



Browse LNG Precinct



Browse Liquefied Natural Gas Precinct

Strategic Assessment Report

(draft for public comment)

December 2010

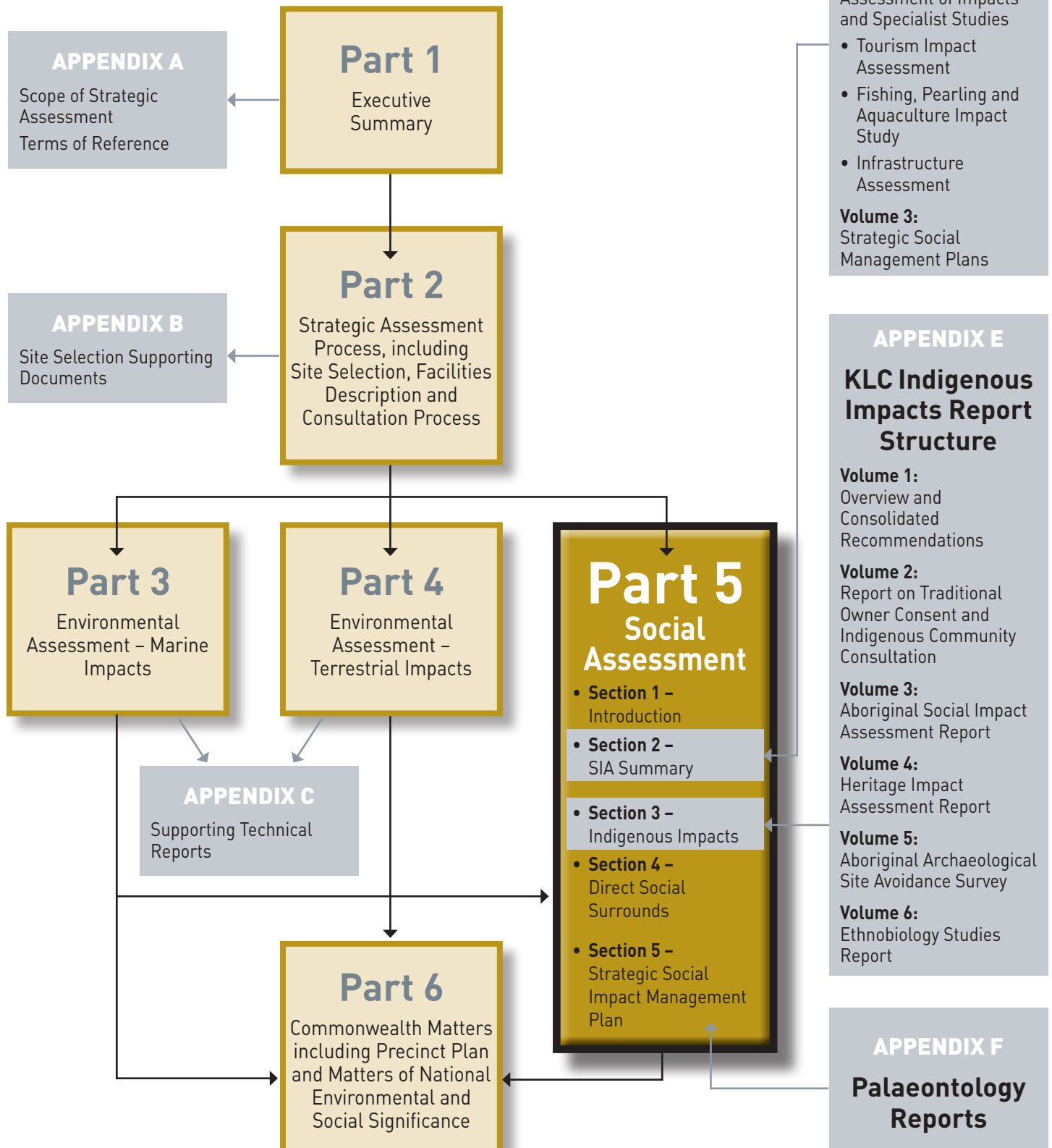
PART 5

Social Assessment

Browse LNG Precinct

Strategic Assessment Report – Structure Display

The State of Western Australia, through the Minister for State Development, has developed the Browse LNG Precinct Strategic Assessment Report (SAR) to enable consideration of a proposed common user liquefied natural gas (LNG) Precinct to process natural gas from the Browse Basin gas fields, at a location near James Price Point, approximately 60 kilometres north of Broome. This SAR is presented in six parts as shown in the following diagram. You are invited to make a submission by visiting the Environmental Protection Authority website at <http://public-consult.epa.wa.gov.au/portal>. Appendices are also available at <http://www.dsd.wa.gov.au/browseLNG>.



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Nomenclature, Acronyms, Measurements and Units List

Acronym	Definition
ABS	Australian Bureau of Statistics
ACMC	Aboriginal Cultural Materials Committee
AGRU	Acid Gas Removal Unit
AGT	Aero Derivative Gas Turbines
AH Act	<i>Aboriginal Heritage Act 1972(WA)</i>
AHC	Aboriginal Heritage Commission
AHD	Australian Height Datum
AIHW	Australian Institute of Health and Welfare
AIMS	Australian Institute of Marine Science
aMDEA	activated methyl-di-ethanol amine
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environment Conservation Council
AQIS	Australian Quarantine Inspection Service
ARI	Average Recurrence Interval
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ARR	Australian Rainfall and Runoff
ARRP Act	<i>Agriculture and Related Resources Protection Act 1976</i>
ASIA	Aboriginal Social Impact Assessment
ASS	Acid Sulphate Soils
ATSIHP Act	<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i>
AWAC	Acoustic Doppler Wave and Current Profiler
BLNG	Browse Liquefied Natural Gas
BLNG Precinct	Browse Liquefied Natural Gas Precinct
BoM	Bureau of Meteorology
BPA	Broome Port Authority
BPEMP	BLNG Precinct Environmental Management Plan
BPMF	Broome Prawn Managed Fishery
BPP	Benthic Primary Producer
BPPH	Benthic Primary Producer Habitat
Bq kg ⁻¹	Becquerels per kilogram
BRAC	Broome Recreation and Aquatic Centre
BRAMS	Broome Regional Aboriginal Medical Service
BRUVS	Baited Remote Underwater Video Surveys
BTEX	benzene, toluene, ethylbenzene and xylene
°C	degrees celsius, degrees centigrade
CaCO ₃	Calcium Carbonate
CAEPR	Centre for Aboriginal Economic Policy Research
CALM	Department of Conservation and Land Management , now DEC
CAMBA	China-Australia Migratory Bird Agreement
Category A	These are the core elements of the BLNG Precinct, including associated infrastructure, necessary to process and export hydrocarbons.
Category B	These are indirect activities and actions as a result of the BLNG Precinct that are considered in the impact assessment but do not form part of the approvals process.

Acronym	Definition
Category C	Related projects that are outside the scope of the Strategic Assessment but form part of the cumulative impact assessment.
CCIMP	Committee for Introduced Marine Pest Emergencies
CEMP	Construction Environment Management Plan
CDEP	Community Development Employment Projects
CEO	Chief Executive Officer
CH ₄	Methane
CHMP	Cultural Heritage Management Plan
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CO ₂ -e	Carbon Dioxide Equivalents
CPI	Consumer Price Index
CPRS	Carbon Pollution Reduction Scheme
CSD	Cutter Suction Dredger
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTM	Chemical Transport Model
CWR	Centre for Whale Research
Cwth	Commonwealth
DAFF	Department of Agriculture, Fisheries and Forestry
DAFWA	Department of Agriculture and Food Western Australia
dB	decibels
dB(A)	A-weighted decibels
DCCEE	Department of Climate Change and Energy Efficiency
DDSDMP	Dredging and Dredge Spoil Disposal Management Plan
DEC	Department of Environment and Conservation
DEEWR	Commonwealth Department of Education, Employment and Workplace Relations
DEWHA	Commonwealth Department for the Environment, Water, Heritage and the Arts, now SEWPAC
DIA	Department of Indigenous Affairs
DLGRD	Department of Local Government and Regional Development
DLNG	Darwin Liquefied Natural Gas
DMAG	Dredging Management Advisory Group
DMP	Department of Mines and Petroleum
DoF	Department of Fisheries
DoIR	Department of Industry and Resources
DoLA	Depart of Land Administration
DoP	Department of Planning
DoT	Department of Transport
DoW	Department of Water
DPI	Department for Planning and Infrastructure
DRDL	Department of Regional Development and Lands
DRET	Commonwealth Department of Resources, Energy and Tourism
DRF	Declared Rare Flora
DSD	Department of State Development
DSDG	Dredge Spoil Disposal Ground

Acronym	Definition
DSDMP	Dredging and Dredge Spoil Disposal Management Plan
EAG3	Environmental Assessment Guideline 3
ECHT	Environment and Cultural Heritage Team
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
EP Act	<i>Environmental Protection Act 1986</i>
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
eq.	Acid Equivalents
EVT	Evergreen Vine Thickets
FEED	Front End Engineering Design
FESA	Fire and Emergency Services Authority of Western Australia
FID	Final Investment Decision
FIFO	Fly in/Fly out
FIS	Fishing Industry Impact Study
FLNG	Floating LNG
FM Act	<i>Fish Resources Management Act 1994</i>
Foundation Proponent	Woodside is a potential Foundation Proponent
FRMR	Fisheries Resource Management Regulations 1995
FRP	Filterable reactive phosphorus
GBRMPA	Great Barrier Reef Marine Park Authority
GBS	Gravity Based Structure
GCA	Gaffney Cline and Associates
GDEs	Groundwater Dependant Ecosystems
GDP	Gross Domestic Product
GHG	Greenhouse Gas
G	grams
GJ	gigajoule
GL	gigalitre
GL/yr	gigalitres per year
GGAP	Greenhouse Gas Abatement Plan
GROH	Government Regional Officer Housing
GRP	Gross Regional Product
GSP	Gross State Product
GST	Goods and Services Tax
GWP	Global Warming Potential
H ₂ S	hydrogen sulphide
ha	hectare
HAT	Highest astronomical tide
HCWA	Heritage Council of Western Australia
HDD	Horizontal Directional Drilling
HFCs	Hydrofluorocarbons
HIA	Heritage Impact Assessment
HNO ₃	Nitric Acid

Acronym	Definition
HoA	Heads of Agreement
HONO	Nitrous Acid
HPA	Heritage Protection Agreement
hr	hour
HSE	Health, Safety and Environment
HYPE	Helping Young People Engage
IBRA	Interim Biogeographic Regionalisation of Australia
ICC	Indigenous Coordination Centres
IFPIC	Indigenous Free Prior Informed Consent
IGCC	Integrated Gasification Combined Cycle
ILUA	Indigenous Land Use Agreement
IMO	International Maritime Organisation
IMS	Invasive Marine Species
IMSMP	Invasive Marine Species Management Plan
IP	Important Population
IPCC	Intergovernmental Panel on Climate Change
IS	Integrated System
ISQG	Interim Sediment Quality Guidelines
ITF	Indonesian Throughflow
IUCN	International Union for Conservation of Nature
JAMBA	Japan-Australia Migratory Bird Agreement
JPP	James Price Point
KAMSC	Kimberley Aboriginal Medical Services Council
KAC	Kimberley Aquaculture Corporation
KACS	Kimberley Aged and Community Services
KDC	Kimberley Development Commission
KES	Kullari Employment Services
kg	kilogram
kgCO ₂ -e	kilogram of Carbon Dioxide Equivalents
kmh ⁻¹ , km/h	kilometres per hour
kHz	kilohertz
KLC	Kimberley Land Council
km	kilometre
km ²	square kilometre
kn	knot
KPP	Kadar Pearson and Partners
kt	kilotonne
LAU	Local Assessment Unit
LCUs	Landscape Character Units
LGA	Local Government Area
LIA	Light Industrial Area
LiDAR	Light Detection and Ranging
LIGT	Large Industrial Gas Turbines
LNG	Liquefied Natural Gas
LNG Hub	Alternative wording for BLNG Precinct

Acronym	Definition
LoR	Limit of Reporting
LPG	Liquefied Petroleum Gas
LPS	Local Planning Strategy
LSR	Light Sensitive Receptors
LVIA	Landscape and Visual Impact Assessment
$\mu\text{g}/\text{m}^3$	microgram per cubic metre
$\mu\text{g g}^{-1}$, $\mu\text{g}/\text{g}$	microgram per gram
$\mu\text{g L}^{-1}$, $\mu\text{g}/\text{L}$	microgram per litre
μm	micrometre
$\mu\text{g m}^{-3}$, $\mu\text{g}/\text{m}^3$	microgram per metre cubed
μMol	micromole
m	metre
m^2	square metre
m^3	cubic metre
m^3/hr	cubic metre per hour
m/s	metres per second
Ma	Mega annum (million years)
mAHD	Metres Australian Height Datum
MDS	Multi Dimensional Scaling
MEG	Mono-ethylene glycol
MF	Marine Facility
mg L^{-1} , mg/L	milligram per litre
MIGT	Medium Industrial Gas Turbines
ML	megalitre
mm	millimetre
MMbtu	Millions of British Thermal Units
MNES	Matters of National Environmental Significance
MODIS	Moderate Resolution Imaging Spectroradiometer
MOF	Materials Offloading Facility
mol%	Mole percentage
MPA	Marine Protected Areas
MPB	Microphytobenthos
ms^{-1} , m/s	metre per second
MSL	Metres below sea level
Mt	megatonne (million tonne)
Mtpa	million tonnes per annum
MVT	Monsoon Vine Thicket
MWDMP	Marine Wasterwater Discharge Management Plan
MWh	megawatt hour
NAGD	National Assessment Guidelines for Dredging
NDT	Northern Development Taskforce
NE	North-east
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NES	National Environmental Significance (i.e. matters of NES)

Acronym	Definition
NGA	National Greenhouse Accounts
NGCC	Natural Gas Combined Cycle
NGER Act	<i>National Greenhouse and Energy Reporting Act 2007</i>
NH ₃	Ammonia
NH ₄	Ammonium
NILF	not in labour force
Nm	nautical mile
NNTT	National Native Title Tribunal
NNW	north-north-west
NO ₂	nitrogen dioxide
NO _x	oxides of Nitrogen (NO and NO ₂)
NPI	National Pollutant Inventory
NRIF	<i>National Recreational and Indigenous Fishing Survey</i>
NRM	Natural Resource Management
NSW	New South Wales
NT	Northern Territory
NTA	<i>Native Title Act 1993</i>
NTU	Nephelometric Turbidity Units
NWMR	Northwest Marine Region
NWQMS	National Water Quality Management Strategy
O ₃	Ozone
OSCP	Oil Spill Contingency Plan
PAH	Polycyclic Aromatic Hydrocarbons
PAR	Photosynthetically Available Radiation
PASS	Potential Acid Sulphate Soils
PBC	Prescribed Body Corporate
PCG	Precinct Control Group
PECs	Priority Ecological Communities
Plan	The formal Plan for the BLNG Precinct under Commonwealth legislation (see also Precinct Plan)
PM	particulate matter
PF	Port Facility
PFCEMP	Port Facilities Construction Environmental Management Plan
PFCs	Perfluorocarbons
ppb	Parts per billion
Ppt	parts per thousand
Precinct Plan	The formal Plan for the BLNG Precinct under Commonwealth legislation (see also Plan)
proponent	Commercial proponents will undertake projects within the Precinct.
Proponent	The Proponent for the Precinct is the Minister for State Development
PRRT	Petroleum Rent Resource Tax
PSD	Particle size distribution
PTS	Permanent Threshold Shift
QA/QC	Quality Assurance/ Quality Control
QMP	Quarantine Management Plan
QLD	Queensland

Acronym	Definition
RBA	Reserve Bank of Australia
RBWG	Roebuck Bay Working Group
RIWI Act	<i>Rights in Water and Irrigation Act 1914</i>
RMS	Root Mean Square
RNE	Register of National Estate
RO	Reverse Osmosis
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
RORO	Roll on Roll off
RoW	Right of Way
RTO	Registered Training Organisation
SA	Strategic Assessment
SAA	Strategic Assessment Agreement
SAP	Sediment Sampling and Analysis Plan
SAR	Strategic Assessment Report
SE	south-east
SEL	Sound Pressure Level
SEP	State Environmental Policy
SEWPAC	Commonwealth Department of Sustainability, Environment, Water, Population and Community
SF ₆	Sulphur Hexafluoride
SIA	Social Impact Assessment
SO _x	oxides of sulphur
SO ₂	sulphur dioxide
SOPEP	Shipboard Oil Pollution Emergency Plan
SoSA	Scope of the Strategic Assessment
SPL	Sound Pressure Level
SPMT	Self Propelled Module Trailers
SPRAT	Species Profile and Threats Database
SRE	Short Range Endemic
SRG	Stakeholder Reference Group
SSIMP	Strategic Social Impact Management Plan
STI	Sexually Transmitted Infection
SWIS	South West Interconnected System
TAFE	Technical and Further Education
TAPM	The Air Pollution Model
TBT	Tributyltin
tcf	trillion cubic feet
TCU	Thermal Combustion Units
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community
TIA	Tourism Impact Assessment
TJ	terajoules
TM	Thematic Mapper
TN	Total Nitrogen
TOC	Total Organic Carbon
TONC	Traditional Owner Negotiating Committee

Acronym	Definition
ToR	Terms of Reference
TOTF	Traditional Owner Taskforce
TP	Total Phosphorous
tpa	tonne per annum
TPH	Total Petroleum Hydrocarbons
TSHD	Trailer Suction Hopper Dredger
TSS	Total Suspended Solids
TTS	Temporary Threshold Shift
UNDRIP	United Nations Declaration of Rights of Indigenous People
UNFCCC	United Nations Framework Convention on Climate Change
UV	Ultraviolet
VET	Vocational Education and Training
VMP	Vessel Management Plan
VOC	Volatile Organic Compounds
VSR	Visually Sensitive Receptors
WA	Western Australia
WACHS	Western Australian Country Health Service
WALFA	West Arnhem Land Fire Abatement
WAM	Western Australian Museum
WAPC	Western Australian Planning Commission
WC Act	<i>Wildlife Conservation Act 1950</i>
WEED	Weed Education Eradication Delivery
WHO	World Health Organisation
WNW	west-north-west
WONS	Weed of National Significance
Woodside	Woodside Energy Limited
WRC	Water and Rivers Commission, now Department of Water (DoW)
WSW	west-south-west
WWF	World Wildlife Fund
WWTP	Waste Water Treatment Plant

1. Introduction

The State of Western Australia (**WA**), through the Minister for State Development (the **Proponent**), proposes to develop an onshore, common-user Liquefied Natural Gas (**LNG**) precinct to process natural gas from Browse Basin gas fields off the west Kimberley coast. The Department of State Development (**DSD**) has been charged with advancing this proposal under direction of the Proponent.

The Browse Liquefied Natural Gas Precinct (**BLNG Precinct** or **Precinct**) would consist of LNG processing facilities and associated infrastructure, and would be located in the vicinity of James Price Point, approximately 60 kilometres (**km**) north of Broome, on the west Kimberley coast of Western Australia. The BLNG Precinct would provide a location for processing gas and associated products from the Browse Basin with an LNG production capacity of up to 50 million tonnes per annum (**Mtpa**). If it were to occur, full development of the Precinct would most likely be phased in as demand for additional processing capacity arises. The Precinct would accommodate a minimum of two proponents at one location and enable sharing of common-user facilities such as the port, roads, infrastructure corridors and workers' accommodation. A **Precinct Plan** has been developed to meet the requirements of the State and Commonwealth Governments.

Woodside Energy Limited (**Woodside**), on behalf of the Browse LNG Development Joint Venture participants, was appointed as a potential Foundation Proponent for the Precinct under the Preliminary Development Agreement signed in October 2009. This Agreement established Woodside as a partner with the State Government in bringing the project to completion.

A detailed and comprehensive assessment has considered the environmental, social, economic, heritage and strategic implications of the Precinct should it reach its full capacity. The assessment process has involved desktop studies, field surveys, modelling, data analysis, impact assessment and stakeholder consultation, the results of which are documented in the BLNG Precinct Strategic Assessment Report (**SAR**).

The purpose of this Strategic Assessment Report is to meet the requirements of the State and Commonwealth governments in accordance with the Terms of Reference. The Strategic Assessment includes a high level impact assessment (including social factors), a description of the strategic proposal, identifying 'future proposals' (to be approved under the *Environmental Protection Act 1986* (the **EP Act**)) and the Precinct Plan (to be endorsed under the *Environment Protection and Biodiversity Conservation Act 1999* (the **EPBC Act**)), and includes the Proponent's proposed draft conditions that may be applied to future proposals. The document includes a summary of existing information, identifying main impact areas and sets out the proposed management arrangements, mitigation and safeguards to ensure impacts are managed.

The SAR is presented in six parts:

Part 1: Executive Summary

Part 2: Strategic Assessment Process including Site Selection, Facilities Description and Consultation Process

Part 3: Environmental Assessment – Marine Impacts

Part 4: Environmental Assessment – Terrestrial Impacts

Part 5: Social Assessment

Part 6: Commonwealth Matters including Precinct Plan, Management Arrangements and Matters of National Environmental and Social Significance

This document (**Part 5**) of the Strategic Assessment Report provides a social assessment and management strategies related to socio-economic and Indigenous aspects.

The WA Government recognised that the establishment of the BLNG Precinct would likely bring both positive and negative social impacts for the people of the Shire of Broome, including Broome itself and the communities in the area of impact from Derby to Bidjardanga. In recognition of this, the WA Government and the Commonwealth agreed that a strategic Social Impact Assessment (**SIA**), including an Aboriginal Social Impact Assessment (**ASIA**) was required as part of the Strategic Assessment for the establishment of the BLNG Precinct. The SIA included looking at past, current and likely future trends in Broome's population and the potential additional impact that the construction and operation of gas processing facilities, would have on services, housing, businesses and employment.

Part 5 structurally differentiates between direct and indirect social impacts to ensure consistency with the rest of the SAR. Direct impacts are those that occur in the vicinity of the Precinct (termed **Category A** in the Scope of Strategic Assessment). Indirect impacts are those that occur on Broome and other localities in the Kimberley Region (termed **Category B** activities in the Scope of Strategic Assessment) as a result of the establishment of the Precinct. In many cases, it is difficult to separate these impacts and the SAR does not regard the direct social impacts as more important than the indirect.

A summary of the strategic SIA is provided in **Part 5, Section 2** of the SAR. This SIA largely addresses the indirect impacts of the BLNG Precinct (Category B activities). **Part 5, Section 4** provides an overview of the direct impacts resulting from activities associated specifically with the BLNG Precinct, focused largely on the James Price Point coastal area. The strategic Indigenous Impact Assessment provided in **Part 5, Section 3** addresses both Category A and B activities, providing a summary of the ASIA alongside other Indigenous impact assessment components.

The strategic SIA establishes a framework from which detailed management measures will be developed when Commercial Proponents undertake their more detailed project level SIA, which is currently in the scoping phase. Commercial Proponent SIAs will further develop relevant social mitigation and management strategies prepared for the Strategic Assessment and contained in this document. Concurrently, the State Government is developing a mechanism to improve social service delivery to Broome and to capture the economic and social opportunities that will flow from the project. Both the Commercial Proponent's SIA and the State's planning for Broome will require input from the community and other stakeholders. The framework promotes mechanisms to help government, private organisations, community agencies stakeholders to work together to identify and manage the potential impacts on education, health and community services and facilities.

The Terms of Reference of the Commonwealth/State Strategic Assessment Agreement (July 2008) as supported by the State included the requirement for a SIA and Indigenous impact report as well as specific information on the social issues arising from the Precinct (Social Surrounds Factors) and specific socio-economic issues.

Part 5 of the SAR presents the social component of the SAR in the following sections:

- **Section 1:** Introduction;
- **Section 2:** A summary of the strategic SIA coordinated by the Department of State Development;
- **Section 3:** A condensed version and discussion of the Indigenous components of a suite of specialist reports, including the ASIA;
- **Section 4:** Direct social surrounds and socio-economic factors, structured in a similar way to the environmental impact assessment chapters in **Part 3** and **Part 4** of the SAR; and
- **Section 5:** Social Impact Management Plan and Governance Structure.

1.1. Structure of the Social Components of the Browse Strategic Assessment Report

The strategic SIA formed the basis for the strategic SIA summary report provided in **Part 5, Section 2**. A range of information sources informed **Part 5, Section 3**; the strategic Indigenous Impact Assessment. Key sources include the suite of Indigenous Impact Reports, customary fishing study, desktop review of available information and consultation with stakeholders (particularly Traditional Owners during the site selection process and the Commonwealth Government regarding the National Heritage Assessment). Summaries of these documents have been integrated as a discrete volume of the SAR to be considered against the Terms of Reference agreed between the State and Commonwealth Governments. The full strategic SIA Reports and Indigenous Impact Reports, are included as Appendices to the SAR, and are available on the Department of State Development's website:

http://www.dsd.wa.gov.au/documents/NEW_Browse_LNG_Precinct

An additional section, **Part 5, Section 4** is provided to principally discuss direct impacts (Category A) on social receptors, in line with the Terms of Reference and relevant State and Commonwealth guidance on environmental and social matters.

Figure 1-1 shows schematically how the various social components have been integrated into the overall SAR.

1.1.1. Strategic Social Impact Assessment

The DSD led an integrated strategic-level SIA process. This process was reported on in three volumes:

- Volume 1: Scope and Profile;
- Volume 2: Assessment of Impacts and Specialist Studies; and
- Volume 3: Strategic Social Impact Management Plan.

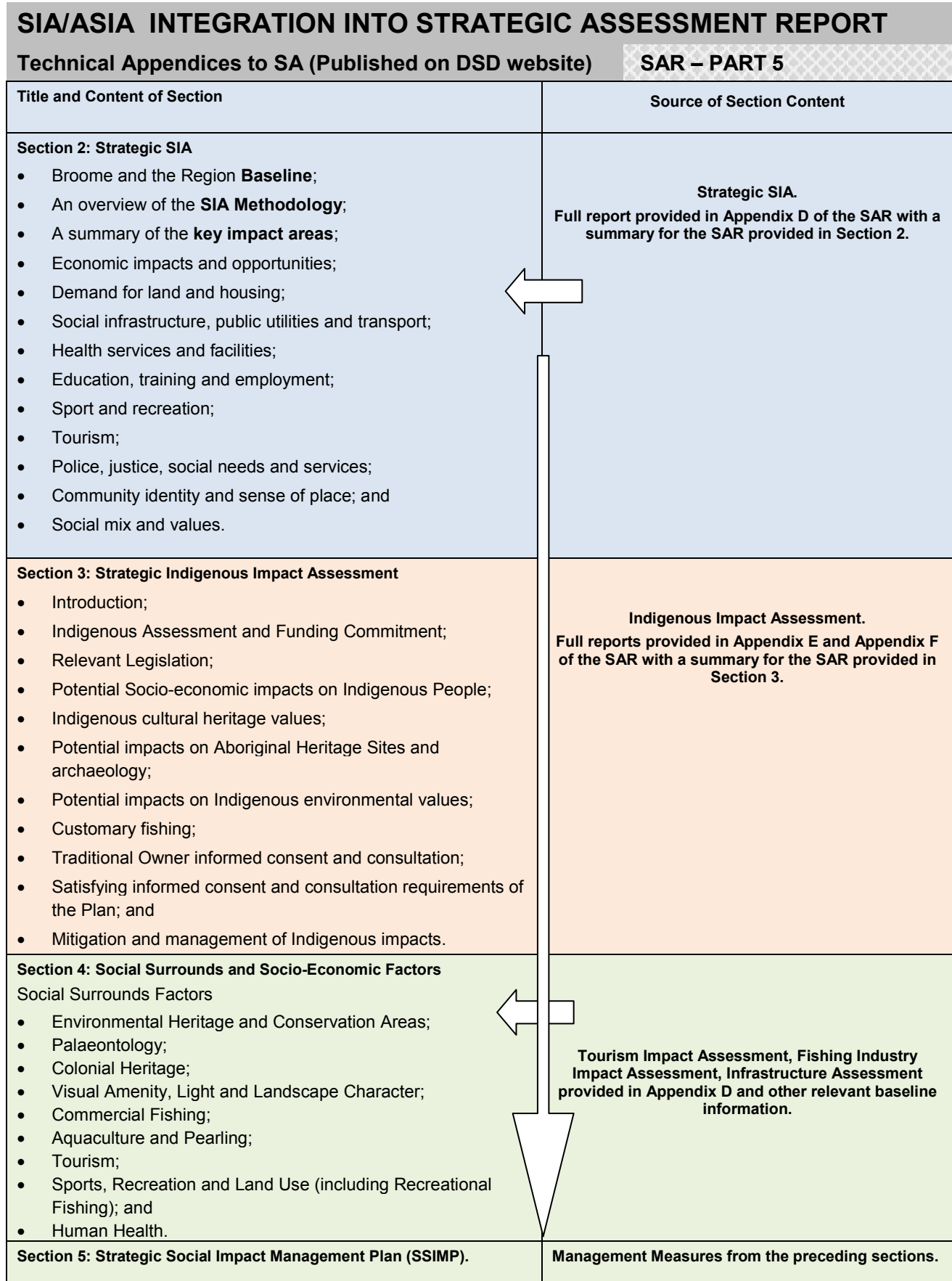
These three volumes can be found in **Appendix D** and on the DSD website at <http://www.dsd.wa.gov.au>.

The SIA process included four separate specialist studies:

- Tourism Impact Assessment (**TIA**) undertaken by Broome-based Kadar Pearson and Partners (**KPP**) and commissioned by Tourism WA at <http://www.dsd.wa.gov.au/7901.aspx>; (KPP Business Development, 2009; **Appendix D-5**);
- Fishing Industry Impact Study (**FIS**) undertaken by Big Island Research Pty Ltd and commissioned by the Department of Fisheries at <http://www.fish.wa.gov.au/docs/op/index.php?0706> (Big Island Research, 2009);
- Infrastructure Assessment undertaken by AECOM and commissioned by the Department of Planning at <http://www.dsd.wa.gov.au/7901.aspx>; (AECOM, 2010d; **Appendix D-6**); and
- Aboriginal Social Impact Assessment, summarised in **Part 5, Section 3** of the SAR with detailed reports included in **Appendix E**.

The DSD was responsible for the delivery of the strategic SIA while Tourism WA, the Department of Fisheries (**DoF**) and the Department of Planning (**DoP**) were responsible for delivery of three of the four specialist studies. The Kimberley Land Council (**KLC**) was responsible for the delivery of the ASIA Report. Originally, the ASIA was to be undertaken in parallel with the other three specialist reports. Ultimately, though, the KLC prepared a comprehensive suite of six stand-alone reports referred to as the Indigenous Impacts Reports (see **Section 1.1.2** for further information). These reports have been used to develop the condensed version and discussion of the Indigenous Impacts Reports. These reports are all available either on the DSD website or via a link to the relevant agency's website.

Part 5, Section 2 and **Section 4** provide a summary of all the reports with the exception of the Indigenous Impacts Reports which are condensed and discussed in **Part 5, Section 3**.



■ **Figure 1-1 SIA/ASIA Integration into SAR.**

1.1.2. The KLC's Indigenous Impacts Report

Part 5, Section 3 presents a condensed version and discussion of the Indigenous impact assessment prepared by the KLC. The KLC's Indigenous Impacts Reports consist of six volumes:

- Volume 1: Overview and Consolidated Recommendations (draft issued 30 March 2010);
- Volume 2: Report on Traditional Owner Consent and Indigenous Community Consultation (final issued 3 September 2010);
- Volume 3: ASIA Report (final issued September 2010);
- Volume 4: Heritage Impact Assessment (**HIA**) Report (final dated 7 September 2010);
- Volume 5: Aboriginal Archaeological Site Avoidance Survey, James Price Point (final dated August 2010); and
- Volume 6: Ethnobiology Studies Report (draft issued July 2010).

Recommendations from the Indigenous Impacts Reports

Volume 1: Overview and Consolidated Recommendations of the Indigenous Impacts Reports contains some 75 recommendations. On review of the KLC recommendations, the State has determined that:

- Many of the issues raised therein are common with those identified in the DSD SIA.
- Some revolve around a common theme and, at a strategic level, can be grouped together for management and mitigation purposes.
- Other recommendations address issues that are already covered, provided for or being considered under the following mechanisms:
 - Strategic Assessment Report;
 - Heads of Agreement (**HoA**) signed on 21 April 2009 between the State, the KLC and Woodside (as a potential Foundation Proponent of the BLNG Precinct);
 - Draft Indigenous Land Use Agreement (**ILUA**) or similar legal agreement between parties;
 - Responsibilities of Environmental Regulators, with Traditional Owner participation in management catered for in the ILUA or similar legal agreement;
 - National Partnership Agreements or like initiatives, specifically in the areas of education, training, employment and health. Note that these themes also intersect with State and Woodside commitments under the HoA and will be confirmed in the ILUA or other legal agreement;
 - Dampier Peninsula Land Use Management Plan;
 - Commonwealth Indigenous Program; and
 - Existing Government Policy.

The KLC and the Traditional Owners are being, and will be, engaged in the development of these initiatives. For example, several recommendations seek support for an Indigenous Ranger's program, which is provided for in the ILUA negotiations (or similar legal agreement between the parties). Also, similar programs already exist that have significant support from the State Department of Environment and Conservation (**DEC**) and Commonwealth Department of Sustainability, Environment, Water, Population and Community (**SEWPAC**).

While there is uncertainty about whether or not an ILUA will be achieved due to some ongoing negotiations within the native title claimant group, the State is committed to delivering the HoA, if the Precinct is established.

Consequently, while still clearly identifying the issues raised by the Indigenous Impacts Reports, many of them have been elevated to a strategic level and are included in the DSD Volume 3 of the SIA – Strategic Social Impact Management Plan (summarised in **Part 5, Section 5**). Woodside (as a potential Foundation Proponent) is also currently preparing to undertake its more detailed project level SIA, which will include consideration in detail of Indigenous impacts and management and mitigation measures as they relate to the establishment of its project.

Part 5, Annexure D provides a table of the 75 ASIA recommendations and where they are addressed.

A key issue raised in the Indigenous Impacts Reports (Volume 2) is that of Indigenous Informed Consent. Refer to **Part 5, Section 3.9** for further details on this issue.

1.1.3. Social Surrounds and Socio-economic Factors

Part 5, Section 4 addresses specific social issues as required by the Terms of Reference and the Scope of the Strategic Assessment. These include potential social impacts directly related to the Precinct surrounds (Social Surrounds Factors) related to Category A activities and potential social impacts related to the regional economy and other issues (Socio-economic Factors). This section includes detail on:

- Social Surrounds Factors:
 - Environmental Heritage and Conservation Areas;
 - Colonial Heritage;
 - Palaeontology; and
 - Visual Amenity, Light and Landscape Character.
- Socio-economic Factors:
 - Commercial Fishing;
 - Aquaculture and Pearling;
 - Tourism;
 - Sports, Recreation and Land Use (including Recreational Fishing); and
 - Human Health.

1.2. Relevant Socio-Economic Factors

Table 1-1 provides an overview of the socio-economic factors and the relevant aspects, and associated rationale, where it has been considered that there is a potential medium or high risk of potential impact. These factors have either been identified in the *Browse LNG Precinct Scope of the Strategic Assessment Report* (DSD, 2010b; **Appendix A-2**) or through the work undertaken by the KLC in the preparation of the *Aboriginal Social Impact Assessment* (**Appendix E**).

The Scope of Strategic Assessment report originally identified factors that were considered to be relevant and requiring further assessment, and those requiring assessment through the Terms of Reference agreed between the Commonwealth and State Governments. The KLC undertook a series of workshops that effectively reviewed the factors identified in the Scope of the Assessment report, and then re-assessed potential impacts as a result of those factors as well as identifying additional factors that were considered not to have been identified but were relevant from the Indigenous population perspective. The source of each relevant factor (Scope of the Assessment report or the KLC reports) is provided in the table, along with a 'sign-post' to the relevant section of the SAR where the potential impacts have been assessed.

■ **Table 1-1 Potential Social/Economic Impacts and Where they are Addressed in the SAR.**

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
Species of ethno-biological significance	Vegetation/habitat clearance	The potential loss of habitats and species of ethno-biological significance (e.g. gubinge) either through clearance or as a result of an altered fire regime has the potential to impact on cultural heritage values. Altered fire regimes may also result in changes to habitat structure and species composition which could also impact on ethno-biological significance.	Browse LNG Precinct Scope of the Strategic Assessment Report.	Impacts in relation to species of ethno-biological significance have been assessed and a summary is presented in Part 4, Section 2.5 and Part 5, Section 3.7.2 .
	Altered fire regimes			
Palaeontology	Atmospheric emissions	Emissions from industrial facilities are dispersed and may settle and impact on paleontological resources.	Browse LNG Precinct Scope of the Strategic Assessment Report.	Impacts in relation to palaeontology are presented in Part 5, Section 4.2 .
	Site disturbance and excavation – terrestrial and marine	Paleontological resources could be lost through physical disturbance during the construction process.		
Environmental Heritage and Conservation Areas	Vegetation and habitat clearing	The loss of habitats and species either through clearance or as a result of site disturbance or an altered fire regime has the potential to impact on environmental heritage values. Altered fire regimes may also result in changes to habitat structure and species composition which could also impact environmental heritage and the integrity of designated sites/areas.	Browse LNG Precinct Scope of the Strategic Assessment Report.	Impacts in relation to Environmental Heritage are presented in Part 5, Section 4.1 .
	Altered fire regimes			
	Site disturbance and excavation - terrestrial			
Aboriginal Heritage	Altered fire regimes	The presence of the LNG Precinct may result in a change in the existing fire regime of the local area on the Dampier Peninsula. Introduction of ignition sources and fire management may alter incidences of fire which could impact sensitive sites as well as the cultural value associated with the fire regime i.e. particularly in relation to times of years when burning could/would occur.	Browse LNG Precinct Scope of the Strategic Assessment Report and KLC Heritage Impact Assessment.	Aboriginal Heritage Impacts have been assessed and a summary is presented in Part 5, Section 3.4 – Section 3.6 .
	Physical presence	The physical presence of the LNG Precinct has the potential to impact on the landscape and marine environment which in turn has the potential to impact on the culture-scape of the area and the cultural interest with the marine and terrestrial environment.		
	Restricted areas	Marine and terrestrial restricted areas associated with construction and operation may constrain access by Traditional Owners/site custodians to visit and		

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
		maintain Aboriginal sites and undertake cultural practices.		
	Site disturbance and excavation – terrestrial and marine	Site disturbance will occur both on land and on the seabed and coastline during construction and will therefore potentially impact on sites of Aboriginal heritage significance within the footprint of the precinct. Many sites of Indigenous cultural significance are located along the coast.		
	Vehicle movements	Improvements in infrastructure and increased vehicle movements may lead to greater access to areas of heritage significance and risk of disturbance of sites.		
	Noise and vibration	There is the potential for off-site noise impact to disturb areas of known or potential Aboriginal heritage value. A song line is known to exist down the coast of the Dampier Peninsula. Cultural practice in relation to maintaining the song line may be potentially affected by noise from the LNG precinct. There is also the potential for noise and vibration to impact on marine factors of cultural value.		
	Terrestrial wastes and discharges	There is the potential for discharges to impact on heritage sites when considered over the lifetime of the project and therefore should be considered.		
	Sediment deposition and turbidity	Changes in sediment and turbidity have the potential to impact both the physical characteristics of cultural heritage values within marine areas and use/access to marine resources in surrounding areas.	KLC Heritage Impact Assessment.	
	Marine discharges (including non-routine events)	Marine discharges have the potential to impact both the physical characteristics of cultural heritage values within marine areas and use/access to marine resources in surrounding areas.		
	Light emissions	Light emissions have the potential to impact use/access to marine and terrestrial resources in surrounding areas through disruption and altered behaviours/activities.		
	Introduced pests	Introduced pests have the potential to impact both access to terrestrial and marine resources and		

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
		cultural values as well as ethno-biological associations.		
	Vegetation/habitat clearance	This aspect has the same potential impacts as those associated with site disturbance.		
	Atmospheric emissions	Emissions from industrial facilities are known to travel and settle significant distances from the emissions source; as such they have the potential to impact on rock art sites.		
	Groundwater abstraction	If the source of water for the proposal were to be groundwater, dependent on the volumes abstracted there is the potential to impact on the groundwater levels and therefore impact on both cultural values and access to and use of traditional resources.		
	Local population increases	Increases in population in the west Kimberley associated, directly or indirectly with the development of the BLNG Precinct has the potential to result in greater unmanaged access to traditional lands and waters.		
Colonial Heritage	Altered fire regimes	The loss of resources either through site disturbance or an altered fire regime has the potential to impact on colonial heritage values/resources and the integrity of designated sites/areas.	Browse LNG Precinct Scope of the Strategic Assessment Report.	Impacts in relation to colonial heritage are presented Part 5, Section 4.3 .
	Site disturbance			
Visual Amenity	Altered fire regimes	Changes to the landscape as the result of altered fire regimes, vegetation/habitat clearance, site disturbance and potential changes in composition as a result of atmospheric emissions or introduced pests could potential impact on how the landscape is viewed and the visual amenity of the area.	Browse LNG Precinct Scope of the Strategic Assessment Report.	Impacts on visual amenity and other potential landscape impacts including light emissions are presented in Part 5, Section 4.4 .
	Vegetation/habitat clearance			
	Site disturbance and excavation – terrestrial and marine			
	Atmospheric emissions			
	Introduced pests - terrestrial			
	Physical presence – terrestrial and marine	The physical presence of the proposal on the landscape will alter the current landscape character and visual aspects of the area potentially impacting on visual amenity.		

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
	Light emissions	The operation of the proposal will result in an altered light regime, during hours of darkness which will impact on visual amenity.		
	Atmospheric emissions	Operations within the LNG precinct could potentially result in visual plumes of atmospheric emissions which will impact the visual amenity of the area.		
	Vehicle movements	The upgrading of infrastructure to accommodate increased vehicle movements has the potential to impact on visual amenity by altering the exiting landscape character of the area. There is also the potential visual impact off increased vehicles being seen within the landscape.		
	Vessel movements	The increase in large vessel movements has the potential to impact on visual amenity.		
Mining	Use of infrastructure and services	The potential impacts relating to mining relate to the increased pressures on infrastructure conflicting with mining activities in the region and this can also be considered in relation to conflicts in relation to labour, with the potential economic impact of increased wages etc . Restricted areas impact from an economic perspective as those areas are no longer available for mining exploration and it is unknown if valuable assets are present.	Browse LNG Precinct Scope of the Strategic Assessment Report.	Although the potential impacts in relation to mining are considered to be negligible as the proposed precinct would seek to minimise competition with other key industries potential impacts have been considered and are summarised in Part 5, Section 2.3.1.3 .
	Restricted areas			
	Increased demand for labour			
Agriculture	Restricted areas	Restricted areas have the potential to impact on areas of land that would be available for agricultural use, so the impact relates to a loss of resources that may have social and/or economic impacts.	Browse LNG Precinct Scope of the Strategic Assessment Report.	Although the James Price Point area is remote from major pastoral leases that are present across other parts of the Dampier Peninsula, there is the potential to impact on traditional agricultural practices. This has been assessed through the Social Impact Assessment which is summarised in Part 5, Section 2.3.1.4 .
	Runoff	Run-off from the proposal could potential impact on agricultural resources in the area.		
	Increased demand for labour	There is the potential for there to be a conflict with labour commitments in the area, which would potentially result in economic impacts associated with wage increases etc.		
	Terrestrial wastes and discharges	Discharges could potential impact on agricultural resources in the area.		

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
Commercial fishing	Invasive marine species	An increase in vessel movements as a result of the project has the potential to result in invasive marine species being introduced into the local area. If invasive species are introduced they may establish and compete with local species leading to a potential impact of loss of certain species. Increased vessel movements also have the potential to impact on commercial fishing operations.	Browse LNG Precinct Scope of the Strategic Assessment Report.	The potential impacts in relation to commercial fishing have been assessed in Part 5, Section 4.5 .
	Vessel movements			
	Light emissions	Light emissions associated with operational activities have the potential to impact on commercial fishing operation due to disturbance.		
	Restricted areas	Restriction on marine areas as a result of construction and operation could result in current areas used for commercial fishing being restricted with an associated potential impact on overall operational activities for the industry.		
	Increased demand for labour	There is the potential for there to be a conflict with labour commitments in the area, which would potentially result in economic impacts associated with wage increases etc.		
	Use of infrastructure and services	Due to increased activity there may be pressure on existing infrastructure in the area, such as the existing port, which may impact on commercial fishing operations.		
	Marine discharges – including non routine events	There is the potential for discharges to affect commercial fishing resources in the area, dependant on the type of event and the type of discharge.		
	Sediment deposition and turbidity	Impacts on water quality as a result of construction and operation activities could potentially impact on commercial fishing stocks in the area thereby impact the commercial fishing industry.		
Aquaculture and Pearling	Invasive marine species	Increased vessel movements as a result of the proposal, increases the potential for invasive marine species to be introduced into the local area. If invasive species are introduced they may establish and compete with local species leading to a potential	Browse LNG Precinct Scope of the Strategic Assessment Report.	The potential impacts in relation to aquaculture and pearling have been assessed in Part 5, Section 4.6 .
	Vessel movements			

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
		impact of loss of certain species. Increased vessel movements also have the potential to impact on commercial fishing operations.		
	Light emissions	Light emissions associated with operational activities have the potential to impact on aquaculture (and pearling) operations.		
	Restricted areas	Restriction on marine areas as a result of construction and operation could result in current areas used for aquaculture (and pearling) being restricted with an associated potential impact on overall operational activities for the industry.		
	Increased demand for labour	There is the potential for there to be a conflict with labour commitments in the area, which would potentially result in economic impacts associated with wage increases etc.		
	Use of infrastructure and services	Due to increased activity there may be pressure on existing infrastructure in the area, such as the existing port, which may impact on aquaculture (and pearling) activities.		
	Marine Discharges – including non-routine events	There is the potential for discharges to affect aquaculture and pearling resources in the area, dependant on the type of event and the type of discharge.		
	Sediment deposition and turbidity	Impacts on water quality as a result of construction and operation activities could potentially impact on aquaculture (and pearling) activities.		
Tourism	Altered fire regime	Altered fire regimes could potentially impact tourism through the alteration and loss to existing habitats and landscape thereby impact on 'tourism value'. Alterations in fire regimes could also limit access of tourist thereby affecting the industry.	Browse LNG Precinct Scope of the Strategic Assessment Report.	It is recognised that Tourism is a key industry for the area and an assessment of potential impacts has been undertaken and is summarised in Part 5, Section 2.9 and assessed in Part 5, Section 4.7 . Tourism is also discussed in relation to potential impacts on cultural heritage values (Part 5, Section 3.5).
	Atmospheric emissions	Operations within the LNG precinct could potentially result in visual plumes of atmospheric emissions which will impact the visual amenity of the area and potentially impact tourism activities.		

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
	Use of infrastructure and services	Due to increased activity there may be pressure on existing infrastructure and services in the area, such as the airport and road network, which could potentially impact on tourism activities.		
	Restricted areas	Restricted areas will limit the current access of the area, which may impact on tourism activities.		
	Increased demand for labour	There is the potential for there to be a conflict with labour commitments in the area, which would potentially result in economic impacts associated with wage increases etc.		
	Introduced pests - terrestrial	Introduced species have the potential to alter habitat composition and thereby change the landscape which could consequently impact tourism values.		
	Light emissions	The operation of the proposal will result in an altered light regime, during hours of darkness which will impact on visual amenity.		
	Noise and vibration	Noise and vibration associated with the construction and operation of the precinct will likely alter the existing noise environment of the area, and as such may impact on tourist activities and values.		
	Physical presence	The physical presence of the proposal on the landscape will alter the current landscape character and visual aspects of the area potentially impacting on visual amenity and tourism values, as well as restricting access to areas.		
	Marine discharges – including non routine events	There is the potential for discharges to affect tourism activities through reduced access during such events as well as potential visual amenity issues.		
	Sediment deposition and turbidity	Activities that may lead to sedimentation/deposition effects could potentially affect amenity of the local coastal area with follow on effects on local tourism uses.		
	Site disturbance and excavation - terrestrial	Changes to the landscape as the result of vegetation/habitat clearance, site disturbance could potential impact on the landscape character of the area and the visual amenity of the area.		
	Vegetation/habitat			

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
	clearance			
	Vehicle movements	The upgrading of infrastructure to accommodate increased vehicle movements has the potential to impact on visual amenity by altering the exiting landscape character of the area. There is also the potential visual impact off increased vehicles being seen within the landscape, as well as potentially impacting on exiting tourist traffic.		
	Vessel movements	The increase in large vessel movements has the potential to impact on visual amenity and therefore tourism values, but there may also be resulting impacts associated with tourist activities.		
Sports and recreation (including recreational fishing)	Altered fire regime	Altered fire regimes could potentially impact sports and recreational activities, through the alteration and loss to existing habitats and landscape thereby impacting on the 'recreational value', but alterations in fire regimes could also limit access of thereby affecting spots and recreation activities.	Browse LNG Precinct Scope of the Strategic Assessment Report.	The potential impacts on sports and recreation including recreational fishing have been assessed and is summarised in Part 5, Section 2.8 and further assessed in Part 5, Section 4.8 .
	Introduced invasive species	Introduced species have the potential to alter habitat composition and thereby change the landscape which could consequently impact sport and recreation values. There is also the potential that introduced species will out-compete native/local species resulting in species loss which may impact recreational activities such as recreational fishing.		
	Light emissions	The operation of the proposal will result in an altered light regime during hours of darkness which will be impact on visual amenity. Light emissions associated with operational activities have the potential to impact on sports and recreation activities due to disturbance.		
	Restricted access	Restricted areas will limit the current access of the area, which may impact on sport and recreation activities.		
	Marine discharges – including non routine events	There is the potential for discharges to affect recreational fishing resources in the area, dependant on the type of event and the type of discharge. There is also the potential for access to sport and recreation		

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
		activities during such events.		
	Local population increase (temporary or permanent)	Potential increased demand for sport and recreation activities may result in positive and negative economic impacts.		
	Physical presence	The development area will unlikely be available for other land uses and there will be limited access in restricted areas which will potentially impact on existing sport and recreation activities.		
	Vehicle movements	Increased traffic in the area may impact on existing recreational users.		
	Vessel movements	Increased vessel movements and likely larger vessels in the area may impact on existing sport and recreational users.		
Water supply	Groundwater abstraction	There is the potential for water abstraction to impact on water supply and availability for other users.	Browse LNG Precinct Scope of the Strategic Assessment Report.	It is recognised that there is a social impact in relation to impacts on groundwater supply, but the potential impacts relate to environmental factors as such this has been assessed under Part 4, Section 2.3 .
	Use of infrastructure and services	There will be increased demand for potable water which will place additional pressure on ground water resources in the region.		
Waste management	Use of infrastructure and services	There will be increased demand for waste management facilities which could potentially impact of current services and resources.	Browse LNG Precinct Scope of the Strategic Assessment Report.	There will be a requirement for commercial proponents to operate within the jurisdiction of the Precinct in relation to waste management. Additional infrastructure will have to be developed as part of any proposals and comply with wider management measures; as such there will be no impact on current waste management facilities and infrastructure. Further information is provided in Part 5, Section 2.5 .
Transport	Vehicle movements	There will be increased traffic and vessel movement as a result of the proposal which will lead to increased use of infrastructure with potential impacts on exiting users as well as the long term integrity of infrastructure.	Browse LNG Precinct Scope of the Strategic Assessment Report.	Potential impacts associated with transport have been assessed and summarised in Part 5, Section 2.5 .
	Vessel movements			
	Use of infrastructure			
Land Tenure	Physical presence	The development area is unlikely to be available for other land uses.	Browse LNG Precinct Scope of the Strategic Assessment Report.	James Price Point is currently unallocated Crown land which has a native title claim over it by the Goolarabooloo Jabirr Jabirr Native

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
				Title Claimants. The final site allocation includes arrangements to ensure land tenure issues are fully addressed. Further detail is provided in Part 2, Section 7 .
Local population increases (temporary and permanent)	General population	The construction and operation of a minimum of two LNG facilities at the precinct is likely to result in an increase in the general population due to people being attracted by direct and indirect opportunities with associated increased demand on goods and services. There is also the potential impact of the work force on the current general population in terms of social factors (such as alcohol and drug issues and social interaction).	Browse LNG Precinct Scope of the Strategic Assessment Report and KLC Social Impact Assessment.	Potential impacts associated with local population increases, both temporary and permanent were a key focus of the Social Impact Assessment and are summarised in Part 5, Section 2 .
	Indigenous Population	There is a significant Indigenous population already residing in the region. The development proposals may result in an increase in this population with associated demand on goods and services. There is also the potential impact of the work force on the current general population in terms of social factors (such as alcohol and drug issues and social interaction).	Browse LNG Precinct Scope of the Strategic Assessment Report.	
	Local employment	Construction and operation of a minimum of two LNG projects within the Precinct is likely to result increased competition for labour which could result in wage increases in order for sectors to compete.		
	Indigenous employment	Construction and operation of a minimum of two LNG projects within the Precinct will likely result in higher demand for employment which may benefit local Indigenous populations, however this may compete with existing employment activities and result in increased wages.		
	Education and training	An increase in population will likely result in an increased demand for education and training, with the associated positive impact of potential opportunities.		
	Cost of living	The increase in population and demand on goods and services which is likely to exert an upward pressure on the regional cost of living and the regional price		
	Regional price index			

Social/Economic Factor	Relevant aspect with potential to cause impact	Rationale for potential social/economic impacts	Source of identification of impact	Where social/economic impacts have been addressed in the SAR
		index.		
	Housing prices	There is the potential, should the direct and indirect workforce reside within the local area that housing prices could increase if demand is greater than supply.		
Use of infrastructure and services	Local employment	Construction and operation of a minimum of two LNG facilities on the precinct will likely result in higher demand for all goods and services as well as placing increased pressure on exiting services and infrastructure, with resulting social and economic impacts (positive and negative).	Browse LNG Precinct Scope of the Strategic Assessment Report.	Potential impacts on infrastructure and services are intrinsically linked with potential population growth. The precinct will be required to have key infrastructure and services and as such will have minimal impact on current infrastructure and services. A summary is provided in Part 5, Section 2 .
	Indigenous employment			
	Housing prices			
	Regional price index			
	Power			
	Telecommunications			
	Health			
	Education			

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2. Strategic Social Impact Assessment

There are considerable gas resources off the Kimberley coast and a high level of industry interest in developing these resources. This raises the potential for multiple and uncoordinated gas processing facilities to be developed along the Kimberley Region coast leading to unnecessary and significant social and environmental impacts. In order to avoid such an outcome, the State Government has identified a single multi-user LNG Precinct from which gas can be processed and transported. The site selected for the LNG Precinct is in the vicinity of James Price Point, approximately 60km north of Broome on the Dampier Peninsula.

The BLNG Precinct would be established subject to environmental and heritage approvals and confirmation of a Foundation Proponent¹. The initial Precinct development is likely to occur as a staged development expanding upwards from an initial 12Mtpa to 15Mtpa of LNG production in the first scenario.

The development of the BLNG Precinct would bring significant benefits for the people of the west Kimberley. These include economic and employment opportunities both at the Precinct and in Broome and the surrounding areas. For example, there are likely to be opportunities supplying services to the Precinct as well as a greater availability of training and employment opportunities for local residents, particularly during long construction periods. In addition, the development of the Precinct would increase the economic resilience of the area by introducing another economic sector.

Indigenous benefits are encapsulated in a HoA that was signed in April 2009 by the State Government, Woodside (as a potential Foundation Proponent) and the KLC on behalf of Traditional Owners. This agreement outlined a range of social benefits and opportunities for improved education, training and business development, and improved service delivery and infrastructure. Further details are provided in **Part 5, Section 3**.

The State agreed to provide in excess of \$250 million over some 30 years to ensure a range of positive outcomes including:

- land tenure reform on the Dampier Peninsula to establish appropriate tenure for housing, economic opportunities and environmental protection;
- the establishment of a Kimberley Enhancement Scheme; and
- Economic Development, Housing, Education and Cultural Preservation Funds.

The Agreement also requires that Foundation and future commercial proponents deliver a range of employment and training benefits as well as significant contributions to provide for the social and economic development of Traditional Owners and the broader community. Delivery of these benefits would in part be through an Indigenous Land Use Agreement or other agreement between the State, the Foundation Proponent and the Traditional Owners and through the establishment of the Precinct Governance Structure (**Part 5, Section 5.3**).

As part of the Strategic Assessment and the planning process for the BLNG Precinct, a strategic-level SIA was commissioned to anticipate the impacts of the BLNG Precinct and recommend strategies for mitigating and managing those impacts and enhance opportunities. The ultimate aim of the SIA is to avoid, mitigate and manage negative social impacts and ensure that benefits and opportunities for the region's local communities are maximised.

As part of that assessment, the Government has conducted a detailed assessment of the potential social impacts of the proposed Precinct. This included looking at past, current and likely future trends in Broome's population and the likely additional impact that the construction and operation of gas processing facilities, would have on services, housing, businesses and employment.

The strategic SIA establishes a framework from which detailed management measures would be developed. Many of the management measures would be further developed when the Foundation Proponent undertakes its project level SIA. The Foundation Proponent SIA would fully develop the relevant social mitigation and management strategies developed for the Strategic Assessment and contained in this document. Concurrently, the State Government is developing a mechanism to improve social service delivery to Broome. Both the Foundation Proponent's SIA and the State's planning

¹ The initial commercial proponent for the Precinct.

for Broome will require input from the community and other stakeholders. The framework promotes mechanisms to help government, private organisations and community agencies and community stakeholders to work together to identify and meet the impacts of this increase on education, health and community services and facilities.

The central finding of the strategic SIA is that, if the mitigation, management and monitoring strategies are implemented, the Precinct-related social impacts can largely be managed.

Precinct development is planned to take place within a context of considerable projected population growth in Broome. Broome Shire's past natural population growth has been well above the State's growth average and increased by 4.7 percent per annum from 1976 to 2006. This growth is forecast to continue regardless of the establishment of an LNG Precinct with predicted increase of 84 per cent from 17,100 people in 2011 to 31,400 people in 2041. **Part 5, Figure 2-6** shows that, assuming a managed access construction camp, the incremental population growth caused by the Precinct would be relatively limited.

The SIA was conducted at the strategic level and examined a range of potential development scenarios over a time period of 30 years, assuming that construction and operation would be undertaken by up to three commercial proponents. The detailed SIA is presented in a three volume report (**Appendix D**) being:

- *Volume 1: Browse LNG Social Impact Assessment Scope and Profile*. This report records baseline data on the region's existing social and economic conditions, details of the proposed Precinct development and potential impact variables. It is available at: http://www.dsd.wa.gov.au/documents/SIA_Vol_1_December_2009.pdf;
- *Volume 2: Browse LNG Assessment of Impacts and Specialist Studies*. This report assesses the magnitude and likelihood of the impact variables identified in Volume 1 and includes four specialist studies. It categorises impacts in relation to: population change, community well being, psycho-social impacts and socio-economic impacts. It is available at: <http://www.dsd.wa.gov.au/7901.aspx#7906>; and
- *Volume 3: Browse LNG Social Impact Management Plan*. This report includes a Strategic Social Impact Management Plan for the Precinct's development to manage the social impacts identified in Volume 2. It is also available at: <http://www.dsd.wa.gov.au/7901.aspx#7906>.

The SIA contributes to the overall Strategic Assessment Report and this **Part 5** summarises the key social impacts and the related mitigation and management measures. The SAR is required as part of obtaining environmental approval under the *Environmental Protection Act 1986* and *Environment Protection and Biodiversity Conservation Act 1999*. Importantly, this SIA is not being considered under those environmental acts, but under the Terms of Reference for the Strategic Assessment as agreed by the Western Australian and Commonwealth Governments. It will, however, use some terminology consistent with that used for the environmental assessment for ease of interpretation. The direct Precinct related activities constitute Category A impacts whereas Category B impacts are caused indirectly by the establishment of the Precinct and **Category C** impacts constitute cumulative impacts from the Precinct and other developments.

As there are no people living permanently within 20km of the Precinct, the Category A social impacts focus on recreation and tourism activities. These direct social impacts are discussed in **Part 5, Section 4**. The majority of social impacts form Category B impacts and are discussed in **Part 5, Section 2**. In terms of the EPBC Act, the most significant impact on matters of National Environmental Significance is likely to be the population increase in the area and the potential displacement of recreational activities from the Dampier Peninsula. Both factors could potentially impact on the Ramsar wetland at Roebuck Bay. The mitigation measures to manage these factors are described in **Part 5, Section 5** and **Part 6**.

The social summaries follow a different format to those of the environmental sections of the SAR because of the interdependence of the social issues and the related mitigation and management strategies. The strategic SIA originally addressed both indirect and direct impacts (Category A and B activities), however, this section, **Section 2**, summarises the indirect impacts primarily.

This Section (**Section 2 of Part 5**) is arranged as follows:

- Broome and the Region **Baseline**: a review of key geographic, historical and social features.
- An overview of the **SIA Methodology**.
- A summary of the **key impact areas** including the baseline and reference to the measures to enhance opportunities, mitigate and manage the potential impacts. These measures are discussed in detail in the following section.
 - A summary of the **economic impacts** and opportunities;
 - A summary of changes in **demand for land and housing**;
 - A summary of the impacts on **social infrastructure, public utilities and transport**;
 - A summary of the impacts on **health services and facilities**;
 - A summary of the potential impacts and opportunities for **education, training and employment**;
 - A summary of the potential impacts and opportunities for **sport and recreation**;
 - A summary of the potential impacts and opportunities on **tourism**;
 - A summary of the potential impacts on **police, justice, social needs and services**;
 - A summary of the potential impacts on **community identity and sense of place**; and
 - A summary of the potential impacts to **social mix and values**.

A **Strategic Social Impact Management Plan** which includes measures to enhance opportunities and mitigate and manage the potential impacts is presented in **Part 5, Section 5**.

2.1. Baseline Profile: Broome and the Region

Section 2.1 provides a summary profile of the existing socio-economic and cultural environment of the proposed Browse LNG Precinct. Profiling provides a baseline from which potential impacts can be predicted and measured. The profile focuses on the SIA primary impact area (Broome to the James Price Point area) and includes the secondary impact area (the Dampier Peninsula, Derby and Bidjadanga).

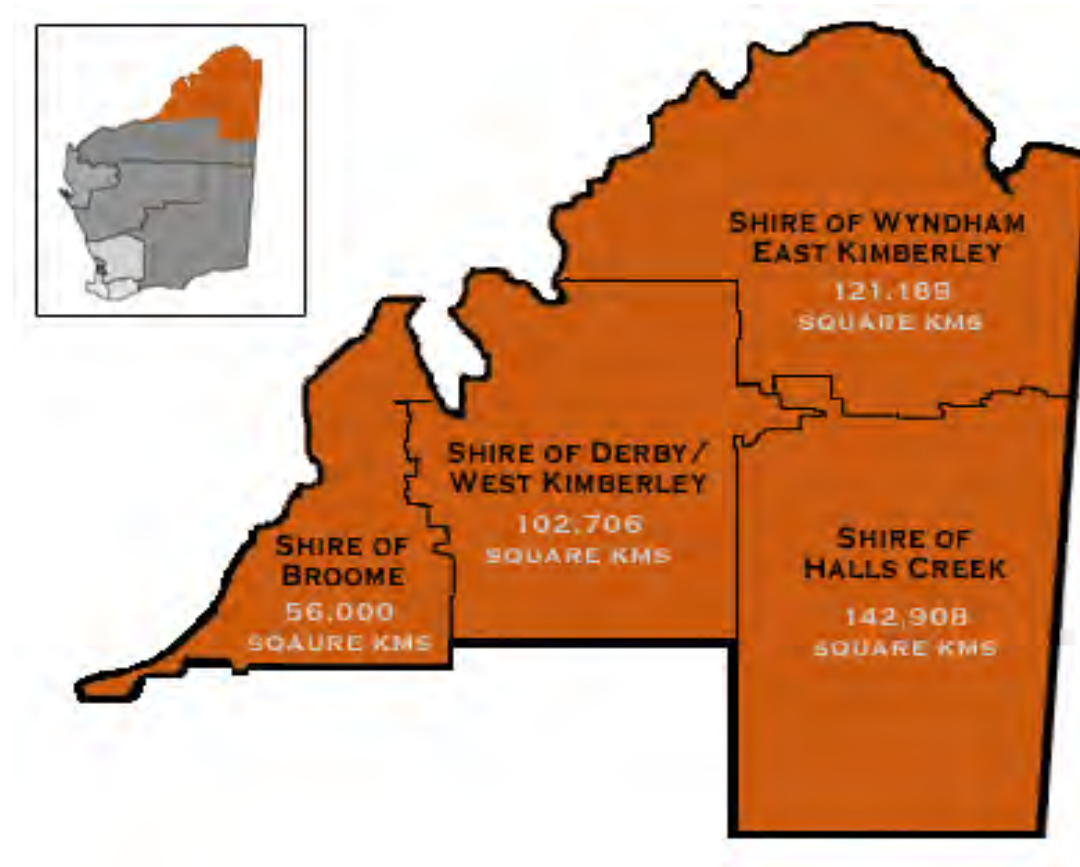
The profile is based on an analysis of relevant census data and other primary and secondary data sources. It briefly reviews the geographical location, historical context and the social characteristics of the region.

2.1.1. Geographic Location

2.1.1.1. The Kimberley Region

The Kimberley region of WA is located in the far north of the State and is bordered by the Pilbara region to the south, the Northern Territory to the east, the Timor Sea to the north and the Indian Ocean to the west. It covers an expanse of 424,517km², which makes up approximately one-sixth of WA. As can be seen in **Figure 2-1**, the region is divided into four local government shires:

- Broome;
- Derby/West Kimberley;
- Halls Creek and Wyndham; and
- East Kimberley.



Source: Reproduced directly from KDC, 2009 in SIA Volume 1.

■ Figure 2-1 Kimberley Local Government Areas.

2.1.1.2. Shire of Broome

The Shire of Broome is located 2,200km from Perth and covers an area of 56,000km², including the metropolitan centre of Broome/Cable Beach as well as the communities and outstations on the Dampier Peninsula and to the south of Broome. The climate of Broome and the Dampier Peninsula has a marked seasonal variation in rainfall and temperature. The wet season lasts from November to April and the dry season from May to October with low humidity and fine weather, the most popular time for tourists to visit.

2.1.2. Historical Context – Colonial and Aboriginal Cultural Heritage

2.1.2.1. The Kimberley

The Kimberley region was first inhabited at least 30,000 years ago, with some sources identifying the earliest evidence of human occupation dating from between 50,000 to 40,000 years ago (Eureka, 2010; **Appendix E-5**). The first documented European to explore the overland area was Alexander Forrest in 1879 and the region was identified and named in 1880. The towns of Broome and Derby were proclaimed in 1883.

For the past century, the majority of Kimberley land has been used for pastoral activities and about 50% of the region is held under pastoral lease for grazing stock. The Indigenous pastoral industry is significant, with 30% of all stations controlled by Indigenous people. Crop production also contributes to the area's agriculture and is dominated by the region's largest irrigated agricultural project, the Ord River Irrigation Area, near Kununurra.

Mining activity in the Kimberley has a long history since the discovery of gold near Halls Creek in 1885. The Kimberley contains the largest range of mineral commodities of any region in WA (Ruddock & Hassan, 2004). Mineral production in the Kimberley is dominated by diamonds from deposits at Argyle and Ellendale. There is also mining activity around nickel, iron ore, zinc and lead.

2.1.2.2. Broome and the Dampier Peninsula

The Dampier Peninsula has a long history of Aboriginal settlement and a relatively recent one of European exploration and occupation. Archaeological records indicate that Aboriginal people have probably lived in the general area for some 30,000 years and on the Peninsula for at least 2,000 years. Early European explorers observed Aboriginal family groups camped on the Peninsula from the mid-1600s and noted their semi-nomadic hunting and gathering lifestyle, use of marine resources and construction of wells to access fresh water. Archaeological and anthropological surveys have confirmed traditional use of the area.

In 1908, population estimates made by Aboriginal Inspector Isdell and police patrols indicate that there were between 300 and 400 Aboriginal people living on the Peninsula and 80 to 90 people on Sunday Island. The establishment of missions at Lombadina, Beagle Bay and Sunday Island in the late 19th century continued to expand the population around these locations.

The founding of Broome was particularly influenced by the Kimberley's pearling industry. The sale of Broome's first town lots occurred in 1886 and the town was gazetted as a port three years later. Between 1889 and 1891, the price of mother of pearl shell increased significantly. By 1898, Broome was the principal cargo port for northern WA.

Missions were established on the Peninsula at Disaster Bay, Beagle Bay, Lombadina, Sunday Island and Cygnet Bay. In addition to their religious and social activities, the missions were involved in market gardening and pastoral activities. The *Aboriginal Act 1905* initiated the removal of Aboriginal children from their families for placement to missions on the Peninsula.

Pastoral stations were established in the area in the late 1800s. By 1908, five pastoral stations were operating along the coast between Broome and Cygnet Bay. However, by about 1930, most of the pastoral land had become mission grants or reserve land for the use and benefit of Aborigines. Historically, the Dampier Peninsula has been utilised for pastoral activities. Today, only three pastoral leases (Yeeda, Mt Jowalaenga and Country Downs) operate in the south portion of the Peninsula at more than 50km to the west and south-west of James Price Point. These pastoral leases cover an area of approximately 420,000 hectares.

World Wars I and II significantly impacted Broome's development and its pearling industry. The European market for mother of pearl collapsed during World War I but by the 1920s, the pearling industry was again successful with prices reaching record highs. World War II resulted in the almost immediate ceasing of all pearling activity as a part of the war effort and Japanese residents being interned in camps. Broome was significantly damaged by air raids during the war and had to be rebuilt after the war. Broome was again slowly rebuilt and its pearling industry evolved with the new market of cultured pearls. Lord Alistair McAlpine is also credited with leading a concentrated effort to restore many of the older buildings in the town and provide a suitable plan for Broome's future.

Current population estimates for the Dampier Peninsula range from 1,100 to 1,600 predominantly Aboriginal people. The population remains concentrated in the northern part of the Peninsula close to the four main communities of Bardi (One Arm Point), Djarindjin, Lombadina and Beagle Bay. In the 1980s some families chose to live on traditional lands and establish outstations.

The number of people living in or close to these communities is thought to be between 650 and 950. An additional 450 to 650 people are estimated to live at, or be associated with, outstations on the Peninsula. These populations are fairly stable, however, numbers are affected by seasons and events.

The missions on the Dampier Peninsula maintained a strong presence at Beagle Bay and Lombadina until the 1970s. Thereafter, there was a gradual return of land to the communities (DPI, 2008). During the *homelands movement* in the 1980s a number of families returned to their traditional lands to re-establish their cultural connections, because of a preference to live outside the main communities, or to establish small tourism related businesses. At the peak of the *homelands* period, up to 90 small family communities or outstations were established. However, the number of permanently occupied outstations is thought to have declined in recent years as a result of changes to State and Commonwealth funding arrangements that have impacted on small communities.

The land tenure on the Dampier Peninsula is a complex mix of:

- Aboriginal Reserves (vested in the Aboriginal Lands Trust);
- Aboriginal Land Trust leases to Aboriginal corporations;
- Aboriginal corporation sub-leases issued to families for the establishment of outstations;
- State Land Service leases to Aboriginal corporations and other entities such as pearling companies,
- pastoral leases;
- limited freehold land (primarily owned by the Catholic Church, Cygnet Bay Pearls and Kooljaman Resort);
- conservation estates (includes Coulomb Point, Swan Island and Lacepede Islands);
- public purpose reserves (for example Cape Leveque Lighthouse and Bungarragut Pool on the Fraser River); and
- unallocated Crown Land.

2.1.3. Social Characteristics of the Region

2.1.3.1. Social Characteristics of the Kimberley

The estimated resident population of the Kimberley region in 2008 was 34,185 (Australian Bureau of Statistics (ABS) (ABS, 2009)². This figure equates to 1.6% of the State's population and 6% of the population in regional³ WA. Important features of the Kimberley population are the large proportion of Indigenous people with 42.1% compared to 3% for WA as a whole. The Indigenous population is of comparatively young age (median age of 22) compared to the older non-Indigenous median age for the region of 35.

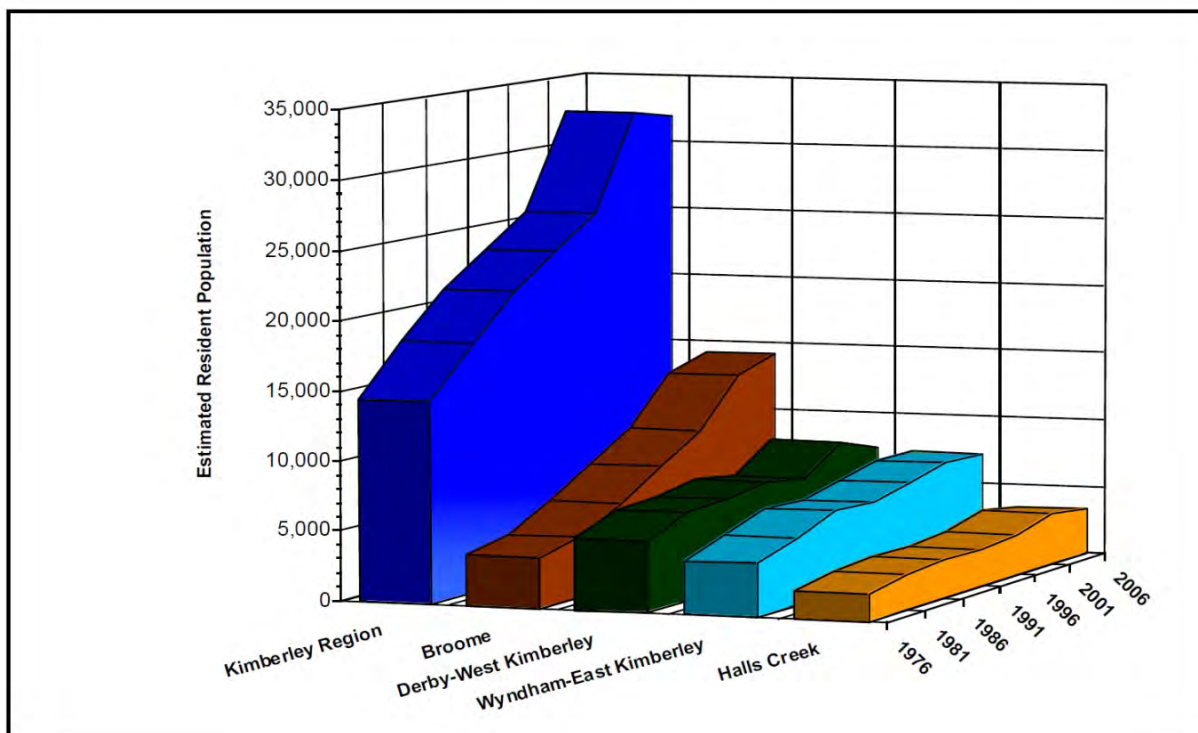
Of the Kimberley's local government authorities, the Shire of Broome (15,386 persons) has the largest share with 45% of the region's population in 2008, followed by the Shire of Derby-West Kimberley (7,799 or 23%) and the Shire of Wyndham-East Kimberley (7,662 or 22%) while the Shire of Halls Creek (3,338 or 10%) is significantly less populated (ABS, 2009). The Shire of Broome also has the largest number of jobs in the region and in 2006, 42% (5,563) of the Kimberley region's jobs were in the Shire of Broome. These jobs were mainly in the services sector (public administration and safety, education and training and health care and social assistance).

Population growth is a key feature of the Kimberley and population growth in the Kimberley region accounted for 7.6% of growth in regional WA in the 10 years between 1998 and 2008. It is notable that past population increases in the Kimberley have not been experienced uniformly across the region. In the 10 year period from 1998 to 2008, the Shire of Broome accommodated 73% of the region's population growth. Derby-West Kimberley and Wyndham-East Kimberley accommodated 10% and 17% respectively, while Halls Creek had a minor decline (ABS, 2009).

Figure 2-2 and **Table 2-1** illustrates the changes in the population of the Kimberley over the 30 year period between 1976 and 2006. During this period, the Kimberley region's population more than doubled from 14,430 in 1976 to 31,928 in 2006 and its share of the State's non-metropolitan population increased from 4.2% to 5.9%. Significantly, this period captured the decline in population of Derby-West Kimberley and the significant increase in population in the Shire of Broome. In 1976, Derby was the regional service centre whereas many of these services are now provided in Broome. The Shire of Broome has continued to grow rapidly and over the 10 years from 1998 to 2008, the Shire of Broome has accommodated 73% of the region's population growth.

² Post census estimate. Estimates for 2008 are based on revised final estimated residential population for 2006 released on 23 April 2009 (ABS, 2009). The previous ABS final estimated residential population (the 19 August 2008 release) has been questioned by State demographers Australia-wide, including the Western Australian State demographer and the update does not change the Kimberley Region. The official 2008 estimate may be conservative.

³ Western Australia excluding the Perth Metropolitan Region (Perth Statistical Division).



■ **Figure 2-2** Estimated Resident Population of Local Government Areas of the Kimberley Region, 1976 – 2006.

■ **Table 2-1** Estimated Resident Population of Local Government Areas of the Kimberley Region, 1976 – 2006.

Local Government Area	Estimated Resident Population at 30 June						
	1976	1981	1986	1991	1996	2001	2006
Broome	3,590	4,280	5,923	7,887	9,766	13,196	14,175
Derby-West Kimberley	5,090	6,330	6,501	7,019	6,512	8,467	7,355
Halls Creek	1,940	2,540	2,748	2,679	2,910	3,751	3,239
Wyndham-East Kimberley	3,810	4,790	5,952	5,790	6,484	7,211	7,159
Kimberley Region	14,430	17,940	21,124	23,375	25,672	32,625	31,928
Regional WA	345,580	378,020	408,899	447,305	470,164	508,157	540,633
WA	1,178,340	1,300,060	1,459,019	1,636,067	1,765,256	1,901,159	2,059,381

Sources: 1976

Estimated Resident Population in Local Government Areas, WA - 1976, 1981 and 1982. Australian Bureau of Statistics WA Office. Cat No. 3203.5. 7 September 1983.

1981

Estimated Resident Population in Local Government Areas, WA 30 June 1981 to 1985. Australian Bureau of Statistics Perth. Cat No. 3203.5. 12 November 1986.

1986

Estimated Resident Population by Age and Sex in Statistical Local Areas 30 June 1992. Australian Bureau of Statistics Canberra. Cat No. 3203.5. 26 September 1994.

1991

Regional Population Growth, Australia. Australian Bureau of Statistics Canberra. Cat No. 3218.0. 25 July 2002.

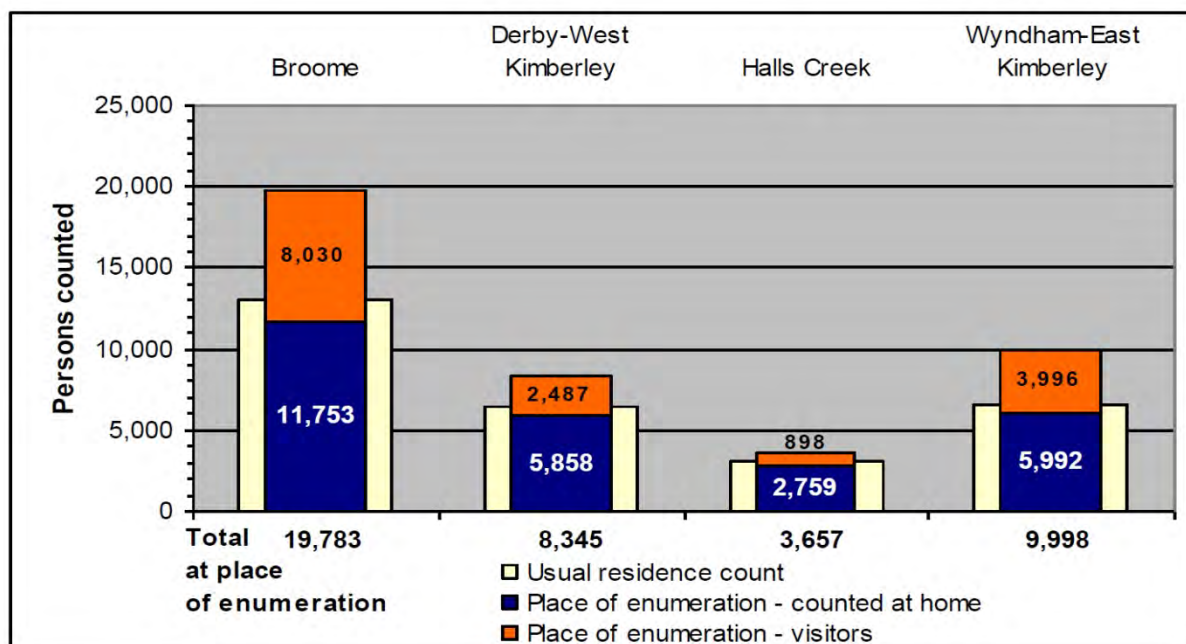
1996 – 2000

Regional Population Growth, Australia. Australian Bureau of Statistics Canberra. Cat No. 3218.0. 19 August 2008.

2001 – 2008

Regional Population Growth, Australia. Australian Bureau of Statistics Canberra. Cat No. 3218.0. 23 April 2009.

The Kimberley is a popular tourist destination and a snapshot of the extent of tourism was provided by the 2006 census that was undertaken in August near the peak of the Kimberley tourist season. **Figure 2-3** shows the numbers of visitor (orange) to the Kimberley local government areas as opposed to the people counted at home (blue) and the people who claimed that the relevant area was their usual place of residence (cream). The impact of tourists is particularly marked in the Shire of Broome and causes a burden for relevant human services such as health. On census night (August 2006) 37% of people counted were visitors to the region (WA average 7%); and, in the Shire of Broome, of 19,783 people counted, 8,030 (or 40.6%) were considered visitors.

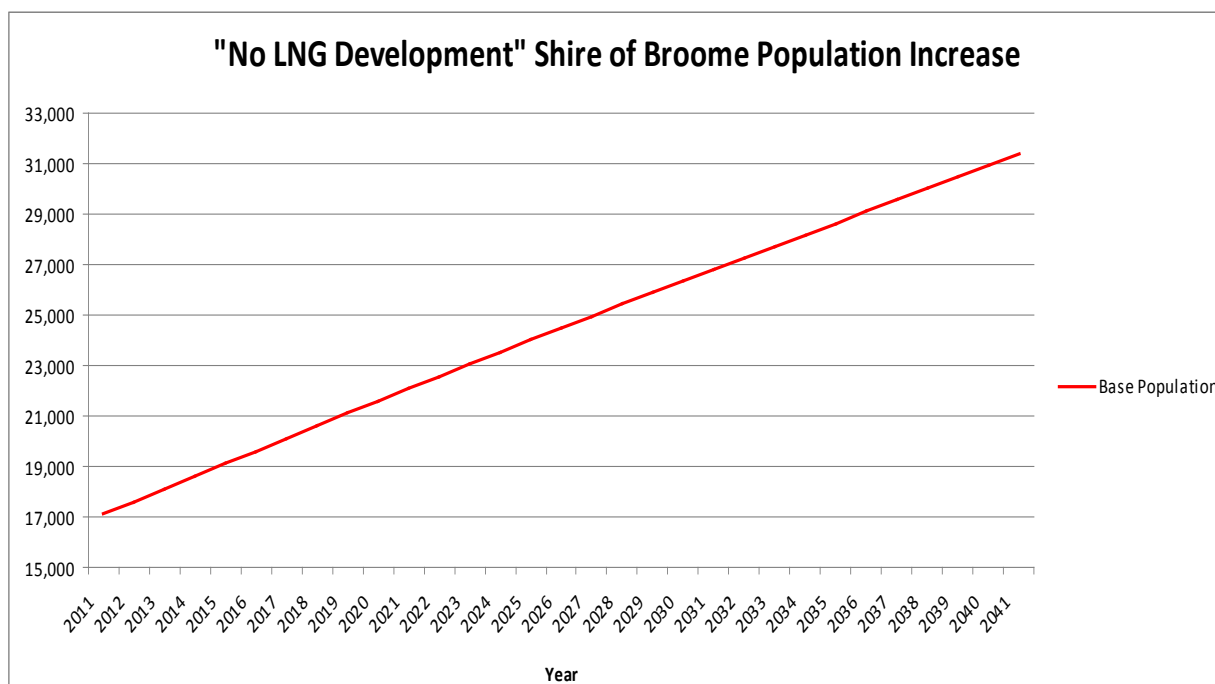


■ **Figure 2-3 Visitors and Residents in Local Government Areas of the Kimberley Region, 2006.**

2.1.3.2. Social Characteristics of the Shire of Broome

A significant feature of the Shire of Broome is that even without the BLNG Precinct development, it demonstrates exceptionally high growth with a 4.7% per annum population increase from 1976 to 2006. Broome is currently experiencing the effects of this significant population growth with the demand for many services outstripping supply.

