems in the area



Shipping Channel & Port Facilities

Planning Scheme	Applicability to Project and Values Present
	
Purpose	***Provisions*** *The purpose of the Landscape values overlay code is to ensure that development protects, maintains and enhances the landscape values within the Cairns region.*
Criteria for Assessment	Landscape values overlay code – assessable development High landscape value areas Development within the coastal scenery zone
Planning scheme policy – Landscape values	
Purpose	The purpose of policy is to provide guidance about the assessment required to satisfy the planning scheme requirements relating to properties affected by the Landscape values overlay code.

3.4.2 Cairns Region Scenic Amenity Study

The Cairns Region Scenic Amenity Study (Cardno Chenoweth, 2012) mapped and assessed the landscape attributes of the Cairns Regional Council area (excluding Yarrabah), and identified places and features of regional significance for either scenic amenity. This study formed the basis of the landscape values provisions included within CairnsPlan 2016 as addressed above.

The study identified a number of Landscape Character Types:

> Forested mountains - including the uplands of the Macalister Range which forms the backdrop to the northern beaches, also in views from offshore;

> Grassy hillsides;

> Lowland areas - coastal and river plains and valley floors which are not used for sugar cane;

> Canefields - lowlands used for the production of sugar cane;

> Coast including beaches, bays, mangroves and inshore ocean. Some of the beaches have an 'iconic' combination of white sand, fringing vegetation, and long views over the Coral Sea;

> Inland watercourses including the Barron, Russell, Mulgrave, Mowbray and Daintree Rivers, plus the associated gorges and waterfalls and the many tributary creeks; and

> Urban areas - including Cairns and its outer suburbs (including the Northern Beach suburbs) as well as Mossman, Gordonvale, Port Douglas and smaller towns.

This study also identified the regional significance of canefields, rivers or coastlines with forested hills in the background including features which show or help define these elements and their edges. Gateways, lookouts and view corridors are significant contributors to scenic amenity and character, and deserve consideration in planning and development. The bridge crossing the Barron River on the Captain Cook Highway is one such 'gateway'.

In terms of Scenic Amenity rating (a combination of visual exposure and scenic preference) the site is assessed and mapped as low scenic amenity (rating 2) and low scenic preference (rating 2-3), notwithstanding that the area was modelled as having very high visual exposure. However, the 2012 visual exposure modelling was based on topography alone (excluding vegetation), and conservatively modelled the low-lying areas as highly visible. The nearby areas of Trinity Inlet and Admiralty Island are comparatively high scenic amenity, with ratings of 9 - 10.

4 Existing Landscape and Visual Environment

4.1 Existing Landscape and Scenic Values

4.1.1 Landscape Character and Values of the Cairns Region

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. 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.

City 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 valley of the Mulgrave River catchment provides another inter urban break separating Cairns from Gordonvale and rural townships further south. Most of these inter urban breaks including the Barron Delta are 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

4.1.2 Cairns Scenic Amenity

The Cairns Region Scenic Amenity Study (Cardno Chenoweth 2012) identified places and features of regional significance in terms of their contribution to scenic amenity and the character and identity of the region. Distinguishing features of the region include the rainforest clad mountain ranges which frame the coastal plains, the river deltas and the tracts of cane land, coastal headlands and sandy coastal beaches, waterways and estuarine mangroves and offshore waters, .which were mapped as Landscape Character Types (LCT).

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*". With respect to the Trinity Bay Project Area, the Scenic Amenity Study categorised the components as:

> **Shipping Channel**

The shipping channel is part of the Port of Cairns and outside the boundary of the Cairns local government area, and partly within and partly excluded from the GBRMP. Although the Scenic Amenity Study was mainly land-based, the shipping channel was included in the 'coastal' land cover classification. All coastal waters were categorised as having High Landscape Values.

> **Northern Sands DMPA**

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' Gorges and Semi Secluded Valleys LCT' (and hence a 'significant landscape feature'); and 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 site 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 pipelines will potentially impact on these features depending on their form, proximity to the shoreline and visibility from the ocean.

> **Tingira Street DMPA**

Tingira Street DMPA is 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.

> **Port Facilities**

The Port facilities includes the land-based infrastructure areas of the fuel farm including tank infrastructure for the IFO, and similarly was not identified as a valued landscape.

In terms of Scenic Amenity rating (a combination of visual exposure and scenic preference) the Northern Sands site was assessed and mapped as low (Rating 1-5), notwithstanding that broadscale modelling (based on landform, without screening vegetation) indicated that the Barron Delta had generally high visual exposure. Field survey confirms that most long views from the highway across the delta (including to the Northern Sands DMPA) are screened by roadside vegetation, except for a gap at the entrance, and some opportunistic glimpses through planting. Tingira Street, 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 location of the DMPAs did not form part of any designated scenic route.

4.1.3 Landscape Character Context

The project visual catchment comprises several Landscape Character Context areas: the Barron Delta, the Cairns coastline (including the coastline to False Cape) and Trinity Inlet (including Admiralty Island and tributary creeks), and 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, Islands, and the mudflats fringing Cairns. Mountains and hillslopes include the Macalister and Lamb Ranges, the Malbon Thomson Range, and Mt Whitfield (Figure 4-1).

Barron Delta

The Barron River is the largest river in the Cairns region, passing through the Barron Gorge to meet the sea at its estuary 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 enters the Coral Sea between Holloways Beach and Yorkeys Knob.

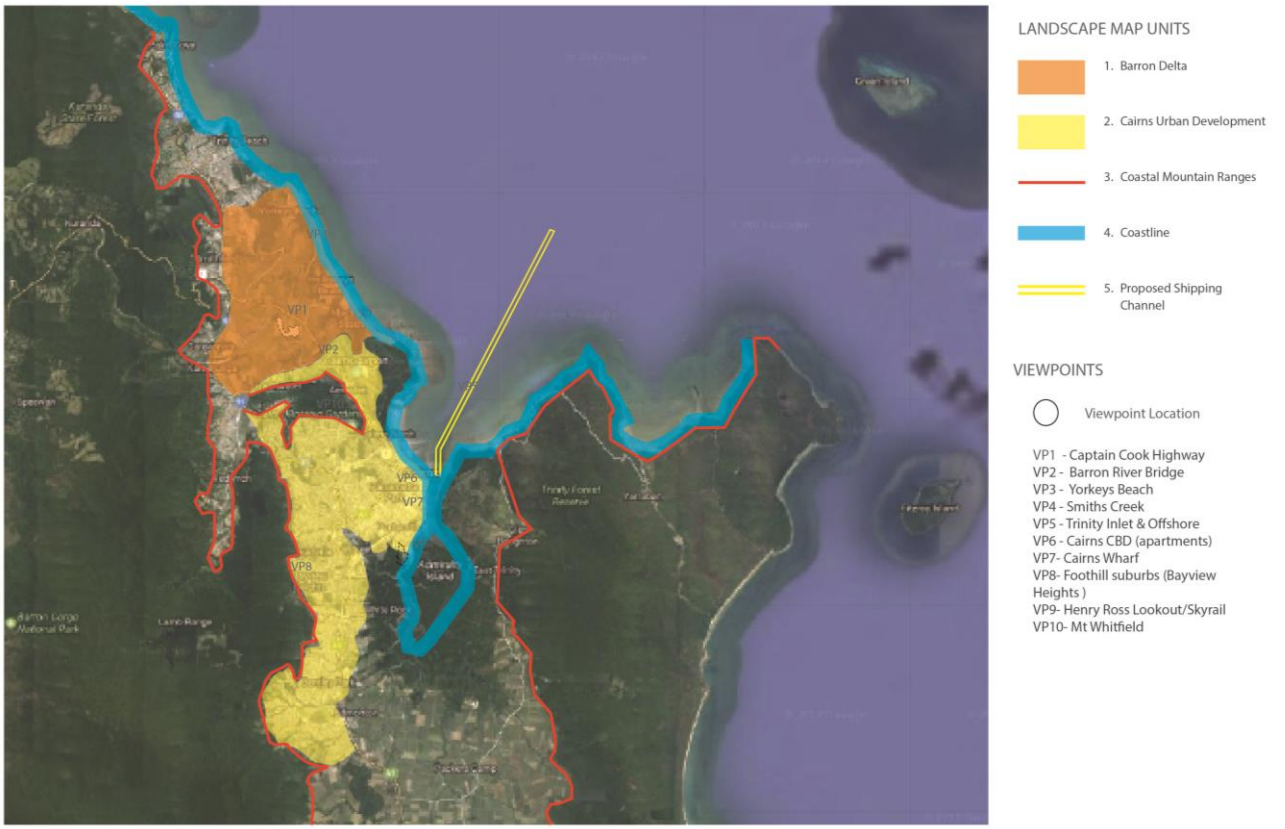


Figure 4-1 Landscape Character Context and Viewpoints

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, Go-kart tracks 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 scenic qualities of the distinctive cane fields along the Delta contribute to the iconic character and appeal of the region generally 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 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 planes approaching or departing Cairns Airport and is also visible from Henry Ross Lookout on the Kuranda Range on a clear day.

Cairns Coastline

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. 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.

Cairns Urban, Industrial and Port

The coastal suburb of Portsmith runs along the western side of the 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, 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 operators as well as the many recreational fishing boats and moored yachts.

While parts of Portsmith are seen mainly from boats along the Inlet or its tributary creeks, other parts can be seen from elevated buildings in 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.

Coastal Mountain Ranges

The Cairns region is characterised by its tropical mountain ranges, which defines and separates 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 (Figure 4-2), 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.

Figure 4-2 – Aerial View over Cairns Port and East Trinity to Malbon Thomson Range

4.1.4 Scenic and Aesthetic Values of GBRWHA

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 6 of this report, 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 6 and detailed in Table 6-1.

4.2 Viewpoints and Context

The 10 viewpoints' identified in Figure 4-1 and grouped according to Landscape Character Context, have been selected on the basis of ZVI modelling, which indicates potential areas of visibility.

4.2.1 Barron Delta

Aerial view of Barron Delta and the Barron River

Rural land uses including cane fields

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. The flat, low-lying floodplains of the Barron Delta are 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.

4.2.2 Cairns Coastline

View south east from Holloways Beach

View from 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 MLWS, and most estuarine inlets, is a part of the GBR World Heritage Area.

4.2.3 Cairns, Industrial and Port

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

4.2.4 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.

5 Landscape and Visual Impact Assessment

5.1 Risk Assessment Approach

A risk management approach involves identifying the potential landscape and visual impacts associated with the project, assessing the risks involved, and developing mitigation measures to eliminate, or minimise, residual environmental risk. A project risk assessment process has been undertaken in order to assess and adequately manage the risks posed to the existing landscape and visual environment during both the construction and operation phases of the project. The results of this risk assessment process are contained in Section 5.7 of this report.