As illustrated in **Figure 2-4** this growth is projected to continue even without the development of an LNG Precinct. The population projections undertaken for the DSD SIA for the Shire of Broome showed a mid-range projection from 17,100 people in 2011 to 31,400 people in 2041, an increase of approximately 84%.



Source: (Produced by EBC (2009); and reported in **Appendix D**).

- **Figure 2-4 Projected Mid-range Population Increase 2011-2041 (84%) of the Shire of Broome (No LNG Development).**

Table 2-2 provides a demographic summary of Broome Urban Centre and the Shire of Broome with WA as comparison.

- **Table 2-2 Demographic Summary of the Primary Impact Area.**

Characteristic	Broome Urban Centre	Shire of Broome	WA
Population characteristics			
Resident population	11,547	13,058	1,959,087
Number of occupied private dwellings	5,721	6,571	757,989
Number of households (excludes "visitors only" and non-classifiable households)	3,468	3,835	703,168
Sex ratio (males: females)	107: 100	107: 100	99: 100
Percentage Indigenous population	20.2% (2,337)	27.2% (3,557)	3.0%
Median age (years)	32	32	36
Median age of Indigenous population (years)	24	22	21
Median age of non-Indigenous population (years)	34	34	36
Speaks only English	78.5% (9,060)	79.4% (10,368)	81.8%
Percentage separated or divorced (aged 15 years and over)	12.5% (1,108)	11.9% (1,176)	11.6%
Percentage one-parent families (includes one-person families with no dependent children or students)	15.8% (385)	17.2% (474)	14.8%
Age groups			
0-4 years Pre-school	8.1% (940)	8.6% (1,118)	6.4%
5-12 years Primary school	12.4% (1,436)	13.0% (1,697)	14.4%
13-17 years High school	5.6% (652)	6.1% (794)	6.5%
18-24 years Youth	9.6% (1,111)	9.8% (1,286)	10.7%
25-44 years Providers	36.5% (4,214)	35.7% (4,666)	33.5%

Characteristic	Broome Urban Centre	Shire of Broome	WA
45-54 years Middle Age	15% (1,732)	9.8% (1,880)	13.3%
55-64 years Pre-retirement	8.2% (945)	7.9% (1,027)	7.6%
65-74 years Active Retired	3.2% (368)	2.9% (412)	3.3%
75+ Elderly	1.3% (149)	1.4% (178)	1.5%
Home ownership			
Percentage (of occupied private dwellings) fully owned	29.0% (1,661)	30.4% (1,997)	31.4%
Percentage mortgaged	17.1% (976)	15.0% (988)	37.6%
Percentage rental housing	35.1% (2,009)	52.5% (2,321)	27.2%
Change of address			
Percentage same address 1 year ago	58.9% (6,679)	61.4% (7,883)	74.7%
Percentage same address 5 years ago	29.4% (3114)	33.8% (4036)	47.7%
Household			
Median housing loan repayment (\$/monthly)	1,733	1,733	1,213
Median weekly rent (\$/weekly)	163	143	170
Median individual income (\$/weekly)	628	568	500
Median weekly household income (\$/weekly)	1,184	1,129	1,066
Percentage of family households (of total occupied private dwellings)	68.7% (2,379)	69.5% (2,664)	71.7%
Percentage of lone person households	24.2% (839)	23.9% (918)	24.7%
Percentage of group households	7.1% (246)	6.6% (252)	3.6%
Percentage of households with Internet connection	59.3% (2,056)	55.7% (2,136)	63.2%
Motor vehicle ownership			
Percentage of households with one motor vehicle	34.3% (1,189)	36.2% (1,388)	34.1%
Percentage of households with two or more motor vehicles	51.6% (1,788)	48.0% (1,842)	55.6%
Education			
Percentage completed Year 12 (aged 15 years and over)	35.7% (3,172)	34.6% (3,427)	41.4%
Percentage attending pre-schools or primary school	8.7% (1,008)	9.4% (1,223)	8.7%
Percentage attending secondary schools	3.6% (412)	3.7% (485)	5.9%
Percentage attending a tertiary institution	4.5% (514)	4.1% (538)	5.8%
Unemployment ^(a)			
Unemployment rate	4.0% (227)	3.9% (244)	3.8%
Unemployment rate (15 to 24 years)	8.7% (78)	8.3% (85)	7.07%
Industry of employment			
Manufacturing	4.0% (214)	3.7% (221)	9.4%
Construction	9.7% (525)	9.09% (542)	9.09%
Retail trade	11.7% (630)	10.7% (640)	11.1%
Health care and social assistance	10.6% (574)	11.4% (679)	10.2%
Professional, scientific and technical services	2.9% (158)	2.8% (168)	6.3%
Accommodation and food services	11.2% (604)	10.5% (629)	5.8%
Public administration and safety	8.3% (448)	9.8% (585)	6.4%

Source: ABS, 2006 Census of Population and Housing in SIA Volume 1.

Note: (a) Community Development Employment Program (CDEP) participants (Indigenous) in both Broome and surrounding communities are counted as 'employed'. Since the 2006 census, CDEP has been abolished in Broome (and Derby) and this may alter the above-quoted employment statistics.

Table 2-3 summarises Broome's educational and employment trends, in comparison to the Shire of Broome and the broader Kimberley region.

■ **Table 2-3 The Kimberley, Shire of Broome and Broome Urban Centre's Education and Employment Trends.**

Education characteristics	Broome Urban Centre	Shire of Broome	Kimberley
%	Light Blue = Shire/Kimberley average less than Broome Dark Blue = Shire/Kimberley average greater than Broome		
Education Institutions Attending			
Attending Primary School*	23.2%	25.3%	30.1%
Attending Secondary School*	9.5%	10.1%	10.5%
Attending Technical/Further Educational Institution*	6.5%	6.2%	4.7%
Highest Level of Education Completed			
Completed Year 10**	23.5%	24.1%	24.9%
Completed Year 12**	35.6%	34.5%	29.5%
Certificate/Diploma and Advanced Diploma*	42.4%	42.4%	40.8%
Bachelor Degree*	15.2%	15.1%	14.7%
Grad. Diploma and Grad. Certificate*	2.1%	2.1%	2.4%
Postgraduate Degree*	2.2%	2.2%	2.1%
Industry of Employment (Top 3)*			
Construction*	15.6%	14.4%	6.8%
Accommodation & Food Services*	10.2%	9.5%	7.2%
Transport, Postal and Warehousing*	9.8%	8.9%	5.1%
Occupation of Employment (Top 3)*			
Retail Trade*	11.7%	10.7%	8.6%
Accommodation & Food Services*	11.2%	10.5%	7.2%
Health Care & Social Assistance*	10.7%	11.4%	15%

Source: *ABS Census: Basic Community Profile (2006) based on place of usual residence.

DSD, 2009; **Appendix D.

Table 2-4 compares the socio-demographic profile of the Shire of Broome between Indigenous and non-Indigenous peoples.

■ **Table 2-4 Shire of Broome's Socio-demographic Profile – Indigenous and Non-Indigenous Comparison 2006.**

Shire of Broome	Indigenous	Non-Indigenous/other
Population	3,558	11,547
Age Structure		
Percent aged 17 and below	40.3%	21.3%
Percent aged 18 to 64 (workforce population)	55.9%	73.7%
Percent aged 65 and above	3.6%	4.9%
Education		
Percent with year 12 or equivalent (highest level attained)	20.3%	47.1%
Percent with year 10 or equivalent (highest level attained)	29.1%	27.1%
Income		
Median individual income (\$/weekly)	240	693
Median household income (\$/weekly)	683	1,241
Family Composition		
Couple family with children	34.7%	27.8%
Couple family with no children	12.5%	29.6%
One parent family	25.8%	5.8%
Dwellings		
Separate house	75.5%	62.6%
Multiple units	17.1%	20.2%
Other dwellings	7.5%	17.3%
Tenure		
Fully owned	9.9%	19.6%
Being purchased	10.2%	28.8%
Rented	70.9%	46.6%

Source: DSD, 2009; **Appendix D**.

2.2. SIA Methodology

The methodology for the SIA follows best practice as identified in the International Principles of Social Impact Assessment developed by the International Association of Impact Assessment⁴. The methodology consists of a number of iterative phases that include understanding the proposed project/s and the community before change (baseline), the potential impacts of the project/s and recommendations for mitigation, management and monitoring of these impacts. Most importantly the review of existing documentation to assist in describing the community and the use of key informant and stakeholder consultation has been an important and integral process in documenting baseline conditions and identifying impacts and the mitigation of these impacts.

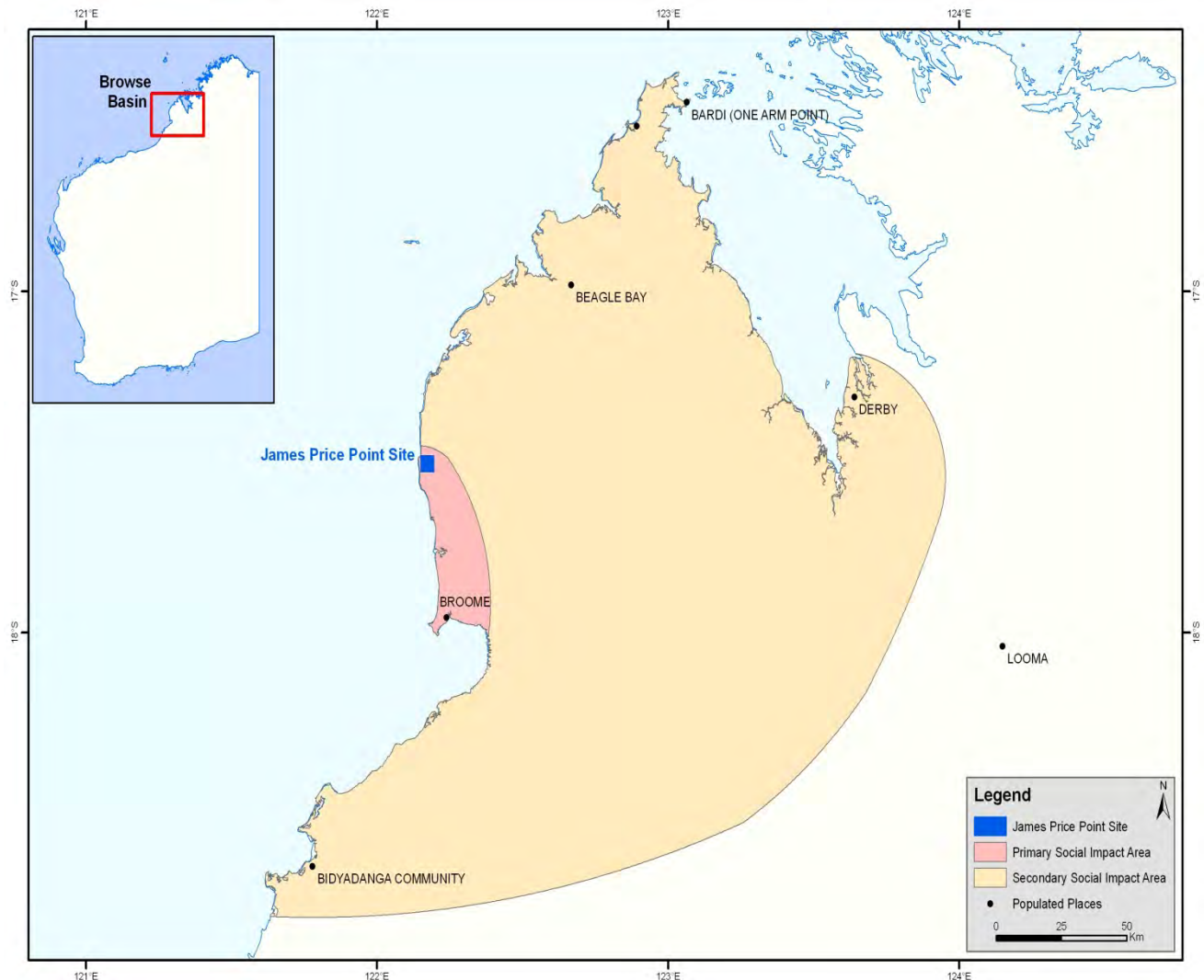
The DSD's SIA process established primary and secondary impact areas. The primary impact area extends from the James Price Point area to the township of Broome, the nearest population centre to the proposed Precinct. The primary impact area includes the area for the construction and operational workforce accommodation as well as service areas for supporting industries. The SIA report identifies this area as likely to experience the majority of the social and economic impacts. The secondary impact area surrounds the primary impact area and includes the communities on the Dampier Peninsula and those of Derby and Bidjadanga.

The SIA draws a distinction between 'primary' and 'secondary' impact areas as shown on **Figure 2-5**. The primary impact area comprises effects within a 10km radius of James Price Point and those on the town of Broome⁵. It was selected based upon the expectation that it would experience the majority of the social and economic impacts, including the effects on population, construction and operational workforce accommodation, service areas for supporting industries, infrastructure, employment and recreation; in addition to cultural and heritage impacts.

The secondary impact area surrounds the primary impact area and includes the communities on the Dampier Peninsula and stretches from Derby in the north to Bidjadanga in the south.

⁴ International Association for Impact Assessment (May, 2003). Social impact assessment: International principles. IAIA Special Publication Series No. 2.

⁵ Information regarding the known technical aspects and workforce relating to the Precinct Development were published in October 2009, in the Browse LNG Precinct Public Information Booklet, available at:
http://www.dsd.wa.gov.au/documents/NEW_Browse_LNG_Precinct_Public_Information_Booklet.pdf



■ **Figure 2-5 Primary and Secondary Social Impact Areas.**

The above geographic areas of impact and the development scenarios designated for assessment were published in Volume One in July 2009. The potential development scenarios are summarised below.

2.2.1. Potential Precinct Development Scenarios

The SIA was undertaken in relation to five potential development scenarios for the Precinct:

- Scenario 1: No development of Precinct;
- Scenario 2: Low development (15Mtpa LNG Precinct within 15 years: i.e. 4 trains);
- Scenario 3A: Medium development (25Mtpa LNG Precinct within 25 years: i.e. 7 trains);
- Scenario 3B: Medium development (35Mtpa LNG Precinct within 25 years: i.e. 10 trains); and
- Scenario 4: High development (50Mtpa LNG Precinct within 30 years: i.e. 14 trains).

Each Scenario represents a gradual increase in the level of the development of the Precinct. It is anticipated that Scenario 2 would represent the presence of a single Foundation Proponent, Scenario 3B would represent the presence of two commercial proponents and Scenario 4 would represent the presence of three commercial proponents. More detail on scenarios can be found in Volume 2 of the DSD SIA, (<http://www.dsd.wa.gov.au/7901.aspx#7906>), also included as **Appendix D-2**.

LNG is traded on the world market and development is subject to market conditions. Government and industry market analysts have predicted that the low to medium Precinct scenarios (Scenarios 2, 3A and 3B) are considerably more likely than the high development scenario (Scenario 4). The high development scenario should be regarded as an aspiration and less likely to occur. Consequently, this assessment focuses on the more likely low and medium scenarios (Scenarios 2, 3A and 3B).

2.2.2. Workforce Assumptions

A number of assumptions about the development of the Precinct have guided the SIA. The most important of these are the overarching assumptions that:

- 80-90% of construction workers would, at least initially, be employed on a 'fly-in/fly-out' (**FIFO**) basis;
- all construction workers would be provided purpose-built accommodation camp with recreation facilities, close to the Precinct (outside of Broome); and
- access to and from this camp would be managed to minimise the impact on Broome and the Dampier Peninsula, particularly during the construction phase when large numbers of workers would be at the Precinct.

The initial construction phase of the Precinct (during Foundation development) could take four to six years and employ a range of onshore and offshore construction workers. The workforce demand would tend to follow a bell-shaped curve and therefore during peak construction (a period of approximately two years within this same time frame) workforce numbers may reach around 6,000 people. As noted within the Public Information Booklet (DSD, 2009d) and the Three-volume SIA publication, these numbers are subject to some flexibility.

The unanticipated delay in land access arrangements has led to the possibility that the Foundation Proponent may need to establish a temporary offsite workforce accommodation camp for around 600 workers on the outskirts of Broome. This workforce would be working on the early works program and commence work on the pioneer camp. There may also be a limited requirement to accommodate directly employed project personnel.

Under Scenario 2 or 3A development, the Precinct is expected to have a permanent operational workforce of about 500 to 750 employees, plus about 160 on shore and offshore contractors during operations. This permanent workforce is likely to be specialised and consist of both a residential and a fly-in/fly-out workforce.

Production (the operational phase) could start approximately 12 months before the completion of construction of the last of the three initial LNG trains.

2.2.3. Stakeholder Engagement

Community and stakeholder engagement, which has been an important and integral methodology for the SIA, has included:

- A range of meetings and presentations with government agencies (Commonwealth, State and Local), formal organisations such as the Broome Chamber of Commerce, and service providers to provide them with information on the project and the potential increase in demand on their services.
- A number of technical workshops with service providers in the areas of: infrastructure; sport and recreation; land and housing; health; and education and training. A further technical workshop on the identification of Broome's character or 'sense of place' was also held.
- Several events which targeted the general community to enable their input into the process to verify (or add to) the issues identified during the earlier mentioned workshops and meetings. These events included: an Open Day (September 2009); participation in a two-day Shore LNG forum (September 2009); and two shopping centre information sessions on Friday and Saturday mornings at each of the two Broome shopping centres early December 2009 and late January 2010). Further input to the SIA process was also invited at the NorthWest Expo held in Broome in May 2009 and May 2010.
- Project-related information was also provided through: fortnightly updates in the local newspaper; fact sheets available at the Shire offices; and publications on the DSD website.

Details of regional and community participation throughout the SIA process, summary workshop notes and details of the community issues at each of the community events can be found at Annexure C of the SIA Volume 2 (**Appendix D-2**).

Table 2-5 contains a summary of the issues of concern raised by the community and stakeholders at the above-mentioned events. This table indicates the number of people at each event who identified issues of concern. For example at the Open Day Shire Forum, 50 (70.4%) of people identified the “capacity of existing town utilities” as an issue of concern.

■ **Table 2-5 Issues of Concern across Community Consultation Locations.**

Issues	Open Day Shire Forum		Paspaley Plaza		Broome Boulevard		Total	
	Count	%	Count	%	Count	%	Count	%
Potential changes to Broome’s unique character or ‘sense of place’	61	85.9	22	53.7	34	64.1	117	70.9
The capacity of health services	55	77.5	23	56.1	34	64.1	112	67.9
The availability of housing, inc. affordable housing	58	81.7	18	43.9	34	64.1	110	66.7
The capacity of existing town utilities	50	70.4	18	43.9	34	64.1	102	61.8
Access to recreational areas near the Precinct	55	77.5	18	43.9	29	54.7	102	61.8
Indigenous issues	55	77.5	18	43.9	28	52.8	101	61.2
Potential impacts to tourism	49	96.0	19	46.3	22	41.5	90	54.5
Potential impacts to recreational fishing	44	62.0	18	43.9	25	47.2	87	52.7
Potential impacts to commercial fishing and pearling	45	63.4	15	36.6	21	39.6	81	49.1
The capacity of education services	45	63.4	14	34.1	21	39.6	80	48.5
The capacity of the police and the justice system	41	57.8	14	34.1	22	41.5	77	46.7
Others	50	70.4	26	63.4	33	62.3	109	66.1
Total participants	71	100.0	41	100.0	53	100.0	165	100.00

Note: The Open Day and Shire Forum were held 17-19 September 2009.
The Paspaley Plaza Shopping Centre consultation was held 4-5 December 2009.
The Broome Boulevard Shopping Centre consultation was held 29-30 January 2010.

2.2.4. Limitations of the Assessment

The Strategic SIA has been the culmination of 18 months’ data collection, modelling and assessment using the best available baseline social data and information for Broome and the west Kimberley. Along with best estimate workforce projections provided by the potential Foundation Proponent, assessments have been made about the possible impacts on the area and its communities in establishing the Precinct. The assessments have been used to develop strategies to overcome or minimise impacts and to maximise opportunities from development.

The assessment was based on a range of potential Precinct development scenarios while there was still some uncertainty about commercial proponents, workforce numbers or precise project specifications. Community consultation was similarly restricted to ‘Precinct’ rather than project-level issues. Both the WA State Government and the potential Foundation Proponent acknowledge that further consultation will need to take place at the ‘Project-level’. The potential Foundation Proponent commenced their SIA in September 2010 and it is expected that future commercial proponents would build on this work in conducting their own social impact assessments, based on the more defined specifications of those particular developments. Notwithstanding, the assessment provides a comprehensive baseline and overview of the Precinct and the potential cumulative impacts of Precinct development. Future assessments would need to include the wider, more detailed level of consultation not part of the current assessment.

Likewise, management measures proposed to mitigate impacts in the present SIA are framed in broad terms. The Precinct is at an early stage of development without confirmed commitment from a Foundation proponent. Management responsibilities have therefore been allocated at a high level and it is expected that a whole of government approach will

be required to address some of the identified impacts, particularly the existing social issues in the region. The management strategies in **Part 5, Section 5** provide an outline of the objectives, output, outcome and responsibilities for the identified strategies.

The management strategies contained apply to Government departments, the potential Foundation Proponent and other future users of the Precinct. They have been developed using adaptive management principles in which the strategies can adapt to accommodate changed conditions and new issues.

Planned processes to advance more specific levels of impact management commitment, and to build on limitations in present knowledge (including more comprehensive consultation) are discussed **Part 5, Section 5.8**.

2.2.5. Sources of Impact

The most significant drivers of impact across all impact variables are:

- temporary and permanent population increase from construction and operational workforce and the potential opportunistic workforce;
- changes to the socio-economic group composition within the regional population.

2.2.6. Population Characteristics and Projected Increase: The Present Case

The Kimberley region's population has been growing faster than the State and other West Australian regions. From 1998 to 2008, the Shire of Broome (the largest centre, with 15,386 people and comprising 45% of the region's population) accounted for 73% of the Kimberley's population growth. The Kimberley also has a highly mobile population (e.g. present FIFO workers; retirees who travel; tourists). The 2006 ABS Census reflects this mobility. Less than 30% of the Broome Urban Area's residents had lived at the same address five years previously.

Broome presently supports workers from the upstream LNG industry, mining, agriculture, fishing and pearling industries. As the Kimberley economy is dominated by the mineral and petroleum industries, it already supports a large population of FIFO workers.

The projected base population increase in the Shire of Broome (**Figure 2-4**) is independent of any direct or indirect population increase attributable to the development and operation of the BLNG Precinct. Broome's natural growth is projected to increase by 84% from 17,100 people in 2011 to 31,400 people in 2041. This above-average growth has also been occurring over a long time and over the thirty years from 1976 to 2006, the Shire of Broome's population increased from 3,590 to 14,175, an increase of 4.7% per annum.

The Kimberley region has a particularly large proportion of Indigenous people; 42.1% compared to Western Australia as a whole (3%). There is also a higher proportion of males to females in the region.

Other notable demographic features are:

- The region's youthful population (median 30 years compared to 36 years for WA).
- The median age of Indigenous people in the region is 22, compared to a median age of 35 for the non-Indigenous population.
- In the town of Broome there are relatively few family households (69%) compared to the State as a whole.
- In WA, separate houses account for 81% of occupied private dwellings; whereas for the Shire and Urban Broome the figures are 67% and 66% respectively.

2.2.7. Population Characteristics and Projected Increase: Precinct Impacts

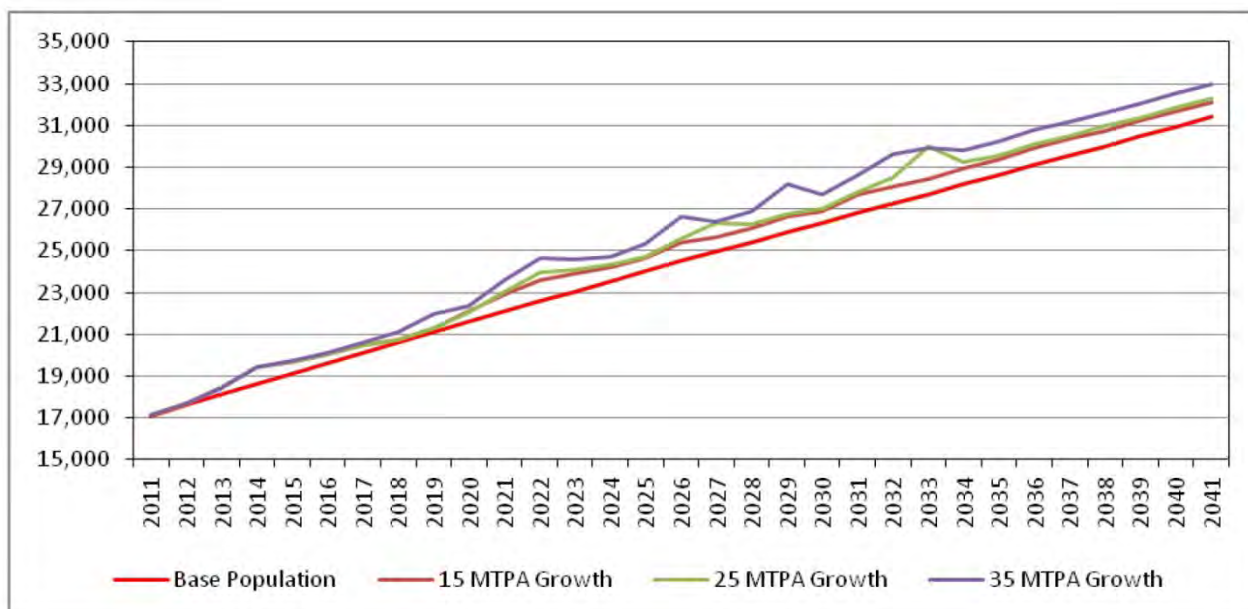
Detailed population modelling was undertaken based on low, medium and high assumptions cases for each development scenario and is reported in detail in Volume Two. Assuming the implementation of the managed-access workforce and other strategies, it is expected that workers living in Broome would either be existing residents or people who choose to relocate to Broome with their families and become part of the resident population. Therefore given the largely FIFO arrangements, likely Precinct-related population impacts on Broome are manageable, particularly when seen within the

context of the unusually high population growth predicted over the 30 year time span of the assessment without any LNG development.

Population increases resulting directly from the establishment of the Precinct over a thirty year period are expected to derive from both direct employment at the Precinct and indirect employment supporting the direct workers during the construction and operational phases; family migration to the area to support new employees; and migration to the area amongst those seeking opportunistic employment at the Precinct.

Natural population growth⁶ in the base population within the Shire of Broome over the next 30 years is shown in **Figure 2-6** (represented in red). The projected base population increase in the Shire of Broome is independent of any direct or indirect population increase attributable to the development and operation of the BLNG Precinct.

Figure 2-6 also shows the predicted population increase resulting from the 15, 25 and 35Mtpa development scenarios (Scenarios 2, 3A and 3B) relative to natural population growth in the Broome Shire. As can be seen, assuming that the mitigation and management measures are implemented, the level of population increase deriving from LNG development is manageable. For instance, by 2041 even the higher scenario (3B) of 35Mtpa development, only adds a further 5% to the population of the Shire of Broome.



■ **Figure 2-6 Shire of Broome Population Increase with 15, 25, and 35Mtpa Scenarios.**

Given that many social services and facilities within the Shire are currently experiencing significant demands on resources and are vulnerable to any increase in demand, attention will need to be given to the provision of services and facilities within the Shire of Broome, even to support the natural population increase over the next 30 years. While any population increases driven by the development of the Precinct are relatively modest in comparison to Broome's natural population growth, they would result in additional demands on already vulnerable services and facilities. These service limitations will be addressed through the implementation of the west Kimberley Socio-Economic Strategy, as discussed in **Part 5, Section 5**.

⁶ The phrase 'natural population growth' refers to the projected population increase of an area which is derived from the number of births, deaths and migration in and out of the area.

2.2.8. Population Composition Impacts

The “dissimilarity to local population” impact variable is defined as the introduction of a significant group of people into the project area that is different to the resident population in age, sex, ethnicity and family structure.

The permanent Precinct workforce is likely to be highly trained and professional and resident in family groups more homogenous to the local population. While their income means they are likely to be socio-economically different, their number would be a lot less than the construction workforce which would be predominantly single FIFO workers.

Impacts caused by the presence of significantly different population groups within the community as a result of the Precinct’s presence is dealt with under a range of social impact factors below, in particular regarding regional identity and sense of place, cost of living and tourism.

2.2.9. Key Social Impacts

The assessment identified that the social impacts to which the region is most vulnerable (in magnitude and likelihood) would relate to:

- housing availability, affordability and homelessness;
- community identity and sense of place;
- development of the regional economy, specifically with respect to workforce competition and small businesses that undergo rapid growth during construction phases;
- cost of living; and
- community wellbeing and social and health service delivery.

Summaries of each social impact (as recorded in the State’s three-volume SIA) appear below according to the following structure:

- Definition and overview of each factor.
- Baseline context.
- Assessment of magnitude and likelihood of the impact under the low medium and high case scenarios (including whether the impact itself may be beneficial).
- The basis for such predictions.
- Where relevant the extent to which impacts are unknown, unpredictable and/or whether further investigation may need to take place.

A list of the relevant management strategies are discussed in more detail in **Part 5, Section 5**.

Social Impact Management Measures have been designed so that one mitigation strategy may cover a range of potential impacts. A Social Impact Management Matrix, tabulating the impact coverage of each measure, and impact-likelihood appears at **Table 5-1, Section 5**.

2.3. Economic Factors

Large scale resources projects can be significant drivers of economic growth but also have the potential to change existing patterns of economic activity. Concerns naturally arise regarding the development's potential to increase the cost of living and wages; and the effect this may have upon the price of, for example, groceries and housing.

Significant expenditure and investment would be expected in relation to any of the BLNG Precinct's development scenarios as the development of LNG facilities requires large initial capital outlays. In addition, significant expenditure items associated with the LNG Precinct would also include payments to contractors for goods and services and payments to its direct employees.

This investment and expenditure can have substantial macroeconomic impacts on factors including Gross Domestic Product (**GDP**), income, inflation (prices) and fiscal variables. The use of several economic modelling processes was considered. However, given uncertainty at this stage in relation to precinct capital investment and construction and operational expenditure, no economic modelling was used to quantify the economic impacts of the Precinct at the local scale.

2.3.1. Economic Baseline Context

Although the Kimberley region has experienced favourable growth conditions since 2000, particularly in relation to mining and tourism activities, the region's contribution to the state's Gross State Product (**GSP**) is small. The development of an LNG industry in the region does provide significant scope for the region to considerably increase its contribution to the State's economy and to increase employment opportunities in the Kimberley.

The Kimberley region is presently (directly and indirectly) responsible for about 1.52% of the State's raw GSP in 2006/07, about 2% of the State's employment in 2005/06 (figures for 2006/07 not available) and about 1.6% of the State's export income in 2006/07.

In 2006/07, in current prices terms the Gross Regional Product (**GRP**) for the Kimberley was estimated at \$1.7 billion (DLGRD, 2007). A simple summation and modelling conducted by the DSD recorded that the region yielded a gross value of production of around \$2.6 billion for 2006/07, meaning only 60% of the income benefits derived from production are retained in the region (GRP/gross value of production). This outcome, in part, is the result of fly-in fly-out arrangements operating in the region's mining industry, and may be relevant for the performance of the region if large scale FIFO arrangements apply to the region's future LNG industry.

The Kimberley economy is dominated by the mineral and petroleum industries. Other significant industries are retail trade, tourism, construction, fisheries, pearling and agriculture. However, the fact that the Kimberley does not have a well established manufacturing base also means that the material input needs of a number of the industries operating in the Kimberley are sourced from outside the region.

The cost of living in the region is markedly high. The 2007 Regional Price Index for the Kimberley (produced by the WA Department of Local Government and Regional Development) indicated that prices for a basket of goods were 16.9% more expensive than in Perth. Broome was found to have 17.2% higher prices than Perth.

In the Kimberley region as a whole, the median weekly individual income in 2006 was \$456 which is approximately 90% of that of the Western Australian population as a whole (\$500). A significant difference exists between Indigenous and non-Indigenous incomes: that of Indigenous people (\$224) is only 30% of that of non-Indigenous people of the Kimberley (\$725). This disparity is pronounced because Indigenous incomes are relatively low compared to Indigenous incomes in the State (\$254) and non-Indigenous incomes are relatively high compared to the non-Indigenous population in the whole of Western Australia (\$507 per week).

In Urban Broome the median individual income overall was \$628 per week which is more than one third higher than in the Kimberley region as a whole. However, the difference between Indigenous and non-Indigenous incomes is reduced. Indigenous incomes are about 50% of non-Indigenous incomes. Indigenous incomes (\$325) are substantially higher than the Kimberley Indigenous population as a whole, and non-Indigenous incomes (\$696) are relatively low. Relatively low non-Indigenous incomes are explained by the under-representation of mining industry workers resident in Broome.

compared to other places in the Kimberley and the over representation of tourist-related employment in accommodation and food services, and retail.

Some of the above income figures have been taken from 2006 Census data and there are questions around its accuracy, particularly as far as Indigenous statistics are concerned. It should also be noted that the 2006 Census was undertaken at a time when the Commonwealth funded Indigenous Community Development Employment Program was in place. Since that time, CDEP has been abolished in both Derby and Broome and further work would need to be done by the Foundation Proponent to establish a more accurate picture should the Precinct proceed.

2.3.1.1. Commercial Fisheries

A number of State and Commonwealth managed fisheries operate in the coastal inshore waters of the Kimberley (DoF, 2008b). In the 2004/2005 season, catches of finfish and prawns contributed 98% of the economic value of the Kimberley fishing industry. Across the board, a catch of 2,426 tonnes was estimated with a value of \$13.5 million (KDC, 2006). The primary focus is on finfish – particularly emperors, snappers, cods (DLGRD and KDC, 2006) – and prawns (DoF, 2008b).

Further information is provided on commercial fisheries in **Part 5, Section 4.5** due to the direct nature of many of the impacts associated with the BLNG Precinct, were addressed in the strategic SIA, however, given the direct impacts (Category A activities) associated with the BLNG Precinct. Additional information is also provided in the Fishing Industry Impact Assessment commissioned by the Department of Fisheries at <http://www.fish.wa.gov.au/docs/op/index.php?0706> (Big Island Research, 2009).

2.3.1.2. Pearling and Aquaculture

Pearling is a key industry in Broome and the Dampier Peninsula. The main pearling licence holder in close proximity to the proposed LNG Precinct is Clipper Holdings Pty Ltd, with additional leases and permit areas in the vicinity of the James Price Point coastal area held by Paspaley Pearling Company. As with Commercial Fisheries above, the impacts associated with the BLNG Precinct would largely be direct (associated with Category A activities) in nature and are therefore discussed in **Part 5, Section 4.6** and in the Fishing Industry Impact Assessment commissioned by the Department of Fisheries at <http://www.fish.wa.gov.au/docs/op/index.php?0706>.

2.3.1.3. Mining

Mining activity has a long history in the Kimberley region, starting with the discovery of gold near Halls Creek in 1885. The Kimberley contains the largest range of mineral commodities of any region in WA (Ruddock and Hassan, 2004) and mining is currently the largest industry in the Kimberley, by value of production, at around \$1.5 billion in 2007/08.

Significant mineral deposits exist throughout the Kimberley, including very large bauxite deposits, which have not yet been developed. The remoteness and relative lack of export infrastructure of the area is considered to be an economic disadvantage to the extraction of these mineral deposits. However, there is a widely-held local community perception that development of the BLNG Precinct and its associated export infrastructure would enable mining of these mineral deposits to become more economically viable.

More specifically, on the Dampier Peninsula, there are mineral sands resources at Coulomb Point and James Price Point; however, development of these resources has been hampered by access difficulties (WAPC, 2004a). The types of minerals present in these sands makes this resource of negligible commercial interest (DPI, 2008). Bulk materials used in construction such as rock, clay, gravel and limestone are also found on the Mt Yowlaenga and Yeeda Stations, and silicified Melligo sandstone is quarried in this area (DPI, 2008).

The BLNG Precinct site at James Price Point is not currently used for mining activities; however, in the vicinity of the Precinct there was a mining licence (10km north of Quondong Point, now cancelled) and an exploration licence (40km east of Quondong Point).

Broome currently plays a role in support of the mining industry as a supply base and as a source of, and transit point for, regional fly-in fly-out labour (WAPC, 2004a). For example, current charter flights out of Broome Airport predominantly service the oil and gas and mining industries. However, over 60% of passengers are still associated with tourism and, while passenger numbers are expected to increase, the majority are still expected to be related to tourism.

2.3.1.4. Agriculture

Agriculture covers about half of the Kimberley's land area and is largely dominated by the pastoral (cattle grazing) industry and to a lesser extent by horticulture (KDC, 2008). Pastoral leases, which cover much of the Dampier Peninsula, were first taken up in 1890. There are currently six pastoral stations extending along the southern boundary of the region through to the centre of the Dampier Peninsula: Country Downs, Kilito, Mt Jowlaenga, Roebuck Plains, Water Bank, and Yeeda Station. Land tenure on the northern end of the peninsula is dominated by crown leases and reserves vested with the Aboriginal Lands Trust (DoW, 2009a).

There are also small horticultural and agroforestry businesses on the Dampier Peninsula. A small orchard and vegetable garden near Beagle Bay has now become part of a Technical and Further Education (TAFE) training program (DPI, 2008). Plantations of Indian sandalwood, teak, Indian rosewood and African mahogany have been proposed in and around the Beagle Bay reserve. As yet, none of these plantations has progressed beyond the trial stage (DPI, 2008). Domestic gardens containing fruit trees are in many of the community outstations, pearl and other leases. Kilito Station also currently operates centre pivot irrigation to produce cereal crops (hay and sorghum) that are mainly used for supplying the station's cattle feed lot.

The coastal areas of the Dampier Peninsula including the James Price Point area contain Indigenous food products that are harvested for use by local Indigenous people. The main species targeted for commercial sales of "bush tucker" is the gubinge or bush plum (*Terminalia ferdinandiana*). A cooperative of seven landholders from the Traditional Owner claimant group in the James Price Point area, the Kullari Australia Co-operative, has been established to develop an industry around commercial harvesting of gubinge for processing into a food supplement which is high in Vitamin C.

The harvest area stretches along a 350 kilometre coastal band from One Arm Point in the North to Bidiyadanga in the south. DEC manages the annual harvest through the issue of a small number (5 to 6) of community licences allowing family members to collect gubinge in areas determined by family groups. The annual harvest ranges between 4 and 6 tonnes per annum depending on seasonal conditions but has the potential for higher production through improved management practices and enrichment plantings. The economic value (farm gate) of the harvest is approximately \$90,000 - \$100,000 per annum (Quentin Blades, Cooradgi; pers. comm.). Further research and a management plan for gubinge is required to determine the potential to develop a larger industry and set sustainable harvest levels for the Dampier Peninsula (Kingsley Miller, DEC; pers. comm.).

The impact of construction and operations at James Price Point industrial area in relation to agriculture would be negligible for the non Indigenous farming activities as the nearest grazing and farming operations are located 50km from the site footprint.

The quantity of gubinge collected from within the BLNG precinct is not known and therefore ongoing monitoring may be required; however, on the basis of area, the impact on gubinge collection is likely to be small in relation to the available harvest. More information on measures to manage the gubinge harvest can be found in **Part 4, Section 2.5**.

2.3.2. Predicted Economic Impacts

Within the context of other similar large scale projects, it is clear that there would be a positive net impact to Australia's GDP. At a regional level, impacts would be significant, as the size of the activity associated with the Precinct is large in proportion to current economic activity in the region. While the region's manufacturing and construction services base is relatively small, there is scope for it to share in the Precinct's contracting for goods and services and, if it so chooses, to grow its manufacturing base.

Increases in regional and local GDP would derive from spending from supply, procurement and, to some degree, associated new employees and their families. It is predominantly during the construction phases that there would be the greatest procurement opportunities for local businesses and contractors.

In the operational stage, operating costs would be relatively low in comparison to the construction phase. During the operational phase a proportion of maintenance services may be sourced from the region and a larger proportion of the direct operational workforce may choose to reside in Broome rather than during construction. While this would provide some investment in the local economy and help ensure the economic wellbeing of the community into the future, expenditure levels would be markedly less than during construction.

2.3.2.1. Impacts on National Income

It can be expected that development of the Precinct would have a positive net impact on Australia's GDP. As an indication of the significant contribution to GDP, one forecast predicted that Chevron's Gorgon project has the potential to boost GDP by \$64 billion (net present value) (Chevron, 2010a). The Gorgon Project comprises a three train 15Mtpa LNG facility that is similar in size to the proposed foundation development scenario (Scenario 2).

National household income is also likely to increase with the establishment of the Precinct due to increased income earned by workers and businesses and the multiplier effects of income spent by these workers on the income for other individuals in the economy.

2.3.2.2. Impacts on State Income

From a State perspective, the payroll tax receipts that would accrue from the development of the Precinct are considerable. Currently a Petroleum Rent Resource Tax (PRRT) revenue receipts accrue to the Commonwealth Government and, while the State Government would receive some royalty receipts from the Precinct's development and operation, these would be relatively small when compared with those earned by the Commonwealth Government.

2.3.2.3. Impacts on Regional and Local Income

An objective of Government in establishing the Precinct is to provide opportunities for local employment and economic development. The opportunity for the region's small manufacturing and construction base to contract for supply of Precinct goods and services is likely to generate flow-on benefits including an increase in both business income and in the capacity of local businesses to deal with large clients and projects. This could lead to further productivity gains in the area and expand its capacity even beyond LNG contracting.

Indigenous businesses would also have potential to gain through the development of the BLNG Precinct. However, in order to realise this benefit, there would need to be considerable examination of barriers to Indigenous employability in the impact areas, and several strategies are proposed to address this issues (refer to **Part 5, Section 5**).

It is likely that new employment opportunities with Broome-based contractors (for example laundry, catering, transport and trades-people) may generate an expanded customer base for the region's non-Precinct related businesses (such as retail and hospitality) and could also include opportunities for the establishment of new Indigenous business. Payment to direct employees and contractors has the potential to increase average individual incomes, which would also suggest a likely increase in local spending.

Increases in the regional and local GDP would derive from spending that resulted from supply, procurement and to some degree, the associated spending by new employees and their families. The greatest procurement opportunities for local businesses and contractors are predominantly during the phases of installation, commissioning, start up, drilling and operations.

The large scale nature of LNG activities proposed for the region would also provide opportunities for companies and service providers to locate activities within the Region. If realised, this would aid in further diversifying the region's economy and provide it with even further employment and income benefits.

While construction and start-up phases would inevitably support major injections into the regional economy, particularly through the opportunities created for local businesses, the benefits of these economic impacts would be tempered by the relatively quick decline in demand as construction comes to an end. It is important that locally established businesses are aware of, and have strategies to manage a relatively fast reduction in demand for their services. This may be averted should new future commercial proponents be secured.

In respect of the operations stage, operating costs for LNG projects can be relatively low in comparison to those incurred by other phases of LNG development. Estimating such costs can be problematic, however broadly speaking, operating costs for a 15Mtpa LNG operation could be between \$500 and \$600 million per year. During this phase, a proportion of maintenance services associated with the LNG development may be sourced from the region and provide opportunities for local employment. In addition, a larger proportion of the comparatively small direct operational workforce may choose to reside in Broome.

Resource competition with other sectors of the Broome economy such as light industry and tourism may result in a reduction in income from those sectors. Labour may be reallocated to higher paying jobs associated with the Precinct, leaving the other sectors with either higher costs or reduced output.

The West Kimberley Socio-Economic Strategy has been developed to maximise the benefits for the west Kimberley from the development of the Precinct. Further details can be found in **Part 5, Section 5**.

2.3.2.4. Impacts from Workforce Competition

Workforce competition, amongst commercial proponents, Broome businesses, and Government and non-Government agencies is a likely impact associated with construction phases at the Precinct. Broome currently experiences difficulties in acquiring employees across all sectors and this problem would increase with the town's natural population growth and an assumed increase in demand for labour during Precinct construction.

Workforce competition impacts on local businesses are likely to be limited to the Precinct's construction phases. During the operations phase, the demand for labour at the Precinct would be mostly highly-skilled in nature, and would be unlikely to be sourced in such high proportions from the local area. Furthermore, the sheer number of workers would also reduce. The required direct workforce, for example, under Scenarios 2 and 3A is projected to only be around 500 to 750 in the years immediately post-construction. The associated services and indirect employees required from the local area would also decrease accordingly.

2.3.2.5. Impacts on Cost of Living

The supply constraints contributing to inflation are more likely to be significant at a local level. Prices in the Kimberley are around 17% higher than in Perth, which is indicative of existing supply constraints. Marginal changes in demand can have significant price impacts in a supply constrained environment.

However, the Precinct may possibly generate a benefit by creating a larger market and bringing about a deflation of certain costs such as food.

It is also possible that because the Kimberley has a relatively small consumer market supply, constraints could easily occur making the Kimberley susceptible to inflationary pressure flowing from development of the Precinct. The number of other resource projects proposed in the Kimberley area and the announcement of new large scale resource projects in the future may exacerbate local inflation and supply constraints by further increasing demand for local goods.

Over the longer term, negative price impacts are likely to be tempered by supply increases in response to price changes. Price impacts may also moderate once the construction phases under the various development scenarios are complete which may lead to a marginal improvement in the cost of living for the region.

2.3.2.6. Impacts on Commercial Fishing, Pearling and Aquaculture

Key aspects of the construction and operation phase of the Precinct that may affect commercial fishing, pearling and aquaculture are discussed in relevant sections of **Part 5, Section 4.5** and **Section 4.6**.

2.3.3. Economic Management Strategies

Four specific economic management strategies have been developed which include strategies to:

- i. retain economic benefits for the region;
- ii. develop education, training and employment;
- iii. increase Indigenous participation in the workforce; and
- iv. minimise the impact of the Precinct on marine resources

These strategies are contained in **Part 5, Section 5**.

2.4. Demand for Land and Housing

The population growth predicted for the Shire of Broome is estimated to increase from 17,100 people in 2011 to 31,400 people in 2041, representing an increase of 84%. Using an occupancy rate of 2.9 persons per dwelling for the Broome Shire, an additional 4,931 dwellings are needed to house the predicted population increase. The new land release at Broome North is adequate to cater for this increase. The predicted housing requirement from the development of the Precinct is comparatively small and is dependent on whether Precinct development follows the low, medium or high case scenario.

2.4.1. Baseline Context

Housing in Broome and the Kimberley is not typical of that found in the remainder of Western Australia. The key differences, as illustrated in the 2006 census, were the lower number of separate houses in the Shire of Broome (67% of occupied private dwellings) as compared to the rest of Western Australia (81%); and the high number of occupied private dwellings being rented in the Shire of Broome (59%) compared to the rest of Western Australia (27%). A further feature of urban Broome and the Kimberley is that both have a high percentage of 'other' dwellings which include caravans, cabins and other informal housing options (13%) when compared to the rest of Western Australia (1%).

A key characteristic of housing in Broome, which partly explains these anomalies, is Broome's role as a regional service centre. Approximately 42% of employment in the Kimberley region is in the Shire of Broome, with this employment mainly being in the services sector including: public administration; education and training; health care; and social assistance.

The cost of buying and renting housing in Broome is high compared to the rest of WA and Australia. The Kimberley Development Commission (KDC) showed that in 2009, Broome's median housing cost was \$635,000, which was significantly higher than that in Perth at \$430,000 and almost double that of Derby at \$330,000 (KDC, 2009). The KDC also reviewed Broome's private housing and rental costs which showed a significant seasonal fluctuation in weekly rental costs, with the median private rental in December 2009 (low season) being \$550 per week.

High housing costs are due in part to the constrained land supply, largely as a result of the long running Rubibi Native Title Claim by the Yawuru people. The limited supply of land and the increase in population has in turn led to increased prices of both land and housing. The Yawuru people's claim was resolved in late February 2010 and this has permitted greater supply of land in Broome with developments such as Broome North occurring in partnership with the Traditional Owners. There is sufficient land in the first release for Broome North to supply housing for Broome's anticipated growth, with the total land release to be upwards of 4,900 lots.

As a result of the high cost of housing, there are also a high percentage of share houses in Broome, each with an average of \$200 per week rent per occupant. The influx of seasonal employees already competes with 'other sections of the community seeking access to housing, contributing to the higher rental demand and pushing up rental costs' (Anthony, 2007). This has been cited as a pivotal cause in sustaining high median rents in Broome. In December 2005, Broome's median private rental price was 40% greater than that of Perth.

A significant proportion of private rental accommodation in Broome is consumed by the Government Regional Officer Housing (GROH) program rentals. GROH pays for 3 bedroom/1 bathroom or 4 bedroom/2 bathroom accommodation for many State Public Service staff (regardless of family) at up to 75% subsidy. This depletes the availability of private family rental accommodation on the market and to some extent, protects private rental prices from dropping due to the natural competition that a private-individual based market would create.

A 2006 report by the Australian Institute of Health and Welfare (AIHW) records the Kimberley as having the highest rate of homelessness in the nation, and Broome has more homeless people than any other town in the region (AIHW, 2006). In addition, the Broome Community Information Resource Centre and Learning Exchange (Strain, 2008) conducted a survey that found 23% of Broome participants were homeless or insecurely housed.

As Broome has a large portion of its workforce employed in the lower wage services sector, the growth in house prices is fast outstripping wage growth. This effect combined with the previous limitations on land availability, would continue to exclude many Broome households from the opportunity of owner occupation for some time.

2.4.2. Predicted Impacts

Community consultation undertaken by the State revealed that one of the most common concerns about Precinct-driven impacts was on housing demand, availability and affordability.

The primary driver for high future housing demand in the region is the projected natural population growth in the Shire of Broome, unrelated to any potential development of the Precinct. Assuming an average family size of 2.9, the baseline population increase will require 4,931 houses to meet the need of the additional population. This requirement is effectively already being catered for by LandCorp's release of 4,900 lots under the Broome North development.

While the assumption in this assessment is that the FIFO construction camp would be in the vicinity of the Precinct, it is likely that a percentage of the direct and indirect workforce would be existing Broome residents or would choose to live in Broome. The mid-range workforce model estimates that 10% of the construction workforce would be existing residents of the region of the short-term (but larger) construction workforce, and up to 50% of the long term (much smaller) operational workforce would become existing residents.

The estimated Precinct-generated housing demand follows distinct peaks and troughs as it is driven by Precinct employment. **Table 2-6** shows the estimated peak annual housing demand for each of the more likely scenarios for both permanent and temporary housing. As can be seen, under the medium case there would be an approximate maximum demand for between 273 and 650 dwellings generated by the Precinct workforce, depending on the development scenario that occurs. However, the annual average demand for housing would be between 174 and 362 dwellings.

■ **Table 2-6 Peak Broome Housing Demand from Precinct Development.**

Scenario	Lower estimate		Middle estimate		Upper estimate	
	Peak	Average	Peak	Average	Peak	Average
2	72	45	273	174	629	391
3 A	156	58	631	226	1,466	513
3 B	177	94	650	362	1,484	816

Source: (Produced by EBC (2010); and reported in **Appendix D**).

The three tables contained at 'Part 5, Annexure A' show the potential impacts of the direct and indirect Precinct workforce (construction and operations) on housing using the lower, medium and higher workforce estimates assumptions.

The tables show considerable variation in the housing deficit and surplus required over time. The modelling of all five scenarios demonstrates clear annual housing deficits and surpluses caused by the direct and indirect workforce housing needs in Broome. These clear fluctuations in demand over the 30 year time horizon of the model, point to a housing management strategy that needs to incorporate housing that could be available to the project and diverted for other uses over time, such as for tourism accommodation or to cope with the projected expansion of Broome from other sources.

In addition to predicting housing impacts on Broome, some stakeholders have expressed concern that families moving for work opportunities on the Precinct may choose to relocate to Derby because of the lower housing costs. However, the potential Foundation Proponent has advised that it is unlikely that its direct workforce would consider such relocation a viable option due to the distance.

2.4.3. Housing and Land Supply Management Strategies

Four specific strategies have been identified in relation to addressing issues associated with the supply of land and housing:

- house FIFO workers at accommodation near the Precinct where external entry and exit is managed;
- restrict incentives for construction workers to live in Broome;
- develop a strategy to discourage opportunistic workers and manage those that do arrive; and
- develop a specific housing strategy that ensures the provision of appropriate housing in Broome.

These strategies are contained in **Part 5, Section 5**.

2.5. Social Infrastructure, Public Utilities and Transport

Public utilities include the provision of services such as water, electricity, gas, telecommunications, wastewater and solid waste disposal.

2.5.1. Baseline Context

Gas

There is no reticulated gas in Broome. Bottled gas is available and sourced by some residents in the region, although it is expensive.

Water

Broome's water supply is obtained from bores in the unconfined Broome Sandstone aquifer north east of the town. The aquifer provides a large resource of high quality water. With appropriate management it is expected that it would support Broome's continued population growth.

Additional plans have been completed for the ultimate projected capacity of the town and its supply requirements (DSD 2009a, SIA Volume 1; **Appendix D-1**). Planning is underway to increase water storage capacity in Broome via new tanks around the town.

On the Dampier Peninsula, water is sourced from the Broome aquifer. Bores are installed and fitted with small treatment systems by contracted parties to support the remote communities.

Wastewater

The existing wastewater treatment plant in Broome is at capacity with an average inflow of 3.5ML per day. The Water Corporation is currently constructing a new wastewater treatment plant and associated infrastructure north of Broome on Crab Creek Road. This new wastewater treatment plant is planned to be operational in late 2010 and will provide an extra 3.5ML a day to service an additional 15,000 people up until 2020. Planning has allowed for a staged increase in capacity at the new site until 2050 as the town continues to grow in the future (DSD 2009a, SIA Volume 1; **Appendix D-1**).

Electricity

Electricity in Broome is provided by Horizon Power. In 2006 there was an investment of \$180 million in capital works and there will be more than \$400 million in power purchases during the next 20 years. The recently commissioned new power stations have replaced diesel-fired power stations that were up to 30 years old (Horizon Power, 2006).

On the Dampier Peninsula, Horizon Power recently established 50kW diesel power stations at Ardyaloon, Beagle Bay and Lom badina/Djarindjin (DPI, 2008). These power stations have the capability for expansion when required (DPI, 2008).

Waste Management

The Shire of Broome manages a waste management facility, located 9km north of Broome. The existing waste management facility has a limited lifespan and future options for waste management, including the possibility of a new waste management site, are being considered (refer to notes from Infrastructure Workshop, 2009 in Volume 2, SIA Annexure C; DSD, 2009b; **Appendix D-2**).

There is no centralised or shared waste collection on the Dampier Peninsula and each community and many outstations have their own refuse disposal facility (DPI, 2008).

Fire and Emergency Services

The Fire and Emergency Services Authority of Western Australia (**FESA**) is the authority that coordinates the response to emergencies and undertakes search and rescue operations for the Kimberley region of Western Australia. Across the region, there are six main towns with 17 volunteer units that are FESA's responsibility with approximately 650 volunteers.

Within the Kimberley region, FESA has offices in Broome and Kununurra that oversee and manage the emergency response volunteer groups and coordinate the implementation of the emergency management arrangements across the Kimberley. There are no FESA 'career fire-fighters' north of Geraldton, therefore, Broome does not have any stations

manned by 'career staff'. The Broome Bushfire Brigade has two water tankers. Broome volunteers receive approximately 500 calls a year for a variety of emergency incidents.

FESA considers there to be an adequate number of volunteers in Broome to deal with current town based emergencies, but the bush-fire response crews are under-resourced for their broader role across the Shire of Broome. Joint ventures with industry are seen as a method of assisting in this regard.

Cyclone emergency welfare centres are limited in capacity and are provided for the town site only. The centres are unable to accommodate all people from Bidyadanga and communities on the Dampier Peninsula. The centres would be unable to accommodate the potential construction workforce located at the Precinct (DSD, 2009a, SIA Volume 1; **Appendix D-1**).

Social Infrastructure

Social infrastructure includes services and facilities such as public libraries, museums, youth centres, senior citizen centres, fire stations and community halls. Population modelling undertaken for the development of the Precinct produced some indicative figures for the additional services that may be needed due to the projected population increase. **Table 2-7** below identifies in general terms the requirement for services and facilities between 2011 and 2041.

■ **Table 2-7 Indicative Social Infrastructure Services and Facility Requirements (2011-2041).**

Scenarios (medium case)	Public Libraries	Museums	Youth Centres	Senior Citizens Centres	Fire Stations	Community Halls
Scenario 2	1	0	1	1	1 - 2	2 - 3
Scenario 3A	1	0	1	1	1 - 2	2 - 3
Scenario 3B	1	0	1	1	1 - 2	2 - 3

Source: (Produced by EBC (2010); and reported in **Appendix D**).

Broome Port

The Broome Port Authority presently raises about 59% of its revenue from the offshore oil and gas exploration industry. The oil and gas exploration sector is therefore an important revenue source for the port authority (DSD, 2009a, SIA Volume 1; **Appendix D-1**).

Wharf usage (berth utilisation) has an upper limit of about 70% (at 40% in 2009) because of the time it takes for ships to berth and depart. Berth utilisation greater than 70% generally results in vessel waiting periods. The Broome Port Authority would view an increase in berth utilisation as desirable as this would maximise the potential of the existing infrastructure and result in increased revenue without requiring significant capital expenditure (DSD, 2009a, SIA Volume 1; **Appendix D-1**).

Public Transport

Broome's road network and particularly the absence of traffic lights contribute to the "laid back" atmosphere of the town. The road network is busy during the peak tourist season and parking is an issue during this period.

Broome's 'Town Bus Service' provides the regular public passenger transport service in the town. It is operated by a private company and is not subsidised by government. The service is targeted at visitors to Broome rather than the local population. However, the service is also used by local residents and carries approximately 400,000 passengers per year with there being limited capacity to expand the fleet (DSD, 2009a, SIA Volume 1; **Appendix D-1**).

The town of Broome also has four taxi companies. There are 23 full time conventional taxis, one multi-purpose taxi and two peak period (weekend) taxis. Since 2007, issues relating to driver recruitment and retention have been experienced by some taxi service providers (DSD, 2009a, SIA Volume 1; **Appendix D-1**). All companies indicated that if they were able to recruit and maintain drivers they would be able to meet existing demand.

2.5.2. Predicted Impacts

Predicted impacts are discussed in relation to public utilities and transport.

Impacts on Public Utilities

The Infrastructure Assessment (AECOM, 2010d; **Appendix D-6**) concluded that there was sufficient actual or planned water, waste water, and power across all the Precinct scenarios to accommodate the needs of the Precinct and the Broome population for the next 30 years. The current solid waste facility is due for closure within the next five years and the proposed new solid waste facility is planned to cope with the cumulative solid waste requirements from population growth.

Transport

Many stakeholders expressed concern about the potential demand that may be exerted on the transport sector, including air transport, boating, bus, taxi and transport-related aspects such as car parking and fuelling. Parking and traffic are already issues in the tourist season and any increase in traffic is likely to further exacerbate this issue.

The Infrastructure Impact Assessment concluded that:

- in engineering terms, the peak construction phase of the Precinct should have a manageable impact on the Broome road network because workers are to be transported by bus between the airport, the accommodation facility and the Precinct;
- Category B and C activities would have an impact on Broome given population increase. Transport infrastructure in Broome should be sufficient to accommodate this increase. However, depending on the rate at which employees settle in Broome, the staging of the future road network upgrades may have to be adjusted to suit increasing demand;
- construction traffic volume should have a moderate impact on the road network. An upgrade of part of the Cape Leveque road would be required and a new road from the Cape Leveque Road to James Price Point would need to be constructed. The type of vehicles and the significant volume of road freight that would be transported to and from the Precinct may have an impact on the road pavement and the class of road that should be provided; and
- an increase in port throughput should not have a long-term impact on total traffic volumes in and around Broome and these impacts would be managed by the commercial proponents.

The assessment further identified that:

- The transport facility upgrades proposed in Broome as part of the planned development (such as Broome North) would decrease the impact of the Precinct's Categories B and C activities on Broome; and
- Total additional passenger numbers and air flight movements should be manageable, provided the commercial proponents manage the movement of workers.

2.5.3. Public Infrastructure and Transport Management Strategies

The Transport Strategy will limit, mitigate and manage the potential transport impacts of the Precinct and associated infrastructure.

The detail of this strategy is contained in **Part 5, Section 5**.

2.6. Health Services and Facilities

As a condition of the Precinct, commercial proponents would be required to supply primary health care services. A key issue for the health sector is the attraction and retention of healthcare workers during the construction phase given the relatively high salaries paid by the oil and gas industry compared to the average salary in Broome.

Further information on the health impacts of the Precinct Development as well as worker health can be found in **Part 5, Section 4.9**.

2.6.1. Baseline Context

The health sector in Broome, including all hospital, medical and allied health services, is currently under extreme pressure with a number of services operating beyond capacity. Even without the LNG Precinct developments the exceptional projected increase in population anticipated for the Shire of Broome, unless addressed, will bring significant additional demand for health services.

The existing Indigenous health landscape in the west Kimberley presents significant health issues. The challenges include mental illness, cardiovascular diseases, metabolic diseases such as diabetes, renal failure, infectious diseases (particularly sexually transmitted infections), poor nutrition, premature and low birth-weight deliveries, recurring infections and injury (Zubrick *et al.*, 2004 and Atkinson *et al.*, 1999). Among young Indigenous people, ear health is a chronic problem which has cascading impacts on education and a number of other factors (Zubrick *et al.*, 2004, 2005 & 2006).

Injury inflicted by another person was the leading cause of hospitalisations for injury and poisoning among Indigenous people in the Kimberley at more than 25 times the Western Australian rate (WACHS, 2008). Key health-related social issues in the Kimberley also include the region's large and fluctuating number of tourists, alcohol issues and high crime rates.

Much of the medical service delivery in Broome is already over capacity. For example, Broome Regional Aboriginal Medical Service (**BRAMS**) services up to 150 patients per day and has, consequently, had to close its books to new patients indefinitely. Approximately 81% of its patients are Indigenous. While closure of the Dakas Street Medical Centre in July 2008 and Dr Neil Jenkins' clinic in 2009 created an increase in demand for BRAMS' services, the subsequent opening of the Broome Doctors Clinic is expected to have offset the Dakas Street Medical Centre closure to some extent.

Other plans for Broome health service delivery that may affect the region's existing health delivery context include:

- the establishment of the new Mental Health Unit (previously 'Acute Psychiatric Unit'), consisting of 14 beds for both the Pilbara and Kimberley; and
- the establishment of a new, specialised paediatric unit at Broome Hospital.

Assuming the implementation of the mitigation and management measures including the West Kimberley Socio-Economic Strategy to improve health services in Broome, the population impacts caused by the Precinct across all Scenarios (other than the upper workforce numbers of the unlikely Scenario 4) in terms of the demand for health services should be manageable. Currently staffing issues pose the most significant challenges for the WA Country Health Service (**WACHS**). These include extremely high staff turnover, the high housing costs and the small subsidies it can offer the staff it wishes to attract. WACHS has stated that it is affected by 'competition with mining and other industry developments for staff and accommodation' and these would potentially be exacerbated by the workforce competition from the Precinct.

More detail on the baseline context can be found in **Part 5, Section 4.9**.

2.6.2. Predicted Impacts

The existing Broome medical services are unlikely to be able to meet the projected demand from non-Precinct and Precinct-related growth. This demand steadily escalates across all scenarios between 2011 and 2041.

The population modelling undertaken as part of the DSD SIA shows the medical requirements from the natural population increase and the Precinct development regardless of whether the development scenario is low, medium or

high. Presently in Broome there is only one community health centre (no general practitioners operate from this, only the hospital) and an Aboriginal Medical Service designed to provide community health services to Broome's Aboriginal population. While two Aboriginal Medical Services are based in Broome, only BRAMS provides direct health service delivery (whereas Kimberley Aboriginal Medical Service is an umbrella service whose only direct service delivery is to Bidjadanga, Beagle Bay and Balgo).

The indicative medical service requirements for Broome under the medium case for each scenario based on the population modelling completed for the Precinct development is demonstrated in **Table 2-8**.

■ **Table 2-8 Indicative Medical Service Requirements for Broome under the Medium Case Scenarios.**

Scenarios (medium case)	Medical Doctors	Dentists	Hospital Beds	Local community health centres	Community health centres	District community health centres	Nursing home (# beds)	Ambulance officers	Disabled respite centres	Aged respite centres
Scenario 2	17-32	1	82-154	6 – 11	2 – 3	1	31 – 58	7 – 13	0 – 1	0 – 1
Scenario 3A	17-32	1	82-155	6 – 11	2 – 3	1	31 – 59	7 – 13	0 – 1	0 – 1
Scenario 3B	17-33	1	82-158	6 – 11	2 – 3	1	31 – 61	7 – 14	0 – 1	0 – 1

Source: (Produced by EBC (2009); and reported in **Appendix D**).

2.6.3. Health Impact Management Strategies

Table 5-1 in **Section 5** illustrates the interdependent nature of the social impact management strategies and this is possibly most noticeable in the Health Impact Management Strategies. Primary and emergency health services would be provided for the workers at the construction camp and this would lessen the impact on Broome and the region's health services. In addition, the Precinct workforce management strategies would limit the number of construction workers living in Broome and making use of the Broome's health services.

The key management strategy to improve health services in Broome is the **Broome Social Services Strategy** that includes improving Broome's social services. Developing a **Precinct Health, Emergency Services, Policing and Security Strategy** is a management measure of the commercial proponents locating at the Precinct. These strategies are contained in **Part 5, Section 5**.

2.7. Education, Training and Employment

This impact variable is defined as the impacts of the Precinct on local employment, the degree to which skills required for the Precinct match those of the unemployed in the Precinct area, and the potential competition the Precinct generates for local skills. The match between required skills and those in the local area is particularly important for Indigenous job creation and would require specific education, training and work-readiness strategies.

Virtually all stakeholders supporting the Precinct stated they did so because they expected the development to provide employment for existing residents of Broome and the Dampier Peninsula, in addition to education and training opportunities for the younger generation within the impact areas. A key feature of the Heads of Agreement was the provision or funding of a range of education and economic development opportunities.

2.7.1. Baseline Context

2.7.1.1. Education and Training

The Shire of Broome is serviced by eight primary schools, one public secondary school, three Catholic secondary schools and two remote schools. Broome itself has five primary schools (including one Catholic private school) and two secondary schools (one Catholic private and one public secondary school). The development of Broome North includes planning for schools and the first phase includes a 4.5ha site for a future primary school and early childhood learning centre.

The State Training Profile 2009-2011 (State Training Board, 2009) provides a current overview of Vocational Education and Training (**VET**) in the Kimberley. The following information was derived from this profile. It is noted in the State Training Profile 2009-2011 that the regional information was compiled prior to the global economic downturn.

Expansions in resource projects including the Argyle Diamond Mine, the Koolan Island Iron Ore Mine and the West Kimberley Power Project have contributed to population growth in the region. Subsequently, there was high demand for infrastructure and community services skills in 2008. The future expansion of the Ord River Irrigation Scheme and the pastoral industry is expected to increase demand for horticulturalists, agriculturalists and practical mechanical skills in the region.

An increasing focus on marine tourism in the region would require ongoing training for deckhands, coxswains, marine engine drivers and the operation of vessels over 35 metres. The proposed expansion of the Broome Port would require additional training for road transport operators, stevedores, port control officers and marine pilots.

Between 2003 and 2007, the biggest employment growth areas in the region were in adult literacy/English as a second language, horticulture, health and hospitality. The biggest declines were in accounting and other business services, building and construction, forestry, farming and land care, and computing.

The exceptional increase in population anticipated for the Shire of Broome even without the LNG Precinct development would have a significant impact on the education and training sector. In consultation, stakeholders raised the following existing deficits in west Kimberley vocational training facilities:

- i. Limited trade facilities at Kimberley TAFE including the lack of appropriate courses and the availability of places on courses. Kimberley TAFE is currently addressing these issues.
- ii. Accommodation for trainees from remote communities in larger centres such as Broome and particularly when trainees need to attend courses or modules in Perth.
- iii. Decentralised or mobile facilities to reach remote communities as most training facilities are in larger centres such as Broome.

Indigenous education and training is an issue in the region and there are considerable barriers to Indigenous young people engaging in education and training opportunities. The Kimberley College of TAFE uses short courses to engage Indigenous students and encourage them to move into longer training programs. However, students often require intensive support and ongoing literacy and numeracy assistance. In consultations undertaken by the KLC, literacy levels were recorded by stakeholders as one of the key barriers presently to engagement in vocational training.

2.7.1.2. Employment

The 2006 Census is generally regarded as having been subjected to an Indigenous undercount. Nevertheless, the census reveals the main features of the Kimberley labour force as follows:

- The labour force participation rate in 2006 in the Kimberley region was the same as that of Western Australia (62%). Urban Broome and the Shire have about the same rate (63%) but the small communities are somewhat lower at 58%. These figures include Indigenous participants of CDEP, which has now been abolished in all townships considered to have other labour force opportunities (including Broome and Derby).
- The unemployment rate was 3.8% in Western Australia and the Kimberley region and 3.9% in the Shire of Broome. Urban Broome was somewhat higher at 4.1% but the unemployment rate is extremely low in the small communities (2.2%). These figures have also been affected by the abolition of the CDEP in Broome.
- Employment in the private sector is relatively low in the Kimberley (76%) compared to Western Australia (84%) but in Urban Broome (82%) it is closer to the norm. In the small communities, only 68% of the resident labour force is employed in the private sector.
- A large portion of jobs (36%) are in the services sector, compared to the average for the rest of Western Australia, which is 25%.
- Base industries (including mining, agriculture and fishing) although less labour intensive, are the key drivers of economic and employment growth in the region. These sectors provide 13% of jobs in the Kimberley compared to 7% in Western Australia. Broome is unique in the region, with very few jobs in mining.
- The tourism industry is also significant in the region and supports a large proportion of jobs in retail trade, and accommodation food services (17% - equivalent to the average for Western Australia as a whole). One quarter of jobs in Broome are in these sectors, reflecting the strong local tourist industry.
- The manufacturing sector is relatively unimportant at 3% in the Kimberley compared to 10% in the State. However, the construction and transport sectors, which support the mining and tourist industries, together account for 17% of jobs in the Kimberley which is similar to the average of 18% for Western Australia.

Among non-Indigenous people, labour force participation is 80% in the Kimberley region and 78% in both Urban Broome and the Shire. This is very high compared to 62% in the general labour force of the State and 64% for the State's non-Indigenous labour force. Conversely, the unemployment rate is very low (2.2% in the Kimberley region and the Shire of Broome, and 2.3% in Urban Broome). There are no unemployed non-Indigenous people in the small communities. Further labour force analysis indicates that:

- In times of high employment, the non-Indigenous labour market in Broome is very tight.
- Based on their age structure and family type, which emphasises childless singles and couples in the prime workforce ages, and their lack of ties through home ownership, the type of non-Indigenous labour force found in Urban Broome is highly mobile, and might readily be attracted to other projects. However, Broome should remain attractive to the established labour force.
- An important attraction of Broome is that there are job opportunities available for the partners of gas workers in established industrial sectors that traditionally employ women. These sectors include the large tourist-associated retail, and accommodation and food services sectors. From this perspective, the continued growth of tourism in Broome could be an important element in attracting gas workers to Broome to live rather than to operate as FIFO employees.

2.7.2. Predicted Impacts

2.7.2.1. Education and Training Impacts

The population modelling completed for the Precinct development scenarios predicts the following indicative impacts on pre-school, primary and high schools for the high, medium and low cases for each scenario. **Table 2-9** provides an indication of the additional services needed as a result of anticipated population growth including impacts of the Precinct, based on the workforce assumptions described in **Part 5, Section 2.2.2**.

■ **Table 2-9 Indicative Educational Requirements (2011-2041).**

Scenarios (Medium case)	Pre schools 2011 - 2041	Primary schools 2011 – 2041	Secondary schools 2011 - 2041
Scenario 2	4 – 7	2 – 3	1 – 2
Scenario 3A	4 – 7	2 – 3	1 – 2
Scenario 3B	4 – 7	2 – 3	1 – 2

Source: (Produced by EBC (2010); and reported in **Appendix D**).

Population escalation in the 5-12 year age group during the years of construction is consistent across all scenarios (with the exception of the 'no development' scenario where the increase is estimated only to be 26 students at its uppermost), at approximately 15 %. This is sufficiently significant to place some stress and demand on present primary school services, although the new primary school proposed at Broome North may accommodate the increased demand in the future.

Across all scenarios, the increase in school-aged population is similar for the 13 -17 year old category during the construction years. The uppermost for all scenarios (other than 'no development'), demonstrates projected increases of up to 16.5% in this age group of the population. The impacts, as discussed above for the 5-12 year age group, similarly apply. However, the 16 year age-group would become eligible for vocational training.

According to the Broome Office of the then State Department of Education and Training, Broome Senior High School currently has the capacity to double the current enrolment of around 500 students. While there is spare secondary schooling capacity to cope with projected increases in population, a current issue that would be exacerbated by additional population is a desire by some for an independent private school to reduce the need to send children to boarding school in Perth when private schooling is the preferred option.

There are significant educational barriers to Indigenous participation and this issue is addressed in the management strategy. If these barriers are addressed, the development of the Precinct represents considerable opportunities for local employment. The local employment strategies need to start well in advance of the Precinct establishment and should be well co-ordinated to ensure a match between the skills required, the capacity of the training providers and the existing level of the potential trainees.

2.7.2.2. Employment Impacts

Most opportunities for local employment would be generated by the construction phases of the Precinct. Although a high proportion of the construction workforce would be FIFO, there would still be a significant number of opportunities in sectors servicing the Precinct. Some of these would arise in areas where local people can acquire new qualifications and become work-ready relatively quickly. However these opportunities would most likely reduce as construction winds down (Scenario 2 construction is anticipated to last approximately five years). During the longer term operational phase, the requirement for a relatively small and highly skilled operational workforce may limit direct employment opportunities.

During both construction and operational phases of the project, there would be economic and employment opportunities that would also accrue beyond the Precinct to Broome and surrounding areas through the employment multiplier effect. For example, there are likely to be opportunities supplying services to the Precinct. These additional employment opportunities are calculated using an employment multiplier. The population modelling for the Precinct was based on indirect local employment multipliers of 0.5 in the low case, 1 for the medium case and 1.5 for the high case. This means that the medium population model includes an assumption that one additional (indirect) local job would be created for every direct Precinct job. This additional potential employment has been included in the population modelling and its outputs such as the demand for houses and services.

The Chamber of Minerals and Energy states that employment opportunities can be broadened by promoting a policy of employing and training local residents and those willing to reside in the Kimberley. This is key to retaining the opportunities of economic development for the region. Positive outcomes for the community can be linked to achieving a balance between residential operations as the predominant form of employment, with FIFO arrangements only used where required due to isolation or labour shortage factors (Chamber of Minerals and Energy, 2005). Increasing employment opportunities for local Indigenous and non-Indigenous people is an important management strategy and should incorporate methods of addressing present barriers to employability in the region.

Not addressing these barriers would reduce the ability to realise or capitalise on the benefits conferred by increased employment opportunities for members of the Indigenous population and marginalised non-Indigenous population in Broome. The resources and energy industries have previously recognised that the most significant inhibitors of Indigenous capacity to engage in economic and employment programs are socio-economic factors.⁷ These factors specifically preclude engagement in employment and training. While sometimes the prevailing view has been that these factors are too numerous and interconnected to address (for example, substance abuse, over-crowded housing, poverty, family violence, physical health and so on), the most recent research now identifies two factors. These are emotional and behavioural difficulties specifically in the areas of:

- resilience and recovery from life stress events; in particular, events such as grief, family violence and child sexual abuse. This corresponds to a lack of capacity to engage in or perform basic life functions; and
- parenting and family functioning.⁸

This has been specifically measured for the Kimberley Region by the Western Australian Aboriginal Child Health Survey (Zubrick *et al.*, 2006).

If addressed with adequate support, these factors contribute significantly to the capacity of Aboriginal people to engage in training and education. Most importantly these factors allow Aboriginal people to participate consistently and effectively in gainful employment.

2.7.3. Education, Training and Employment Management Strategies

The education, training and employment strategies relate to the economic management strategies discussed in **Part 5, Section 2.3.3**. The specific education, training and employment strategies are:

- i. Education, Training and Employment Strategies;
- ii. Indigenous Workforce development Strategy; and
- iii. Cross-Cultural Training.

These strategies are contained in **Part 5, Section 5**.

⁷ See for example, Statement by C. Leneghan, CEO Rio Tinto, 'Minerals Week' 2005, Brereton D, and Parmenter, J the Centre for Social Responsibility in Mining, University of Queensland, *Indigenous Employment in the Mining Industry*, Journal of Energy and Natural Resources Law 21(1) pp66-90, *Australian Parliamentary Inquiry into Successful Initiatives in Indigenous Employment* (June 2007) and *Boom and Bust: 1960-2007 Valuable Lessons in Indigenous Employment in the Mining Industry*, Mining, Petroleum, Oil and Gas Symposium, 9-10 July 2007, Broome.

⁸ See for example, Zubrick SR, Silburn SR, Lawrence DM, Mitrou FG, Dalby RB, Blair EM, Griffin J, Milroy H, De Maio JA, Cox A, Li J. *The Western Australian Aboriginal Child Health Survey: The Social and Emotional Wellbeing of Aboriginal Children and Young People*. Perth: Curtin University of Technology and Telethon Institute for Child Health Research, 2005 and Centre for Community Child Health (Murdoch Children's Research Institute) and Telethon Institute for Child Health, prepared by the AEDI National Support Centre, Centre for Community Child Health, Royal Children's Hospital (Melbourne), *Australian Early Developmental Index Community Profile, Pilbara Communities WA, Final Report, November 2007*

2.8. Sport and Recreation including Recreational Fishing

The area on the Dampier Peninsula at James Price Point near the proposed LNG Precinct is a favoured camping and fishing area for residents of Broome and the Dampier Peninsula. As such, these areas represent Category A direct impacts, and are therefore discussed in **Part 5, Section 4.8**. This section provides summarised details relating to sports and recreation associated with Category B activities (impacts on sports and recreation facilities in Broome) only alongside outputs of stakeholder engagement associated with these factors.

2.8.1. Baseline Context

The existing status of sport and recreation in Broome and the local area was discussed with various local stakeholders during a workshop facilitated by DSD in 2009. Key issues identified through this workshop process included:

- the current informal (and illegal) camping activities along the north coast of Broome, including James Price Point;
- the inadequate sport and recreational facilities in the Shire because of a low ratepayer base (less than 6,000 ratepayers) but high population (due to significant tourists influxes during the tourist season);
- the potential decline in the availability of volunteers; and
- the need to develop opportunities for Indigenous sport and recreation.

The Department of Sport and Recreation is currently developing an Indigenous Sport and Recreation Plan to invest in existing communities.

Physical infrastructure, recreation, leisure, community facilities and groups available in Broome include:

- recreation and aquatic centre (squash, netball, basketball, badminton, volleyball and tennis courts);
- skate parks;
- surf lifesaving club (very strongly supported – highest participation club of its type for WA in 2008);
- waterpolo club (very strongly supported);
- basketball competition club (very strongly supported);
- volleyball competition club (very strongly supported);
- library;
- parks;
- playgrounds;
- arts and music centres;
- bird observatory;
- bowling club;
- fishing clubs (that fish from locations including Gantheaume Point Beach, James Price Point, Willie Creek and Manari);
- darts clubs;
- golf club;
- touch football association;
- youth support groups;
- community centres; and
- playgroup.

The Broome Recreation and Aquatic Centre (BRAC) presently operates at capacity virtually all year round. The additional sporting facilities offered by BRAC however, are somewhat under-utilised and are likely to be able to cope with the small population increases projected from the Precinct. However in light of the high level of expected (non-Precinct related) population growth in Broome, regardless of Precinct development, BRAC may experience some resource pressures in the next decade or two.

2.8.2. Predicted Impacts

The significant natural population growth anticipated for the Shire of Broome is likely to increase the number of people using the recreational facilities of the region.

Use of sports and recreation Infrastructure and Services, as identified in the Scope of the Strategic Assessment (**SoSA**), was considered to have a cumulative impact rather than a direct impact from Category A activities alone. The use of infrastructure and services associated with the construction and operation of a minimum of two LNG projects within the BLNG Precinct may increase pressure on the port, and other services, which may cause negative impacts for recreational fishing. An assessment of impacts on the recreational and landscape values of the Indigenous community has not been specifically undertaken to inform this section. This is addressed as part of a stand-alone A SIA (summarised in **Part 5, Section 3**).

2.8.3. Sport and Recreation Management Strategies

There are a number of interrelated strategies to mitigate and manage the potential impacts of the BLNG Precinct on sport and recreation in the region. The management strategies include:

- i. Recreation Management Strategy;
- ii. Access to Broome and the Dampier Peninsula; and
- iii. Strategies to manage marine resource use impacts.

These strategies are contained in **Part 5, Section 5**.

2.9. Tourism

Tourism is one of the key industries in Broome and the Kimberley. Together with Perth and Margaret River, Broome is one of Western Australia's iconic tourism destinations. As a result of concerns about the potential impact of the Precinct on Broome's tourism industry, a separate TIA was conducted by KPP Business Development (2009; **Appendix D-5**) on behalf of Tourism WA. Unless otherwise noted, this section is summarised from the TIA.

This section provides summarised details relating to sports and recreation associated with Category B activities (impacts on tourism branding etc) only, alongside outputs of stakeholder engagement associated with these factors. Direct social impacts from Category A activities are discussed in **Part 5, Section 4.7**. The TIA can be found at <http://www.dsd.wa.gov.au/7901.aspx#7906>, and also included as **Appendix D-5**.

2.9.1. Baseline Context

Tourism is an important contributor to the regional economy in the Kimberley with the industry contributing approximately \$637 million to the region, approximately 36% of the total Kimberley economy. Broome is the key tourism destination in the Kimberley region and attracted approximately 250,000 visitors in 2008 with accommodation occupancies in excess of 95% in the peak tourism season (June to October) (KPP Business Development, 2009; **Appendix D-5**).

Tourism supports a large proportion of jobs in retail trade, accommodation and food services (17% of industry in the Kimberley). Approximately one quarter of jobs in Broome relate to these sectors. The 2006 Census recorded that approximately 37% of people in the Broome Township on Census night were visitors to the Kimberley, a figure 30% higher than the State average of 7%. In the Shire of Broome, of the 19,783 people counted on census night, 8,030 (or 40.6%) were visitors.

The TIA has also identified that tourism is an important industry to the Indigenous community, with approximately 20 Indigenous cultural tourism organisations operating in the Broome and Dampier Peninsula area.

A key characteristic of the Kimberley tourism sector is the strong interdependency that exists between tourism groups, operators, accommodation providers and support services. In relation to visitor accommodation, the TIA identified 58 accommodation establishments with 3,571 available rooms in the township (excluding campsites).

Consultation undertaken with accommodation providers, land and marine based tour operators, retailers and providers of goods and services to visitors, as part of the TIA, revealed the key characteristics listed in **Table 2-10** below:

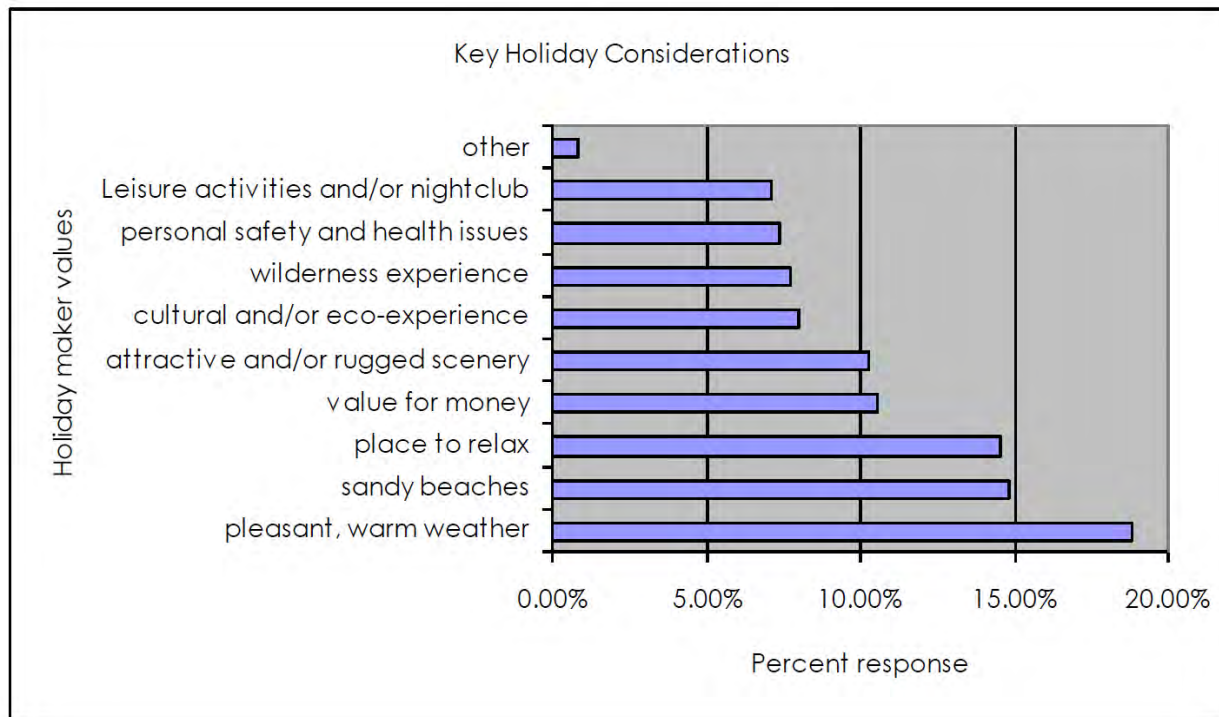
■ **Table 2-10 Key Characteristics of the Broome Tourism Industry.**

Parameter	Value (2008)
Number of visitors to the Kimberley	274,200
Number of visitors to Broome	260,990
Contribution to the Kimberley economy (including multipliers)	\$637.3m
Tourism core industry (direct impact of end providers of goods and services to visitors)	\$369m 20.7% of Gross Regional Product
Tourism industry employees in 2008	2,175

Broome's tourism sector also benefits from cruise ships that berth at Broome's port, as it is the main port for about 40 cruise and tour operators that offer marine based Kimberley coastal tours. Broome hosts around 24,000 transit passengers from large cruise ships each year. The TIA states that cruise ship movements through the port of Broome are anticipated to increase by 25.8% in the 2009/2010 financial year.

Fishing tour operators range from small specialists offering tours such as kayak fishing and creek-based fishing for barramundi, threadfin and other near-coast species, to operators with large and expensive vessels that utilise a range of areas up the Kimberley coast into and beyond the Buccaneer Archipelago.

The undeveloped nature of the Kimberley and the Dampier Peninsula has value to the tourism industry. The chart below (**Figure 2-7**) summarises other reasons why visitors choose to holiday in Broome and the locality. It illustrates that the wilderness experience and cultural and/or eco-experience are a significant factor influencing holiday decisions.



■ **Figure 2-7 Key Holiday Considerations for Visitors to the Region.**

2.9.2. Predicted Impacts

Key findings from the TIA were that tourism industry stakeholders and Broome residents considered:

- The Precinct could co-exist with tourism although it may also have a negative impact on the Kimberley's reputation and destination image.
- A FIFO workforce may reduce the availability of short term visitor accommodation and have the potential to impact negatively on the tourism values, character and appeal of Broome.
- There would be an increased likelihood of greater access and use of the Dampier Peninsula by locals and tourists.

Many stakeholders who participated in the TIA commented that the proposed development of the Precinct would expand economic diversity and increase employment opportunities for the region. Many sporting and recreational clubs saw this as having the potential to increase membership and sponsorship opportunities as a direct result and to increase the revenue available to develop new recreational facilities in the future.

Interviews undertaken with tourists and tourist providers to support the preparation of the TIA also identified a range of additional perceived potential impacts and issues of concern and/or interest to the tourism industry, visitors and the local community. **Table 2-11** displays the key themes of stakeholder perceptions in relation to potential benefits and impacts of the Precinct upon the tourism industry in the region:

■ **Table 2-11 Perceived Potential Impacts/Opportunities for the Tourism Sector based on Consultation Activities.**

Theme	Perceived Impacts/Opportunities
Fly-in fly-out workforce	<ul style="list-style-type: none"> increased demand for short term accommodation reducing availability of visitor accommodation and tour sales; and compromised tourism values and destination appeal.
Airport activity	<ul style="list-style-type: none"> changes to character and destination appeal of Broome – reduced amenity.
Land and housing	<ul style="list-style-type: none"> reduced availability and affordability of: <ul style="list-style-type: none"> housing and land; staff accommodation; and visitor accommodation.
Tourism branding	<ul style="list-style-type: none"> changed visitor perceptions due to negative publicity/media references.
Marine infrastructure	<ul style="list-style-type: none"> increased usage and maintenance of marine infrastructure.
Air services	<ul style="list-style-type: none"> development of a regular international air service between Broome and Singapore; improved access to the Kimberley region; and development of new tourism markets.
Marine infrastructure	<ul style="list-style-type: none"> increased maintenance of marine infrastructure.
Dampier Peninsula/Sealing of roads	<ul style="list-style-type: none"> increased access to the Dampier Peninsula; and improved sustainability of Indigenous tourism businesses.

Source: KPP Business Development, 2009; **Appendix D-5**.

The TIA identified the presence and visibility of the FIFO workforce as having a critical impact on the character and appeal of Broome. This is reflected by stakeholder concerns regarding tourism values, tourism branding and destination appeal. A key concern was the potential impact of behaviour by FIFO workers and their interaction with leisure tourists at points of intersection such as the airport, bars, restaurants and retail shopping areas. Suggestions were also made to minimise the visibility of construction workers (for example, the wearing hard hats and high visibility safety jackets) in Broome. This view was supported by the TIA's resident survey in which 66% of surveyed residents agreed that Broome is a tourist town and did not want a FIFO culture to develop (KPP Business Development, 2009; **Appendix D-5**).

In relation to the perceived impacts of FIFO workforce demands upon temporary accommodation, the Infrastructure Assessment Report identified that the Precinct would be unlikely to create demand for short-stay accommodation due to the provision of a workers' accommodation/construction camp for the Precinct workforce. Existing occupancy rates also suggest that there is accommodation capacity within the short term accommodation market to absorb temporary accommodation requirements associated with the Precinct, particularly in the wet season.

The environmental impacts of these aspects are evaluated in **Part 5, Section 4** in the Strategic Assessment Report and will be considered under the relevant environmental legislation.

The Lurujarri Trail is a significant Goolarabooloo eight day song line walk which extends along the coast from Minyirr to Coloumb Point and past the LNG Precinct site. Access around the LNG Precinct would be restricted for safety reasons, but arrangements are being considered that would allow guided walks with Traditional Owners to occur seasonally.

The TIA reports that sealing the Cape Leveque Road would improve visitor access and further opportunities for Indigenous tourism businesses. While this may be seen as a positive impact, this activity also brings with it potential issues such as an unsustainable influx of visitors impacting on the local environment and local communities. Sealing the road may produce a net benefit if visitor numbers are properly managed.

Small charter operators interviewed for the FIS revealed concerns about the impact of Precinct construction and on-going dredging on the sailfish and other local fish stocks. When the TIA was undertaken in early 2009, the charter fishing sector indicated that there was 'little or no information available to assess the potential impacts on the fishing tourism business.'

The potential tourism impacts are closely related to the potential of the Precinct development to impact on visitor/tourist perceptions of Broome and the current reputation and branding of the Kimberley region, as a pristine environment and tourist destination. During the TIA, industry stakeholders, visitors and resident groups were consulted to gauge their

perceptions of potential negative and positive impacts associated with the construction and ongoing operation of the Precinct on the tourism industry.

The construction phase appears to be the most critical in terms of potential impacts, with the consensus among tourist industry representatives being that if this phase is not well managed, then the tourism industry may suffer.

2.9.3. Tourism Management Measures

The tourism management measures are supported by a number of related mitigation and management measures:

- i. Tourism Management measures;
- ii. Workforce Behaviour;
- iii. Managed-Access Construction Camp;
- iv. Recreation Management measures; and
- v. Sense of Place and Community Identity Management measures.

These strategies are contained in **Part 5, Section 5**.

2.10. Police, Justice, Social Needs and Services

Community members have expressed concern that unless management strategies are put in place, the arrival of the Precinct workforce and the associated pressures it would place on the fabric of the community of Broome would create an increase or even the inception of particular social problems. As a result, a Precinct condition is that all commercial proponents provide policing and security services at the Precinct.

As already noted, although impacts to demands upon services driven by the Precinct-related population may be manageable even marginal increases in the size of the population to Broome would most likely result in a proportionately higher increase of stress upon Broome's community service providers in this area.

2.10.1. Baseline Context: Police and Justice

Crime rates in the Kimberley have been reported as being the highest in Western Australia. The Broome police and prison are operating at, or near capacity. The police and justice services will have additional pressures placed on them as a result of the anticipated population increase, even without Precinct development.

For the 2008/09 financial year, the Kimberley's reported offences against the person constituted approximately one fifth of such offences for all of regional Western Australia. By comparison to the central metropolitan region of Perth, which possesses a greater population than for the Kimberley, the Kimberley's statistics (2,393) constituted approximately two thirds of the figure of such offences for the metropolitan region (WA Police, 2009).

Highest featuring offences in the Kimberley for 2008/09 are:

- aggravated sexual assault (317), approximately one quarter of such offences for regional WA and almost double that of the Perth metropolitan region;
- aggravated assault (720), approximately one quarter of such offences for regional WA and approximately equivalent to that of the Perth metropolitan region;
- non-aggravated assault (919), approximately one sixth of such offences for regional WA and two thirds of the same offence type for the Perth metropolitan region; and
- theft and property damage (1,341 and 1,222 respectively). These offences feature highly in relation to the Kimberley District's own crime statistics but are not proportionately high in relation to those of regional WA, or by comparison to the Perth metropolitan area.

Police have already identified that the main issues that presently require policing in the town of Broome are anti-social behaviour, domestic violence and property offences. These issues are mainly associated with juvenile offenders, poor socio-economic circumstances and alcohol and drug abuse (Broome Police, 2009; pers. comm.).

Existing issues such as homelessness and poverty may lead to increases in crime if not managed. It is also possible that, particularly under a high development scenario, a perception of increased wealth in the town may develop and may render some people vulnerable targets for theft and property damage.

Justice administration is currently serviced by a single magistrate, three independent (private) lawyers, a branch of Legal Aid Western Australia, a branch of the Western Australian Legal Aid Service and seven full-time equivalent staff at the Broome courthouse.

In addition, the Commonwealth Attorney-General's Department funds two Aboriginal legal services in Broome. The 'Aboriginal Legal Service WA' branch is operating at capacity. The Indigenous Family Violence Prevention Legal Service is not burdened to quite the same extent, but this may be a reflection of low reporting or disincentives to taking legislative action against family violence by Aboriginal people in the area. Both services provide outreach to Aboriginal communities across the region.

2.10.2. Baseline Context: Social Services

The Kimberley has a number of features of severely dysfunctional communities. These indicators include very high rates of family violence, sexual assault, child abuse, suicide and substance misuse.

The Kimberley has among the highest rates of family violence in the State and under-reporting is common. There is one Broome community counselling service (Kinway) and one refuge (Marnja Jarndu) to address this issue. They both have limited capacity and are also required to provide outreach to remote communities in addition to servicing the Broome region. In the secondary impact area, in particular Derby, family violence rates are also excessive. Again, there is one refuge and very few therapeutic intervention services available. It is unlikely that current service delivery measures will be able to cope with a growing and sustained demand on their services generated from expected population growth.

Sexual Assault is frequently underreported but, in 2001, the Kimberley still had the highest number of reported sexual assaults for any region in Western Australia. There are currently two services to support victims of sexual assault; these are Kinway and Kimberley Headspace which provides services to 12-25 year olds. There are no Aboriginal sexual assault counsellors in Broome. This reflects a system already at capacity. Increased rates of sexual assault are likely with the expected population growth of the town. An increased rate of sexual assaults was a specific concern of participants at DSD's 'Health Workshop' consultation (12 August 2009).

The west Kimberley's number of open contacts within the child protection system over the 2008-2009 financial year was among the highest in the State, despite lower population levels than other regions (Department of Child Protection 2008/2009). Anecdotal and media reports suggest that the Department of Child Protection's offices in the region are already working beyond their capacity. There are also limited services in Broome with some services provided by Kinway, Kimberley Mental Health or by the psychologist based at the Kimberley Division of General Practice provide assistance.

The Kimberley's excessively high suicide rate prompted the Hope Inquiry, an investigation by State Coroner Alistair Hope into 22 deaths in the region. In 2003, 28% of Aboriginal people in the Kimberley surveyed had lost a family member to suicide (Ralph *et al.*, 2003). Counselling is available through Kinway, and the services it provides through Kimberley Headspace, but no Aboriginal counsellors are formally employed to undertake this role.

The Kimberley has the highest per capita alcohol consumption rate of any region in the State. Notwithstanding the range of liquor restrictions were introduced to the Broome region by the Western Australian Government in early 2009, rates of alcohol abuse remain high. In addition, a range of restrictions have been introduced to communities surrounding Broome, which has seen a rise in the itinerant population seeking to access alcohol from the town centre. This trend creates a demand for services, for instance, the Kullari Patrol operates from Broome to intervene and diffuse potentially violent situations arising from public intoxication.

Substance abuse is well-documented as a self-medicating response to early or recent life stresses. Kinway Counselling Services, Kimberley Mental Health and Drug Service and the two psychologists operating from the Kimberley Division of General Practice play a critical role in addressing the underlying issues which give rise to substance abuse in the region. However, with limited resources available to address these issues even a marginal increase in demand would create significant issues in relation to service provision.

The Milliya Rumurra Alcohol and Drug Rehabilitation Centre provides a residential facility, a day program for non-residential clients, one-on-one programs for relapse, harm minimisation, parenting services, a sober-up shelter five nights a week and have an outreach program. The centre is operating at full capacity and like many other similar service providers, would likely experience difficulties in coping with further demand.

2.10.3. Predicted Impacts

Although the anticipated, longer-term Precinct-related population increase is manageable relative to the projected growth of the population, it is expected that any population increase, including Precinct-related population increase, would contribute to the crime rate, based on average criminal activity per head of population nationally.

Broome District Police believe that, given the quantum of construction workforce resident at the Precinct, the Precinct itself may require its own police post. A decision has yet to be made as to whether the Precinct would be policed from Broome. If this were the case, additional resources would need to be allocated so Broome-based service-delivery is not diminished.

Minimisation of impact would also require a safety and security management strategy be developed which includes a policy of obtaining police clearances for workers.

Participants at the DSD's Health Workshop were concerned about an increase in informal prostitution by some of Broome's existing younger residents. They were also concerned that during construction sex workers from other regions may be attracted due to the 'influx of a predominantly single, male FIFO workforce' with high disposable incomes. This in turn raised fears of an increase in the level of Sexually Transmitted Infections. Measures are expected to be put in place that would manage access into and out of the accommodation camp that would seek (among other things) to reduce the likelihood of workers leaving the camp and engaging in this behaviour.

Participants at the same workshop also raised concerns about members of the workforce who 'took breaks' in Broome and caused 'havoc' in the town specifically in relation to public intoxication, sexual assault and harassment. The town already experiences this problem on a periodic basis from workforces on breaks from other industries. Potential management measures to reduce this impact include transporting the workers directly from their flights to Broome to the workers accommodation and organising structured activities for workers on their mid-cycle recreation day. This impact is likely to remain for incoming independent contractors who service the Precinct or workers who choose to remain in Broome for their recreational leave.

Any additional demand upon child abuse and neglect intervention services, including that from small population increases resulting from the Precinct's development, could have a disproportionate impact on the social service and child protection system which is already under some stress.

It is unclear whether steep population increases or decreases would affect rates of suicide in the region. There is no discourse directly linking the two. It is clear that any impacts creating an increase in the incidence of the psycho-social issues cited directly above would most certainly influence the rate of suicide (see Zubrick *et al.*, 2006). This underlines the importance of strong management measures to address psycho-social and community wellbeing impacts.

A recent report by Planning WA reviewed the social and community impacts of a FIFO workforce in the Pilbara. This report described family dysfunction, guilt, loneliness, substance abuse, depression and reduced commitment to workplace tasks as commonly experienced by FIFO workers (Planning WA, 2009).

Issues of substance abuse and the psychological health of the FIFO workforce and their families is a general issue which needs to be addressed. In relation to impacts on Broome, a policy of limiting FIFO workforce layover time in Broome may substantially mitigate potential increases in substance abuse from the workforce population. Additionally, the existing practice in the Industry of compulsory random alcohol and drug testing may also limit the prevalence of substance misuse by Precinct workers in the town. The issue could be exacerbated by the indirect workers and those moving to Broome in the hope of work (the 'opportunistic workforce').

2.10.4. Social Services, Police and Justice Management Strategies

A number of interdependent strategies address the issues around social services, justice, policing and emergency services. These include:

- i. The managed access construction camp;
- ii. Worker behaviour strategies; and
- iii. Precinct emergency services, policing and security strategy.

These strategies are contained in **Part 5, Section 5**.

2.11. Community Identity and Sense of Place

The 'sense of place' social impact variable is defined as a change to the defining character or 'essence' of a location. This character usually results from the interaction of a number of aspects including location, climate, lifestyle, heritage and atmosphere. This variable includes potential impacts to the area's heritage, which are captured in a separate heritage study.

Potential changes to the unique 'Broome feel' are a major concern raised by almost all stakeholders. Broome's identity is a combination of the natural and social factors. The tropical climate, its isolation and location on a peninsula that captures sea breezes and promotes outdoor living for much of the year; the striking contrasts in the landscape between the turquoise sea, sand and red pindan soil. The multicultural nature of Broome also contributes much to its unique identity and is different to the rest of Western Australia mainly because of the historical development of the pearling industry.

2.11.1. Baseline Context

Whether or not the proposed Precinct proceeds, the projected population growth means that Broome will undergo significant change in the next twenty years. Community identity and 'Sense of Place' are dynamic concepts and have undergone substantial change in the past. Long-time residents of Broome speak of when Broome had less than 4,000 people and 'everyone knew everyone else'. The town has increased substantially since then and still has a similar atmosphere. A workshop with local stakeholders to identify key aspects of Broome's sense of place and potential impacts was held in July 2009. The themes that workshop participants considered important to Broome's sense of place are its:

- Cultural Diversity: Multicultural heritage; the cosmopolitan feel of the place.
- Climate: Outdoor living; tropical climate; connectedness to nature and the natural cycles.
- Geography: Isolation of Broome from other big centres and proximity to wilderness; proximity to beaches such as Cable Beach.
- Built Environment: The close proximity of the airport; buildings that respect the environment, are simple, functional and use local materials; non industrial feel.
- Indigenous Contribution: Indigenous achievements and the pride of non-Indigenous people about these achievements; impact of the Catholic Church on Indigenous people. Broome Style: Its 'laid back style', the concept of 'Broome Time'. The workshop noted that there is no such thing as a 'Broome' Person, rather 'people come to Broome to be a Broome Person'.
- Community concerns already exist in relation to impacts the Broome 'sense of place' will experience due to changes in the region occurring independently of the Precinct's existence. Stakeholders anticipated these to be the:
 - transient nature of Broome's population and scarcity of skilled people to undertake seasonal jobs;
 - growth can lead to a loss of the friendly small community feel of the place (high growth rate over the last 15 years);
 - small rate payer base and high demands;
 - lack of arts facilities, function centres, or museums to preserve and promote culture and the arts. There is a need for more volunteers and sponsorship for the arts (growth could positively impact this); and
 - lack of forward planning during recent growth periods to cope with change in demand

2.11.2. Predicted Impacts

Stakeholders at a number of SIA events expressed concern about the potential impact of the Precinct development on Broome's community identity. These concerns include:

- The risks of sex, drugs and the potential moral shift in the town from a large FIFO workforce;
- The potential increases in flights with more planes landing near the town;
- Tourists sharing planes with workers impacting on the welcoming sense of place of Broome;
- Increased industrial activity from a potential supply base in Broome to support offshore development of the gas fields;

- Pollution in the water around the port and impacts on bird and fish life;
- Impacts on whales;
- The visual impact of the LNG Precinct development;
- Fears that wage discrepancy between the town and workers could lead to community disharmony; and
- Impacts to the protection and respect for Indigenous culture, Indigenous seasons, Indigenous flora and fauna.

In addition to the concerns listed above, a significant number of stakeholders believed that workers who move to Broome with their families are less of a social risk than single FIFO workers.

2.11.3. Community Identity and Sense of Place Management Strategies

Broome's sense of place will be managed by implementing a range of interdependent strategies. These include:

- i. The Sense of Place Management Strategy;
- ii. The Managed-Access Construction Camp;
- iii. Access to Broome and the Dampier Peninsula;
- iv. Workforce Behaviour Management;
- v. Tourism Impact Management Strategy; and
- vi. Opportunistic Workforce Management.

These strategies are contained in **Part 5, Section 5**.

2.12. Impacts to Social Mix and Values

A recurrent theme in discussions with stakeholders is the concern that the gas industry would bring about changes to the social mix in Broome and on the Dampier Peninsula. The concern centres on the perceived high incomes of LNG workers and relatively low incomes of the Broome population. Volume 1 (p.89) illustrates that the median individual income in urban Broome was \$696 per week for non-Indigenous people and \$325 for Indigenous people with an aggregate income average of \$628 per week. Based on the average construction income supplied by the Foundation Proponent (\$200,000 per annum), the average construction worker would receive \$3,846 per week, which is over six times the median individual income for urban Broome. The average permanent operational workforce salary is \$2,500 per week (\$130,000 per annum), which is almost four times the median individual income for urban Broome.

The profile of the average LNG construction workforce is typically that of young single men. It is anticipated that construction workers would be limited, as far as possible, to the accommodation facility north of Broome in a self-contained camp where all requirements would be provided for the workers. The Foundation Proponent has stated its intention to operate a managed access camp that limits construction worker access to Broome (see Public Information Booklet DSD, 2009d, <http://www.dsd.wa.gov.au>). There would be mechanisms at a Precinct level to ensure that future commercial proponents are subject to the same arrangements as the Foundation Proponent. As Broome is one of the key tourist destinations in Western Australia and based on experience in the Pilbara, it is possible that some of the construction workers would choose to spend rest periods in Broome.

The smaller permanent workforce is likely to consist mainly of professional people and would match the current profile of Broome residents more closely than the construction workforce.

2.12.1. Social Mix and Values Management Strategies

A number of management strategies manage the potential social mix and values conflicts include:

- i. The Managed-Access Construction Camp;
- ii. Access to Broome and the Dampier Peninsula; and
- iii. Workforce Behaviour Management.

These strategies are contained in **Part 5, Section 5**.

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3. Strategic Indigenous Impacts Assessment

3.1. Introduction

The State of Western Australia, through the Minister for State Development, proposes to develop a common user LNG Precinct to process natural gas from the Browse Basin (the **BLNG Precinct Plan**). The BLNG Precinct would consist of LNG processing facilities and associated activities, and would be located near James Price Point, approximately 60 kilometres north of Broome, on the West Kimberley coast of Western Australia. The Minister of State Development is the Proponent for the BLNG Precinct Plan and would be responsible for overseeing and coordinating the implementation of the Plan.

The Western Australian Government and the Commonwealth Government have entered into a Strategic Assessment Agreement to cooperatively develop a strategic assessment that will meet the requirements of both the *Environmental Protection Act 1986* (WA) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). The strategic assessment of the BLNG Precinct is being undertaken in accordance with the agreed Terms of Reference.

This Strategic Indigenous Impacts Assessment (**Part 5, Section 3**) has been developed as part of the requirements in the Terms of Reference relating to the comprehensive assessment of Indigenous impacts. While not all parts of this Strategic Indigenous Impacts Assessment (hereafter referred to as the Indigenous Impacts report) will be assessed under the EP Act or the EPBC Act, the report has been developed as part of the requirements in the Terms of Reference relating to the comprehensive analysis of the potential impacts of the Plan on Indigenous people and culture that are likely to be directly or indirectly affected by the Plan.

Strategic level assessments are made based on a range of development scenarios to cater for possible proponent and project outcomes within the BLNG Precinct area. There are accordingly limitations in the level of detail available for assessment at this stage. Both the WA State Government and Woodside acknowledge that more extensive consultation and social impact assessment will need to take place at the 'Project Level'. In this regard, in August 2010 Woodside commenced its scoping for a more detailed social impact assessment. The State will require that Woodside address the management measures contained in the Strategic Social Impact Management Plan herein submitted as part of the Strategic Assessment Report (**Part 5, Section 5**). The State will also require future commercial proponents to conduct a project level social impact assessment.

3.1.1. Terms of Reference

This Indigenous Impacts Report has been prepared in accordance with the Terms of Reference established under the Strategic Assessment Agreement (the Terms of Reference are provided in full in DSD, 2010c; **Appendix A-3**). Extracts from sections of the Terms of Reference particularly relevant to this Indigenous Impacts Report are set out below.

Section 5 (The Environment Likely to be Affected) of the Terms of Reference states the following:

- a) *The Report must provide a detailed description of the environment likely to be affected by the Plan, the actions or classes of actions taken under the Plan including any associated infrastructure and construction and operational activities. This description must identify the environmental assets and characteristics, including biophysical processes associated with the site(s) selected in the Plan and the terrestrial and marine environments likely to be directly or indirectly impacted, for example:*
- b) *Indigenous environmental values and Indigenous cultural heritage (environmental) values, including all values held by Traditional Owners in the area likely to be affected and including broader biological communities, habitats and environments in which species with Indigenous environmental/conservation values might live.*

Section 7 (Indigenous Impacts) of the Terms of Reference states the following:

The Report must include a comprehensive analysis of the potential impacts of the Plan on Indigenous people and culture (including matters of NES and those prescribed under the WA Aboriginal Heritage Act 1972 and the WA EP Act) that are likely to be directly or indirectly affected by the Plan.

In particular, the analysis must include:

- a) *a description of the potential impacts, including socio-economic impacts, of the Plan on Indigenous people (including to the extent possible, information on the degree of confidence with which impacts and indirect impacts can be predicted and quantified)¹;*
- b) *an assessment of whether any impacts on Indigenous people (including Indigenous heritage) are likely to be unknown, unpredictable or irreversible;*
- c) *an analysis of the significance of potential impacts on known listed and unlisted Aboriginal heritage sites, objects or landscapes and values of cultural significance with reference to the Aboriginal Heritage Act 1972-section 5,6 and Indigenous Heritage values under the EPBC Act;*
- d) *reference to the technical data and other information relied upon in assessing the Indigenous heritage impacts of the Plan; and*
- e) *whether the Traditional Owners have given informed consent, in a culturally appropriate manner to the implementation of the Plan.*

Section 8 (proposed Management Arrangements for the LNG Precinct and associated activities) of the Terms of Reference, requires that the Report include a description of legislation, policies, performance and mitigation measures that are relevant to the implementation of the Plan, including how the scheme will ensure that obligations contained in the *Aboriginal Heritage Act (1972)* are met. It also states that the Report must set out specific management arrangements, including the possible role of Traditional Owners in those arrangements.

¹ Certain Indigenous information and knowledge provided as part of the assessment and consideration of approval for a Common-user LNG Precinct will not necessarily be made available to the public where it is culturally inappropriate to do so and unnecessary for the assessment of the Precinct Plan in accordance with the terms of reference.

3.1.2. Overview of Precinct Plan

The Plan for the BLNG Precinct is to establish gas processing and liquefaction complexes, LNG and condensate storage tanks, multi-user Port Facilities and supporting infrastructure facilities such as accommodation facilities, Light Industrial Area, desalination and wastewater treatment plants, roads and buffer zones. The processing plants would be fed by a number of hydrocarbon pipelines, from the offshore Browse Basin gas fields onshore for processing. To allow for the export of hydrocarbons and provide supporting infrastructure, a port is proposed, including product loading berths, a Marine Facility and small vessel harbour.

The details of the Precinct Plan are comprehensively set out in the Strategic Assessment Report (**Part 2, Section 5**).

Several potential Precinct development scenarios were developed for the social impact assessment process and were considered:

- Scenario 1: No development of Precinct;
- Scenario 2: Low development (15Mtpa LNG Precinct within 15 years);
- Scenario 3A: Medium development (25Mtpa LNG Precinct within 25 years);
- Scenario 3B: Medium development (35Mtpa LNG Precinct within 25 years); and
- Scenario 4: High development (50Mtpa LNG Precinct within 30 years).

Each Scenario represents a gradual increase in the level of the development of the Precinct. It is anticipated that Scenario 2 would represent the presence of a single Foundation Proponent, Scenario 3B, the presence of two commercial proponents and Scenario 4, more than two commercial proponents.

Some of the key assumptions about the development are as follows:

- 80-90% of construction workers would, unless conditions change, be employed on a 'fly-in/fly-out' basis.
- All construction workers would be housed in a purpose-built accommodation camp outside of Broome.
- Access to and from this camp would be managed to minimise the impact on Broome and the Dampier Peninsula, particularly during the construction phase when large numbers of workers would be at the Precinct.
- The Indigenous Impact Reports and the DSD SIA were conducted with the best available workforce information at time of writing. This indicated that the initial construction phase of the Precinct (during Foundation development) could take four to six years and employ around 2500 to 3500 construction workers. After the completion of these reports, the peak workforce of this initial construction phase has been revised upwards to around 6000 workers. Although these revised workforce figures have now been incorporated into the SIA, the Indigenous Impact Report should be read in the knowledge that the initial peak workforce is likely to be substantially larger than that assumed during consultation.
- The initial construction phase of the Precinct (during Foundation development, identified in Scenario 2) could take four to six years and employ a range of onshore and offshore construction workers. The workforce demand tends to follow a bell-shaped curve and peak construction, a period of approximately two years within this same time frame, workforce numbers may reach around 6000 people as noted within the Public Information Booklet (DSD 2009d, available at <http://www.dsd.wa.gov.au/7901.aspx>) and the three-volume SIA publication, these numbers are subject to some flexibility.
- The long term operational workforce worker numbers are far lower. Under a Scenario 2/ 3A (see above) development, the Precinct is expected to have a permanent operational workforce starting at about 400 to 600 workers, plus about 160 onshore and offshore contractors during operations. This permanent workforce is likely to be specialised and consist of both a residential and a fly-in/fly-out workforce in up to potentially equal proportions.

The assumptions that were made about the management of the workforce, particularly during construction, have been largely borne out in terms of the KLC's findings about the appropriate way in which to manage workforce impacts on Indigenous people.

3.1.3. Indigenous Impacts Report

As part of the comprehensive assessment and consultation processes being undertaken, DSD commissioned the Kimberley Land Council, a statutory representative of the Goolarabooloo/Jabirr Jabirr native title claimants and a representative body for the purposes of the *Native Title Act 1993 (Cth)* (**NT Act**), to undertake an Indigenous Impacts Report comprising the following:

- Indigenous Impacts Report Volume 1: Overview and Consolidated Recommendations (KLC, 2010a; **Appendix E-1**).
- Indigenous Impacts Report Volume 2: Traditional Owner Consent and Community Consultation, a report on the consultation and agreement processes (O’Faircheallaigh et al., 2010; **Appendix E-2**).
- Indigenous Impacts Report Volume 3: Aboriginal Social Impact Assessment; a report on the social and economic impacts (Kahn, 2010; **Appendix E-3**).
- Indigenous Impacts Report Volume 4: Heritage Impact Assessment (**HIA**), a report on Aboriginal cultural heritage values and impacts (KLC, 2010b; **Appendix E-4**).
- Indigenous Impacts Report Volume 5: Aboriginal Archaeological Site Avoidance Survey (Eureka, 2010; **Appendix E-5**).
- Indigenous Impacts Report Volume 6: Ethnobiology Report, James Price Point (Margetts and Grabasch, 2010a and 2010b; **Appendix E-6** and **Appendix E-7**).

The following additional work was conducted to assist in the compiling of this report:

- Fishing Industry Impact Study Report: *James Price Point Proposed Liquefied Natural Gas Hub*, Guy Wright and Christian Pyke, Big Island Research, 2009, a report, commissioned by the Department of Fisheries, on the impact of the proposed BLNG on customary fishing in the vicinity of James Price Point.
- The three-volume Strategic Social Impact Assessment for the establishment of the Browse LNG Precinct (**Appendix D**).

The Indigenous Impact Reports form part of **Appendix E** Supporting Documents of this Strategic Assessment Report and are available on the Department of State Development’s website at:

<http://www.dsd.wa.gov.au/7901.aspx>

The KLC reports consider the cultural heritage and social and economic impacts on Indigenous people separately.

In assessing the heritage impacts of the Plan, the KLC Report (Volume 4) distinguishes between the area within the immediate vicinity of James Price Point that is likely to be physically impacted by the development and a broader area of impact identified by reference to cultural connections and geographical considerations.

For the purposes of the social and economic assessment undertaken, the areas that were considered in the A SIA differed from those considered in the DSD SIA assessments. The DSD SIA differentiated between a primary impact area and a secondary impact area. The primary impact area comprises effects within a 10km radius of James Price Point and those upon the town of Broome. The secondary impact area surrounds the primary impact area and includes the communities on the Dampier Peninsula, stretching from Derby in the north to Bidyadanga in the south.

3.1.4. Overview of Potential Impacts on Indigenous People and Culture

The potential direct and indirect impacts of the BLNG Precinct on Indigenous people and culture set out in **Section 3** were identified through a process of assessment and consultation with the Indigenous people potentially affected. The consultation process has enabled the Proponent to develop a broad understanding of the likely potential impacts and identify mitigation strategies or processes for developing mitigation strategies.

The main potential impacts identified in the SAR which are directly or indirectly relevant to the Precinct Plan are:

- impacts on the cultural heritage values within the proposed location of the BLNG Precinct and in the broader Kimberley region;
- the disturbance of Aboriginal sites within the proposed location of the BLNG Precinct;
- impacts on Indigenous people's customary fishing practices;
- indirect impacts on Indigenous people via impacts on species with ethno-biological significance; and
- socio-economic impacts on Indigenous people that live in the vicinity of the proposed Precinct Plan (some of these impacts may be negative and others positive.)

The Terms of Reference also require specific reference to the analysis of the significance of potential impacts on known listed and unlisted Aboriginal heritage sites, objects or landscapes and values of cultural significance with reference to the *Aboriginal Heritage Act, 1972* (WA) (**AH Act**) and Indigenous heritage values under the EPBC Act. There would be limited impacts on known listed and unlisted Aboriginal sites within the BLNG Precinct. The identified impacts would be relatively confined with only four identified registered sites potentially affected. The Heritage Impact Assessment identifies (mostly indirect) impacts further afield outside the area of the Precinct and the manner in which those impacts can be made less significant.

Discussions with Traditional Owners to date for the heritage and other agreements indicate that no heritage sites or values exist and would be affected to a degree that would require the development not to proceed. However, further work is required to completely understand the heritage landscape of the Precinct site. This would include survey work and the development of management plans in consultation with the Traditional Owners to manage specific localised impacts. These activities would be subject to compliance with the terms of the Heritage Protection Agreement by the commercial proponents.

The Terms of Reference requires information to be provided, to the extent possible, on the degree of confidence with which impacts and indirect impacts can be predicted and quantified. This is possible for direct heritage impacts based on the work that has occurred and will continue in accordance with the terms of the HPA. The accuracy of the prediction and the quantification will be assisted by the further work that will occur under the heritage agreements and other arrangements with the KLC and Traditional Owners.

One feature of the socio-economic assessment on Indigenous people and culture is the relative uncertainty of the impacts. The socio-economic and cultural impacts can be predicted at a strategic level but quantification is difficult. This is because a development of this nature and scale would be new to the Kimberley and the experience of communities in previous developments is not uniform. As the base line work also indicates, underlying social issues, particularly for Indigenous people, may hinder their capacity to take advantage of the opportunities the development offers and amplify any negative impacts. This makes impacts and opportunities related to the Plan difficult to quantify. As a result, the monitoring of the anticipated impacts against what occurs is an important part of the implementation.

The approach taken by the KLC was to assess the socio-economic impacts with the objective of maximising the positive impacts and minimising the negative impacts of the Precinct. It viewed the ASIA as a vehicle to incorporate Aboriginal people's perspectives into the statutory approval process and was intended to assist in developing benefit sharing mechanisms. A key goal of the ASIA was for the affected native title groups and other affected Aboriginal people to play a central role in the process. The participatory process enabled the involvement of the Goolarabooloo / Jabirr Jabirr native title claimants and, within time constraints, the other affected Aboriginal people. A recognised deficiency of the ASIA was the lack of engagement with the Yawuru people, the native title holders over Broome, despite the parties exploring engagement options on a number of occasions. As Broome is likely to experience significant impacts from the development of the Precinct, the exclusion of the Yawuru people from effective engagement by the ASIA process should be recognised when reading this summary.

3.1.5. Overview of Proposed Management and Mitigation Measures

This report sets out the mitigation and management measures to address the potential negative impacts of the BLNG Precinct on Indigenous people identified in this report. The ASIA identified 75 recommendations, many of which correspond with the strategic-level mitigation and management measures proposed as part of the DSD SIA. These strategic-level mitigation and management strategies are outlined in **Part 5, Section 5** of this report and specify desired objectives, outputs, timeframes and responsibilities for each strategy. The detail of the ASIA recommendations should be considered in the further development of the strategies.

The KLC's 75 recommendations contain both broad and specific measures to address the predicted impacts. The State acknowledges that some of the KLC recommendations have not been dealt with to the level of detail contained in the ASIA recommendations. They are, however, dealt with through a number of mechanisms. Where possible, the recommendations have been included in the high-level strategies in **Part 5, Section 5** and these should be considered in greater detail when the strategies are further developed. Elsewhere, they are captured, again at a strategic level, under proposed agreements as discussed in **Part 5, Section 3.2. Table 5-1** shows where the KLC recommendations have been captured. The Precinct is at an early stage of development without confirmed commitment from the potential Foundation Proponent. Likewise, government responsibilities have therefore been allocated at a high level and it is expected that a whole of government approach will be required to address some of the identified impacts.

The strategies will take the form of Precinct conditions or other similar mechanisms for all Precinct proponents. These arrangements will have an adaptive mechanism to enable changes to the conditions, subject to agreement from relevant parties. These Precinct conditions or other mechanism will be audited on a regular basis. It should be noted that some of these management measures are shared responsibilities and not solely the responsibility of the proponent. For more detail on the management measures see **Part 5, Section 5**. Suggested management strategies that should be included in the Precinct conditions include those related to:

- 1) Managed-Access Construction Camp: To mitigate the potential for negative impact on the communities and environment of Broome and the Dampier Peninsula from the construction work force associated with the LNG Precinct.
- 2) Access to Broome and Dampier Peninsula: To manage the interaction between a large scale construction workforce and the communities of Broome and the Dampier Peninsula.
- 3) Workforce Behaviour Management: To manage the potential for worker behaviour to have a negative effect on the communities of the surrounding areas.
- 4) Local Living: Commercial proponents should provide sufficient accommodation in the Precinct accommodation camp for the construction workforce to reduce the motivation for construction workers to move to Broome.
- 5) Cross-Cultural Training: All workers at the Precinct are aware of the culture and the cultural obligations of their indigenous colleagues, their heritage and the heritage values within and near the Precinct and surrounding area, including their importance and legal obligations of managing or avoiding impacts to heritage sites.
- 6) Education, Training and Employment: To maximise education, training and employment opportunities for the local community and ensure a coordinated approach to the range of education, training and employment strategies implemented to support the development of the BLNG Precinct.
- 7) Indigenous Workforce Development: To maximise the Indigenous employment outcomes at the BLNG Precinct through a coordinated approach to the range of Indigenous education and training and employment strategies.
- 8) Transient workforce management: To minimise the number of transient or opportunistic workers arriving in the region and to manage those who do arrive.
- 9) Strategies to maximise economic benefits for the communities of Broome and the region.
- 10) Precinct Health, Emergency Services, Policing and Security: Establish appropriate primary health care, emergency and security services capacity in order to meet Precinct requirements and minimise the potential impacts on existing services.
- 11) Transport Management: To mitigate and manage the impact of the Precinct development on transport and traffic.

The Social Impact Matrix (**Part 5, Table 5-1**) of the Strategic Social Impact Management Plan indicates where the ASIA recommendations regarding Precinct related impacts have been considered in the various mitigation and management strategies.

General mitigation and management measures are accounted for in **Part 5, Section 5**.

- 1) Management of Marine Resource Use Impacts: Minimise, mitigate and manage the impact of the BLNG Precinct on marine resources including commercial and recreational fishing activity in the James Price Point region.
- 2) Management of Tourism Impacts: Broome retains its status as one of WA's premier tourism destinations.
- 3) Management of Impacts of Recreational Use: Develop management arrangements for recreational activities which address local user and Traditional Owner requirements.
- 4) Sense of Place and Community Identity Management Strategy:
 - a) Dampier Peninsula Sense of Place Strategy: Retain the identity and sense of place associated with the Dampier Peninsula.
 - b) Broome Character and Sense of Place Management Strategy: To retain the unique character and sense of place associated with Broome during the development of the BLNG Precinct.
- 5) Housing Strategy: Ensure the timely delivery of appropriate land and housing requirements for Broome in order to meet projected population increases, including those associated with Precinct requirements.
- 6) West Kimberley Socio-Economic Strategy: Government services are delivered to reasonably meet the social impact assessment baseline of existing community requirements and population growth projections.

Other ASIA recommendations are contained in a range of agreements negotiated or under negotiation with the KLC:

- the broader environmental impact assessment, the Heads of Agreement between the State, Woodside and the KLC. This agreement provides the framework for the Indigenous Land Use Agreement or other land agreement under negotiation between the parties;
- the Heritage Protection Agreement between the State and Woodside and the KLC; and
- Other agreements being negotiated as part of the benefits package such as the Cultural Heritage Management Plan (CHMP) and the establishment of Conservation and Heritage Reserves under an Indigenous Land Use Agreement or other Land Agreement.

Such agreements will be established irrespective of the legislative process currently underway.

A significant element in avoiding and mitigating potential negative impacts of the BLNG Precinct on Indigenous people is ongoing consultation with and the involvement of the Indigenous community. **Part 5, Section 3.9** summarises the extensive consultation that has been undertaken through the site selection process, the process of negotiating an agreement to establish the Precinct (which is ongoing) and the process of gathering information via the KLC. Through those processes various potential Indigenous impacts have already been avoided, minimised or mitigated.

3.2. Indigenous Agreements and Funding Commitments

3.2.1. State-Woodside-KLC Agreements

The State and Woodside have entered into a HoA and a HPA with the KLC. The total benefits package is approximately \$1.5 billion. The State has also negotiated a Studies Agreement and funding agreements with the KLC. Other agreements, including a land agreement that will, among other matters, establish a Cultural Heritage Management Plan, are still under negotiation. None of these are public documents, nor are they intended to be as they were/are the subject of confidential negotiations.

The State commitments in the HoA, however, assume contributions from a Foundation Proponent and subsequent proponents. The State's portion of the benefits package under the HoA is \$251 million. The 2009/2010 State budget allocated \$85 million over four years of the HoA commitments for a Regional Benefits Agreement to contribute towards the social, health and economic needs of Indigenous people in the Kimberley.

3.2.2. Commonwealth Commitments to the West Kimberley Region of WA

In March 2009, during the negotiations of a HoA, the Commonwealth Government, through the Minister for Indigenous Affairs, advised the KLC and the State that Aboriginal communities and citizens in the West Kimberley can expect to be a major beneficiary of increased resources over the next four years and beyond.

The benefits will be delivered through the National Partnerships process that gives States/Territories particular responsibilities for implementation following agreement on a Bilateral Implementation Plan. The Commonwealth Government will work closely with the Western Australian Government to ensure that the Kimberley region receives the necessary priority in program implementation.

Under the Indigenous Remote Service Delivery National Partnership, the Commonwealth is proposing that the Dampier Peninsula be included as one of the 26 priority remote service delivery locations.

Key features of the Commonwealth projected investment in the West Kimberley are set out in **Table 3-1**.

Table 3-1 Key Features of the Commonwealth Projected Investment in the West Kimberley.

Benefit	Total Value
Health (includes support for Aboriginal medical services, drug and alcohol services, aged care services, primary care services and RFDS clinics) \$29.5M/yr @ 4yrs.	\$118 million
COAG National Health Care Agreement.	\$16 million
Health related National Partnership Agreement.	\$0.690 million
Indigenous Health National Partnership Agreement.	\$2 million
Education, Employment and Training (including investment in infrastructure to support the delivery of early childhood education, schooling and training and investment in new strategies to improve outcomes under the National Partnership agreements).	\$80 million
Housing (under the National Partnership agreement on Remote Indigenous Housing).	\$110 million
Environment and Heritage (working on country program for employment of Indigenous rangers and coordinators to implement natural resource management plans on country and for IPAs).	\$15 million
Total	\$341.69 million

3.3. Relevant Legislation

3.3.1. Commonwealth ATSIHP Act

All Aboriginal sites in Western Australia are protected by State legislation (**Part 5, Section 3.3.3**). Certain Aboriginal places and objects are also protected by Commonwealth legislation. The ATSIHP Act applies in conjunction with the Western Australian legislation.

The ATSIHP Act was introduced to enable the Commonwealth to protect significant Aboriginal areas and sites when State or Territory law does not provide effective protection. The Minister can only take action when he or she receives an application by or on behalf of Aboriginals or Torres Strait Islander people to protect a specified area from injury or desecration. The application can be made orally or in writing and does not have to adhere to any particular prescribed formalities.

Significant Aboriginal areas that are under threat of injury or desecration may be protected if the Minister makes a declaration to that effect. These declarations can be made on either an emergency, interim basis or on a permanent basis. A declaration will contain provisions for and in relation to the protection and preservation of the area from injury or desecration and it is an offence to contravene the terms of a declaration.

A declaration of the Minister can only be overturned by the Minister or Parliament in accordance with the ATSIHP Act.

3.3.2. EPBC Act – Heritage Values

The EPBC Act protects matters of National Environmental Significance, including National Heritage places, Commonwealth Heritage places and World Heritage properties.

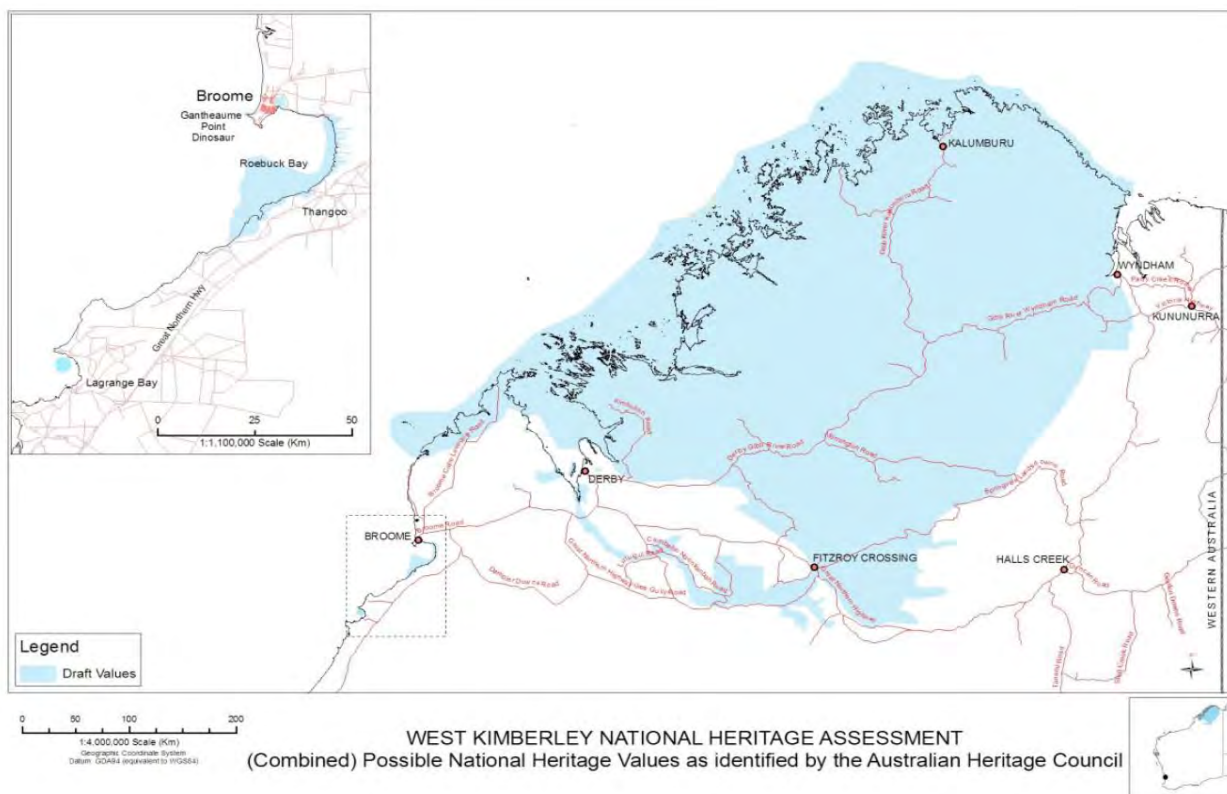
The Indigenous heritage values of a place are relevant to determining whether the place has "National Heritage value", "Commonwealth Heritage value" or "World Heritage values" that need to be protected under the EPBC Act.

In February 2008 the State government and the Commonwealth government agreed to undertake a formal assessment of the National Heritage values of the west Kimberley in accordance with the requirements of the EPBC Act. The assessment is being undertaken by the Australian Heritage Council (AHC) in parallel to the strategic assessment of the Precinct Plan.

The National Heritage assessment of the west Kimberley includes an assessment of the Indigenous heritage values of the area to determine whether they have National Heritage significance. The James Price Point area was within the boundaries of the west Kimberley area originally nominated for National Heritage assessment. In March 2010 the Australian Heritage Council completed its preliminary National Heritage assessment of the area which found that, while James Price Point had heritage values, there was insufficient evidence to demonstrate that they reached the high threshold required for National Heritage listing. This preliminary assessment will be subject to a final recommendation from the Minister.

The areas in which the Australian Heritage Council has identified possible National Heritage values are shown on **Figure 3-1** below.

This report addresses the potential impacts of the BLNG Precinct on Indigenous heritage values, in accordance with the Terms of Reference. Analysis of whether the Indigenous heritage values have National Heritage significance is beyond the scope of this report.



■ **Figure 3-1 West Kimberley National Heritage Assessment – Possible National Heritage Values Identified in Preliminary Assessment.**

3.3.3. Western Australian Aboriginal Heritage Act

The *Aboriginal Heritage Act 1972 (WA)* protects Aboriginal sites which are defined in Section 5 of the Act as:

- any place of importance and significance where persons of Aboriginal descent have, or appear to have, left any object, natural or artificial, used for, or made or adapted for use for, any purpose connected with the traditional cultural life of the Aboriginal people, past or present;
- any sacred, ritual or ceremonial site, which is of importance and special significance to persons of Aboriginal descent;
- any place which, in the opinion of the Committee, is or was associated with the Aboriginal people and which is of historical, anthropological, archaeological or ethnographical interest and should be preserved because of its importance and significance to the cultural heritage of the State;
- any place where objects to which this Act applies are traditionally stored, or to which, under the provisions of this Act, such objects have been taken or removed.

The *Aboriginal Heritage Act 1972 (WA)* provides that it is an offence to:

- excavate, destroy, damage, conceal or in any way alter an Aboriginal site; or
- in any way alter, damage, remove, destroy, conceal, or deal with in a manner not sanctioned by relevant custom, or assume the possession, custody or control of, any object on or under an Aboriginal site, unless the person is acting with the authorisation of the Registrar or the consent of the Minister under section 18 of the Act.

The *Aboriginal Heritage Act 1972 (WA)* provides that it is a defence to such an offence if the person charged can prove that they did not know and could not reasonably be expected to have known that the place or object was protected by the Act.

Aboriginal sites can be registered on a Register maintained by the Registrar of Aboriginal Sites. However registration is not required for statutory protection. The identification of Aboriginal sites is therefore necessary. Cultural heritage surveys are conducted to assist companies in availing themselves of this defence.

Where areas of land are required for development, the identification of Aboriginal sites is usually undertaken through the conduct of surveys. If any Aboriginal sites are potentially affected, a proponent would then consult with the relevant Aboriginal people as to the potential impacts and mitigation options.

If any Aboriginal sites that are identified cannot be avoided, then a consent under section 18 would be required. This process involves:

- a notice being given by the land holder that contains information about the proposed purposes and Aboriginal sites within the land the subject of the notice;
- consideration of the notice by the Aboriginal Cultural Materials Committee (**ACMC**) to enable it to form an opinion as to whether there is any Aboriginal site on the land and to evaluate the importance and significance of any such site;
- submission by the ACMC of the notice to the Minister together with its recommendation in writing as to whether or not the Minister should consent to the use of the land for that purpose, and, where applicable, the extent to which and the conditions upon which his consent should be given; and
- a decision by the Minister as to whether consent ought to be given.

3.4. Potential Socio-Economic Impacts on Indigenous People

3.4.1. Overview

This section:

- Describes the potential socio-economic impacts on Indigenous people arising from the development of the Precinct, largely drawn from the Aboriginal Social Impact Assessment (**ASIA**). This includes information on the degree of confidence with which impacts can be predicted and quantified (Clause 7a of the Terms of Reference for the Strategic Assessment).
- Assesses whether any impacts on Indigenous people (excluding Indigenous heritage) are likely to be unknown, unpredictable or irreversible (Clause 7b of the Terms of Reference for the Strategic Assessment).

The KLC, as the Native Title Representative Body for the Kimberley region of WA, was contracted to assess the potential Aboriginal impacts for the Strategic Assessment through an ASIA. The methodology included a literature review of previous international and Australian experiences of large-scale resource development and the impacts on Indigenous people and an analysis of the baseline social and economic conditions in Broome and the Dampier Peninsula. This information provided the context and background against which to predict and quantify the potential impacts of the Precinct development. These potential impacts were assessed largely through extensive consultation with relevant affected native title claim group other affected Aboriginal people and their organisations.

The assessment concludes that the development of the precinct is likely to have a major impact on Aboriginal people. The underlying relative deficiencies in housing, education, employment, training and other factors would limit the extent to which the Precinct-related opportunities can be taken up by Aboriginal people. The report found that the extent to which these underlying issues are addressed would help shape the nature of the impacts and opportunities. This theme is consistent with the broader DSD Social Impact Assessment conducted as part of the Strategic Assessment (**Part 5, Section 2**). The central finding of the DSD Social Impact Assessment is that, if mitigated and managed, social impacts from the Precinct are manageable; however their effect is likely to be substantially amplified given the already stressed social services and socio-economic environment of the West Kimberley, particularly Broome. This notwithstanding, the Precinct offers the region a unique opportunity to substantially alleviate its existing social pressures through government and commercial proponent activity that not only mitigates impact, but provides benefits that may also relieve the region's presently fragile social state. This represents an advantage that may not have existed without the prospect of the Precinct.

Most of the issues and concerns raised by participants of the ASIA fall under the following impact categories:

- impacts on land and sea country;
- social impacts of increased population in Broome, both in the town itself and in the Dampier Peninsula;
- housing and the cost of living;
- economic, employment and enterprise development;
- education and training;
- health and well-being;
- youth;
- service delivery and infrastructure;
- Distributive impacts and the equitable distribution of benefits to Indigenous people;
- land tenure issues; and
- culture and heritage.

The key concern and risk identified by the ASIA was the view that Indigenous people may be disproportionately exposed to some of the negative risks associated with the development of the Precinct (such as cost of living) and less set up to take advantage of the opportunities the Precinct offers (due, for example, to poorer education and health outcomes than those of the general community). In other words, there may be inequity in the distribution of impacts within the general population with the majority of Indigenous people more likely to experience negative impacts and less likely to experience the positive benefits of the project.

3.4.2. ASIA Process for Identifying and Assessing Potential Impacts

A consultation program was undertaken by the KLC's ASIA team (between September and December 2009) to assess the likely impacts of the proposed BLNG Precinct at James Price Point.

The ASIA study area (**Figure 3-2**) was developed having regard to the scope of the Terms of Reference, the time constraints and the need to consider impacts on Indigenous people and Traditional Owners in particular. The ASIA therefore focused on Broome; the Dampier Peninsula communities of Beagle Bay, One Arm Point, Lombadina and Djarindjin; smaller settlements or outstations associated with these communities; and Derby (including Mowanjumb community). Bidyadanga was not included for the following reasons:

- Time constraints and travel limitations.
- In contrast to Derby, few native title holders or claimants whose interests are most likely to be affected by the BLNG Precinct reside there.
- Derby, as a regional centre with a substantial housing stock and only two hours by sealed road from Broome, appears much more likely than a small community such as Bidyadanga to feel the 'overflow' effects of greater demand for housing and other services generated by population growth in Broome" (Kahn and O'Faircheallaigh, op. cit. circa page 15).

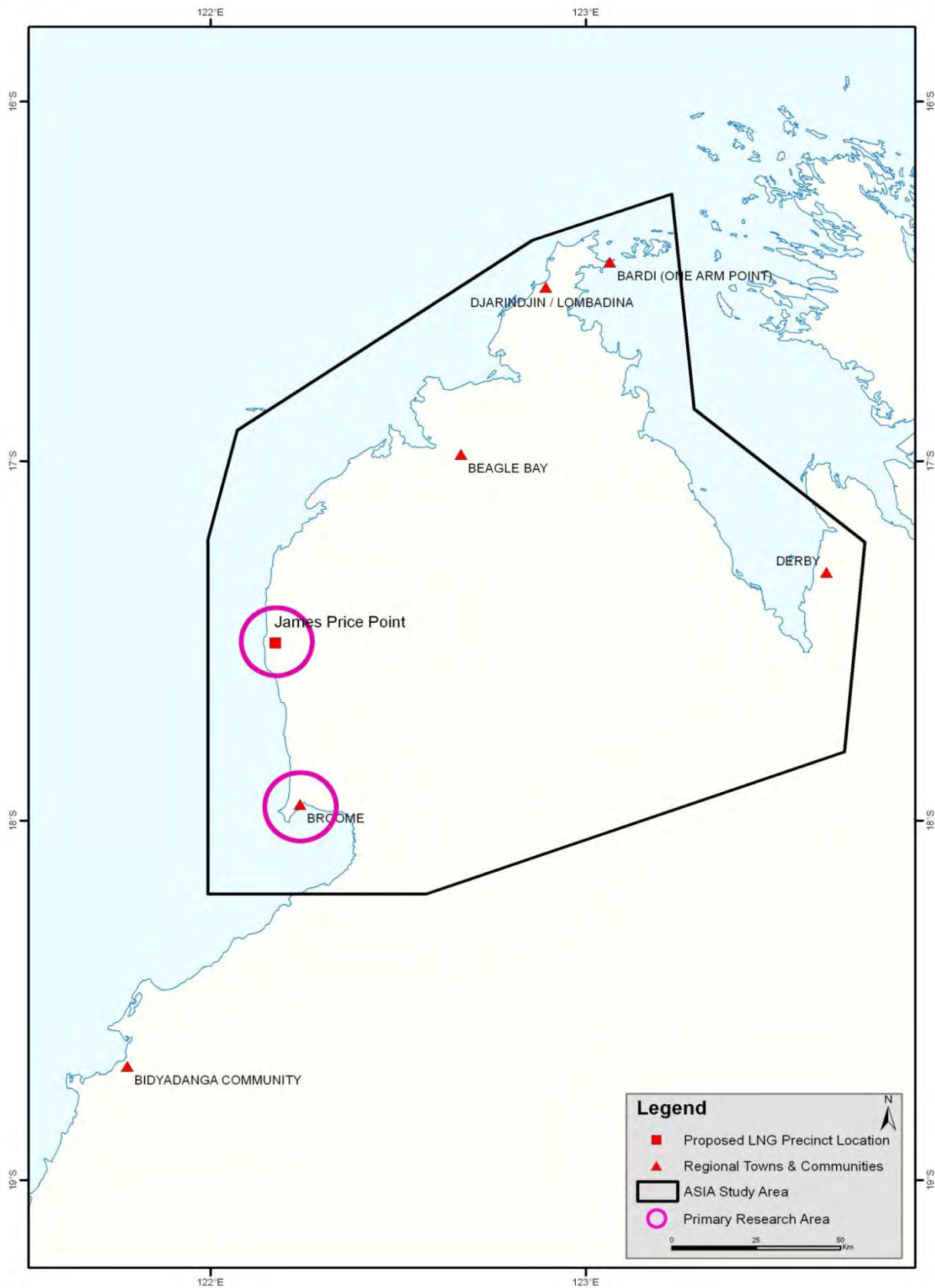
The ASIA assumed that the small Aboriginal communities on the Dampier Peninsula may be subject to greater or more intense social impacts than Broome. The key Precinct condition that all commercial proponents operate a Managed-Access Construction Camp (**Part 5, Section 5**) means that these impacts would be largely avoided. The analysis contained in the broader Social Impact Assessment assists in the understanding of the impacts likely to be experienced by Indigenous people resident in Broome.

The ASIA also recognised that, notwithstanding negotiations with the DSD to date, the proposed BLNG Precinct may have significant effects on native title rights and interests and on Indigenous sites and culture. It also recognised that many of the Aboriginal people who hold and assert these interests and/or who are custodians for these sites reside in the Dampier Peninsula and Derby areas.

Participants involved in the consultation process raised a large number of issues and concerns about the potential negative impacts of the BLNG Precinct on Indigenous people in Broome and the Dampier Peninsula, discussed in the following sections. Participants also identified potential opportunities associated with the BLNG Precinct that could generate positive outcomes for them and their communities.

This section is organised as follows:

- Key findings from the literature review of impacts of resource developments on Indigenous people.
- Key potential socio-economic impacts:
 - Social impacts of increased population in Broome;
 - Housing and the cost of living;
 - Economic, employment and enterprise development;
 - Education and training;
 - Health and well-being;
 - Social impacts of environmental impacts and conservation;
 - Youth;
 - Social and cultural impacts, community identity;
 - Social service delivery and infrastructure; and
 - The social impacts of internal conflict of gas development.
- Potential precinct opportunities.



■ **Figure 3-2 Area of Assessment for the ASIA (as adapted from the HIA).**

3.4.3. Key Findings from the Literature Review of Impacts of Resource Developments on Indigenous People

DSD commissioned the KLC to undertake the ASIA to assess social and cultural aspects of potential Indigenous impacts, and to run the process of consultation with Traditional Owners. To inform the KLC's social and cultural assessment of potential impacts and the consultation process the KLC undertook a literature review. The review considered the documented impacts of large resource developments on Indigenous people. The literature is based on experiences internationally, in Australia and in the Kimberley more specifically.

The KLC concluded from its review that the literature demonstrates that:

- The impacts of large-scale resource development on Indigenous people have often been negative. Sometimes they have been positive.
- Impacts are more likely to be positive (or more positive) in cases where appropriate public policies and Indigenous-developer agreements have been in place and continuous Indigenous engagement and consideration of impacts occurs throughout all phases of a development.
- Indigenous influence or control over resource development activity is critical if positive outcomes for Indigenous people are to be achieved and maximised.
- Even where appropriate policies and Indigenous-developer agreements are in place, obstacles arise in ensuring that large-scale resource development generates positive changes in the lives of affected Indigenous people. A key problem identified is a failure at the implementation stage of agreements negotiated between resource developments and affected Indigenous groups.

The KLC also reviewed the history of development in the Kimberley in identifying a set of cumulative impacts and experiences that helped shape Indigenous people's understanding of and responses to contemporary industrial development. The KLC discussed the experiences at Nookanbah, the negotiation of the Argyle "Good Neighbour Agreement" in 1980 and the subsequent Participation Agreement and Ord River Irrigation Area (stages 1 and 2). The KLC drew the following conclusions from these three historical cases:

- impacts are more widely spread than often thought;
- Indigenous people need full and well-presented information in order to make informed decisions about development on their country;
- procedures need to be implemented to ensure recommendations to address impacts are implemented;
- impacts have long-term positive and negative consequences, some of which cannot be predicted and all of which have to be managed, monitored and mitigated where possible;
- the mere presence of development does not necessarily ensure better outcomes for Indigenous people;
- many factors have to be taken into consideration when measuring quality of life for Indigenous people, including socio-cultural factors;
- there is a legacy of distrust of government, corporations and their consultative and administrative processes and practices; and
- robust regional Indigenous governance is an essential component of ensuring reasonable long-term outcomes (KLC 2008, pp.45-46).

3.4.4. Potential Socio-economic Impacts

3.4.4.1. Overview

The relevant baseline information identified by the KLC and through the broad Social Impact Assessment undertaken in parallel by DSD, the potential impacts identified in the above literature review and the potential socio-economic impacts that were identified in the KLC field work during the ASIA are set out below.

The international and Australian literature and historical experience in the Kimberley highlight the reality that large-scale resource development can generate serious, negative impacts for Indigenous people. The deliberations of the Traditional Owner Task Force and the ASIA consultations show that Traditional Owners and other Indigenous people who would be affected by the BLNG Precinct hold concerns about its potentially negative effects. The potential socio-

economic and cultural effects can be identified, predicted and assessed, informed by the literature and the baseline information.

The potential impacts are:

- the risk of damage to land and sea country and marine resources;
- the adverse social effects of internal conflict around gas development;
- the population influx associated with development;
- the impact of population growth on services and on housing and living costs;
- the possible inability of Indigenous people to take advantage of the economic opportunities associated with the BLNG Precinct due to deficits in education and skills;
- the potentially widening inequality between Indigenous and non-Indigenous people; and
- a deepening of the problems currently faced by Indigenous youth.

The review of other developments shows that where existing social and economic opportunities are limited, these impacts are potentially more severe and existing pre-conditions may be exacerbated by development. Conversely, the review establishes that, if appropriately managed, and particularly with the meaningful involvement of Indigenous people, the impacts of large scale resource development can be positive for a community.

The baseline data was drawn from a range of sources, including interviews with service providers as well as the 2006 Census on the Indigenous Estimated Resident Population of Broome and the Dampier Peninsula. There are a number of issues using Census statistics for the ASIA including the lack of correspondence between Census boundaries and Indigenous boundaries and the Indigenous undercount in the 2006 Census, particularly in the Kimberley where the undercount was up to 25%. The Census therefore operates like a large sample survey of population characteristics and should be treated as such. As far as population characteristics are concerned, the important outputs from the Census are not population levels but population rates. Thus the remaining tables in this section that report population characteristics are based on Census counts of usual residents only and are not adjusted using ERPs.

3.4.4.2. Social Impacts of Increased Population in Broome

A major focus of all ASIA consultation meetings and discussions with agencies was that one of the greatest social impacts of the proposed LNG Precinct and the associated increase in Broome's population growth is that it may place additional pressure on social services, exacerbate social issues that already exist in Broome, and may result in a flow over of these issues to the communities on the Dampier Peninsula and to Derby. The DSDSIA reported on the significant historical and projected future population increase in the Shire of Broome. It duplicated the ASIA participants concerns around the social impacts of this increased population although this increase is predicted to occur regardless of LNG development. The management measures contained in **Part 5, Section 5** focus on avoiding most of the population impacts of the development of the BLNG Precinct through requiring commercial proponents operate a Managed Access Construction Camp.

The key potential impacts associated with an increased population identified in the ASIA were:

- Exacerbation of social issues and social dysfunction that already exist in Broome and the communities on the Dampier Peninsula and Derby;
- Increases in alcohol consumption, drug abuse, crime, racist attitudes and the further marginalisation of Indigenous people;
- Increase in social inequality in Broome and the communities;
- An increase in visitors using the Dampier Peninsula resulting in increased demand on services and facilities and increased use of resources on the Dampier Peninsula; and
- Increased demand on services for socially and economically disadvantaged people.

Comments recorded during the ASIA consultation illustrate the concern around the potential population impacts. These included:

- *More violence and theft in the town because of more new people. (Beagle Bay, September 2009)*
- *Not enough fuel and accommodation or infrastructure on the Peninsula to cope – pressure on community resources. (Djarindjin, October 2009)*
- *We need assistance up here with rangers to be ready for the influx of people. We don't have services, public toilets for influx of people. (Lombadina, December 2009)*
- *You don't know people in your town anymore, so many new faces. (Yawuru, September 2009)*
- *People just come up here to make dollars with an attitude and lack of understanding. It will be subtle, if you have been sheltered like most of us have up here from the workplace racism. (Beagle Bay, December 2009)*

The population of the Kimberley and the Shire of Broome in particular has been growing considerably faster than the State. Even without the Precinct development, this is projected to continue into the future. The population projections undertaken for the broader DSD SIA project the natural population growth* in the base population within the Shire of Broome over the next 30 years, to increase by 84% from 17,100 people in 2011 to 31,400 people in 2041. This predicted increase is independent of any direct or indirect population increase attributable to the development and operation of the BLNG Precinct.

The baseline Indigenous population has the following characteristics:

- The large proportion of Indigenous people in the Kimberley region (approximately 42% compared with a State wide average of about 3%);
- The small scale of the Indigenous population (a total of some 4,200 people) relative to the size of the construction workforce for the LNG Precinct;
- The young age of the Indigenous population, with 51% of the Broome population (**Table 3-2**) and 57% of the Dampier Peninsula population (**Table 3-3**) below 24 years of age. This compares with the equivalent figure of about 30% for the non-Indigenous population of Broome, and 38% for the population of Western Australia as a whole;
- The continued growth trends are well above the State average even without the BLNG development with a very significant increase in the Indigenous population over 55 years of age within 10 years (**Table 3-4**);
- Impacts caused by the presence of significantly different population groups accessing the Dampier Peninsula may impact on the regional identity and sense of place of people living on the Peninsula.

* The phrase 'natural population growth' refers to the projected population increase of an area which is derived from the number of births, deaths and migration in and out of the area.

■ **Table 3-2 Estimated Resident Indigenous Population, Broome, 2006, by Age and Gender.**

Age	Males	Females	Total	Percent of total	Cumulative percent
0-4	150	147	297	9.5	9.5
5-9	173	173	346	11.1	20.6
10-14	169	154	323	10.3	30.9
15-19	169	136	305	9.8	40.7
20-24	177	141	318	10.2	50.9
25-29	135	145	280	9.0	59.8
30-34	125	88	213	6.8	66.7
35-39	122	105	227	7.3	73.9
40-44	102	105	207	6.6	80.6
45-49	99	124	223	7.1	87.7
50-54	81	58	139	4.5	92.1
55-59	38	53	91	2.9	95.1
60-64	32	26	58	1.9	96.9
65 +	32	64	96	3.1	100.0
Total	1604	1519	3123	100.0	

Source: ABS, 2007 and 2008b.

■ **Table 3-3 Estimated Resident Indigenous Population, Dampier Peninsula, 2006, by Age and Gender.**

Age	Males	Females	Total	Percent of total	Cumulative percent
0-4	75	77	152	14.0	14.0
5-9	74	68	142	13.0	27.0
10-14	62	50	112	10.3	37.3
15-19	64	37	101	9.3	46.6
20-24	48	67	116	10.7	57.3
25-29	49	52	102	9.4	66.6
30-34	44	34	78	7.2	73.8
35-39	43	31	74	6.8	80.6
40-44	26	30	56	5.1	85.7
45-49	23	16	39	3.6	89.3
50-54	15	19	35	3.2	92.5
55-59	8	8	15	1.4	93.9
60-64	13	11	24	2.2	96.1
65 +	21	23	44	4.0	100.0
Total	567	523	1089	100.0	

Source: ABS, 2007 and 2008b.

Note: Rounding up or down may cause slight discrepancies in totals in this and the following tables.

■ **Table 3-4 Indigenous Population Projections Broome SLA 2006 – 2021.**

Age	2006	2011	2016	2021	% increase between 2006-2021
0-4	507	625	665	707	39.45
5-9	561	504	621	661	17.83
10-14	498	560	504	620	24.50
15-19	460	498	559	503	9.35
20-24	479	457	495	556	16.08
25-29	443	475	453	489	10.38
30-34	338	438	469	447	32.35
35-39	334	331	430	460	37.72
40-44	291	326	323	419	43.99
45-49	293	281	313	311	6.14
50-54	193	279	267	298	54.40
55-59	112	181	262	250	123.21
60-64	82	103	165	240	192.68
65 +	159	190	232	317	99.37
Total	4750	5248	5758	6278	32.17

Source: ABS, 2007.

Mitigation and Management Measures – Increased Population

The managed access management measure (**Part 5, Section 5**) is a condition of all commercial proponents locating at the Precinct. This would avoid many of the population impacts during construction. The population modelling undertaken for the DSDSIA captures the direct and indirect workforce that would potentially choose to live in Broome. Given that all construction workers would be required to live in a Managed Access Construction Camp out of Broome, the population modelling predicts that the population growth on Broome due to the BLNG Precinct would be modest relative to the projected natural growth in population.

Given that many social services and facilities within the Shire are currently experiencing significant demands on resources and are vulnerable to any increase in demand, attention will need to be given to the provision of services and facilities within the Shire of Broome in order to support the natural population increase over the next 30 years. The West Kimberley Social Services Strategy aims to co-ordinate and improve the provision of social services, particularly in Broome and the Dampier Peninsula.

3.4.4.3. Housing and the Cost of Living

Housing and cost of living were key issues and concerns identified during consultation undertaken for the ASIA. Throughout the consultation process, there was strong concern that the proposed BLNG Precinct or other major developments may have a significant impact on the cost of living, including the cost of housing, and on the availability of affordable housing, especially in Broome where there is already a critical housing shortage, and a high rate of homelessness.

Both Indigenous participants and agencies involved in the ASIA consultation process believe that the cost of living, including the cost of daily necessities, food, fuel and utilities, could rise along with house and rental prices should the population in Broome increase because of the BLNG Precinct.

Because of their dependence on Broome for supplies, the ASIA identified that if this occurred it would impact on residents of the Dampier Peninsula who are already paying high prices for day-to-day necessities, forcing them to rely even more heavily on food resources from the sea. This illustrates the independence of social and environmental issues and the concern of Indigenous participants around precinct-related marine impacts.

The key potential housing and cost of living impacts identified in the ASIA were associated with potential increase in demand for housing by the Precinct workforce with associated increases in housing and rental costs and the higher disposable incomes raising the cost of living. These impacts are:

- Increased housing and rental costs due to increase in demand from BLNG Precinct workforce;
- Delays to upgrading housing due to lack of skilled tradespersons now at the BLNG Precinct;
- Exacerbation of difficulties experienced by agencies in retaining staff (due to accommodation costs);
- Increased pressures on temporary accommodation for Indigenous people visiting Broome;
- Increased homelessness due to lack of affordable housing; and
- Increased cost of living (including for daily necessities).

Comments recorded during the ASIA consultation illustrate the concern around the potential impacts. These included:

- *That [the LNG Precinct] is going to add a lot of pressure on housing issues already now, how is that going to impact on housing and homeless people now? And on tourists, finding the accommodation, they will go out to other areas. (Beagle Bay, December 2009)*
- *Only people who can afford to buy a house are mining company. I can't afford to buy land or a house here even though I was born here so I may have to move. (Yawuru man, November 2009)*
- *Need more hostels in Broome for people coming from the communities and outstations. (Lombadina, October 2009)*
- *Some of the people are on outstations in substandard houses. We have been told at the Centre that there is a lot of money there with the Commonwealth Government - so where are the houses? (CDEP Manager, Djarindjin December 2009)*
- *Lack of affordable housing is already a serious issue that impacts on agency's ability to find clients suitable accommodation and impacts on agency to retain staff. (Burdekin Youth in Action, September 2009)*

The ASIA's community profiles of the Dampier Peninsula communities illustrate the significant issues around the shortage of housing and the condition of the existing housing stock. Each community profile documents the current housing status and planned new houses and upgrades.

These identified impacts were based upon findings that included:

- Indigenous households' reliance on public housing that is both undersupplied and of relatively poor quality. Access to public housing is a particular concern identified by the ASIA. There are long wait times for public housing and access is means tested without due regard for regional costs of living.
- The cost of living in the region is markedly high. The 2007 Regional Price Index for the Kimberley (produced by the WA Department of Local Government and Regional Development) indicated that prices for a basket of goods were 16.9% more expensive than in Perth. Broome was found to have 17.2% higher prices than Perth.

- In the Kimberley region as a whole, the median weekly individual income in 2006 was \$456, which is approximately 90% of that of the Western Australian population as a whole (\$500). A significant difference exists between Indigenous and non-Indigenous incomes: that of Indigenous people (\$224) is only 30% of that of non-Indigenous people of the Kimberley (\$725). This disparity is pronounced because Indigenous incomes are relatively low compared to Indigenous incomes in the State (\$254) and non-Indigenous incomes are relatively high compared to the non-Indigenous population in the whole of Western Australia (\$507 per week).
- In Urban Broome the median individual income, overall was \$628 per week which is more than one third higher than in the Kimberley region as a whole. However, the difference between Indigenous and non-Indigenous incomes is reduced. Indigenous incomes are about 50% of non-Indigenous incomes. Indigenous incomes (\$325) are substantially higher than the Kimberley Indigenous population as a whole, and non-Indigenous incomes (\$696) are relatively low. Relatively low non-Indigenous incomes are explained by the under-representation of mining industry workers resident in Broome compared to other places in the Kimberley and the overrepresentation of tourist-related employment in accommodation and food services, and retail.
- **Table 3-5** provides information on average weekly incomes, and shows that in each labour force status category, Indigenous residents, and especially those of the Dampier peninsula, earn incomes that are much lower than those of Broome non-Indigenous residents. For the employed, Broome Indigenous residents earn only 69%, and Dampier Peninsula Indigenous residents only 31% of the average income of Broome non-Indigenous residents. The latter figure reflects, in large part, the fact that a high proportion of Indigenous Dampier Peninsula residents were employed through CDEP.

■ **Table 3-5 Median Weekly Incomes by Labour Force Status, Broome and Dampier Peninsula, 2006.**

Labour force status	Broome Non-Indigenous (\$)	Broome Indigenous (\$)	Dampier Peninsula Indigenous (\$)
Employed	942.60	653.6	292.6
NILF	320.9	237.8	197.3
Unemployed	385.4	218.2	66.5

Source: ABS, 2007 (NILF – not in labour force).

- A similar discrepancy exists between the incomes of Broome Indigenous and non-Indigenous residents who are not in the labour force or unemployed, though in these cases the difference between Broome and Dampier Peninsula Indigenous residents is much less marked, reflecting the fact that rates for pensioners and other recipients of social security payments are equivalent regardless of place of residence.
- The significance of these relative income figures is greatly increased by the fact that Indigenous people in the West Kimberley tend to have much higher childhood dependency ratios than do non-Indigenous residents. This ratio describes the number of children in the population (aged 0 – 14 years) per member of the working-age population. Taylor reports that the ratio for the Indigenous population of the West Kimberley is 2.33 times that for the non-Indigenous population (Taylor, 2006; pp.40- 41). Thus Indigenous people must, relatively speaking, support many more children on incomes that are much lower than those of non-Indigenous residents.
- Information collected by the ASIA highlights the fact that the current housing situation for Indigenous and non-Indigenous people in Broome and the Dampier Peninsula is inequitable. This is mainly due to the disparity in income between the two groups, the limited availability of public housing and the absence of emergency or short-term accommodation, housing allocation policies, and lack of secure land title. On the last point, home ownership on the Dampier Peninsula is generally unattainable due to land tenure issues associated with ALT lands. Because of limited financial collateral and level of income, private sector rentals and home ownership are not options for many Indigenous people in Broome.
- There is a high level of reliance of Indigenous households on public rental accommodation, with 72% of Broome households and 84% of Dampier Peninsula households living in rented accommodation, compared to 46% for non-Indigenous households (**Table 3-6**). The latter figure is itself significantly higher than the average for Western Australia, which is 27% (DSD, 2009b; p.75; **Appendix D-2**). Conversely, rates of home ownership are significantly lower for Indigenous households, with 21% of Broome households and 3% of Dampier Peninsula households living in houses that are fully owned or being purchased, compared to 47% for Broome non-Indigenous households, and to 69% for Western Australia as a whole (DSD, 2009b; p.75; **Appendix D-2**).

■ **Table 3-6 Tenure Type, Indigenous and Non-Indigenous Households, Broome and the Dampier Peninsula, 2006.**

Broome	Indigenous Households (percentage)	Other Households (percentage)
Fully owned	10.78	20.86
Being purchased	10.62	26.26
Being rented	72.39	45.75
Other tenure type	4.41	5.11
Not stated	1.80	2.01
Dampier Peninsula	Indigenous Households (percentage)	Other Households (percentage)
Fully owned	2.88	43.02
Being purchased	0.00	3.49
Being rented	83.65	13.95
Other tenure type	12.02	36.05
Not stated	1.44	3.49

Source: ABS, 2007.

- Indigenous households rely in particular on public housing provision, for instance with only 11% of Indigenous households renting from a real estate agent in Broome Shire, compared to more than one third of non-Indigenous households. The supply of public housing is seriously inadequate, as indicated by the fact that the number of Indigenous households on the waiting list for state-owned and managed Indigenous housing in 2007 in the Broome and Derby-West Kimberley housing zones was 44% higher than the number of households already in such housing (Taylor, 2008; pp. 18-19).
- The Census data indicates that average occupancy of Broome Indigenous households is 3.5 persons, or 1.4 times that of Broome non-Indigenous households, while average occupancy of Dampier Peninsula households is 3.9 persons, or 2.8 times higher than the non-Indigenous rate (**Table 3.7**). However elsewhere Taylor, using derived estimates of Indigenous populations, indicates that the Census data may seriously underestimate occupancy rates, and estimates rates of 5.4 persons for Indigenous households in Broome, 8.2 persons for Djarindjin/Lombadina and 9.0 persons for Beagle Bay (Taylor 2008, p.10). The occurrence of such high occupancy rates is also supported by an Environmental Needs Survey undertaken in 2004, which found rates of between 7.3 and 10.3 persons in Dampier Peninsula communities (Department of Planning and Infrastructure, 2009; pp.10-11).

■ **Table 3-7 Average Occupancy Rate per Indigenous and Non-Indigenous Households, Broome and the Dampier Peninsula.**

Broome	Occupancy Rate Census Data	Occupancy Rate Estimated Resident Population
Indigenous household	3.50	4.67
Non-Indigenous household	2.54	3.13
Dampier Peninsula	Occupancy Rate Census Data	Occupancy Rate Estimated Resident Population
Indigenous household	3.90	5.21
Non-Indigenous household	1.40	1.91

Source: ABS, 2007.

- Taylor also emphasises that a high proportion of Indigenous housing stock is of low quality. For instance he cites data from the 2006 Community Housing and Infrastructure Needs Survey that identifies the proportion of dwellings requiring major repair or replacement. This indicates that housing in some of the Dampier Peninsula communities is in very poor condition, with 70.4% of houses in Bardi Jawi and 98.1% of houses in Beagle Bay falling into this category. Across the Broome region as a whole, 45% of the housing stock fell into this category (Taylor, 2008; pp. 13-14).

- The Census data does not provide information on rates of homelessness among Indigenous people at the small area scale. However for Western Australia as a whole the Indigenous homeless rate was almost three times the non-Indigenous rate (Taylor, 2008; p.16).
- The rental for public housing is charged at a minimum 25% of the tenant's weekly household income and up to the maximum rate set for the size of dwelling, and is means tested. This is a state-wide policy which does not take into account the differences in cost of living between various towns and regions in Western Australia. There is anecdotal evidence that long-term tenants have been required to vacate the dwelling because their weekly income has increased. Such action does not encourage the tenant's attempt at economic advancement especially if there is no alternative affordable accommodation available.
- An Indigenous person's loss of access to public housing is particularly serious given that their household is likely to hold considerably more people than a non-Indigenous household. Often the Indigenous household consists of the immediate family plus relatives who are in Broome for various reasons, for example, haemodialysis, or to give support to relatives in hospital or jail, but are unable to access temporary accommodation such as a hostel.
- The waiting time for public housing is very long, varying between 6 months to 7 years depending on size of dwelling and location. According to DHWA (Broome, November 2009; pers. comm.) 'the average waiting times have increased due to demand, with a total of 124 applications received for Broome and 43 for Derby in 2009.'
- There is no emergency or temporary accommodation currently available in Broome and hostel accommodation is seriously limited. There are only two hostels: Broome Hostel for renal dialysis patients which is full; and Milliya Rumurra Hostel for substance abuse rehabilitation. As a result, Indigenous visitors to Broome either have to stay with relatives, or live in insecure housing, or live rough, in the sand dunes for example. The Broome Residents Homelessness and Overcrowding Survey Report (Strain, 2008) concluded that homelessness is rising rapidly, and that there may be up to 2,500 homeless (primarily Indigenous) people in Broome. When the ASIA was conducted there was no temporary housing in Broome although the Shire is developing an Indigenous Visitors Centre
- Student accommodation in Broome is limited to student houses at Notre Dame University and the Broome Residential College, which provides boarding facilities for secondary school students attending either Broome Senior Secondary School (42 student quota) or St Mary's Catholic Secondary School (30 student quota). The Broome Residential College, which is jointly funded by Catholic Education (40%) and Western Australian Education Department (60%), has limited capacity (72 beds) and a 12-month waiting list with the exception of young people at risk, who are under the care of the Western Australian Department of Child Protection and considered top priority. The majority of the students, who are Indigenous, are on Abstudy, and it is their first time away from home. There are plans to double Broome Residential College's capacity.