In assess risks of adverse visual impacts, the consequences, duration and likelihood of impacts (as shown in Tables 5-1 to 5-3) determine risk ratings (as shown in Tables 5-4 and 5-5).

The visual impact consequences detailed in Table 5-1 have been used to assess the risks associated with construction and operation of the whole of the project as designed, by day and by night time, without additional 'risk treatment' (management and/or mitigation). Generally, mitigation of visual impacts involves changing their likelihood, or changing their consequences.

For this project, visual impact assessment is based on views from publicly accessibly viewpoints in a range of locations including coastal areas, known scenic views and places likely to attract viewers. The significance of any visual impact is based on the visibility and scale of change, the extent and permanence of the affected view and the sensitivity of the viewshed.

Table 5-1 Risk Consequences in terms of Visual Amenity

Impact Consequences	Qualitative Description
Beneficial	Impacts have a positive outcome on the existing situation. This could include, for example, an improvement in scenic amenity.
Negligible adverse	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
Minor adverse	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
Moderate adverse	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
High adverse	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
Very High adverse	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

Impact Consequences	Qualitative Description
	and associated national or state visual sensitivity Bright lighting which permanently changes observer experiences of a previously-dark nightscape over an extensive area

Source: Adapted from *Guidelines for Landscape and Visual Impact Assessment* (The landscape Institute and the Institute of Environmental Management and Assessment, 2002)

In Table 5-1 above, the time periods referred to (duration of impact) are specified below in Table 5-2

Table 5-2 Duration of Impact

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

Table 5-3 Risk Likelihood Levels

Impact Likelihood	Qualitative Description
Highly Unlikely / Rare	The event may occur in exceptional circumstances; not heard of at similar developments.
Unlikely	The event may occur at some time but is unlikely; heard of happening from time to time at similar developments.
Possible	May or may not occur; event may occur once during the life of the development.
Likely	Probable that it will occur; event has occurred several times before at similar developments.
Almost Certain	The event is expected to occur; event will occur on an annual basis (or more frequent).

Table 5-4 Risk Rating Matrix

(see legend in Table 5-5 below)

Likelihood	Adverse Consequences					
	Beneficial	Negligible	Minor	Moderate	High	Very High
Highly Unlikely / Rare	Negligible	Negligible	Negligible	Low	Medium	High
Unlikely	Positive Benefit	Negligible	Low	Low	Medium	High
Possible	Positive Benefit	Negligible	Low	Medium	Medium	High
Likely	Positive Benefit	Negligible	Medium	Medium	High	Extreme
Almost Certain	Positive Benefit	Low	Medium	High	Extreme	Extreme

Table 5-5 Risk Rating Legend

Risk	Description

Risk	Description
Positive Benefit	Likely to result in a net benefit
Negligible	No impact mitigation or management required
Low	Manageable by standard mitigation and operating procedures
Medium	Requires project-specific measures to mitigate and manage impacts
High	Significant mitigation measures need to be implemented before works commence and are to be maintained during construction and/or operation
Extreme	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

5.2 Visibility of the CSD Project

The following section provides an assessment of the visual impacts arising from the construction and operation of the project and/or the proposed DMPA's 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.

5.2.1 Shipping Channel and Ships

The visibility of the Channel Project Area to external viewers is modelled as a ZVI (Figures 5-1 to 5-4 and Appendix B). 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', the largest ship which currently uses the existing channel) or 63m (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 has not been 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 63m high ship (future) has been compared to that of the existing baseline situation (a 52m high ship). The ZVIs model the extent of proposed change in ship size and visibility likely to be facilitated by the project.