Mitigation and Management Measures – Housing and Cost of Living

- The Precinct-related housing impacts are likely to be felt primarily in Broome and **Part 5, Section 5** contains details of the management measures that aim to avoid the Precinct's population impacts. These include the Managed Access Construction Camp, the Local Living Strategy to restrict workers living locally and the Transient Workforce Management Strategy to manage those opportunistic workers that do arrive in search of work.
- **Part 5, Section 5** also contains details of the Precinct-level Housing Management Strategy. This strategy has the objective of ensuring the timely delivery of appropriate land and housing requirements for Broome in order to meet projected population increases, including those associated with Precinct requirements. The strategy is also intended to address short-term accommodation deficits, affordable housing, social housing and homelessness issues. Commercial proponents are also, under the "Retain Local Benefits" management strategy, required to monitor local indicators of economic development such as cost of living, employment and business development. The Remote Communities Housing National Partnerships Agreement already prioritises Dampier Peninsula in excess of \$110 m (2009-2014) committed to new builds and refurbishments. The Homelessness National Partnerships agreement provides funding for hostels and one is under consideration for Broome.
- The HoA identifies further funding for housing and home ownership of an additional \$30 million into the Indigenous Housing Fund during the life of the agreement. The HoA also provides funding for the development of Indigenous enterprise which, should the TO's decide, could be used to support the development of an Indigenous housing development business.

3.4.4.4. Economic, Employment and Enterprise Development

Concerns around potential Indigenous jobs and business opportunities emerged from the ASIA consultation. While it is often assumed that a major development like the LNG Precinct would create a plethora of jobs and business opportunities, many ASIA participants felt that local Indigenous people may be excluded from these opportunities. These concerns are based on the following factors, as reported in the ASIA:

- Most of the jobs generated by development of the LNG Precinct require people with specific qualifications and specialist skills, which few Indigenous people in Broome and the Peninsula possess.
 - *You have to have a certificate for any job now. (Lombadina, December 2009)*
 - *Up in this area, blackfellas are no better off, because they only one certificate available. (Beagle Bay, December 2009)*
- People are not convinced that the LNG Precinct operator or its contractors would practice affirmative action to give local Indigenous people priority, but instead would deploy personnel from other projects or use their preferred contractors to work at the site on a FIFO basis, as has occurred in the Pilbara and mining sites elsewhere. Indigenous people strongly expressed the view that local people should be given priority, and that a concerted effort be made to skill up local Indigenous people.
- Companies would bring in their own or preferred contractors and supplies which would have an impact on local businesses.
 - *Because it is such a big project, they will engage the big companies, not the little ones, the small Indigenous family businesses like plumber. At the end of the day, they will engage non-Indigenous businesses that have Indigenous people working for them. That is not the same, the money goes to non-Indigenous. (Beagle Bay, December 2009).*

Further concerns cited by ASIA participants include:

- Education and skills deficits that cannot be overcome in the short term and form a barrier to many Indigenous people benefiting from the Precinct development. Some ASIA participants reported that while they had significant site development and construction experience, they did not have the necessary certificates.
- The negative community experiences of people moving from low incomes (CDEP) to the higher resource industry wages without the skills to manage that income.
 - *Socially it is bad, because these boys go down there [Pilbara] and come back on their week off and piss it up all over the place, [get drunk] and have nothing to show for it. Basically most of them had just lived off CDEP or through their wives and their pensions and they go away, earn big dollars for that week... They have insecurity, so they come back and they get messed up. The three there have nice cars but they have huge debts, if they miss three shifts how will they pay for it? (Lombadina, December 2009).*
- The higher wages at the LNG Precinct would attract Indigenous people with valuable skills from the communities.
 - *We work hard to get the business going and then hand it the kids, who may leave being attracted to the precinct to work for big dollars (Owner of an Indigenous eco-tourism venture, Beagle Bay, December 2009).*
- Limitations imposed by inadequate transport and child-care arrangements.

Like the rest of the Kimberley, the majority of Indigenous people that live in communities and outstations on the Peninsula have relied on CDEP as their major source of employment and income for several years. CDEP ceased in towns in July 2009, while CDEP programs in remote communities will cease in 2011, with the assumption that current CDEP workers will by then be actively engaged in training and alternative employment or receive welfare payments.

In relation to Indigenous enterprise development, a number of participants noted the difficulty for Indigenous people in accessing financial assistance to set up or expand enterprises. The majority of Indigenous people living on the Peninsula rely on CDEP payments for income, and do not have security of tenure, with the result that they are not eligible to get loans.

- *We can't even get money, not from the banks, we can't get a credit rating because we are on CDEP which is work for the dole basically...It is the young generation, not us, how are they going to get funding for anything? (One Arm Point, December 2009).*

Moreover, most of the existing but fledgling enterprises such as the eco-tourism enterprises were set up as CDEP programs, and people running them are dependent on CDEP payments to supplement their income. This is especially so in the wet season, when business is slow.

The key potential impacts identified in the ASIA were:

- Increased employment and business opportunities but deficits in the education and skills needed to take up these opportunities;
- Benefits to existing Indigenous enterprises in Broome and the Peninsula; and
- Loss of skilled Indigenous people from communities to BLNG.

In terms of economic impacts, overall the Precinct is likely to have a positive impact. However, the ASIA concluded that any employment benefits to be experienced by Indigenous people were likely to be tempered pre-existing factors such as an inadequate skills base, lack of transport and child care facilities and lack of preparedness for work through CDEP programs.

These identified impacts were based upon findings that included:

- Key informants from education and training agencies who indicated the BLNG Precinct could increase employment and business opportunities although there could also potentially be a loss of skilled Indigenous people from communities to the BLNG precinct.
- The Kimberley region is presently (directly and indirectly) responsible for about 1.52% of the State's raw GSP in 2006/07, about 2% of the State's employment in 2005/06 (figures for 2006/07 not available) and about 1.6% of the State's export income in 2006/07.
- In 2006/07, in current prices terms the gross regional product for the Kimberley was estimated at \$1.7 billion (DLGRD, 2007). A simple summation (and modelling) conducted by the West Australian Department of State Development recorded that the region yields a gross value of production of around \$2.6 billion for 2006/07, meaning only 60% of the income benefits derived from production are retained in the region (GRP/gross value of production). This outcome, in part, is the result of fly-in-fly-out arrangements operating in the region's mining industry, and may be relevant for the performance of the region if large scale fly-in-fly-out arrangements apply to the region's future LNG industry.
- The employment rate of Broome Indigenous residents is only slightly more than half that of non-Indigenous residents, at 45%. That for Dampier Peninsula Indigenous residents is significantly higher at 61.5%, while their unemployment rate is only 2.44%, about a third that of Broome Indigenous residents. This situation largely reflects the major role of CDEP in Indigenous communities on the Peninsula at the time of the 2006 Census; CDEP was not nearly as significant in Broome. CDEP is of course now being phased out in the communities. In this context it should be noted that, if CDEP participants were counted as unemployed, it is estimated that the Indigenous unemployment rate would be 19.8% in urban Broome and 85.6% in the Dampier Peninsula communities (DSD, 2009b; p.91; **Appendix D -2**). Highlighting the significance of this point is the fact, mentioned above, that in December 2009, 142 job seekers were registered with one employment service agency in One Arm Point, Djarindjin and Lombadina.

- Fewer Indigenous residents fill skilled occupations such as managers, professionals and technical and trades workers. This is particularly so in the Dampier Peninsula, where these categories account for less than 10 % of those employed, compared to about 53% of Broome non-Indigenous residents and 38 % of Broome Indigenous residents. Conversely, the category 'labourers' accounts for just over two thirds of employment among Dampier Peninsula Indigenous residents, compared to only 10 % of Broome non-Indigenous residents and 16% of Indigenous residents. The high proportion of Broome Indigenous residents in the 'community and personal services workers' category is explained by the substantial level of government employment among Broome Indigenous residents
- If the region's small manufacturing and construction base successfully contracts for supply of Precinct goods and services, flow-on benefits would include both an increase in business income and the capacity of local businesses to deal with large clients and projects. This could lead to further productivity gains in the area (and expand its capacity even beyond LNG contracting).
- Indigenous businesses would have potential to gain through the development of the BLNG Precinct. Measures to ensure the participation of Indigenous business in the Precinct's activities are presently the subject of the native title agreement negotiations with Traditional Owners. However, in order to realise and capitalise upon this benefit, there will need to be considerable examination of barriers to indigenous employability in the impact areas.
- It is likely that new employment opportunities with Broome-based contractors (for example laundry, catering, transport and tradesmen) may generate an expanded customer base for the region's non-Precinct related businesses (such as retail and hospitality).

Mitigation and Management Measures – Employment and Enterprise Development

- The Precinct-level SIA Strategic Management Plan recognises the key role of education and skills development in enabling local Indigenous people to be able to take advantage of the opportunities presented by the LNG Precinct. **Part 5, Section 5** contains a number of relevant management strategies. These include:
 - An Education, Training and Employment Strategy: to maximise education, training and employment opportunities for the local community and ensure a coordinated approach to the range of education, training and employment strategies implemented to support the development of the LNG Precinct.
 - An Indigenous Workforce Development Strategy: to ensure a coordinated approach to the range of Indigenous education, training and employment strategies; develop and implement a strategy to increase the number of Indigenous workers on the project; develop or link to existing programs to assist Indigenous people to overcome barriers to education, training and employment; provide opportunities for Indigenous people to work on cultural and environmental values relevant to precinct operation; and, develop appropriate workforce arrangements and that includes support for Indigenous workers.
- Measures to mitigate and manage impacts on employment and enterprise development opportunities for Indigenous people will be provided for in the ILUA or other land agreement negotiated with the Traditional Owners, the framework for which has been agreed in the HoA.

3.4.4.5. Education and Training

The issue of education and training was seen by ASIA participants as critical in shaping the impacts of the LNG Precinct, in particular whether Indigenous people would be able to share in the benefits created by employment opportunities, or whether these opportunities would flow largely to non-Indigenous people and outsiders, increasing existing social and economic inequalities. Poor levels of literacy and numeracy are seen as a major constraint for some Indigenous people, especially the youth, preventing them from actively engaging in meaningful employment and other opportunities.

During the ASIA consultation process participants raised a number of issues with regard to education and training including the limited quality and range of current VET programs; the limited secondary education programs available, especially in schools on the Peninsula; insufficient student accommodation available in Broome and problems with student literacy and numeracy. Comments recorded during the ASIA consultation include:

- *TAFE is a bad example of government delivering training services. Up in this area, blackfellas are no better off, because they only have one certificate available, TAFE, and they aren't doing the stuff in which people want training* (Beagle Bay December 2009).
- *We need a secondary school on the Peninsula.* (One Arm Point, September 2009).
- *What it comes down to, we need to start from the bottom and go up with literacy and numeracy.* (Beagle Bay, September 2009).

The smaller locally-based RTOs in Broome such as Djaringo and KGT were considered exceptions, because their method of delivery incorporates the learning styles preferred by Indigenous people and they are committed to meet the needs of their Indigenous clients.

The key potential impacts identified in the ASIA were:

- Loss of skilled trainers to BLNG industry;
- Fewer places available at secondary school in Broome for students from communities;
- Education and training opportunities including additional schools and trade training centres;
- Expansion of curricula available at secondary schools in Broome;
- Future employment opportunities for children.

These impacts identified in the ASIA were based upon findings that included:

- Indigenous people in Broome, and more particularly in the Dampier Peninsula, have low levels of school education, a point highlighted by the comparison with Broome's non-Indigenous population. Only 26% of Indigenous residents of Broome, and 18% of Indigenous residents of the Dampier Peninsula, have completed Year 12, in comparison with nearly 50% of Broome's non-Indigenous residents, and over 41% for Western Australia as a whole (DSD, 2009b; p.75; **Appendix D-2**). Such low levels of school education are likely to disadvantage Indigenous people affected by the BLNG Precinct comparative to the rest of the population if they wish to take advantage of the training and employment opportunities it would generate.
- It is by no means certain that this picture will change in the near future, as school enrolments across the West Kimberley region still appear to tail off rapidly after the age of 15 years. Taylor (2006, p.84, p.86) reports that retention rates in Years 10 – 12 among Broome Indigenous students, for instance, reached only 33% in 2005, compared to 57% for Broome non-Indigenous students and 71% for Western Australian non-Indigenous students as a whole.
- Research undertaken for the ASIA does indicate a recent improvement in retention rates in at least some cases. For example, the Broome Senior High School report (Department of Education Western Australia, 2010) states that '14 Aboriginal students completed Year 12 which equates to a 64% completion rate from Year 8 to Year 12. Of these, 11 graduated [which is] a rate of 78.5% ... considered very high for Indigenous students'. The report attributes the improved retention rate to the establishment of Broome Residential College in 2007 to provide safe student accommodation and the expansion in programs that creates a high level of interest among Indigenous students.

- Programs for Indigenous children such as the Football Academy and the Jija Basketball Program (for girls), the Follow My Dream Program, and TAFE apprenticeships and traineeships have also made a positive impact on attendance, student behaviour and performance. According to the Principal of Broome High School (November 2009), the retention rate among the 44 Indigenous Year 11 students was 100%. He predicts that 35 or more will graduate from Year 12 in 2010.
- Those Indigenous students who are enrolled in school tend to have relatively low attendance rates. Taylor reports that in 2005 Broome Indigenous students had attendance rates of 83% (primary) and 70% (secondary), compared to 94% (primary) and 92% (secondary) for Broome non-Indigenous students (Taylor, 2006, p.86).
- The ASIA sought to compile more recent and detailed data on school attendance. However it is difficult to differentiate between Indigenous and non-Indigenous students as both the State's 'Schools Online' figures (Department of Education Western Australia, 2010) and the Commonwealth's recently established My School website (ACARA, 2010) aggregate Indigenous and non-Indigenous attendance. However, it can be assumed from the figures that are available on overall attendance and on the ratio of Indigenous to non-Indigenous students that Indigenous attendance rates are relatively low.
- There are two secondary schools and four primary schools in Broome, and three community schools on the Peninsula that cater for both levels, but enrol predominantly primary school students. In semester two, 2009, a total of 2728 students were enrolled in schools in Broome (2425) and on the Dampier Peninsula (303), of which approximately 44% were Indigenous. During that period, 932 Indigenous students (616 primary and 316 secondary) were enrolled in school in Broome and 284 on the Dampier Peninsula (242 primary and 42 secondary). On the Dampier Peninsula secondary classes only include Years 8 – 11.
- Currently the options available for Indigenous students in Broome and the Dampier Peninsula who wish to pursue tertiary education and vocational training in Broome or locally are:
 - Notre Dame University – Broome Campus (Catholic Education);
 - Kimberley TAFE (WA Department of Education) – Broome Campus; and
 - Registered Training Organisations (RTOs) based in Broome.
- VET courses are the most popular courses pursued by Indigenous people. This is because the completion of Year 12 is not a prerequisite. Also, they are shorter, practical and more closely related to jobs in the community and, very importantly, can often be taught in the community. At present the majority of the VET courses available (mainly Certificate I and II levels) reflect the type of industries that are operating in the region and the types of jobs currently available. Furthermore, due to the gradual cessation of the Community Development Employment Program and the current policy of 'no work no pay' and 'no training no Centrelink payments', former CDEP workers are required to make some attempt to prepare for employment or some other income generating activity or enterprise by engaging in training. For example, in December 2009 142 job seekers were registered with Kullari Employment Services (KES) in One Arm Point, Djarindjin and Lombadina.
- Training organisations are responding to this demand and have attempted to broaden the range of courses they deliver that focus on the local employment market. According to Kimberley TAFE (2008, p.8), in 2008, there was 'a significant increase in the commercial delivery of programs to remote communities in the West Kimberley, as a direct result of the changes in CDEP funding.
- Almost 84% of Broome Indigenous residents, and 91% of Dampier Peninsula Indigenous residents, had no post-school qualifications, compared to 56% of Broome non-Indigenous residents. Conversely, 14.5% of Broome non-Indigenous residents had achieved bachelor degree level or above, compared to only 2.6% of Broome Indigenous residents and 0.65% of Dampier Peninsula Indigenous residents.
- Evidence from key informants to the ASIA, who were from education and training agencies, indicated the BLNG Precinct could potentially facilitate the provision of additional schools and trade training centres; scholarships and sponsorships; and a range of training programs that are more directly work related. Key informants also believed that secondary schools in Broome would be able to offer a wide curricula due to larger student numbers associated with the LNG workforce.
- Key informants to the ASIA also indicated that while the availability and retention of suitably qualified skilled trainers was currently an issue, there was also concern that skilled trainers would be attracted through higher wages to the BLNG Precinct which would further limited the availability of trainers in Broome and the Kimberley.

Mitigation and Management Measures – Education and Training

- The Precinct-level Strategic Management Plan recognises the key role of education and training development in enabling local Indigenous people to be able to take advantage of the opportunities presented by the BLNG Precinct. **Part 5, Section 5** contains a number of relevant management strategies. These include:
 - An Education, Training and Employment Strategy: to maximise education, training and employment opportunities for the local community and ensure a coordinated approach to the range of education, training and employment strategies implemented to support the development of the LNG Precinct.
 - An Indigenous Workforce Development Strategy: to ensure a coordinated approach to the range of Indigenous education, training and employment strategies; develop and implement a strategy to increase the number of Indigenous workers on the project; develop or link to existing programs to assist Indigenous people to overcome barriers to education, training and employment; provide opportunities for Indigenous people to work on cultural and environmental values relevant to precinct operation; and, develop appropriate workforce arrangements and that includes support for Indigenous workers.
- Measures to maximise opportunities for education and training for Indigenous people will be provided for in the ILUA or other land agreement negotiated with the Traditional Owners, the framework for which is provided in the HoA.
- The development of education, training and employment strategies for Traditional Owner groups is part of the aforementioned negotiations. The suggested strategies should build on and further develop these initiatives for the region.
- The education National Partnership Agreement is providing major investments in the Kimberley that address these recommendations including: the student hostel in Broome; school trades centres; and literacy and numeracy programs.
- Education, employment and training projects are being developed in an integrated “whole of life cycle” or productivity framework. In key areas, for example trade training, projects are being developed to ensure there is an articulated or dovetail approach between school based trades or vocational training and industry training. These projects are funded, in development or under discussion between the KLC, DEEWR, DSD, DIA and other Australian and West Australian government and other partners. Many other projects are funded, under development or under discussion that impact on the “whole of life cycle, productivity ‘closing the gap’ agendas covering early childhood, education, employment and training outcomes across the Kimberley.
- The HoA provides for an Education Development Fund to support scholarships and training programs upon signing of an ILUA or other land agreement. The state would also be seeking commitments in the form of lump sum and other payments from the proponents over the life of the project for addressing education amongst other issues.

3.4.4.6. Health and Well-being

Participants and the health agencies consulted during the ASIA predict that existing health issues, especially those related to alcohol abuse, may increase and show in patients at increasingly younger ages as a result of the social impacts potentially associated with the BLNG Precinct. These ASIA participants believed the following health issues may be exacerbated if the BLNG Precinct goes ahead:

- Increase in STIs
 - *If it is an issue in Broome it will be on the Peninsula because of transference and possible increase in sexual activities – an issue if any large group coming to town, need screening. Also condoms are not available in some of the communities for religious reasons. (Djarindjin Health Clinic, October 2009)*
- Increase in alcohol and drug abuse in communities on the Peninsula, especially amongst youth. This concern is based on the assumption that the Cape Leveque Road would be sealed and offer easier access, and that increased disposable income due to higher wages earned at the BLNG Precinct would result in higher spending on alcohol and drugs.
- The stress of attending a plethora of meetings, which can be contentious and controversial, which affects the health of Traditional Owners, especially the elderly, some of whom have chronic medical conditions. Their level of stress is exacerbated by the context of the meetings, community and family matters and climatic conditions.
 - *Senior Traditional Owners, Mr A (heart) and Mr B (chronic disease) are constantly stressed due to high demands, constantly fighting their case, juggling home-life and frustrations with the young. (Health Clinic, Lombadina/Djarindjin, October 2009).*
- Increased demand on community clinics due to the growing number of tourists and other visitors to the Peninsula;
 - *Only two nurses here – emergency will be taken up for tourist rather than community. (Djarindjin October 2009)*
- Indigenous people at Beagle Bay were also worried that health hazards, for example, a growing incidence of cancer, could be caused by gas processing and other activities that would be conducted at the LNG Precinct.
 - *We need to know the risks to health. How hazardous is CO2? (Beagle Bay, September 2009)*

The key potential impacts identified in the ASIA were:

- Exacerbation of existing health issues (including alcohol and drug abuse, STIs, demand on community clinics); and
- Health hazards caused by gas processing and other activities conducted at the BLNG Precinct.

These identified impacts were based upon findings that included:

- Key informant interviews with ASIA and health agency participants indicated a concern that health issues associated with increased alcohol and drug abuse, sexually transmitted diseases and health hazards from gas processing and other precinct activities could potentially impact on Indigenous people.
- The scope of the likely health services at the Precinct is unclear, but it is likely that a development the size of the Precinct would have its own primary health care facility. A key issue for the health sector is the attraction and retention of workers during the construction phase given the high salaries paid by the oil and gas industry.
- The health sector in Broome, including all hospital, medical and allied health services, is currently under extreme pressure with a number of services operating well beyond capacity. Even if the BLNG Precinct does not proceed, the exceptional projected increase in population anticipated for the Shire of Broome, unless addressed, will bring significant additional demand for health services. The pressure upon West Kimberley health service delivery is estimated to deepen regardless of any further development proceeding in the region.
- The present indigenous health landscape in the West Kimberley presents significant health issues. While specific data on the health status of the affected Indigenous population is limited, it is clear from more aggregate data that it is poor.

- Systematic baseline data on the health status of Indigenous people in the Area of Impact was not able to be located. The only recent data on Indigenous health are aggregations (based on postcodes or on the former ATSI district of Kullari, neither of which differentiate particular locations such as Broome or the Dampier Peninsula communities); or are for the Kimberley as a whole.
- The challenges in Indigenous health include: mental illness; cardiovascular diseases; metabolic diseases such as diabetes; renal failure; infectious diseases and particularly sexually transmitted infections; poor nutrition; premature and low birth-weight deliveries; and recurring infections and injury (Zubrick *et al.*, 2004 and Atkinson *et al.*, 1999). Among young indigenous people, ear health is a chronic problem which has cascading impacts on education and a number of other factors (Zubrick *et al.*, 2004, 2005 & 2006).
- For example, the ABS estimates the life expectancy of Indigenous Western Australians at 58.5 years for males and 67.2 years for females, compared to 79.1 years for all male Western Australians and 83.8 years for all females. Major causes of premature death are cancer, diseases of the circulatory system, respiratory diseases, endocrine disorders (especially diabetes and renal failure), suicide, injury, and drug-related poisoning.
- Lifestyle factors associated with overcrowded housing, risk behaviours, low incomes and poor nutrition contribute to high morbidity rates (Taylor, 2008; pp.25-30). As Taylor notes, poor health means that 'the chances of full and prolonged Indigenous participation in the workforce and regional economy ... are clearly curtailed' (Taylor, 2008; pp.25). This is highlighted by his estimate that in the West Kimberley 'the number of [Indigenous] diabetics alone in 2006 (to say nothing of other disabling diseases) is somewhat more than the projected number of 1304 in mainstream employment in the same year' (Taylor, 2008; p.33).
- Health issues among Indigenous youth were identified as a key issue (Refer to **Part 5, Section 3.4.4.8**).

Mitigation and Management Measures – Health and Well-being

- The Precinct-level Strategic Management Plan contains a number of measures to avoid, mitigate and manage the potential health impacts from the development of the BLNG Precinct. The key mechanism to avoid many of the potential health impacts of the BLNG is to keep the Precinct workers and the residents of Broome and the Dampier Peninsula separate, apart from organised visits. The relevant management measures (see **Part 5, Section 5**) include:
 - Commercial proponents to develop an Education, Training and Employment Strategy to maximise education, training and employment opportunities for the local community (Precinct condition);
 - Commercial proponents to develop an Indigenous Workforce Development Strategy (Precinct condition);
 - Commercial proponents to operate a managed access construction camp (Precinct condition);
 - Commercial proponents to manage worker access to Broome and the Dampier Peninsula (Precinct condition);
 - Commercial proponents to manage worker behaviour including access to drugs and alcohol and unacceptable employee behaviour when visiting Broome and other areas in the Kimberley (Precinct condition); and
 - Commercial proponents to provide health and emergency services required to service the BLNG Precinct in a manner that does not impact upon the provision of these services in Broome (Precinct condition).
- Measures to mitigate and manage impacts on health and well-being for Indigenous people would be provided for in the ILUA or other land agreement negotiated with the Traditional Owners.

3.4.4.7. Social Concerns Related to Environmental impacts

The Indigenous people living on the Dampier Peninsula rely on marine resources to supplement their incomes. This culturally significant use of food resources from the sea has led to significant concern around the environmental impact of the Precinct development. The key environmental concern raised by ASIA participants related to the potential damage to land, sea and coastline and impact on marine life. Participants were worried that the impacts of blasting and dredging and the dispersal of sediments would not be restricted to the area around James Price Point but would also be experienced further up the Dampier Peninsula due to currents and tidal activity as well as the movement of marine life. Indigenous people on the Peninsula not only rely on marine life for customary purposes, but continue to rely heavily on such food sources to supplement their diet, especially as the majority are low-income earners and the cost of food items in the community stores are high. Comments included:

- *Shop is expensive – we live off the sea we need it. Broome is too far also to go and get stores. (Djarindjin, October 2009)*
- *This turtle is enough to feed the whole family, all thirty of them. (One Arm Point, 3 December 2009)*

Indigenous people follow customary codes, including seasonal patterns of fishing, to ensure the ongoing sustainability of marine stocks:

- *We only catch stingray when it is the right season when they show a patch on their belly like a birthmark and we throw back the female crabs if they are full of eggs. (Jabirr-Jabirr man, December 2009)*

These concerns were exacerbated by the impacts of the Montara oil platform leak and the capture of a turtle, suspected to be contaminated by oil, sometime after the oil spill occurred:

- *Would that oil spill have had that effect on that turtle do you reckon? The young fella who got it said it wasn't the same as the rest. It came this way [from the north where the oil spill occurred] towards here. We couldn't eat it. (One Arm Point, December 2009)*
- *We live off the sea, it [spill] will have effects everywhere. (Djarindjin, December 2009)*

ASIA participants also expressed concern about the impact of the construction workers on marine resources. Anecdotal evidence from the Pilbara and other regions indicates that fishing is a popular pastime for construction workers.

Other environmental concerns included: Precinct waste and water management and the potential impact on groundwater resources on the Peninsula; increased fire risk as a result of increased activity on the Peninsula; and, quarantine issues as a result of contaminated ballast water.

The ASIA participants were emphatic that frequent and stringent monitoring along the coastline of the Dampier Peninsula be undertaken and that communities on the Peninsula must receive regular feedback from monitoring programs during all phases of the Precinct's development. Participants who live on the Peninsula stated that they want to be involved in the environmental management and conservation programs related to the LNG Precinct. The Management Framework in Part 1.11 does provide for the involvement of Traditional Owners in environmental monitoring and management.

Mitigation and Management Measures

Part 3 and **Part 4** provide mitigation and management measures for potential marine and terrestrial impacts respectively. **Part 5, Section 4** contains details on the Precinct-level social management measures, including a requirement that a management plan be developed to ensure the effective mitigation of commercial, recreational and customary fishing, pearling and aquaculture. In response to the concern around construction workers undertaking recreational fishing, the precinct-level management measure "Access to Broome and the Dampier Peninsula" involving a Managed Access Construction Camp, requires that, as a condition of locating at the Precinct, commercial proponents manage construction worker access to recreational fishing. The intention is that construction workers would only be able to fish when participating in organised tours.

3.4.4.8. Youth

Participants and youth groups felt that the LNG Precinct would have serious, negative impacts on youth if they are not actively engaged and in particular given meaningful employment and opportunities. A primary concern amongst key informants to the ASIA was that increased access to higher disposable incomes amongst young people would lead to higher rates of substance abuse and potentially increase the already high rates of youth suicide.

Issues currently affecting youth and identified by participants included the following:

- *Teenagers are always drinking alcohol and smoke ganja because kids have nothing to do. (Beagle Bay, September 2009)*
- *70% school attendance Monday to Thursday down to 40-50% on Fridays - an outcome of pay day. Kids play till late around the school ground where they feel safe. (Principal Beagle Bay School, September 2009)*
- *Recreation is a big issue – need a Rec Officer so in the evenings the kids are occupied e.g. sport, community activities, and help bring kids out on country together. There is no CDEP to fund these activities. (One Arm Point, October 2009)*

Participants and youth service agencies expected the social impacts of the proposed LNG Precinct to lead to higher rates of substance abuse, poor nutrition, and physical, verbal and emotional abuse of young people. Indigenous parents fear that the impact of increased access to disposable income and access to drugs may exacerbate the already high rate of youth suicide. The key potential impacts identified in the ASIA were:

- Higher incomes might increase the rates of substance abuse and other damaging behaviours.
- An opportunity to address entrenched education, training and employment deficits.

These identified impacts were based upon findings that included:

- The ASIA identified youth health issues as a key issue and particularly youth suicide. It identified a significant problem that already exists in this area. Suicide amongst Indigenous youth is not a recent phenomenon, has been documented in a number of reports over the past 20 years, and continues to be a major issue of concern in Broome and communities on the Dampier Peninsula.
- Lack of future direction, dysfunctional and overcrowded home life, poor self esteem due to poor performance at school, lack of commitment by some service providers, marginalisation and insecurity and, in certain cases, the erosion of culture, can all contribute to despondency amongst Indigenous youth. This is reflected for instance in the poor school attendance of secondary school students and anti-social behaviour of some Indigenous youths.

Currently, there are limited employment and recreational activities and few apparent future pathways, following secondary education, for many young people in the communities. Active engagement by Government and commercial proponents with Indigenous people was seen as providing an opportunity to address these issues amongst Indigenous youth.

Mitigation and Management Measures - Youth

The key mitigation and management measures focus on restricting contact between the Precinct workers and the residents of Broome and the Dampier Peninsula. The relevant management measures (see **Part 5, Section 5**) include the requirement for commercial proponents to:

- manage access construction camp (Precinct condition);
- manage worker access to Broome and the Dampier Peninsula (Precinct condition);
- manage worker behaviour including access to drugs and alcohol and unacceptable employee behaviour when visiting Broome and other areas in the Kimberley (Precinct condition);
- provide health and emergency services required to service the BLNG Precinct in a manner that does not impact upon the provision of these services in Broome (Precinct condition);
- develop an Education, Training and Employment Strategy to maximise education, training and employment opportunities for the local community (Precinct condition); and
- develop an Indigenous Workforce Development Strategy (Precinct condition).

3.4.4.9. Social and Cultural Impacts, Community Identity

The ASIA stated that the care for country (both sea and land) and the protection of heritage sites are paramount for Kimberley Traditional Owners. KLC and the State have undertaken heritage and site surveys, to minimise any impact on sites and country at the LNG Precinct site (see **Part 5, Section 3.5. to Section 3.7**).

Other and more general issues raised in the ASIA involved access to land for native title groups; the impact of an influx of tourists venturing wherever they please, and therefore affecting the privacy of Indigenous people to conduct ceremonies and other cultural activities on the Peninsula; and the heritage assessment process. Comments included:

- *A major concern – the level of usage and access and impacts on the specific native title groups to exercise their native title rights in the area around the Precinct. (Yawuru and Beagle Bay, September 2009, and Djarindjin October 2009)*
- *Probably get a lot more people wandering around and getting lost. (Djarindjin December 2009)*

The key potential impacts identified in the ASIA were:

- The influx of high income workers and the presence of significantly different population groups and social mix within the community as a result of the Precinct's presence may also result in social and cultural impacts to Indigenous people.
- The potential for cultural practices such as customary fishing to be limited by the development leading to a breakdown of social structures.
- Fears that the arrival of the Precinct workforce and the associated pressures it would place on the fabric of the community of Broome and the surrounding communities would create an increase or even the inception of particular social problems. Even if this is managed through a Managed Access Construction Camp people remained concerned about the potential for problems.
- Although impacts to demands upon services driven by the Precinct-related population may be small, even marginal increases in the size of the population to Broome would most likely result in a proportionately higher increase of stress upon Broome's community service providers in this area.
- The potential for impacts on the social structures of Indigenous groups and communities. For instance, availability of cash income can reduce the economic importance of access to land, and so the authority of elders who manage that access. Absence of parents due to wage employment, especially where projects operate on a fly-in fly-out basis, can also undermine traditional authority patterns.
- Loss of land or sea country (even if it is limited) can have profound social, cultural and spiritual ramifications, because land and sea and the plants and animals they support occupy a central position in the lives of Indigenous people. Threats to country, whether through destruction caused by development or through environmental degradation associated with it, cause great anguish and fear. This in turn can lead to problems at the individual, family and community level associated with, for example, alcohol abuse, violence, family breakdown, mental illness and suicide.
- The desire to share in the economic benefits of resource development can result in attempts to redefine interests in land and so to reconstitute social formations that are land-based or land-related. This has the potential to create major social tensions and organisational problems over the longer term if not managed carefully.

The additional incomes generated by resource development can also generate positive social and cultural effects. Indigenous access to well-paid jobs can add to individual self-esteem, and to the regard with which employed individuals are held by family and other community members. Wage income can also support maintenance or reinvigoration of traditional hunting and fishing and of cultural activity. Employment rosters that include substantial blocks of leave, for instance FIFO systems based on two weeks at work followed by two weeks leave, can facilitate use of wage income in these ways. Conversely, additional high income generated by resource development if not well managed can have negative social and cultural consequences such as substance abuse, domestic violence, unrealistic expectations, and significant debt.

Mitigation and Management Measures – Social and Cultural Impacts, Community Identity

A number of relevant mitigation and management measures are contained in **Part 5, Section 5**. Measures include:

- The managed access construction camp;
- The management of the impacts of recreational use which will develop management arrangements for recreational activities to address local user and Traditional Owner concerns; and
- The Dampier Peninsula Sense of Place Strategy which intends retaining the identity and sense of places associated with the Dampier Peninsula, including cultural and cultural heritage values.

3.4.4.10. Social Service Delivery and Infrastructure

Participants in all ASIA consultations indicated concern about a perception that governments plan to use the BLNG Precinct as the platform for providing basic public services such as health and education to their communities, so evading government responsibilities to provide these services. People also expressed concerns that withdrawal of government funding in recent times for community support and infrastructure indirectly forces Indigenous people on the Dampier Peninsula to support the LNG Precinct.

- *Are there alternative solutions to improving health, education, employment and housing other than gas? (Beagle Bay, September 2009)*

The key potential impacts identified in the ASIA were:

- increased demand on existing service providers; and
- the potential for improved service delivery and improved infrastructure.

The key finding in respect of social services generally was that, given the strain these services are currently under, the establishment of the BLNG Precinct may have a disproportionately large impact on the delivery of these services. In terms of some impacts, such as the criminal justice system, the establishment of the BLNG Precinct may have a limited direct impact on the services. The identified impacts were based upon findings that included:

- Housing supplies are already overloaded and the impact of people looking for work in Broome may cause further overcrowding, particularly for Indigenous people (see **Part 5, Section 3.4.4.3**).
- The Infrastructure Assessment concluded that the Peak construction phase of the Precinct should have an overall negligible impact on the Broome road network.
- Population increase would cause impacts in Broome. Transport infrastructure in Broome should be sufficient to support this increase. However, depending on the rate at which employees settle in Broome, the staging of the future road network upgrades may have to be adjusted to suit increasing demand.
- Construction traffic volume should have a moderate impact on the road network. An upgrade of part of the Cape Leveque road would be required and a new road from the Cape Leveque Road to James Price Point would need to be constructed. An upgrade of the Cape Leveque road would have both positive and negative impacts. As documented in the ASIA, this would include easier access to outstations and communities with improved service delivery and access to employment opportunities. In contrast, many Indigenous people, as reported in the ASIA, also believed that it would increase visitor numbers which may impact negatively on resources on the Dampier Peninsula and at the same time increase access to drugs and alcohol supplies.
- An increase in port throughput should not have an appreciable impact on total traffic volumes in and around Broome.
- The impact of project infrastructure outside the Precinct area was a cause for concern. In particular, road or track construction can result in a rapid rise in activity by non-Indigenous hunters and fishers.
- Estimates for the West Kimberley as a whole suggest that arrest and incarceration rates for the affected Indigenous population are very high. For instance it is estimated that during 2004, 14% of the estimated Indigenous population over 10 years of age at that time were arrested. Major reasons for arrest were driving and traffic offences (27%); offences against the person (23%); and offences against good order (22%). Some 650 of those arrested were in the prime working age group of 18 – 34, figures that are very substantial when set against numbers in the workforce at equivalent ages (Taylor, 2008; p.36).

Mitigation and Management Measures – Social Service Delivery and Infrastructure

A number of relevant Precinct-level mitigation and management measures are contained in **Part 5, Section 5**. These management measures include:

- The Transport Management Strategy to mitigate and manage the impacts of the Precinct development on transport and traffic, and
- The Housing Strategy.

In addition, measures to mitigate and manage any Precinct impacts on service delivery and infrastructure for Indigenous people will be provided for in the ILUA or other land agreement negotiated with the Traditional Owners.

3.4.4.11. Social Impacts from Internal Conflict Around Gas Development

The proposal to establish a BLNG Precinct has created some disquiet in both the Indigenous and non-Indigenous communities in Broome. Some people, particularly long-term residents of the town, are opposed to the proposed development (KPP, 2009; **Appendix D-5**), and a number of groups (for example, Save the Kimberley and the Wilderness Society), are mounting public campaigns to try and prevent it (Save the Kimberley, 2010). There are also divisions within the Indigenous community and, in discussions with the ASIA Team, Traditional Owners report that there is conflict even within individual families, and talk about the distress this causes them. Graffiti attacking the KLC has appeared around Broome, the KLC has received 'hate mail' and the KLC CEO's vehicle has been vandalised. 'Anti gas' slogans and posters highlighting the conflict over gas development regularly appear around Broome.

Such internal conflict is a major source of social impact, causing stress to individuals and undermining Broome's historical identity as a multi-racial and tolerant community. It threatens to weaken community cohesion and, as a result, to undermine the Broome community's capacity to maximise the potential benefits associated with gas development.

Some participants, while acknowledging that the Traditional Owners of James Price Point would be the most affected by the LNG Precinct, believe that the impacts would extend along the Peninsula and affect them as saltwater people. They fear that they are being overlooked and not listened to by the TONC.

- *Although Traditional Owners make a final decision, will they take into consideration the ideas and concerns of other claim groups and communities on the Peninsula. (Beagle Bay, September 2009)*
- *We provide our concerns, but sometimes it is hard where there is no two-way dialogue happening. I expect that process but we are tired of this, we don't have the opportunity to talk with them, the TONC. (Beagle Bay, December 2009)*

ASIA participants also expressed concerns around the equitable sharing of the benefits packages to all people on the Dampier Peninsula and a concern that the government would not honour the agreement contained in the Heads of Agreement. The report expresses a recurring concern around the delivery of the benefits contained in the Heads of Agreement and other policies and plans such as the development of the Dampier Peninsula Land Use and Infrastructure Plan. This is understandable, given that an ILUA is not yet signed. It remains the State's preferred position that an ILUA be achieved through the good faith negotiations continuing around land access arrangements. If this does not occur, the State's offer as outlined in the HoA remains open if the project proceeds. Woodside has also informed the KLC of its intent to honour its benefits package if the project proceeds.

The ASIA recommends the creation of a new legal entity, a BLNG Precinct Indigenous Social Impact Monitoring and Management Board, to ensure ongoing social impact monitoring and management. An additional institutional layer is not supported by the State Government as the Management Framework in **Part 6, Section 3** contains both the BLNG Precinct Management Committee as well as the Social Management Group which is tasked with implementing the outcomes of the SIA and ASIA.

Although the ASIA captured a number of concerns and perceptions relating to the social conflict around gas development and concerns around the negotiation and strategic assessment process, a number of Indigenous families have embraced the project as a means to provide security for their children's future.

Mitigation and Management Measures – Protection of Indigenous Interests

The Management Framework in **Part 6, Section 3** contains a number of mechanisms to ensure that Indigenous interests are protected. The BLNG Precinct Management Committee will be established under the ILUA or similar mechanism to facilitate the implementation of management plans relating to Environment, Cultural Heritage, Training and Employment, Business Development and Contracting, Land Access and Cross-Cultural Training. The Native Title Parties will play a significant role in this committee.

3.4.5. Potential Opportunities

The ASIA canvasses participant's views on the potential opportunities presented by the development of the BLNG Precinct. Although participants and agencies identified many potential negative impacts from the proposed BLNG Precinct, they recognised that there could also be potential opportunities (short- and long-term) for Indigenous people should the project go ahead. These include:

- participation in environmental management and conservation activities, including participation in monitoring environmental management of the LNG precinct;
- Indigenous involvement in the environmental management of the LNG Precinct, proposed conservation areas and the Dampier Peninsula as a whole can provide Traditional Owners and affected groups with training and employment opportunities and allow them to fulfil their responsibilities to care for country, monitor the effectiveness of the LNG Precinct operator's environmental management, and provide feedback to their respective groups.
 - *Could there be more Indigenous involvement in assessment? (Beagle Bay, September 2009)*
 - *Ongoing monitoring conducted by traditional owners or their representatives e.g. appointed Rangers. (Beagle Bay, Djarindjin, One Arm Point, September/October 2009)*

The participants in the ASIA identified a number of other opportunities presented by the development of the BLNG Precinct. These are described below:

Increased opportunities for education, training and employment, including the development of training networks, scholarships and apprenticeships;

ASIA participants recognised the job opportunities that would arise directly and indirectly due to the LNG Precinct, and that because of its long life these could also be available to their children and grandchildren. They also recognised that most of these jobs require specific skills and qualifications, and acknowledged that many Indigenous people in the region, especially those living on the Peninsula, do not have the required skill sets and would need to address these deficits as soon as possible to be ready when jobs become available.

- *Training – The school leavers need to know about it, it's their future. (One Arm Point, December 2009)*

Employment and business opportunities, through targeted employment of local Indigenous people;

Both ASIA participants and many of the agencies consulted believe that the LNG Precinct would directly and indirectly provide a wide range of employment and business opportunities. Indirect employment opportunities would arise in the additional support industries that would provide goods and services to the LNG Precinct and to the workers and their families. However, both groups stressed that to realise these opportunities, the companies involved in the LNG Precinct and their contractors must be committed to employ local people; that local Indigenous people should have priority; and that companies must be held accountable if they fail to do so.

- *Employment for local Aboriginal people – local Indigenous people should have first priority before outsiders or other Australians. (GJJ, Djaberra Djaberra, and Beagle Bay, September 2009).*

Other Opportunities Identified Include:

- additional support for youth;
- improved service delivery and infrastructure; and
- support for cultural pursuits, through greater acknowledgement and recognition of Indigenous Cultural Heritage.

The ASIA contains a list of 75 recommendations (**Annexure C**) to address the impacts identified in the ASIA. The ASIA did not contain mitigation and management plans and there was significant overlap between the mitigation and management measures developed during the ASIA. The high-level SIA management plans include most of the recommendations from the ASIA (See **Part 5, Table 5-1**). The detail in the ASIA recommendations will contribute to the further development of the high-level management strategies.

Management Measures – Maximising Potential Opportunities

The Education, Training and Employment Strategy in **Part 5, Section 5** seeks to maximise education, training and employment opportunities for the local community and ensure a coordinated approach to the range of education, training and employment strategies implemented to support the development of the BLNG Precinct.

The Indigenous Workforce Development Strategy (**Part 5, Section 5**) specifically provides for opportunities for Indigenous people to work on cultural and environmental values relevant to Precinct operation. The strategy seeks to ensure a coordinated approach to the range of Indigenous education, training and employment strategies; develop and implement a strategy to increase the number of Indigenous workers on the project; develop or link to existing programs to assist Indigenous people to overcome barriers to education, training and employment; provide opportunities for Indigenous people to work on cultural and environmental values relevant to precinct operation; and, develop appropriate workforce arrangements and that includes support for Indigenous workers.

3.5. Indigenous Cultural Heritage Values

3.5.1. Overview

This section:

- identifies the Indigenous environmental values and Indigenous cultural heritage values pertaining to the land and waters the subject of the Plan (including by reference to other more detailed sections of the SAR dealing with environmental values);
- assesses whether any impacts on Indigenous heritage and cultural values are likely to be unknown, unpredictable or irreversible;
- analyses the potential impacts on Aboriginal heritage sites, materials and values under the AH Act and EPBC Act (including by reference to other sections of the SAR such as that dealing with archaeology); and
- sets out the proposed mitigation and management strategies that will be employed to manage the impacts on cultural heritage at, and values ascribed to, the James Price Point area including the indirect impact on those values across the region.

The HIA conducted by the KLC identifies the potential for the existence of heritage sites within the James Price Point and surrounding area. The report identifies the existence of dreaming trails and important sites across the region. The report identifies that the Lurujarri Heritage Trail may be directly affected by the Plan as it crosses the area designated for the BLNG Precinct. There are archaeological heritage sites that have been identified with the James Price Point area that are potentially impacted by the Precinct Plan. It is also possible that these sites have ethnographic significance. Further survey work will be done before the Plan is implemented to ensure that any impacts are appropriately managed and mitigated to the extent possible. This will enable more detailed assessment of the sites that are identified before the Precinct Plan is implemented.

The HIA concludes that the Traditional Owners of the James Price Point area and the wider Dampier Peninsula are part of an interconnected system of country, culture, people and places across the Dampier Peninsula and the wider HIA area. As such the development of the Plan has the potential to affect these interconnected values. The HIA identifies the importance of Indigenous cultural values associated with the James Price Point area that are potentially directly affected by the Plan. Even if the localised impact of the Plan means that the impact on the values is limited and manageable, the values are also potentially indirectly affected by the development by virtue of their interconnected nature. The assessment concludes that in this regard impacts are more difficult to predict and quantify.

The heritage values of the region were also assessed against the criteria for National Heritage Listing. The HIA considered the potential heritage values of the HIA area and this report sets out the possible values. As part of the assessment of the Kimberley region for possible inclusion on the National Heritage List, the James Price Point locality was assessed by the AHC for possible national heritage values. Following its preliminary assessment, the AHC found that, while James Price Point had heritage values, there was insufficient evidence to demonstrate that they reach the very high threshold required for National Heritage listing. The AHC subsequently released a map of the area it considered might have national heritage values, which did not include James Price Point.

The mitigation and management strategies developed for the Plan will address the heritage values and sites potentially affected by the Plan. These are set out in this section as well as in **Part 5, Section 5**. They will also take into account the regional aspects of the heritage values associated with the HIA area. The selection process which took place was critical to the early management of the interconnected nature of heritage values and Indigenous people across the region. The KLC consulted with the Traditional Owners across the entire West Kimberley region in this regard. This played a big part of the selection of the four sites deemed suitable by the Traditional Owners, which ultimately led to the selection of James Price Point. Essentially the area could best accommodate these concerns, having regard to the engineering and environmental factors that were also weighed and balanced.

The following discussion should be considered in the context of the comprehensive and geographically extensive approach taken in the HIA to describe all potentially affected cultural heritage values rather than those perceived to be 'directly' affected because of both the interconnectedness of values and the perceived uncertainty of potential impacts of the Plan. The HIA response to the general nature of the findings is to identify a number of process related management initiatives, which accordingly have informed the strategies outlined in **Section 3.5.5**.

3.5.2. Scope of the Heritage Impact Assessment

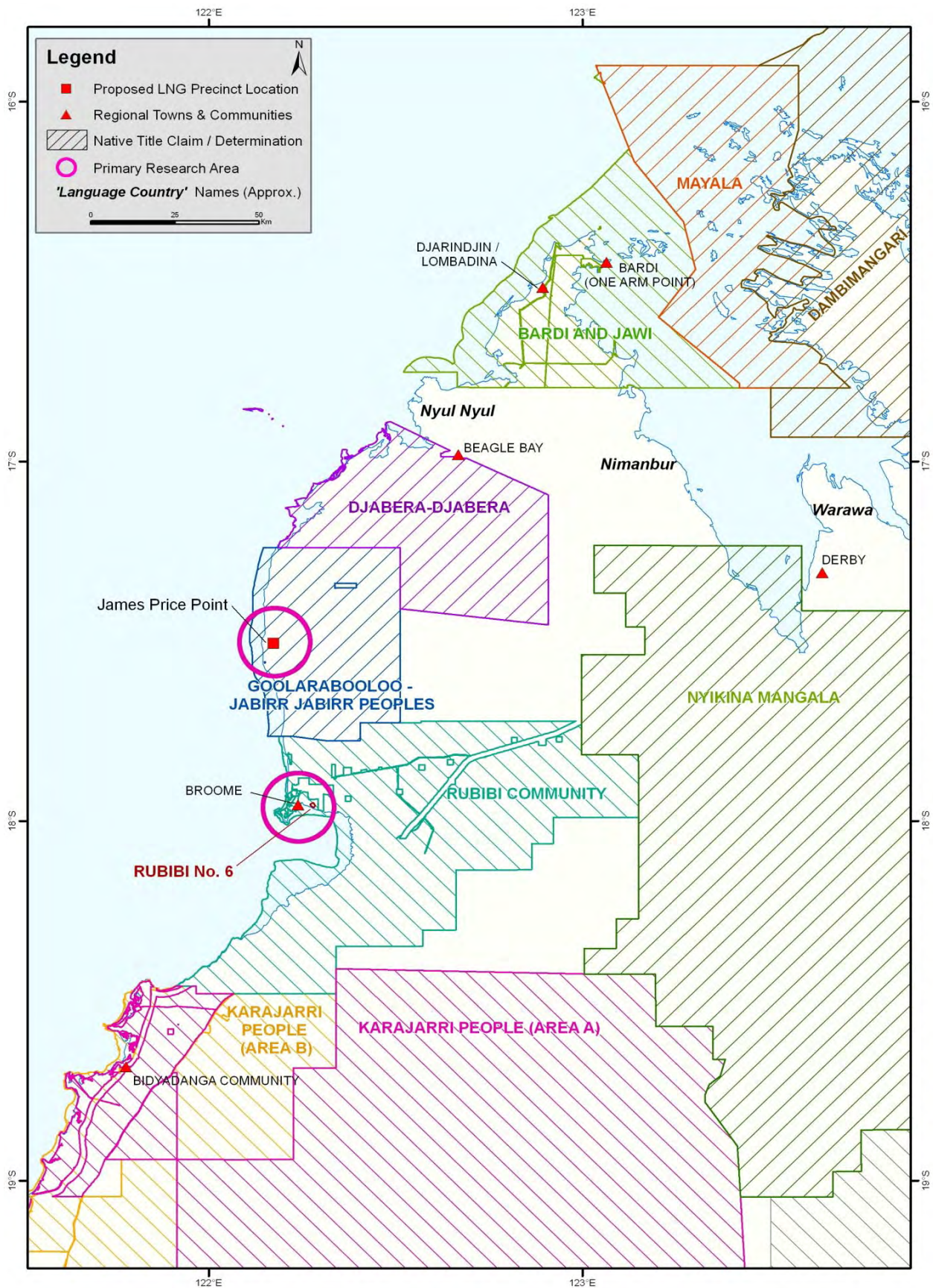
3.5.2.1. Affected Traditional Owners

The KLC is the representative body under *the Native Title Act 1993 (NTA)* with statutory functions for the Kimberley region. The KLC has advised that James Price Point is located in the traditional country (lands and waters) of the Jabirr Jabirr people. It is affected by the Goolarabooloo / Jabirr Jabirr native title claim and these people are the "Traditional Owners" for the area. The KLC further advised that the Traditional Owners of the wider Dampier Peninsula (including the Goolarabooloo/Jabirr Jabirr people) are connected through a system of traditional laws, customs and culture which connects people, country and culture and continues to be observed and followed in the present. The KLC is of the view that an assessment of the heritage impacts of the proposed LNG Precinct therefore requires that the area of the assessment take into account these traditional connections. The HIA commissioned by the KLC therefore covers a geographically extensive area that was determined to take into account these traditional connections. The HIA assessed potential impacts of the Precinct Plan on the cultural values and Aboriginal heritage of the relevant Indigenous people, particularly the Traditional Owners and their families.

3.5.2.2. Heritage Assessment Area

The KLC HIA assessed the geographic area set out at **Figure 3-3**. The area was determined by KLC with respect to the requirements of the HIA and it had reference to the following factors:

- What constitutes Aboriginal heritage from the perspective of the relevant affected Traditional Owners.
- The nature of the 'Indigenous cultural landscapes' and 'Indigenous cultural seascapes'. The entirety of 'country,' conceptualized as a cultural land-, sea- (and sky) scapes (a culture-scape) constitutes the Aboriginal heritage of Kimberley Aboriginal people, including those whose countries fall within the HIA Area. Culture-scapes include sites, larger areas of special cultural significance (for example, ceremonial sites and child-conception sites), and Dreaming tracks that connect sites and areas of country both within the country of a particular Aboriginal society and between areas of country in the Indigenous countries of two or more Aboriginal societies.
- What the available data indicates is the likely or potential extent of impact having regard to the nature of 'Aboriginal heritage' and 'cultural values' of the assessment area.
- Native title determination and claim areas and language country areas, and the regional cultural relationships between these areas.
- The 'site specific area of interest' and the 'regional area of interest' identified in the DSD's scoping document for studies required to be done to assess potential zones of direct and indirect impacts for the SA. The 'regional area of interest' includes the entire Dampier Peninsula, marine areas 70km from the mainland, land areas south of Broome to Port Smith and east and north-east to the Great Northern Highway, but not including Derby. The 'site specific area of interest' is "James Price Point coastal area".
- The 'Primary Impact Area' and the 'Secondary Impact Area' identified for the social impact assessment being conducted for the SA. The 'Primary Impact Area' is defined by "a 10km radius from James Price Point where the Precinct would be located, and the Urban Area of Broome". The 'Secondary Impact Area' is defined as that which "surrounds the Primary Impact Area and contains the areas that would be impacted either directly or indirectly by the project to a lesser extent" and includes the communities on the Dampier Peninsula and the communities of Derby and Bidjadanga.
- The area the subject of the Aboriginal Social Impact Assessment conducted by the KLC (**Part 5, Section 3.4.2**) was identified by the KLC on the basis that small Aboriginal communities on the Dampier Peninsula may be subject to intense social impacts. The ASIA also recognises that the proposed BLNG Precinct may have significant affects on native title rights and interests and on Indigenous sites and culture, and that many of the Aboriginal people who hold these interests and/or are custodians for these sites reside in the Dampier Peninsula and Derby areas.



■ Figure 3-3 Area of the Heritage Impact Assessment.

Based on the above factors the KLC determined that the assessment/impact area of the HIA needed to cover:

- the 'regional area of interest' identified in the Scoping Document;
- the 'Primary Impact Area' and 'Secondary Impact Area' around James Price Point and the Broome urban area for the social impact assessment identified by the Proponent;
- the rest of the Dampier Peninsula;
- culturally associated and geographically close lands and waters, namely the Mayala Native Title Claim area, a part of the Karajarri Native Title Determination area, and a part of the Dambimangari Native Title Claim area; and
- parts of Warawa language country and the Nyikina Mangala Native Title Claim area, that were also identified for a case study in the ASIA.

The HIA therefore addresses impacts on Aboriginal heritage and cultural relationships that exist from Bardi and Jawi country at the northern extremity of the Dampier Peninsula, the adjacent saltwater areas including parts of Yampi Peninsula, to Karajarri country, located south of Broome, as well as the Aboriginal heritage and cultural relationships of all cultural groups in between.

3.5.3. Indigenous Heritage Values Identified in the HIA

The HIA describes those elements of the environment relevant to an assessment of the potential direct and indirect impacts on heritage and cultural values. These cover:

- Indigenous heritage sites (also covered by the archaeological report);
- Indigenous cultural values both around James Price Point (i.e. values that are potentially directly affected) and in the balance of the assessment area (i.e. values that are potentially indirectly affected);
- potential or prospective matters of national environmental significance; and
- Indigenous environmental values (i.e. customary fishing and other ethnobiological works separately addressed in **Part 5, Section 4**).

The identification of these values and the potential effects on them has commenced and it appears from the preliminary studies that the issues associated with the heritage sites identified within James Price Point to date are capable of management. The mitigation and management measures outlined in **Section 3.7** have been informed by those identified in the HIA as measures to make impacts acceptable and less than significant.

3.5.3.1. Indigenous Cultural Values at James Price Point

James Price Point is located within Jabirr Jabirr country. Jabirr Jabirr people adhere to cosmology that the land has been infused with meaning by ancestral beings that provided language and Law to the landscape. The HIA concludes that the traditional peoples and countries of the Dampier Peninsula are part of an interconnected system of country, culture, people and places and other language groups on the Dampier Peninsula which subscribe to the same cosmology.

Jabirr Jabirr people and other groups on the Dampier Peninsula believe that ancestral beings travelled the country and during their travels imbued the physical landscape with spiritual meaning. Specific places where the ancestral beings are known to have travelled and interacted with the landscape are places of particular importance for the Jabirr Jabirr people.

The HIA indicates that the broader HIA Area contains many areas that are of particular significance and areas that the Jabirr Jabirr people's law decrees must be protected. Many of these areas are gender specific sites that cannot be revealed to members of the opposite sex or sometimes to the uninitiated. The HIA does not indicate whether the James Price Point area contains any of these places. Accordingly while there may potentially be indirect impacts on these places by development at James Price Point, the extent to which there might be direct impacts is as yet unknown. This will be further investigated as part of the processes set out in the Heritage Protection Agreement.

The HIA explains that Jabirr Jabirr people continue to exercise ritual so as to protect and appease the spirits within the landscape. Many Jabirr Jabirr connections to country have to be maintained through the proper management of spirits. When Jabirr Jabirr people visit country they are careful to observe proper behaviour in order to be respectful, elicit help from spirits and protect themselves and outsiders from spiritual harm. As with other Dampier Peninsula groups, the Jabirr Jabirr have beliefs about 'Creator Snakes'. There is a particular snake that is said to have inhabited the Jabirr Jabirr people's traditional country. This snake is said to be so powerful its name may not be spoken.

The HIA explains that language and country are fundamentally intertwined, and language is an important mechanism by which people are bound to country and country is bound to people. Jabirr Jabirr language is still used today, particularly in relation to place names, resources names and people's bush names. Like Christian names these bush names have meaning, however the bush name is often more elaborate than a contemporary Christian name. Jabirr Jabirr peoples' Aboriginal names may describe their belonging to a place. For example, a senior member of the Jabirr Jabirr community shares a bush name with her great grandmother, and that name is also the place name for James Price Point.

The HIA summarises the archaeological record for Jabirr Jabirr country as revealing extensive Indigenous occupation.² The existing work identified mainly shell middens, a quarry complex, and possible turtle butchering sites. The HIA also references an archaeological survey (Smith, 1997 as cited in the HIA; KLC, 2010b; **Appendix E-4**) that located a stone wall trap at James Price Point and an archaeological site with a radiocarbon date derived from a shell sample, which indicates that occupation of the area includes people's presence some 1300 years ago as well as in the more recent past.

The HIA provides maps of registered heritage sites in the James Price Point Primary Research Area, Broome Urban Primary Research Area and overall HIA Area (refer to Figures 10, 11 and 12 of the HIA). These maps are intended to be indicative of the type of sites within the respective locales that are of significance to Aboriginal people, and cumulatively, to demonstrate the presence of a lively cultural landscape. A number of registered sites are identified within the James Price Point Primary Research Area. These range in site type (for example, mythological, burial, artefacts and fish traps) and from north to south include Flat Rock 2 (site number K02303), Kulmukarakun Juno 1 (K02304), Kulmukarakun Juno 2 (K02305), Ngarrimarran Juno Quarry (K02306), Pidirakundjuna Creek (K02783), Walmadan (James Price Point) (K02164), Inballal Karnbor (K02520), Kundandu (K02308), Murrudun (K02307), Murrjal (K02309) and Kardilakan-Jajal (K01678).

While such sites are important for Aboriginal people, the HIA stresses that they are not the only focus of concerns regarding the protection of heritage; instead sites are seen as inter-connected components of multifaceted cultural landscapes, seascapes (and skiescapes) that constitute Aboriginal 'country.'

3.5.3.2. Indigenous Cultural Values in the Balance of the HIA Area

As described above, the interconnectedness of culture, land, people and country means that impacts of the Precinct Plan in the James Price Point area can have indirect impacts on cultural values across the wider HIA area. This is the case even though it appears based on the KLC's HIA and Archaeological Site Avoidance Survey reports that with proper management, the impact on Aboriginal sites would be manageable even if they are not entirely avoidable.

According to the HIA, language Groups of the Dampier Peninsula area share a distinct culture-scape, or alternatively, their culture-scapes are especially interconnected. Their languages are related, and they share other cultural features, including beliefs about the pre-existing souls of people called rai or raya. They share ancestral creator beings who are said to have created their countries, and provided them with their Law, and they share Peninsula Law which embraces all of the local and regional Dreaming beings, Dreaming events and locations, and associated ethics.

For example, law and ritual practice on the Peninsula is a body of knowledge that instructs novices in social etiquette – rules of marriage and proper behaviour, as well as knowledge of the country and how to survive in it. This Law has local expressions, including expressions as Dreaming tracks, as well as regional import. According to the HIA's findings, this Peninsula Law embraces all of the local and the regional Dreaming beings, Dreaming events and locations, and the

² It references the first systematic archaeological survey of the coast as undertaken by Elizabeth Bradshaw and Rachel Fry in 1988, and previous, less extensive, work by Akerman and Bindon.

associated ethics and Laws. The HIA concludes that as a consequence, the impact of the BLNG Precinct may be experienced not only by the Traditional Owners for the James Price Point area but by other groups to the north, south and east that share Law and ritual practice, and who have responsibilities to 'look after' the Law and places associated with it.

The HIA says that men from outside the Dampier Peninsula also take part in the Peninsula Law. As well as the unifying practice of the Law, a number of other rituals connect the Peninsula people to Aboriginal groups elsewhere in the Kimberley. Therefore, the HIA concludes that any impact in the Dampier Peninsula area that affects ritual sites and the Dreaming tracks that connect them is likely to have wide repercussions for the ritual life of many Kimberley Aboriginal people.

The HIA states that these interconnecting ritual relationships reinforce a sense of 'sameness' between Aboriginal groups but also illustrate the differences of local expression and content. They are relationships that demand respect and reciprocity and are linked to events along extensive Dreaming tracks, thus extending the potential impacts of the BLNG Precinct beyond the James Price Point area as well as, potentially, beyond the HIA area.

Resources obtained from the land and the sea as well as other benefits derived from country (such as those from resource development benefit agreements) are also important for Kimberley Aboriginal people as components in the regional exchange system known as wurnan. Wurnan is a fundamental component of Kimberley traditional culture and a significant part of the 'connectedness' between the language groups and countries of the region.

Wurnan can be thought of as a set of broad protocols which direct a huge array of actions on the part of Aboriginal people. For example, wurnan requires people to share their resources with one another, and a man is said to be 'following the wurnan' when he honours his responsibility to 'look after' his wife's family. Importantly, wurnan law also applies to the exchange of goods in a widespread trading network that includes both sacred and secular items. This network extends across the Kimberley and beyond. It has been documented in the earliest ethnographic accounts for the region, and it is a traditional Indigenous system that continues to be of major significance to Kimberley people today as part of their contemporary economic and ritual life.

The HIA concludes wurnan routes are significant components of distinct Indigenous culture-scapes - such as those that characterise the "countries" of the HIA area - but they are also one of the ways in which the countries of the HIA area are inter-connected with the "countries" of other Kimberley Aboriginal people.

The Lurujarri Trail forms part of the joint Commonwealth and Western Australian government funded Heritage Trail Network located along the west Dampier Peninsula coastline. The Heritage Council's Heritage Trail booklet *Lurujarri: Retracing the Song Cycle from Minarriny to Yinara* provides an overview of the trail and some of the Dreamtime stories associated with the Lurujarri. According to the booklet, these include the three Dreamtime sisters Lija, Udang and Birmarra, who travelled from north to south creating parts of the landscape as they went, the Creator Being who turned himself into a powerful snake to maintain Law during troubled times and the Creator spirit Marrala, commonly referred to as Emu man, who is associated with the three-toed footprints from Yinara to Minyirr point that European scientists believe to be those of a dinosaur.

As discussed in **Part 5, Section 4.2** no three toed dinosaur footprints associated with the Creator Spirit Marrala were identified during the two palaeontology surveys in the BLNG Precinct area near James Price Point. The two surveys were conducted in the presence of a Traditional Owner and at the lowest possible tide. However, no anthropologist attended the surveys therefore it is uncertain whether the type of possible dinosaur fossil underprints identified at James Price Point are of cultural significance to the Traditional Owners. The palaeontology report concludes that dinosaur underprints (ichnofossils) within the James Price Point coastal area are considered to be of lower scientific quality compared with other examples along the Dampier Peninsula coast, and any paleontological impacts that might occur would therefore be of a local rather than regional significance, albeit further survey work is recommended. The cultural significance to the Traditional Owners of the type of dinosaur underprints near James Price is therefore uncertain. Nonetheless, it is recognised that Traditional Owner involvement in any further survey work and in decisions on impacts or removal is important. From a scientific/conservation basis, the Western Australian Museum concluded that the fossils that may be impacted are of low importance. It is possible, however, that better quality specimens may be exposed during construction activities. Detailed heritage surveys will be undertaken for the Precinct at which the ethnographic significance of these ichnofossils will be discussed with the Traditional Owners.

The Lurujarri heritage trail has been identified by the HIA and Archaeological Site Avoidance Survey reports as of ethnographic and archaeological significance. According to the HIA, documentation of important areas along the Lurujarri trail by Bradshaw and Fry (as cited in KLC, 2010b; **Appendix E-4**) provides evidence of the nature of its culture-scape(s). The trail begins within that portion of the Primary Research Area around James Price Point (Minarriny/Coulomb Point), and continues south to end in the other Primary Research Area of Broome (at Yinara). The trail is part of a cross-cultural heritage interpretive trail. The trail includes a large number of sites on the DIA Sites Register, some of which have restricted information associated with them, including the travelling Snake mentioned above. Other places along the trail are open cosmological and religious sites, old camping areas, historical sites, and burials.

Most of these sites have been registered with the DIA. The trail passes through country traditionally associated with Jabirr Jabirr, Ngumbar, and Yawuru. Due to gender restrictions on some of the information associated with some of the sites, Bradshaw and Fry did not record any of this detail in their report. More detailed information is held in the DIA records.

The Archaeological Site Avoidance Survey report outlines Bradshaw and Fry's survey of the route for the Lurujarri trail in 1988 which found a total of 64 archaeological sites, of which 42 were newly identified sites. These include shell middens, artefact scatters, quarry sites, burial sites, freshwater springs, and mythological sites that are almost continuous along the western coastline of the Dampier Peninsula. Bradshaw and Fry (1989) (as cited in KLC, 2010b; **Appendix E-4**) highlight the continued importance of this stretch of coast because of its association with important ethnographic sites.

The HIA concludes that it is likely that the development of the BLNG Precinct would have consequences not only for the Aboriginal heritage of the Dampier Peninsula, including James Price Point, but also for the Aboriginal heritage of adjacent areas as well as those further afield in the Kimberley. As described earlier, these potential impacts derive from the interconnectedness of the law and the land in the region as well as from actual physical impacts that may occur outside the Precinct.

3.5.3.3. Potential or Prospective Matters of National Environmental Significance

The Terms of Reference required that the SAR include an assessment of impacts of the Plan on matters of NES. The matters of NES assessed were places/values on the National Heritage List and places/values that are potentially or prospectively places on the National Heritage List.

There are no places currently on the national heritage list within the area directly affected by the Precinct Plan or the HIA area more broadly.

Parties to the Strategic Assessment Agreement agreed to a formal assessment of the National Heritage (and potential international heritage) values of the West Kimberley in accordance with the requirements set out in the EPBC Act. The whole of the Dampier Peninsula, including James Price Point, was included in the National Heritage assessment study boundary. In its preliminary assessment the Australian Heritage Council did not find sufficient evidence that heritage values of James Price Point met the very high threshold of significance for National Heritage. The areas proposed for inclusion were to the north of the Dampier Peninsula. The Australian Heritage Council completed its assessment of the potential National Heritage values of the west Kimberley in June 2010. The Council's final assessment will be publicly available following the decision by the Minister for SEWPAC on whether to include any part of the West Kimberley in the National Heritage List.

To inform the national heritage assessment process, the KLC conducted extensive consultations with Traditional Owners regarding the west Kimberley region of WA which identified the following potential national heritage values:

- an overarching theme of "resistance, adaptation and survival";
- the story of Kimberley Aboriginal people and the pastoral industry;
- Indigenous cultural values of the Fitzroy River system and catchment;
- the double log raft;
- Indigenous cultural values of the pearl shell, and Indigenous perspectives of the history of the pearling industry;
- Jandamarra and the Bunuba resistance;
- Bungarun Leprosarium;
- Indigenous cultural values in boab trees;
- The Wanjina-Wunggurr Cultural Land and Seascape and Gwion Gwion rock art; and
- The story of resistance at Noonkanbah in 1978-1980.

There are no places currently protected under the ATSIHP Act within James Price Point or the HIA area.

3.5.3.4. Indigenous Environmental Values

The HIA identifies that many species of plants and animals have economic, customary and religious importance to Traditional Owners and Aboriginal people of the Dampier Peninsula. Plants and animals are part of the cultural land- and sea-scapes, and, as such, are significant components of the Aboriginal ethnobiology of the HIA Area. Certain areas are both recognised and named as especially rich sources for such resources. The extensive middens on the beaches and headlands of the Dampier Peninsula attest to the rich harvest that people extracted from the ocean in the past. This harvest continues today and a lot of people living in the HIA Area and visitors from other communities (such as Bidyadanga) derive a substantial portion of their protein supply from fish, turtles, dugong and shellfish from this region.

The potential impacts on these values were the subject of specific investigation in the customary fishing and ethnobiological reports, the findings of which are set out in **Part 5, Section 3.7** and **Part 4, Section 2.5** respectively.

Groundwater abstraction was also identified as having the potential to impact on Cultural Values and access to and use of traditional resources. Detailed assessment of potential environmental impacts from groundwater abstraction is addressed in **Part 4, Section 2.3**. The use of groundwater is controlled under the RIWI Act, administered by the Department of Water (DoW) and in addition to environmental considerations they also assess whether the use is in the public interest, may prejudice other current and future needs for water, and would have a detrimental effect on another person.

The economic values of wild resources are addressed in detail in the ASIA Report prepared for the strategic assessment, and potential impacts and appropriate management strategies are outlined in **Part 5, Section 2** and **Part 5, Section 3.8**.

3.5.4. Assessment of Potential Impacts on Cultural Heritage Values

The HIA examined the potential impacts on Indigenous heritage and cultural values identified in the DSD's scoping document and assessed them and any additional potential impacts identified. This analysis included an examination as to whether the impacts can be predicted and quantified and whether they are likely to be unknown, unpredictable or irreversible.

As discussed earlier, the HIA analysis was conducted on the assumption that the interconnectedness of culture, land, people and country means that impacts of the Plan in the James Price Point area can have indirect impacts on cultural values across the wider HIA area.

Furthermore, the HIA's analysis of impacts presented below should be understood in the context of the qualification made in the HIA that the Plan the subject of the strategic assessment was at the time of the study subject to further development and that it was therefore not possible to identify every potential impact on Cultural Values / Aboriginal heritage from the Plan. The HIA states that in respect of those potential impacts that have been identified, significant uncertainty exists in relation to the scale, duration, and permanence of those impacts. It is worth reiterating here,

however, that the Traditional Owners through the Heads of Agreement have indicated that subject to the HPA requirements and the development of a Cultural Heritage Management Plan, there are no Aboriginal heritage issues that will prevent the establishment of the BLNG in the vicinity of James Price Point and the construction and operation of the BLNG Precinct and other proponents.

The key outcomes of the HIA analysis are contained in the tables presented below. In addition to the potential risks identified in the Scoping Document (DSD, 2010b; **Appendix A-2**), the HIA identified the following potential sources of indirect impacts:

- a) Increased visitor numbers to traditional country.
- b) Damage to rock art sites, rock engraving sites and other sites of cultural significance caused by emissions from the activities or classes of activities under the Plan.
- c) Sourcing of construction materials (quarrying, etc).

The HIA raises that a potential indirect impact is increased visitor numbers to traditional countries on and surrounding the Dampier Peninsula as a result of increased population in the region. This relates to a broad geographical area that includes the entirety of the HIA Area, as well as areas beyond it within the Kimberley region because it is argued in the HIA that there would be impacts not only on specific sites of cultural and heritage significance to Kimberley Aboriginal people, but also on the cultural land- and seascapes of which such sites are integral components. Some places, such as rock art sites accessible by water, are considered to be potentially more intensively impacted than places within the HIA Area itself because population increase associated with the proposed LNG Precinct is expected to result in a cumulative increase in marine travel along the coast, as increased numbers of individuals become clients for organised tours along the coast or tour the area in private pleasure crafts.

A key issue discussed is the potential for unregulated visitation without appropriate cultural protocols for accessing sites and areas of country. This may involve ecological and culturally defined damage or disturbance to sites, including rock art sites, burial sites, and surrounding eco-systems, and photographing and publishing of sites of significance, vandalism, soil erosion and littering. These are considered disrespectful to country and to have the potential to damage the 'health' of the country, the Traditional Owners and their families and offend its resident Dreaming beings, which can have repercussions for the reciprocal relations that exist between Traditional Owners and their country and create conflict within Aboriginal communities.

Many of the concerns raised above should be considered in the context that the population projections for the Shire of Broome indicate an 85% increase from 17,100 in 2011 to 31,400 in 2041 without the BLNG project going ahead, and that management of potential impacts on heritage sites should be considered in broader land use planning. Potentially, these impacts could occur regardless of establishing the BLNG Precinct.

As discussed in the social impact and tourism sections of the SAR, a Managed Access Camp, with the enforcement of relevant workforce management strategies such as a code of conduct and cultural awareness training, would help to address potential issues associated with increased visitors to culturally significant areas that might be associated with the establishment of the Precinct. There are a number of interrelated strategies discussed in these sections to mitigate and manage potential impacts of the BLNG Precinct including a Recreation Management Strategy and possible arrangements that would allow guided walks with Traditional Owners to occur seasonally. The Dampier Peninsula Land Use and Infrastructure Plan discussed in **Part 3, Section 3.4.5** would also help to address the potential impacts of a cumulative increase in recreation and tourism.

While limited analysis is provided, the HIA raises the potential impacts of extraction of construction materials on heritage values. The Master Plan Report indicates that the sourcing of construction resources and associated activities for the construction of the BLNG Precinct and other activities under the Plan may occur in an area that extends beyond the proposed BLNG Precinct and possibly beyond the Primary Impact Area or the HIA Area. Therefore, along with impacts from increased population associated with the proposed LNG Precinct, it is considered that sourcing of construction materials and associated extraction activities are also likely to have impacts on the cultural and heritage values of the HIA Area and the wider Kimberley region if not mitigated and managed in a culturally appropriate way.

The HIA also raises potential impacts on rock art/engraving sites from LNG associated activities and identifies potential sources as dust and other emissions (increased vehicular traffic, mining and quarrying) during construction, and operational emissions such as mercury, hydrogen sulphate and carbon dioxide from the liquefaction process, emissions

from power generation and desalination activities, and anthropogenic acidification of rain resulting from industrial activities. The HIA provides an overview of available information on rock art sites and identifies three registered rock art/engraving sites on the Dampier Peninsula close to a 150km radius from James Price Point; the concentration of registered sites within this radius is significantly less than that in the rest of the area (see Figure 32 in HIA for regional map). In this context, the air quality assessment for the project concluded that the potential for atmospheric deposition impacts from gaseous emissions is very low (see Air Assessments, 2010; **Appendix C-25**).

The HIA refers to wind data from Broome airport showing prevailing offshore winds in the wet season and onshore in the dry, which is suggested as indicative of James Price Point wind patterns. It goes on to say that appropriate research and modelling of meteorological conditions at James Price Point would be required to determine likely dispersal of emissions from LNG associated industry. This has been undertaken, with full results presented in **Part 4, Section 2.8** (Air Quality).

An overview of investigations of the possible impact of industrial emissions from shipping iron ore, downstream processing of natural gas to ammonia and LNG processing facilities, on rock art engraving in relation to the Burrup Peninsula is also provided, which establishes that while no scientific evidence of measurable impact of emissions was found, further monitoring was recommended.

From this preliminary research the HIA presents the following conclusions:

- a) the effect of chemicals emitted by LNG associated industrial processes on rock art and rock and engravings of the type found in the north west Kimberley is not known;
- b) the likely extent, based largely on meteorological factors, of emissions from and LNG Precinct at James Price Point, is not known; and
- c) the proximity and frequency of rock art and rock engraving sites, particularly on the Dampier Peninsula, is unknown.

It should be recognised that the geology of the Burrup, the type of emissions distribution and density and type of known rock art sites are considerably different to those of James Price Point and the Dampier Peninsula. From current knowledge of art sites, with the closest approximately 150km from James Price Point, the nature of the terrain and the prevailing winds, it would appear unlikely that a large number of significant rock art galleries would occur within range of the proposed BLNG Precinct that might be negatively impacted by LNG emissions. However, as further heritage work is undertaken at the BLNG Precinct, and through the development of the Cultural Heritage Management Plan, further discussion and consideration of this matter will occur.

Table 3-8, Table 3-9 and Table 3-10 have been extracted directly from the KLC Heritage Impact Assessment Report.

Because of the stated uncertainty regarding the significance of potential impacts, the HIA recommends that aaptive safeguard and mitigation measures be developed which include future assessment of currently unknown impacts and appropriate measures to ensure that any such impacts, once identified, are appropriately managed. An integrated approach to management involving Traditional Owners is recommended as appropriate to ensure that numerous sources of impacts, and impacted matters, are dealt with in a coordinated manner. These findings are taken into account in the management and mitigation measures outlined below.

■ **Table 3-8 Potential Impacts on Aboriginal Heritage Identified in the Social Impacts Summary Table from Scope of Strategic Assessment Document, and Analysis of the Assessed Risks.**

Impact type	Stressor (source of impact)	Likelihood	Consequence	Inherent Risk Ranking	Rationale	Analysis of Potential Impacts in light of Cultural Values (including Aboriginal heritage) identified in Section 3
Marine Impacts	Site disturbance / excavation	Possible	Major	High	Seabed disturbance associated with the installation of marine infrastructure could have localised impacts on Aboriginal heritage. Many sites of indigenous cultural significance are located along the coast. A high proportion of sites in the JPP coastal area listed on the DIA database are composed of artefact and midden scatters (Scoping Report s.5.3.10.3). The final site for the Precinct will be agreed with the traditional owners to ensure areas of highest indigenous heritage value are avoided. Further aboriginal heritage and ethnographic studies are required.	The identified level of risk is consistent with findings on Cultural Values. Culturally appropriate management and mitigation measures are recommended, including that the arrangements in relation to engagement with Traditional Owners are continued throughout the development and operation of the LNG Precinct.
	Physical presence	Possible	Minor	Medium	Exclusion zones, introduction of large vessels to region, increased marine traffic and installation of marine facilities will cause changes to landscape in vicinity of the development. Further aboriginal heritage and ethnographic studies are required	The identified level of risk is not consistent with findings on Cultural Values, in particular in relation to the culture-scape with includes cultural interests in marine areas.
Terrestrial Impacts	Site disturbance / excavation	Unlikely	Moderate	Medium	Site disturbance will be limited to the development area and footprint will be minimised. Clearing / excavation works will nonetheless present a risk of disturbance to areas of archaeological heritage value. Heritage studies will be completed in collaboration with traditional owners, to ensure disturbance to areas of archaeological significance are to be avoided where practicable.	The identified level of risk is not consistent with findings on Cultural Values. Site disturbance is highly likely to impact Cultural Values / Aboriginal heritage. Culturally appropriate management and mitigation measures are recommended, including that the arrangements in relation to engagement with Traditional Owners are continued throughout the development and operation of the LNG Precinct.

Impact type	Stressor (source of impact)	Likelihood	Consequence	Inherent Risk Ranking	Rationale	Analysis of Potential Impacts in light of Cultural Values (including Aboriginal heritage) identified in Section 3
	Run-off	Highly unlikely	Minor	Low	Runoff is considered unlikely to impact on heritage sites, as the selection and footprint of the development area gives consideration to the location of areas of heritage significance, so as to mitigate risk of disturbance where practicable.	The identified level of risk is not consistent with findings on Cultural Values. Site disturbance as a result of run-off is likely, however the potential for run-off to be managed so as to avoid such impacts is relatively high if Traditional Owners are involved in the site layout process and management mechanisms. Culturally appropriate management and mitigation measures are recommended.
	Noise and vibration	Quite likely	Slight	Medium	There is a potential for off-site noise impacts to disturb areas of known or potential aboriginal heritage value. A song line is known to exist down the coast of the Dampier Peninsula. Cultural practices in relation to maintaining the song line may be slightly affected by noise projected from the LNG Precinct therefore a moderation level of risk is assigned.	The identified level of risk is consistent with findings on Cultural Values, subject to information on the likely intensity and duration of noise and vibrations.
	Vehicle movements	Unlikely	Moderate	Medium	Increased traffic and roads may lead to greater access to areas of heritage significance and risk to disturbance of sites.	The identified level of risk is not consistent with findings on Cultural Values. Increased access to and disturbance of cultural values in country is identified as an impact in Section 3. Culturally appropriate management and mitigation measures are recommended, including that the arrangements in relation to engagement with Traditional Owners are continued throughout the development and operation of the LNG Precinct.

Impact type	Stressor (source of impact)	Likelihood	Consequence	Inherent Risk Ranking	Rationale	Analysis of Potential Impacts in light of Cultural Values (including Aboriginal heritage) identified in Section 3
	Altered fire regime	Unlikely	Minor	Medium	The presence of the LNG Precinct may result in a change in the existing fire regime of the local area on the Dampier Peninsula. Introduction of ignition sources and fire management may alter incidence of fire which could impact sensitive sites. It is possible that a positive impact may be derived should the introduction of a controlled fire regime lead to lower frequency and severity of bushfires. The potential impact of an altered fire regime on local aboriginal heritage values warrants further investigation.	The identified level of risk is not consistent with findings on Cultural Values. An altered fire regime is very likely, particularly given the unsuitability of the current regime for an area used for processing of hydrocarbons. The consequences of any new fire regime on Cultural Values will depend on the content of that new regime, in particular times of year for burning and whether or not Traditional Owners will be involved in the development and implementation of that new regime. Culturally appropriate management and mitigation measures are recommended.
	Physical presence	Unlikely	Minor	Medium	The physical presence of the LNG Precinct facilities and the increased traffic and number of people has the potential to impact Aboriginal heritage sites in the local area. Land disturbance will be limited to the development area and the footprint will be minimised. Disturbance to areas of Aboriginal heritage significance are to be avoided where practicable, as agreed with Traditional Owners during the design/layout process.	The identified level of risk is not consistent with findings on Cultural Values. Physical presence of an industrial facility is highly likely to impact Cultural Values / Aboriginal heritage. Culturally appropriate management and mitigation measures are recommended.
	Terrestrial wastes and discharges	Highly unlikely	Minor	Low	A non-routine event is considered to have low probability of occurrence. Terrestrial discharges are considered unlikely to impact on heritage sites as the selection and layout of the development area gives consideration to the location of these.	The identified level of risk is not consistent with the findings on Cultural Values. The rationale for the risk assessment should also take into account the likelihood of waste discharges over the life of the project in an area subject to monsoonal rainfall. Culturally appropriate management and mitigation measures are recommended, including arrangements that continue throughout the development and operation of the LNG Precinct.
Impact type	Stressor (source of impact)	Likelihood	Consequence	Inherent Risk Ranking	Rationale	Analysis of Potential Impacts in light of Cultural Values (including Aboriginal heritage) identified in Section 3
Social impacts	Restricted areas	Possible	Moderate	High	Marine and terrestrial restricted areas associated with the construction and operation of multiple LNG projects within the Kimberley LNG Precinct may constrain the access of Traditional Owners/ site custodians to visit and maintain Aboriginal sites and undertake cultural practices.	The likelihood of the risk is not consistent with the findings on Cultural Values, which suggest that the likelihood is very high. The level of risk (high) is appropriate. Culturally appropriate management and mitigation measures are recommended, including that Traditional Owners participate in the development of management arrangements and implementation of those arrangements as they relate to Cultural Values (including Aboriginal heritage).