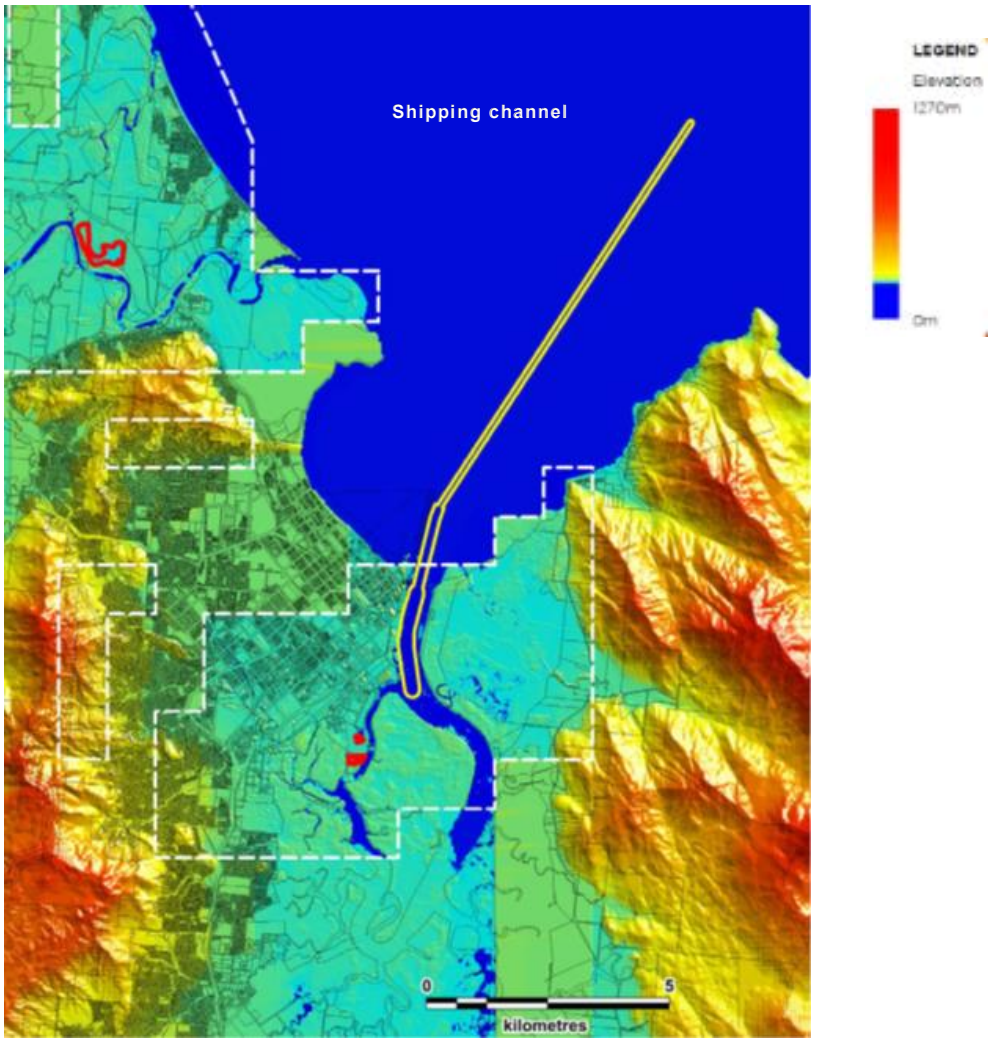


Figure 5-1 DSM of Study Area showing Shipping Channel in topographic context

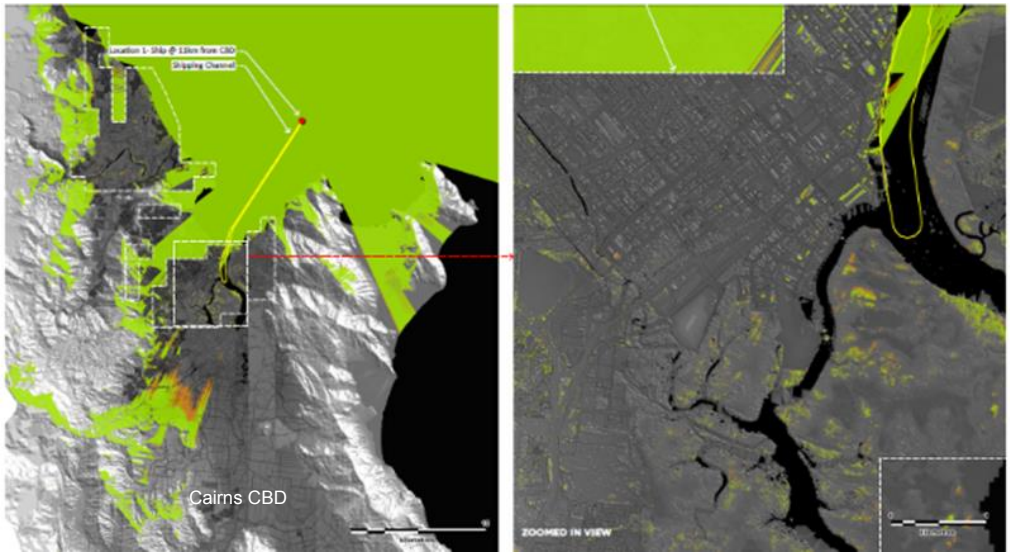


Figure 5-2 ZVI of Shipping Channel – Outer Channel

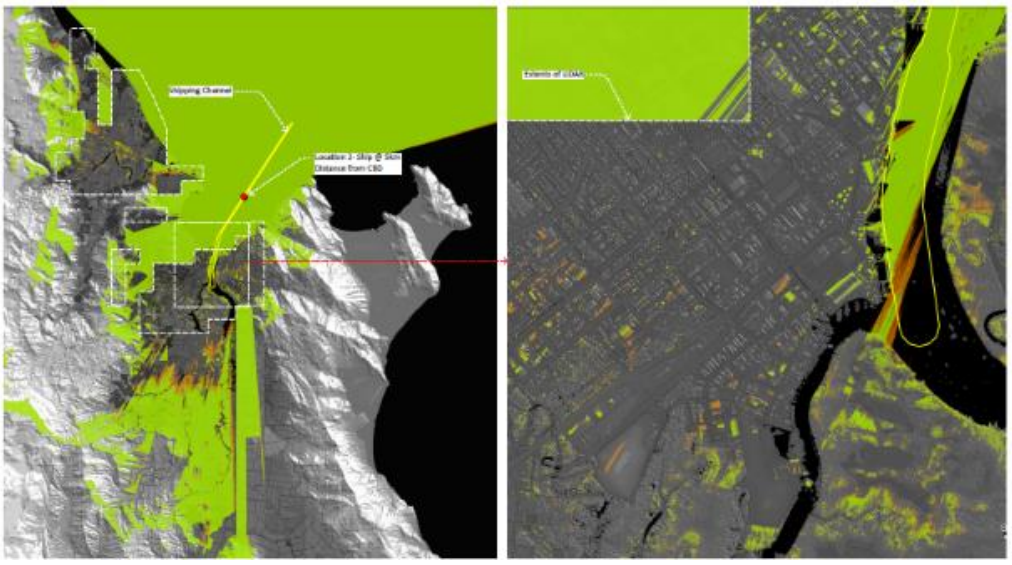


Figure 5-3 ZVI of Shipping Channel – Middle Channel

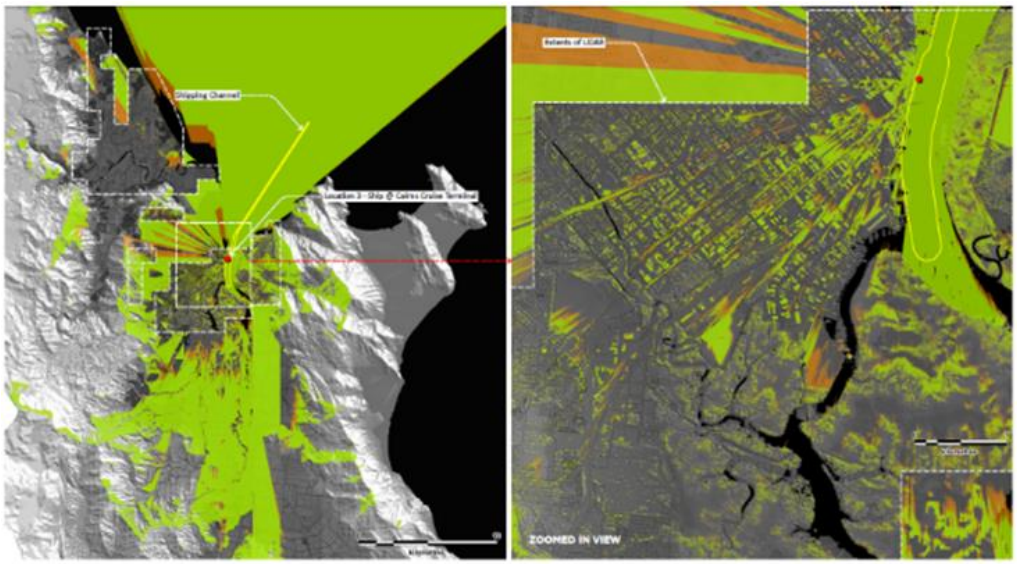


Figure 5-4 ZVI of Shipping Channel – Inner Channel

LEGEND
Visibility of Existing Ships (Rhapsody of Seas- 52m high)
Visibility Increase by Proposed Ships (Voyager of the Seas- 63m high)

5.2.2 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 water surface at a minimum of 0m AHD and also with the proposed temporary bund at 7.5m AHD l, 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 5-5 and Appendix B). 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 5-5 and Appendix B) 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 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.

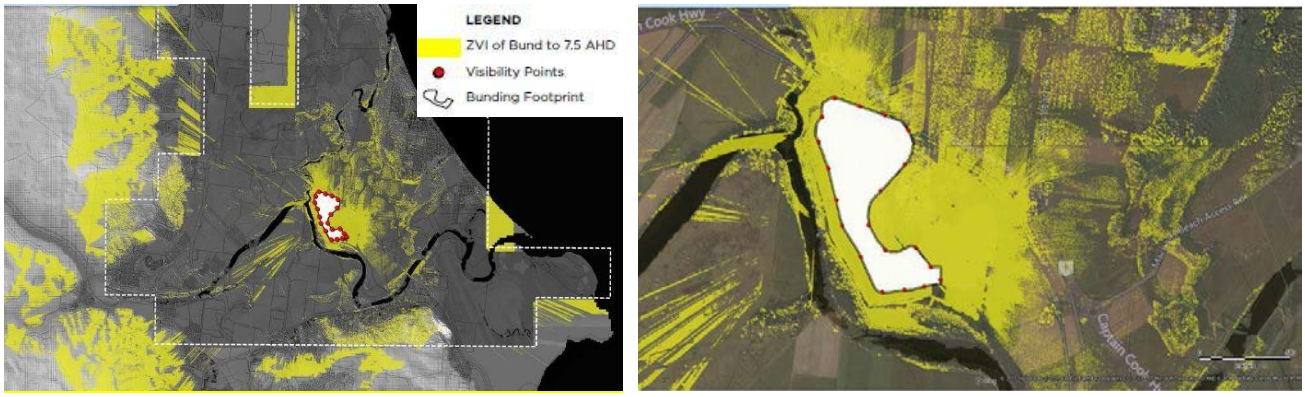


Figure 5-5 ZVI of Northern Sands DMPA

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.

5.2.3 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 5-6 and Appendix B). 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.

5.2.4 Port Facilities

The proposed upgrade to the wharf facilities and land-based infrastructure as described in section 1.3 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.

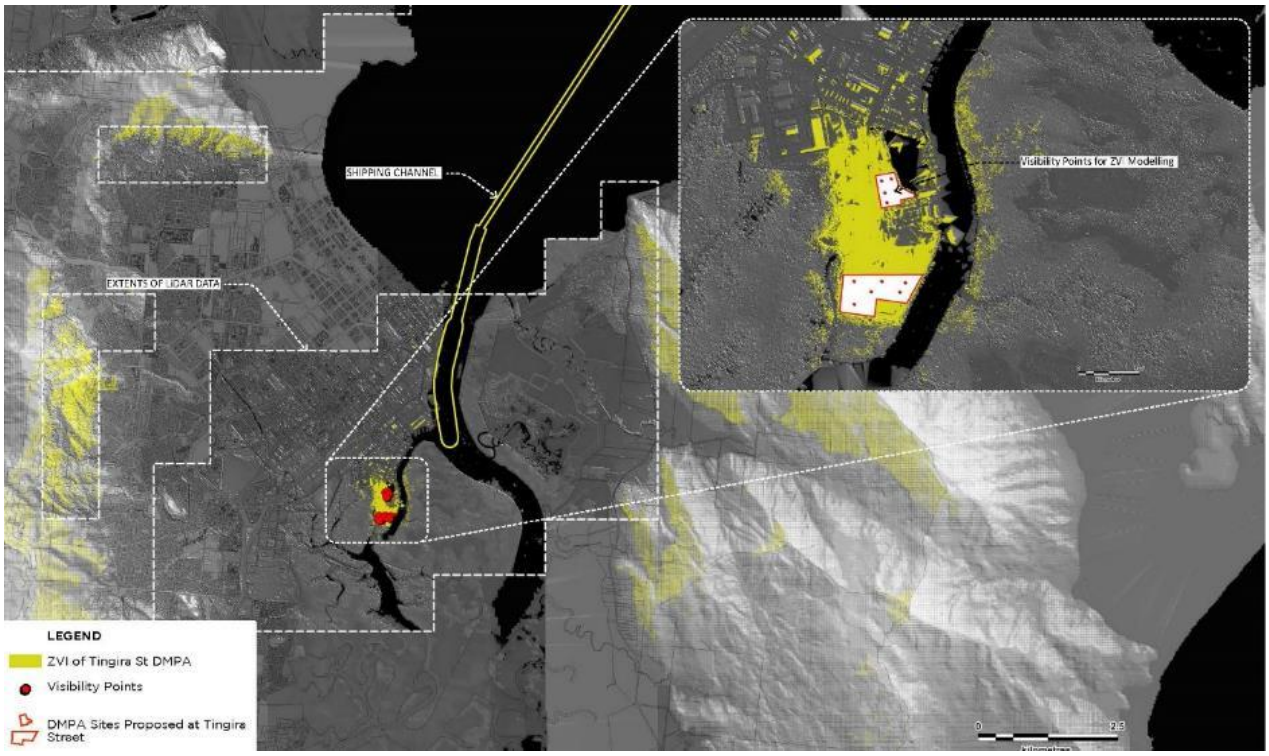


Figure 5-6 ZVI of Tingira Street DMPA

5.3 Visual Impacts in Landscape Character Context

5.3.1 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.

VP1 - View from Captain Cook Highway looking towards the existing Northern Sands site

VP2 - View towards Northern Sands DMPA from Barron River Bridge (Google 'Streetview' 2015)

Figure 5-7 Views from VP 1 & 2 towards Northern Sands DMPA

Project Works

Shipping Channel and Ships

The increase in the size of ships (an 11m 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 terminal. The ZVI indicates that there will be negligible changes in visibility of larger ships located at the outer channel (approximately 11 kilometres 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 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 pipelines and associated infrastructure located at Yorkey's Beach will potentially be visible from elevated viewpoints, or coastal areas in close proximity to the booster pumps. Any inshore marine-based infrastructure is likely to be noticeable however, the pipelines 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.

Port Facilities

Neither the wharves nor the land-based infrastructure, including the additional storage tanks at the proposed existing fuel farm will be visible from the Barron Delta areas.

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. 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.

5.3.2 Cairns Coastline

The proposed CSD Project will be visible from a number of Cairns coastline viewing locations.

VP3 - Yorkeys Beach and residences on Janett Street, Yorkeys Knob (Photos by David Rivett, 2013)

VP4 - View from Smiths Creek

VP5 - View from Trinity Inlet

Figure 5-8 Views from Trinity Inlet and coastal viewpoints VP 3 - 5

Project Works

Shipping Channel and Ships

The difference in size between the largest ship currently using the channel ('Legend of the Seas at 52m 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 63m height above sea level, equivalent to a 20 storey hotel) is 11m, 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, combined with the existing port facilities., 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, parts of the pump-out structure, offshore pipeline and booster stations proposed near Yorkeys Knob will be visible from some boat-based viewpoints, looking back towards the mainland. While the pump-out structure will be visible from its immediate surrounds, its 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 Yorkey's Knob beach, near Richters Creek (VP3), and from nearby parts of Holloways Beach. Although the pipelines will be either submerged or at low elevation and will not be overly apparent from offshore views (they may be seen as 'slivers' on the surface of the water), they will be seen from the beach, as will the pipe fabrication and storage areas. 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.

Port 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 11m 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.

5.3.3 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.

VP6 – Views from Cairns apartments (arrows in top two images indicate approximate location of Tingira Street DMPA) (Arup,2014)

VP7 - Views from Bayview Heights (View Close) Google Earth Streetview (2016)

VP8 - Cairns Wharf - View south along the heritage listed wharf and clock tower with the historic sugar sheds building to the west (Arup, 2014)

Figure 5-9 Views from Cairns urban, industrial and port areas VP 6 - 8

Project Works

Shipping Channel and Ships

The proposed 11m 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, 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. 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. However the number is estimated to increase to between 107 to 173 vessels per year by 2026 (an estimated 5 – 10 % increase in arrivals and departures per year[1]). The 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 are unlikely to affect the perceived character of Trinity Bay and the port. .