Source: Table 6 of KLC Heritage Impact Assessment Report.

■ **Table 3-9 Additional ‘Stressors’ that are Likely to Impact on Cultural Values (including Aboriginal Heritage).**

Impact type	Stressor (source of impact)	Likelihood	Consequence	Inherent Risk Ranking	Rationale	Analysis of Potential Impacts in light of Cultural Values identified in Section 3
Marine Impacts	Noise and vibration	Likely	Moderate	Medium	Noise and vibrations from marine areas may impact on Cultural Values both in marine areas and in terrestrial areas which are affected by noise / vibration which emanates from marine areas	Culturally appropriate management and mitigation measures which provide for Traditional Owner involvement in development and implementation of those arrangements are recommended. These arrangements should also provide for ongoing monitoring and assessment.
	Sediment deposition and turbidity	Likely	Moderate	Medium	Change in sediment and turbidity has the potential to impact both the physical characteristics of Cultural Values within marine areas and use / access to marine resources in surrounding areas affected by increased turbidity.	
	Marine discharges including non-routine events	Likely	Moderate	Medium	Marine discharges have the potential to impact both the physical characteristics of Cultural Values within marine areas and use / access to marine resources in surrounding areas affected by marine discharges	
	Light emissions	Likely	Moderate	Medium	Light emissions have the potential to impact use / access to marine resources in surrounding areas.	
	Introduced pests	Likely	High	High	Introduced pests have the potential to impact both access to marine resources and Cultural Values in marine areas.	Conditions in relation to this issue are included in the ASIA Report. Appropriate conditions may also be recommended in the ethnobiological report
Terrestrial Impacts	Vegetation / habitat clearing	Likely	High	Medium	Vegetation clearance is a form of site disturbance and is therefore determined to have similar risks associated with it.	Management arrangements in relation to site disturbance should include management of vegetation clearing.
	Atmospheric emissions	Highly Likely	Low	High	Emissions from industrial facilities are known to travel and settle significant distances from the emissions source. Emissions also have the potential to affect rock art sites.	Monitoring of emissions dispersal and impact of emissions on rock art sites within the area of dispersal are recommended

Impact type	Stressor (source of impact)	Likelihood	Consequence	Inherent Risk Ranking	Rationale	Analysis of Potential Impacts in light of Cultural Values identified in Section 3
	Groundwater abstraction	Likely	Moderate / High	Medium / High	The source of water for the proposal the subject of the Plan has been identified as either groundwater abstraction or saltwater desalination. Subject to the source of water, and subject to the amounts abstracted, the change in groundwater levels has the potential impact both Cultural Values and access to and use of traditional resources.	Management arrangements should provide for appropriate impact assessment of the chosen water source and involvement of Traditional Owners in monitoring and management of use of that source.
	Introduced pests	Likely	High	High	Introduced pests have the potential to impact both access to traditional resources and Cultural Values in affected areas	Conditions in relation to this issue are included in the ASIA Report. Appropriate conditions may also be recommended in the ethnobiological report
Social impacts	Local population increases	Likely	High	High	Increases in population in the West Kimberley associated, directly or indirectly, with the development of the LNG Precinct has the potential to result in greater volumes of unmanaged access to traditional lands and waters.	Appropriate management arrangements in relation to cultural impacts of this stressor are recommended. The ASIA Report includes recommendations in relation to the social impacts.

Source: Table 7 of KLC Heritage Impact Assessment.

■ **Table 3-10 Confidence and Certainty regarding Identified Potential Impacts.**

Impact type	Stressor (source of impact)	Degree of confidence in assessment of impact	Level of predictability of impact	Direct / Indirect	Local / Regional	Cumulative	Irreversible
Marine Impacts	Site disturbance / excavation	High (subject to detail in master plan)	Moderate - subject to detail in master plan and HPA / ILUA arrangements	Direct	Local	Possibly	Yes
	Physical presence	High	Low - subject to detail in master plan	Direct	Local and regional (depending on arrangements regarding shipping routes and movements)	No	No
	Noise and vibration	Low (subject to detail in master plan)	Low - subject to detail in master plan	Direct	Local	Possibly in relation to vibration	Unknown (regarding vibration)
	Sediment deposition and turbidity	Low (subject to detail in master plan)	Low - subject to detail in master plan	Direct and indirect (in relation to potential impacts on traditional resources)	Local and regional	Yes – subject to dredging arrangements	Unknown
	Marine discharges including non-routine events	Low (subject to detail in master plan)	Low - subject to detail in master plan	Direct and indirect (in relation to potential impacts on traditional resources)	Local	Possibly	Unlikely
	Light emissions	Low (subject to detail in master plan)	Low - subject to detail in master plan	Direct and indirect (in relation to potential impacts on traditional resources)	Local	No	No
	Introduced pests	Moderate (subject to detail in master plan)	Moderate - subject to detail in master plan	Direct and indirect	Local and regional	Possibly	Possibly
Terrestrial Impacts	Site disturbance / excavation, including vegetation clearing	High (subject to detail in master plan)	Moderate - subject to detail in master plan and HPA / ILUA arrangements	Direct	Local	Possibly	Yes

Impact type	Stressor (source of impact)	Degree of confidence in assessment of impact	Level of predictability of impact	Direct / Indirect	Local / Regional	Cumulative	Irreversible
	Run-off	Low (subject to detail in master plan)	Low - subject to detail in master plan	Direct	Local	Possibly	Unlikely
	Noise and vibration	Low (subject to detail in master plan)	Low - subject to detail in master plan	Direct	Local	Possibly relation in to vibration	Unknown (regarding vibration)
	Vehicle movements	Low (subject to detail in master plan)	Low - subject to detail in master plan	Direct	Local	Possibly	No
	Altered fire regime	Low (subject to detail in master plan)	Low - subject to detail in master plan and management arrangements	Direct and indirect	Principally local (site and surrounds)	Possibly	Possibly
	Physical presence	High	Low - subject to detail in master plan	Direct	Local and regional (depending on arrangements regarding shipping routes and movements)	No	No
	Terrestrial wastes and discharges	Low (subject to detail in master plan)	Low - subject to detail in master plan	Direct and indirect (in relation to potential impacts on traditional resources)	Local	Possibly	Unlikely
	Atmospheric emissions	Low (subject to detail in master plan)	Low - subject to detail in master plan	Direct	Local and regional	Possibly	Possibly
	Groundwater abstraction	Low – water source not identified	Low – water source not identified	Direct and indirect	Local and regional	Yes	Unknown
	Introduced pests	Moderate (subject to detail in master plan)	Moderate - subject to detail in master plan	Direct and indirect	Local and regional	Possibly	Possibly
Social impacts	Restricted areas	Moderate	Low	Direct	Local	No	Unlikely
	Local population increases	Moderate	Low	Indirect	Local and regional	Yes	Likely

Source: Table 8 of KLC Heritage Impact Assessment.

3.5.5. Management and Mitigation of Potential Impacts on Cultural Heritage

Under the Heads of Agreement, the State and Woodside have made the following commitment:

“The State as operator of the LNG Precinct and Woodside will work with the Native Title Party and the KLC to design, construct, operate, decommission and rehabilitate the LNG Precinct in a manner that where possible avoids impacts on Aboriginal sites, including (without limitation) song lines, or minimises any impact on Aboriginal sites in accordance with the Studies Agreement (dated 7 May 2008), the proposed Heritage Protection Agreement and any future cultural heritage management plans.”

Further to this the HPA sets out the Traditional Owners' rights, how the parties to the agreement will manage heritage studies, what will be done in the event of the discovery of a site, how applications to the Aboriginal Cultural Material Committee established under the AH Act will be managed and how other activities will be conducted. The HPA confirms the mutual obligations of all parties to the agreement and states that all parties will use their best endeavours to ensure that a mutually acceptable program and timeframe for the conduct of surveys and work program clearances is agreed and that those activities proceed as expeditiously as possible. All actions and activities under the HPA are required to be AH Act compliant. They will also be conducted in accordance with the requirements of the EP Act. As such, there will be multiple triggers for Traditional Owners to be involved in the management of potential impacts on heritage. These opportunities will occur as part of archaeological and anthropological surveys so both physical and intangible cultural heritage values can be identified.

As part of the agreements with the Traditional Owners, a Cultural Heritage Management Plan is being developed that will document how any vulnerable sites will be monitored, managed and protected during the construction and operational phases of the Precinct. Each proponent seeking to establish a project within the Precinct will be required to develop a CHMP. While the breadth of the KLC HIA Report, the culture-scapes of the West Kimberley and the possible indirect impacts on broader cultural values described in the HIA will be considered, the Strategic Assessment and Precinct Plan focuses on the Precinct area and land management of the Dampier Peninsula region.

Any direct impacts to heritage sites will be done in accordance with the HPA and the AH Act on advice from the Minister for Indigenous Affairs. The BLNG Precinct Management Structure, as delineated in **Part 6, Section 3**, will provide another important mechanism to monitor, manage and report on any potential cultural heritage impacts, specifically through the Precinct Management Committee. Heritage impacts will be monitored and incorporated within the Annual Reports developed by the governance groups and submitted to the Minister.

For some specific mitigation and monitoring measures related to cultural heritage see **Part 5, Section 5** and the management measures discussed within regarding workforce, sport and recreation, tourism and sense of place. Of particular relevance are the management measures for a Managed Access Construction Camp, organised recreational activities and cultural awareness training.

The above measures will complement existing plans by the Department of Planning, Department of Indigenous Affairs (**DIA**) and the Department of Environment and Conservation (**DEC**) to develop a Dampier Peninsula Land Use and Infrastructure Plan and associated conservation reserve in collaboration with the KLC and Traditional Owners. These plans were initiated to help address existing and ongoing impacts of various land uses on the Dampier Peninsula. They will provide appropriate mechanisms to address possible impacts of visitors accessing the area on cultural heritage, including registered and unregistered rock art and other sites on the Dampier Peninsula.

The KLC is engaged in a planning process that is aimed at putting in place a management regime to deal with the potential impacts identified in this report. The Dampier Peninsula Land Use and Infrastructure Plan is intended to define areas of cultural, environmental and heritage significance and to apply appropriate land tenure and land management arrangements that will allow for the management and enforceability of access arrangements.

These tenure options could include:

- designation as conservation reserves under Conservation and Land Management (**CALM**) Act provisions;
- Indigenous Protected Area status under the AHA Act;
- Part III reserve under the AHA Act; or
- freehold title with occupier rights excluding access.

Current Ranger programs are linked to looking after Country and are not statutory in nature but this could change under joint management arrangements with DEC. In addition, DIA has the capacity to endorse Heritage wardens who could exercise AH Act compliance, particularly over the Part III reserve lands where it is an offence to enter without a valid permit.

The KLC is currently working with Traditional Owner groups on the Kimberley Coast to develop a set of guidelines and protocols for tour operators to access Aboriginal land, art and heritage sites. This work has included some Cross Cultural Awareness sessions specifically for tour operators on the Peninsula. It is anticipated that more formal protocols will be established for the coastal cruising industry.

These protocols will be in addition to the existing formal protocols that apply when accessing art and heritage sites on Aboriginal Land (obtaining a permit administered by the DIA) or when accessing unallocated Crown land and pastoral leases (obtaining permission administered by the Department of Regional Development and Lands).

Additional Mitigation and Management Measures

The ASIA notes that provisions to deal with impacts upon cultural heritage sites are contained in the KLC Heritage Impact Assessment Report and that this report will inform the BLNG Precinct ILUA or similar land agreement.

This current report sets the strategic framework to incorporate the assessment of the impacts and management requirements associated with the entire precinct, including the current proposal and future LNG processing projects. Heritage impacts specific to future LNG processing projects will be assessed by the State as part of project approvals processes. Consecutive comprehensive heritage surveys will be conducted with the Traditional Owners over the entire precinct impact area. The areas designated for the first commercial proponent lot and for common user infrastructure will be undertaken as a priority, with the survey of the area for future proponents to follow. The State and Woodside have been working with the KLC and the Traditional Owner Environment and Cultural Heritage Team (**ECHT**) to schedule the survey program.

With regard to Aboriginal heritage within the area of direct impact for the proposed BLNG Precinct, no EPBC Act matters have been identified, nor are there any Indigenous Protected Areas. Therefore studies undertaken consider Aboriginal heritage as required by the SAA Terms of Reference in the context of the Western Australian AH Act, the Environmental Review and Management Plan processes established under the Western Australian EP Act and Indigenous Heritage values under the EPBC Act.

As mentioned in **Part 5, Section 3.9**, under the HoA, the State has committed funding for 10 years for the creation of conservation and heritage reserves on the Dampier Peninsula. For the protection, management and promotion of heritage the HoA provides for the development of a CHMP to appropriately manage heritage sites in and around the Precinct and for the State to financially support a Cultural Preservation Fund over 16 years in order to sponsor and support the enhancement and protection of Indigenous cultural heritage in the Kimberley region.

3.6. Potential Impacts on Aboriginal Heritage Sites - Archaeological

3.6.1. Overview

In addition to the broad heritage assessment referred to in **Part 5, Section 3.4**, the following assessments have been conducted to ensure that the proposed Precinct Plan can be implemented consistently with the requirements of the AH Act and the ATSIHP Act:

- a review of the existing Aboriginal registered site information available at the DIA; and
- an Aboriginal Archaeological Site Avoidance survey of the Precinct area with the Goolarabooloo Jabirr Jabirr native title claimants; these surveys were conducted for the purposes of the studies; [surveys are yet to be done for the Foundation Proponent's plant layout within the Precinct, the future commercial proponents' area, the Light Industrial Area and the workers accommodation].

The survey work conducted to date (the Aboriginal Archaeological Site Avoidance Survey) indicates that the surface characteristics of the archaeological heritage landscape of the Precinct area are recognised. However, the specifics of the site are yet to be studied and understood in detail. The extent to which the Precinct Plan will affect sites and values is understood in general terms and more detailed work is yet to be completed. Additional work will need to be completed before any construction begins to ensure compliance with heritage protection legislation. All survey work undertaken to date has been consistent with the Heritage Protection Agreement and other arrangements that are in place with the KLC and the Traditional Owners.

A limited number of sites protected under the AH Act may be affected by the development. Any disturbance of those sites would be done in accordance with the AH Act and the agreements the State has with the Traditional Owners. In the regional archaeological scheme, it is predicted that these impacts are relatively confined and not significant in the sense that while the sites themselves may be affected it is likely that other examples exist. Further work will be conducted to confirm the heritage landscape of the entire Precinct area and to analyse in further detail the sites that have already been located. This work will be conducted under the heritage agreements with the Traditional Owners and the KLC.

3.6.2. Regional Archaeological Context and Existing information

The KLC commissioned an archaeological survey of the proposed BLNG Precinct in December 2009. The survey focused on the onshore component of the proposed development, while noting that additional archaeological work to investigate the potential for Aboriginal and other heritage values in the intertidal zone of the LNG Precinct area will be required. Consultation with the Goolarabooloo Jabirr Jabirr to develop a mitigation strategy to manage potential Aboriginal archaeological material in the intertidal zone will need to occur.

The proposed onshore Precinct covers an area of approximately 21 square kilometres. Within this, a 5 square kilometre priority area was identified by Woodside for the layout of its industrial block (Area A of the Precinct Master Plan at **Part 6, Section 3** of the SAR). An archaeological survey was conducted of the proposed Precinct area in January 2010. The aim of the survey was to identify Aboriginal archaeological sites within the proposed Precinct site and provide advice on the avoidance and management of any sites identified.

Background research was conducted prior to the field work which identified:

- Two Aboriginal archaeological sites, Walmadan (DIA Site ID 13076) and Kundandu (DIA Site ID 12902), are currently listed on the DIA Register of Aboriginal Sites within the proposed Precinct Area.
- Another site, Inballal Karnbor (DIA Site ID 12684) is shown on the DIA Register as extending to within 50m of the southwest margin of the proposed BLNG Precinct.
- Manari Rd, which currently provides the only vehicle access to James Price Point and the proposed Precinct, cuts through both Walmadan (DIA Site ID 13076) and Inballal Karnbor (DIA Site ID 12684).

The background research also identified and considered sites and heritage reports in the vicinity of the survey area. The survey area with existing site information as provided by the consultant archaeologists is shown in **Figure 3-4**.

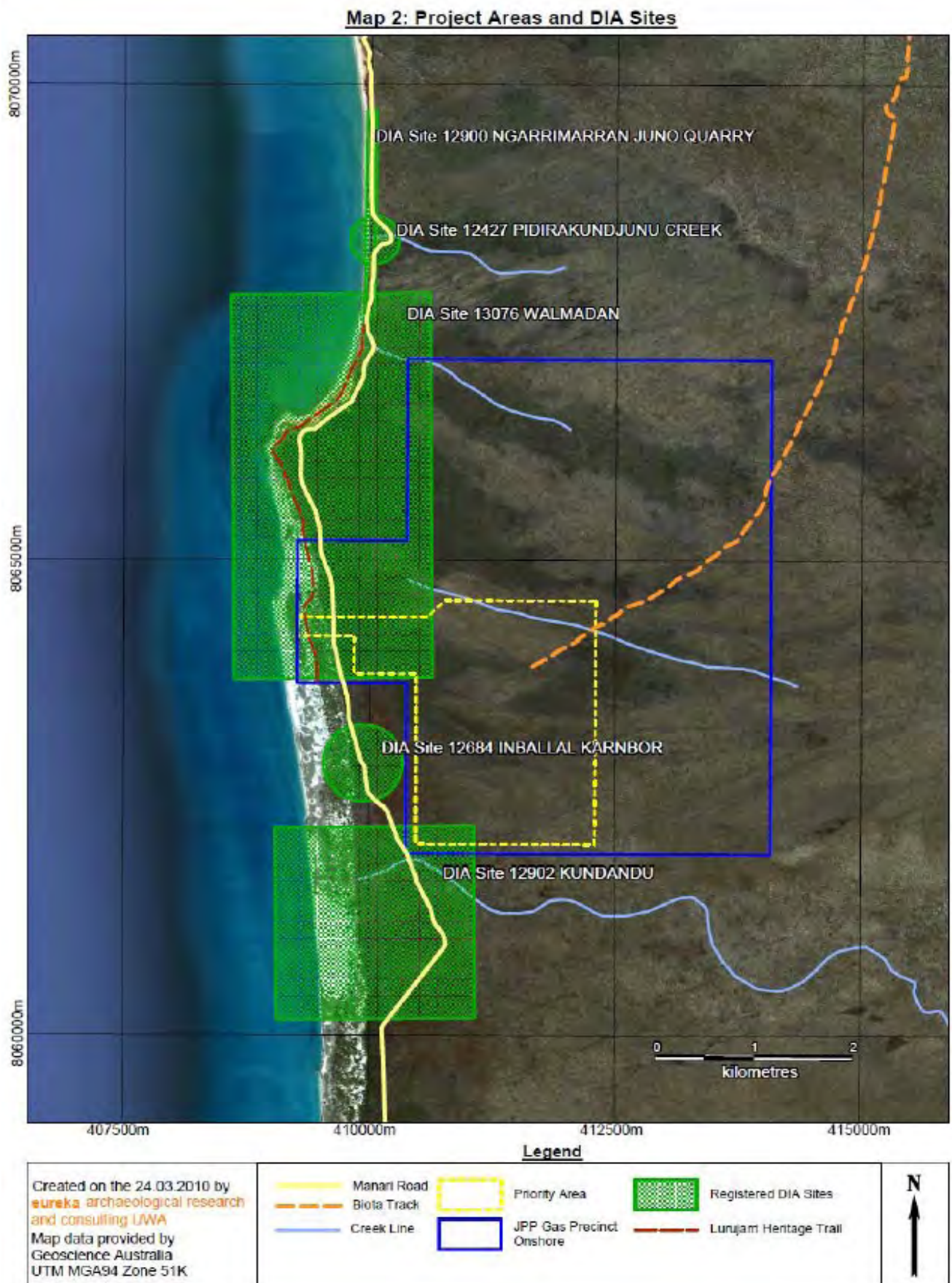
The registration of large blocks of land on the Aboriginal Heritage register represent "dithered sites" designed to conceal the actual Aboriginal site boundaries, which are generally much smaller.

3.6.3. Results of the Archaeological Survey

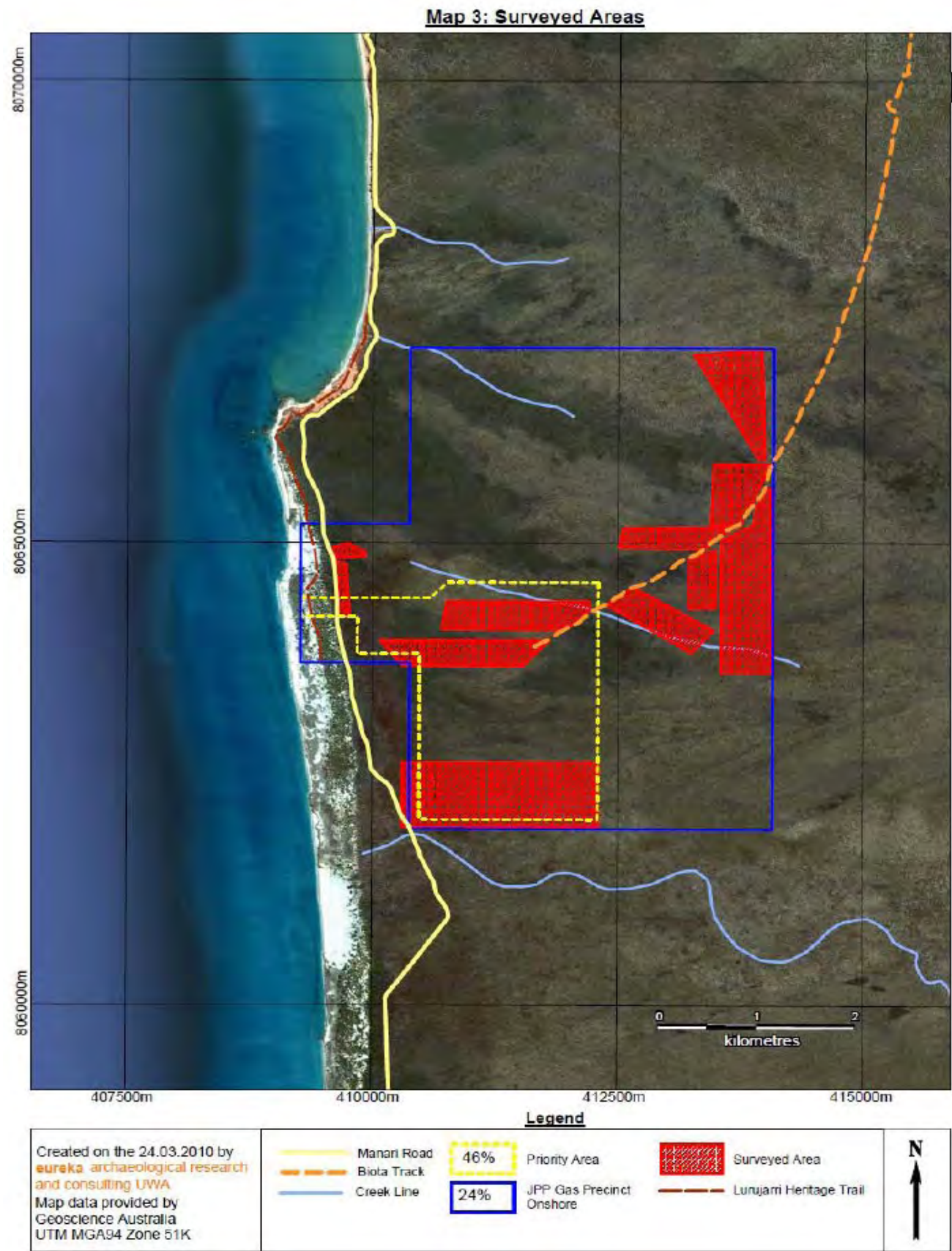
Figure 3-5 sets out the areas surveyed. The fieldwork also enabled the consultants to consider the regional archaeology and the context in which the BLNG Precinct is located. This is relevant for a quantification of the potential impacts on archaeological sites. If a site is required to be disturbed that is of high archaeological potential and of which there are likely to be few examples, such impacts would be higher than the impacts of disturbing a site of a nature likely to be replicated elsewhere in the region.

The principal findings and conclusions of the archaeological survey were as follows:

- An Aboriginal archaeological Site Avoidance survey of the proposed BLNG Precinct has been completed.
- The survey inspected approximately 24% of the Project Area and 46% of the nominated Priority Area within it.
- No archaeological sites that are not already documented on the DIA registers have been identified to date.
- While much of the inland area of the Precinct has not been subject to survey, the Traditional Owners have expressed the view that in general, travel up and down the Peninsula has been restricted to the coastal areas.
- Only four registered sites were identified within the Project Area. Based on the archaeological report it does not appear that any of these sites are of a nature that disturbance could not be managed.
- In the Kimberley, less background archaeological survey work exists that would enable the consultants to predict the regional significance of the sites and to quantify the significance of any disturbance to the archaeological record of the region and to the Traditional Owners. This is as compared to the Pilbara where there is a rich longstanding body of work due to mining development. The archaeological records in that region could be among the best and most comprehensive in Australia.
- The survey confirmed that the eastern boundary of Walmadany (DIA Site ID 13076) extends into the Project Area but has not yet been determined. Site Avoidance level recording was undertaken at DIA registered site Walmadany (DIA Site ID 13076) to identify the site boundary in relation to the Project Area. Detailed findings in relation to the site were provided to the DSD.
- In consultation with Goolarabooloo Jabirr Jabirr native title claimants, a mitigative strategy to manage Aboriginal archaeological material potentially located offshore should be developed. This could include monitoring and sieving of samples of dredged material.
- No Aboriginal archaeological materials were identified in the portion of Kundandu (DIA Site ID 12902) shown as extending into the Project Area.
- A preliminary inspection of the Inballal Karnbor (DIA Site ID 12684) site was undertaken to identify if the site actually extends into the Project Area.



■ **Figure 3-4 Survey Area with Existing Site Information.**



■ **Figure 3-5** Surveyed Areas.

3.6.4. Management and Mitigation of Archaeological Impacts

Detailed recommendations were provided by Eureka Archaeological Research and Consulting UWA, the consultants engaged by the KLC to conduct the archaeological survey in conjunction with the KLC and the Traditional Owners. While some of these recommendations are in excess of the requirements of the AH Act and are more appropriate for studies of scientific interest, generally the recommendations are in accord with the Terms of Reference and HPA and as such have been incorporated into the management measures outlined below. These measures, as well as additional survey and management work as necessary will enable the DSD to manage the potential impacts of the Precinct Plan on archaeological heritage sites.

It should also be noted that Eureka Archaeological Research and Consulting UWA recommended that ethnographic survey work occur in respect of the Precinct Area. Significant work has already been undertaken to ensure that the Precinct site does not contain any heritage sites with such ethnographic significance that they would prevent the Precinct Plan proceeding. This work included the site selection work and the Heritage Protection Agreement. Additional ethnographic survey work for the Precinct is anticipated and will be planned with the KLC to ensure compliance with the HPA and the AH Act.

The State, Woodside and any future commercial proponent will adopt and implement the following measures to ensure that archaeological impacts are identified, managed and mitigated as the development progresses:

- If the State passes on or delegates any authority to other parties to conduct operations in the BLNG Precinct area it will also pass on any relevant obligations to those parties. If it does not, those obligations are assumed to remain with the State.
- all employees and contractors to be advised that the identified sites within the Precinct are Aboriginal archaeological sites to which the AH Act applies and must be avoided unless appropriate consents are in place.
- all ground disturbing work in the vicinity of registered sites will not be undertaken until sites are identified and recorded to an appropriate level of detail.
- Further archaeological survey work will be conducted as required to ensure that any works that are commenced are conducted in accordance with the requirements of the applicable heritage legislation.
- Prior to disturbing any sites, in accordance with the HPA, the State and Woodside or other future commercial proponents will:
 - consult with the Goolarabooloo Jabirr Jabirr native title claim group and its representatives on those plans;
 - not disturb sites without appropriate consents under the AH Act given by the Minister for Indigenous Affairs. Applications for these consents will be submitted following consultation with the Goolarabooloo Jabirr Jabirr native title claim group and its representatives;
 - record the sites to the level of detail in accordance with the DIA Guidelines before disturbance and conduct an archaeological site significance assessment made by a suitably qualified archaeologist as required under Section 18 of the AH Act;
 - subject to conditions imposed by AH Act consents, enable salvage to occur as agreed after consultation with the native title claimants.

A Cultural Heritage Management Plan will be developed for sites within the Precinct area in consultation with Goolarabooloo / Jabirr Jabirr native title claimants. This may cover storage of salvaged materials, monitoring as required, or stop work procedures in the event that skeletal materials are discovered during construction. In the event subsurface archaeological material is found during construction, procedures as established under the HPA and any agreed Cultural Heritage Management Plan will be followed. If a AH Act consent to use the land has been granted, the conditions of that consent will apply in **addition** to any requirements under the HPA and CHMP which do not breach the AHA condition of consent.

3.7. Potential Impacts on Indigenous Environmental Values

3.7.1. Overview

The impact on species and environmental values has been assessed in detail in the SAR. These potential impacts are very relevant to Indigenous people because of the economic, social and cultural significance of particular species and activities (such as fishing) and their unique relationship with the landscape (as described in **Part 5, Section 3.5**).

This section outlines the potential impact of the Precinct Plan on environmental values and species that could have specific impacts on Indigenous people. The KLC ethnobiology, archaeological, heritage and ASIA reports each point to the potential cultural value to Aboriginal people of species within and surrounding the Precinct.

The impacts on Indigenous people in this regard are difficult at this stage to predict and quantify. Given the relatively limited area of the Precinct compared with, for example, the country associated with the Goolarabooloo Jabirr Jabirr and the Indigenous people of the Peninsula, it is expected that overall the impacts would be confined and manageable. To the extent that Indigenous people would be restricted access to the Precinct site and the works destroy flora or cause fauna to leave the site, this would potentially affect Aboriginal people. However, based on the ethnobiology and customary fishing report, it appears that the activities associated with the collection and use of customary renewal resources are conducted in various locations across the region. This would indicate that if the implementation of the Precinct Plan in part prevents the activities occurring, it would not mean the end of the activities, but it may limit people's options to conducting them to other areas. However, this effect should be understood in the context of visitor growth in the Peninsula area, in part due to the establishment of the Precinct but primarily due to the projected growth of the population of Broome, and associated potential cumulative impacts on marine resources.

3.7.2. Ethnobiology

3.7.2.1. Indigenous environmental values

Many species of plants and animals found in Indigenous country are of economic and religious importance to their Traditional Owners. This is the case for the Dampier Peninsula people, as well as for Aboriginal People in other parts of the Kimberley.

Plants and animals are part of the cultural land- and sea-scapes of these areas and, as such, they are significant components of the Aboriginal heritage of the Precinct area. Certain areas are both recognised and named as especially rich sources for such resources.

These values which apply to the Dampier Peninsula area were identified in the KLC's Indigenous Impacts Report and ASIA. The KLC findings and any applicability to the Precinct area can be summarised as follows:

- Some areas, such as Packer Island (north of Pender Bay) and the immediate hinterland to the east continue to be a focus for Aboriginal people to source bush foods, as it was in the past. There are many extensive middens along the island and on the beaches to the east. There are freshwater sources nearby, as well as access to open ocean to the west and tidal flats to the east, thus creating an ideal environment for sustainable living due to the wide variety of habitats available for exploitation.
- Turtle and dugong continue to be highly prized resources. People used to, and continue to, watch from the top of nearby dunes or headlands for signs of both turtle and dugong and launch boats (or rafts in the past) to pursue them.
- Many varieties of reef, near-shore and offshore fish species are caught by line, spear and/or trapped in man-made or natural fish traps.
- Some fish are poisoned using plant based fish poison (*Tephrosia crocea*). Mangrove areas and associated mudflats are sourced for various shellfish species and mud crabs at low tide. People climb up mangrove trees during high tide to spear fish from this platform. Species such as mullet and long-toms in particular are caught here. There are no mangroves in proximity to the BLNG Precinct area.
- Stingray can be speared off the beaches and mangrove worms collected. These activities also reinforce and support people's social relationships and connections to country.

- Birds and reptiles have also been harvested for food in the region. Gums from trees have been used and honey extracted from tree hollows. The ti tree or paperbark groves surrounding the mangroves are particularly suited for habitation by the native bees that produce honey.

3.7.2.2. Ethnobiology Information for Terrestrial Plants and Animals

See **Part 4, Section 2.5** - Species of Ethno-biological Significance.

3.8. Customary Fishing

3.8.1. Overview and Conclusions about Impacts

Dr Guy Wright was commissioned by the Department of Fisheries to provide a report entitled "Impact of the proposed Kimberley LNG Precinct on Customary Fishing in the Vicinity of James Price Point" (Big Island Research, 2010). The report summarised findings about the fishing practices of Indigenous people likely to be affected by the Precinct Plan.

In the context of the Terms of Reference, the following matters can be concluded from the Report:

- It can be reasonably predicted that the Precinct Plan is likely to affect customary fishing in the immediate vicinity of the Precinct just south of James Price Point because the facilities would restrict access and much of the fishing done is land based or close to shore.
- Access to James Price Point itself would be maintained from Broome via the Precinct access road and an unsealed track around the Precinct itself. This access would be managed within the context of:
 - the Recreation Management Strategy;
 - the Dampier Peninsula Land Use and Infrastructure Plan; and
 - management plans developed in consultation with the Traditional Owners for the proposed conservation reserve that is to surround the Precinct area.
- However, customary fishing in the immediate vicinity of the Precinct has declined in recent years. It would appear that fishing is also conducted regularly and by a large proportion of the Indigenous population at a variety of coastal locations in the impact area.
- There are cultural values associated with customary fishing that would be affected if the fishing at James Price Point declines as a result of the development. However, it appears likely that customary fishing would not stop as a result of the development but would continue elsewhere as discussed above. On this basis, it can be concluded that the cultural values associated with fishing activities can be maintained notwithstanding the implementation of the Precinct Plan.

3.8.1.1. Customary Fishing Context and Existing Information

The report relies on the 2006 census information to conclude that 20.2% of the population of urban Broome is identified as "Indigenous." This equates to an Indigenous population in the order of 2,800. According to the statistical data available on Aboriginal fishing practices, up to about 90% of these people may conduct some form of fishing in a given year (see below). This gives a rough indication that the number of potential Aboriginal fishers based in Broome would be about 2,500.

A 2003 Commonwealth sponsored statistical study entitled *The National Recreational and Indigenous Fishing Survey (NRIF)* found, in the 13 Kimberley communities that were studied, that between 89% and 93% of Aboriginal people aged five years and older had fished at least once in the previous year (Henry and Lyle, 2003: 110). The same study found that approximately 28.5% of the general population of Western Australia over the age of five years had fished at least once in the previous year (Henry and Lyle, 2003: 131).

The data generated from the NRIF came from across northern Australia generally, and it is difficult to extract regionally specific information from it. However, it clearly shows that Aboriginal people in northern Australia fish much more regularly than people in the general population. This is likely to be due to a range of factors including: relative poverty

(the need to provide food); lack of alternative recreational opportunities (especially in the small communities where the Commonwealth focused much of its research); and a desire to be “on country” to focus on Aboriginal identity.

Research has included estimates of the types of fishing that Aboriginal people in general are known to engage in. Very few Aboriginal people own boats for fishing, although the numbers who do are probably growing. Most customary fishing is from shore; line fishing is easy and accessible to all who can get to the coast with a simple handline. This is the typical manner of fishing. However, nets are also used (**Figure 3-6**) both to procure bait and for catching fish such as mullet, which are a highly valued fish but which are difficult to catch with hook and line.

There are a much smaller number of people who fish with spears. Most of these, based on experience, are using surface spears, but some are snorkelers who use spearguns. Catching certain fish by hand is also practiced, especially for crayfish, but the category may also include the collection of shellfish. Aboriginal people continue to collect a range of shell species, many of which are not taken by non-Aboriginal fishers.



Source: Photo by Customary Fishing Study author Dr Guy Wright.

■ **Figure 3-6 Casting for Bait near Manari.**

3.8.1.2. Findings about why Indigenous People Fish

During the fieldwork, a Jabbir Jabbir man described customary fishing around Broome as being for “culture, food, flavour, and fun.” The order in which the priorities are set out appears to be accurate and indicates they are the result of some reflection.

Culture

Aboriginal people consider their cultural selves as Aboriginal people as being dominant features in their lives. There are both formal and informal aspects to this cultural view of life. Each man interviewed was the member of at least one specific, linguistically defined, cultural group. Each participates in formal aspects of culture, which require, in addition to religious observances, certain obligations and formal relationships with others. They are engaged in reciprocal arrangements with other Aboriginal people from their own and other groups. Formal and informal trading networks are actively engaged and remain highly significant aspects of the local economy that derive from cultural understandings (Peterson and Rigsby, 1998; Cordell, 1992; Meyer *et al.*, 1997; as cited in Big Island Research, 2010).

Formal aspects of culture require certain prescriptions and observances that limit what may be eaten. Fish, dugong and turtle are apportioned according to status and the kin relation of the receiver to the fisher/hunter. Respect of individuals

and the community generally is shown by the maintenance of these practices. For example, red meat is prescribed for people who are in mourning – during “sorry time.”

In less formal terms, customary fishing is an integral element of the cultural outlook of Aboriginal people in the Kimberley. It sustains them in their ongoing need to remain connected with their country and provides an important focus for informal engagement with their “countrymen” and “countrywomen,” which reinforces and maintains their cultural outlook.

Food

Wild-caught fish and meats are a highly significant portion of the local economy for Aboriginal people in the communities of the Kimberley, and also in Broome. Wild meat and fish that is procured this way appears to enter systems of generalised reciprocity where it is distributed, first among family members, and then to a wider community where appropriate. This system of reciprocity has obvious traditional utility, since surplus meat could not be stored in traditional times. The widespread use of freezers makes the system more convenient. The Jabirr Jabirr fishers jokingly referred to it as “freezer fishing” – meaning that they took a meal of fish or other meat from (usually) another’s freezer.

The generalised nature of the reciprocal system means there is no specific requirement to exchange like with like, as might occur during a “barter” session. Meat and fish appears to enter the system, usually the result of the efforts of a relatively small number of good hunters and fishers, and is distributed informally.

In the communities of the northern Dampier Peninsula, recent work conducted through the Centre for Aboriginal Economic Policy Research ANU (CAEPR) has shown there are quite significant economic savings to be made across the community from this form of economy. Geoff Buchanan and others surveyed the Bardi/Jawi use of turtle and dugong as a substitute for store-bought meat. This study found that although 20% of the population did hunting for turtle and dugong, a small percentage of active hunters (five out of a total of fifty-five hunters) provided almost half the catch. In a twelve-month period it was estimated that 11,840kg of meat came into the community of 588 people. This was worth about \$355,200 in total value, or about \$79.43 to each household per week. In the context of low average weekly incomes of about \$692 per week for households (\$250 per week for individuals) this offset to the food budget is substantial.

Flavour

Aboriginal people in the Kimberley universally refer to wild meat and fish as being “fat” when the animal is in its prime and it is the best time, in the appropriate season, to be killed and eaten. Meat and fish in polystyrene containers at the supermarket do not have the same appeal, no matter what their quality. One of the Goolarabooloo / Jabirr Jabirr customary fishers pointed out that it was irrelevant to think about the costs of quality produce available because they would never buy it anyway. Bush food is preferable. Tastes that are available to people from bush food is not replicable in other foods.

Fun

Fun is the last item on this prioritised list. This reflects a reverse of the priorities that would be relevant to recreational fishers, who are expected to be fishing primarily for the enjoyment of the experience, and from which good fish, a good feed, and some cultural meaning may result as by-products of the enjoyable experience. Although customary fishers usually enjoy their experience greatly, the enjoyment is subordinate to the other three key factors described above.

3.8.1.3. Results of the Customary Fishing Study

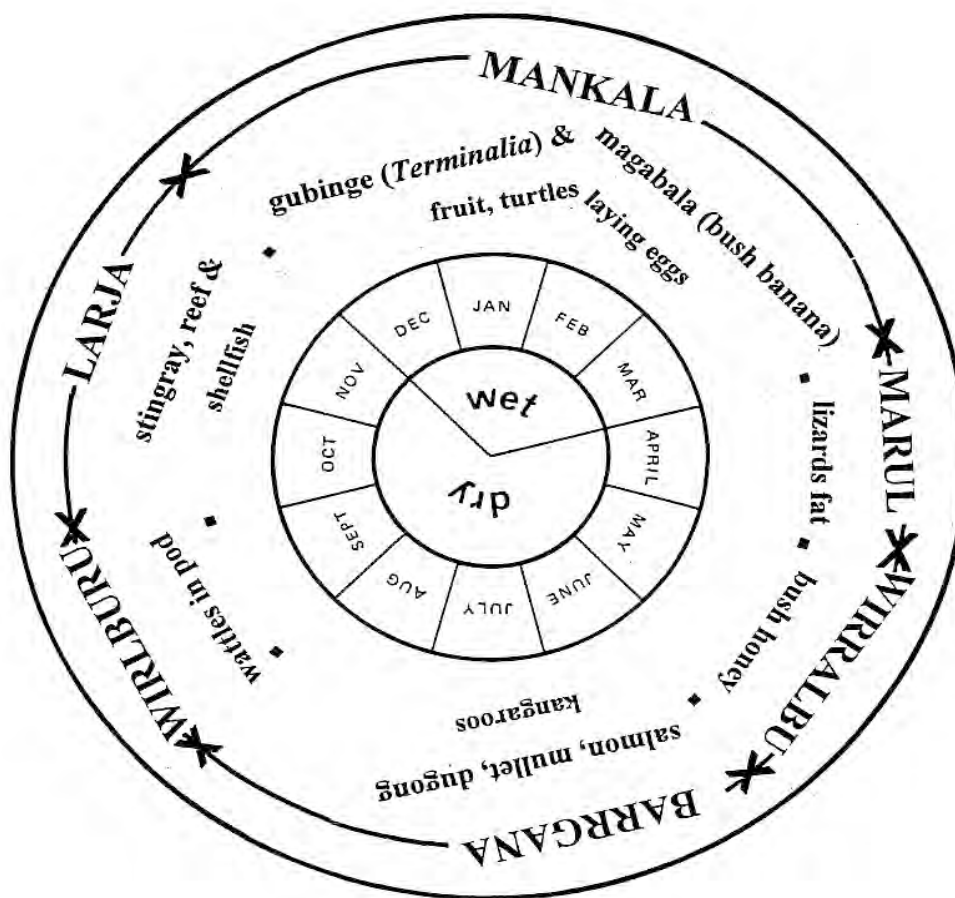
James Price Point has a number of features that make it particularly attractive to customary fishers. It has a relatively large reef system associated with it, which extends south of the point, potentially into the area that is likely to be required for use by the proposed BLNG Precinct. The reef is described by customary fishers as being “... *really alive: it has a lot of coral and shellfish, clams and trochus.*”

It has the advantage of being accessible for fishers without the need for a dinghy or boat. It produces a wide range of fish species, plus both green and flatback turtles, which appear to use the area opportunistically for feeding and some nesting, and dugong. “Yesterday I saw a flatback turtle nesting. Just south of Price’s Point.” Several people commented that it was a good place to catch turtle. One man specialises in snorkeling and fishing with a spear-gun in the reef’s gutters just to the south of James Price Point.

Customary fishers say they catch the following species at or near James Price Point:

Maori Sea Perch (<i>gidit</i>)	Stingray (oysterback)	Blue bone (parrotfish)	Threadfin salmon – both species
Queenfish	Spangled emperor	Green turtle	Yellowtail bream
Painted crayfish	Mussels	Flatback turtle	Silver Bream
Surgeon fish	Oysters (rock)	Coral trout	Rock cods
Red snapper	Trevally	Mulloway	Small sharks
Manta rays	Baler	Clam	Dugong
“Unicorn fish” – Leatherjacket (<i>gumbul</i>)	Javelinfish (Triggerfish)	Mullet (two species “deep sea” and “yellow”)	

Representation of seasonal coastal activities with reference to Bardi people of the northern Dampier Peninsula (Smith, 1997:7 as cited in the HIA; KLC, 2010b; **Appendix E-4**) is provided in **Figure 3-7** below.



Source: Big Island Research, 2010.

■ **Figure 3-7 Seasonal Coastal Activities with Reference to Bardi People.**

Almost all customary fishers remarked that James Price Point is arguably the best place to catch Maori sea perch, or “gidit,” sometimes called “Green Snapper” (*Lutjanus rivulatus*), which is the favoured fin-fish of customary fishers. There was some concern that this species now appears to have a relatively restricted range. Customary fishers reported that *gidit* used to be more abundant and that it could be caught down to Gantheume Point near Broome, but it now appears to be restricted to the areas north of Quandong and south of Manari. The “bait balls” that the recreational sector fishers commented on as creating particularly good fishing off the Quandong-James Price Point coastal area (Big Island Research, 2009:9ff.) were also noted by the customary fishers.

James Price Point is considered an excellent fishing place. However, it appeared from the interviews that it is used somewhat less now than it was in the past. When access was more difficult in previous years, Aboriginal families would camp at Walmadany for weeks on end. Now, most fishing is done on a day-trip basis, although some people do continue to camp for short periods behind the cliffs. Increasing access, and more disturbance from non-Aboriginal locals and tourists from Broome seemed to be the key reason people use it less for longer term outings. However, the better access allows people to come on day-trips easily.

3.8.1.4. Concerns about the Potential Impacts of the Precinct Plan on Customary Fishing

The following results reflect the information and opinions provided by customary fishers in interviews undertaken as part of the customary fishing study.

Concerns about the scale of development

- All customary fishers interviewed commented on the size of the proposed development. Most said that they were unlikely to feel comfortable fishing near the BLNG Precinct when it is built. They thought it would alter their feeling for the country and that this would be a reason for them simply not to return to the area.
- One younger person pointed out, however, that people continue to use the Broome Wharf for fishing and that it too was considered a huge industrial structure. He thought that, over time, people would adapt to the presence of the BLNG Precinct and, so long as there were no pollution and other problems, it would be accepted as part of the re-adjusted land and seascape.

Local overfishing during construction phase

- It was considered that the 6000 estimated peak workforce required to construct the BLNG facility should not be permitted to fish recreationally near the construction site. This would risk severe localised overfishing. Recreational fishers also raised this issue in the Fisheries Impact Study.
- It was generally accepted that something would need to be done about the potentially intense fishing pressure that could occur during construction. The possibility for management arrangements was discussed with the Goolarabooloo /Jabirr Jabirr group who were of the view that discussions should take place with the range of interested stakeholders, including Traditional Owners.

Increasing pressure from growth of Broome

- All the Traditional Owners that participated in the study were especially concerned about the growth of the general population in the Broome region and the pressure that this would place on fish and other resources. All Traditional Owners interviewed considered this to be either the most important issue associated with the proposed BLNG Precinct or a very significant issue. The 2006 census established Broome's population as 14,436 (Australian Bureau of Statistics), but the town swells during the tourist season to about 45,000.
- Even without development associated with Browse Basin gas, Broome is expected to double in size from an estimated 17,100 people in 2011 to 31,400 people twenty years later in 2041. Although the overall population growth attributable to the BLNG Precinct is relatively modest – an initial 400-600 full-time ongoing positions are expected – this is cumulative growth that adds to the already substantial growth expected in the Shire of Broome.
- Several people interviewed said that they used the James Price Point area for fishing now less than they had in the past because of the roads and easy access that encourage tourists to use the area.
- Another customary fisher noted his perception of environmental changes in Roebuck Bay. In his view, Roebuck Bay had been “devastated” by pollution, especially phosphorus that is washed into the Bay and helps foster algal blooms. He also commented that the Mangroves around Broome were suffering and that an unhealthy change in species mixes was occurring. He commented, “When we were young it was a paradise, food was everywhere, but now it's getting hard to find – because of the relentless development of Broome.”

Access north of James Price Point may be enhanced

- A key issue for many recreational fishers (Big Island Research, 2009: 23) is that access to the north of James Price Point may be significantly hindered by the proposed BLNG Precinct. They hope that access will be established around the Precinct so that they can continue to travel to Manari and places further north.
- This is resisted by the customary fishers who see that the increasing numbers of campers and day-trippers accessing country around Broome is one of the key negative features of Broome's expansion, which is expected to be exacerbated by the proposed BLNG development.
 - The Recreation Management Strategy described in **Part 5, Section 5** intends managing worker access to the Dampier Peninsula. It will be developed and implemented in consultation with the Traditional Owners.
 - Access by the general public, unrelated to the establishment of the Precinct, will be managed through the finalisation of the Dampier Peninsula Land Use and Infrastructure Plan being developed in consultation with the Traditional owners and the conservation reserve that will ultimately surround the precinct
- The Goolarabooloo / Jabirr Jabirr group were concerned for their own interests in the Barred Creek to Coloumb Point segment of the coast, but they were equally concerned for their fellow Aboriginal people based in Beagle Bay and the communities further north. They pointed out that recreational fishers accessing the coast with boats from James Price Point would easily run north to Beagle Bay and beyond. This, they thought, would have a detrimental effect on the capacity of the people at Beagle Bay to conduct their customary fishing.

Native Title and Integrated Planning

- An integral part of Goolarabooloo / Jabirr Jabirr expectations for better planning is that a workable system of rangers would be developed, using local Indigenous people. Most customary fishers interviewed complained that the extremely small number of Department of Fisheries compliance officers allocated to the massive Pilbara/Kimberley region could not possibly provide adequate policing of fisheries and other marine issues. Indigenous ranger training programs have been developed elsewhere with some success. Appropriately supported marine rangers could provide valuable services that are of benefit to all user groups is discussed earlier.
- There is a critical need to enhance the capacity of Traditional Owners to engage in regional coastal and marine planning matters. Recognition of native title rights in the Goolarabooloo / Jabirr Jabirr group may assist to enable Traditional Owners to be an integral part of any negotiated arrangements that are relevant to integrated coastal and marine planning in the Kimberley.

Maritime Hygiene

- Goolarabooloo / Jabirr Jabirr people and other Traditional Owners were concerned about the range of environmental hazards that may be associated with the proposed BLNG Precinct. In particular, and in common with pearl farmers, commercial and recreational fishers, they worried that as yet unknown pest species and diseases could be introduced from the increase in international shipping traffic that would accompany the Precinct's development (See for example Hutchings *et al.*, 2004 and Minoru, 2000; as cited in Big Island Research, 2010).
- The concern about the introduction of pests and diseases stems in part from the same sense of the need for environmental responsibility as other members of the public, but it has the added imperative that Traditional Owners rely upon the marine environment for a considerable portion of their basic food needs.
- All customary fishers interviewed expressed their expectation that the highest possible levels of cleanliness and inspections would be required of vessels using the BLNG facility.
- Customary fishers made three suggestions:
 - Australian inspectors working to the highest Australian standards should make all pre-departure inspections of international shipping destined for the proposed BLNG facility.
 - Where ballast water or other foreign material needs to be discharged it should be done at a single place that can be monitored so that if disease or pests are transported they will be found, hopefully contained and dealt with.
 - Some form of failsafe design could be designed into the wharf and other facilities to contain any accidental spillage that may cause pollution.

Potential pollution and silting

- In common with the other fisheries interests, customary fishers were concerned that there would be considerable repetitive dredging required for the proposed shipping channels and harbour, and that this would cause excessive silting of a wide area because of the currents and high tidal range in the area.

3.8.1.5. Management and Mitigation of Impacts on Customary Fishing

The following mitigation measures have been suggested to manage impacts on recreational fishing and apply equally in respect of customary fishing:

- In relation to concerns regarding a potential reduction in fish stocks as a result of over-fishing by construction workers, customary fishing activities will be protected by the operation of a Managed Access Construction Camp close to the James Price Point Precinct.
- The risk to fishing interests from Invasive Marine Species (IMS) will be mitigated through the implementation of measures to minimise incursions, support early detection and response, control and/or stop activities that are found to cause the introduction or spread of IMS when required.
- IMS will be managed in accordance with international, Commonwealth and State legislation; vessel movements and operation will be conducted in a manner that is consistent with relevant conventions and associated guidance, including but not limited to the:
 - International Maritime Organisation (IMO) – ‘International Convention for the Control and Management of Ships’ Ballast Water and Sediments’;
 - Convention on Biological Diversity - specifically identifies the need to “control or eradicate those alien species which threaten ecosystems, habitats or species”;
 - United Nations Convention of the ‘Law of the Sea’ - specifically protection and preservation of the marine environment;
 - ANZECC/ARMCANZ Code of Practice for Antifouling and In-water Cleaning and Maintenance; and
 - Voluntary Biofouling Management Guidance Documents.

The State notes that apart from the Managed Access Construction Camp, these and other related strategies form part of the environmental impact sections of the Strategic Assessment Report, especially those relating to Marine Ecosystem Integrity (**Part 3, Section 2.8**).

- Access restrictions to fishing and boating areas will be mitigated through:
 - maintenance of coastal vehicle access around the Precinct site as far as practicable and an investigation into options for maintaining existing coastal access for recreational use. One such example is providing boardwalk facilities to provide improved access to fishing areas;
 - establishment of alternative coastal routes in consultation with customary fishers and fishing groups;
 - investigation of the establishment of an alternative recreational boating facilities/boat ramp (as part of the Recreation Management Strategy described in **Part 5, Section 5**) near to the Precinct site to offset anticipated access restrictions; and
 - investigation of the establishment of medium scale boating facilities in Broome capable of catering to recreational and charter vessels, commercial fishers, and pearling vessels.

Most of these suggested measures are considered reasonable and are under discussion between the State and the KLC as part of the negotiations for the development of the conservation and heritage reserves referred to in the Heads of Agreement. Provision of vehicle access around the Precinct has been agreed in the final Master Plan. Funding for a Broome boating facility was announced in the recent State Budget.

The customary fishing report also raised concerns of Traditional Owners that related to the potential increase of recreational fishers. This would largely arise through general increases in population that are indirectly related to the development of the BLNG Precinct. There is scope for these concerns to be addressed in the ongoing discussions with the Traditional Owners.

3.9. Traditional Owner Informed Consent and Consultation

On 15 June 2007 the Cabinet of the Western Australian Government established the Northern Development Taskforce (**NDT**) “to identify one or more suitable strategic industrial sites to minimize the environmental and heritage footprints of, and be practicable for, proposed Browse Basin gas-based projects”.

At that time a key objective of government was to establish the basis for the meaningful participation of Kimberley Aboriginal communities in a site selection process to underpin “informed consent” for the development of the Browse Basin gas at a site on the Kimberley coast and ultimately for the BLNG Precinct Plan under the Strategic Assessment.

The process set out below describes the range of good faith negotiations, consultation, engagement and other mechanisms by which the Western Australian Government undertook to achieve the informed consent of the Traditional Owners throughout the West Kimberley more broadly, and that of the Goolarabooloo / Jabirr Jabirr native title claimants in establishing a BLNG Precinct subject to statutory approvals.

Several significant engagement activities highlight the long timeframe and ongoing nature of the consultation and mutual engagement process, including:

- In January 2008 the State and the KLC executed a Financial Assistance Agreement to support the engagement process to agree on site selection.
- Between March and July 2008 the KLC conducted a consultation program involving over 30 West Kimberley community and Traditional Owner Taskforce (**TOTF**) meetings.
- On 7 May 2008, in good faith and with mutual respect, the State and the KLC entered into a studies agreement to ensure technical studies were conducted in an appropriate manner and did not impact on heritage sites.
- In December 2008 a final site selection report was released.
- On 11 March 2009 the State and the KLC executed a Negotiation Funding Agreement for ongoing negotiation and consultation.
- On 21 April 2009, the State, the KLC and Woodside Energy Ltd executed a Heads of Agreement to establish the BLNG Precinct in the vicinity of James Price Point.
- On 14 August 2009, a full day workshop was held in Broome to further refine the James Price Point site.
- From that workshop, a series of technical, environmental and heritage questions were developed that ultimately formed the basis of the Traditional Owners’ Information Package, later modified to produce a comprehensive Public Information Booklet hosted on the DSD website noted below. This information package was circulated by the KLC to assist in the process that ultimately lead to the Traditional Owners agreement of the final site location.
- On 8 October 2009, the State and the KLC entered into a Funding Agreement to fund the KLC to meet the costs of the negotiations for an ILUA or ILUAs and related agreements and other specified activities.
- On 13 November 2009 the State, the KLC and Woodside entered into a Heritage Protection Agreement (**HPA**), to ensure appropriate account was taken of the Traditional Owners’ views regarding heritage sites.
- Throughout 2010 funding has been provided to progress involvement in studies, negotiations, consent determination and promotion of the benefits negotiated in the HoA.

Further detail about the involvement of the KLC and the Traditional Owners can be found in the DSD *Browse LNG Project, Indigenous Impacts Reports* and is posted on the DSD website at:

http://www.dsd.wa.gov.au/documents/NEW_Browse_LNG_Precinct

3.9.1. Terms of Reference

The Terms of Reference for the Strategic Assessment Report, included in DSD, 2010c; **Appendix A-3**, was agreed by the State and the Commonwealth and advertised for public comment before being finalised. Section 7 of the Terms of Reference is the primary section dealing with relevant Indigenous impacts, where Section 11 deals more generally with consultation, including Indigenous consultation.³

Extracts from the Terms of Reference are provided below:

Section 7 – Indigenous Impacts

- a) whether the Traditional Owners have given informed consent, in a culturally appropriate manner to the implementation of the Plan.

Section 11 – Consultation

The Report must include any details of consultation, in addition to the statutory consultation, about the Plan, including:

- a) details of the consultation process for site selection including the public process and directed engagement with stakeholders, and the outcome of these consultations;
- b) any consultation that has already taken place, including with Indigenous communities;
- c) proposed consultation about relevant impacts of the action, including with Indigenous communities; and
- d) if there has been consultation about the proposed development, and if so, whether there is any documented response resulting from the consultation (including how the assessment and Report have addressed issues raised by the consultation).

3.9.2. State's Objective to Achieve Informed Consent and to Confer Benefits to the Region's Indigenous People

In pursuing the establishment of a LNG Precinct, an important objective of the Western Australian Government was to ensure that Traditional Owners were fully informed about the options during the site selection process, and that they provide support for the site ultimately selected. Another key objective of Government was that the establishment of a LNG Precinct would provide the indigenous people of the region significant benefits and opportunities to assist in overcoming indigenous disadvantage.

Consistent with these objectives and with the Cabinet decision noted above, the NDT set about as a priority establishing the basis for the Kimberley Aboriginal community's meaningful participation in the site selection process. The process was to underpin the ultimate "informed consent" decision in anticipation of finding a suitable site that was technically viable, environmentally sustainable and acceptable to Aboriginal people taking into account Aboriginal heritage, cultural significance and any related impacts on the Aboriginal community. The government was mindful of the costs associated ensuring an appropriate level of participation and consultation with all Kimberley Traditional Owner groups and factored this into the funding levels provided.

³ In the development of the Terms of Reference with the Commonwealth, the Western Australian Government was cognisant of the aspirations inherent in the principle of Indigenous Free Prior Informed Consent (IFPIC) as contained in the UN Declaration on the Rights of Indigenous People (UN DRIP). While originally declining to sign the Declaration, the Commonwealth subsequently voiced its general support on 3 April 2009; some 14 months after the Terms of Reference were agreed. There has however, been no undertaking to embody any of the Declaration in Australian law.

It follows then that the Terms of Reference that was agreed by the State and the Commonwealth and advertised for public comment before it was finalised, deliberately uses the simple language of "informed consent" and not that used under the Declaration. If the intent had been to use the UN principle, then it would have been explicitly written into the agreement.

The KLC facilitated comprehensive consultations and engagement with Traditional Owners related to the Browse Basin gas development and site evaluation process. This facilitated continued engagement and consultation in response to:

- the release of the NDT site evaluation report;
- the final site selection of James Price Point;
- the detailed development of the Precinct Plan;
- the negotiation and development of the Heads of Agreement;
- the negotiation of the Heritage Protection Agreement; and
- ongoing negotiations for an ILUA or land agreement.

The process has also included direct engagement with Woodside as a potential Foundation Proponent.

3.9.3. Traditional Owner Participation in the Assessment of 43 Sites

The initial site selection process for the Browse Basin gas development considered some 43 different sites in the Kimberley as well as options outside the Kimberley such as offshore processing and piping the gas to the Pilbara region for processing. That process eliminated the suitability of many of the sites, reducing further evaluation to 11 sites on the Kimberley coast. While engagement with the KLC and Kimberley Traditional Owners had been ongoing from the beginning of the site selection process, their participation increased significantly by mutual consent once selection was refined to the 11 sites and subsequently to four as detailed below.

For the purposes of the NTA, the KLC is the recognised Native Title Representative Body for the Kimberley region, representing Traditional Owners in the Kimberley. The KLC is therefore the appropriate organisation to facilitate comprehensive engagement with Kimberley native title holders and claimant groups and other Aboriginal community members.

3.9.4. Traditional Owner Participation in the Assessment of Eleven Sites

In January 2008, the State signed a Financial Assistance Agreement with the KLC to support the process to refine site selection. This was to ensure that informed engagement and consultation with Traditional Owners at this critical stage of site selection was achieved in accordance with the Equator Principles⁴ and the Performance Standards of the International Finance Corporation.

The KLC and the NDT agreed to a work plan to ensure that native title holders, claimants and Aboriginal communities on the Kimberley coast had the opportunity to be fully informed about the Browse Basin gas development and any proposals to process the gas onshore.

The KLC indicated the support of the TOTF to allow the NDT to continue with the evaluation of sites and agreed that it would facilitate consultations with all coastal native title holders, claimants and Aboriginal communities from Cape Londonderry in the north to the Kimberley/Pilbara representative area in the south.

The TOTF undertook extensive consultations with all stakeholders and participated in technical, environmental and heritage studies, visits to country and a visit to the Burrup Peninsula. During the site selection process, the KLC consultation program involved over 30 community and Traditional Owner representative meetings between March and July 2008.

The KLC and the Traditional Owners actively participated in NDT working groups or in field studies and workshops. In addition, other Aboriginal interests such as Aboriginal tourism businesses and community organisations contributed to knowledge sharing.

⁴ The Equator Principles (EPs) are a voluntary set of standards for determining, assessing and managing social and environmental risk in project financing. Extract from the Browse LNG Precinct Public Information Booklet available at:
http://www.dsd.wa.gov.au/documents/NEW_Browse_LNG_Precinct_-_Public_Information_Booklet.pdf

The eleven sites were subject to further detailed examination and four sites were short listed. Issues taken into account included:

- the suitability of locations in terms of technical, environmental and Indigenous heritage constraints;
- proximity to the gas fields and to existing infrastructure; and
- impacts on existing communities and on community and industry uses.

An open and transparent community consultation process continued throughout the site selection process that culminated in a three day workshop convened in Broome in July 2008 and involved over 150 stakeholders. The TOTF established by the KLC sought evaluation of another two sites. One of these sites (Cape Voltaire) had previously been considered by industry and not selected, while a new site (the Anjo Peninsula) was added to the evaluation list.

The site evaluation report, and the process which informed it, provided the Traditional Owners of the Kimberley through their representatives the KLC, with information to assist them with their decision-making regarding the granting of their agreement to gas processing in the Kimberley.

The NDT site evaluation process identified four potential locations for further assessment and the Site Evaluation Panel recommended the following:

- Gourdon Bay;
- James Price Point;
- North Head; and
- Anjo Peninsula.

The NDT also sought public comment on the report and advice from the Environmental Protection Authority (EPA) and the former Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) (now SEWPAC) on the short list of sites recommended.

3.9.4.1. Traditional Owner Participation in Final Site Selection

The KLC provided a detailed submission to the NDT as part of the public comment period following the release of the NDT Site Evaluation Report that identified the four sites. The KLC argued that two small LNG precincts in the Kimberley may be preferable to a single major precinct due to the likely cumulative impacts on sensitive marine environments and on Aboriginal communities. In addition, the KLC noted the need for further technical, design, heritage and social impact studies to be undertaken.

While the matters raised by the KLC were all acknowledged and carefully considered, they were but part of the mix of factors that required consideration in selecting a suitable site to establish an LNG precinct. The NDT ultimately recommended the nomination of the James Price Point coastal area as the preferred location for a Kimberley based LNG processing precinct. The decision was based on assessment of all the relevant factors, including social, heritage, environmental and technical.

Formal Environmental Protection Authority advice provided under Section 16e of the EP Act concluded that the James Price Point area was relatively unconstrained and impacts were likely to be manageable (EPA, 2008). The location offers:

- flexibility in locating multiple processing operations and their facilities to meet heritage and environmental requirements;
- no people living within 10 kilometres of the location; and
- proximity to established infrastructure facilities in Broome.

One of the key social drivers for the selection of James Price Point was that there were no Aboriginal communities living within 10 kilometres of the area. This was not the case for Gourdon Bay and North Head, where it was considered the impacts on Indigenous communities would be far greater due to their proximity to those sites. In selecting the James Price Point area, the NDT acknowledged that Aboriginal heritage and geotechnical studies must be undertaken to assist in determining the final, precise location for the industrial precinct, port facilities and other multi-user infrastructure.

Subsequent to the public comment period, the TOTF met and instructed the KLC to continue engagement with the State, Commonwealth and industry on the proposed LNG development. A final site selection report identifying the area around James Price Point was released in December 2008 following the public comment period, receipt of EPA and SEWPAC advice and the outcome of the Traditional Owner decision-making process.

Further refinement of the site was achieved following extensive consultation with Traditional Owners (See **Section 3.9.7**) and consideration of heritage, technical and environmental data with the final site for the BLNG Precinct being situated immediately south of James Price Point.

3.9.5. Studies Agreement

On 7 May 2008, the State and the KLC entered into, in good faith and with mutual respect, a studies agreement with the objective of undertaking studies to help provide a better understanding of potential areas in the Kimberley for a LNG Precinct to process gas from the Browse Basin.

The agreement provided for the studies to be undertaken in a collaborative partnership to support best practice decision-making in order to achieve beneficial indigenous cultural and environmental outcomes. It also established a process agreeable to the KLC and the Traditional Owners for their participation in undertaking the range of environmental investigative studies such as flora and fauna studies required to further refine and confirm the suitability of a precise location for the Browse LNG Precinct. The State ensured the KLC was adequately funded to facilitate the engagement of the Traditional Owners in participating in these early activities, including the agreement to fund an Ethnobiology study to be conducted in parallel with the flora and fauna studies.

3.9.6. Heads of Agreement

On 21 April 2009, the State Government, the KLC and Woodside (as a potential Foundation Proponent) executed a Heads of Agreement to establish the BLNG Precinct at James Price Point, subject to the ultimate execution of a formal Indigenous Land Use Agreement or, if an ILUA is not achievable in a reasonable timeframe, another form of binding agreement. Following achievement of the HoA with the KLC, the State and Woodside, the KLC and the Traditional Owner Negotiating Committee facilitated a large claim group meeting to ensure the native title claimants were updated and fully informed of the processes to date.

The State Government's commitments as part of this broad agreement include:

- Only taking land that is required for the Precinct, when it is required;
- When the land is no longer needed, returning it fully remediated to the Traditional Owners;
- Providing an area of land equivalent to that required for the processing facility, under freehold title, to the Traditional Owners, which could be developed, including by taking opportunities to benefit from the Precinct project;
- Funding for Indigenous management of nature and heritage reserves;
- Funding support for economic development, better housing and education and cultural preservation;
- Resolving land title issues involving Indigenous communities on the Dampier Peninsula north of Broome;
- Creating new nature and heritage reserves on the Dampier Peninsula;
- Funding for a Kimberley Enhancement Scheme that will expand and improve existing government services and facilities in the broader community;
- Reaching broad agreement on a number of principles necessary to obtain cultural heritage consents for the establishment of the LNG Precinct;
- Agreement to work together to identify the location and layout of the BLNG Precinct in the vicinity of James Price Point;
- Committing to entering into a Heritage Protection Agreement; and
- Where possible, avoiding or minimising impact on Aboriginal sites.

In addition, the State will consider entry into a State Agreement in relation to:

- The States commitment to remediate the land within the Precinct and to grant an appropriate title to the land to the relevant Traditional Owners after the Precinct reverts to the State; and
- Limiting further LNG development on the Dampier Peninsula.

3.9.7. Traditional Owner Information Booklet

Engagement with the Traditional Owners continued throughout the process of further refinement of the James Price Point site, including a full day workshop on 14 August 2009. In response to a request from the Traditional Owners at the workshop, a substantial Public Information Booklet containing significant technical, environmental and heritage information was prepared. This was required as a reference to answer questions frequently asked by various Traditional Owner groups from time to time throughout the site selection process as well as questions asked by Traditional Owners in relation to James Price Point. It was initially prepared for the use of the Traditional Owner Negotiating Committee and the broader group of Traditional Owners/family groups to assist people in making decisions about the Browse LNG Precinct to be located at James Price Point (DSD, 2009d). The booklet is available on the Department of State Development's website at:

[http://www.dsd.wa.gov.au/documents/NEW_Browse_LNG_Precinct - Public Information Booklet.pdf](http://www.dsd.wa.gov.au/documents/NEW_Browse_LNG_Precinct_-_Public_Information_Booklet.pdf)

3.9.8. Funding Agreement of 11 March 2009

On the 11 March 2009 a Funding Agreement was entered into for the following:

- the formation of a Traditional Owner Negotiating Committee (**TONC**) to represent relevant registered native title claimants in the pursuit of the project;
- participation in the Negotiations, including participating in meetings between the TONC, the State, WEL and others in accordance with the Negotiation Engagement Plan
- the conduct of meetings/workshops with the Indigenous groups including:
 - development and dissemination of information to the Indigenous groups;
 - preparation of information in support of the Project.

3.9.9. KLC Funding Agreement

On 8 October 2009, the State and the KLC entered into a Funding Agreement to provide funding to the KLC to meet the costs of the negotiations for an ILUA or ILUAs and related agreements and other specified activities.

The scope of activities to be funded relates to certain of the matters contemplated in the HoA, and includes:

- Discussion and negotiation of agreements framework leading to ILUA(s), State Agreement and other documents contemplated by the Heads of Agreement and necessary to establish the LNG Precinct;
- Undertaking an Aboriginal social impact assessment;
- Involvement/participation in technical studies and evaluation conducted by Woodside and/or the State;
- Identification of the Precinct site (including land and marine areas) in accordance with the Heads of Agreement, including participating in the BLNG Precinct design and master plan;
- Planning identification of Aboriginal heritage sites within the BLNG Precinct, including the negotiation of a Heritage Protection Agreement;
- Involvement / participation in Strategic Assessment processes;
- Connection research, connection report and possible claim modification, and generally progressing the Goolarabooloo / Jabirr Jabirr native title claim;
- Traditional Owner engagement – including for claim group meetings, TONC meetings;
- Working collaboratively with the State to promote through the media the objectives of the Heads of Agreement;
- Planning and community consultation; and
- Initial activities related to employment, training and commercial planning.

3.9.10. Heritage Protection Agreement

The State and Woodside recognised that there are Aboriginal sites in the vicinity of James Price Point and agreed to work with the KLC to design, construct, operate, decommission and rehabilitate the BLNG Precinct in a manner that where possible avoids impacts on Aboriginal sites or minimises impact on Aboriginal sites.

On 13 November 2009, the parties entered into a Heritage Protection Agreement, to ensure appropriate account was taken of the Traditional Owners' views regarding sites. The agreement established a process for:

- the identification, protection and management of Aboriginal sites on the lands within the BLNG Precinct;
- the parties to work together to identify the precise layout of the BLNG Precinct in the vicinity of James Prince Point; and
- the State and the Proponent seeking permits or consents pursuant to the Western Australian *Aboriginal Heritage Act 1972* for purposes related to the development of the BLNG Precinct.

Since the execution of the HPA, the KLC, the Traditional Owners, the State and Woodside have worked together in undertaking a range of technical and environmental studies required to support the Strategic Assessment Agreement and the development of the LNG Precinct.

3.9.11. Satisfying Informed Consent and Consultation Requirements of the Plan

It was envisaged that the State's process undertaken to achieve informed consent as discussed in **Section 3.9** consent and consultation would provide the Traditional Owners with as much information as was available at the time to ensure they understood:

- why the State is pursuing the establishment of the Precinct;
- the need to select a site that best considers heritage, technical and environmental requirements for the establishment of a Precinct;
- what will be done during the different phases of the project;
- what the environment and heritage impacts might be on their traditional lands and the surrounding area and what measures will be taken to mitigate and manage those impacts;
- what the social and cultural impacts might be on the Traditional Owners and other Indigenous people of the area and to get their advice on how they might be mitigated and managed;
- what opportunities there are for meaningful participation in the management of the Precinct; and
- what benefits might flow to them from the project.

This is consistent with the State's approach subsequent to the Government decision "to identify one or more suitable strategic industrial sites to minimise the environmental and heritage footprints of, and be practicable for, proposed Browse Basin gas-based projects" which established the NDT. The NDT site selection process was undertaken to ensure that Traditional Owner informed consent as described above was achieved during that process. That is to say that the Traditional Owners had an appropriate level of relevant information to make their decision in an informed manner. The State engaged and appropriately funded the KLC as the representative body to consult with the Traditional Owners to ensure they had that relevant information.

The KLC report states that the IFPIC *reflects the fundamental cultural values and political principles held by Kimberley Traditional Owners* (O'Faircheallaigh, C *et al.*, 2010; **Appendix E -2**) where those principles aspire such levels of Indigenous decision-making. The State acknowledges that the political principles held by the Traditional Owners means that they aspire to the levels of indigenous decision-making contained in the UN DRIP"

There are, however, wide ranging views and interpretations on what informed consent means. For example, the following view was expressed by an academic in the field shortly before the Commonwealth voiced its general support for the principles of UN DRIP:

- *A Declaration of the United Nations General Assembly is non-binding or what is known as “soft” international law. It does not create new rights in international law or any binding legal obligations in domestic legal systems. It has symbolic significance, and is often referred to as “aspirational” - which means that states must work towards the realisation of the UN DRIP together with Indigenous peoples. The spirit of the Declaration is about self-determination and participatory rights - having a say in the decisions that affect yourself and your community.*
- *The suggestion that the Declaration goes above and beyond Australian domestic law is untrue. Nor does it elevate Aboriginal customary law above domestic law. Indigenous peoples agreed in the drafting groups before the adoption that the Declaration should be explicitly subject to democracy, the rule of law, principle of state sovereignty and territorial integrity.*⁵

The term “informed consent” is defined by the:

- Oxford Dictionaries Online as:
 - *‘permission granted in full knowledge of the possible consequences, typically that which is given by a patient to a doctor for treatment with knowledge of the possible risks and benefits’*
- West’s Encyclopedia of American Law, edition 2 at Free Dictionary as:
 - *‘Assent to permit an occurrence, such as surgery, that is based on a complete disclosure of facts needed to make the decision intelligently, such as knowledge of the risks entailed or alternatives’.*

The term is used in a wide range of fields. For example, as well as patient consent for operations, it is also used in Section 23WF of the *Crimes Act (Cth) 1914* or the principle that researchers should try to avoid both uninformed and misinformed participation by subjects in research. <http://www.esomar.org/index.php/glossary-i.html>

Notwithstanding the different views on the interpretation of informed consent, KLC did find that the site selection process conducted between December 2007 and September 2008 embodied the principle of IFPIC to a substantial degree. In particular, Traditional Owner groups were able to take decisions as to whether or not their land and sea country would continue to be considered as potential LNG Precinct sites. The report notes, however, that the Traditional Owners assert that they did not have access to detailed information on the precinct proposal. The KLC has claimed that this was in part because Woodside, State agencies and their consultants did not respond to some requests for information, and in part because the information available at the time was of a broad, conceptual nature and did not afford them the level of detail they sought and therefore:

- detailed proposals for plant layout within an LNG Precinct were not available; and
- detailed environmental and heritage studies had not been completed.

At all steps in the consultation process, the State ensured that the KLC and the Traditional Owners were provided with the best possible information available at the time, including the preparation of a detailed Traditional Owner Information Booklet.

⁵ Modified from Davis, Megan: Director, Indigenous Law Centre and Senior Lecturer, Faculty of Law, University of New South Wales, ANTAR website Thursday, March 26th, 2009

The KLC considers that while the Traditional Owners' continued to participate in the process, IFPIC was not achieved for consultation beyond that point for various reasons, but most importantly because:

- 1) Premier Colin Barnett stated that it was unacceptable for government to, in his words, give 'a right of veto to local Aboriginal people, expressed in the following terms that projects would not go ahead unless there was informed consent by Aboriginal people' (Government of Western Australia, 2008).
- 2) The State Government indicated that, while it would consult with Traditional Owners regarding measures for impact mitigation and community benefits, the existing site selection process involving the Traditional Owner Task Force would be discontinued (O'Faircheallaigh, C *et al.*, 2010; **Appendix E-2**).
- 3) The policy of the new State Liberal government that placed time constraints on agreement making, which, if not met, would oblige the government to consider compulsory acquisition in order to meet the project's commercial timeframes.

In regard to point 2 above, the State established the TOTF in consultation with the KLC to ensure the participation of West Kimberley Indigenous people in the site selection process being conducted by the NDT in identifying a common user site for the processing of LNG from the Browse Basin. The State Government wound up the NDT in December 2008 after it announced that the vicinity of James Price Point was the State's preferred site location. As the site selection process was then completed the role of the NDT and the TOTF was then redundant. The Traditional Owner Negotiation Committee was then formed for ongoing negotiation and consultation.

In regard to point 3 above, under the NTA, the process in which to reach an Indigenous Land Use Agreement does not provide for any arbitral determination in the event that agreement cannot be reached. Unless time constraints are established to negotiate a successful ILUA then the negotiation period is infinite. As the Foundation Proponent is constrained to meet the project's commercial timeframes, this uncertainty would likely result in the commercial proponent not pursuing its project in the foreseeable future. This would not be in the best interests of the State of Western Australia and the Nation.

Negotiations continue with respect to a detailed agreement about the terms of the development. In its report the KLC has also expressed the view that because the process for reaching agreement has not been concluded, the Traditional Owners have not yet given informed consent. The KLC asserts that:

*Any endorsement of the Plan must be subject to the conclusion of an ILUA which allows the Traditional Owners to ensure that any impact of the LNG Precinct and associated developments on their cultural heritage is avoided where possible and, where avoidance is not possible, is minimised. Recognising the principle of Indigenous Free Prior Informed Consent (O'Faircheallaigh, C *et al.*, 2010; **Appendix E-2**), no damage to Indigenous cultural heritage must be permitted without the informed consent of Traditional Owners.*

The KLC report further finds in regard to IFPIC that:

The principle of Indigenous Free Prior Informed Consent provides an appropriate standard for determining whether Traditional Owners have given 'Indigenous informed consent' or have 'given informed consent in a culturally appropriate manner', because the principle:

- sets explicit benchmarks for assessing issues related to the granting of Indigenous informed consent that are grounded in international law, are increasingly recognised in relevant international fora, are central to the United Nations Declaration on the Rights of Indigenous People, and are consistent with Australian common law principles on what is valid and effective consent.
- The Australian government voiced its general support on 3 April 2009 (some 14 months after the Terms of Reference were agreed); and
- reflects fundamental cultural values and political principles held by Kimberley Traditional Owners.

Some uncertainty remains around whether or not an ILUA can be achieved. The negotiations have been constantly affected due to ongoing instability within the native title claimant group itself. On 8 September 2010, however, the Western Australian Government subsequently commenced a process to enable the land required for the Precinct to be secured. The State would prefer to secure the land by way of an agreed ILUA with the native title claimants.

In any event the State and the Foundation Proponent intend that benefits that have been offered during negotiations will remain open for discussion notwithstanding the outcome, providing the Precinct is established.

The authorisation processes required under the NTA will require a decision by the relevant native title claimant group on whether or not it wishes to enter into the ILUA and related agreements. Notwithstanding that negotiation and consulting have been ongoing since April 2009, it still remains too early to comment in detail on the specific nature of the Indigenous consent involved in development and consideration of these agreements. However, the State has issued notice pursuant to the LAA and NTA to secure the land. The State would prefer to secure the land by way of an agreed ILUA with the native title claimants. If this is not achieved within the 6 month 'negotiation in good faith' timeframe provided under the NTA processes, with mediation being provided by the Commonwealth NNTT, or such further period that may be agreed between all parties, the State will then consider the need to seek arbitral relief.

The KLC indicates that any Indigenous consent in this case cannot be 'free'. As was the case with the Heads of Agreement, there is a need to negotiate the ILUA within timelines that are driven by commercial proponent and regulatory timeframes.

The process of consultation and negotiation is ongoing as even if an ILUA is ultimately not agreed, development cannot proceed without the affording of procedural legal rights to any registered native title claimants over the area. Moreover, common ground has already been reached between the State and the appropriate Traditional Owners as to the following major issues:

- the appropriate location for the BLNG Precinct;
- there are no heritage issues that would significantly impede the development at James Price Point;
- the additional heritage work pursuant to the agreed HPA that will need to be undertaken prior to any development;
- the matters that would be the subject of an agreement between the State, Woodside and the Traditional Owners including financial benefits.

Clearly, finalisation of agreements relating to the Precinct will provide earlier certainty for the Traditional Owners.

3.10. Mitigation and Management of Indigenous Impacts

3.10.1. Introduction

Failure to consult and involve Indigenous people in the assessment of a proposed resource development would lead to heightened Indigenous impacts, particularly social and cultural impacts. The literature review of international and Australian experience demonstrates that when there is a process for consultation with the Indigenous community, the outcomes for the Indigenous people are improved and the project is better supported.

The process of identifying the potential impacts and assessing those impacts is set out in preceding sections. The consultation with the Traditional Owners that will assist to address or avoid those potential impacts has largely been undertaken and is part of the broader strategic environmental assessment of the Browse LNG. The consultation process is continuing through the ongoing process of negotiation for an agreement with the Traditional Owners for the establishment of the BLNG Precinct.

The potential direct and indirect impacts of the Precinct Plan on Indigenous people and culture have been identified and assessed through:

- e) consultation with Traditional Owners as part of the site selection process;
- f) research on the impacts of other resource developments on Indigenous people in the Kimberley, Australia and overseas;
- g) an understanding of the baseline social and economic conditions in the West Kimberley;
- h) a reasonable understanding of the known physical heritage sites;
- i) archaeological survey and heritage assessment; and
- j) consultation with Traditional Owners for the ASIA customary fishing survey and the Ethnobiology report.

3.10.2. Nature of impacts

Impacts on Indigenous people are of their nature not entirely predictable. The types of potential impacts of large resource developments on Indigenous People are generally known. However, the extent to which those impacts both positive and negative are likely to result from the Precinct Plan can be affected by the manner in which it is implemented and by other factors. Moreover, development of this scale has not occurred in the Kimberley.

The potential direct and indirect impacts of the Precinct Plan on Indigenous people and culture can be broadly categorised as follows:

- a) physical site impacts (that is, impacts on Aboriginal heritage sites);
- b) general cultural impacts that might result from disturbance of the site (including impacts on the environment, customary fishing and Ethnobiology);
- c) social and economic impacts.

The likely physical site impacts can be identified and work will be undertaken so that the impacts on Aboriginal heritage are more fully understood. Currently understanding is based on registered site information on the DIA database and the archaeological survey work and the heritage impact assessment work undertaken by the KLC. The potential impacts are to some degree predictable, based on our understanding of the nature of archaeological sites generally. Impacts involving the disturbance of Aboriginal heritage sites at a site level tend to be irreversible but limited.

The cultural impacts that might result from the disturbance of the site are generally known, based on similar experiences with other large resource developments. However, the extent of the different types of cultural impacts is somewhat unpredictable. Social and economic impacts are generally known, but the extent of those impacts is also somewhat unpredictable.

These impacts culminated in the 75 specific recommendations in its ASIA, as captured in **Part 5, Annexure C**. These specific recommendations have been captured in a range of strategies as shown in **Part 5, Annexure D**. Where appropriate, the recommendations have been incorporated into the high-level strategic SIA mitigation and management plan in **Part 5, Section 5**.

3.10.3. Mitigation and Management through Consultation Processes

A significant element in avoiding and mitigating potential negative impacts of the BLNG Precinct on Indigenous people is consultation with the Indigenous community. Extensive consultation has been undertaken through the site selection process and the process of negotiating an agreement for access (which is ongoing). Through those processes various impacts have already been avoided, minimised or mitigated. The ongoing engagement and consultation with Traditional Owners through the process of negotiating an agreement to establish the Precinct enables potential impacts to be further minimised and mitigated.