[1] AEC Group (June 2016) Cairns Shipping Development 2016 Demand Study Update, for Ports North

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 kilometres 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 facility 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.

Port 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.

5.3.4 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.

VP9 - View from Henry Ross Lookout over the Delta (daytime photo April 2017, night time 2013)

VP10 - Mount Whitfield Conservation Park - Elevated view across Cairns and the Trinity Inlet with distant views to Malbon Thomson Range (Arup, 2014)

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 kilometres) 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 kilometres 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.

Port 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, 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.

5.4 Summary of Landscape and Visual Impacts

5.4.1 Impacts on Viewers

Viewers in the Cairns Region generally, and in particular those at the nominated viewpoints (Figure 4-1) 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 and the dredge mooring point in the shipping channel, project-related activity at the port, and pipes, pumps and barges taking dredged material to the DMPAs. 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 already a generally turbid environment. However when operational, the deepened channel will be capable of navigation by larger ships (up to 11m 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.

5.4.2 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.

5.4.3 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 St); 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.

5.4.4 Impacts on World Heritage Values

While the project sites are adjacent to or will affect GBRWHA waters, neither of the two DMPAs will be visible from offshore nor seen by most GBRWHA visitors, including tourists on ferry routes, although the Tingira St 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 6-1, there are no aesthetic OUV attributes of the GBRWHA which are present in the shipping channel or the DMPA sites 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 and the current periodic 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.

5.5 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 earlier in the report, 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.

5.6 Mitigation Measures

In general, the location, surrounding vegetation flat topography of the DMPAs, the absence of adjacent residential uses, the temporary nature of the proposed bunding and the relatively low elevation of the final fill levels mitigates most landscape and visual character impacts.

Where additional mitigation is warranted during the construction phase, both DMPAs have ample opportunities to screen views from nearby streets into the sites by planting fast growing trees and shrubs along the property boundary and/or within the road reserves. This could be undertaken prior to works commencing, to ensure a suitable buffer height and density by the time operations commence.

Any future development of the filled DMPAs, including use of the Tingira St DMPA in accordance with the Seaport Local Area Plan, will be subject to further application and consideration of visual impacts and mitigation measures.

5.7 Visual Impact Risk Assessment

Table 5-6 summarises in standard risk matrix format, the likelihood and consequences of visual impacts associated with the CSD Project. Also included in Table 5-6 for completeness, although addressed in Section 6 below, are visual impact risks to the Outstanding Universal Value of the GBRWHA. As indicated in Table 6-1, it is only Attribute 3 (*Coastal and adjacent Islands with mangrove systems of exceptional beauty)* which is represented to any extent in the parts of the study area likely to be affected by the CSD Project, and accordingly this attributed is assessed for visual impact risks in Table 5-6.

In summary, the risks of adverse visual impacts associated with the construction phase of the CSD project are generally low or negligible, 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 risks of ‘medium’ adverse visual impacts are the additional dredge plumes, barge movements and lighting which may be visible from some Cairns high-rise apartment buildings, and some additional lighting glow as seen from mangrove systems near the Port. However these risks can be reduced to ‘negligible’ by standard management and mitigation measures such as plume management, directed lighting and screen fencing of construction activities, as will be detailed in EMPs.

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

Table 5-6 Visual Impact 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. Lighting of compounds and works sites will be restricted to agreed hours and in accordance with a Construction Environmental Management Plan.	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		Negligible	Negligible
Cairns Coastline								
Yorkeys Knob Yorkeys Knob beach	Visual intrusion of the dredge pipeline and associated infrastructure	Short Term	Minor	Unlikely	Low	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 to minimise the potential for turbidity plumes.	Negligible	Negligible
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
	Additional light glow from construction activities	Medium Term	Minor	Possible	Low		Negligible	Negligible

Viewpoint	Potential Impact	Duration	Consequence	Likelihood	Risk Rating	Mitigation	Post-Mitigation Consequence	Residual Risk Rating
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. Lighting of compounds and works sites will be restricted to agreed hours and in accordance with a Construction Environmental	Negligible	Negligible
	Visual intrusion from dredge plumes and associated machinery	Short Term	Negligible	Possible-	Negligible		Negligible	Negligible

Viewpoint	Potential Impact	Duration	Consequence	Likelihood	Risk Rating	Mitigation	Post-Mitigation Consequence	Residual Risk Rating
	Additional light glow from construction activities	Medium Term	Negligible	Possible	Negligible	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
Outstanding Universal Value GBRWHA Aesthetic Attribute 3 (Coastal … Mangrove Systems of Exceptional Beauty) – See Table 6-1								
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	Change in perceived character of Trinity Bay 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
Cairns Coastline								
Yorkeys Knob Smiths Creek Trinity Inlet and Offshore	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 height 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.	Negligible	Negligible

Viewpoint	Potential Impact	Duration	Consequence	Likelihood	Risk Rating	Mitigation	Post-Mitigation Consequence	Residual Risk Rating
						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.		
Cairns Urban, Industrial and Port								
Cairns High-Rise Apartments Foothill Suburbs - Bayview Heights/ Caravonica Cairns Foreshore Cairns Wharf	Change in perceived character of Trinity Bay, due to increase in ship size and frequency	Long Term	Negligible	Possible	Negligible	Increase in ship height 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	Low	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	Change in perceived character of Trinity Bay 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
Outstanding Universal Value GBRWHA Aesthetic Attribute 3 (Coastal … Mangrove Systems of Exceptional Beauty) – See Table 6-1								

Viewpoint	Potential Impact	Duration	Consequence	Likelihood	Risk Rating	Mitigation	Post-Mitigation Consequence	Residual Risk Rating
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

6 Outstanding Universal Value of the GBRWHA

6.1 Scenic and Aesthetic Attributes

While the Cairns Port area and the shipping channel are excluded from the Great Barrier Reef Marine Park and the World Heritage Area, the remainder of Trinity Bay and Cairns foreshore area, plus the tributaries of Trinity Inlet and Smiths Creek and Admiralty Island are part of GBRWHA waters. These parts of the bay are also seen by World Heritage Area visitors, hence the aesthetic attributes which contribute to its OUV are relevant considerations. The UNESCO 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 Great Barrier Reef has been World Heritage-listed because it meets all four of the natural environment criteria, including the aesthetic criterion (vii) "*containing superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance"*. 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 viewshed associated with this project are addressed in Table 6-1.

Table 6-1 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 - 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 9km away) and Green Island (25km 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. 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 cleared site and the proposed works will not impact on habitat.
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 ie. Attribute 7 of the OUV may be present, but to no greater extent than any other coastal and estuarine waters.

As indicated in Table 6-1, 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.

7 References

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Context (2013) Defining the Aesthetic Values of the Great Barrier Reef: Final Report for SEWPaC

Great Barrier Reef Marine Park Authority (2014) Great Barrier Reef Region Strategic Assessment: Strategic assessment report

Landscape Institute and the Institute of Environmental Management and Assessment (2002) Guidelines for Landscape and Visual Impact Assessment, Second Edition

Ports North (2014) CSD Project Draft EIS

Ports North (2013) Land Use Plans for Strategic Port Land (Seaport Volumes 1, 3 and 5)

State of Queensland (2014) Great Barrier Reef Coastal Zone Strategic Assessment 2014: supplementary strategic assessment report

State of Queensland (2013) Great Barrier Reef Coastal Zone Strategic Assessment: strategic assessment report

UNESCO (2015) Operational Guidelines for the Implementation of the World Heritage Convention

Cairns Shipping Development Project

APPENDIX A

TERMS OF REFERENCE

Cardno
Shaping the Future

Table A-1 Terms of Reference – Landscape and Scenic Amenity

ToR Section	Title	Details	Section of Report
5.2.2	Scenic amenity and lighting	**Description of environmental values** 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. Include information such as maps and photographs, particularly where addressing the following issues:	4
		• major views, view sheds, outlooks, and features contributing to the amenity of the area, including assessment from private residences	4.1 and 4.2
		• focal points, landmarks, waterways and other features contributing to the visual quality of the area and the project site	4.2
		• character of the local and surrounding areas including vegetation and land use	4.1
		Include any relevant World Heritage and National Heritage values of the area.	4.1
5.2.2	Scenic amenity and lighting	**Potential impacts and mitigation measures** Describe the potential beneficial and adverse impacts of the project on landscape character and visual qualities of the site and the surrounding area. Explain what measures will be undertaken to avoid or mitigate the identified impacts.	5
		Provide an assessment of all potential impacts of the project's lighting, during all stages, with particular reference to objectives to be achieved and management methods and strategies to be implemented to avoid or mitigate, such as:	5
		• the visual impact at night	5.2, 5.3 and 5.4.2
		• night operations/maintenance and effects of lighting on residents and terrestrial and marine fauna	
		• the potential [visual] impact of increased vehicular and marine traffic	5.2 – 5.5
5.4	Nature conservation	Describe the environmental values in terms of: … • integrity of landscapes and places including wilderness and similar natural places	4.1 and 4.2
8.3.1	Hazard and risk	Describe the existing health and safety values of the community, workforce, suppliers and other stakeholders in terms of the environmental factors that can affect human health, public safety and quality of life, such as … lighting and amenity….	5.7

Table A-2 Commonwealth Government Guidelines

Guideline Section	Title	Details	Section of Report

5.5	Project Description	vii. Simulated viewfields of the proposal (including Trinity Inlet infrastructure and operations within the Great Barrier Reef World Heritage Area) showing its visual impact from various aspects including the adjacent coastline, nearby inhabited islands, and offshore	4 - 6
5.10	Relevant Impact of the Proposed Action	m) Impacts on amenity (including from the mainland, air, vessels and surrounding islands);	5.2 – 5.5
5.14	Monitoring and Reporting	a) Ecosystems and habitats, climatic or seasonal variations, flora and fauna (particularly listed threatened species/ecological communities and listed migratory species), and those at-risk species, groups of species and habitats identified in the Draft Great Barrier Reef Biodiversity Conservation Strategy 2012, underwater noise issues, **light and light horizon impacts** and water quality issues as a result of the proposed development;	5.2, 5.3 and 5.4.2
5.19	Reference List and Bibliography	The reference list and bibliography provided in the EIS is to be accurate and concise and include the address and date accessed of any internet pages used as data sources.	7
5.20	Appendices and Glossary	Detailed technical information studies or investigations necessary to support the main text of the EIS, but not suitable for inclusion in the main text must be included as appendices; for example, detailed technical or statistical information, maps, risk assessment, baseline data, supplementary reports etc. A copy of the Guidelines must also be included. A glossary defining technical terms and abbreviations used in the text must be included to assist the general reader.	Abbreviations and Glossary

Cairns Shipping Development Project

APPENDIX B

ZVI AND VIEWSHED MAPPING

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EXTENTS OF LiDAR DATA

SHIPPING CHANNEL

INSET A

Cairns CBD

LEGEND

Elevation

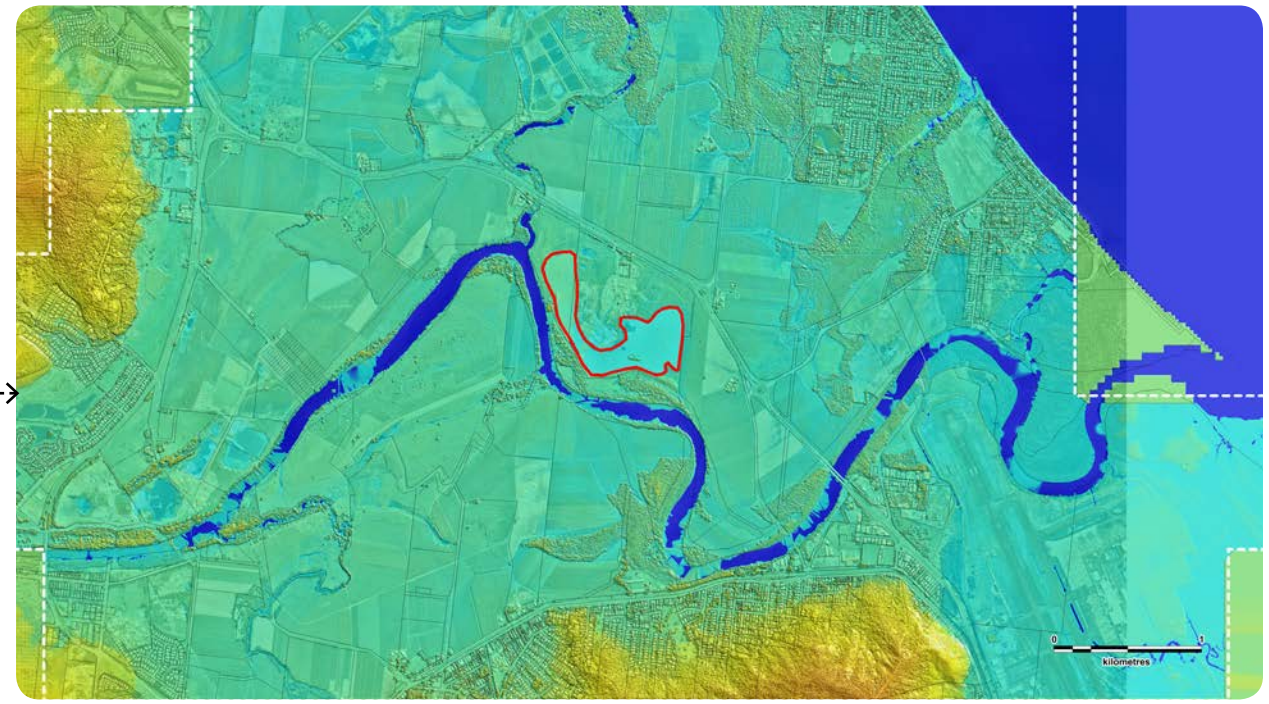
1270m

0m

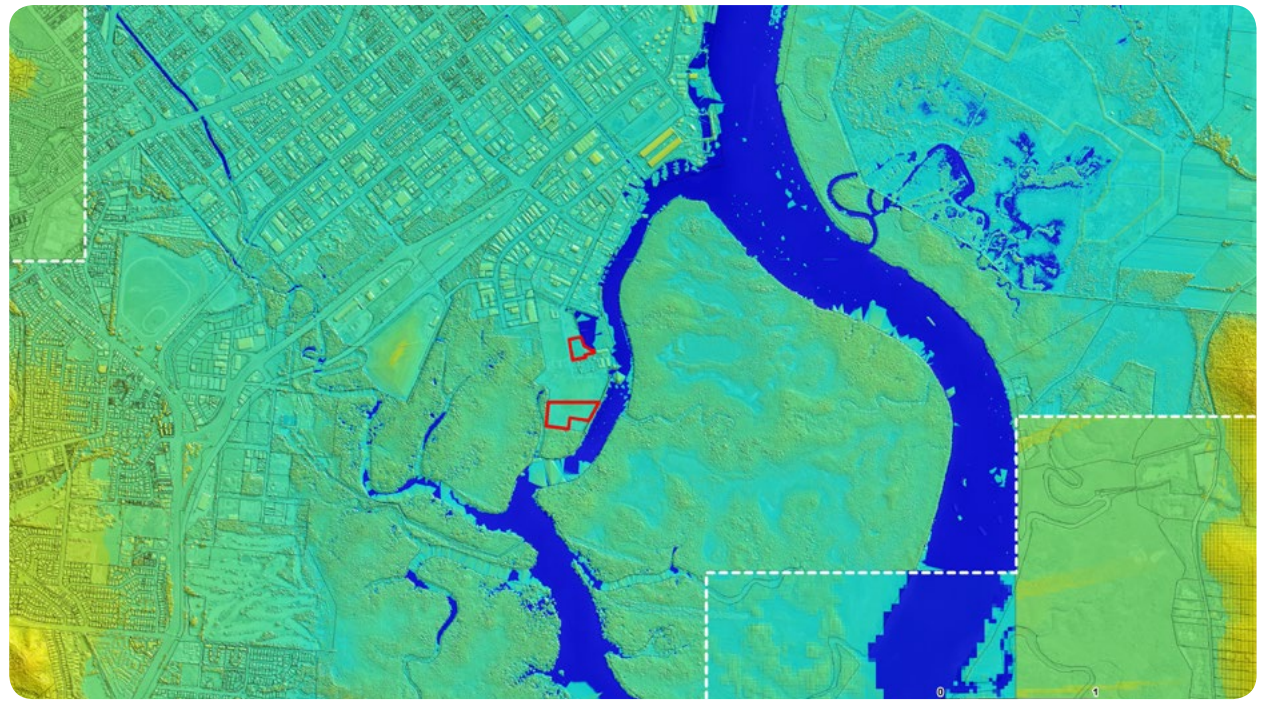
0 5

kilometres

*Elevation model is created by combination of LiDAR, DEMs and DTM derived from 10m & 5m Contours.



INSET Northern Sands DMPA



INSET - Tingira Street DMPA

CAIRNS SHIPPING DEVELOPMENT PROJECT

Digital Surface Model (DSM) **Figure 1**

Date: 20/03/2017| Issue: A

Level 11 Green Square North Tower, 515 St Pauls Terrace, Fortitude Valley QLD 4006 Australia

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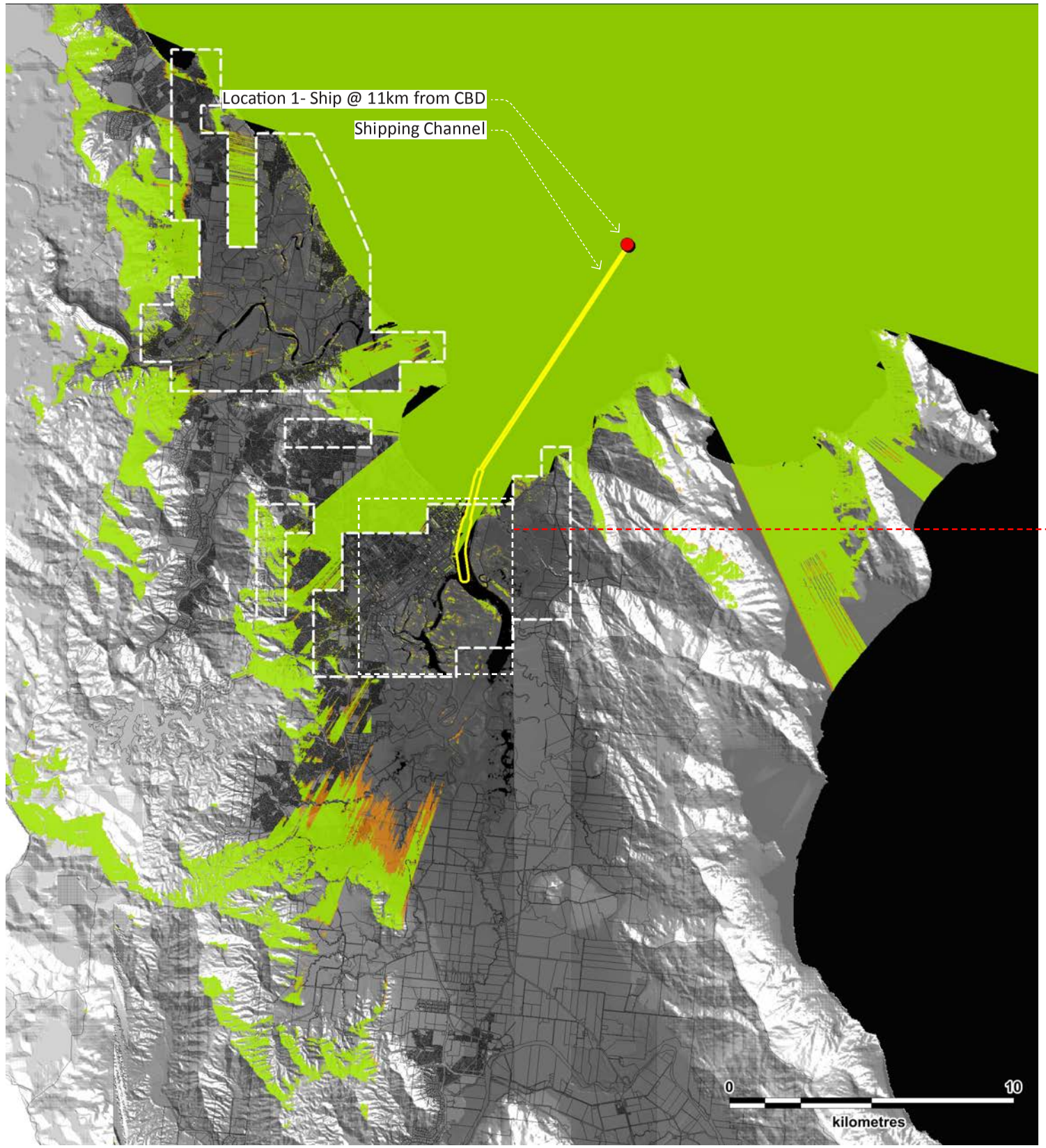
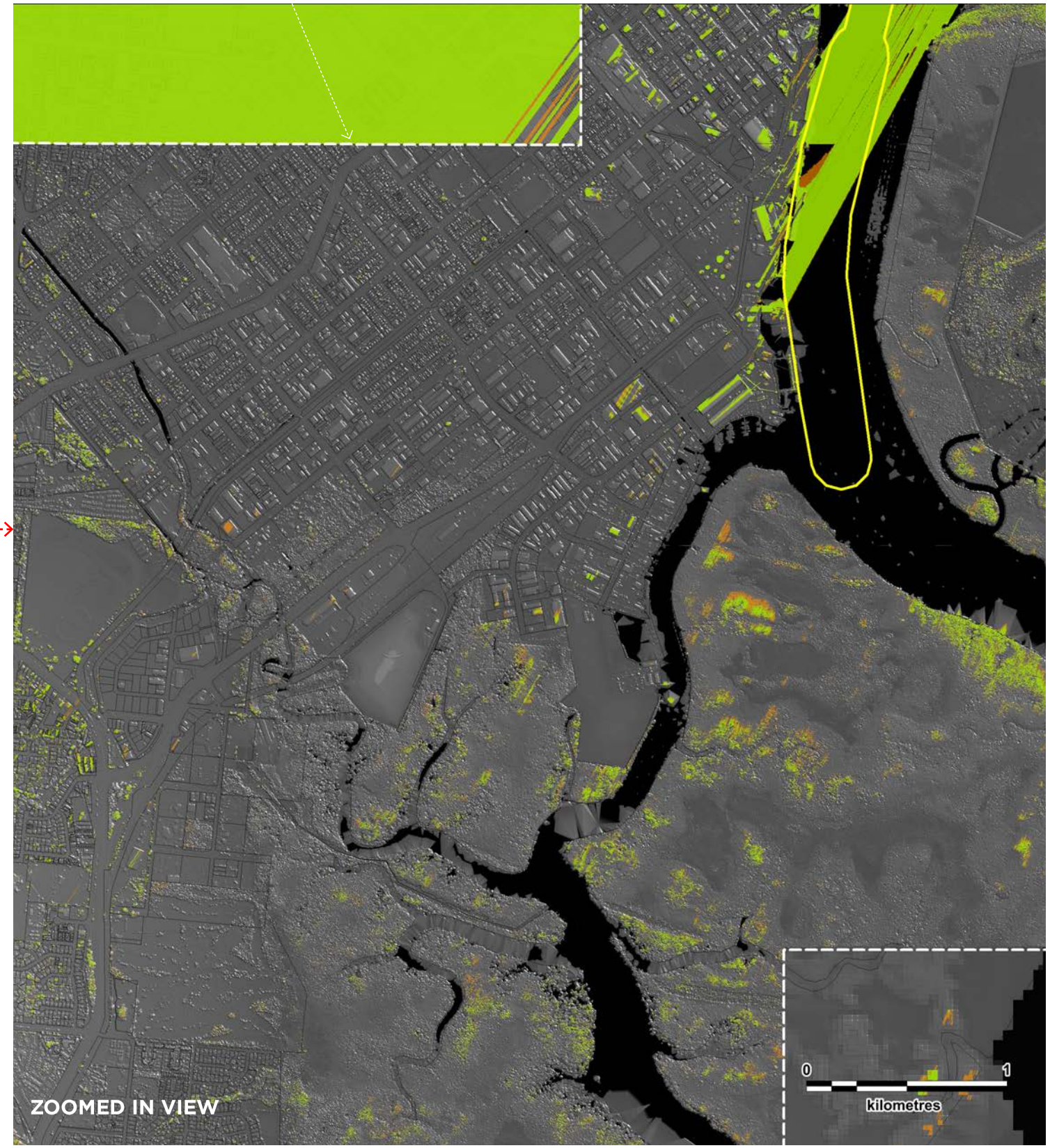
Extents of LiDAR