The identification of Aboriginal heritage sites through a heritage survey is a critical process in avoiding and mitigating potential impacts on heritage. DSD engaged the KLC to undertake an archaeological and ethnographic heritage assessment to identify heritage sites and potential direct and indirect impacts of the Browse LNG Precinct (see **Part 5, Section 3.5**) and further detailed work is to be undertaken.

Most potential Indigenous impacts are a sub-set of the broader potential impacts of the Browse LNG Precinct, which DSD is assessing as part of the broader strategic environmental and social impact assessments. Consequently, many of the mitigation and management measures that DSD proposes to address those broad impacts will also address the corresponding Indigenous impacts. Refer to **Part 5, Section 5** for more detail.

3.10.4. Specific Mitigation and Management Measures

The broad strategic SIA managed by the DSD as an input to the SAR assessed the potential social impacts of the development of the Precinct under a number of different scenarios. The SIA identified that the Shire of Broome is projected to undergo substantial population growth regardless of the development of the Precinct. Broome and the Dampier Peninsula are somewhat vulnerable to the temporary and permanent population increases caused by the development of an LNG Precinct.

The ASIA identified a number of potential impacts on the Indigenous communities of Broome and the Dampier Peninsula and made recommendations to minimise those impacts. **Part 5, Annexure D** shows where these recommendations are addressed in the SAR (**Part 5, Section 5**) and other documents.

A number of mitigation and management measures have been developed to address these potential social impacts for the Indigenous and non-Indigenous populations. The overarching social impact mitigation measure is the requirement that commercial proponents house their workers in a Managed Access Construction Camp close to the Precinct and generally minimise the impact of their workforce on Broome and the Dampier Peninsula. A number of mitigation and management mechanisms are utilised, including Precinct conditions or similar. The detail of these mitigation measures can be found in **Part 5, Section 5** and Volume 3, Strategic Social Impact Management Plan of the SIA. As these mitigation and management measures have been developed at a strategic level for the Precinct, they largely refer to mitigation and management strategies that need to be fully developed by individual commercial proponents although some responsibilities fall to the State, local government or the Commonwealth. The management structure to oversee the mitigation, management and monitoring is discussed in the SAR. This section of the report contains mitigation and management measures that have been specifically identified to address potential impacts on Indigenous people. These mitigation and management measures should be read in conjunction with those in **Part 5, Section 5**.

3.10.5. Environmental Impacts and Conservation

Environmental impacts are being extensively assessed as part of the broader strategic environmental assessment. Management of those impacts will be carefully monitored and regulated by the relevant regulators.

The involvement of Indigenous people in the management of environmental impacts will be provided for in the ILUA or other land agreement negotiated with the Traditional Owners. The agreement will require the establishment of a Management Committee to oversee the development and implementation of a range of management plans and provide input into environmental management.

General environmental mitigation and management guidelines are provided for under the legislative framework of the EPBC Act and the EP Act.

Section 17(1) of the EPBC Act describes the current provision of the EPBC Act as providing for the *involvement of Indigenous peoples in conserving Australia's biodiversity, including to protect the traditional use of land and water by Indigenous peoples, to protect Indigenous heritage and to provide for Indigenous involvement in managing Commonwealth reserves.*

Sections 17(2) and 17(3) describe the provisions of the EPBC Act for a cooperative approach to conservation and management for all stakeholders, including Indigenous people, and recognising and promoting their knowledge of ecologically sustainable development.

Under the HoA, the State had committed funding for 10 years for the creation of conservation and heritage reserves on the Dampier Peninsula. These reserves would be jointly managed by the Department of Environment and Conservation and Traditional Owners. The purpose of the reserves would be the protection of Aboriginal cultural heritage sites and song lines, protection of areas of environmental sensitivity and rehabilitation of degraded lands leading to the restoration of biodiversity.

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4. Direct Social Surrounds and Socio-economic Factors

This section of **Part 5** assesses factors that were identified through the *Browse LNG Precinct Scope of the Strategic Assessment* (DSD, 2010b; **Appendix A-2**) report but were either not assessed within the original scope of the overall SIA and ASIA, or required further detailed assessment in the context of the BLNG Precinct and direct Category A related impacts. These factors provide further context to the social surrounds and economic context for the BLNG Precinct, addressing current knowledge of those surrounds, their key characteristics, and the potential impacts on them related to the proposed development, and the mitigation and management measures designed to address the impacts. The broader social and economic context and assessment of impacts for Broome and the Region are discussed in **Part 5, Section 2**.

The approach to assessment of the following factors has, in part, followed the impact assessment methodology (**Part 2, Section 7**). However, it must be noted that the methodology has been developed in relation to assessing environmental factors, and it must be recognised that assessing social-economic impacts can be complex to assess in a semi-quantitative manner and therefore, can be subjective and qualitative.

The factors that will be assessed in this section comprise:

- Environmental Heritage and Conservation Areas;
- Palaeontology;
- Colonial Heritage;
- Visual Amenity, Light and Landscape Character;
- Commercial Fishing;
- Aquaculture and Pearling;
- Tourism;
- Sport, Recreation and Land Use (including Recreational Fishing); and
- Human Health.

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4.1. Relevant Factor: Environmental Heritage and Conservation Areas

Natural or Environmental Heritage refers to natural formations, sites or areas that demonstrate natural environmental significance. These may include physical and biological formations or groups of formations; geological and physiographical formations and areas that constitute the habitat of Indigenous species of animals and plants; and/or natural sites or areas that are significant in terms of science, conservation or natural beauty. Places having environmental heritage typically have many different types of values and may also have associated cultural values, which have social significance. Sites or areas of significant environmental heritage or conservation value may be formally designated.

4.1.1. Current Knowledge

The recognition of a place for its environmental heritage value requires an understanding of its significance in terms of science, conservation and/or natural beauty. Those places for which sufficient information exists to satisfy the relevant criteria may be included on one or more of several lists, registers and inventories which are used to document environmental heritage. Despite the reasonable amount of both published and unpublished data and information on the Kimberley, much of the data is broad scale with poor resolution, patchy with varying levels of resolution, or specific to particular sites. For this reason, and almost certainly because the Kimberley has not been a focus for major development until recently, there are relatively few places in the region formally listed for their environmental heritage value. There are no listed places of environmental heritage or conservation significance within the Proposal footprint; however, a total of 13 places were identified on relevant lists, registers and inventories of which nine have no form of legal heritage protection (**Table 4.1-1**). While these other places are not protected, their listing confers heritage status and a moral obligation exists for their preservation.

Four sites can be considered legally protected, however these are not in close proximity to the proposed BLNG Precinct and are located in proximity to Broome. Overall there are three places on the Register of the National Estate that warrant consideration in terms of their potential to be either directly or indirectly affected by the project: Coulomb Point Nature Reserve (including the Point Coulomb Area), which is located adjacent to the James Price Point coastal area, Lacepede Islands (Middle and West) and Mermaid Reef – Rowley Shoals. Mermaid Reef at the Rowley Shoals warrants consideration despite being some distance from the site as there is potential for impact from increased vessel movements.

• **Table 4.1-1 Environmental Heritage Places in the Region.**

Place ID	Place	Location	Register of the National Estate	Commonwealth heritage List	Municipal inventory and Town Planning Scheme	Legal heritage protection	Status *
17321	Roebuck Bay Area including Roebuck Plains and Lake Eda	Great Northern Highway, about 0.5km east of Broome (approximately 60km south of James Price Point)	Y			N	Registered
10132	Coulomb Point Nature Reserve	70km north of Broome between Cape Bertholet and Coulomb Point (approximately 15km north of James Price Point)	Y			N	Registered
100132	Point Coulomb Area, Broome	Broome-Beagle Bay Road, about 50km north of Broome (approximately 15km north of James Price Point)	Y			N	Indicative Place
100378	Clerke Reef – Rowley Shoals	300km west-north-west of Broome (approximately 290km from James Price Point)	Y			N	Registered
100377	Imperieuse Reef – Rowley Shoals	349km west-north-west of Broome (approximately 340km from James Price Point)	Y			N	Registered
18631	Gantheaume Point	About 5km south-west of Broome (approximately 65km from James Price Point)	Y			N	Indicative Place
10135	Swan Island (King Sound)	120km north-west of Derby and 20km north-east of Lombardina Mission (approximately 160km from James Price Point)	Y			N	Registered
10133	Lacepede Islands Middle and West	120km north of Broome and 35km west of Beagle Bay (approximately 70km north of James Price Point)	Y			N	Registered
106063	The Kimberley	Great Northern Highway (as close as 50km south of James Price Point)	Y			N	Ministerial Request for Assessment

Place ID	Place	Location	Register of the National Estate	Commonwealth heritage List	Municipal inventory and Town Planning Scheme	Legal heritage protection	Status *
HCWA 16874	Billabong (Lake Eda)	Broome Road to Roebuck Plains Station, Lake Eda (approximately 60km south east of James Price Point)			Y	Y	
HCWA 16869	Roebuck Bay Foreshore	Roebuck Bay Town Foreshore, Broome (approximately 60km from James Price Point)			Y	Y	
105255	Mermaid Reef – Rowley Shoals	295km west-north-west of Broome (approximately 280km from James Price Point)		Y		Y	Listed Place
HCWA 7190	Buccaneer Rock	Roebuck Bay, Broome (approximately 60km south of James Price Point)			Y	Y	

Note: * **Registered** – The place is in the Register of the National Estate; **Indicative Place** – The place has been entered into the database and is at some stage in the assessment process. A decision on whether the place should be entered in the Register has not been made; **Ministerial Request for Assessment** – N/A (No definition provided on the SEWPAC website); **Listed Place** – The Council has sent an assessment to the Minister and the Minister has entered the place in the Commonwealth Heritage List.

The Class A Coulomb Point Nature Reserve (The Nature Reserve has no legal heritage protection but is protected pursuant to the *Conservation and Land Management Act 1984*) is the only gazetted conservation area on the Dampier Peninsula, occupying 28,676 hectares. The roughly rectangular shaped reserve is situated on the western coastal margin of the peninsula between Cape Bertholet and Coulomb Point and lies approximately 15 kilometres north of James Price Point. The Coulomb Point Nature Reserve comprises a sandplain with drainage lines that support pindan shrubland and open woodland typical of near coastal areas of the southern Dampier Peninsula. Fringing vegetation of creeklines are also well represented, however, vegetation associated with outcrop surfaces, coastal communities, fresh water swamps and vine thickets is not well represented (Burbidge *et al.* 1991).

There is a notable lack of secure conservation reserves on the Dampier Peninsula compared to other regions within the State (Burbidge *et al.*, 1991). The reservation status of the Dampier Botanical District is less than five percent (DPI, 2009). The DPI has stated that there is a need to represent the vegetation of the northern part of the Peninsula and to protect an adequate area of pindan and other features typical of Dampierland such as coastal sand dunes, mangroves, Melaleuca thickets and swamps (DPI, 2009).

In 1991 CALM (now DEC) in its report *Nature Conservation Reserves in the Kimberley* (Burbidge *et al.* 1991) proposed increasing the size of Coulomb Point Nature Reserve to 112,800 hectares and declaring it a National Park (Dampierland National Park). The Park would include a greater number of the ephemeral lakes and fresh water springs, such as Wonganut Springs, increase the representation of coastal and riverine environments and of low-level pindan on through-drained soils. This proposed reserve was also included in the Department of Land Administration's (now Department of Land Information) *Waterbank Structure Plan* (DOLA, 2000) with the purpose of the reserve broadened to include Aboriginal heritage. This area included the James Price Point area where the BLNG Precinct is proposed. The decision on whether to establish the Dampierland National Park, or any alternative reserve options currently the subject of consultation as part of the development of the Dampier Land Use Management Plan, is one to be determined by the Government as part of negotiations to secure access to the LNG Precinct with the Goolarabooloo Jabirr Jabirr Native Title Claimants.

Located immediately south of Broome, Roebuck Bay is a listed Ramsar wetland of international significance, covering an area of approximately 34,120 hectares. Roebuck Bay is located approximately 60 kilometres to the south of the James Price Point coastal area and provides important habitat for migratory bird species. The intertidal mud and sand flats of Roebuck Bay support a high abundance of benthic dwelling invertebrates, which are a key food source for waterbirds. The site is one of the most important migration stopover areas for shorebirds in Australia and globally. For many shorebirds, Roebuck Bay is the first Australian landfall they reach on the East Asian Australasian Flyway. The total numbers of waders using the site each year is estimated at over 300,000. The northern beaches and Bush Point provide important high tide roost sites (Australian Government, 2010).

In October 2010 the WA State Government announced its intention to establish a marine park over the Roebuck Bay Ramsar area.

4.1.2. Socio-economic Significance

In addition to the significant environment values noted above, the Commonwealth and WA Governments acknowledge the outstanding natural, Indigenous and historic cultural heritage values of the Kimberley region and have commenced an assessment of the national heritage (and potentially international heritage) values in accordance with the requirements of the EPBC Act and as part of a strategic assessment of land use development within the region.

The Commonwealth's objective is to avoid significant impacts on matters of NES, the environment on Commonwealth land or the environment generally where it involves actions by Commonwealth agencies. There are no listed places protected pursuant to the EPBC Act that occur within or near the site. Additionally, in its preliminary assessment of National Heritage values of the west Kimberley, the Australian Heritage Council found that there was insufficient evidence to demonstrate that heritage values in the vicinity of James Price Point reached the very high threshold required for National Heritage listing. In making a decision on whether to include a place in the National Heritage List, The Minister for Sustainability, Environment, Water, Population and Communities must have regard to the Australian Heritage Council's final assessment on whether a place meets any of the National Heritage criteria, all comments received and "may seek, and have regard to information or advice from any source [s.324JJ(5)(b) of the EPBC Act]". While the Australian Heritage Council's final assessment will become publically available following a decision of the Minister for Environment on National Heritage listing, current knowledge indicates that there are unlikely to be any significant impacts on National Heritage matters. The Minister's final decision is expected by 30 June 2011.

The preliminary national heritage assessment identified a large area of the Kimberley that may qualify for National Heritage Listing, in relation to its environmental heritage and conservation value. It is expected that all or part of the region will ultimately be included on the National Heritage List for its outstanding natural and cultural heritage values. While these values have yet to be determined, there is a variety of special landscapes, ecosystems and species known to occur in the Kimberley region (and areas relevant to the Dampierland bioregion), of which the proposal site is a part. **Part 5, Section 3** addresses the ethno-biological association and cultural value of species, and further environmental impact assessment is presented in **Part 3** (Marine Impacts) and **Part 4** (Terrestrial Impacts).

Areas considered to have significant environmental heritage and conservation value, can also have wider values associated with tourism and recreation. Thereby identification of such sites and managing and enhancing the integrity of the value can be significant in terms of maintaining economic benefits for an area.

4.1.2.1. Key Statutory Requirements, Policy and Guidance

The following is the relevant legislation, policies and guidance are applicable to the management of environmental heritage and terrestrial conservation areas:

Commonwealth

- *Australian Heritage Council Act 2003*; and
- *Environment Protection and Biodiversity Conservation Act 1999*.

State

- *Conservation and Land Management Act 1984*.

4.1.3. Description of Factor

Environmental heritage and conservation value within the Kimberley is significant, with the expectation that the west Kimberley will be designated within the Natural Heritage List. There are a number of factors that combine to result in an area or location being identified to have environmental heritage or conservation value. These may include physical and biological formations or groups of formations; geological and physiographical formations and areas that constitute the habitat of Indigenous species of animals and plants; and/or natural sites or areas that are significant in terms of science, conservation or natural beauty. Places having environmental heritage typically have many different types of values and may also have associated cultural values.

4.1.4. Identification of Key Aspects

4.1.4.1. Definition of Relevant Aspects

Aspects associated with the development and operation of the BLNG Precinct and associated infrastructure that may have a social-economic impact in relation to environmental heritage and conservation areas were identified in the Scope of the Strategic Assessment. These aspects include:

- vegetation and habitat clearing;
- altered fire regimes;
- site disturbance and excavation; and
- physical presence.

4.1.5. Source of Potential Impact

Vegetation and habitat clearing

The sources of potential impacts associated with any vegetation or habitat clearing required for the construction and operation of the BLNG Precinct are summarised as follows:

- earthworks (site levelling);
- road construction; and
- pipeline construction (shore crossing and onshore).

Vegetation and habitat clearing may result in loss and alteration of spaces/habitat composition impacting environmental heritage and cultural value.

Altered Fire Regimes

The source of potential impacts associated with any altered fire regime as a result of construction and operation of the BLNG Precinct are summarised as follows:

- increased potential sources of ignition; and
- management control during operation of the Precinct.

Altered fire regimes (potentially more controlled, or more frequent and of higher intensity) may result in changes to habitat composition and landscape impacting environmental heritage and cultural value.

Site Disturbance and Excavation

The sources of potential impacts associated with site disturbance and excavation required for the construction and operation of the BLNG Precinct are summarised as follows:

- earthworks (site levelling);
- road construction;
- dredging; and
- pipeline construction (shore crossing and onshore).

Site disturbance and excavation have the potential to result in loss of or change to habitats, species and landscape features impacting on environmental heritage and conservation values.

Physical Presence

The sources of potential impacts associated with physical presence required for the construction and operation of the BLNG Precinct are summarised as follows:

- hard stand areas, roads and buildings;
- modified topography; and
- drainage systems.

Physical presence would result in a permanent change to the area which may compromise existing environmental heritage and conservation areas impacting on heritage value. Physical presence would also change the use of the area with the potential for increased access which could result in pressure and impact on existing environmental heritage and conservation areas.

Other aspects were also identified in the SoSA; however, these were not considered to be significant in relation to the environmental heritage and conservation value of the area. Therefore, these aspects have not been considered further in this section. Listed below are the aspects and the justification for their exclusion:

- Invasive marine species introduced via shipping and vessel movements pose a threat to conservation areas; - the BLNG Precinct area is located outside the boundaries of reserves and potential impacts on areas of environmental heritage value would be highly unlikely. Marine discharge from regular operations is considered to have low probability of impact to environmental heritage areas as any marine discharges would be monitored for toxicant levels and appropriate action implemented. Non-routine events are considered to be unlikely and, if they occur, are expected to have a temporary and localised impact.
- Physical presence, marine, including exclusion zones, increased marine traffic and installation of marine facilities would cause changes to landscape in vicinity of the development;- the BLNG Precinct area is located outside the boundaries of reserves and potential impacts on areas of environmental heritage value will be highly unlikely. Sediment deposition and turbidity will impact the marine area on a short-term basis (during dredging activities) and, coupled with the natural high turbidity in coastal waters, adverse impacts are unlikely.
- Site disturbance/excavation, marine, would disturb the seabed; - the BLNG Precinct area is located outside the boundaries of reserves and potential impacts on areas of environmental heritage value would be highly unlikely.
- Terrestrial wastes and discharges could impact environmental heritage sites mainly via non routine events; - the probability of a non-routine event occurring is considered to be low and, therefore, the impact from terrestrial wastes and discharges is considered to be low.

4.1.5.1. Sensitivity and Resilience

There are no key designated sites within or adjacent to the BLNG Precinct, however it is recognised that the wider area is under consideration for designation in relation to environmental heritage and conservation value. In relation to sensitivity the Precinct is considered to be of low sensitivity with the wider area considered to be of moderate or high sensitivity depending on designations and listings. The development of the Precinct would alter the existing environment and therefore potentially impact on environmental heritage and conservation values in relation to how the area is perceived with follow on impacts to Indigenous heritage values, tourism and recreation.

4.1.6. Predicted Impacts

The predicted impacts on environmental heritage and conservation value from the construction and operation of the BLNG Precinct are discussed in detail in the following sub-sections, taking into consideration the assessment of impact relevant to this factor.

Both direct and indirect impacts are considered within these sections. For the purpose of this assessment it is considered that direct impacts would largely be confined to areas of direct disturbance within the BLNG Precinct, and other locations where development activities are proposed to occur.

4.1.6.1. Potential Impacts on Environmental Heritage and Conservation Areas due to Vegetation and Habitat Clearing

Vegetation and habitat clearance would be required within the area of the BLNG Precinct during construction, which would result in loss of habitat, which has the potential to impact on environmental heritage and conservation value. The direct impacts would be negligible as there are no designated sites located within the Precinct area, however there is the potential indirect impacts of vegetation loss on wider environmental heritage and conservation values. Due to the potential area loss of habitat in the context of the wider area and the overall environmental heritage value of the Dampier Peninsula it is considered that the indirect impacts would be negligible. Further assessment in relation to habitat loss is presented in **Part 4, Section 2.4**.

4.1.6.2. Potential Impacts to Environmental Heritage and Conservation Areas due to Altered Fire Regimes

There would be a natural fire regime in the areas, as well as activities associated with fire linked with Indigenous heritage aspects. However the construction and operation of the BLNG Precinct would likely impact on existing fire regimes through an increase in potential ignition sources, potential for fires to be more frequent and more intense, but also through a higher degree of management control on natural regimes.

The BLNG Precinct therefore has the potential to directly impact on the current fire regime of the area which would have an indirect impact on environmental heritage and conservation areas, as there would potentially be loss of habitat or alteration of habitat composition, as well as wider impacts on landscape character. In turn these impacts have the potential to directly impact on value of the area from a socio-economic perspective through impacts on cultural values associated with the area, but also in relation to the following:

- Indigenous heritage – loss of key areas, species of value;
- Tourism – changed perception in the area resulting in fewer visitors; and
- Recreation – changed perception of the area resulting in fewer users, or loss of key areas and species limiting recreational activities.

4.1.6.3. Potential Impacts to Environmental Heritage and Conservation Areas due to Site Disturbance

The potential direct and indirect impacts associated with site disturbance and excavation reflect those identified above in **Section 4.1.6.1** and **Section 4.1.6.2** and relate to loss of habitats and features resulting in change and impacts on integrity of environmental heritage and conservation values.

4.1.6.4. Potential Impacts to Environmental Heritage and Conservation Areas due to Physical Presence

Physical presence would result in a permanent change to the area which may compromise existing environmental heritage and conservation areas impacting on heritage value. Physical presence would also change the use of the area with the potential for increased access which could result in pressure and impact on existing environmental heritage and conservation areas. However, there may be associated impacts in relation to overall perception of the area in relation to environmental heritage values.

There would also be the indirect impact of restricting public access at James Price Point for fishing, camping and other recreational activities on Environmental Heritage. This may lead to displacement elsewhere on Dampier Peninsula but could also provide the beneficial outcome of ensuring the environmental heritage and conservation areas are designated and managed. The indirect impacts on Dampier Peninsula's only current nature reserve is uncertain as increases in visitors to the Peninsula who will frequent areas in and around Coulomb Point Reserve as an alternative to James Price Point is difficult to ascertain. An informal campground is located at Coulomb Point which may come under increased pressure from more campers, once the informal camping area at James Price Point becomes inaccessible to the public. Currently, the Coulomb Point camping area within Coulomb Point Nature Reserve is a free camp site with no facilities, however, it may become necessary to more closely manage the site to ensure the nature reserve is not detrimentally affected. Monitoring of day visitors and campers to this area would be required to determine whether increased management of the reserve and camping area is required.

4.1.6.5. Summary

The potential impacts of the BLNG Precinct on potential places of environmental heritage significance, such as the Kimberley, are dependent on the values for which those places have been listed and the extent to which these values might be affected by the development.

With regard to the Kimberley National Heritage Assessment, it is expected that the west Kimberley region will be formally included on the National Heritage List for a range of natural and cultural values. While the specific nature and distribution of these values has yet to be formalised, it is unlikely that the James Price Point coastal area will be considered to be representative of the outstanding environmental heritage and conservation values for which the region might feasibly be listed.

Table 4.1-2 summarises the predicted impacts and mitigation measures to be undertaken in relation to aspects or activities that may have an impact upon environmental heritage and conservation area values.

4.1.7. Mitigation and Management Measures

The Social Impact Management Plan is presented in **Part 5, Section 5** which outlines the management framework for the BLNG Precinct in order to mitigate any potential social-economic impacts and should be referred to for further detail. As some of the social-economic impacts are indirect, environmental management plans will also be relevant in terms of mitigating social impacts and these are presented in detail within each of the relevant environmental sections.

The relevant State Management arrangements comprise:

- The management of Roebuck Bay and 80 Mile Beach through the establishment of the Roebuck Bay Management Plan, and on-going management of 80 Mile Beach by DEC.
- The State Government intends, through the implementation of the Dampier Peninsula Land Use and Infrastructure Plan, to facilitate the establishment of additional nature reserves and/or national parks within the Dampier Peninsula to secure representative vegetation of the Peninsula in reserves, protect fauna habitat of rare and specially protected fauna and to protect Aboriginal culture and heritage. The establishment of a National Park and its location will be in accordance with an Indigenous Land Use Agreement with the Goolarabooloo Jabirr Jabirr Native Title Claimants. Mitigation measures to avoid impacts on terrestrial conservation areas from indirect activities associated with the implementation of the Precinct Plan including:
 - fire and weed management in and around Coulomb Point Nature Reserve and any other nature reserves established in the vicinity of the Plan area in collaboration with the DEC;
 - DEC to monitor visitor numbers to Coulomb Point Reserve camping area; and
 - DEC to develop a management plan for the Coulomb Point Reserve.
- Develop and implement a Management and Monitoring Strategy for Vegetation of Medium to High Conservation Significance which will inform all future proponents of requirements for detailed management plans specifically relating to:
 - Fire Management Plan;
 - Terrestrial Fauna Management Plan;
 - Terrestrial Weed Management Plan; and
 - Appropriate management of hydrology (both surface water and groundwater).
- Prepare and implement a Fire Management Strategy for the Dampier Peninsula to align with existing fire management strategies to reduce the frequency of fires and the occurrence of late dry season burns to the Peninsula.

In addition to the above, it is anticipated that the assessment of impacts on marine and terrestrial factors undertaken, detailed in **Part 3** and **Part 4** of the SAR, inherently address the protection and management of impacts to values or features that may be recognised in any future National Heritage Listing.

4.1.8. Socio-economic Outcome of Category A Activities

The EPA objective for heritage largely relates to historical and cultural associations, not environmental heritage. However, after management and mitigation measures have been applied, the BLNG Precinct Project would not result in significant impact to the nearby Coulomb Point Nature Reserve and is likely to facilitate the establishment of conservation reserves on the Dampier Peninsula.

The Commonwealth's objective is to avoid significant impacts on: matters of national environmental significance, the environment on Commonwealth land or the environment generally where it involves actions by Commonwealth agencies. As there are no listed places protected pursuant to the EPBC Act that occur within or proximate to the site, it may reasonably be concluded that there can be no significant impacts on related Matters of National Environmental Significance (for example National Heritage places) or other protected matters.

4.1.9. Cumulative Impacts of the Proposal and Associated Activities and Projects

The assessment of cumulative impacts refers to the assessment of the combined impact of direct impacts of development of the BLNG Precinct Project (Category A), indirect or facilitated impacts from activities arising from its development (Category B), and unrelated activities that are approved or likely to occur in the environs of Category A or B activities (Category C).

Category A, B and C activities would result in an increase in population and associated demand for residential, commercial and industrial development, services, infrastructure and recreation. This will inevitably place pressure on existing places of environmental heritage significance through a combination of direct and indirect impacts primarily associated with site disturbance (for example, clearing, excavation and degradation) and competition from surrounding land uses. **Part 5, Section 2** covers the potential cumulative impact of population increases. This section also includes a number of relevant management plans to address cumulative impacts.

The potential impacts on known heritage places arising from predominately urban activities, such as residential and industrial development, can feasibly be mitigated and/or managed at the appropriate time; however, this is not necessarily the case for indirect impacts on heritage places arising as a result of increased recreation activity.

The predicted influx of workers and their dependents associated with Category A, B and C activities, combined with the Shire of Broome's existing positive population growth rate is expected to lead to an increased demand for recreational activities that could affect listed and unlisted places of environmental heritage significance, such as Coulomb Point Nature Reserve and Roebuck Bay, and potentially at conservation areas further afield such as Windjana Gorge (255 kilometres from Broome) and Geikie Gorge (390 kilometres from Broome). Predicted impacts on these areas would be speculation at this stage. Monitoring of visitor numbers in these areas is recommended and subsequent measures to adequately manage visitors should be implemented if parks and reserves are being detrimentally affected by increased visitation.

• **Table 4.1-2 Impact Assessment Summary for Environmental Heritage and Conservation Areas.**

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
Vegetation and Habitat Clearing	Loss of habitat impacting on overall integrity of environmental and heritage values. However there are no designated sites at the location of the Precinct.	Prepare and implement a Management Plan for Roebuck Bay and on-going Management of 80 Mile Beach. Implementation of Dampier Peninsula Land use and Infrastructure Plan to facilitate the establishment of additional nature reserves and/or national parks. Mitigation measures to avoid impacts on terrestrial conservation areas from indirect activities associated with the implementation of the Plan including;	The Proponent shall not cause the loss of vegetation, including monsoon vine thicket, in excess of the limits of cumulative loss prescribed in management measure for Part 4, Section 2.4 (Terrestrial Flora and Vegetation).	Prepare and implement a Construction Environmental Management Plan to the satisfaction of the Western Australian Minister for Environment, which addresses the following:	Very Low
Altered Fire Regimes	Potential loss of habitat or alteration of habitat conservation impacting on overall integrity of environmental heritage and conservation values. However there are no designated sites at the location of the precinct.			<ul style="list-style-type: none"> • schedule of construction activities; • details of the construction methods to be used; • objectives and targets; • environmental management; • environmental training and inductions; and • Environmental monitoring, contingencies and reporting, and stakeholder consultation. 	Very Low
Site Disturbance	Potential loss of habitat or alteration of habitat conservation impacting on overall integrity of environmental heritage and conservation values. However there are no designated sites at the location of the precinct.	<ul style="list-style-type: none"> • Fire and weed management in and around Coulomb Point Nature Reserve and any other nature reserves established in the vicinity of the Plan area in collaboration with the DEC; • DEC to monitor visitor numbers to Coulomb Point Reserve camping area; and • DEC to develop a management plan for the Coulomb Point Reserve. 			Very Low
Physical Presence	Physical presence will result in permanent change and loss of current areas within the region, which may indirectly impact on other areas within the region as visitors are displaced.	Develop and implement a Management and Monitoring Strategy for Vegetation of Medium to High Conservation Significance which will inform future Proponents of requirements for		In order to address the potential impacts to environmental heritage and conservation values, the CEMP would include specific environmental measures such as: <ul style="list-style-type: none"> • Fire and weed management at the Coulomb Point Nature Reserve and any other nature reserve area established. • Information and training for staff/contractors and site visitors as to appropriate, low impact behaviour. 	Low

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
		detailed management plans specifically relating to : <ul style="list-style-type: none"> • Fire Management Plan; • Terrestrial Fauna Management Plan; • Terrestrial Weed Management Plan; and • Appropriate management of hydrology (both surface water and groundwater). 			

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4.2. Relevant Factor: Palaeontology

Palaeontology has a socio-economic value as often sites may hold cultural heritage value significance or are a tourism recreation destination. The Kimberley coast, including south of Broome at Gantheaume Point and coastal areas north along the Dampier Peninsula, is made up of Broome Sandstone which contains 130 million year old dinosaur underprints (Broome Visitors Centre, 2008). Typically, footprints would form in fine-grained muddy sediment (for example, a tidal mudflat) and subsequently become covered with coarser sand, preserving the original impression. Some of these footprints can be seen at low tide and, particularly at Gantheaume Point, they are a tourist attraction of the area. The Broome sandstone also supports a variety of other fossils (AECOM 2010c; **Appendix F-1**).

There are historical reports that similar underprints can be found on the intertidal platform in the James Price Point coastal area; however, the exact location of these underprints is not publicly available.

4.2.1. Current Knowledge

The Broome sandstone is a moderately hardened, fine to coarse-grained, grey and buff to orange-coloured sandstone exposed along the coast between Cape Leveque (190 kilometres north-northeast of Broome) and Cape Gourdon (53 kilometres south-southwest of Broome). The coastal exposures, mainly as rock platforms, contain numerous examples of dinosaur footprints and trackways, the best known of which are at Gantheaume Point and on the northern margin of Roebuck Bay opposite Broome. The majority of the footprints are from sauropods; no bone material has been found to date.

The Broome sandstone is up to 286 metres thick in the Broome area (Playford *et al.*, 1975). At the James Price Point coastal area, the Broome sandstone is exposed intermittently within the intertidal zone and in cliff sections north of James Price Point.

Two field surveys were undertaken by the WA Museum to assess the fossil content of the intertidal exposures of the Lower Cretaceous Broome sandstone around James Price Point. The first survey was undertaken at low tide along a 4.2 kilometres stretch of coastline, 3 kilometres south to 1.2 kilometres northeast of James Price Point (AECOM, 2010c; **Appendix F-1**). Tidal restrictions limited accessibility of parts of the intertidal platform during the course of the survey; hence, the examination of the lowermost 1 metre of vertical outcrop within the total intertidal zone was not possible, and weather precluded surveys further north of James Price Point.

The second survey (Western Australian Museum, 2010; **Appendix F-2**) was undertaken in March/April to take advantage of extreme spring tides, which enabled survey of the lowermost 1 metre vertical outcrop and to focus on the most likely areas of direct impact from construction activities, notably the port development and the southern pipeline crossing. During both surveys, Traditional Owners accompanied palaeontologists undertaking the survey.

During the first survey relatively abundant, sub-circular structures interpreted as degraded sauropod underprints were found at an approximate density of one item per 200m² (of accessible platform) in two beds in the lowest third of the intertidal zone that was able to be accessed. Most of the structures were located in the lower bed, within a 280 metre long and 30 metre wide area, approximately 2 kilometres south of James Price Point within and adjacent to the BLNG Precinct project area (**Figure 4.2-1** and **Figure 4.2-2**).

Dinosaur underprints were not recorded from the Broome sandstone exposed in cliff sections and within the intertidal zone between 1.5 kilometres south and 1.2 kilometres north of James Price Point. The intertidal zone between 1.2 kilometres and 4.5 kilometres north of James Price Point was not surveyed due to weather limitations; however, this area was largely covered by sand which precluded surveying for paleontological resources (**Figure 4.2-3**).

During the second survey, a small number of putative sauropod underprints were located in the lowermost part of the total intertidal zone additional to similar more-or-less circular structures identified within the same lithological bed during the November, 2009 survey (Western Australia Museum, 2010; **Appendix F-2**). The proposed southern pipeline shore crossing area (~ 6.2-7.5km south of James Price Point) did not yield any macro-fossils during this survey.

The Broome sandstone also supports a variety of other fossils, however occurrence of, plant fossils, relatively abundant in the Broome sandstone around Broome itself, were very rare (AECOM 2010c; **Appendix F-1**).

Dinosaur ichnofossils (trace fossil such as tracks, trails or burrows) occur in the Broome sandstone between Broome and James Price Point (Thulborn, *et al.* 1994) and virtually all imprints are exposed within the intertidal zone. Dinosaur ichnofossils range in state of preservation from 'world-class' assemblages of extraordinary scientific importance (for example, Gantheaume Point and Roebuck Bay) to severely degraded, barely recognisable underprints over the extent of the Broome sandstone.

The dinosaur ichnofossils (trackways and isolated underprints) found during the 2009 and 2010 surveys of the BLNG Precinct area are of low scientific/conservation importance, as at James Price Point they occur in rubbly rather than platform Broome Sandstone and are severely degraded from natural wave erosion. No tridactyl footprints were identified in either of the surveys. It is likely that there are more trackways or isolated footprints in the intertidal area around James Price Point, however the area surveyed was focused on areas likely to be directly impacted and was targeted to assess the most likely areas of occurrence using historical evidence. It should be noted however that museum grade trackways could become exposed during construction.



■ **Figure 4.2-1 Relatively Large (~70cm in Diameter) Sauropod Underprint with Positive Relief, South of James Price Point.**



■ **Figure 4.2-2 Two Degraded Sauropod Underprints South of James Price Point.**



■ **Figure 4.2-3 The Area North of James Price Point at Low Tide. Note the Sand-covered Intertidal Zone in the Background.**

4.2.2.1. Statutory Requirement, Policy and Guidance

The following are the relevant legislation; policies and guidance that are applicable to the management of palaeontology in certain contexts:

Commonwealth

- *Environment Protection and Biodiversity Conservation Act 1999;*

State

- *Aboriginal Heritage Act 1972;* and
- *Conservation and Land Management Regulations 2002.*

4.2.2.2. Description of Factor

The palaeontology resources that are of relevance and significance relate to the known presence and potential unknown presence of dinosaur footprints, particularly in relation to the intertidal coast line.

4.2.3. Identification of Key Aspects

4.2.3.1. Definition of Relevant Aspects

Aspects associated with the development and operation of the BLNG Precinct and associated infrastructure that may have a social-economic impact in relation to palaeontology were identified in the Scope of the Strategic Assessment and considered in the Scoping risk assessment to be of medium to high risk. These aspects include:

- Site disturbance and excavation – construction and excavation activities (including vehicle movements along beaches) could disturb Broome sandstone which has the potential to contain paleontological resources.
- Atmospheric Emissions – emissions from industrial facilities are dispersed and may settle and impact on paleontological resources.

In addition to the aspects identified in the Scope of the Strategic Assessment, the physical presence of the marine infrastructure has been considered to potentially have an effect on paleontological values.

4.2.4. Sources of Potential Impact

Currently no large scale development activities occur within the James Price Point coastal area. The presence of the BLNG Precinct has the potential to impact upon paleontological resources within the area.

Activities, facilities and infrastructure associated with the development and operation of the BLNG Precinct that may have the potential to result in the disturbance of known and unknown heritage sites within the BLNG Precinct footprint include:

- clearing;
- drilling;
- piling;
- earthworks;
- dredging, and
- operation.

4.2.4.1. Sensitivity and Resilience

The footprints in the Broome sandstone exposed in the intertidal zone are subject to natural erosion by waves and are thus ephemeral in the medium to long-term. The intertidal outcrops of the Broome sandstone especially around James Price Point are predominantly rubble rather than platform as in other places between Cape Leveque and Gourdon Bay where well preserved dinosaur footprints occur. This reduces the potential for significant paleontological resources to be located within the James Price Point coastal area. The main existing threatening process to the fossils of the Broome sandstone is erosion by waves of exposed sandstone in the intertidal zone. The presence of humans who could extract the fossils illegally or otherwise disturb them is also a potential threat.

4.2.5. Predicted Impacts

The predicted impacts on paleontological resources from the construction and operation of the BLNG Precinct are discussed in detail in the following sub-sections.

4.2.5.1. Potential Impacts on Palaeontology due to Site Disturbance and Excavation

The sauropod underprints found during the 2009 and 2010 surveys are located within the James Price Point intertidal zone, part of which may be removed or disturbed by the construction (drilling/blasting activities) of infrastructure associated with the BLNG Precinct. The construction of the marine facilities would also remove or disturb Broome sandstone that could contain other paleontological resources. Sediments from excavation activities could be shifted and deposited elsewhere in the marine environment resulting in burial of any existing unrecorded paleontological resources.

The impacts from marine disturbance would be a significant local impact that would reduce the amount of potential fossil material or dinosaur footprints in the James Price Point coastal area. The regional impact, however, on the entire dinosaur trackway assemblage of the Broome sandstone is likely to be small, considering the superior quality of trackways found further south along the coast at Gantheaume Point and Roebuck Bay compared to those found and possibly located in the intertidal zone of James Price Point and surrounds.

During construction, the proposed development would require dredging of the marine environment to construct marine facilities, pipelines, a turning basin and shipping channels. This would cause sediments to be mobilised and deposit elsewhere in the marine environment, potentially resulting in burial of any existing unrecorded paleontological resources. Burial of footprints through sedimentation is not considered to be detrimental as exposed footprints are most at risk of natural erosional processes. Therefore, this is not considered to be a significant impact and no management measures are proposed.

Excavation in the terrestrial environment could potentially unearth any hidden existing paleontological resources within the coastal environment, and vehicle and machinery movements along the beach have the potential to damage or disturb paleontological resources such as degraded sauropod underprints in the intertidal zone. The proposed condition regarding disturbance of Broome Sandstone in the intertidal zone would also address potential disturbance along the beach.

The loss or damage of any palaeontology assets could potentially result in social impact in relation to indirect impacts on cultural value, i.e. they may have particular symbolism in the area and be of cultural significance to the Traditional Owners, or affect tourism aspects, such as tourists visiting the area for the sauropod underprints.

4.2.5.2. Potential Impacts on Palaeontology due to Physical Presence

Groynes and bulkheads constructed for the marine facilities could result in a re-distribution of sediments transported by longshore currents. The net impact on paleontological resources in the area is unpredictable; currently-exposed sauropod underprints may become buried under sand, whereas currently covered underprints could be exposed.

The sand beaches in the vicinity of James Price Point appear to be eroding, with extensive low, steep cliffs observed along the backshore, indicating intermittent erosion during major storms and cyclones. Recovery of eroded material after storms is apparently slow, indicating a possible overall net loss of material. Detailed hydrodynamic and sediment transport modelling would describe this process more completely; however, the modelling is reliant on a well-developed port concept design and layout. Once this design is available, the extent of impacts expected from the presence of marine infrastructure would be able to be modelled. It is likely that the re-distribution of sediments would be localised

and eventually attain a seasonal equilibrium state; however, any local impact can be minimised by refining the infrastructure design, such as including a sand bypass system.

The loss or damage of any palaeontology assets could potentially result in social impact in relation to indirect impacts on cultural value, i.e. they may have particular symbolism in the area and be of cultural significance to the Traditional Owners, or affect tourism aspects, such as tourists visiting the area for the sauropod underprints.

4.2.5.3. Potential impacts on Palaeontology due to Atmospheric Emissions and Marine Discharges

The Scope of the Strategic Assessment also identified that atmospheric emissions or marine discharges could affect paleontological resources in the area. The Strategic Assessment concludes that atmospheric emissions are unlikely to affect the Broome sandstone as the intertidal zone is regularly inundated with sea water and any deposition would be unlikely to accumulate and affect the integrity of the sandstone that the underprints are located in. Marine discharges would be expected to have a low likelihood of affecting the paleontological resources as they are not susceptible to the potential sustained routine discharges, and other non-routine discharges such as spills are likely to be temporary and highly localised. For these reasons, neither of these potential impacts is further addressed in the Strategic Assessment specifically in the context of palaeontology.

4.2.5.4. Summary

It is possible that construction of the marine facilities in the intertidal zone for the BLNG Precinct would remove a portion of the ichnofossils in the Broome sandstone around James Price Point. The stretch of intertidal zone within the BLNG Precinct project area is approximately 1 km long. As the Broome Sandstone occurs between Cape Leveque (190 kilometres north-northeast of Broome) and Cape Gourdon (53 kilometres south-southwest of Broome), only a small proportion of any potential paleontological resource would be affected. As the underprints and fossils within the James Price Point coastal area identified to date are considered to be of lower quality than other resources along the coast, the relatively small amount of area to be disturbed is considered of local rather than regional significance. As the value of dinosaur footprints to the Traditional Owners is uncertain their involvement in any decisions on removal or use is important. On a scientific/conservation importance basis, the fossils that may be removed are of low importance; however, they may be of significant importance to the Traditional Owners.

Section 4.2.6 summarises the predicted impacts and mitigation measures to be undertaken in relation to aspects or activities that may have an impact upon paleontological resources.

4.2.6. Mitigation and Management Measures

The Social Impact Management Plan is presented in **Part 5, Section 5** outlines the management framework for the BLNG Precinct in order to mitigate any potential social-economic impacts and should be referred to for further detail. As some of the social-economic impacts are indirect, environmental management plans would also be relevant in terms of mitigating social impacts and these are presented in detail within each of the relevant environmental sections.

There are no specific state management measures, however other relevant mitigation and management measures comprise:

- Preparation and implementation of a Dredging and Dredge Spoil Management Plan (**DSDMP**), to the satisfaction of the Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts.
- Preparation and implementation of a Port Facilities Construction Environmental Management Plan (**PFCEMP**).
- Proponents of derived proposals shall demonstrate application of best practice measures to be implemented to minimise the impacts on coastal processes from onshore and near shore marine infrastructure.

The potential mitigation proposed for this impact is that any proponents of derived proposals that may disturb offshore or intertidal Broome sandstone at the BLNG Precinct would be required as a condition of approval to:

- Identify the potential for fossil materials or footprints/underprints to occur;
- conduct additional focused surveys at the most appropriate time of the year (lowest tide) of any areas not already surveyed potentially containing dinosaur footprints prior to disturbance of the Sandstone; and,
- If footprints, or other fossils, are discovered or known to be in the planned disturbance area, the evidence will be scientifically documented and an appropriate response determined in consultation with the Western Australian Museum and the Traditional Owners.

The proposed condition would comprise.

For any derived proposal that may disturb offshore Broome Sandstone at the BLNG Precinct, the proponent of derived proposals shall conduct additional focused surveys at the most appropriate time of the year (lowest tide) of any areas not already surveyed potentially containing dinosaur footprints prior to disturbance of the Sandstone. This survey should be conducted in consultation with Western Australian Museum and the Traditional Owners in the company of an anthropologist and in accordance with any agreement between the State of Western Australia and the Traditional Owners.

If footprints, or other fossils, are discovered in the planned disturbance area, their significance on either a scientific and/or ethnographic basis should be determined in consultation with the Traditional Owners. If they are of significant value any response should be determined in consultation with the Traditional Owners and the Western Australian Museum.

This proposed condition regarding disturbance of Broome Sandstone in the intertidal zone will also address potential disturbance along the beach with respect to terrestrial site disturbance and excavation.

Detailed hydrodynamic and sediment transport modelling would describe the extent of impacts on the longshore processes from the presence of marine infrastructure. The modelling is reliant on a well-developed port concept design. Preliminary information (from hydrodynamic modelling) and management measures associated with hydrodynamics and sediment transport are provided in **Part 3, Section 2.1** and **Section 2.3**.

4.2.7. Socio-economic Outcome of Category A Activities

The Outcome of Category A activities based on the results of the site-specific survey, the quality of the footprints and other fossils in the area is low in comparison to other paleontological sites on the Dampier Peninsula. Notwithstanding this, before construction commences that may disturb Broome sandstone, a focused survey of the intertidal zone will be required to describe paleontological resources in the proposed area to be disturbed and, if found, an appropriate response will be developed in consultation with the Traditional Owners and the Western Australian Museum.

4.2.8. Cumulative Impacts of the Proposal and Associated Activities and Projects

Impacts from Category A activities on paleontological resources would be localised to the site and have a low importance as the resources identified to date are of negligible scientific value in comparison to other sites on the Dampier Peninsula. There would be no direct overlap of Category B or C projects with those of the Plan on paleontological resources of the Broome sandstone.

The increased recreational use of the Dampier Peninsula that may be associated with the BLNG Precinct due to improved access could allow for a greater chance of disturbance of the footprints, but this impact is unlikely to be significantly greater than currently experienced in the area.

■ Table 4.2-1 Impact Assessment Summary of Impacts Table for Palaeontology.

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
Site disturbance and excavation.	Potential physical loss of paleontological resources through direct disturbance and excavation within the construction/operation zone. Excavation could also result in sediment disturbance resulting in covering of existing resources but also potential uncovering of undiscovered resources.	No specific State Government measures	For any derived proposal that may disturb offshore Broome Sandstone at the BLNG Precinct, the proponent of derived proposals shall conduct additional focused surveys at the most appropriate time of the year (lowest tide) of any areas not already surveyed potentially containing dinosaur footprints prior to disturbance of the Sandstone. This survey should be conducted in consultation with Western Australian Museum and the Traditional Owners in the company of an anthropologist and in accordance with any agreement between the State of Western Australia and the Traditional Owners. If footprints, or other fossils, are discovered in the planned disturbance area, their significance on either a scientific and/or ethnographic basis should be determined in consultation with the Traditional Owners. If they are of significant value any response should be determined in consultation with the Traditional Owners and the Western Australian Museum.	Prepare and implement a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts.	Very Low
Physical Presence	The presence of groynes and bulkheads could result in a re-distribution of sediments transported by longshore currents			Preparation and implementation of a PFCEMP. Commercial proponents shall demonstrate application of best practice measures to be implemented to minimise the impacts on coastal processes from onshore and near shore marine infrastructure.	Very Low
Atmospheric Emissions and Marine Discharges	Air emissions and marine discharges could alter integrity of palaeontology resources.				Very Low

4.3. Relevant Factor: Colonial Heritage

Colonial legacy is evident throughout parts of the Kimberley Region particularly in Broome, Derby and across the Dampier Peninsula. The existence of, and potential impacts to colonial heritage provided in the following sections has been informed by a desktop-based colonial heritage assessment. No site-based field surveys have been undertaken.

4.3.1. Current Knowledge

Colonial heritage includes heritage buildings, archaeological sites, camps, shipwrecks and pearling and fishing sites. A desktop study was commissioned to identify the known and listed places of colonial heritage significance and to assess the potential impacts of the BLNG Precinct (AECOM, 2010e).

Database searches have identified a number of colonial heritage values along the mainland between La Grange Bay 70 kilometres south of Broome and Cape Leveque at the northern point of the Dampier Peninsula. Database searches have also identified noted and known off-shore places of interest and shipwrecks between La Grange Bay and the eastern side of King Sound around 180 kilometres to the northeast of Broome. A list of the databases used is included in the study (AECOM, 2010e).

The desktop study found a total of 368 heritage places with 285 of these being protected and 83 unprotected. No historic heritage sites within the area searched are currently listed on the World Heritage List, the Commonwealth Heritage List or the National Heritage List. However, the proposed Kimberley National Heritage Listing (as described in **Part 5, Section 4.1**) is likely to include a range of cultural heritage sites. Overall, 215 of the 368 places are located in Broome or the waters off Broome. This high density of heritage in Broome can be attributed to the historical pearling industry, for which Broome was founded to service in the 1880s.

The known and identified heritage places located in or near Broome (60km south of James Price Point) include:

- 82 heritage buildings or archaeological sites within the town of Broome with statutory protection;
- 22 heritage buildings or archaeological sites within the town of Broome which do not have statutory protection
- 102 shipwrecks with statutory protection; and
- nine shipwrecks without statutory protection.

The Lacepede Islands contain the densest concentration of colonial heritage (shipwrecks) outside the immediate Broome area.

4.3.1.1. Heritage Buildings or Archaeological Sites

No colonial heritage places were found within the James Price Point coastal area from the database searches. Two heritage sites are located about 30 kilometres south at Willie Creek:

- Captain Kennedy's holiday cottage; and
- the Afghan wells.

Both of these sites are protected under the Shire of Broome's Town Planning Scheme.

Willie Creek is also a known location of a large pearling 'lay-up' camp with a second such camp 20 kilometres south of James Price Point at Barred Creek. To date, the pearling lay-up camps in creeks near Broome do not have statutory protection as they have not been archaeologically surveyed and assessed for heritage listing; however, they are potentially maritime heritage sites under the *Western Australian Maritime Act 1973* and could be eligible for listing as significant places on the Register of Heritage Places under the *Heritage of Western Australia Act 1990*.

While no known land sites of colonial significance have been identified within the James Price Point coastal area and, hence, within the BLNG Precinct footprint, it is important to note that this may be a result of a lack of site-specific surveys undertaken in the area to date and not necessarily due to the absence of sites.

4.3.1.2. Shipwrecks

To date, none of the shipwrecks thought to have occurred near Broome have been found. Most of these vessels were associated with the pearling industry which formed the mainstay of the Broome economy from its founding until early into World War I. Many vessels were lost in cyclones. The Lacepede Islands contain the densest concentration of shipwrecks outside the immediate Broome area.

Database searches and consultation with the WA Museum have identified that there is one known and potentially two other shipwrecks within 20 to 30 kilometres of James Price Point. These are identified in **Table 4.3-1**. Only the Shamrock shipwreck has been located and it has recently been included in the potential National Heritage Listing assessment of the Kimberley currently in progress.

■ **Table 4.3-1 Shipwrecks Possibly in the James Price Point Coastal Area.**

Name	Location	Date
Herculese	Barred Creek (approximately 20 kilometres south by sea from James Price Point)*	1918
Mikado	Barred Creek (approximately 20 kilometres south by sea from James Price Point)*	1918
Shamrock	Cape Bertholet (approximately 25 kilometres north by sea from James Price Point)	1901

Note: * Location not confirmed

4.3.1.3. Statutory Requirements, Policy and Guidance

The following relevant legislation, policies and guidance are applicable to the management of colonial heritage:

Commonwealth

- *Australian Heritage Council Act 2003*; and
- *Environment Protection and Biodiversity Conservation Act 1999*.

State

- *Heritage of Western Australia Act 1990*; and
- *Maritime Archaeology Act 1973*.

4.3.1.4. Description of Factor

Colonial heritage relates to heritage building, archaeological sites and shipwrecks that provide a context and background to the colonial history of the area. The preservation in situ of these assets provides context and a point of reference for the cultural value associated with such assets.

4.3.2. Identification of Key Aspects

4.3.2.1. Definition of Relevant Aspects

Aspects associated with the development and operation of the BLNG Precinct and associated infrastructure that may have a social-economic impact in relation to colonial heritage were identified in the Scope of the Strategic Assessment and considered in the risk assessment to be of medium to high risk. These aspects include:

- altered fire regime (more frequent and higher intensity fires) could impact sensitive areas with colonial heritage value
- site disturbance/excavation, terrestrial, may present a risk of disturbance to any buildings or archaeological sites of environmental heritage value.
- site disturbance/excavation, marine, may present a risk of disturbance to any shipwrecks with environmental heritage value.

Construction of the proposed jetty structure could affect additional shipwrecks and coastal heritage sites not thought to be immediately impacted. Hence, the following aspect is considered to be relevant to colonial heritage:

- physical presence of the marine facilities could change water flow and sediment deposition and erosion along the coast resulting in damage to heritage values such as shipwrecks,

Marine noise and vibration was identified in the SoSA as an aspect with potential to cause impact to colonial heritage values. This aspect was considered in the SA to have a low risk of affecting colonial heritage values as the nearest known sites of heritage value are at least 20 kilometres from the James Price Point coastal area. The heritage values are unlikely to experience detrimental impacts from noise or vibration at this distance and, if impacts were to be experienced, they would be short term.

4.3.3. Sources of Potential Impact

Currently no large scale development activities occur within the James Price Point coastal area. The presence of the BLNG Precinct has the potential to impact upon colonial heritage values.

Activities, facilities and infrastructure associated with the development and operation of the BLNG Precinct that may have the potential to result in the disturbance of known and unknown heritage sites within the BLNG Precinct footprint include:

- Clearing;
- Drilling;
- Piling;
- Earthworks; and
- Dredging.

4.3.3.1. Sensitivity and Resilience

No heritage buildings or archaeological sites have been identified within or adjacent to the BLNG Precinct, however it must be recognised that in relation to archaeological remains there is always the potential for unknown remains to be present. No shipwrecks are known to be within the Precinct boundary, however information has identified that within that area of coastline there is the potential for there to be three shipwrecks. These assets are potentially sensitive but in the context of the wider value of the area it is considered that overall sensitivity would be minimal.

4.3.4. Predicted Impacts

Based on recent interest in the Kimberley National Heritage Listing Assessment, it is likely that the Kimberley region will be formally included on the National Heritage List for a range of natural and cultural values. While the specific nature and distribution of these values has yet to be formalised, there is seemingly a low probability that the James Price Point coastal area will be considered to have outstanding colonial heritage values. Nevertheless, any identified Colonial Heritage sites near James Price Point coastal area will need to be protected and managed. Aspects that may impact Colonial Heritage are described in the following sections.

4.3.4.1. Potential Impacts on Colonial Heritage due to Altered Fire Regime

Refer to **Part 5, Section 4.7** (Tourism) and **Section 4.8** (Sports, Recreation and Land Use (including Recreation Fishing)). Some areas with Colonial Heritage are also tourist areas (for example, Captain Kennedy's holiday cottage at Willie Creek) and alteration of fire regimes could result in the overall integrity of the area for which tourists are visiting being compromised, but could also pose a risk to visiting tourists, as well as resulting in loss of Colonial Heritage assets.

Fire management plans to be developed for the protection of environmental values are expected to be effective in protecting heritage values, and are likely to have a positive benefit in the long term through improved fire management.

4.3.4.2. Potential Impacts on Colonial Heritage due to Terrestrial Site Disturbance/Excavation

Refer to **Part 5, Section 4.7** (Tourism) and **Section 4.8** (Sports, Recreation and Land Use (including Recreation Fishing)). Some areas with Colonial Heritage are also tourist areas (for example, Captain Kennedy's holiday cottage at Willie Creek). It is unlikely that there would be any direct disturbance of colonial heritage assets, but there could be resulting indirect impacts on tourism and recreation.

4.3.4.3. Potential Impacts on Colonial Heritage due to Marine Site Disturbance/Excavation

At this time no shipwrecks have been discovered in the James Price Point coastal area, however it is known that there are undiscovered shipwrecks in the area. Therefore there would be no known direct impacts, but appropriate management and mitigation would need to be implemented to manage impacts should a shipwreck be discovered during development of the Precinct.

4.3.4.4. Potential Impacts on Colonial Heritage due to Physical Presence

The Physical Presence of the marine facilities could change water flow and sediment deposition and erosion along the coast resulting in additional damage or smothering of heritage values such as shipwrecks. Refer to **Part 3, Section 2.1** (Tidal regimes, wave climate, currents and hydrodynamics) for a discussion on the sediment redistribution expected in the James Price Point coastal area.

4.3.4.5. Summary

Currently no resources are identified within the Precinct area, therefore impacts would be negligible, however it must be recognised that there are assets identified in desk based sources that have not been identified in situ. As such there is the potential for unknown resources within the precinct area.

Table 4.3-2 summarises the predicted impacts and mitigation measures to be undertaken in relation to aspects or activities that may have an impact upon colonial heritage.

4.3.5. Mitigation and Management Measures

The Strategic Social Impact Management Plan is presented in **Part 5, Section 5** which outlines the management framework for the BLNG Precinct in order to mitigate any potential social-economic impacts, and should be referred to for further detail. As some of the social-economic impacts are indirect environmental management plans would also be relevant in terms of mitigating social impacts, and these are presented in detail within each of the relevant environmental sections.

Relevant State Government measures comprise:

- Prepare and implement a Fire Management Strategy for the Dampier Peninsula to align with existing fire management strategies to reduce the frequency of fires and the occurrence of late dry season burns to the Peninsula.

Other relevant mitigation and management measures comprise:

- Preparation and implementation of a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts.
- Preparation and implementation of a PFCEMP.

4.3.6. Socio-economic Outcome of Category A Activities

By implementing the Colonial Heritage management measures described above the BLNG Precinct development would not result in any significant detrimental effect on colonial heritage and will comply with relevant heritage legislation.

4.3.7. Cumulative Impacts of the Proposal and Associated Activities and Projects

The Precinct workforce will be largely fly-in-fly-out and accommodated in a managed access camp. Any recreation activities undertaken on rest days will be actively managed (guided tours with Aboriginal tour operators and/or fishing tour operators, for example).

It is unlikely that the workforce of the BLNG Precinct would have a significant impact on the colonial heritage assets in and around the BLNG Precinct or in the Broome townsite. It is more likely that the natural projected population increases within the Shire of Broome could potentially impact on heritage values in the area through increased pressure on the historic built environment of Broome, particularly the historic shopping areas within the town.

The increase in population is likely to lead to an increase in recreational activities which could adversely affect heritage places including shipwrecks, pearling and fishing camps at locations such as Willie Creek, Barred Creek and the Lacepede Islands.

■ Table 4.3-2 Impact Assessment Summary for Colonial Heritage.

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
Altered Fire Regime	Direct loss of colonial heritage resources as a result of fire or areas of colonial heritage value that have a tourism value being compromised. There is the potential positive impact of improved management of fire regimes which may result in reduced risk to colonial heritage assets.	Prepare and implement a Fire Management Strategy for the Dampier Peninsula to align with existing fire management strategies to reduce the frequency of fires and the occurrence of late dry season burns to the Peninsula.	Prior to commencement of dredging, proponents of derived proposals shall prepare and implement a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts. The Plan shall include: <ul style="list-style-type: none"> • Consideration of the re-use of suitable dredge material for MOF construction, where practicable. • Design of the MOF including construction of bunds to isolate fill material from wind and wave action. • Consideration of applicability of management techniques and technology in meeting location specific WQ environmental values and environmental quality objectives. • Consideration of the re-use of reclaimed material to minimise ocean disposal. • Measures to minimise 	Prepare and implement a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts. Preparation and implementation of a PFCEMP.	Very Low
Site disturbance and excavation - Terrestrial.	Potential physical loss of colonial heritage assets through direct disturbance and excavation within the construction/operation zone.				Very Low
Site Disturbance and Excavation - Marine	Potential physical loss of colonial heritage assets through direct disturbance and excavation within the marine construction/operation zone. Excavation could also result in sediment disturbance resulting in covering of existing resources but also potential uncovering of undiscovered resources.				Very Low
Physical Presence	The Physical Presence of the marine facilities could change water flow and sediment deposition and erosion along the coast resulting in additional damage or smothering of heritage values such as shipwrecks.				Low

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
			<p>dredging impacts during sensitive ecological windows.</p> <ul style="list-style-type: none"> • A monitoring strategy for ecological receptors and health during marine construction (including baseline surveys). • The development of trigger levels for benthic communities and water quality that define additional management responses. • Mechanisms to audit and assess environmental performance of proponent during construction. • A communications strategy to inform other local marine users of times of peak construction activity that may influence non-construction related activities within the area. <p>The DSDMP will be subject to assessment under the <i>Environment Protection (Sea Dumping) Act 1981</i> (Cwth), including appropriate stakeholder consultation.</p>		

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4.4. Relevant Factor: Visual Amenity, Light and Landscape Character

This section addresses three different topics: Visual Amenity, Light and Landscape Character and describes how the BLNG Precinct and associated supporting infrastructure at James Price Point has the potential to impact on receptors and landscape features. In order to gain an understanding of the potential impacts, a desktop landscape and visual impact assessment (LVIA) has been undertaken. This has been generally in accordance with the Visual Landscape Planning in WA guidelines published by the DPI (2007), and other accepted methodologies adopted across Australia, the United States of America and the United Kingdom. A desktop light impact assessment has also been undertaken, supported by a field-based survey of light levels of an operational LNG facility.

4.4.1. Current Knowledge

The following section describes the existing characteristics of the BLNG Precinct area and surrounds relevant to the assessment of impacts on visual amenity, light and landscape character reflecting the relative risks defined in the risk assessment for this project.

The overarching EPA objective associated with the management of light is *“to avoid or manage potential impacts from light overspill and comply with acceptable standards.”* (EPA, 2009).

The overarching EPA objective associated with the management of impacts to visual amenity is *“to ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as possible.”* (EPA, 2009).

The overarching EPA objective associated with the management of impacts to landscape character is *“to maintain the integrity, ecological functions and environmental values.”* (EPA, 2009).

This assessment of visual amenity, light and landscape character has focussed on the ‘key receptors’ within the vicinity of the BLNG Precinct, as outlined in **Table 4.4-1**.

■ **Table 4.4-1 Key Receptors Considered in the Impact Assessment.**

Key Receptor	Rationale for Selection as a key receptor
Landscape Character Units (LCU)	Landscape Character Units (LCUs) generally comprise homogenous patterns of characteristics such as landform, vegetation, water form and land uses as well as individual features (DPI, 2007). Five LCUs have been identified within the study area. Landscape values are defined by their qualities or associations which can be related to perception (intrinsic value), scenic values, topography, cultural/heritage and ecology.
Visually Sensitive Receptors (VSRs) and Light Sensitive Receptors (LSRs)	Several receptors that people utilise from a recreational, tourism or residential perspective have been identified on the Dampier Peninsula. Users of these receptor locations may be sensitive to the visual and light impacts of the BLNG Precinct and are discussed in this section.

The Indigenous cultural values, locations and sites that contribute to landscape character are detailed in **Part 5, Section 3.5 to Section 3.8** and **Appendix E**.

4.4.1.1. Key Statutory Requirements, Environmental Policy and Guidance

A statutory landscape planning designation (or related discipline such as heritage and ecological designations) can indicate the value of a landscape. The James Price Point site itself has no legislation applying to landscape character, light and visual amenity; however there are a number of designations within the study area:

Commonwealth / International Legislation

- **SEWPAC National Estate Register:** RNE is a list of natural, Indigenous and historic heritage places throughout Australia, which recognises and protects these places under the EPBC Act. Coulomb Point Nature Reserve and Coulomb Point to the north of the site are on this register. Coulomb Point Nature Reserve is a known breeding area for endangered species, diverse flora and fauna. Coulomb Point Area is awaiting formal nomination on the RNE (currently listed as an '*indicative place*', pending formal nomination by SEWPAC). It is recognised for its diversity of geological features, vegetation and fauna species and aesthetic values for the local Dampier Peninsula community. The coastal scenery is described as '*attractive with red pindan cliffs juxtaposed against long white beaches and green mangroves set by the northern Indian Ocean*'. In addition, the location is noted as being networked with tracks and frequently visited by tourists.
- **Potential National Heritage Listing:** The west Kimberley region occupies a significant area, with the western boundary located 200km east of James Price Point. The value of this area has been acknowledged by both State and Commonwealth Governments as the area is currently being assessed to determine its values for potential national Heritage Listing.

State Legislation

- **State Coastal Planning Policy 2.6 – (WAPC, 2003):** The policy aims to ensure that development adjacent to the coast is sited and designed to complement and enhance the coastal environment in terms of its visual, amenity, social and ecological values.
- **The Shire of Broome Town Planning Scheme 4 (Planning WA, 2010):** The purpose of the scheme is to control and guide land use development within the Shire of Broome. Several locations in and directly north of the Broome town site are identified as areas for future rural and urban development, all of which are at least partially developed at this time.

4.4.1.2. Description of the Factor

The impact of the BLNG Precinct and associated infrastructure on the visual amenity, light exposure and landscape character of the surrounding area was assessed using viewshed analyses. The viewshed analyses identify a 3.7 kilometre radius, around the James Price Point area which has been selected as the primary study area for the purposes of this assessment. The area has been defined by the furthest extent of the viewshed, which is a 37 kilometre radius from the BLNG facility. A viewshed is the areas or parts of the surrounding area that could potentially view some of the BLNG facilities or elements of it. Mapping of four viewsheds in the form of a seen area analysis have been undertaken and are illustrated in **Figure 4.4-4** to **Figure 4.4-7**.

4.4.1.3. Landscape Character

The James Price Point coastal area is located within a broad-scale landscape of gently undulating sand plains and dramatic coastal features. The area is Crown Land under a Native Title claim by the Goolarabooloo /Jabirr Jabirr people. The site is a former pastoral station and it is used predominantly for low level Indigenous agriculture and informal recreation and tourism. As a result, it has a remote, relatively natural and untouched character. Coastal areas are characterised by distinctive coloured cliffs, sandy beaches, rocky headlands, dune systems and a diversity of vegetation structure and texture. The only permanent drainage feature on the James Price Point site is Flow Dam (located in the northern section). Inland areas consist of an extensive flat sand plain indistinctly dissected with few landmarks and limited structural or textural vegetation diversity.

The site is located in the Dampier Tablelands landscape character sub-region, one of nine sub-regions comprising of the Kimberley Landscape Region (CALM, 1994). The Dampier Tablelands are characterised by a featureless and gently undulating sand plain with limited relief or dissection. The coastline exhibits a greater diversity of landscape characteristics compared to the extensive inland areas including; long, narrow sandy beaches, elongated sand dunes, platforms of coastal sediments, prominent but low lying cliffs and headlands. Distinctive colour diversity and dramatic tidal variation are also characteristic features of the coastal foreshore and near shore areas.

4.4.1.4. Landscape Features

Key landscape features that exist both inside and outside of the BLNG Precinct boundary include:

- many ephemeral waterways or overland flow paths dissecting the study area;
- rock outcrops scattered across the inland plains (outside precinct boundary);
- the Lurujarri Heritage Trail extending from Coulomb Point (*Minarriny*) 80km along the coast to *Yinarar* to the south of Broome. The trail links old aboriginal camping grounds, unmarked burial places, former water soaks and a variety of food gathering places, for example an old camping ground with shell middens at Minarriny (Coulomb Point) (**Figure 4.4-3**). Infrastructure includes way finding and interpretation (inside and outside Precinct boundary). Refer to the strategic Indigenous Impact Assessment section (**Part 5, Section 3**) for more detail;
- Manari Road, a popular four wheel drive route from Broome north along the coast to Quondong Point (approximately 10km south of James Price Point), James Price Point and on to Coulomb Point Nature Reserve (**Figure 4.4-2**) (inside and outside Precinct boundary);
- the three prominent rocky headlands; Quondong Point, James Price Point, and Coulomb Point. Each headland provides extensive panoramic views along the coastline. James Price Point is located closest to the proposed BLNG Precinct (inside and outside Precinct boundary);
- four smaller rocky headlands, less than 0.5km in length, outcrop between Coulomb Point and Quondong Point (inside and outside Precinct boundary);
- six metre high soft pindan cliffs at James Price Point. These pindan cliffs are one of the iconic features of the Dampier Tablelands (inside and outside Precinct boundary);
- coastal dunes located at Quondong Point, close to James Price Point and in the embayment immediately south of Coulomb Point (inside and outside Precinct boundary); and
- monsoon vine thickets (inside and outside Precinct boundary) (see landscape character unit descriptions for details).

4.4.1.5. Definition of Landscape Character Units and Definition of Landscape Receptors

Landscape Character Units (LCUs) generally comprise homogenous patterns of characteristics such as landform, vegetation, water form and land uses as well as individual features (DPI, 2007). Five LCUs have been identified within the study area. Landscape values are defined by their qualities or associations which can be related to perception (intrinsic value), scenic values, topography, cultural/heritage and ecology.

Five LCUs have been defined within the study area. These are summarised below and their locations are shown in **Figure 4.4-1**.

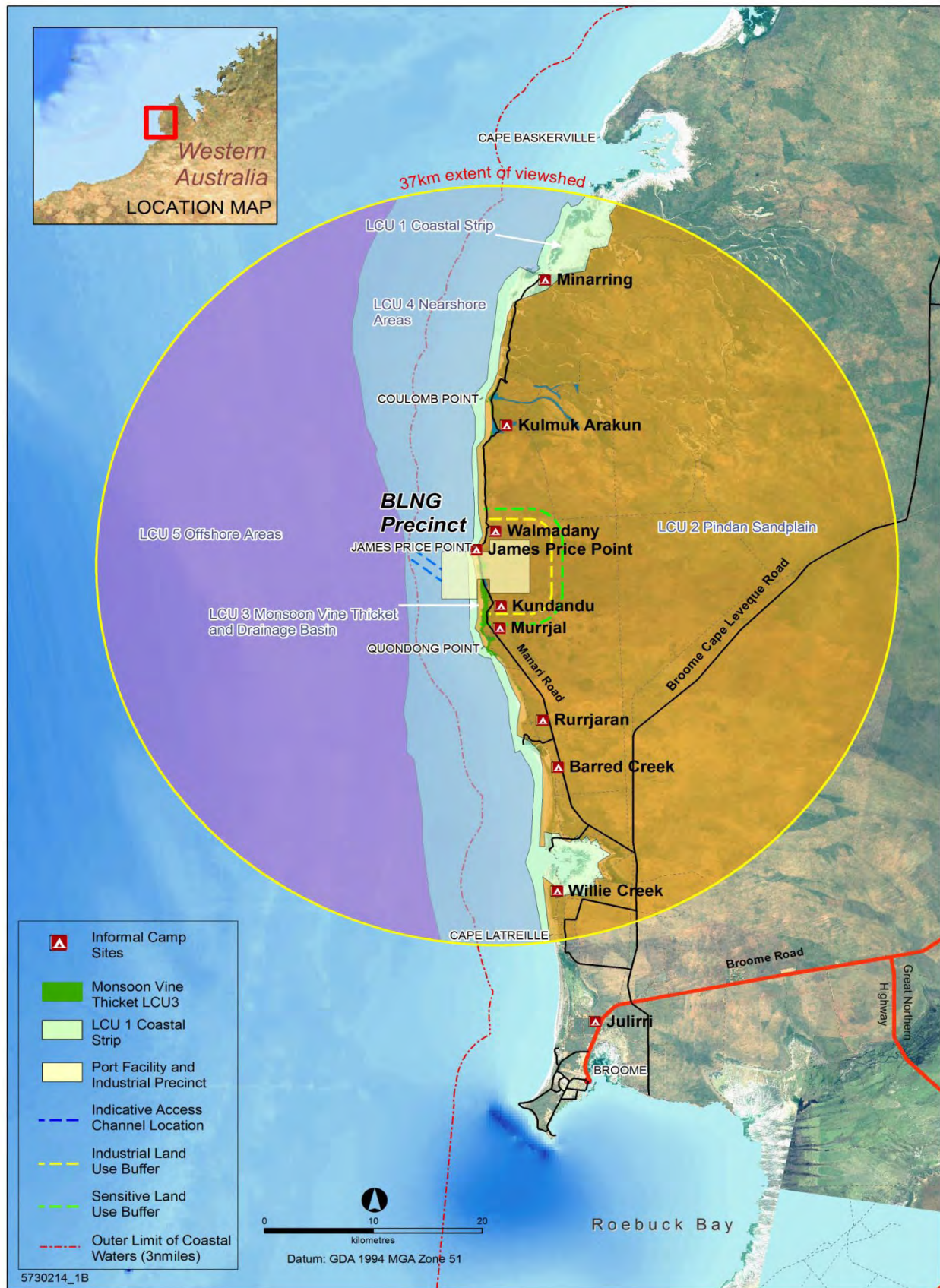
LCU1 – Coastal Areas: A narrow strip of land from the high water mark, across the dunes and inland to where the sea is no longer a significant element in the view. The coastal areas between high water mark and the hind dune area, along flat-topped cliffs, dunes and in blow-out areas are low wind-pruned heathland and coastal communities of beach spinifex, sedges and mixed shrubs. Some areas are degraded by introduced grassland species. This LCU contains a diversity of landforms including the distinctive pindan cliffs and sand dunes and includes the Lurujarri Heritage Trail. This unit attracts the greatest level of recreational and tourism activities such as camping, bush walking and four wheel driving. Viewers achieve long distant views and in many cases visit to appreciate the remote landscape. The two key roads in the study area are Broome – Cape Leveque Road and Manari Road; both are unsealed. The Broome – Cape Leveque Road is located approximately 20 kilometres from the proposed site and is the main road linking Broome with the northern section of the Dampier Peninsula. Manari Road traverses the site on a north to south orientation.

LCU2 – Pindan Sandplain: Covers the extensive, uniform inland areas. The pindan sandplain is a relatively flat featureless plain with supporting open woodland and scrubland vegetation communities consisting of wattle shrub and eucalypts. The vegetation does not have high conservation value. Minor features include ephemeral creeks and small rocky outcrops. It has qualities associated with an undisturbed natural landscape including remoteness.

LCU3 – Monsoon Vine Thickets: Located in scattered, sheltered areas between the coastal strip and extensive woodland/scrubland. They range from semi-deciduous vine thickets to closed evergreen vine thickets and are visually characterised by their dense dark-green canopy during the wet season and deciduous appearance during the dry season. The importance of this landscape is reflected in its listing by the DEC as a TEC. The species within LCU3 contribute to a visually diverse landscape, with contrasting colour and texture and seasonal variations.

LCU4 – Nearshore areas: Located from the high tide mark, to the 20m depth contour and include shallow water areas extending 2.5 to 10km from the shoreline, within the Canning sub-region of the North-west Marine Bioregion (DEWHA 2008a). The Canning Marine Bioregion extends from the southern boundary at Eighty Mile Beach (approximately 190km from James Price Point) to the western edge of Cape Leveque. This region includes a vast abyssal seafloor and a broad continental shelf with atolls and islands. Key characteristics of this LCU include flat sandy areas, rocky substratum, reef platforms and long distant, uninterrupted views. There is little evidence of human activity, even though various fishing, pearling and aquaculture activities take place. The Commonwealth waters adjacent to Quondong Point have been identified by SEWPAC as one of the 14 key ecological features of the Canning bioregion, WA (DEWHA, 2009a).

LCU5 – Off-shore areas: Extend from the shallow nearshore water edge to the extent of the study area, located within the Canning Marine Bioregion. There is little evidence of human activity offshore, albeit occasional fishing and recreational vessels. Of particular significance from a public perception standpoint, is the seasonal presence of migrating humpback whales, which may be viewed from the shoreline. Several pearling leases are held in offshore areas within the Canning Marine Bioregion, with the Clipper Holdings lease being in closest proximity to James Price Point.



■ **Figure 4.4-1 Location of Existing Landscape Character Units and Extent of Viewshed.**

4.4.1.6. Definition of Visually Sensitive Receptors and Light Sensitive Receptors

Visual impacts relate to changes in views experienced by people in the landscape. The extent of a visual impact is assessed according to the sensitivity of the receptor. Several receptors have been identified as being sensitive to the visual and light impacts of the BLNG Precinct and are discussed in this section. The same receptors have been adopted as Visually Sensitive Receptors (**VSR**) and Light Sensitive Receptors (LSR), with the exception of LSR7- Residential areas which are not expected to be impacted by direct views of the Precinct and so are not considered to be VSRs. The VSRs and LSRs are outlined and described in **Table 4.4-2** below, and their locations shown in **Figure 4.4-2** and **Figure 4.4-3**.

■ **Table 4.4-2 Visually Sensitive Receptors and Light Sensitive Receptors Summary Description.**

Visually/Light Sensitive Receptor	Description	Main User Types
VSR/LSR1 and VSR/LSR2 – Occupational and Recreational Road Users	<ul style="list-style-type: none"> a) Broome Cape Leveque Road is an unsealed Minor Road located approximately 33km inland from the site. b) Great Northern Highway is located approximately 40km south-east of the site, and heads east from Broome towards Willare. c) Numerous unsealed minor roads and access tracks diverting off the Broome to Cape Leveque Road to various communities located throughout the Dampier Peninsula 	Occupational users
VSR/LSR2 – Recreational Road Users	<ul style="list-style-type: none"> a) Broome Cape Leveque Road is an unsealed Minor Road located approximately 33km inland from the site. b) Manari Road is an unsealed track that follows the coastline from Willie Creek through to James Price Point before extending north towards Coulomb Point Nature Reserve. c) Great Northern Highway is located approximately 40km south-east of the site, and heads east from Broome towards Willare. d) Numerous unsealed minor roads and access tracks diverting off the Broome to Cape Leveque Road to various communities located throughout the Dampier Peninsula 	Residents Occupational users Tourists Recreational users
VSR/LSR3 – Occupational Marine Users	<ul style="list-style-type: none"> a) Commercial fishing vessels use nearshore tidal areas as well as deep water to the west of the reef shelf. b) Pearling support vessels use nearshore waters servicing pearling leases and permits, as well as deep water to the west of the reef shelf. 	Commercial Fishing Pearling
VSR/LSR4 – Recreational Marine Users	<ul style="list-style-type: none"> a) Recreational vessels launch from various points along the coast in the vicinity of the James price Point and use both nearshore tidal areas and deep water to the west of the reef shelf. b) Charter vessels launch from Broome Port and use both nearshore tidal areas and deep water to the west of the reef shelf, for activities such as fishing and whale watching. c) Cruise vessels operate in the area generally between March and October, during daylight as well as the hours of darkness. 	Recreational users Tourists
VSR/LSR5 – Recreational Users and Tourists (Figure 4.4-2)	<ul style="list-style-type: none"> a) The Lurujarri Heritage Trail extends from Coulomb Point 80km along the coast to Yinarar, passing through the James Price Point coastal area. The trail is divided into six sections and features signage of key features of cultural heritage significance. b) The Class A Coulomb Point Nature Reserve is situated 15km north of James Price Point. Informal camping facilities are available within the Reserve. 	Tourists Recreational users Traditional owners

Visually/Light Sensitive Receptor	Description	Main User Types
	<p>c) Cable Beach is an extensive recreational beach to the west of Broome town centre, located 44km south of James Price Point. Restaurants, recreational activities such as fishing and swimming, and camel riding occur here.</p> <p>d) Indigenous tourism operators utilise various locations on the Dampier Peninsula accessible via the Broome to Cape Leveque Road.</p> <p>e) Willie Creek, a seasonal pearl farming, boutique, café and site seeing facility located 32km south of James Price Point.</p> <p>f) Coconut Wells is located 37km south of James Price Point and contains a small number of houses, primarily leased to short term recreational visitors; as such they are addressed in the context of recreational users and tourists.</p> <p>g) Numerous campsites are located along the Luruijarri Heritage Trail (refer to Figure 4.4-3)</p>	
VSR/LSR6 – Traditional Owners	<p>Indigenous agriculture harvesting Bush Plum in the site and in adjacent areas where the species is naturally occurring and areas are accessible.</p> <p>Aboriginal significance identified along the Luruijarri Heritage Trail detailed in VSR5. Further details on the significance of VSRs/LSRs to Traditional Owners is detailed in Part 5, Section 3.5 to Section 3.8 and Appendix E.</p>	<p>Traditional owners</p> <p>Tourists</p> <p>Recreational users</p>
LSR7 – Residential Areas	<p>The following settlements were identified in the vicinity of the viewshed; however it is unlikely these would be visually impacted due to the distance from the proposed development and so would be discussed in the context of light only.</p> <p>a) Broome is located 60km to the south of James Price Point. The Broome residential areas which are closest to the BLNG Development are the coastal suburb of Cable Beach and northern suburbs of Djugun and Bilingurr located north of the Broome Airport.</p> <p>b) Beagle Bay Aboriginal mission has a population of 220 and is located 81km north-east of the site.</p> <p>c) Lombadina / Djarindjin Aboriginal missions are located 153km north east of the site, with a combined population of 250.</p> <p>d) One Arm Point Aboriginal mission is located 154km north east of the site and has a population of around 300.</p>	<p>Local Residents</p> <p>Tourists</p>



■ **Figure 4.4-2 Location of Existing Visually Sensitive Receptors and Light Sensitive Receptors.**

Note: Locations of significance to Traditional Owners are provided in **Part 5, Section 3.5 to Section 3.8 and Appendix E.**



■ **Figure 4.4-3 Location of Campsites along the Lurujarri Heritage Trail (VSR/LSR5g).**

4.4.2. Identification of Key Aspects

The following aspects associated with the establishment of the BLNG Precinct that have the potential to affect visual amenity and landscape character in the James Price Point area include:

- vegetation and habitat clearing;
- site disturbance and excavation;
- atmospheric emissions;
- vehicle movements;
- waste disposal;
- altered fire regimes;
- marine sediment deposition and turbidity;
- non-routine marine discharges;
- vessel movements; and
- physical presence of infrastructure.

Given the significant number of aspects applicable to visual amenity, light and landscape character, this section addresses receptors (LCUs, VSRs, LSRs) that could be affected by the BLNG Precinct, rather than the affects of each aspect separately.

4.4.2.1.1. Sources of Potential Impact

Components of the BLNG Precinct and aspects of the Plan relevant to the assessment of landscape character, light and visual amenity impacts are described in **Table 4.4-3**.

The physical attributes and emissions associated with these aspects are the primary consideration in assessing impacts on visual amenity, light and landscape character.

■ **Table 4.4-3 BLNG Precinct Components Relevant to the Assessment of Landscape Character, Light and Visual Amenity.**

Activity Source			Phase of Project			Light Characteristics		Duration
Aspect/ Component	Visually Significant Characteristics	Illumination Sources	Construction	Commissioning	Operation	Wavelength / Spectrum	Intensity	
Road construction, and construction of pioneer camp and associated facilities	Preparation for an accommodation camp will occur in a 200ha area containing shared single storey accommodation units and associated facilities for the workers. Access roads and site drainage will be established within the BLNG Precinct. In addition, Manari Road will be diverted around the BLNG Precinct buffer zones from the current coastal alignment.	Transient bright headlights and general construction safety lighting	✓		✓	Narrow, specific frequencies Red/orange/white (590-750Nm)	High, localised Low/medium	Continuous during construction
Site clearing, earthworks and levelling	Temporary graders, excavators, bulldozers, trucks etc. will be used for site clearing, levelling and bulk to prepare areas to foundation levels. Up to 3,037 hectares of land will be required for the Precinct (including corridors, and ancillary infrastructure)	Transient bright headlights	✓			Narrow, specific frequencies	High, localised	Continuous during construction
Vegetation thinning and fire breaks within the buffer zone	Removal of spear grass and pruning of vegetation to maintain fire breaks within and surrounding land use buffer zones	N/A	✓		✓	N/A	N/A	Continuous
Foundations construction, tank construction; construction of onshore	Foundations (for example pad footings, raft or piled foundations) will be established to provide a stable platform for installation and construction	Transient bright headlights and general lighting of buildings	✓		✓	Narrow, specific frequencies Red/orange/white (590-750Nm)	High, localised	Continuous

Activity Source			Phase of Project			Light Characteristics		Duration
Aspect/ Component	Visually Significant Characteristics	Illumination Sources	Construction	Commissioning	Operation	Wavelength / Spectrum	Intensity	
processing facilities; administration and plant building	of major plant infrastructure. Following foundation establishment, buildings will be constructed either onsite or erected from pre-assembled modules.						Low/medium	
Dredging	Dredge vessels may include: cutter suction dredger; trailer suction; hopper dredger, backhoe/grab dredgers and/or jack up drill and blast barge vessel. A sediment dispersion pressure field will result from dredging activities.	Permanent deck and navigation lighting	✓		✓	White, red (620-750Nm) / yellow (570-590Nm) and specified LEDs	Medium	Continuous during construction. Intermittent during operations for maintenance dredging only
Port Facility	Export jetty facilities (18m height) and breakwater (if required), ship berthing pockets, MOF, vessel all-weather harbouring facilities (tugs and support vessels) and other facilities to support marine port operations.	Permanent general lighting.	✓		✓	Red/orange/white (590-750Nm)	Low/medium	Continuous
Installation of pipelines in State waters, shore crossings and installation of pipelines onshore	A range of construction methods may be used for installation of pipelines including: conventional shore crossing techniques (using excavation equipment, such as cutter suction dredges, rock trenching machines or backhoe dredges, to create a pipeline trench); HDD; or tunnelling methods	Transient bright spotlights and general lighting of vessels	✓			White, red (620-750Nm) / yellow (570-590Nm) and specific	High, localised	Continuous during construction

Activity Source			Phase of Project			Light Characteristics		Duration
Aspect/ Component	Visually Significant Characteristics	Illumination Sources	Construction	Commissioning	Operation	Wavelength / Spectrum	Intensity	
LNG Processing Infrastructure	The most prominent aspects of LNG Processing Infrastructure will be LNG storage and condensate tanks (approximately 45m height), exhausts (36m height), columns (maximum height of 45m), and fin fans (20-25m height).	Permanent general lighting Columns and exhausts will not be lit	✓		✓	Red/orange/white (590-750Nm)	Low/medium	Continuous
Supporting infrastructure								
Workers accommodation camp and associated facilities	A single storey construction camp and eventually a permanent accommodation and associated facilities to support the construction workforce personnel and operations workforce (including maintenance personnel)	Permanent general lighting	✓	✓	✓	Red/orange/white (590-750Nm)	Low/medium	Continuous
Light Industrial Area	The LIA will consist of multiple facilities to provide goods and services to the BLNG Precinct. The area will cover approximately 200 hectares	Permanent general lighting	✓		✓	Red/orange/white (590-750Nm)	Low/medium	Continuous
Water supply and waste water treatment	Water supply options as described in Part 2 .	N/A	✓		✓	N/A	N/A	Continuous
Shipping Movements	Various dredging, cabling and pipe laying vessels, in addition to supply vessels, during construction. LNG, LPG and condensate carriers during operations	Transient bright spotlights, general vessel lighting, light emitting diode (LED), navigational aids	✓		✓	White, red (620-750Nm) / yellow (570-590Nm) and specified LEDs	Medium	Regular short duration

Activity Source			Phase of Project			Light Characteristics		Duration
Aspect/ Component	Visually Significant Characteristics	Illumination Sources	Construction	Commissioning	Operation	Wavelength / Spectrum	Intensity	
Emissions								
Marine discharges and wastes (including non-routine events)	Marine discharges as described in Part 2 .	N/A	✓		✓	N/A	N/A	Rare
Terrestrial discharges and wastes	Terrestrial discharges as described in Part 2 .	N/A	✓		✓	N/A	N/A	Rare
Flaring during commissioning and operations	Emergency high pressure flare system (approximately 100-180m height) or ground flare.	Hot gas fire		✓	✓	Red/orange (590-750Nm)	High	Rare and very short duration

4.4.2.2. Sensitivity and Resilience

An assessment of potential impacts on the defined LCU, VSR and LSR took into account the overall sensitivities of each receptor, outlined below.

Sensitivity of Key Landscape Character Units

Landscape sensitivity refers to the extent to which a landscape can accept change of a particular type and scale without unacceptable adverse effects to existing landscape character. The extent to which a landscape can absorb change varies with the existing land use, the pattern and scale of the landscape, and the value placed on the landscape. Sensitivity of the Landscape Character Units is evaluated according to:

- quality of LCUs, including landscape designations;
- importance and rarity of special landscape elements;
- ability of the LCU to accommodate change;
- significance of any change to this LCU in the local and regional context; and
- maturity of the landscape.

Potential impacts on the landscape character relate to changes in landscape features, elements and characteristics. The impacts may relate both to changes in existing features and to the addition of new features. The assessment of landscape character impacts considers how the changes to landscape elements and features interact to change the landscape character.

The degree of sensitivity of the LCUs is classified as follows:

- high – e.g. - important components or landscape of particularly distinctive character susceptible to small changes;
- medium – e.g. - a landscape of moderately valued characteristics reasonably tolerant to change; and
- slight – e.g. - a relatively unimportant landscape which is able to accommodate extensive change.

Factors affecting the *magnitude of change* of each LCU are:

LCU1 – Coastal Areas: Overall sensitivity is **High**, based on the following:

- it is recognised at a State level through the WA State Coastal Planning Policy and is considered of high landscape value;
- it contains distinct landscape features of value in an intrinsic, recreational and social context; and
- it has a low ability to accommodate industrial change, due to its remote and natural landscape character.

LCU2 – Pindan Sandplain: Overall sensitivity is **Medium**, based on the following:

- it has no formal protection policy/legislation;
- it is a common landscape type on the Dampier Peninsula and of low rarity; and
- it has a low ability to accommodate industrial change, due to its undisturbed natural landscape character, flat topography combined with its strong sense of remoteness.

LCU3 – Monsoon Vine Thickets: Overall sensitivity is **High**, based on the following:

- it is recognised at a State level through the DEC's Threatened Ecological Community (TEC) listing and is considered of High landscape value
- it is not common;
- it has possible cultural and ethnobotanical significance due to the presence of Bush plum within the vine thicket; and
- it has a low ability to accommodate industrial change, due to its limited and valued landscape character.

LCU4 – Nearshore areas: Overall sensitivity is **High**, based on the following:

- it is recognised at a state and national level through the DEWHA (2009a) recognition that this is one of 14 key ecological features of the Canning Bioregion, WA and is considered of High landscape value;
- it supports features of biological interest such as benthic primary producer habitat and supporting species
- it is usable for a range of recreational and tourism activities; and
- it has a low ability to accommodate industrial change, due to its valued natural features and its characteristic long distant, uninterrupted views.

LCU5 – Off-shore areas: Overall sensitivity is **Medium**, based on the following:

- it supports species of biological and intrinsic value such as humpback whales and commercial/recreational fisheries;
- it is valued for its Indigenous cultural heritage, visual/scenic amenity values and high ecological significance, and is therefore considered of High landscape value;
- it is a common landscape type and of low rarity; and
- it has a low ability to accommodate industrial change, due to its valued natural features and the seascape is an important visual characteristic.

■ **Table 4.4-4 Landscape Character Units Summary and Sensitivity.**

LCU (landscape receptors)	Level of Importance	Landscape Value	Rarity	Ability to Accommodate Change	Landscape Sensitivity
LCU1 – Coastal areas	State/Regional	High	Medium	Low	High
LCU2 – Pindan sandplain	Local	Medium	Low	Low	Medium
LCU3 – Monsoon vine thickets	State/National	High	High	Low	High
LCU4 – Nearshore areas	State/National	High	Medium	Low	High
LCU5 – Off-shore areas	State/National	High	Low	Low	Medium

Sensitivity of Visually Sensitive Receptors and Light Sensitive Receptors

Visual impacts relate to changes in views experienced by people in the landscape. The extent of a visual impact is assessed according to the sensitivity of the receptor. The sensitivity of the VSRs has been assessed generally in accordance with the following criteria:

- sensitivity associated with cultural heritage, colonial and environmental heritage, tourism and recreation values;
- traditional owner values (detailed in **Part 5, Section 3.5 to Section 3.8** and **Appendix E**);
- viewing experiences and expectations (perceived values) to understand the cognitive relationships between the VSRs and the existing site;
- viewer numbers;
- identify levels of viewer significance (refer Table 6 Visual Landscape Planning in Western Australia Manual (DPI, 2007);
- value and quality of existing views;
- duration of frequency of view; and
- degree of visibility.

The views available to the identified VSRs will be rated in accordance with their sensitivity to change using high, medium or slight as follows:

- *high*: VSRs who expect a high level of visual amenity, such as tourists, residents, campers etc;
- *medium*: VSRs who expect a medium level of visual amenity, i.e. people in transit; and
- *slight*: VSRs who do not expect a high level of visual amenity such as people engaged in work practices.

In order to assess the possible impacts the BLNG Precinct may have on these VSRs, an understanding of the levels of significance (also defined as sensitivity i.e.: the higher the significance of a viewing location, the higher the sensitivity) for viewing locations and viewer experience is also required. The DPI guidelines¹ outline three levels of significance for Western Australia as follows:

Level 1: National/State Significance:

- state highways and other main roads (sealed or unsealed) with high levels of vehicle usage;
- designated tourist routes, scenic drives;
- recreation, conservation, cultural or scenic sites, areas, viewpoints and lookouts of state or national significance, including their access routes;
- walking, cycle or bridle tracks of national or state significance;
- towns, settlements or residential areas;
- passenger rail lines;
- navigable waterways of national or state recreation importance;
- ocean sites of national or state recreation importance e.g. surf breaks; and
- views of national or state importance.

Level 2: Regional significance

- main roads with moderate levels of vehicle usage (sealed or unsealed);
- recreation, conservation, cultural or scenic sites, areas, viewpoint, and lookouts of regional or high local significance (including their access routes);
- navigable waterways of regional recreation significance;
- walk, cycle or bridle tracks of regional significance; and
- views of regional importance.

Level 3 Local significance

- all remaining roads with low levels of vehicle usage;
- locally significant roads or tracks;
- recreation and other use areas of local significance;
- navigable waterways of local recreation significance;
- walk, cycle or bridle tracks of local significance; and
- views of local importance.

¹ Department of Planning and Infrastructure (DPI, 2007) *Visual Landscape Planning in Western Australia*.

Factors affecting the *magnitude of change* of each VSR are:

- location of the proposed development in the view;
- compatibility of the development with the surrounding landscape;
- duration of impacts in the construction and operation phases;
- scale of the development in the view;
- reversibility of change; and
- potential blockage of view by intermediate landscape elements, such as vegetation, structures and topography.

The sensitivity of the LSRs has been assessed generally in accordance with the following criteria:

- sensitivity associated with cultural heritage, colonial and environmental heritage, tourism and recreation values;
- traditional owner values;
- duration of frequency of light emissions;
- degree of visibility of light emissions;
- viewer numbers; and
- value and quality of existing views.

Factors affecting the *magnitude of change* of each LSR are:

- degree of existing anthropogenic light;
- duration of impacts in the construction and operation phases;
- degree of light emissions visible;
- reversibility of change; and
- potential blockage of light by intermediate landscape elements such as vegetation, structures and topography.

For the purposes of the impact assessment three Potential Light Emission Zones were identified, detailed in **Table 4.4-5** below.

■ **Table 4.4-5 Potential Light Emission Influence Zones.**

Potential Light Emission Influence Zone	Distance from an Observer to the LNG Precinct
Not Visible Beyond this distance, neither the light fitting or the glow will be visible.	>50km
Glow Potentially Visible Lighting will not be directly visible, however the glow in the atmosphere may be visible.	37km – 50km
Lighting Potentially Visible Lighting from the BLNG precinct may be visible within this zone depending on terrain and vegetation between the VSR and the BLNG Precinct.	< 37km

Whilst the above distances suggest potential influence zones, it must also be noted that these will vary depending on climatic conditions. For example, on evenings with higher humidity and with substantial cloud cover, the glow may be more noticeable within the Glow Potentially Visible Zone. Similarly, the ambient light levels surrounding the LSR will also affect the visibility of the BLNG Precinct at night time. Where an LSR is located within an area of higher ambient light such as in a township, the effects of any night time glow have been observed as greatly reduced. Where the LSR is located in an area of low ambient light such as a campsite, the effects of glow have been observed as more noticeable.

The identified VSRs will also be adopted as the Light Sensitive Receptors (LSRs) as will their sensitivities. The one additional LSR is **LSR7 Residential Areas**. Subject to the confirmation of the 'Glow Potentially Visible' zone, some of the residential areas in the northern areas of Broome may be affected by the glow emitted from the BLNG Precinct. The sensitivity of these LSRs is considered to be high as recreational LSRs expect a high quality visual amenity, particularly during night time when any additional light sources have the potential to affect rest/sleep patterns.

Based on the preliminary desktop analysis for this visual impact assessment six types of visually and light sensitive receptors (VSR/LSR) or viewers and their sensitivity have been identified, as summarised in **Table 4.4-6**.

■ **Table 4.4-6 Visually and Light Sensitive Receptors Summary and Sensitivity.**

Visually Sensitive Receptors (visual receptors)	Sensitivity Discussion	Sensitivity	DPI Significance Rating
VSR/LSR1/2 – occupational and recreational road users VSR/LSR1/2a - Broome Cape Leveque Road VSR/LSR1/2b - Manari Road VSR/LSR1/2c – Great Northern Highway	VSR/LSR1/2a: Main road with moderate level of vehicle use VSR/LSR1/2b: Designated tourist route/scenic drive, access to viewpoints of State significance (Coulomb Point Nature Reserve, Lurujarri Heritage Trail and associated camp sites) VSR/LSR1/2c: State Highway	VSR/LSR1/2a: Medium VSR/LSR1/2b: Slight VSR/LSR1/2c: Slight	VSR/LSR1/2a: Regional Significance VSR/LSR1/2b: State Significance VSR/LSR1/2c: State Significance
VSR/LSR3 – occupational marine users	North West region Pearling industry is regionally significant	Slight	Regional Significance
VSR/LSR4 – recreational marine users	Recreational areas of local significance	High	Local Significance
VSR/LSR5 – recreational users and tourists	Recreational, cultural and scenic sites of state or national significance including their access tracks	High	National / State Significance
VSR/LSR6 – Traditional Owners	Cultural and scenic sites of regional significance (detailed in Part 5, Section 3.5 to Section 3.8 and Appendix E).	High	Regional Significance
LSR7 – Residential Areas	Towns, settlements or residential areas	High	State Significance

Sensitivity of Observers to Dredge Plumes

A 'visible plume' is a discrete area of water that can be identified by an observer using their unaided vision and determined to be emanating from dredging or spoil disposal activities. The extent of the 'visible plume' may be of interest to stakeholders that place importance on visual amenity values of the marine environment, such as tourism operators or recreational users. These observers may be regarding the sea from an aircraft, a vessel or from the shoreline. The discrimination of a sediment plume will be subjective, dependent on the observer and local environmental conditions at the time (e.g. rough versus calm seas). To be identified by an observer, a plume will need to be:

- distinguishable in clarity or colour from the surrounding water;
- visible by someone looking from above the water; and
- of a minimum size.

It is likely that the recognition of plumes will be dependent on many factors including the observation point; the observer; the weather and sea state; the plume material and colour relative to water outside the plume; and the background turbidity levels. Experience in the waters of Mermaid Sound in the Pilbara Region suggest that an experienced observer may be able to visually detect a plume with a total concentration >2 mg/L when surrounding waters are very clear (<1mg/L); and a plume with a total concentration of >10mg/L when background is ~5mg/L (MScience unpublished observations). Based on these observations, the critical difference between background and plume could be expressed as:

$$\text{critical difference} = a + b \times \text{background (mg/L)}, \text{ where } a = 2 \text{ and } b = 0.6.$$

One of the few published studies on the ability of observers to perceive changes in water quality suggests that a 30% decline in clarity is a level that can be detected by most observers (Davies-Colley & Smith 1990; cited in ANZECC & ARMCANZ 2000). This study was based on perceptions of water quality in a small stream, and thus is unlikely to be relevant in terms of observation point and sea conditions. Baseline water quality monitoring in the JPP nearshore marine environment indicates a summer median of 10-15mg/L and a winter median of 2-3mg/L. As this data is collected near to the seabed, a reduction of approximately 50% could be expected between the seabed and the surface, resulting a summer median of 5-7.5mg/L and a winter median of 1-1.5mg/L. Based on these surface values, critical differences (using the above formula) would be ~6.5mg/L in summer and ~2.9mg/L in winter. Based on these calculations, the conservative nature of the model inputs (refer to DSD, 2010d; **Appendix C-13** - BLNG Precinct Dredging and Spoil Disposal Assessment), and inherent inaccuracies associated with simulating sediment transport processes, a value of 5mg/L has been used as a critical threshold for visual amenity. A minimum size criterion is necessary to link the capacity of a model to predict SSC for small parcels of water with the need for an observer to recognise a sufficiently large patch of turbid water that they identify it as a 'plume'. In this case, the minimum size of the turbid area required before being recognised as a plume is likely to depend on the distance between plume and observer. Other factors impacting the minimum area will include the observer and natural patterns of turbidity in the area. An arbitrary minimum could be set to 250 x 250m to represent the smallest plume commonly able to be detected by an average observer.

It should be noted however, that the visibility of plumes is not an indicator of deleterious water quality that results in human/ ecosystem health impacts.

4.4.3. Predicted Impacts

The predicted impacts on visual amenity, landscape character and light from the construction and operation of the BLNG Precinct are discussed in detail in the following sub-sections. Potential impacts on visual amenity, landscape character and light are discussed in the context of receptors (VSRs and LCUs) instead of by aspect as in other impact assessment chapters, in line with relevant guidelines (e.g. DPI, 2007).

4.4.3.1. Impact Assessment Methodology

The fundamental tool for evaluating the significance of landscape, light and visual impacts is the matrix of the sensitivity of each defined receptor and the magnitude of change the project will have on that receptor. Using these parameters, the significance of the landscape, light and visual impacts will be defined using the terms outlined in **Table 4.4-7** and described in the following sections.

The magnitude of change for landscape, light and visual receptors are classified as follows:

- large – notable change in the landscape characteristics over an extensive area ranging to very intensive change over a more limited area;
- intermediate – moderate changes to a local area;
- small – small changes to specific landscape components; and
- insignificant – no changes to the baseline condition.

The combination of sensitivity and magnitude of change generates an overall significance of impact as illustrated in **Table 4.4-7**. For example for V SR1, these receptors are considered to be of “slight” sensitivity and a “large” magnitude of change were anticipated on the views, the significance of the visual impact would be “moderate”.

These significance rankings should be considered in addition to the generic impact assessment undertaken for consistency with other chapters (as presented in the preceding section).

■ **Table 4.4-7 Significance of Impacts on Landscape Character, Light and Visual Amenity.**

Magnitude of Change	Sensitivity/Quality			
		Slight	Medium	High
	Large	Moderate	Moderate to major	Major to severe
	Intermediate	Low to moderate	Moderate	Moderate to major
	Small	Low	Low to moderate	Moderate
	Insignificant	Negligible	Negligible	Negligible

The significance of impacts on the visual amenity, light, and landscape character will be evaluated using the following thresholds:

- *Negligible Significance* – insignificant magnitude of change from a viewpoint or to an area of recognised landscape character with slight, medium or high sensitivity, i.e., very small level of effect that is barely discernable over ordinary day to day effects. The assessment of ‘negligible’ impact significance is usually based on visibility. That is, the BLNG Precinct, its relevant components, or associated light emissions are not visible even in good weather, or would be a minute or indistinguishable element in the view across a man-modified landscape.
- *Low Significance* – small magnitude of change from a viewpoint or to an area of recognised landscape character with slight to medium sensitivity/quality, i.e., adverse effects that are noticeable but that will not cause any significant adverse visual impacts. In most cases, management will be effective in minimising or eliminating the visibility of the development or associated light emissions.
- *Moderate Significance* – small magnitude of change from a viewpoint or to an area of recognised landscape character with a medium to high sensitivity/quality, and/or intermediate magnitude of change from a viewpoint of slight to high sensitivity/quality and/or large magnitude of change from a viewpoint with slight to medium sensitivity/quality.
- *Major Significance* – intermediate magnitude of change from a viewpoint or to an area of recognised landscape character with high sensitivity/quality and/or large magnitude of change from a viewpoint of medium to high sensitivity/quality i.e., extensive adverse effects that cannot be completely avoided, remedied or mitigated.
- *Severe Significance* – large magnitude of change from a viewpoint or to an area of recognised landscape character with high sensitivity/quality i.e., extensive adverse effects that cannot be avoided, remedied or mitigated. This threshold normally applies to the first modification to an otherwise natural landscape.

4.4.3.2. Impacts on Landscape Character

Impacts to the landscape character are likely to occur during construction and operation activities relating to the site excavation and disturbance including dredging and earthworks, vehicle and vessel movements and due to the physical presence of terrestrial and marine components of the BLNG Precinct into the existing landscape. Given the current predominantly natural character of the proposed site and surrounding area this is expected to generate a considerable change in the landscape. Receptors will be affected by key aspects such as vegetation clearing, physical presence and noise and vibration.

The level of potential impacts on the LCUs is anticipated to be the same during both the construction and operation periods. Specifically, direct impacts are anticipated on four of the LCUs. Only LCU5, offshore area will not be directly affected. Three LCUs, LCU1 coastal strip, LCU3 monsoon vine thickets and LCU4 – nearshore areas, are anticipated to have major – severe impacts. Even though the impacts are directly affecting LCU2 – pindan sandplains, the overall impact is lower, due to the lower sensitivity of the receiving landscape with a moderate – major overall impact. LCU5 Offshore Areas is indirectly affected and the least impact is anticipated at “moderate”.

Table 4.4-8 summarises the key impacts on landscape character that are likely to occur within each LCU within the study area during construction and operation.

■ **Table 4.4-8 Landscape Character Type (landscape receptors) Impact Assessment Summary.**

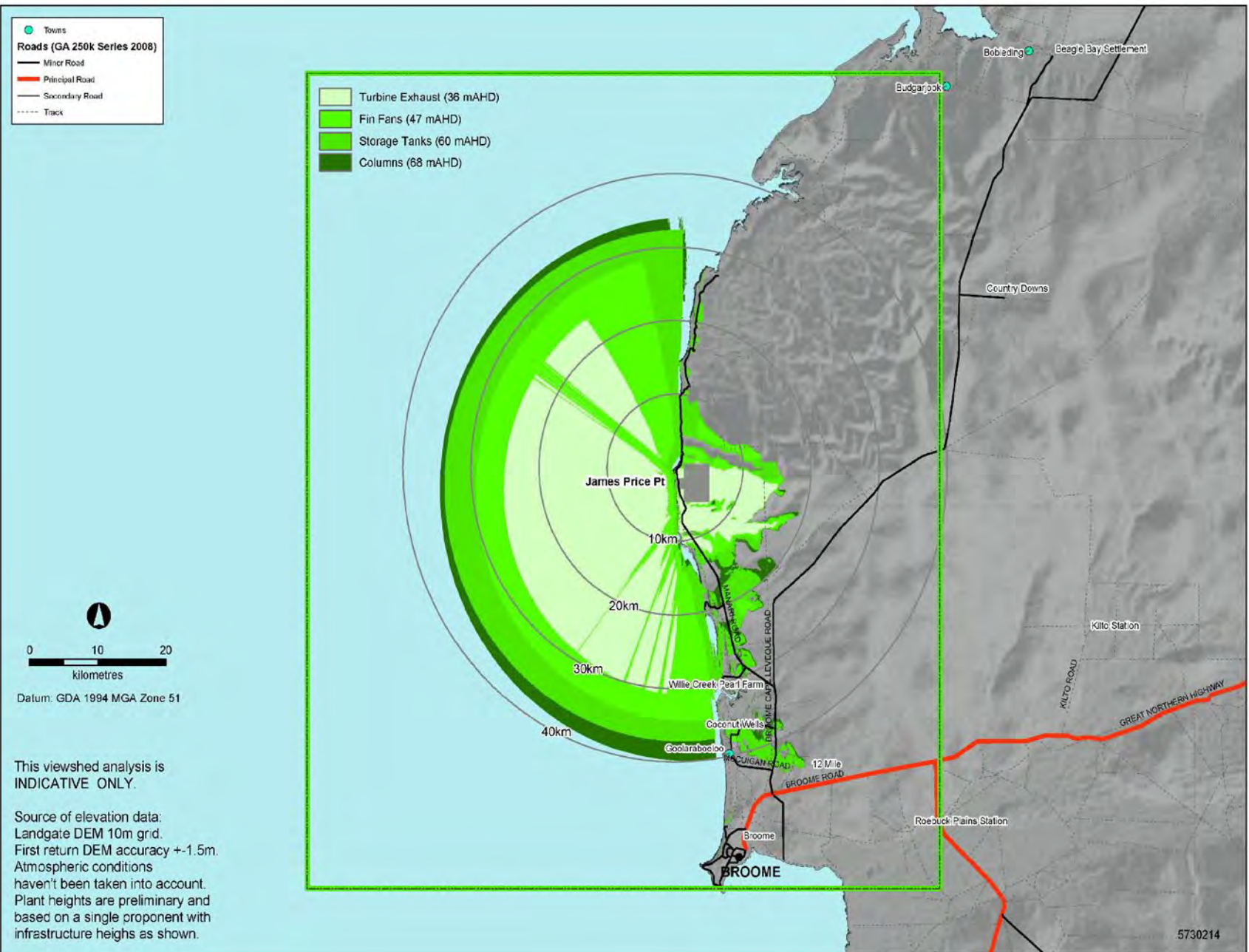
Landscape character type	Landscape Sensitivity	Magnitude of change		Potential Impacts	
		Construction	Operation	Construction	Operation
LCU1 – coastal areas	High	Large direct impacts	Large direct impacts	Major – severe	Major – severe
LCU2 – pindan sand plain	Medium	Large direct impacts	Large direct impacts	Moderate - major	Moderate - major
LCU3 – monsoon vine thickets	High	Large direct impacts	Large direct impacts	Major – severe	Major – severe
LCU4 - nearshore areas	High	Large direct impacts	Large direct impacts	Major – severe	Major – severe
LCU5 – off-shore areas	Medium	Intermediate direct impacts	Intermediate direct impacts	Moderate	Moderate

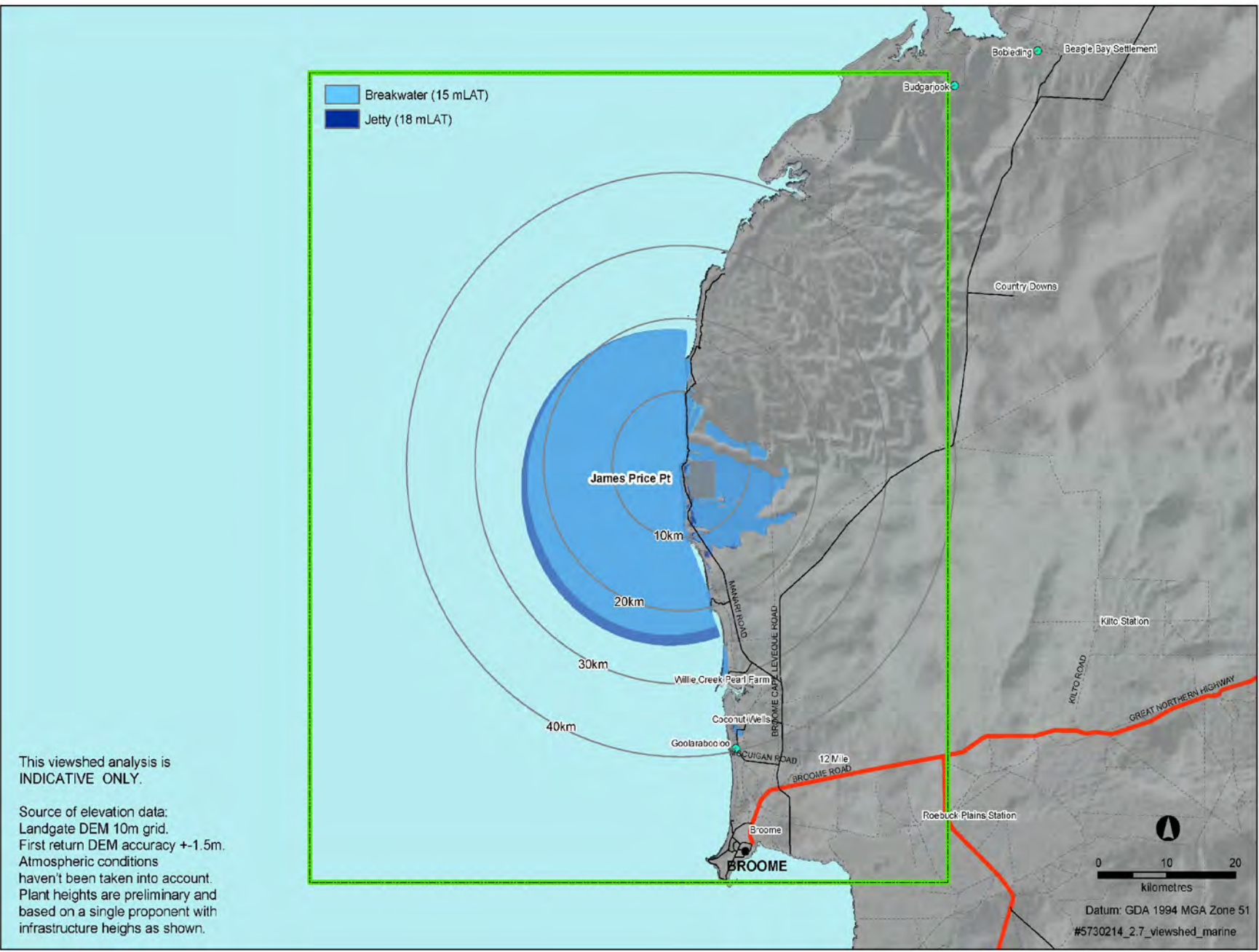
The potential impacts range from moderate to severe, depending on the LCU (**Table 4.4-8**). Following the implementation of appropriate management and mitigation measures presented in **Table 4.4-14**, the significance of residual impacts (aligned to the process utilised in other environmental impact chapters) associated with these aspects ranges from low to high.

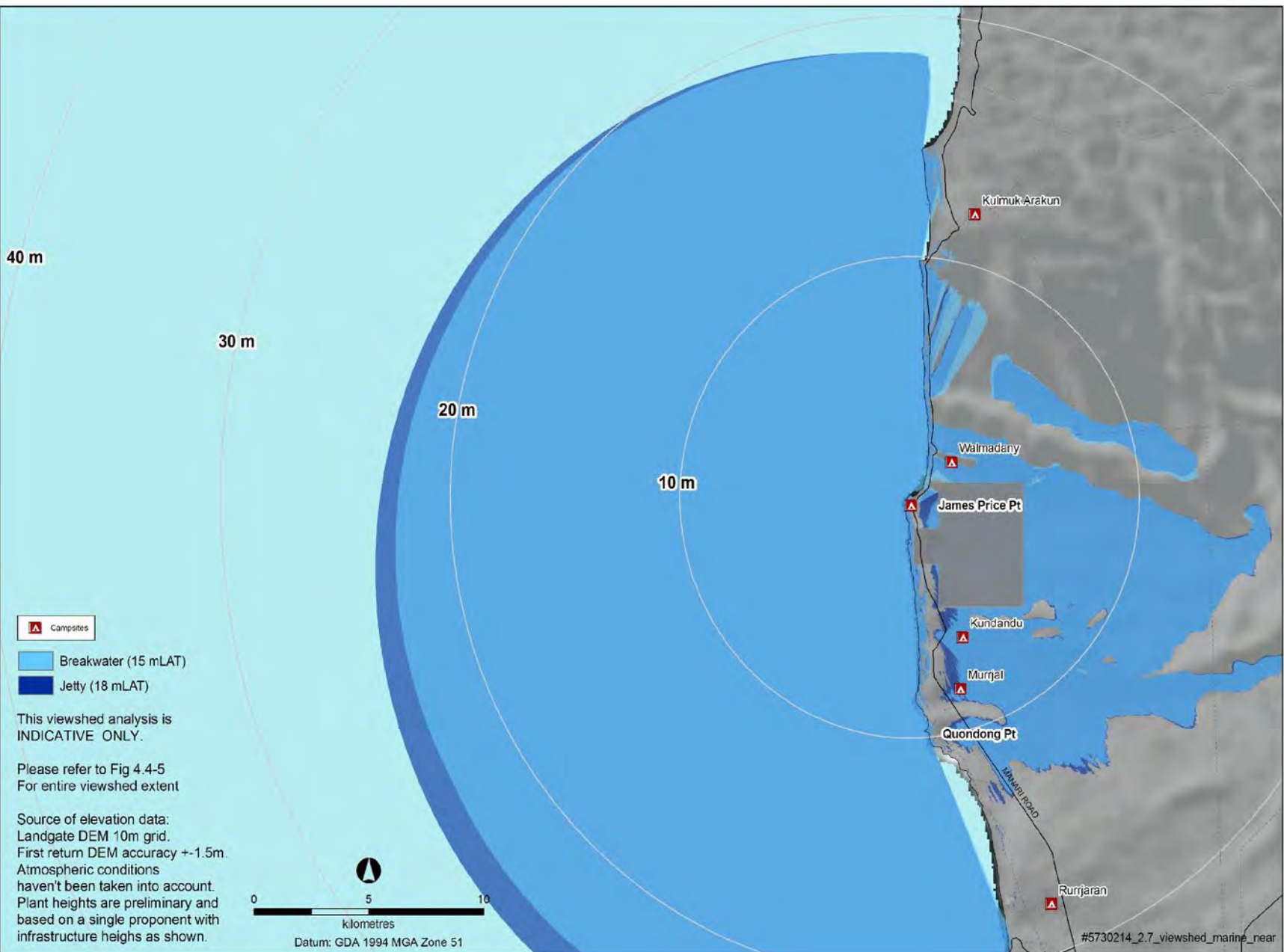
4.4.3.3. Impacts on Visual Amenity

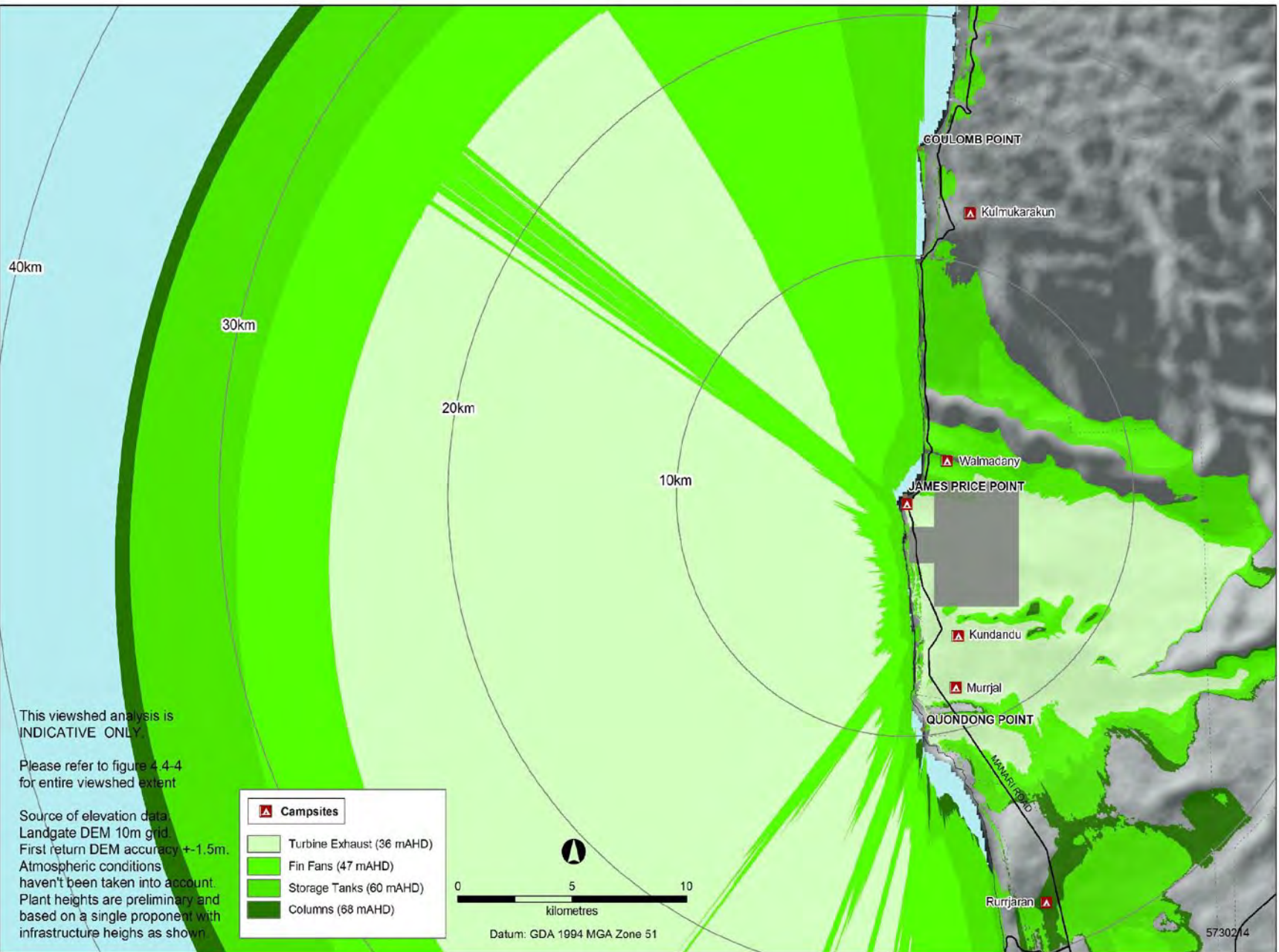
The construction and operation of the BLNG Precinct is likely to have an impact on views and visual amenity within the 37km radius study area. The construction and operation of the BLNG Precinct is likely to have an impact on visual amenity for receptor user groups, primarily through the visibility of fixed structures associated with the LNG processing facilities such as processing trains, hydrocarbon storage tanks and flares in the landscape and from vehicle and vessel movements. The impact assessment process determined development activities may result in impacts on visual receptors in the vicinity of the BLNG Precinct. These impacts will be affected by key aspects such as physical presence, sediment deposition and turbidity, site disturbance and excavation, vehicle and vessel movements, non-routine spills and vegetation clearing.

Mapping of four viewsheds in the form of a seen area analysis have been undertaken and are illustrated in **Figure 4.4-4** to **Figure 4.4-7**.









■ **Figure 4.4-7 Near Field Indicative Viewshed of Terrestrial Infrastructure.**

The levels of potential impact on the VSRs are anticipated to be the same during both the construction and operation periods, increasing incrementally as infrastructure is constructed. The following are the key visual amenity impact findings:

- No impacts are expected on any permanent settlements or residential VSRs such as Broome.
- VSR1 – Occupational Road Users and the VSR2 Recreational Road Users of the Broome Cape Leveque Road, are only located within the 7.7 – 37 kilometre “zone of theoretical visibility”. Within these zones, the overall potential impact is low for VSR1 and low – moderate for VSR2.
- VSR3 Occupational Marine Users, the impacts have been identified as moderate up to 7.7 kilometres and from 23-37 kilometre distances. The impact reduces to a low - moderate impact between 7.7 – 23 kilometre zone.
- The highest level of visual impacts are anticipated for VSR4 Recreational Marine Users, VSR5 Recreational Campers and Tourists, and VSR6 Traditional Owners. For all these receptors within the 37 kilometre radius the visual impacts are anticipated to be as major – severe during both the operation and construction periods.
- The flare is anticipated to be viewed by many of the receptors identified, however, this visibility is likely to be glimpsed and transient in nature. The visibility of the plume from the flare will be dependent on atmospheric conditions. It is envisaged that a visible plume may be detected from close receptors to the Precinct under certain conditions. The plume is unlikely to be visible for the majority of the year at distant VSRs such as VSR5, however, under very atypical northerly wind conditions, the plume may be visible.
- The level of potential impact on the VSRs is anticipated to be the same during both the construction and operation periods. The following are the key visual amenity impact findings.

VSR1 Occupational Road Users:

VSR1 a) Users of the Broome-Cape Leveque Road classified under this VSR are transient in nature and are engaged in work activities. It is unlikely that any onshore or marine infrastructure will be visible to road users travelling in a north or south bound direction due to intervening topography and surrounding vegetation (Pindan shrubland approximately 2m in height) separating the road from the BLNG Precinct. Upper elements of the emergency high pressure flare system may be visible to users of the Broome Cape Leveque Road when travelling in either direction on the section of road that extends 50km north from Broome. High visibility red and white banding will be applied to the upper elements of the flare to comply with aviation regulations, which will increase the visibility of the flare to all VSRs with a direct view.

VSR1 b) Great Northern Highway heads east from Broome beyond the 37km zone of visual influence and is separated from the BLNG Precinct by intervening topography. It is highly unlikely that any infrastructure will be visible to road users.

VSR2 Recreational Road Users:

VSR2 a) Recreational users of the Broome Cape Leveque Road are likely to be in the area to engage with the surrounding environment and to visit more distant locations on the Dampier Peninsula. It is unlikely that any onshore or marine infrastructure will be visible to road users travelling in a north or south bound direction due to intervening topography located to the south east of the BLNG Precinct. Upper elements of the emergency high pressure flare system may potentially be intermittently visible to users of the Broome Cape Leveque Road travelling in either direction, with visibility increased by red and white banding to comply with aviation regulations.

VSR2 b) Recreational users of Manari Road are likely to be in the area to engage with the surrounding environment and to access recreational locations. Any visual impacts will be greater than for occupational road users. From the section of Manari Road that lies adjacent to the Precinct, or that will be diverted around the Precinct, both onshore process infrastructure and marine infrastructure will be visible to road users as indicated by viewsheds shown in **Figure 4.4-4** and **Figure 4.4-5**. The taller elements of onshore infrastructure such as columns, LNG storage tanks and LNG processing trains will be very prominent from this VSR. The emergency high pressure flare system, with red and white banded upper elements, will be visible to users of Manari Road travelling in either a north or south bound direction irrespective of whether it is a ground based or elevated flare.

VSR2 c) Great Northern Highway heads east from Broome beyond the 37km zone of visual influence and is separated from the Precinct by intervening topography. It is highly unlikely that any infrastructure will be visible to road users.

VSR3 –Occupational Marine Users:

VSR3 a & b) Commercial fishing vessels and pearling vessels are transient, and involved in occupational maritime activities where their attention is not focussed on views. Marine infrastructure such as the breakwater and jetty may be

visible from up to 25km south and west, and up to 20km north of the BLNG Precinct (**Figure 4.4-5**). Taller elements of the onshore processing infrastructure, such as columns may be visible to occupational marine users from up to 40km from the BLNG Precinct (**Figure 4.4-4**). Storage tanks may be visible to users of this VSR from up to 35km south and west, and up to 32km north of the Precinct. Turbine exhausts may potentially be visible from up to 25km north and west and 30km south (**Figure 4.4-4**). The emergency high pressure flare system, with the red and white banding of upper elements to comply with aviation regulations, appears visible to occupational marine users from up to 55km south and 45km north or west of the Precinct, however, the flare will largely blend into the ridgeline behind, given its elongated appearance and the inability of the human eye to distinguish such a feature at this significant distance. Movements of pipelay vessels and rock sourcing vessels during construction, as well as LNG, LPG and Condensate Tankers during operations may be visible to occupational marine users. The sediment dispersion pressure field indicates that a 'plume' may potentially be visible to occupational marine users in the nearshore areas from Cape Boileau to Coulomb Point for a significant number of days in a year during periods of dredging activity, however, the visibility of any changes to water clarity associated with such activities is dependent on a number of factors so the likely number of days will be variable.

VSR4 – Recreational Marine Users:

VSR4 a, b & c) Recreational vessels may be involved in a variety of activities such as sailing or kayaking and users of this VSR are likely to be in the area to engage with the surrounding environment. Passengers on charter fishing vessels, whale watching vessels and cruise vessels will also be expecting a high quality visual environment. Marine infrastructure may be visible to vessels from up to 25km south and west, and up to 20km north of the BLNG Precinct (**Figure 4.4-5**). Onshore columns may be visible when looking towards the coast from approximately 40km away in a southerly direction, and from 35km in a north or westerly direction. Shorter elements of onshore processing infrastructure, such as turbine exhausts, may be visible from up to 20km from the Precinct. Vessels located within the 30km radius will not be able to see marine or terrestrial infrastructure if they are within the two bays immediately to the south of the Precinct as views will be obstructed by the northern headland of the bay (**Figure 4.4-4** and **Figure 4.4-5**). The emergency high pressure flare system may be visible to recreational marine users from up to 55km south and 45km north or west of the Precinct. The elongated appearance of the flare, as well as the inability of the human eye to distinguish such features at this significant distance, will result in the flare largely blending into the ridgeline behind. The emergency high pressure flare will not be visible to vessels located within Carnot Bay to the north of the Precinct. Movements of pipelay vessels and rock sourcing vessels during construction, as well as LNG, LPG and Condensate Tankers during operations may be visible to recreational marine users. The sediment dispersion pressure field indicates that a visible 'plume' may potentially be visible to recreational marine users in the nearshore areas from Cape Boileau to Coulomb Point for a significant number of days in the year during dredging periods, however, the visibility of any changes to water clarity associated with such activities is dependent on a number of factors so the likely number of days will be variable.

VSR5 – Recreational Campers and Tourists:

Tourists and recreational users generally expect a high quality visual environment. The undeveloped nature of the James Price Point coastal area is one of the main reasons for the occurrence of tourism and recreation in the area. These recreational users may experience views of the BLNG Precinct from various locations, from nearshore marine areas, the beach or within the dune areas.

VSR5 a & g) Users of the Lurujarri Heritage Trail and the camp sites along the trail (**Figure 4.4-3**) expect a natural remote experience which will be impacted by views of the Precinct as the trail passes directly through the James Price Point coastal area. It is possible that the high pressure emergency flare system may be visible from all locations along the trail (**Figure 4.4-7**); however surrounding vegetation and significant distances may obscure the view in some areas. Locations along the trail with direct ocean views may be impacted by the visibility of marine infrastructure such as the breakwater, jetty and LNG tankers. Direct views of marine infrastructure may be experienced from campsites such as Murrjal, Kundandu, and Walmadany (**Figure 4.4-6**). Most of the taller elements of onshore processing infrastructure are likely to be visible to users of these VSRs within a 30km radius of the BLNG Precinct (**Figure 4.4-4**). The campsites in closest proximity to the Precinct may experience views of onshore processing infrastructure. The Murrjal, Kundandu and Walmadany campsites may potentially see the taller elements of onshore infrastructure such as turbine exhausts, fin fans, storage tanks and columns (**Figure 4.4-7**). Users of the Rurrjaran and Kulmukarakun campsites may experience views of the emergency high pressure. The sediment dispersion pressure field associated with construction activities for the BLNG Precinct may be visible from areas of the Trail with direct ocean views. The duration of potential visibility which may impact the visual experience of users of the Trail, is anticipated to be a small number of days per year between Broome and Cape Boileau, and for a large number of days (potentially three quarters of the year) between Cape Boileau and Coulomb Point, however the visibility of any changes to water clarity associated with such activities is dependent on a number of factors so the likely number of days will be variable. **VSR5 b)** Visitors to the Coulomb Point Nature Reserve

generally expect a high quality visual environment and a remote natural experience. Marine infrastructure and onshore process infrastructure will not be visible from this VSR due to the distance from the Precinct and the occurrence of intervening topography. The high pressure emergency flare system may be visible from the south-western areas of the Reserve, however due to the significant distance between this VSR and the Precinct; it is unlikely that the human eye will be able to distinguish the flare.

VSR5 c) Cable Beach (approximately 44km south of James Price Point) is an iconic tourist location with unrestricted ocean views. Marine infrastructure and onshore processing infrastructure will not be visible to users of Cable Beach due to the distance from the Precinct and the shape of the coastline. Red and white banded upper elements of the emergency high pressure flare system may be visible from the VSR, however, this is unlikely in a non-flaring state given the significant distance between the receptor and the flare and the human eye's inability to view such a narrow piece of infrastructure at such significant distances. Movements of vessels during construction, as well as LNG, LPG and Condensate Tankers during operations may be visible at this VSR.

VSR5 d) Visitors of Indigenous tourism operators accessible via the Broome Cape Leveque Road expect a remote natural experience and may be impacted by views of onshore infrastructure such as air coolers, LNG storage tanks and columns. Some aspects of marine infrastructure such as LNG tankers may be visible from this VSR. Upper elements of the emergency high pressure flare system may be visible from the VSR, depending on the location of the receptor. Surrounding vegetation may obscure these views and help to maintain the remote natural experiences of visitors.

VSR5 e) Visitors to Willie Creek expect a high quality visual environment which will not be impacted by views of marine or onshore infrastructure due to the occurrence of surrounding vegetation and intervening topography. Users of this VSR looking to the north may be impacted by views of the emergency high pressure flare system, however due to the elongated appearance of the flare, and the distance of the receptor, this is unlikely. It is anticipated that a sediment dispersion pressure field as a result of construction activities, which may cause a reduction in water clarity and reduce the visual attractiveness of the creek, may be visible to visitors of Willie Creek for a moderate number of days (approximately a fifth of the year), however, the visibility of any changes to water clarity associated with such activities is dependent on a number of factors so the likely number of days will be variable.

VSR5 f) Users of Coconut Wells short term residential properties (approximately 37km south of James Price Point) may be impacted by views of LNG tankers operating in the area, as well as views of onshore infrastructure such as storage tanks and columns (**Figure 4.4-4**). The emergency high pressure flare, particularly the red and white banded upper elements may also be visible from this VSR, however this is unlikely due to the inability of the human eye to distinguish such features at significant distances. Sediment dispersion pressure field models indicate that water clarity of Willie Creek may be reduced slightly for a moderate number of days (approximately a fifth of the year), which may impact on the viewing experience of visitors or residents of Coconut Wells. However, the visibility of any changes to water clarity associated with such activities is dependent on a number of factors so the likely number of days will be variable.

VSR6 – Traditional Owners: Refer to **Part 5, Section 3**.

Table 4.4-9 summarises the key impacts on views and visual amenity within the study area on the VSRs during construction and operation.

■ **Table 4.4-9 Visually and Light Sensitive Receptors Impact Assessment Summary.**

VSR	Sensitivity to Change	Magnitude of Change	Potential Impacts	
			Construction	Operation
Potentially Visually Dominant (VSR/LSR 1.8 kilometres from BLNG Precinct)				
VSR/LSR1 – Occupational Road Users Not occurring within this zone	Slight	N/A	Negligible	Negligible
VSR/LSR2 – Recreational Road Users VSR/LSR 2a – Broome Cape Leveque Road VSR/LSR 2b – Manari Road	Medium Slight	N/A Large	Negligible Moderate	Negligible Moderate
VSR/LSR 3 – Occupational Marine Users Commercial and fishing in nearshore tidal areas (unlikely based on survey results)	Slight	Large	Moderate	Moderate
VSR/LSR4 – Recreational Marine Users Recreational fishing in nearshore areas	High	Large	Major - Severe	Major - Severe
VSR/LSR5a/g – Recreational Campers and Tourists Recreational users and tourist using the Lurijarri Heritage Trail and informal camping area along the foreshore	High	Large	Major - Severe	Major - Severe
VSR/LSR6 – Traditional Owners Traditional Owners visiting the Lurijarri Heritage Trail site and other sites and informal camping and gathering along the foreshore	High	Large	Major - Severe	Major - Severe
LSR7 – Residential Areas Not occurring within this zone	High	N/A	Low	Low
Potentially Visually Evident Zone (VSR/LSR 1.8 kilometres – 7.7 kilometres from the BLNG Precinct)				
VSR/LSR1 – Occupational Road Users VSR/LSR1c – Great Northern Highway	Slight	N/A	Negligible	Negligible
VSR/LSR2 – Recreational Road Users VSR/LSR2a – Broome Cape Leveque Road VSR/LSR2b – Manari Road VSR/LSR2c – Great Northern Highway	Medium Slight Slight	N/A Intermed Negligible	Negligible Moderate Negligible	Negligible Moderate Negligible
VSR/LSR3a/b – Occupational Marine Vessel Users Commercial fishing vessels and pearling vessels in nearshore tidal areas	Slight	Large	Moderate	Moderate
VSR/LSR4a/b/c – Recreational Marine Users Recreational vessels, charter vessels and cruise vessels in nearshore areas	High	Large	Major - Severe	Major - Severe
VSR/LSR5a/g – Recreational Users and Tourists Recreational users and tourists using the Lurijarri Heritage Trail and informal camping area along the foreshore	High	Large	Major - Severe	Major - Severe
VSR/LSR6 – Traditional Owners Traditional Owners visiting the Lurijarri Heritage Trail site and other sites and informal camping and gathering along the foreshore	High	Large	Major – Severe	Major – Severe
LSR7 – Residential Areas Not occurring within this zone	High	N/A	Low	Low
Potentially Visually Noticeable Zone (VSR/LSR 7.7 kilometres – 23 kilometres from the BLNG Precinct)				
VSR/LSR1 – Occupational Road Users VSR1a - Broome – Cape Leveque Bay Road VSR1c – Great Northern Highway	Slight	Small	Low	Low
VSR/LSR2 – Recreational Road Users VSR/LSR2a – Broome Cape Leveque Road VSR/LSR2b – Manari Road	Medium Slight	Small Small	Low – Moderate Low	Low – Moderate Low
VSR/LSR3a/b – Occupational Marine Users Commercial fishing vessels and pearling vessels in deep water	Medium	Large	Low – Moderate	Low – Moderate

VSR	Sensitivity to Change	Magnitude of Change	Potential Impacts	
			Construction	Operation
VSR/LSR4a/b/c – Recreational Marine Users Recreational vessels, charter vessels, cruise vessels in deep water	High	Large	Major – Severe	Major – Severe
VSR/LSR5a/b/g – Recreational Users and Tourists Recreational users and tourists using the Lurijarri Heritage Trail Visitors to Coulomb Point Nature Reserve Informal camping along the foreshore	High	Large	Major – Severe	Major – Severe
VSR/LSR6 – Traditional Owners Traditional Owners visiting the Lurijarri Heritage Trail site and Coulomb Point Nature Reserve, and other sites and informal camping and gathering along the foreshore	High	Large	Major – Severe	Major – Severe
LSR7 – Residential Areas Not occurring within this zone	High	N/A	Low	Low
Potentially Visually Insignificant Zone (VSR/LSR 23 kilometres – 37 kilometres from BLNG Precinct)				
VSR/LSR1 – Occupational Road Users Broome – Cape Leveque Road	Slight	Small	Low	Low
VSR/LSR2 – Recreational Road Users VSR/LSR2a – Broome Cape Leveque Road VSR/LSR2b – Manari Road	Medium Slight	Small Small	Low – Moderate Low	Low – Moderate Low
VSR/LSR3a/b – Occupational Marine Users Commercial fishing vessels and pearling vessels in deep water	Slight	Large	Moderate	Moderate
VSR/LSR4a/b/b – Recreational Marine Users Recreational vessels, charter vessels, cruise vessels in deep water	High	Large	Major – Severe	Major – Severe
VSR5/LSRa/b/g – Recreational Users and Tourists Recreational users and tourists using the Lurijarri Heritage Trail Visitors to Coulomb Point Nature Reserve Informal camping along the foreshore	High	Large	Major – Severe	Major – Severe
VSR/LSR6 – Traditional Owners Traditional Owners visiting the Lurijarri Heritage Trail site and Coulomb Point Nature Reserve, and other sites and informal camping and gathering along the foreshore	High	Large	Major – Severe	Major – Severe
LSR7 – Residential Areas Not occurring within this zone	High	N/A	Low	Low

The potential impacts range from low to severe, depending on the VSR (**Table 4.4-9**). Following the implementation of appropriate management and mitigation measures presented in **Table 4.4-14**, the significance of residual impacts (aligned to the process utilised in other environmental impact chapters) associated with these aspects ranges from very low to high.

4.4.3.4. Impacts on Anthropogenic Light Levels

For the purposes of this assessment, emphasis has been made on the impacts of sky glow in the far field, direct light and sky glow in the mid field and direct light and light spill in the near field.

The BLNG Precinct has the potential to impact on users of receptors via direct light, light spill and sky glow emanating from terrestrial/marine infrastructure and vessels, primarily through lighting on LNG processing trains, flares, marine infrastructure and lit vessels. Receptors (VSRs) will be affected by key aspects such as physical presence and light emissions from facilities and infrastructure.

Light modelling has not been undertaken to support this Strategic Assessment. Outputs of light modelling are dependent on a high degree of certainty relating to the following:

- Plant layout (particularly the locations of prominent, lit infrastructure)
- Orientation and location of lighting, and
- Type of lighting proposed.

Given the strategic nature of this assessment process and the lack of preliminary stage of engineering design by commercial proponents, the light assessment has been based on interpretation of the following:

- Viewshed analyses to identify areas likely to be exposed to direct light and light spill
- Interpretation of light modelling produced for similar LNG facilities (Gorgon Gas Development), and
- A study of light spill and sky glow from Karratha Gas Plant intended to record lux/sky glow and night time photographs in order to benchmark likely emissions.

Karratha Light Emissions Study

A study of light emissions from Karratha Gas Plant was conducted in July 2010 with lux levels and sky glow readings measured at varying distances from the LNG facilities (**Figure 4.4-8**). Lux levels were recorded to be 0.1lux at a distance of 3.25km from the Emergency/Operational Flare, dropping to 0.0lux beyond 4.01km (**Figure 4.4-9**). Sky glow was measured in magnitudes per arcsecond² and interpreted based on the scale presented in Flanders (2009) where a skyglow reading of 22.0mags/arcsec² represents a moonless night sky that is completely free of artificial light pollution, 19.0mags/arcsec² describes a typical rural area, and a reading of 18mags/arcsec² represents a bright suburb or dark urban neighbourhood. Sky glow within 4km of Karratha Gas Plant was found to be comparable to the level of light pollution associated with a dark urban neighbourhood, and as distances increased up to 18km, sky glow readings decreased to levels more comparable with a remote urban area.

The lux and sky glow levels recorded at different distances from Karratha Gas Plant are used to predict a worst case scenario for the James Price Point coastal area. Measurements taken in the light emissions study were influenced by other light sources such as Dampier Port and the Hamersley Iron loading wharf, and as such developments are not present in the vicinity of the BLNG Precinct, lux and skyglow levels in the James Price Point coastal area are not expected to be as high as in the area surrounding Karratha Gas Plant. Light emissions from the BLNG Precinct and associated infrastructure are not expected to be as noticeable as those from the Karratha Gas Plant, due to the BLNG Precinct being set back a minimum 1km from shore behind a natural dune system.

The level of potential impact on the LSRs is anticipated to be greater during operations. The following are the key light emission impact findings by LSR receptor (refer to **Figure 4.4-10** through to **Figure 4.4-14**).

LSR1 – Occupational Road Users and LSR2 - Recreational Road Users:

LSR1/2 a) Users of the Broome-Cape Leveque Road are transient in nature, Occupational users are engaged in work activities and so light emissions will have a lower impact than on recreational users who are more engaged with the surrounding natural environment. It is unlikely that any direct light or light spill from onshore or marine infrastructure (see flare discussion below) will be directly visible to road users due to intervening topography and surrounding vegetation to the south east of the BLNG Precinct. Direct light from the emergency high pressure flare system may be visible during flaring events to users of the Broome Cape Leveque Road when travelling in either direction on the section of road within 50km from Broome. It is expected that any skyglow from the BLNG Precinct may be visible at this LSR will be less evident than that represented in **Figure 4.4-14** due to increased distance from the light source. The skyglow shown in

Figure 4.4-14 emanates from the Hamersley Iron loading wharf which is significantly brighter than LNG infrastructure lighting as can be seen in **Figure 4.4-13**.

LSR2 b) Manari Road runs directly adjacent to the Precinct and so from this section of the road, direct light and light spill from both onshore LNG infrastructure and marine infrastructure may be visible for sections of the road. From the far northern and southern sections of Manari Road, it is unlikely that any direct views of infrastructure lighting may occur. Direct light from the emergency high pressure flare (during flaring events) as well as sky glow generated by the BLNG Precinct may impact users of this VSR along the entire length of the road, however, views may be obscured by surrounding vegetation to some extent. Sky glow from all the facilities may be evident along stretches of Manari Road.

LSR1/2 c) Great Northern Highway heads east from Broome and due to intervening topography, users of the road are unlikely to be impacted by direct light or light spill from any light sources associated with the BLNG Precinct. Sky glow from the Precinct may be visible to road users, however, the magnitude of change is predicted to be low due to the existence of sky glow from Broome Town and other sources of light within user's field of view such as headlights of other vehicles.

LSR3 –Occupational Marine Users:

LSR3 a & b) Commercial fishing vessels and pearling vessels may experience views of direct light from sources associated with the marine and terrestrial infrastructure when looking towards the BLNG Precinct. The most visible elements of the BLNG Precinct are likely to be the LNG/condensate/LPG tankers, jetties, breakwater, and emergency flare system (during flaring events). From further out to sea, beyond 37km, skyglow may be visible on the horizon. However, this is likely to be considerably less evident than the skyglow seen in **Figure 4.4-11** as the depicted infrastructure is located much closer to the coast than the proposed BLNG Precinct, with no intervening topography or vegetation. Light emissions from vessels moving at night during construction and operation may be visible to occupational marine users. The magnitude of change is considered to be large reducing with distance from the BLNG Precinct.

LSR4 – Recreational Marine Users:

LSR4 a, b & c) Recreational marine users may potentially see the same elements as LSR3, as described above, however, they may be closer to the coastline than occupational marine users and so may experience direct light, from the BLNG Precinct infrastructure, as well as increased skyglow represented in **Figure 4.4-8** and **Figure 4.4-10**. However, impacts are not expected to be as severe as shown in the photo, due to the 1km set back of the proposed BLNG Precinct. Light spill is unlikely as recreational users movements within the BLNG Precinct Port area, where light spill may be evident, will be restricted. The magnitude of change is likely to be large in close proximity to the BLNG Precinct. Light emissions from vessels moving at night during construction and operation may be visible to recreational marine users.

LSR5 – Recreational Campers and Tourists:

LSR5 a & g) Users of the Lurujarri Heritage Trail and the associated camp sites expect a natural remote experience which will be impacted by direct views of the BLNG Precinct light sources. It is likely that direct light, light spill and sky glow from the high pressure emergency flare system will be visible from all locations along the trail; however, surrounding vegetation and distance from the receptor may obscure direct light and light spill in some areas. Locations along the trail with direct ocean views from headlands may be impacted by the visibility of direct light and light spill (only in close proximity ~ <4km of the BLNG Precinct) from marine infrastructure such as the breakwater and jetty (**Figure 4.4-6**). Glimpses of sky glow associated with onshore process infrastructure may be visible through surrounding vegetation in areas of the Lurujarri Heritage Trail within 20km of the Precinct (**Figure 4.4-7**), however, this is likely to be considerably less evident than the skyglow seen in **Figure 4.4-12** as the depicted infrastructure is located much closer to the coast than the proposed BLNG Precinct, with no intervening topography or vegetation.. It is highly unlikely that direct light and light spill from marine or onshore infrastructure lighting will be visible from the far northern and southern sections of the trail; however, skyglow may potentially be visible from these distances. Potential levels of skyglow at distances of approximately 13km from the BLNG Precinct are shown in **Figure 4.4-14**, however it is unlikely that skyglow will be this evident to users of these LSRs as the skyglow shown in **Figure 4.4-14** emanates from the Hamersley Iron loading wharf which is significantly brighter than LNG infrastructure lighting as can be seen in **Figure 4.4-13**.

LSR5 b) Visitors to Coulomb Point Nature Reserve (approximately 15km from James Price Point) generally expect a high quality visual environment and a remote natural experience. Direct light and light spill from marine infrastructure and onshore process infrastructure is unlikely to be visible from this VSR due to the distance from the Precinct and the occurrence of intervening topography. The upper elements of the high pressure emergency flare system may be directly visible from the south-western areas of the Reserve but it is likely that direct light will be obscured by intervening topography and vegetation. Skyglow from the BLNG Precinct and associated infrastructure is likely to be visible from accessible parts of the reserve, but likely to be considerably less evident than the skyglow seen in **Figure 4.4-13** due to the minimum 1km set back of the proposed BLNG Precinct and the presence of intervening topography and vegetation.

LSR5 c) Cable Beach is an iconic tourist location with unrestricted ocean views. Only direct light from the emergency high pressure flare system may be visible from the LSR during flaring events. Sky glow may potentially be visible from Cable Beach, however, due to the significant distance between the receptor and the BLNG Precinct and its proximity to lighting in Broome Town, is not expected to be impacted too severely. Light emissions from vessels moving at night during construction and operation may be visible at the LSR but unlikely as movements will be concentrated around the BLNG Precinct Port Area and access channel.

LSR5 d) Visitors to Indigenous tourism operations accessible via the Broome Cape Leveque Road expect a remote natural experience and may be impacted by direct lighting, light spill from infrastructure lighting, the high pressure emergency flare (during flaring events), and sky glow through surrounding vegetation.

LSR5 e) The high quality night time environment expected by visitors to Willie Creek are unlikely to be impacted direct light from marine or onshore infrastructure due to the occurrence of surrounding vegetation and intervening topography. Users of this LSR looking to the north may be impacted by direct lighting from the emergency high pressure flare system (during flaring events) as well as sky glow associated with the BLNG Precinct. Skyglow from the BLNG Precinct may possibly be visible from Willie Creek, however, due to the distance from the Precinct, and the closer proximity to Broome Town, the magnitude of change in light levels at Willie Creek are expected to be insignificant.

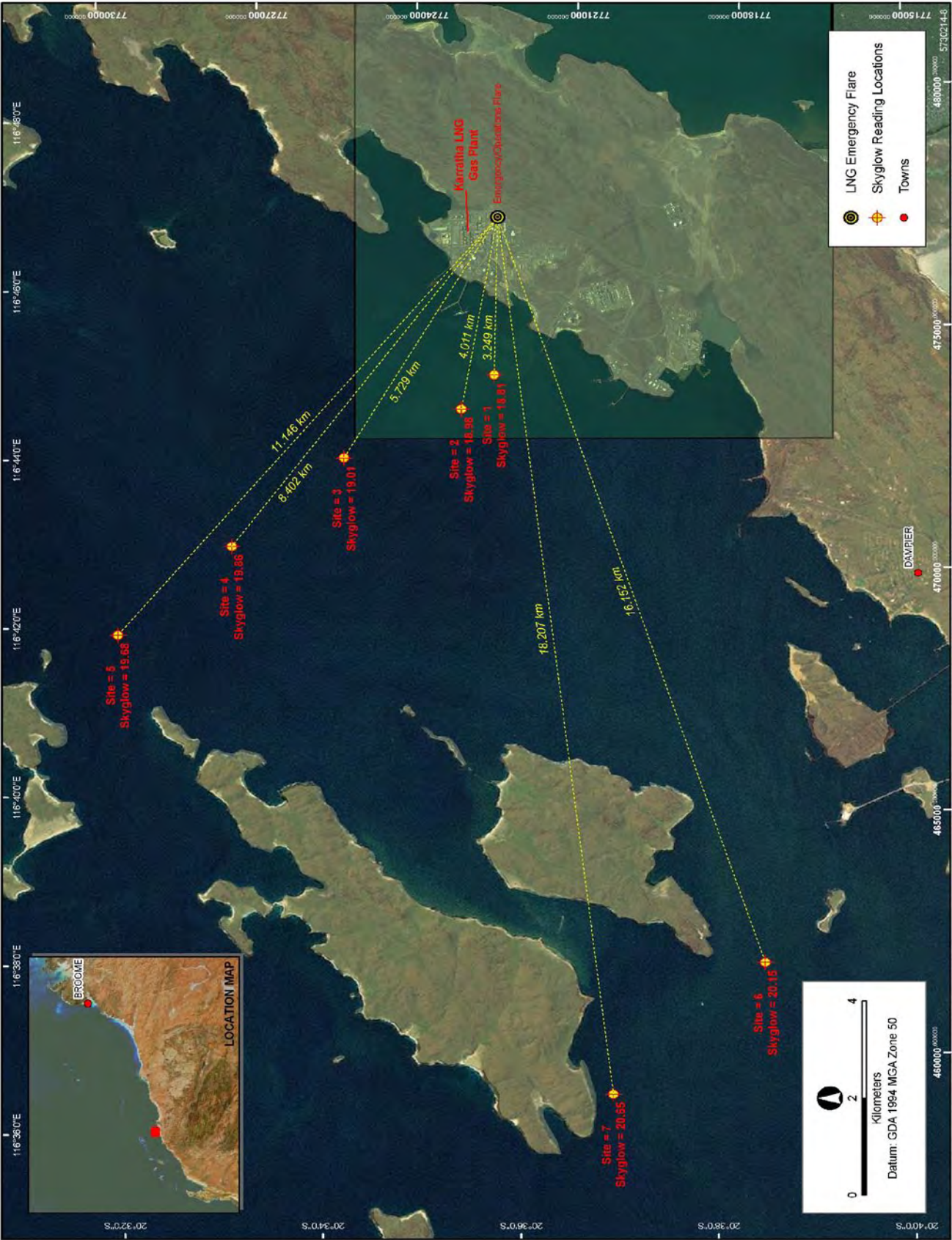
LSR5 f) Users of Coconut Wells short term residential properties may be impacted by views of LNG/LPG/condensate tankers operating in the area, as well as views of onshore infrastructure lighting such as storage tanks. Direct light from the emergency high pressure flare may also be visible from this VSR during flaring events. Sky glow may potentially be visible from Coconut Wells, however, due to its proximity to Broome, the existing quality of the night time environment is not expected to be too adversely impacted.

LSR6 – Traditional Owners:

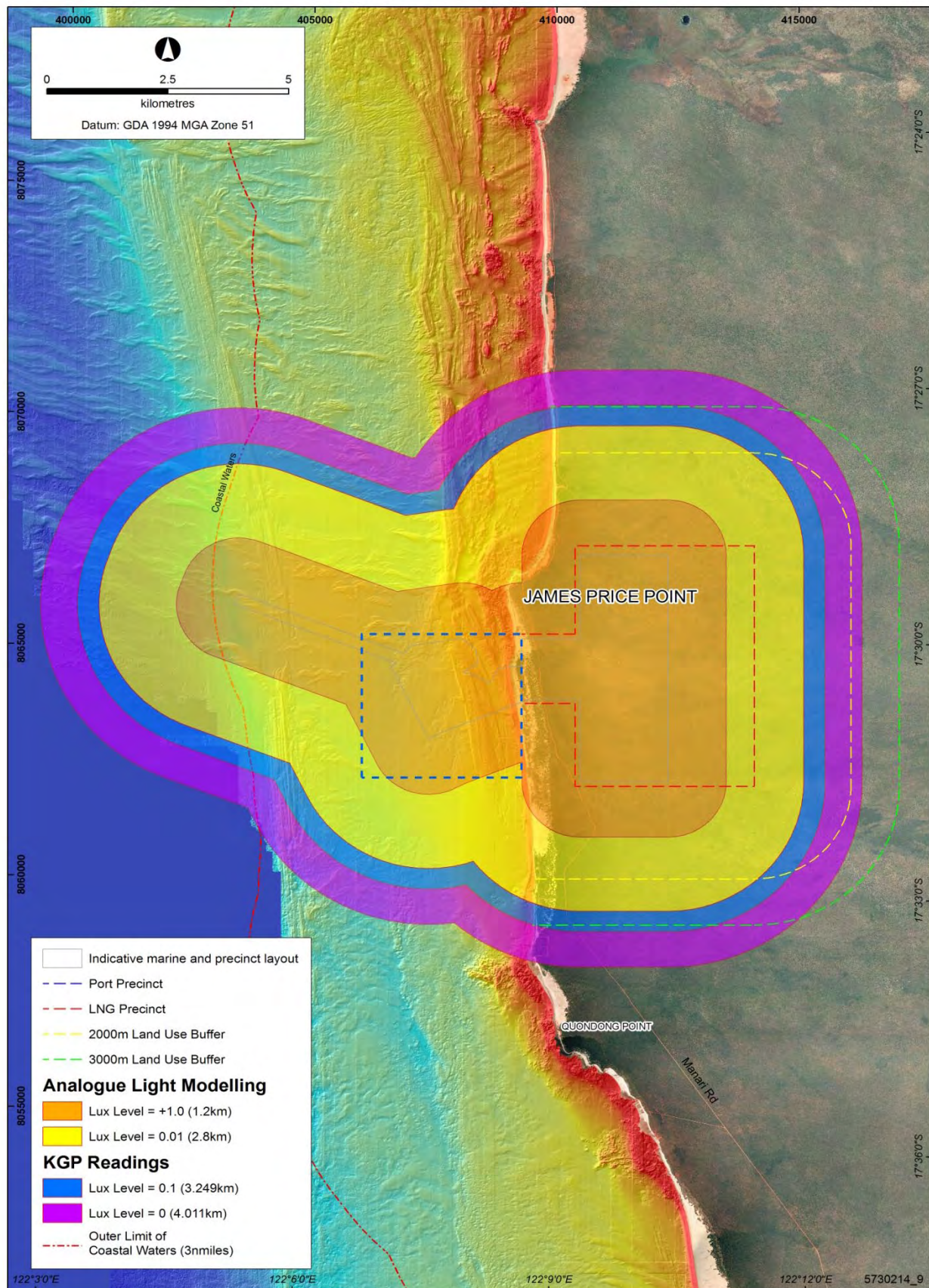
LSR6 Traditional owners may experience direct light and light spill from sources associated with the BLNG Precinct; mostly the taller elements such as the emergency high pressure flare system (during flaring events) in certain locations in close proximity to the BLNG Precinct. These views are likely to be intermittent between existing vegetation, or rising above the surrounding vegetation when in closer proximity to the BLNG Precinct. From distances beyond 37km, sky glow may be visible above the existing foreground landscape, however, this would not be particularly prominent at this distance.

LSR7 – Residential Areas:

These LSRs may potentially see very distant and low sky glow from the BLNG Precinct. However, many of these LSRs will be in areas with other sources of ambient light, thus reducing the visibility of the glow. It is highly unlikely that users of these LSRs will experience direct light or light spill from sources associated with the BLNG Precinct due to their distance from the site.



■ **Figure 4.4-8 Skyglow Levels (Visual Mag/Arcsec²) Recorded from Karratha Gas Plant.**



■ **Figure 4.4-9 Indicative Light Levels (lux) Anticipated in Vicinity of the BLNG Precinct Based on Analogue Assessments.**



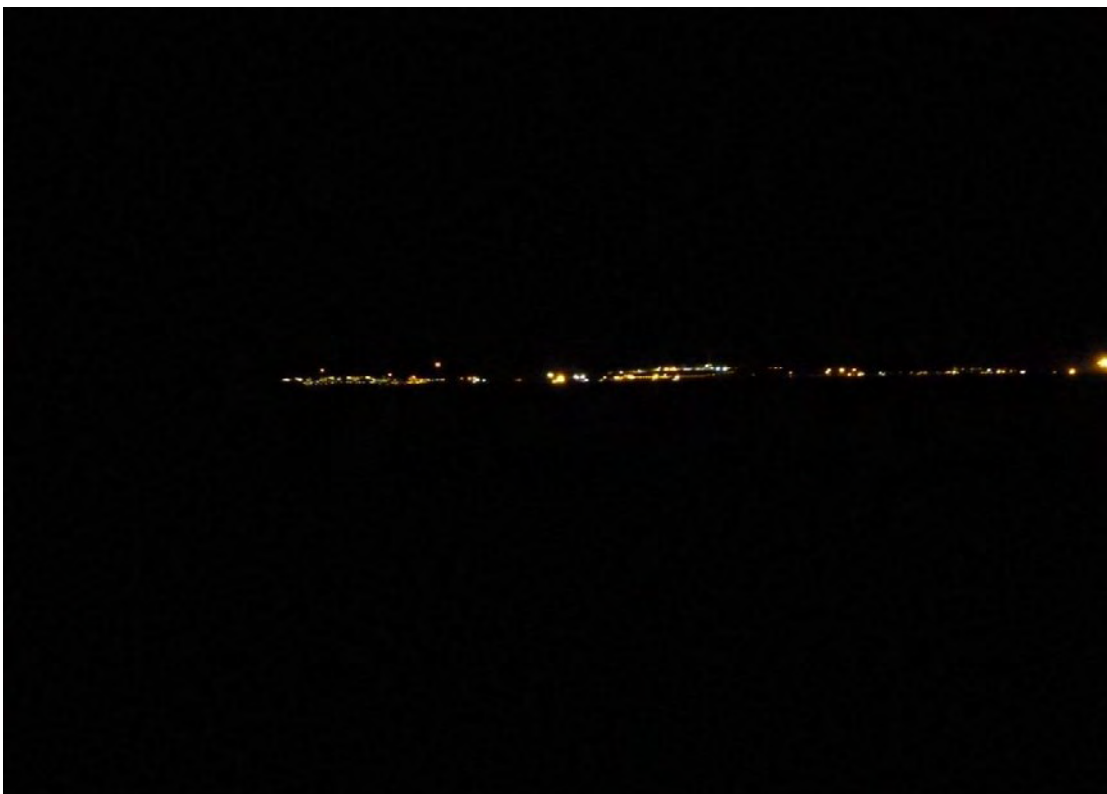
■ **Figure 4.4-10 Karratha Gas Plant Infrastructure Lighting photo taken from 3.25km west of the Emergency / Operational flare.**



■ **Figure 4.4-11 Karratha Gas Plant Infrastructure Lighting photo taken from 5.73km north west of the Emergency / Operational flare.**



■ **Figure 4.4-12** Karratha Gas Plant Infrastructure lights glow photo taken from 1.15km north west of the Emergency / Operational flare.



■ **Figure 4.4-13** Karratha Gas Plant Infrastructure lights glow photo taken from 16.15km south west of the Emergency / Operational flare.



■ **Figure 4.4-14 Skyglow picture taken of Hamersley Iron loading wharf from behind East Lewis Island approximately 13km west.**

■ **Table 4.4-10 Light Sensitive Receptors Impact Assessment Summary.**

LSR (light receptors)	Sensitivity to Change	Magnitude of Change	Potential Impact	
			Construction	Operation
Lighting Potentially Visible Zone				
LSR1 – Occupational Road users	Slight	Large	Moderate	Moderate
LSR2 – Recreational Road Users	Medium	Large	Moderate – Major	Moderate – Severe
LSR3 – Occupational Marine Users	Slight	Large	Moderate	Moderate
LSR4 – Recreational Marine Users	High	Large	Major – Severe	Major – Severe
LSR5 - Recreational Users and Tourist	High	Large	Major – Severe	Major – Severe
LSR6 – Traditional Owners	High	Large	Major – Severe	Major – Severe
LSR7 - Residential Areas	High			
Glow Potentially Visible Zone				
LSR1 – Occupational Road Users	Slight	Small	Low	Low
LSR2 – Recreational Road Users	Medium	Small	Low – Moderate	Low – Moderate
LSR3 – Occupational Marine Users	Slight	Small	Low – Moderate	Low - Moderate
LSR4 – Recreational Marine Users	High	Small	Moderate	Moderate
LSR5 - Recreational Users and Tourist	High	Small	Moderate	Moderate
LSR6 – Traditional Owners	High	Small	Moderate	Moderate
LSR7 - Residential Areas	High	Intermediate	Moderate	Moderate

The potential impacts range from low to severe, depending on the LSR (**Table 4.4-10**). Following the implementation of appropriate management and mitigation measures presented in **Table 4.4-14**, the residual environmental impact for light emissions is assessed to be medium.

4.4.4. Mitigation and Management Measures

Mitigation measures and safeguards that have been identified to manage potential impacts to visual amenity, lighting and landscape character are outlined below in **Table 4.4-11**, **Table 4.4-12** and **Table 4.4-13**.

■ **Table 4.4-11 State Government Measures for Visual Amenity, Landscape Character and Light.**

State Government measures	Responsibility	Timing
<p>Ensure planning and layout of the BLNG Precinct is subject to appropriate strategic land use buffer zoning in alignment with State Planning Policy (Industrial Buffer Policy) and EPA requirements (Guidance Statement No. 3), to ensure appropriate separation distances between industrial and other land uses and minimise off-site impacts.</p> <p>Key considerations will include:</p> <ul style="list-style-type: none"> Proposed buffer areas for the BLNG Precinct will align with the principles and objectives of the State Industrial Buffer Statement of Planning Policy 4.1, as agreed on by the WAPC, in consultation with local government and other appropriate regulatory authorities. Identification of the nature of off-site impacts which may affect more sensitive land uses (noise, smoke, dust, odour, vibration and light) or create potential risks, in line with WA EPA Guidance Statement No. 3 – Separation Distances between Industrial and Sensitive Land Uses. Identification of appropriate land uses that may be compatible within and surrounding the buffer area, and appropriate control measures to ensure that social amenity and heritage values in the vicinity of the Precinct Project Area are maintained. <p>Implementation of buffer zones for the BLNG Precinct will meet the national environment protection goals and other established environmental quality criteria, while recognising contributions from other existing sources. The buffer zone will acknowledge:</p> <ul style="list-style-type: none"> environmental and social protection ‘no go’ areas; location of supporting infrastructure; social, heritage and recreational user groups outside buffer zones. 	DSD with advice from LandCorp, DEC, and State Planning Commission.	On approval of the BLNG Precinct.
Prepare and implement a closure and decommissioning strategy for the Browse LNG Precinct and related activities for the purpose of providing a timely and consistent approach to removal or retention of plant and infrastructure, rehabilitation of disturbed areas and identification of contaminated areas.	DSD.	5 years prior to decommissioning of BLNG Precinct infrastructure.
Prepare and implement an engagement plan to manage all interactions with public users of the marine and terrestrial environment in and around James Price Point, including recreational users and tourism operators.	DSD with advice from Broome Port Authority and LandCorp.	Prior to the commencement of construction.
Prepare and implement a Management and Monitoring Strategy for Vegetation of Medium to High Conservation Significance, with particular reference to remnant monsoon vine thicket and drainage basin vegetation on the Dampier Peninsula. See Part 4, Section 2.4.	DEC.	Throughout the life of the Plan.

■ **Table 4.4-12 Proposed Environmental Conditions for the Strategic Proposal that may affect Visual Amenity, Landscape Character and Lighting.**

Condition No.	Proposed Environmental Conditions for the Strategic Proposal
T3.1	The Proponent shall not cause the loss of vegetation including monsoon vine thicket in excess of the limits of cumulative loss prescribed in Part 4, Section 2.4. (Terrestrial Flora and Vegetation) for the BLNG Precinct.
T2.1	<p>Prior to the commencement of construction activities, proponents of derived proposals shall prepare and implement an Ecological Surface Water Requirements Management Plan, to the satisfaction of the Western Australian Minister for Environment, which shall address the following:</p> <ul style="list-style-type: none"> • Drainage measures to manage surface water flows and minimise environmental impacts as far as practicable on monsoon vine thicket and drainage basin vegetation communities within the affected catchments. • A vegetation composition, health and condition monitoring program for areas of vegetation determined likely to be dependent on surface water flows, including the superficial aquifer, for seasonal water requirements. • Process to be implemented if monitoring indicates declining vegetation condition or changing composition as a result of changes in surface water flows.

■ **Table 4.4-13 Requirements to be Addressed via Development of a Management Plan to support a Derived Proposal in regards to Visual Amenity, Landscape Character and Light.**

Requirements for proponents	Timing
<p>Prepare and implement a Visual Amenity Management Plan (applicable during the design and construction of facilities) that addresses:</p> <ul style="list-style-type: none"> • techniques to be used to reduce visual impacts from facilities (for example use building materials, colours and finishes that complement the surrounding landscape); • a lighting strategy to reduce light spill, sky glow and direct light from the BLNG Precinct infrastructure; • siting of facilities to reduce visibility as reasonably practicable (including set back from the coastline of highly visible infrastructure); and • retention of areas of landscape character significance (e.g. Sand Dunes/Pindan Cliffs), where possible. 	Prior to construction
<p>Prepare a Rehabilitation Plan, to the satisfaction of the Western Australian Minister for Environment, which includes the following:</p> <ul style="list-style-type: none"> • objectives, targets and associated monitoring; • rehabilitation of areas not required post-construction; • stabilisation of disturbed landforms; • use of local native species in revegetation activities; • rehabilitation techniques (such as relocation of topsoil, translocation of particular trees); and • reporting on inspections and monitoring. 	Prior to commencement of associated construction activities

Cumulative Impacts of the Proposal and Associated Activities

The cumulative emissions of the BLNG Precinct proposal and from emissions from indirectly facilitated or related projects in the region have been considered in this section.