LEGEND

Visibility of Existing Ships (Rhapsody of Seas- 52m high)

Visibility Increase by Proposed Ships (Voyager of the Seas- 63m high)

CAIRNS SHIPPING DEVELOPMENT PROJECT

Visibility of Cruise Ships in Shipping Channel - Location 1 **Figure 2**

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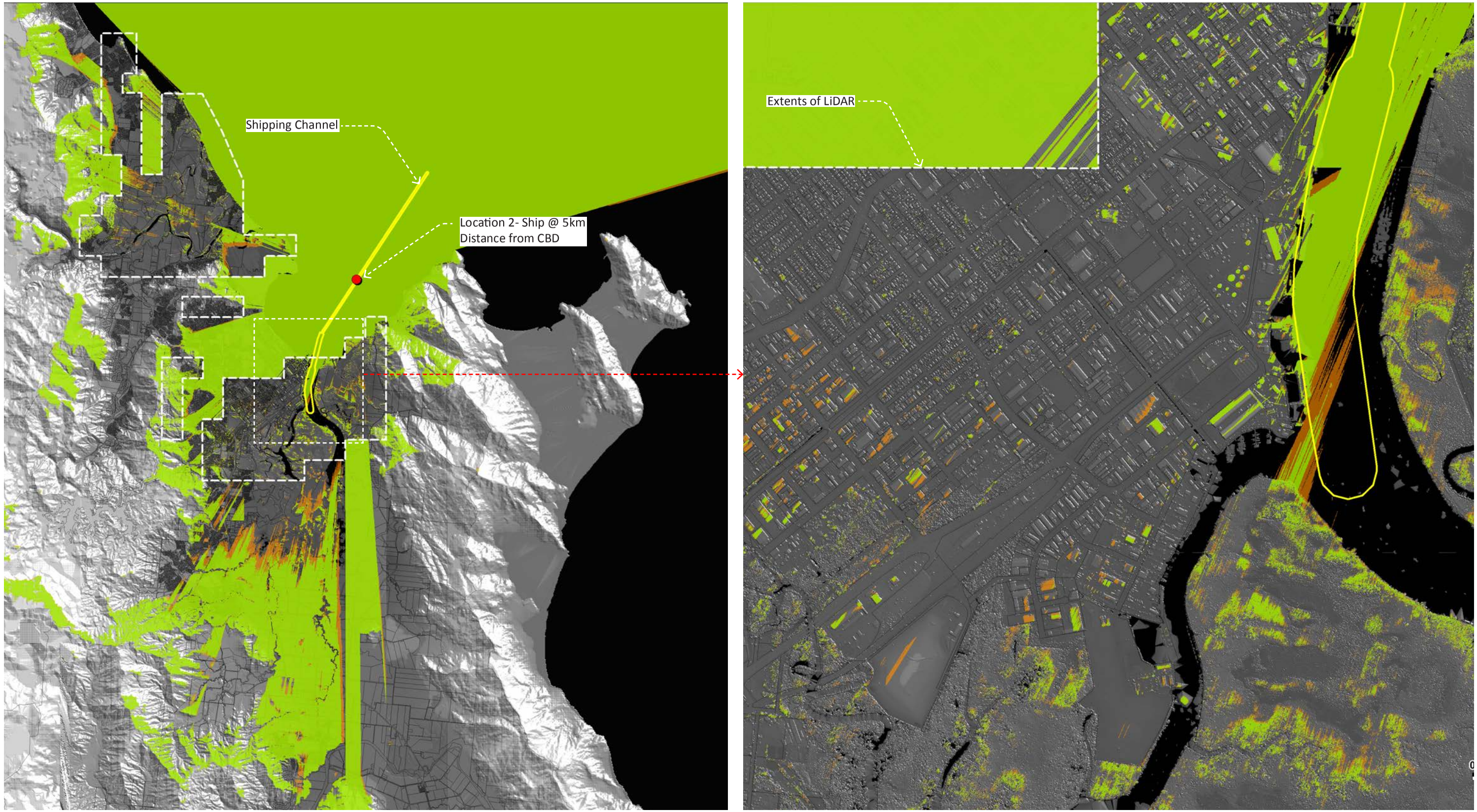

LEGEND

Visibility of Existing Ships (Rhapsody of Seas- 52m high)

Visibility Increase by Proposed Ships (Voyager of the Seas- 63m high)

CAIRNS SHIPPING DEVELOPMENT PROJECT

Visibility of Cruise Ships in Shipping Channel - Location 2 **Figure 3**

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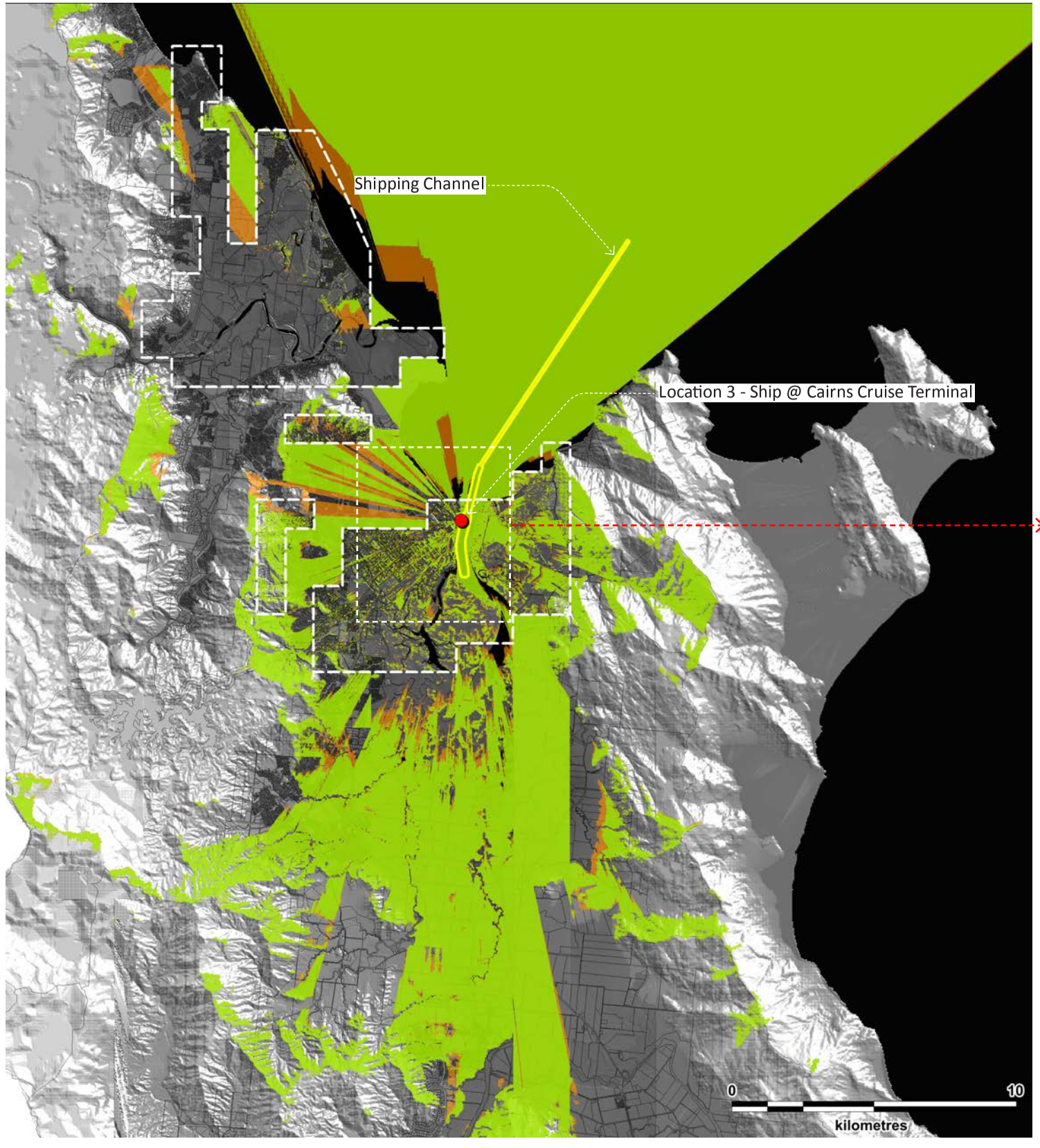

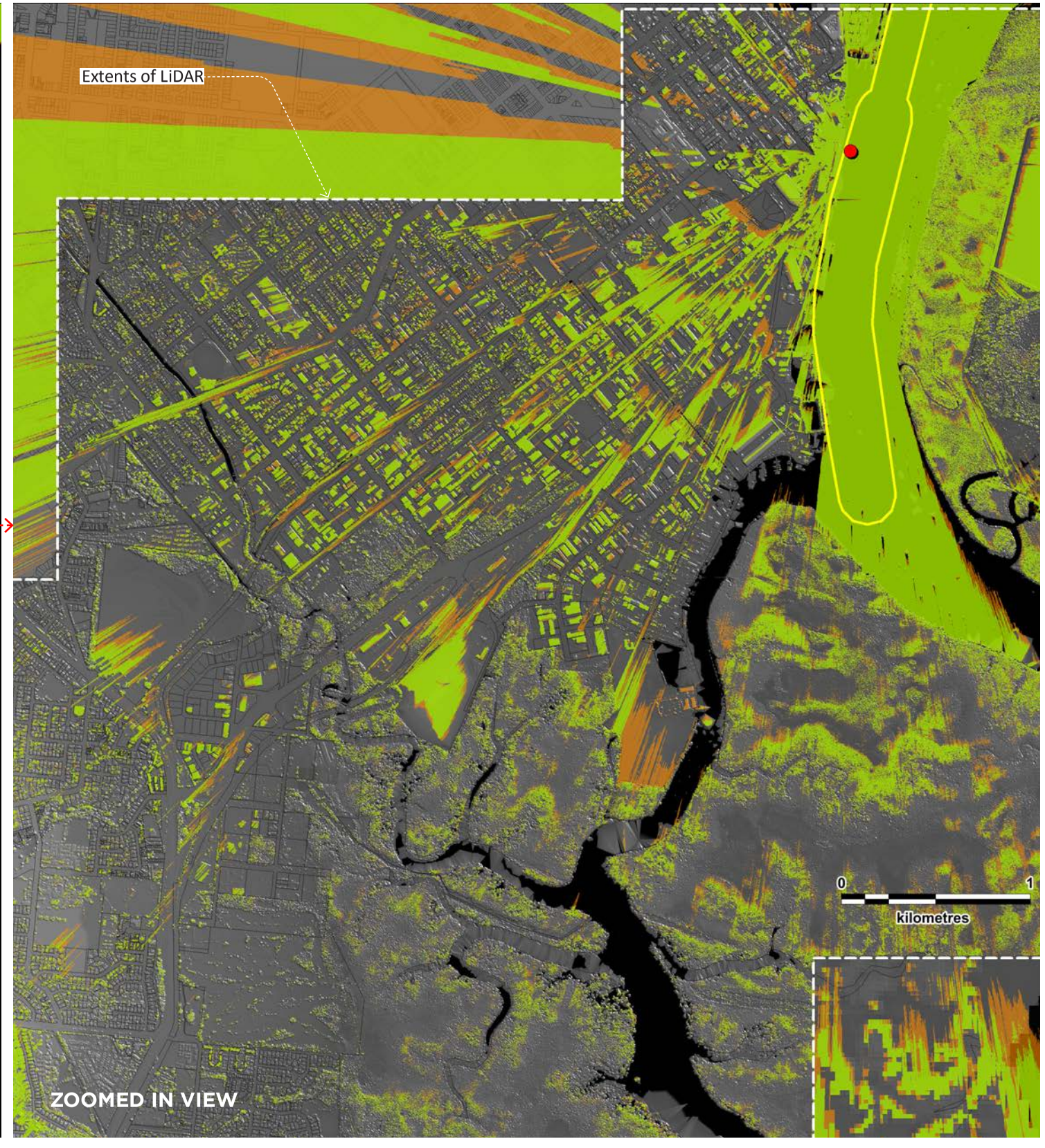

LEGEND

Visibility of Existing Ships (Rhapsody of Seas- 52m high)

Visibility Increase by Proposed Ships (Voyager of the Seas- 63m high)

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Visibility of Cruise Ships in Shipping Channel - Location 3 **Figure 4**

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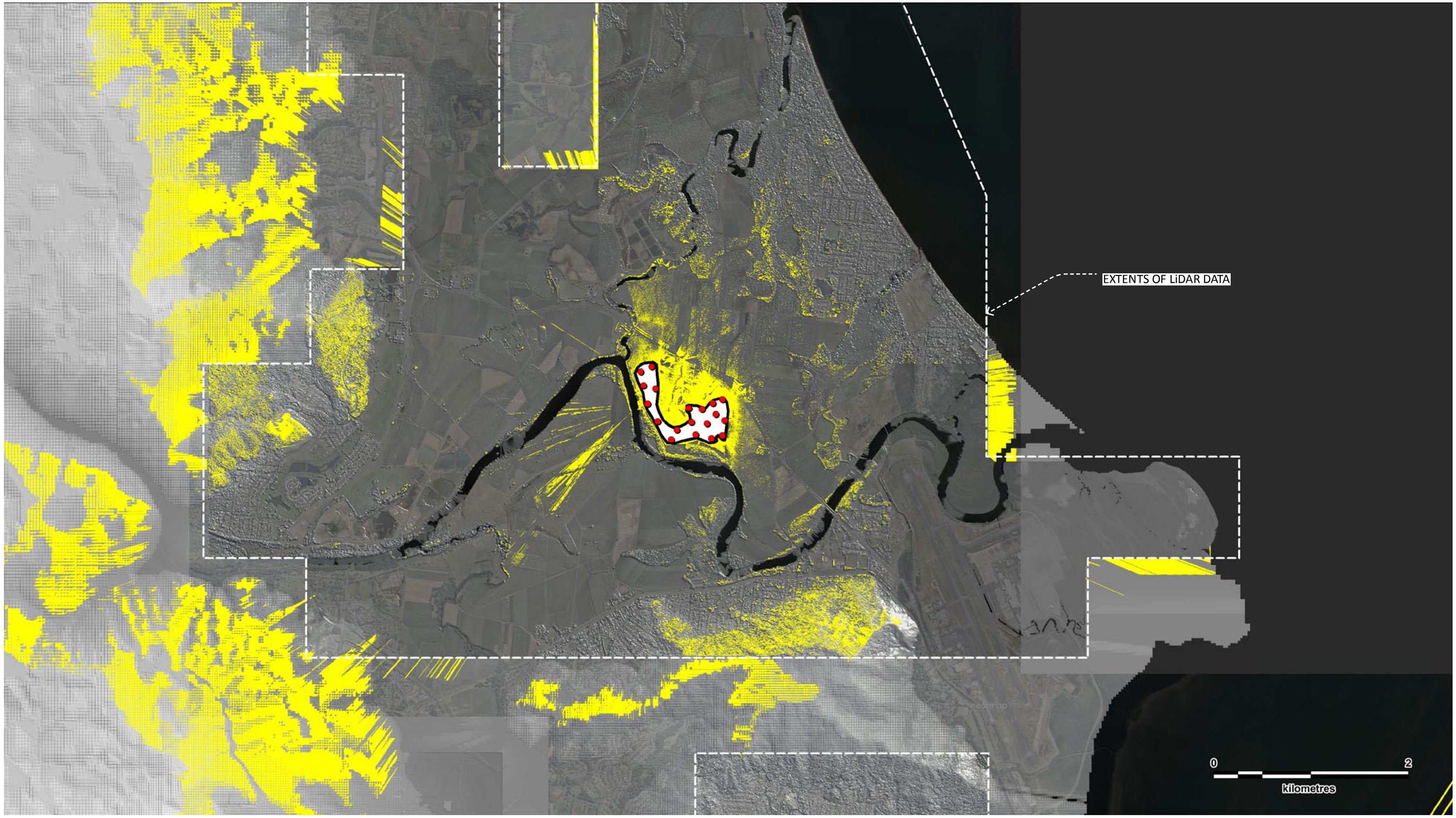

LEGEND

ZVI of Northern sands DMPA

Visibility Points

Site Boundary

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Zone Of Visual Influence - Northern sands DMPA **Figure 5**

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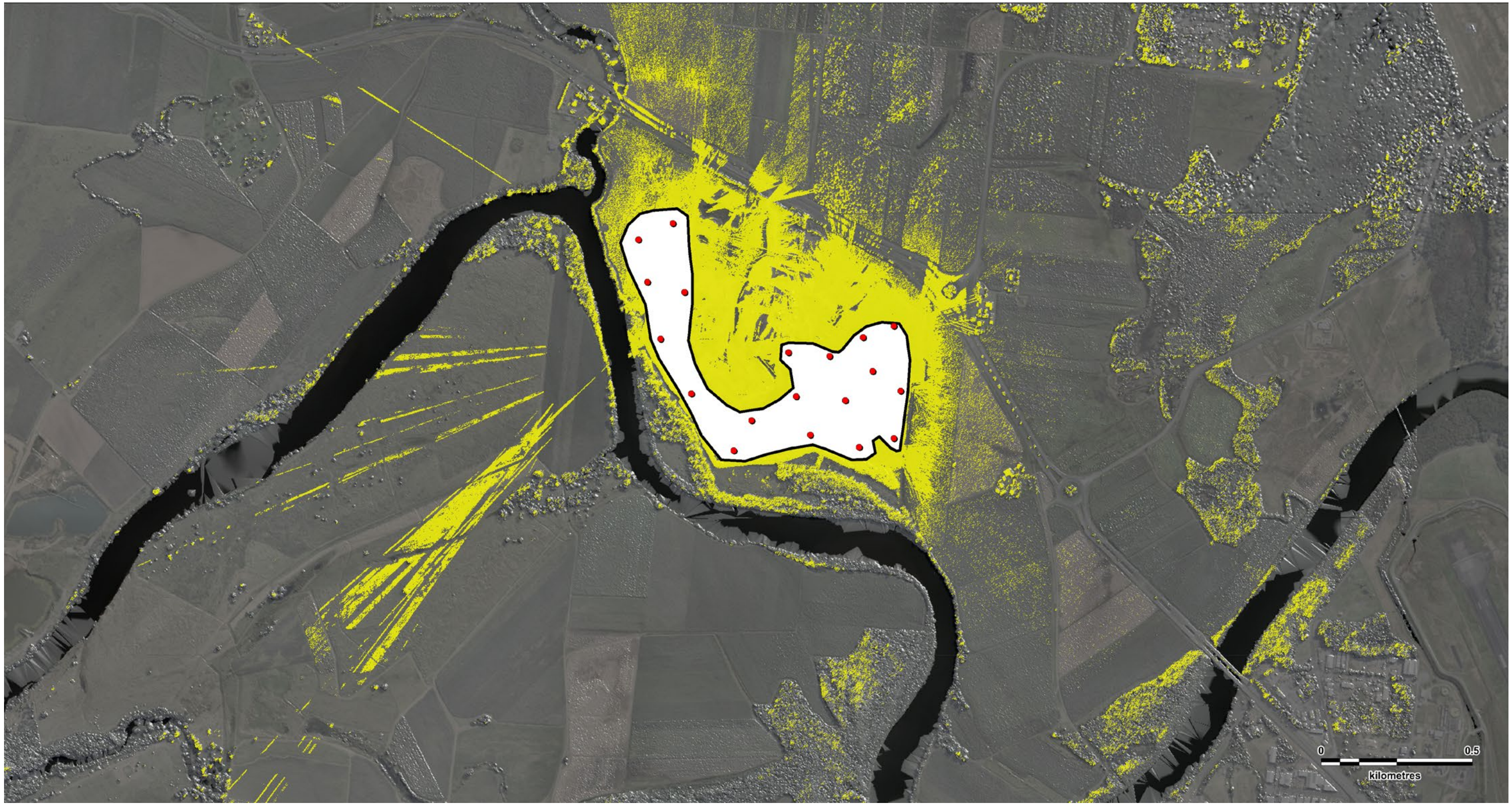

LEGEND

ZVI of Northern sands DMPA

Visibility Points

Site Boundary

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Zoomed In - Zone Of Visual Influence - Northern Sands DMPA **Figure 6**

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Visibility of Northern Sands DMPA from Captain Cook Highway **Figure 7**

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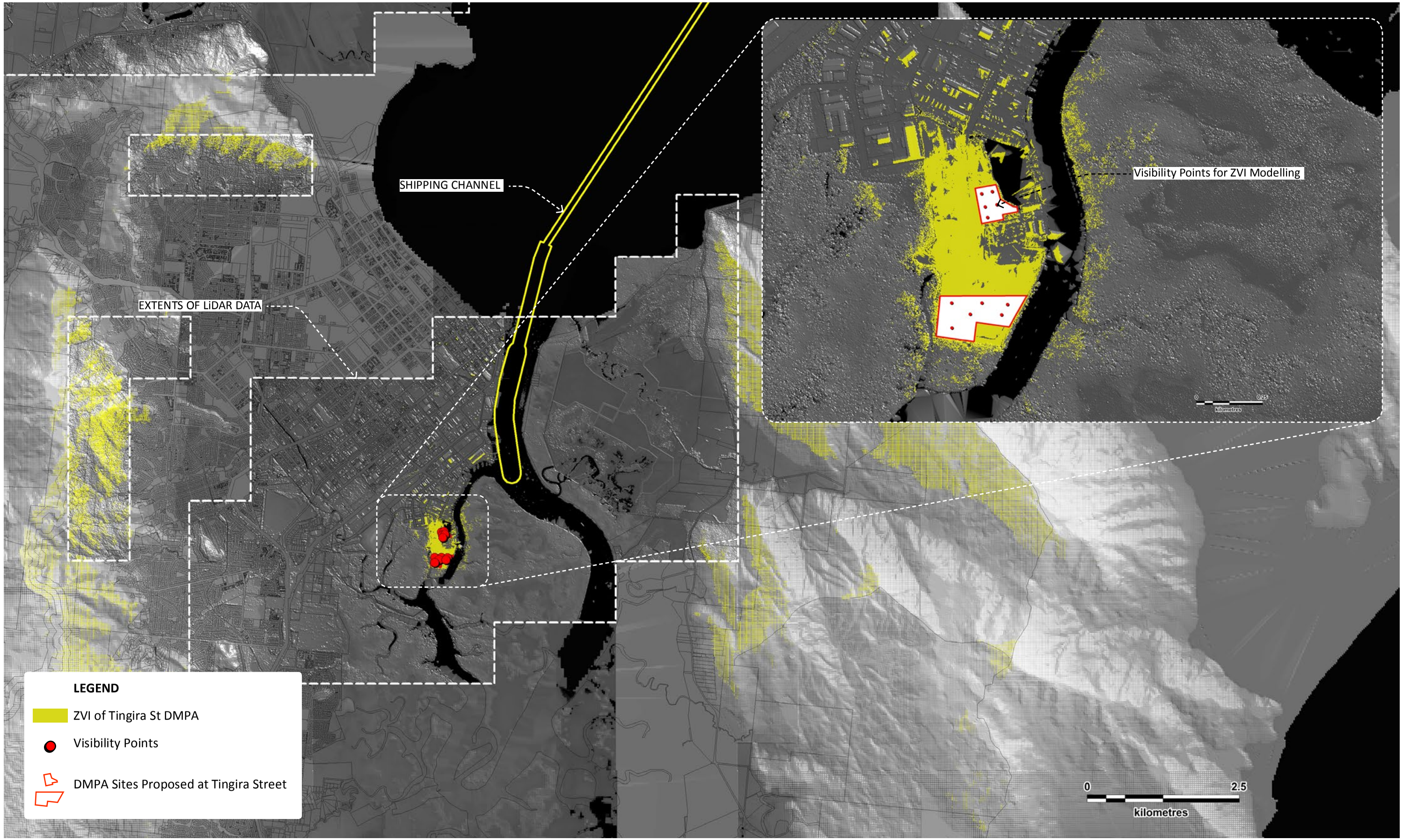

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Zone Of Visual Influence - Tingira Street DMPA **Figure 8**

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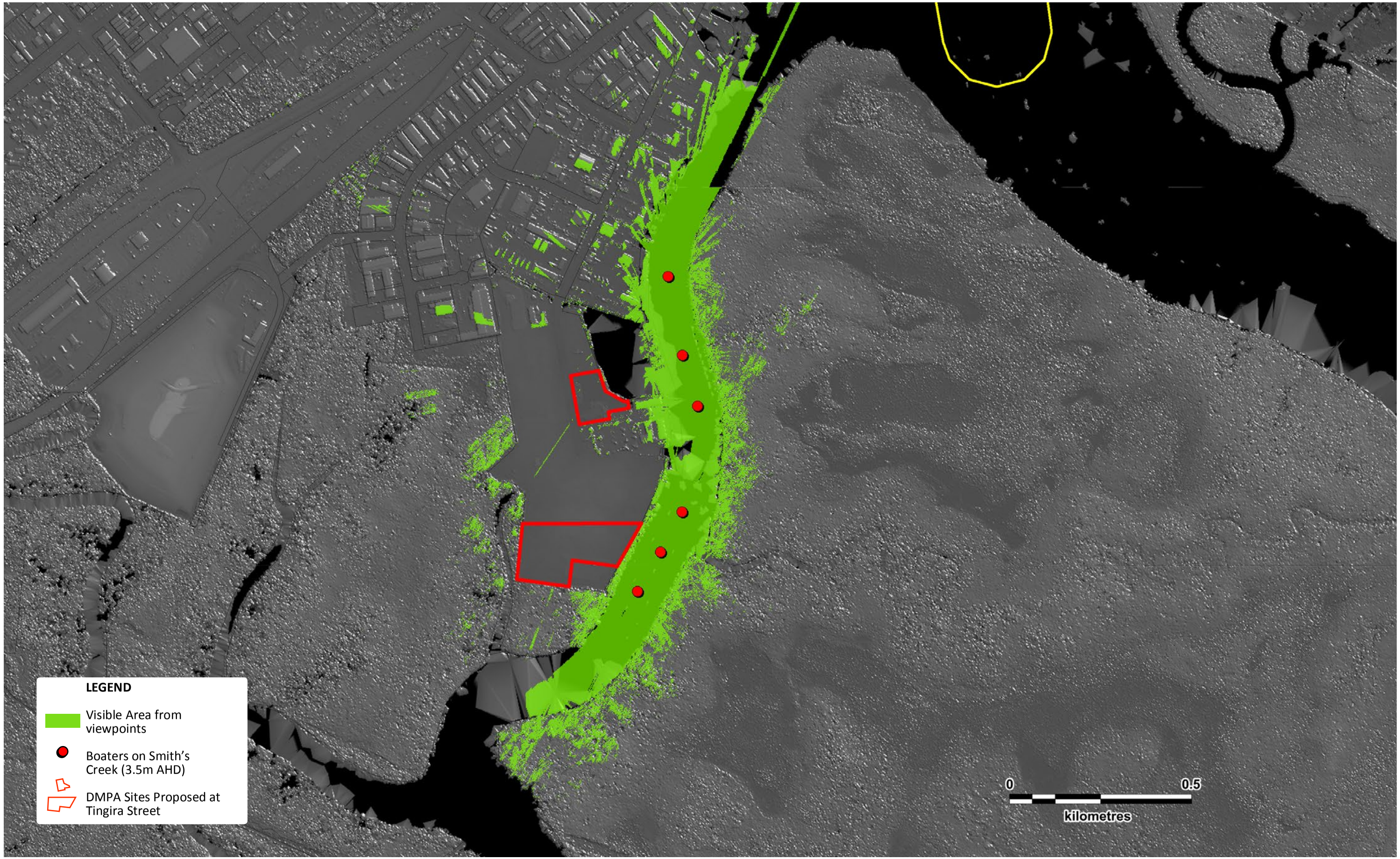

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Visibility of Tingira Street from Boats on Smith's Creek **Figure 9**

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