The construction and operation of the BLNG Precinct is likely to have an impact on views and visual amenity within the 37 kilometres radius study area. Impacts would be primarily through construction and operation related activities: vehicle and vessel movements, and fixed structures associated with the BLNG processing facilities such as LNG processing trains, hydrocarbon storage tanks and flares.

4.4.4.1. Category B Activities

Emissions from activities that may indirectly arise as a result of the development and operation of the Precinct (Category B activities) are largely driven by increases to the population base in Broome as a result of the Precinct development. These include impacts to visual amenity, light and landscape character arising from:

- Additional housing in Broome;
- Additional urban infrastructure (roads, service infrastructure);
- Transportation, including vehicle, vessel and aircraft traffic; and
- Demand for industrial services.

The expected population increases and associated construction of infrastructure are expected to have a cumulative impact on the visual amenity, light and landscape character of the James Price Point area. Increased urban development would impact on the visual amenity and landscape character of currently undeveloped areas on the peripheries of Broome. This development is expected to be largely contiguous with Broome in a visual and landscape character context. Light emissions in Broome would also be increased; however, this additional light is not likely to be distinguishable from the existing lit form of the town.

4.4.4.2. Category C Activities

Category C activities include upstream development (explorative and construction activities) of the Browse Basin gas field (to acquire the LNG resource) and the operation of the upstream extraction of LNG. Category C activities which have the potential to impact the visual amenity, light and landscape character of the area are limited to vessel movements, seabed disturbance, and light emissions.

The potential impacts from increased vessel movements are anticipated to be comparable regardless of whether the vessels are supporting the Browse Upstream LNG Development or the other activities associated with the development of the Browse Basin. Impacts to visual amenity from increased vessel movements include vessel discharges which may decrease water quality and visual amenity, and light emissions which may be seen from other commercial and tourist vessels.

Seabed disturbance associated with the development of the Browse Basin has the potential to cause cumulative impacts such as localised changes in water quality due to elevated suspended sediments, and smothering and disturbance of benthic habitats. These impacts have the potential to affect the visual amenity of the area by decreasing water quality and thereby degrading the visual quality of the environment experienced by commercial and recreational users.

The physical presence of upstream infrastructure is unlikely to cause major impacts as the majority of infrastructure would not be visible once constructed. The main impacts to visual amenity, light and landscape character associated with upstream infrastructure would be during construction when vessel movements would increase and seabed disturbance may temporarily decrease water quality. The presence of brightly lit service vessels during operations of the BLNG Precinct may also impact visual amenity, light and landscape character.

■ **Table 4.4-14 Impact Assessment Summary for Visual Amenity, Landscape Character and Light.**

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future Proponent Management Plans	
Physical presence	<p><i>Change to visual amenity</i></p> <p><i>Changes to landscape character</i></p> <p><i>Changes to light levels</i></p> <p>The physical presence of the BLNG Development will permanently alter the visual amenity and landscape character of the James Price Point coastal area. Physical presence of terrestrial and marine components of the BLNG Precinct into the existing landscape, given the current predominant natural character of the proposed site and surrounding area, is expected to generate a considerable change in the landscape. The construction and operation of the BLNG Precinct is likely to have an impact on views and visual amenity within the 37km radius study area.</p> <p>It is expected that potential impacts from physical presence of terrestrial infrastructure will be mitigated in part by the application of management and mitigation measures such as the Visual Amenity Management Plan which includes a set back from the coastline for the industrial blocks and siting of infrastructure to minimise visual impacts. A more detailed description of proposed mitigation measures is presented in Section 4.4.4.</p>	<p>Ensure planning and layout of the BLNG Precinct is subject to appropriate strategic land use buffer zoning in alignment with State Planning Policy (Industrial Buffer Policy) and EPA requirements (Guidance Statement No. 3), to ensure appropriate separation distances between industrial and other land uses and minimise off-site impacts.</p> <p>Key considerations will include:</p> <ul style="list-style-type: none"> Proposed buffer areas for the BLNG Precinct will align with the principles and objectives of the State Industrial Buffer Statement of Planning Policy 4.1, as agreed on by the WAPC, in consultation with local government and other appropriate regulatory authorities. Identification of the nature of off-site impacts which may affect more sensitive 	<p>Prior to the commencement of construction activities, proponents of derived proposals shall prepare and implement an Ecological Surface Water Requirements Management Plan, to the satisfaction of the Western Australian Minister for Environment, which shall address the following:</p> <ul style="list-style-type: none"> Drainage measures to manage surface water flows and minimise environmental impacts as far as practicable on monsoon vine thicket and drainage basin vegetation communities within the affected catchments. A vegetation 	<p>Lighting control measures will be in line with best practice principles.</p> <p>Prepare and implement a Visual Amenity Management Plan (applicable during the design and construction of facilities) that addresses:</p> <ul style="list-style-type: none"> techniques to be used to reduce visual impacts from facilities (for example use building materials, colours and finishes that complement the surrounding landscape) siting of facilities to reduce visibility as reasonably practicable (including set back from the coastline of highly visible infrastructure), and retention of areas of landscape character significance (e.g. Sand Dunes/Pindan Cliffs), where possible. <p>Prepare and implement an</p>	Medium

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future Proponent Management Plans	
Light emissions	<p><i>Change to visual amenity</i></p> <p>The BLNG Precinct has the potential to impact on users of receptors via direct light, light spill and sky glow emanating from terrestrial/marine infrastructure and vessels. Emphasis has been made on the impacts of sky glow in the far field, direct light and sky glow in the mid field and direct light and light spill in the near field. Impacts on high sensitivity receptors such as Broome town are not likely to be significant given the distance between the BLNG Precinct and the residential receptors.</p> <p>Any potential impact on LSRs due to light emissions is expected to be restricted to areas in close proximity to the BLNG Precinct for direct light and light spill. Impacts from both of these sources will be minimised significantly by the preparation of a lighting strategy as part of the overall Visual Amenity Management Plan. Further details are provided in Section 4.4.4.</p>	<p>land uses (noise, smoke, dust, odour, vibration and light) or create potential risks, in line with WA EPA Guidance Statement No. 3 – Separation Distances between Industrial and Sensitive Land Uses.</p> <ul style="list-style-type: none"> Identification of appropriate land uses that may be compatible within and surrounding the buffer area, and appropriate control measures to ensure that social amenity and heritage values in the vicinity of the Precinct Project Area are maintained (see Section 5, Part 5 for further social management measures associated with these aspects. 	<p>composition, health and condition monitoring program for areas of vegetation determined likely to be dependent on surface water flows, including the superficial aquifer, for seasonal water requirements.</p> <ul style="list-style-type: none"> Process to be implemented if monitoring indicates declining vegetation condition or changing composition as a result of changes in surface water flows. 	<p>engagement plan to manage all interactions with public users of the marine and terrestrial environment in and around James Price Point, including recreational users and tourism operators.</p> <p>Prepare and implement an engagement plan to manage all interactions with public users of the marine and terrestrial environment in and around James Price Point, including recreational users and tourism operators.</p> <p>Prepare and implement a Vessel Management Plan (VMP). Refer Part 3, Section 2.6 (Marine Mammals).</p> <p>Prepare and implement a Hydrocarbon and Chemical Spill Contingency Plan, to the satisfaction of the Western Australian Minister for Environment.</p>	Medium
Sediment deposition and turbidity	<p><i>Change to visual amenity</i></p> <p><i>Changes to landscape character (seascape)</i></p> <p>Changes in sediment deposition and turbidity, as a result of dredging for the port, Marine Facility (MF) access channels, spoil disposal and pipelines may cause a decline in local water quality extending out from James Price Point. Under certain seasonal conditions, users of the nearshore marine environment and coastal areas may experience a visible plume in surface layers of the water column. This has the potential to impact on the visual amenity and seascape character experienced by users of coastal areas.</p>	<p>Implementation of buffer zones for the BLNG Precinct will meet the national environment protection goals and other established environmental quality criteria, while recognising contributions from other existing sources. The buffer zone will acknowledge:</p> <ul style="list-style-type: none"> environmental and social protection 'no go' areas; 	<p>Prior to the commencement of construction activities, proponents of derived proposals shall prepare and implement an Ecological Surface Water Requirements Management Plan, to the satisfaction of the Western Australian Minister for Environment, which shall address the</p>	<p>All vessels will be required to have in place a Ship-Board Oil Pollution Emergency Plan (SOPEP) and will be required to comply with MARPOL 73/78 regulations with regards to discharges at sea. Refer Part 3, Section 2.3 (Marine Water Quality).</p> <p>Proponents of derived proposals shall prepare and implement a</p>	Medium

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future Proponent Management Plans	
	Recent dredging programmes on the North West Shelf have demonstrated that given appropriate management and contingency procedures, prolonged dredging campaigns can successfully mitigate water quality impacts and achieve acceptable outcomes in visual terms. Prior to commencement of dredging, proponents of derived proposals would be required to prepare and implement a Dredging and Dredge Spoil Disposal Management Plan (DSDMP) to demonstrate best practice management techniques and technologies which would be applied to minimise potential dredging impacts. A more detailed description of the DSDMP is presented in Part 5, Section 4.6.4 .	<ul style="list-style-type: none"> location of supporting infrastructure; social, heritage and recreational user groups outside buffer zones. <p>Prepare and implement a closure and decommissioning strategy for the Browse LNG Precinct and related activities for the purpose of providing a timely and consistent approach to removal or retention of plant and infrastructure, rehabilitation of disturbed areas and identification of contaminated areas.</p>	<p>following:</p> <ul style="list-style-type: none"> Drainage measures to manage surface water flows and minimise environmental impacts as far as practicable on monsoon vine thicket and drainage basin vegetation communities within the affected catchments. A vegetation composition, health and condition monitoring program for areas of vegetation determined likely to be dependent on surface water flows, including the superficial aquifer, for seasonal water requirements. Process to be implemented if monitoring indicates declining vegetation condition or 	<p>Port Facilities Construction Environmental Management Plan (PFCEMP), to the satisfaction of the Western Australian Minister for Environment.</p> <p>Refer Part 3, Section 2.8 (Marine Ecosystem Integrity).</p> <p>Prepare a Rehabilitation Plan, to the satisfaction of the Western Australian Minister for Environment, which includes the following:</p> <ul style="list-style-type: none"> objectives, targets and associated monitoring; rehabilitation of areas not required post-construction; stabilisation of disturbed landforms; use of local native species in revegetation activities; rehabilitation techniques (such as relocation of topsoil, translocation of particular trees); and reporting on inspections and monitoring. <p>Refer Part 4, Section 2.4 (Terrestrial Flora and Vegetation).</p>	
Site disturbance and excavation (Construction)	<p><i>Change to visual amenity</i></p> <p>Site disturbance and excavation associated with the construction of marine infrastructure may affect visual amenity via changes in local water quality and the presence of construction equipment, plant and machinery which may be visible to users of coastal areas. The changes in landforms associated with earthworks will affect the landscape character of areas within the Precinct footprint.</p> <p>It is expected that potential impacts can be successfully mitigated by application of management and mitigation measures such as creation of land use buffer zones in the terrestrial landscape and identification of key environmental values and development of water quality objectives and criteria within the Port through a BLNG Precinct Environmental Management Plan (BPEMP) for marine site disturbance. This will include management of</p>	<p>Establish the Broome Port Authority as the statutory Port Authority for the BLNG Precinct, and an associated port area.</p> <p>Ensure planning and layout of the BLNG Precinct is subject to appropriate strategic land use buffer zoning in alignment with State Planning Policy (Industrial Buffer Policy) and EPA requirements (Guidance Statement No. 3), to ensure appropriate separation distances between industrial and other land uses and minimise off-site impacts. For more detail see the Physical Presence Environmental Aspect.</p> <p>Management and Monitoring Strategy of Vegetation of</p>			Low

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future Proponent Management Plans	
	exclusion zones, Dredging and Dredge Spoil Disposal Management Plan (DSDMP) and effective stakeholder engagement with relevant operators. A more detailed description of proposed mitigation measures is presented in Part 5, Section 4.6.5 and Section 4.4.4 .	Medium to High Conservation Significance. Refer Part 4, Section 2.4 (Terrestrial Flora and Vegetation).	changing composition as a result of changes in surface water flows.		
Vehicle movements	<i>Change to visual amenity</i> Movements of vehicles to and from the BLNG Precinct, during construction and operations, along the existing or redirected Manari Road and the Broome- Cape Leveque Road may impact the visual amenity of the area. Users of the Lurujarri heritage trail and associated campsites, as well as recreational users of Manari Road may see an increase in traffic movements. It is expected that potential impacts to terrestrial fauna due to vehicle movements can be minimised through measures such as the establishment of designated vehicle access setting of appropriate vehicle speed limits during construction and operation phases. A more detailed description of proposed mitigation measures is presented in Part 4, Section 2.6.4 .				Low
Vessel movements	<i>Change to visual amenity</i> Movements of construction vessels such as pipelay and supply vessels during construction, as well as LNG, LPG and Condensate Tankers during operations may be visible to occupational and recreational users of coastal areas. It is expected that potential impacts can be successfully mitigated through application of management and mitigation measures such				Medium

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future Proponent Management Plans	
	as regulation of vessel navigation, operations and movements within the port area by the Port Authority, and control of vessel movements through a Vessel Management Plan. A more detailed description of proposed mitigation measures is presented in Part 5, Section 4.6.5 .				
Non-routine discharges (spills and leaks)	<p><i>Change to visual amenity</i></p> <p><i>Changes to landscape character (seascape)</i></p> <p>Non-routine discharges (i.e. spills and leaks), although highly unlikely, can result in a significant effect on water quality, which can have flow-on impacts on visual amenity and changes to the seascape and landscape character of coastal areas.</p> <p>In the event of a LNG spill, the surface of the receiving water will receive cryogenic LNG heated up by the marine waters. This effect is likely to be short lived given that phase transition would be rapid. Similarly, if spilled, other hydrocarbons (e.g. fuel oil, diesel or condensate) will spread from the site release point in the direction of prevailing wind and waves.</p> <p>Impacts associated with non-routine spills are minimised as a result of strict industry standards and procedures for product handling and storage and appropriate response planning as described in Part 5, Section 4.6.4. It is therefore concluded that the significance of residual impacts to aquaculture and pearling from the proposed BLNG Precinct can be managed to an acceptable level.</p>				Very low

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future Proponent Management Plans	
Noise and vibration	<p><i>Change to landscape character</i></p> <p>The BLNG Precinct may introduce numerous sources of noise and vibration including piling, blasting, pipelaying and vessel movements in the James Price Point coastal area. Due to the current predominant natural character of the proposed site and surrounding area this is expected to generate a change in the landscape and seascape character in the vicinity of construction areas.</p> <p>Noise impacts during construction will be managed through a Port Facilities Construction Environmental Management Plan and Construction Environmental Management Plan. Operational noise from the LNG facilities is unlikely to affect landscape character beyond the buffer zones for the Precinct.</p> <p>A more detailed description of proposed mitigation measures is presented in Part 5, Section 4.6.5 (for marine impacts) and Part 4, Section 2.7.5 (for terrestrial impacts). Buffer zones are discussed in Section 4.4.4</p>				Low

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future Proponent Management Plans	
Vegetation / habitat clearing	<p><i>Change to landscape character</i></p> <p>One of the main elements contributing to the landscape character of the James Price Point coastal area are the vegetation communities, parts of which will be altered or removed during construction of the BLNG Precinct. Given the current predominant natural character of the proposed site and surrounding area, this is expected to generate a considerable change in the local landscape.</p> <p>It is expected that potential landscape character and visual associated with clearing of terrestrial flora and vegetation can be minimised through measures such as the implementation of a management and monitoring strategy for vegetation of medium to high conservation significance and measures to limit the extent of areas to be cleared. A more detailed description of proposed mitigation measures is presented in Section 4.4.4.</p>				High

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4.5. Relevant Factor: Commercial Fishing

Unless otherwise indicated, this section is based largely on the Fishing Industry Impact Study (FIS) commissioned by the Department of Fisheries and undertaken by Big Island Research (2009). Information in the report is based on interviews with representatives of the commercial and recreational fishing community. Inevitably, information collected this way is qualitative and anecdotal. The report does not claim to be a scientific study and it makes clear that opinion is divided about whether the project would have a benign or detrimental impact on the fishing industry.

The Fishing Industry Impact Study can be found on the Department of Fisheries website at <http://www.fish.wa.gov.au/docs/op/index.php?0706>.

4.5.1. Current Knowledge

Commercial fishing is an important industry in the Broome/Dampier Peninsula region. A summary of key features of this sector in the study area is provided below. Recreational Fishing has been addressed at **Part 5, Section 4.8** while the features of the Aquaculture and Pearling sectors are detailed at **Part 5, Section 4.6**.

4.5.1.1. Managed Commercial Fisheries

A number of State and Commonwealth managed fisheries operate in the coastal inshore waters of the Kimberley (DoF, 2008b). Those fisheries that operate in the vicinity of the proposed BLNG Precinct, and relevant issues of concern identified by commercial fishers during the consultation phase of the FIS (Big Island Research, 2009), are presented in **Table 4.5-1**.

The Kimberley Region has a number of limited-entry trawl fisheries for prawns dominated by banana, tiger and endeavour prawns. In the west Kimberley region, the focus is on western king and coral prawns (KDC, 2006). Other significant fish species include Spanish mackerel, barramundi, threadfin salmon, shark and mud crabs.

The Kimberley region commercial fishery produced a total of 1,730 tonnes with a gross value of \$9.2M in 2008/09 (**Table 4.5-1**)

■ **Table 4.5-1 Key Commercial Fisheries Showing Production and Value.**

Fishery	Amount	Gross value (tonnes)
Mackerel	205	\$2m
Northern Demersal Scale Fish	1,000	\$5.5m
Kimberley Prawn	160	\$0.2m
Kimberley Gillnet and Barramundi	165	\$0.9
Beche de Mer	200	\$0.6
TOTAL	1730	\$9.2m

Source: DoF, 2009.

4.5.1.2. Other Commercial Fishing/Marine Interests

Specimen shell and marine aquarium fishers, who collect rare and interesting shell specimens primarily for private collections and small fish and other marine fauna for use in aquariums, report that the west coast of the Dampier Peninsula is an important place for their fisheries; with James Price Point identified as a regular place for these fishery operations. The plan area is described as “not major but important” in the FIS.

■ **Table 4.5-2 State and Commonwealth Managed Fisheries Operating in the Vicinity of the BLNG Precinct.**

Fishery	Licences/ operators	Key Features/Characteristics raised by licensees	Concerns raised by fishers relating to the BLNG Precinct
Broome prawn managed fishery (BPMF)	<ul style="list-style-type: none"> 5 Kimberley licences. None operate within the BLNG Precinct. 	<ul style="list-style-type: none"> none of the five Broome Prawn fishery licence holders are based in Broome or within the James Price Point coastal area; operate in a designated trawl zone due west of the James Price Point coastal area (labelled “the Box” by the prawn fishers); inshore boundary of ‘the Box’ is about 11 nautical miles from the coast adjacent to the Quondong/James Price Point area; fishers target western king prawns and coral prawns; the season is typically June, July and August; the catch and the value of the catch in the fishery has followed a declining trend over the four years 2002/03 to 2006/07 – annual value to fishers of about \$500,000 in 2007 with no significant return to fishers in the two years since 2007; no boats used the fishery in 2009 due to unsatisfactory economic conditions and a recent lack of availability of king prawns; prawn fishers note that the BPMF is a small but highly important part of their operations as, when prawns are available, it fills a space between other seasons; and use of the fishery is not expected to change significantly in the near future. 	<ul style="list-style-type: none"> traffic concerns associated with an increased risk of collision; need to retain the whole of the Box to retain viability of the fishery; possible direct disturbance to prawns from pipelines and/or a possible shift in species mix near pipelines; suspended sediments disturbing prawns – especially juveniles; and exacerbation of existing marine infrastructure pressures in Broome.
Kimberley gillnet and barramundi managed fishery	<ul style="list-style-type: none"> 7 Kimberley licences. 6 active. Only one currently operates in Broome area. 	<ul style="list-style-type: none"> extends from the WA/NT border to the top of Eighty Mile Beach; seven licences are available to access this fishery, although only six were active in 2007; estimated annual value of \$1.039m with 55 tonnes of Barramundi and 101 tonnes of threadfin salmon caught in 2008; many of the licensees in the Kimberley Gillnet and Barramundi Managed Fishery operate to the east of Cape Leveque; the Broome coast fishery holds two of the seven available licences and concentrates fishing effort in Roebuck Bay; currently there is only one operator who specialises in the Broome Coast portion of this fishery; target species are barramundi, giant threadfin salmon and clue threadfin salmon; and use of the fishery is not expected to change significantly in the near future. 	<ul style="list-style-type: none"> possible disruptions to patterns of threadfin behaviour due to the extensive jetty system, the breakwater, and the dredged channel to accommodate the LNG vessels at the Precinct; and disturbance from sediment plumes.

Fishery	Licences/ operators	Key Features/Characteristics raised by licensees	Concerns raised by fishers relating to the BLNG Precinct
Northern demersal scalefish managed fishery (NDSF)	<ul style="list-style-type: none"> 7 active licences. None operate within the BLNG Precinct. 	<ul style="list-style-type: none"> operates off the north-west coast of WA in waters east of longitude 120°E; estimated annual value of \$5.7M with 1010 tonnes caught in 2008; of the seven vessels operating in the fishery, four use the port of Broome for vessel unloading, berthing, refuelling, re-stocking and maintenance; to minimise conflict between commercial and recreational fishers, the inshore waters in the vicinity of Broome (including the Quondong-James Price Point area) are closed to NDSF fishing but Areas 1 and 2 are relatively close to the BLNG site; and use of the fishery is not expected to change significantly in the near future. 	<ul style="list-style-type: none"> cumulative effects of increasing levels of maritime activity associated with the development of gas reserves; increased risk of collision from marine traffic and associated damage to equipment; loss of available fishing space or currently productive fishing places may become off limits due to exclusion areas around oil and gas marine infrastructure; possible change to local habitats due to undersea structures; potential risk of damage to fishery due to pollution from an LNG facility as a result of leaks; exacerbation of existing resource sharing pressures with recreational fishers/rig tenders; and exacerbation of existing marine infrastructure pressures in Broome.
Mackerel managed fishery	<ul style="list-style-type: none"> 3 active vessels in the Kimberley zone. None within the BLNG Precinct. 	<ul style="list-style-type: none"> extends between Cape Leeuwin and the WA/NT border, with the largest catches taken off the Kimberley and Pilbara coasts; bulk of the catch (75%) comes from around Lacepede Islands; estimated catch for the Kimberley region of 194 tonnes in 2008; between May and September during the mackerel season the southeast winds dominate the weather limiting mackerel fisheries capacity to fish 'out wide' to the west of the Dampier Peninsula; good fishing grounds are located between 40 and 50 nautical miles west of Cape Bertholet but can only be accessed when weather permits; area around Talboy rocks about 13 nautical miles north west of JPP is useful in strong easterly winds; and use of the fishery is not expected to change significantly in the near future. 	<ul style="list-style-type: none"> loss of inshore passage/current navigation routes; physical disruption due to vessel movements and dredging activities; and potential for noise pollution to affect mackerel populations.

Source: Big Island Research, 2009

4.5.1.3. Statutory Requirements, Policy and Guidance

The following relevant legislation, policies and guidance are applicable to the management of commercial fishing:

Commonwealth

- *Fisheries Management Act 1991.*
- *Quarantine Act 1908.*

State

- *Fish Resources Management Act 1994.*
- Fish Resources Management Regulations 1995.
- *Fisheries Legislation Amendment Act 2010.*

4.5.1.4. Description of Factor

Commercial fishing out of Broome relates to managed fisheries for various catches (prawn, mackerel, Kimberley gillnet, barramundi, northern demersal scalefish) as well as chartered fishing trips and specimen shell and marine aquarium fisheries. Further information on each of these elements is presented in the Fishing Industry Impact Study which can be found on the Department of Fisheries website at <http://www.fish.wa.gov.au/docs/op/index.php?0706>.

4.5.2. Identification of Key Aspects

4.5.2.1. Definition of Relevant Aspect

Aspects associated with the development and operation of the BLNG Precinct and associated infrastructure that may have a social-economic impact in relation to commercial fishing were identified in the Scope of the Strategic Assessment and considered in the risk assessment to be of medium to high risk. These aspects include:

Key aspects of the construction and operation of the proposed BLNG precinct that may affect commercial fishing activities include:

- invasive marine species;
- light emissions – marine;
- use of infrastructure and services;
- commercial fishing – restricted areas;
- increased demand for labour;
- marine noise and vibration;
- marine discharges (including non routine events);
- sediment deposition and turbidity;
- site disturbance and excavation; and
- vessel movements.

Marine noise and vibration and site disturbance and excavation were considered at the scoping stage to pose a low risk to commercial fishing and consequently were not considered in detail.

4.5.3. Sources of Potential Impact

A range of coastal and nearshore port facilities would be constructed for the BLNG Precinct. These facilities are likely to include an export jetty facility, ship berthing pockets (with loading platforms, breasting and mooring dolphins), a breakwater (if required), and a Marine Facility including a marine offloading facility (MOF), vessel all-weather harbouring facilities (for tugs and support vessels) and other facilities to support marine port operations. Pipeline infrastructure within the marine and nearshore environment will include the feedstock gas pipelines and other ancillary pipelines.

Activities, facilities and infrastructure associated with the development and operation of the BLNG Precinct that may have the potential to result in the disturbance of known and unknown heritage sites within the BLNG Precinct footprint include:

- clearing;
- drilling;
- piling;
- earthworks; and
- dredging.

The primary pathway for IMS introduction is via vessels, either through contaminated ballast water discharge or biofouling on the vessel's hull and internal niche areas. Sources of impact include parasites, diseases and marine organisms. The construction and operation of the BLNG Precinct will utilise a range of vessel types sourced from within WA, interstate and internationally. The likely vessel types that will be required include barges, dredging and dredge spoil disposal vessels, LNG and condensate tankers, mobile offshore support units, pipe laying vessels, research vessels and other construction related vessels.

Different types of vessels provide different risks for the introduction of marine species. The least likely vessels to introduce marine species through movements between ports, according to the Western Australian Department of Fisheries (2009) are LNG tankers. This is because these vessels are well maintained and are routinely cleaned and anti-fouled. In addition to being good environmental practice, keeping LNG tankers as clean as possible will reduce fuel costs as fouling organisms can slow the vessel. When these vessels are in port, it is for a minimum period, further reducing the risk of transportation of marine species between ports.

4.5.3.1. Sensitivity and Resilience

Key findings from the Fisheries Impact Study identified that there is the potential for the BLNG Precinct to impact on commercial fishing due to reductions in levels of activity due to restrictions but also due to impacts on sensitive aspects such as local oceanographic currents, benthic habitats, patterns of pelagic fish movements and coastal freshwater hydrography. It was identified by the study that Roebuck Bay plays an important role in terms of driving the biological cycle resulting in high levels of marine biota found in the area.

4.5.4. Predicted Impacts

The following sections address specific impacts on the commercial fishing sector as identified through initial scoping and through consultation with industry representatives undertaken as part of the FIS.

Both direct and indirect impacts are considered within these sections. For the purpose of this assessment it is considered that direct impacts would largely be confined to areas of direct disturbance within the BLNG Precinct, and other locations where development activities are proposed to occur.

4.5.4.1. Potential Impacts on Commercial Fishing due to Invasive Marine Species

Increased shipping and vessel movements associated with the construction and operation of the proposed Precinct may increase the potential for introduction of IMS. IMS may be introduced into the marine environment by various sources including on the hulls of vessels and ballast water discharge from vessels associated with the BLNG Precinct. The introduction of IMS, whilst of low likelihood if controls are put in place, has the potential to result in economic impacts on aquaculture and the wider fishing industry in the Kimberley region.

If an outbreak of an invasive marine species were to occur, the commercial fishing industry could be affected by:

- a decline in commercial fish biomass (dependant on IMS species)
- reduced fishing efficiencies (dependant on IMS species) caused by:
 - an increase of target by-catch;
 - an increase in fouling of fishing gear; and
 - increased maintenance reducing performance and fishing efficiencies.
- reduced access to fishing areas, restricted in an attempt to limit the further spread of an IMS.

This issue was raised by commercial fishing operators in the Fishing Industry Impact Study as they believed that marine pests and disease could be brought to the area by international tankers (Big Island Research, 2009). However, the least likely vessels to introduce marine species through movements between ports, according to the Western Australian Department of Fisheries (2009) are LNG tankers.

The establishment of an IMS is very unlikely but the consequences could be significant, potentially leading to a loss of fishing productivity, exclusion from fishing areas or increased maintenance costs. Furthermore, such impacts would be virtually impossible to reverse, hence the risk of affecting commercial fishing in the area was determined to be 'medium' in the SoSA.

Further detail on impact assessment IMS and proposed mitigation measures is provided in **Part 3, Section 2.8** (Marine Ecosystem Integrity).

4.5.4.2. Potential Impacts on Commercial Fishing due to Light Emissions – Marine

As identified in **Part 5, Section 4.4** during operation of the Precinct, marine users, including commercial fishers would see light sources in the Precinct. Licensees did not raise this as an issue in the FIS.

Further detail on assessment and proposed mitigation measures to address visual amenity and light emissions is provided at **Part 5, Section 4.4** (Visual Amenity and Landscape Character).

4.5.4.3. Potential Impacts on Commercial Fishing due to Restricted Areas

Project scoping identified that the construction and operation of the Precinct may restrict the existing access of commercial fishing activities in and around James Price Point.

Representatives of the mackerel managed fishery reported concerns of a potential loss of access to current navigation routes between Broome and their fishing grounds. These impacts are unlikely however, as vessel movement restrictions would be limited to the port area in close proximity to the coastline. There may with some localised temporary movement restrictions during construction of marine infrastructure such as stretches of pipelines but these are not likely to inhibit movement to and from mackerel fishing grounds.

The specimen shell and marine aquarium fisheries also reported an ongoing general concern with a loss of access to productive beaches, littoral, and adjacent shallow seas. However, as identified above, James Price Point is not critical to the collection activities of this group.

This issue was raised by commercial fishing operators in the Fishing Industry Impact Study as they believed that there could be prawn fishing viability if access to productive fishing grounds in 'the box', within which the BPF is permitted, is limited or other restrictions placed on operations (Big Island Research, 2009). Long term access restrictions to 'the Box' affecting commercial viability are unlikely as the area is a significant distance westwards of the port area, outside of the 3mn boundary and therefore outside of the extent of assessment for the BLNG Precinct. Short term localised access restrictions may be possible within 'the Box' during pipeline construction and dredging activities.

4.5.4.4. Potential Impacts on Commercial Fishing due to Marine Noise and Vibration

A detailed description of Precinct development activities is provided in **Part 2**. In summary, potential sources of marine noise and vibration associated with the Precinct include:

- vessels (engines and propellers);
- drilling;
- blasting;
- piling activities;
- dredging;
- pipeline installation;
- breakwater construction; and
- aircraft movements.

According to the Broome prawn fishers, the passage of large vessels has the potential to impact the behaviour of prawns. The impact of vessel noise and large propeller turbulence on prawn distribution is unknown.

Commercial fishing operators in the Fishing Industry Impact Study believed that marine noise caused by seismic testing would disturb fish behaviour and make fish harder to catch (Big Island Research, 2009). Seismic programs would be typically associated with upstream developments which are not assessed as part of the BLNG Precinct. The need for large scale seismic programs for the BLNG Precinct is unlikely. Impacts on fish as a result of seismic programs were investigated as part of the Maxima and Gigas seismic programs undertaken by Woodside (SKM 2009d). The study, undertaken using a collaboration of industry, university and government expertise at Scott Reef off the Kimberley coastline, concluded that fish exhibit a temporary, non-lethal startle response before acclimatising to the seismic testing. It is envisaged similar impacts would be experienced by commercial fish species.

Further detail on assessment of potential noise impacts on fish is provided in **Part 3, Section 2.5** (Fish).

4.5.4.5. Potential Impacts on Commercial Fishing due to Marine Discharges (Including Non-Routine Events)

Marine discharges would occur during both construction and operation of the Precinct. Planned discharges will be designed to comply with acceptable limits and regulated under licence conditions and conditions applied to proponents of derived proposals. Non-routine (for example accidental spills or leaks) from the Precinct facilities and/or associated vessels will be subject to oil spill management procedures. Potentially catastrophic events such as collisions or a rupture of an LNG/condensate tanker or failure of a production pipeline leading to the rapid release of a large volume of LNG or condensate will be subject to emergency response plans to control the extent of contamination of the environment with requirements for safety.

Further detail on assessment and proposed management measures for marine discharges is provided in **Part 3, Section 2.3** (Marine Water Quality).

4.5.4.6. Potential Impacts on Commercial Fishing due to Sediment Deposition and Turbidity

Project scoping identified that dredging during construction and ongoing maintenance may potentially increase sedimentation which may potentially disturb local commercial fishing activities.

This concern was also identified by commercial fishers with prawn fishers expressing concerns that suspended sediments may disturb prawns, especially juveniles, potentially altering the species mix of the local area. Representatives from the mackerel managed fishery also suggest that fish may be “turned off” by sediment plumes from dredging activities leading to a reduced catch near areas of disturbance.

The environmental issue that was of greatest concern to the fishers interviewed was the dredging that will be necessary for port construction and tanker access. Given the lack of oceanographic and engineering detail, fishers were worried that the large scale of dredging that would be necessary would harm the marine environment of the Quondong-James Price Point coastal area, particularly marine habitats and result in possible disruptions to existing species patterns/behaviour (Big Island Research, 2009). The dredge plume associated with the capital dredging works would be

dynamic and temporary in nature. **Part 3, Section 2.5 (Fish)** **Part 3, Section 2.3 (Marine Water Quality)** and provides detailed discussions on the likely extent of dredging impacts and on sediment deposition and turbidity impacts on fish populations.

4.5.4.7. Potential Impacts on Commercial Fishing due to Site Disturbance and Excavation and Physical Presence

Several of the Broome prawn fishers expressed concern development of the could make the local fishery non-viable due to general disturbances and disruptions that might result in less prawn recruitment, as well as the safety issues of dealing with a fishery on a major tanker route. Tanker issues are addressed in vessel movements in **Section 4.5.4.8**.

The DoF has advised that the prawn resource is spread much more widely than the small “box” within which fishing is permitted. If recruitment of new prawns is taking place over a wide area, in part from the south as well as the north, the construction and presence of pipelines and other infrastructure associated with the proposed Precinct may have a less significant impact on the prawn population than imagined by the prawn fishers (Big Island Research, 2009).

The feedstock pipeline will be installed through a portion of the Box, outside of the 3nm boundary. Potential impacts from the presence of this permanent infrastructure are:

- creation of artificial habitat and modification of existing habitat
- localised disturbance to current and hydrodynamic processes, and
- interference with and exclusion of pearling vessels.

The three active mackerel fishers interviewed were also concerned about physical disruption as a result of the proposed Precinct construction and ongoing operation with concerns raised that the movements of large ships, dredging, pipe laying, ship anchoring and similar impacts would have a negative effect on the mackerel fishery around the Lacepede Islands. In addition, stakeholders also outlined concerns that changes to local benthic habitat and species composition could occur as a result of the presence of submarine infrastructure such as pipelines.

Further discussion of mitigations and controls for physical presence of infrastructure on fish species is provided in **Part 3, Section 2.5 (Fish)**.

Table 4.9-1 summarises the predicted impacts and mitigation measures to be undertaken in relation to aspects or activities that may have an impact upon commercial fishing.

4.5.4.8. Potential Impacts on Commercial Fishing due to Vessel Movements

As identified in **Part 5, Section 4.8 (Sport, Recreation and Land Use (including Recreational Fishing))** the majority of fishers consulted felt that the increased vessel traffic associated with the Precinct would cause navigation challenges and that past experience had suggested that oil and gas vessel operators tended to be unsympathetic to local traffic.

During construction, impacts associated with vessel movements are likely to be concentrated in the vicinity of the port area (where commercial fishing does not typically occur) and pipeline corridors.

During operations, vessel movements will be largely associated with the access channel and port area. This may result in short term impacts on commercial fishing vessel movements in the vicinity of LNG, LPG and condensate tankers. These are likely to occur in ‘the Box’ outside of the 3nm boundary for this assessment. LPG, LNG and condensate tanker movements in the vicinity of the Box are likely to up to three per day and are therefore not likely to result in frequent impacts. Vessel movements associated with the Precinct are not likely to occur in the vicinity of the Lacepede Islands where mackerel fishing is known to occur (see reference in **Section 4.5.4.7**).

Stakeholders also envisaged particular issues identified by certain sectors. For example:

- vessels such as prawn trawlers ‘with their gear down’ will have limited manoeuvrability, as would large LNG tankers
- prawn fishers work during the night and with only a limited time to generate their catch (10 hours); if a trawl shot is interrupted for reasons such as vessel or pipeline avoidance, their capacity to catch would be significantly affected.

Further discussion of mitigations and controls for vessel movements in the marine environment is provided in **Part 3, Section 2**.

4.5.4.9. Mitigation and Management Measures

The Strategic Social Impact Management Plan is presented in **Part 5, Section 5** which outlines the management framework for the BLNG Precinct in order to mitigate any potential social-economic impacts and should be referred to for further detail. As some of the social-economic impacts are indirect, environmental management plans will also be relevant in terms of mitigating social impacts and these are presented in detail within each of the relevant environmental sections.

The relevant State Government measures comprise:

- Establish the Broome Port Authority as the statutory Port Authority for the BLNG Precinct, and an associated port area.
- The Port Authority will prepare a BLNG Precinct Environmental Management Plan (BPEMP) for the port area.
- Prepare and implement an Engagement Plan to manage all interactions with public users of the marine and terrestrial environment in and around James Precinct Point, including recreational users and tourism operators

Key management plans (discussed in further detail in **Part 5, Section 5**) include:

- Management of Marine Resource Use Impacts.

Additional relevant mitigation measures are identified below:

- Preparation and implementation of a Port Facilities Construction Environmental Management Plan (PFCEMP).
- Invasive Marine Species will be managed in accordance with International, Commonwealth and State legislation, which will be outlined in an Invasive Marine Species Management Plan (IMSMP). The IMSMP would be developed in consultation with the Australian Quarantine Inspection Service (AQIS) and will be applied to vessels, barges and immovable equipment that plan to enter or operate within the precinct and will be conducted in a manner that is consistent with relevant conventions and associated guidance, including, but not limited to:
 - International Maritime Organisations (IMO) – ‘International Convention for the Control and Management of Ships’ Ballast Water and Sediments’.
 - Convention on Biological Diversity - specifically identifies the need to “control or eradicate those alien species which threaten ecosystems, habitats or species”.
 - United Nations Convention of the ‘Law of the Sea’ - specifically protection and preservation of the marine environment.
 - ANZECC/ARMCANZ Code of Practice for Antifouling and In-water Cleaning and Maintenance.
 - Voluntary Biofouling Management Guidance Documents.
- Preparation and implementation of a Hydrocarbon and Chemical Spill Contingency Plan.
- All vessels will be required to have a SOPEP.
- Preparation and implementation of a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts.
- Preparation and implementation of a Marine Wastewater Discharge Management Plan (MWDMP), to ensure that disposal of treated wastewater from operation of the BLNG Precinct facilities is undertaken and managed in a way that minimises the environmental impacts and is consistent with the local water quality environmental values.
- Preparation and implementation of a Vessel Management Plan (VMP).

Refer also to **Part 5, Section 4.6.7** for a commitment to implement a fishing industry mitigation and management strategy, with commercial and recreational fishing stakeholders.

Potential impacts resulting from increased lighting at the site can be minimised by the careful placement and direction of lighting used, in accordance with relevant Australian Standards. Further detail on proposed management measures to address visual amenity and light emissions is provided in **Part 5, Section 4.4** Visual Amenity, Light and Landscape. Character A defined buffer zone will be established to maintain suitable separation distances between the LNG Precinct and users of the broader coastal area.

4.5.5. Socio-economic Outcome of Category A Activities

Effects of the development of the BLNG Precinct on commercial fishing are uncertain. Ongoing monitoring of catch rates will be important to assist in identifying any impacts on commercial fishing. However, based on currently available information the activities of commercial fishers are unlikely to be significantly affected over the long term.

4.5.6. Cumulative Impacts of the Proposal and Associated Activities and Projects

The construction and operation of a minimum of two LNG projects within the Precinct has the potential to increase pressure on marine infrastructure e.g. Broome Port and services that may have flow-on effects for commercial fishing activities, and increased competition for labour in the region.

In common with the recreational fishers interviewed, the commercial fishing groups have reported existing infrastructure problems, including wharfage in Broome, suggesting that this will be exacerbated by the implementation of the Plan (Big Island Research, 2009).

The BLNG Precinct Infrastructure Assessment Study (AECOM, 2010d; **Appendix D-6**) has identified that the Broome port, including planned upgrades and expansion, should adequately handle the anticipated increase in vessel traffic as a result of the Precinct's operation and construction activities. A net effect of the Plan may be a substantial improvement in the marine and boating infrastructure in Broome.

As identified in other sections of this assessment of socio-economic factors, the construction and operation of a minimum of two LNG projects within the BLNG Precinct is likely to result in increased competition for labour in the region that may lead to wage increases for other industries, like commercial fishing.

This issue was identified by the aquaculture sector, during the FIS (Big Island Research, 2009), with concerns raised that pearling staff will be attracted to the higher wages associated with employment at the Precinct and elsewhere. **Part 5, Section 2** assesses this potential impact and provides mitigation measures.

■ **Table 4.5-3 Impact Assessment Summary of impacts table for Commercial Fishing.**

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
Invasive Marine species	Invasive marine species (IMS) could be brought into the area by construction and operation vessels. If IMS establish then they could result in a loss of commercial fish biomass.	Establish the Broome Port Authority as the statutory Port Authority for the BLNG Precinct, and an associated port area.	Proponents of derived proposals shall prepare and implement an Invasive Marine Species Management Plan (IMSMP), to the satisfaction of the Western Australian Minister for Environment, to minimise the risk of introducing invasive marine species (IMS) to Australian waters during the life of the activity. The plan shall be developed in consultation with the AQIS and will be applied to vessels; barges and immersible equipment that plan to enter and operate within the Precinct. Prior to commencement of dredging, proponents of derived proposals shall prepare and implement a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and	Prepare and implement a Construction Environmental Management Plan. Preparation and implementation of a Port Facilities Construction Environmental Management Plan (PFCEMP).	Very Low
Light Emissions Marine	The precinct as a light source will be visible with the potential impacts on marine activity.	The Port Authority will prepare a BLNG Precinct Environmental Management Plan (BPEMP) for the port area.		Prepare and implement a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts.	Very Low
Restricted Areas	Potential loss of current fishing grounds.			Prepare and implement an Invasive Marine Species Management Plan (IMSMP)	Low
Marine noise and vibration	Potential disturbance of marine biota as a result of underwater noise and vibration resulting from construction and operation activities.			All vessels will be required to have a Ship-Board Oil Pollution Emergency Plan (SOPEP).	Very Low
Marine Discharges (including non-routine events)	Potential impacts associated with discharges from site as well as from vessels resulting in impacts on marine biota.			Preparation and implementation of a Marine Wastewater Discharge Management Plan (MWDMP), to ensure that disposal of treated wastewater from operation of the BLNG Precinct facilities is undertaken and managed in a way that minimises the environmental impacts and is consistent with the local water quality environmental values.	Very Low
Sediment deposition and turbidity	dredging during construction and ongoing maintenance may potentially increase sedimentation which may potentially disturb local commercial fishing activities			Preparation and implementation of a Vessel Management Plan (VMP).	Low
Physical presence	Potential impact of loss of fishing grounds due to permanent physical presence of precinct.				Low
Vessel Movements	Increases in vessel traffic as a result of construction and operational activities at the Precinct.				Low

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
			<p>technologies to minimise potential dredging impacts. The Plan shall include:</p> <ul style="list-style-type: none"> • Consideration of the re-use of suitable dredge material for MOF construction, where practicable. • Design of the MOF including construction of bunds to isolate fill material from wind and wave action. • Consideration of applicability of management techniques and technology in meeting location specific WQ environmental values and environmental quality objectives. • Consideration of the re-use of reclaimed material to minimise ocean disposal. • Measures to minimise dredging 		

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
			<p>impacts during sensitive ecological windows.</p> <ul style="list-style-type: none"> • A monitoring strategy for ecological receptors and health during marine construction (including baseline surveys). • The development of trigger levels for benthic communities and water quality that define additional management responses. • Mechanisms to audit and assess environmental performance of proponent during construction. • A communications strategy to inform other local marine users of times of peak construction activity that may influence non- 		

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
			<p>construction related activities within the area.</p> <p>The DSDMP will be subject to assessment under the <i>Environment Protection (Sea Dumping) Act 1981</i> (Cwth), including appropriate stakeholder consultation.</p>		

4.6. Relevant Factor: Aquaculture and Pearling

The following information is provided to form a basis for understanding the potential impacts from the BLNG Precinct that could affect the aquaculture and pearling industries in the region. The section also identifies controls to be implemented to mitigate these impacts.

Unless otherwise indicated, this section is based on the FIS undertaken by Big Island Research (2009). Information in the report is based on interviews with representatives of the commercial and recreational fishing community. Information collected this way is generally qualitative and anecdotal and should be viewed as representing the opinions of the interviewees, which may reflect personal perspectives, and as advice to the State, not the State's views or advice. The FIS does not purport to be a scientific study, and it makes clear that opinion is divided about the effect the BLNG Precinct would have on the pearling and aquaculture industries.

The Fishing Industry Impact Study can be found on the Department of Fisheries website at <http://www.fish.wa.gov.au/docs/op/index.php?0706>.

The information gathered by the FIS is used to understand stakeholder perceptions of impacts of the BLNG Precinct on the Pearling and Aquaculture industry. Further literature reviews and modelling was undertaken to assess the validity of these perceptions, and the results are discussed in this section.

4.6.1. Current Knowledge

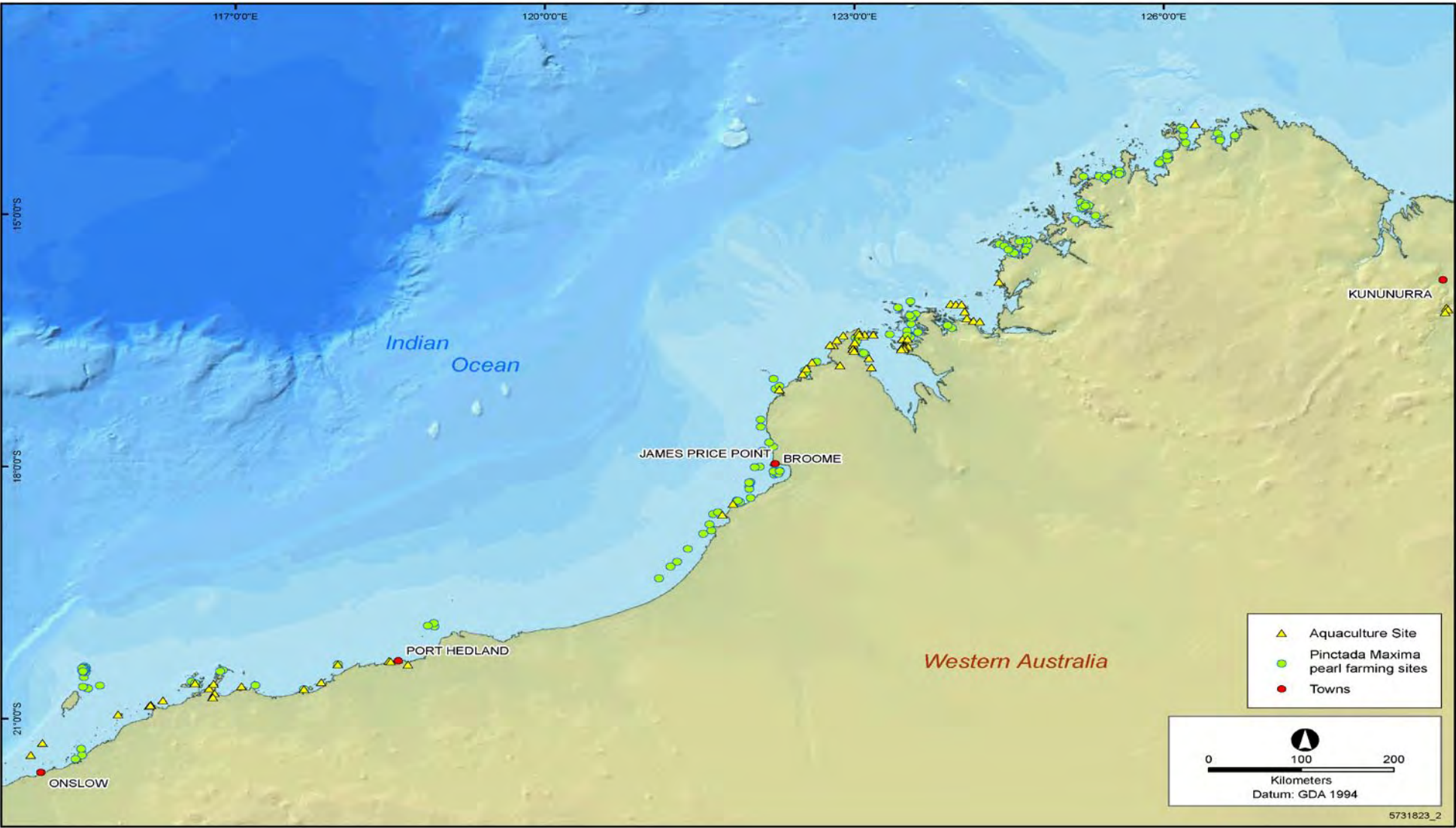
Within the North West Marine bioregion there are a number of areas where aquaculture and pearling take place. **Figure 4.6-1** and **Figure 4.6-2** show regional locations and zones.

Nine companies operate pearl farm leases between Gourdon Bay (approximately 111 km south of James Price Point) south of Broome and Pender Bay (approximately 103km north east of James Price Point) near the northern end of Dampier Peninsula, with all companies having multiple sites as shown in **Figure 4.6-3**.

The closest pearl farm to the James Price Point coastal area is owned by Clipper Holdings Pty Ltd (Clipper Pearls) (Big Island Research, 2009). The northern boundary of the Clipper Pearls farm is approximately 4km west of James Price Point and extends 15.7km to the south, extending past Quondong Point shown in **Figure 4.6-3**. Clipper Pearls are said to produce approximately 17 percent of the total value of production of pearls in Western Australia. Clipper Holdings has 17 wild stock quotas and 20 hatchery quotas operating in the Pearl Oyster Zones 2 and 3 under the Pearling Action 1990. Additional pearling leases in the James Price Point coastal area are operated by the Paspaley Pearling Company, with one lease area located approximately 30km north west, and another lease approximately 18km north west of James Price Point. The Australian South Sea Pearling Company have a pearl farm lease located approximately 21km south of James Price Point, with the southern boundary located approximately 1km north of Willie Creek. There are also a number of smaller pearling leases located within Roebuck Bay and to the south west of Broome which are operated by various companies as shown in **Figure 4.6-3**.

Although there is a limited pearling and aquaculture presence in the Precinct area, the broader Kimberley Region has been identified as having significant potential for further aquaculture development of species in addition to pearl oysters. Numerous sites in the broader Kimberley Region are considered suitable for the culture of finfish and shellfish species in marine, brackish water and fresh water environments (Big Island Research, 2009).

The overarching objective associated with the management of impacts to the Western Australian Pearling Industry is “to conserve the pearling resource, maintain and protect the marine environment in which pearl farming is carried out, and maximise the net economic, social and other benefits from pearling activities to the Western Australian community and pearling industry” (Pearling Act 1990).



■ Figure 4.6-1 Licensed Aquaculture and Pearl Farming and Holding Sites of the North West Marine Bioregion.

This assessment of pearling and aquaculture has focussed on the key receptor that is outlined in Table 4.6-1.

■ **Table 4.6-1 Key Pearling and Aquaculture receptor considered in the Impact Assessment.**

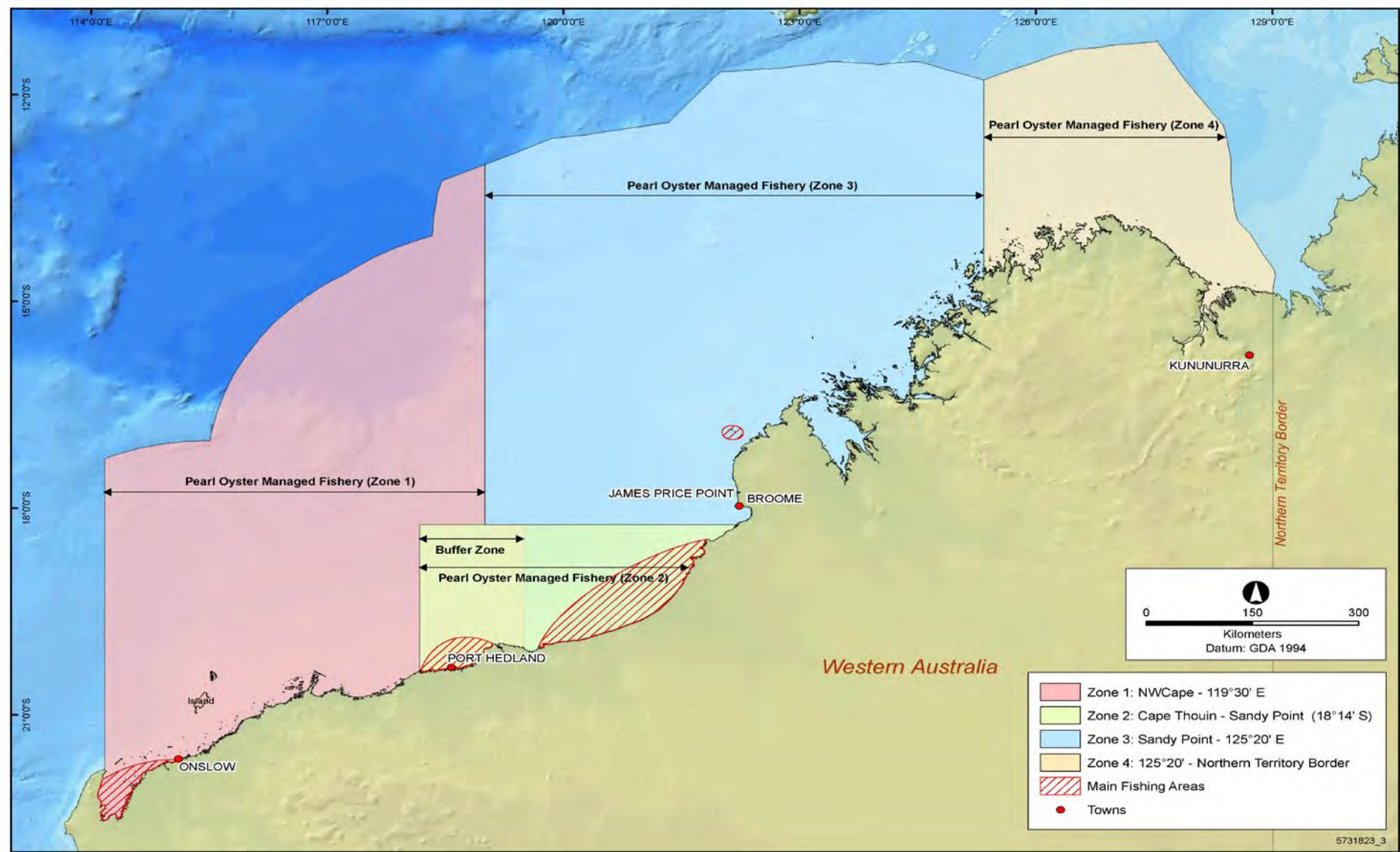
Key Receptor	Rationale for Selection as a key receptor
Existing and proposed pearling leases	Existing and proposed pearling leases which occur in the vicinity of James Price Point, may be sensitive to changes in the marine environment resulting from the development of the BLNG Precinct

4.6.1.1. Key Statutory Requirements, Environmental Policy and Guidance

The following Legislative Acts and Policy Guidelines are associated with the governance of the Western Australian pearling and aquaculture industry.

State Legislation

- **Pearling Act 1990:** This Act governs the commercial use of the silver-lip pearl oyster *Pinctada maxima* in Western Australia. The main objectives of the Act are to conserve the pearling resource (*P. maxima*), maintain and protect the marine environment in which pearl farming is carried out, and maximise the net economic, social and other benefits from pearling activities to the Western Australian community and pearling industry. The industry is demarcated by a number of zones for the collection of wild shell, according to the distribution of the wild shell 'beds' (Figure 4.6-2).
- **Pearling Regulations 1991:** Supports the **Pearling Act 1990** by providing the framework for the management of administrative and technical matters.
- **Fish Resource Management Act 1994 (FRMA):** the FRMA provides the legal framework for managing commercial and recreational fisheries and the aquaculture industry in WA.
- **Fish Resource Management Regulations 1995 (FRMR):** the FRMR provides the technical details for managing commercial and recreational fisheries and the aquaculture industry in WA.
- **Ministerial Policy Guideline No.17:** *The Pearling Act (1990)* provides for the Minister for Fisheries to issue a policy statement giving guidelines on significant matters which may affect farm leases, licences and permits. The purpose of the policy statement *Pearl Oyster Fishery Guidance* is to provide information for the Western Australian pearling industry and guidance for the Executive Director in the administration of the Act. The guideline details the general outcomes to be achieved and the basic rules of management for the fishery, and
- **Ministerial Policy Guideline No.8:** The guideline, *Assessment of applications for authorisations for Aquaculture and Pearling in coastal waters of Western Australia*, outlines the requirements around applying for pearling leases and marine aquaculture licence sites by detailing the provision of required information to interested parties, and the timing of the application process.



4.6.2. Description of Factor

4.6.2.1. Pearling and Aquaculture

The pearling and aquaculture industry is a significant contributor to the Western Australian economy, and also serves as an attraction for tourists to the area. Visitors to Broome are able to tour pearl farms such as Willie Creek, located 32km south of James Price Point, as well as to browse many showrooms of pearl displays and jewellery, and visit the local museum which contains many records of the pearling days predating from before the 20th Century.

The aquaculture industry employs Indigenous people along the Kimberley coast, including small remote coastal communities on the Dampier Peninsula and Buccaneer Archipelago. These communities are suitably located with access to quality water and land resources for aquaculture use (KDC, 2006).

The Kimberley Aquaculture Corporation (KAC), DoF and Kimberley College of TAFE are working together to provide business and training opportunities for people to work in the aquaculture industry. Hatcheries have been established at One Arm Point (Dampier Peninsula), Broome, Kununurra, Derby, Fitzroy Crossing and the Buccaneer Archipelago.

The species of oyster utilised in the pearling industry is *Pinctada maxima*, commonly known as the silver-lip pearl oyster. *P. maxima* is a relatively large and fast growing bivalve, generally growing large enough for commercial use within 2 years, which inhabits a variety of substrates, from mud, sand, gravel, sponge and seagrass beds between the intertidal zone to deepwater reefs (Southgate and Lucas, 2008). The habitats in which *P. maxima* is most abundant are generally characterised by substantial amounts of terrigenous sediments combined with high nutrient inputs and productivity levels. Adult *P. maxima* are known to release their hold on substrata by releasing their byssal threads, and become free living on the substratum (Yukihira *et al.*, 1999), however they are effectively sessile as they are large heavy and not capable of significant locomotion.

4.6.2.2. Pearl Cultivation

To cultivate a pearl, the pearl oyster is implanted with a specialised shell nucleus and suspended in panels that are attached to 'longlines'. The oyster panels are attached to the longlines at regular intervals. As the pearl oysters grow, they coat the nucleus with nacre, which would hopefully develop into a round pearl over a long period of time (usually two years). Pearl oysters are individually cleaned of fouling material routinely, with the period between cleaning varying between two and six weeks depending on season and location.

Pearl oysters are filter-feeders and the surrounding seawater provides all their nutritional and physiological needs. The pearl farmers try to mimic the natural condition and feeding state as much as possible for optimal growth and having a saleable product in the least time.

Each pearl farm operation (with the majority being sea-based) consists of collection infrastructure for the wild oysters, seeding facilities, cleaning vessels, accommodation facilities and the longline systems, where the seeded and non-seeded pearl oysters are held. Some pearl farming companies incorporate hatchery facilities for the production of spat for grow out to seedable shell.

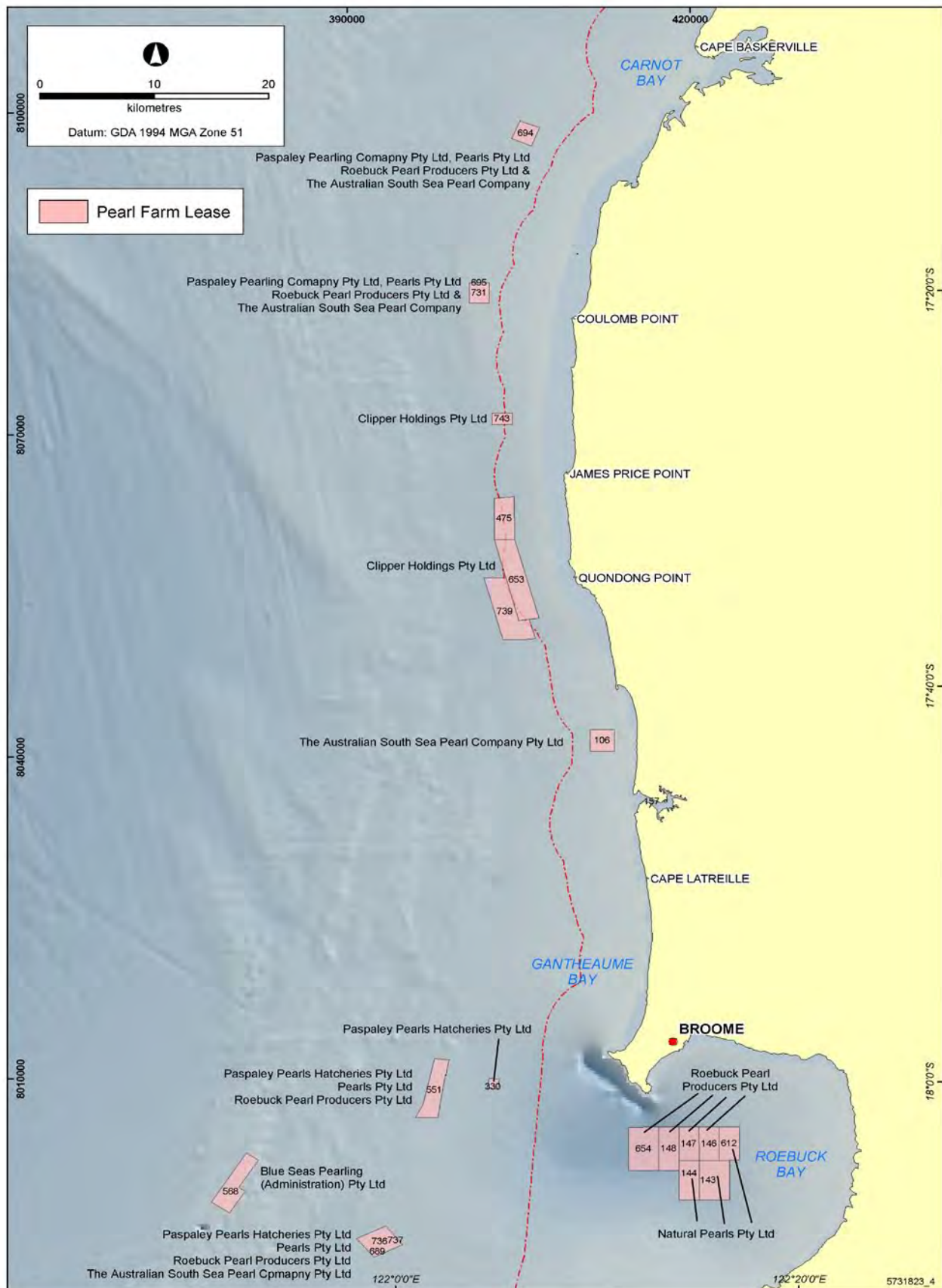
4.6.2.3. Commercial Status Overview

The value of the entire pearl oyster fishery including the value of cultured pearls and relevant by-products was estimated to be approximately \$113 million in 2007 (DoF, 2008b). The FIS reports that a significant proportion of the operations of this industry segment are based in the west Kimberley region.

The pearl oyster stocks underpinning the fishery in Zone 2/3 continues to provide a sufficient level of production to support this major Western Australian industry. However, preliminary research points to rainfall associated with cyclonic activity as being an external driver of the current high levels of abundance. High levels of pearl stocks in the market can reduce the value of the pearl product. There are also two external factors that provide a potential threat to the future commercial viability of the industry. First, in October 2008, the Global Financial Crisis effectively halted the world trade in pearls and the pearling industry faces substantial economic hardship in 2009/10. As a result, wild stock harvest was likely to have been reduced in 2009. There appears to be a general trend of consolidation of pearling interests to introduce greater economies of operation (Big Island Research, 2009); any such consolidation is likely to have a further depressing effect on the pearl industry.

The development of the BLNG Precinct may exacerbate this trend by adding to local pressures, such as access to good farm lease sites, access to wharfage in Broome and elsewhere, access to suitable labour, and the capacity to retain quality and experienced personnel (Big Island Research, 2009).

Secondly, with or without the BLNG Precinct, the on-going issues of the oyster oedema disease (OOD) would continue to undermine hatchery-production capacity in some sectors of the industry. However, to date, the disease does not appear to have affected wild stocks or any other marine organisms (DoF, 2009).



■ **Figure 4.6-3 Pearling Leases off the Southern West Coast of the Dampier Peninsula.**

Aquaculture

The aquaculture industry in the North West Marine Bioregion consists of four types of operations:

- non-maxima pearl oyster licence holders (for culture of black lip pearl oysters, *Pinctada margaritifera* and Wing Shell, *Pteria penguin*). These farms are significantly smaller operations than commercial *P. maxima* farms generally due to reduced investment and difficulties accessing spat for grow out. Many licence holders are inactive yet hold onto licence areas for future opportunities
- finfish cage farming on an industrial scale as is the case with Marine Produce Australia operating in Cone Bay. This is the most significant finfish aquaculture operation in the region is the Marine Produce Australia Ltd salt-water barramundi farm at Cone Bay, approximately 370 km from James Price Point in the Buccaneer Archipelago. Marine Produce Australia Ltd is licensed to produce 1000 tonnes of barramundi per year. This form of aquaculture is set to develop further as demand for Australian saltwater barramundi and economic conditions improve
- ornamental fish and invertebrate production for the aquarium trade. This is a relatively small, intense production industry with a high value per unit produced, and
- aboriginal Aquaculture Corporations hold several aquaculture licences in the Kimberley. They are generally similar and are endorsed for many species including non maxima pearl oysters, trochus, finfish and ornamental species. Active operations continue at the Kimberley Aboriginal Aquaculture Corporation facility in Broome and at Ardyaloon Hatchery at One Arm Point, approximately 154 kilometres north-east of James Price Point. Potential exists for increases in productivity at these sites. In the late 1990s through to early 2000s, hatchery production of trochus juveniles for reef reseeding was the focus of a Department of Fisheries project with the goal of laying the foundation for community-based trochus shell ranching and harvest industry.

As none of these operations occur within close proximity to the James Price Point coastal area, they will not be further discussed in the impact assessment.

4.6.3. Identification of Key Aspects

Aspects associated with the development and operation of the BLNG Precinct and associated infrastructure that may have an impact on the pearling and aquaculture industries were identified in the Scope of the Strategic Assessment. These aspects include:

- vessel movements;
- invasive marine species;
- light emissions – marine;
- marine discharges (including non routine events);
- sediment deposition and turbidity;
- marine noise and vibration; and
- marine site disturbance and excavation.

Of these, the most relevant aspects considered in detail in this assessment are marine site disturbance and excavation, sediment deposition and turbidity, physical presence and introduced marine species. Other aspects considered to pose a low risk to aquaculture are not addressed in detail in the impact assessment.

4.6.3.1. Sources of Potential Impact

Marine Site Disturbance and Excavation

The construction of the BLNG Precinct marine infrastructure will require dredging, dredge spoil disposal, drilling and coring of boreholes, positioning of jack-up barges and other marine activities (e.g. piling). These activities are associated with the dredging of the approach channel and turning basin, LNG export jetty installation, breakwater construction and pipeline trenching.

Sediment Deposition and Turbidity

Sources of impact from sediment deposition and turbidity will include dredging, offshore dredge spoil disposal, pipeline installation, pipeline trenching, reclamation, propeller wash, vessel anchoring and export jetty construction. The construction of the BLNG Precinct will require a capital dredging (and subsequent maintenance dredging) and dredge spoil disposal program to develop the shipping channel, turning basin(s) and berth pockets. The dredging and disposal of

dredge spoil would result in increased sediment deposition and turbidity within the area around the marine construction activities. The spatial extent of the predicted area of impact is limited to the direct footprint of the BLNG Precinct Port area, dredge spoil disposal grounds and the surrounding sediment plume. In the absence of detailed project designs, the dredging techniques and associated equipment required cannot be certain but is expected to include a combination of Trailer Suction Hopper Dredgers (TSHD), Cutter Suction Dredgers (CSD), Mechanical Dredgers (backhoes dredge, grab dredge) and jack up drill and blast barge vessel. Dredging activities will result in both fine and coarse sediments being suspended within the water column. Typically, the coarse material in the dredge plume will settle out on the seabed in close proximity (within 500 m) of the active dredge and at the dredge spoil disposal site (Mscience, 2008). Fine particles with slow settling velocities, particularly those < 75 µm, will remain in suspension for longer time periods and will tend to be transported over greater distances, even in relatively calm conditions. The extent and behaviour of the sediment plume will be determined via sediment dispersion modelling. For more detail on the sediment dispersion modelling process and the extent of the area of predicted impact, refer to the *BLNG Precinct Dredging and Spoil Disposal Assessment technical appendix (Appendix C-13)*.

Physical Presence of Marine Infrastructure

A range of coastal and nearshore port facilities will be constructed for the BLNG Precinct. These facilities are likely to include an export jetty facility, ship berthing pockets (with loading platforms, breasting and mooring dolphins), a breakwater (if required), and a Marine Facility including a marine offloading facility (MOF), vessel all-weather harbouring facilities (for tugs and support vessels) and other facilities to support marine port operations. Pipeline infrastructure within the marine and nearshore environment will include the feedstock gas pipelines and other ancillary pipelines.

Invasive Marine Species

The primary pathway for IMS introduction is via vessels, either through contaminated ballast water discharge or biofouling on the vessel's hull and internal niche areas. Sources of impact include parasites, diseases and marine organisms. The construction and operation of the BLNG Precinct will utilise a range of vessel types sourced from within WA, interstate and internationally. The likely vessel types that will be required include barges, dredging and dredge spoil disposal vessels, LNG and condensate tankers, mobile offshore support units, pipe laying vessels, research vessels and other construction related vessels.

Different types of vessels provide different risks for the introduction of marine species. The least likely vessels to introduce marine species through movements between ports, according to the Western Australian Department of Fisheries (Wells *et al.* 2009) are LNG tankers. This is because these vessels are well maintained and are routinely cleaned and anti-fouled. In addition to being good environmental practice, keeping LNG tankers as clean as possible will reduce fuel costs as fouling organisms can slow the vessel. When these vessels are in port, it is for a minimum period, further reducing the risk of transportation of marine species between ports.

It is estimated that there are approximately 200 introduced marine species recorded in Australian waters (Hewitt, 2000) of which 60 species are considered to have been introduced into Western Australian waters (Huisman *et al.* 2009; Wells *et al.* 2009). The majority of these species (37 in total) are temperate, occurring south of Geraldton, with 12 species recorded in Port Hedland and only three species (*Amphibalanus amphitrite*, *Megabalanus tintinnabulum* and *Megabalanus ajax*), recorded in the Port of Broome (Huisman *et al.* 2009; Wells *et al.* 2009). None of the recorded introduced species within the north-west region of Western Australia are included as species of concern on the Revised Consultative Committee for Introduced Marine Pest Emergencies (CCIMPE) Trigger List. Therefore, there are no known introduced species within the north-west of Western Australia that are considered as IMS of national concern.

4.6.3.2. Sensitivity and Resilience

Several assessments of risk within or to the Pearl Oyster culture industry have been undertaken recently. Wells & Jernakoff (2006) predates the proposed development at James Price Point, however there are many similar themes to later assessments conducted in 2009 (Econsearch, 2009; **Appendix D-4**) an economic impact study, and the Fishing Industry Impact Study (Big Island Research, 2009). Pearl farmers are primarily concerned with risks associated with pearl farming business in two areas – biological issues and human/management issues.

There are numerous environmental conditions that impact the marine environment, however, to design and monitor a program to measure these multifactorial parameters and also to set thresholds and related triggers is an extremely difficult task in the dynamic marine environment (ANZECC & ARMCANZ 2000).

A number of environmental factors play a predominant role in determining the colour and lustre of the pearl nacre which consequentially affects pearl value. Water depth is one of the most important factors, as quality pearls tend to be produced in waters below 10 m. Fouling and shell boring problems and siltation are considerably less at depths of 10 m or more.

The pearl culture grounds also play a significant role in determining pearl quality, and repeated culture on the same ground has been shown to negatively affect the quality of pearls (Southgate and Lucas, 2008). However, this may depend on location and associated hydrographic and geomorphological processes.

Marine Site Disturbance and Excavation

The physiological state of the pearl oyster, and the condition of the grow-out areas, have a bearing on oyster growth and the size and colour of pearl. This depends principally on differences in chemical composition of the seawater, as well as the kind and amount of plankton in the area where the pearl oysters are reared. The chief source of conchiolin¹, are the nitrogenous substances in plankton, which influences the colour of pearls and its toughness. Minerals and trace elements in the seawater are also important, as these also influence the colour of pearls (Nations Food and Agriculture Organisation, 1991).

Discussions with officers of the DoF have indicated that wild stock grow-out locations are sited for a number of reasons: remoteness; geomorphologic processes; depth of water; quality of water; water temperature; and food availability. Operators regularly lift and pressure clean pearl culture 'panels' to remove fouling from the shells and to check on growth (Taylor *et al* 1997). Some operators have occasionally moved longlines, however, this grow out infrastructure usually remains in situ as it a complex and costly procedure to relocate. While resting the area, the longlines remain in the lease site which has been chosen for its specific geographic and water quality attributes.

Sediment Deposition and Turbidity

Suspension feeding bivalves respond to fluctuations in SPM/turbidity on both short (minutes to hours) and long (days to weeks) time scales by adjusting various feeding processes, including clearance rates, pseudofaeces production, particle selection efficiencies, and digestive parameters (Iglesias *et al.*, 1992 and Bayne *et al.*, 1993).

P. maxima, has a relatively high tolerance to turbid environments when compared to other temperate and sub-tropical suspension feeding bivalves. Laboratory studies by Yukihiro *et al.* (1999) found that *P. maxima* feeds without active particle selection yet they function efficiently under relatively turbid conditions and has the ability to cope with high particulate loads, including substantial amounts of inorganic particles. When exposed to increases in turbidity *P. maxima* responds by reducing their clearance rate and absorption efficiency, and by increasing the proportion of particles filtered in order to compensate for the 'dilution' of food material in the relatively turbid environment. *P. maxima* is able to ingest a wide range of particle sizes and optimum particle size is <4µm at concentrations range between 3 and 15mgL⁻¹ (Yukihiro *et al.*, 1999) and maintains scope for growth (surplus energy available for growth or reproduction) at SPM levels up to 30-40mgL⁻¹.

It is thought that *P. maxima* are able to tolerate relatively high turbidity due to anatomical adaptations to relatively turbid environments, such as specialised gill and labial palp structures (Yukihiro *et al.*, 1999). However, if SPM remains below the optimum thresholds noted above and within the Australia and New Zealand Water Quality Guidelines (2000), growth should remain within the existing range and within commercially acceptable margins.

At higher levels of SPM, many bivalves including *P. maxima*, produce pseudofaeces, particles bound in mucus and ejected without being digested, in order to clear particulate matter in excess of digestive capacity from the oyster (Yukihiro *et al.*, 1999). As higher SPM leads to higher pseudofaeces production, the oysters are filtering and concentrating particles that would otherwise move through the farm. Once bound in mucus, the mass of concentrated SPM may sink nearer to the longlines and may increase deposition within the lease site. Therefore, unnaturally elevated levels of SPM may create biodeposition issues under the longlines of the farm.

The organic substances excreted by the pearl oysters (faeces and pseudofaeces) and fouling organisms removed during routine cleaning are deposited on the sea bottom and their build-up eventually affects the chemical and physical state of the seabed and the adjacent water. Periodic removal of the oysters to different part of the lease allows natural

¹ Conchiolin is a complex protein which is secreted by the mollusc's outer mantle and aids the development of nacre (mother of pearl finish) and toughness.

processes to process and remove these deposits. In subsequent cropping on 'fallowed' or 'rested' areas of the lease, the production of pearls with desirable quality increases. During the final 'make-up culture' period, pearl oysters are shifted to places of potential quality pearl yielding grounds – grow-out areas such as those off James Price Point.

At present, tropical cyclones are the only irregular event that the operators cannot fully mitigate and would produce a short term increase in SPM levels exposure to pearl oysters in culture.

Marine Discharges

Changes in water temperature associated with discharges (such as those that may be associated with RO plant discharges) have been shown to impact on production in other pearl production areas of the world (Elshorbagy, 2005). Temperature controls the metabolic rate of the molluscs. Higher temperature leads to faster growth in oysters and higher rate of nacre deposition, but this may also affect the quality of pearls. Thinner laminar nacreous layers, which result from low temperature and pH, are desirable at least in the later phase of the culture period, since the thinner mineral laminae in the upper layers of the pearl give a better lustre to the pearls.

4.6.4. Predicted Impacts

The following sections address specific impacts on the pearling and aquaculture sector about which concerns were raised during the initial scoping and consultation with industry representatives undertaken as part of the FIS.

The predicted impacts on pearling and aquaculture from the construction and operation of the Browse LNG Precinct are discussed in detail in the following sub-sections, and summarised in **Table 4.6-5**.

4.6.4.1. Potential Impacts to Aquaculture and Pearling due to Invasive Marine Species

Increased shipping and vessel movements associated with the construction and operation of the proposed Precinct may increase the potential for introduction of IMS. IMS may be introduced into the marine environment by various sources including on the hulls of vessels and ballast water discharge from vessels associated with the Browse LNG Precinct. The introduction of IMS, whilst of low likelihood if controls are put in place, has the potential to result in economic impacts on aquaculture and the wider fishing industry in the Kimberley region.

During consultation, pearling stakeholders expressed a concern about the introduction of marine pests, and were particularly concerned about the potential introduction of the black striped mussel (*Mytilopsis sallei*). The primary concern of pearl farmers is that the mussel proliferates rapidly, and would quickly foul pearling longlines. In the worst case, the cost of cleaning the oyster shells and culture equipment in the event of a major infestation would make pearl production unviable. The pearl industry also expressed concerns about the potential introduction of new diseases for the pearl oyster.

While a review of scientific research undertaken for the FIS has revealed that there are potentially fewer problems with introduced species and pests in tropical waters than in temperate waters, this hypothesis is yet to be adequately tested, so the potential for the introduction of pests remains a serious concern for the pearling industry (DoF, 2008b). In the past, marine species have been introduced to Western Australian Ports, however quarantine measures to be put in place for the Browse LNG Precinct will be much more rigorous and so comparisons with earlier IMS management strategies used at other ports is not appropriate.

Quarantine controls would be put in place on aquaculture movements if certain species of IMS are detected. This would affect production area locations and export. If IMS were introduced into the marine exclusion zone, the impacts would probably extend beyond the exclusion zone, and would represent a significant economic threat to aquaculture at a regional level, mainly to pearl culture operations.

Measures to mitigate impacts of marine invasive species on the aquaculture sector are identical to those presented for the recreational and commercial fishing sectors in **Part 5, Section 4.5** (Commercial Fishing) and **Part 5, Section 4.8** (Sports, Recreation and Land Use (including Recreational Fishing)); further details on proposed mitigation measures are also provided in **Part 3, Section 2.8** (Marine Ecosystem Integrity).

Central to reducing significant impacts for the industry associated with IMS is minimising the risk of an occurrence through the implementation of a precinct-wide quarantine management strategy and proponent quarantine management

plans that identify high risk areas and vectors in the Precinct port area and surrounding areas, prescribed management measures, incident response procedures, communication and long-term monitoring.

In regard to the potential introduction of pearl oyster diseases, additional research into the possible effects of pearl oyster diseases has also been recommended by the pearling industry.

The impact assessment determined that the introduction and establishment of IMS, as a result of BLNG Precinct activities, to affect aquaculture and pearling is unlikely, due to the low endemicism, high biodiversity and competitive exclusion exhibited by existing biota. It is expected that potential impacts can be successfully mitigated by application of management and mitigation measures, such as the enforcement of IMS inspection requirements to significantly reduce the risk of IMS introduction and establishment. A more detailed description of proposed mitigation measures is presented in **Section 4.6.5**. The significance of residual impact is considered to be low.

4.6.4.2. Potential Impacts to Aquaculture and Pearling due to Marine Discharges

Pearl oysters are sensitive to contamination in the marine environment and marine chemical pollution is a considerable threat to the wild and farmed pearl oyster and marine habitat in general. Acute and chronic chemical pollution may have different expressions in pearl oyster growth, reproduction and survival. Sublethal effects include poor growth and unusual reproductive reversals. Discharges that affect nutrient levels in the water column could affect pearl development by reducing phytoplankton availability. Heavy metals associated with routine discharges may bioaccumulate in oysters leading to human health impacts from pearl meat and a reduction in pearl quality.

Discharges that affect nutrient levels in the water column (such as hypersaline discharge from an RO Plant) could affect pearl development by reducing phytoplankton (food source) availability. The leases have been carefully situated to take advantage of specific phytoplankton levels that are optimal for pearl growth. Similarly, the return of hypersaline discharge may affect water quality in a localised area around the mixing zone. This discharge is unlikely to affect the pearling leases given the distance of these leases from the BLNG Precinct Port area.

Heavy metals associated with routine discharges may bioaccumulate in pearl meat. If pearl meat is sold for human consumption, there may be human health and food standards implications that need to be investigated and addressed. Additionally, some heavy metal contaminants may cause a reduction in pearl quality due to negative impacts on shell growth.

Heavy metals bioaccumulate in the oyster through exposure to elevated levels of pollutants in water and from the food. The absorption of metals (such as chromium, cadmium, silver, zinc and cobalt) by microalgae is relatively easy physiologically, these heavy metals then bioaccumulate following digestion by bivalves. Short generation times and rapid cell growth indicate the algae are able to rapidly incorporate metals and other pollutants quickly into cell tissues (ANZECC/ARMCANZ Water Quality Guidelines, 2000). There exists a paucity of research on *P. maxima* tolerance to pollutants, however *Pinctada fucata/imbricata* grown in NSW demonstrated that growth declined significantly when exposed to lead and zinc (Gifford *et al.*, 2006). There is also a change in susceptibility with different life history stages (Jones, 2006) with larval and young mollusc spat particularly vulnerable to levels of metals and hydrocarbons that may actually be below detectable limits.

Routine discharges of industrial and domestic wastewater occur from a number of sites along the WA coastline with manageable environmental impacts and acceptable outcomes. Given the dynamic nature of the receiving environment at James Price Point, routine wastewater discharges will be rapidly mixed through the water column such that it is highly likely that any contaminants entering receiving waters from the BLNG Precinct operations will not be detectable above background levels, except within the immediate mixing zone. Proponents of derived proposals will be required to demonstrate that routine wastewater discharges achieve the relevant ANZECC/ARMCANZ water quality guidelines within an agreed mixing zone and undertake regular ecotoxicity testing to target 99% species level of protection beyond the BLNG Port Area. A Wastewater Discharge Management Plan will also be developed, including hydrodynamic modelling and environmental monitoring to ensure these water quality guidelines are achieved, minimising potential environmental impacts associated with a decline in water quality from routine discharges.

Similarly, for routine brine discharges from desalination (if required), industry experience gained at Cockburn Sound and King Bay have demonstrated that engineering design, active management and monitoring protocols can successfully mitigate water quality impacts and achieve acceptable outcomes. Given the comparatively dynamic hydrodynamic

environment at the BLNG Precinct, rapid and complete dispersal within an agreed mixing zone is anticipated to be readily achievable using standard industry practices. Details on such practices will be included in the Marine Wastewater Discharge Management Plan.

Uncontrolled release of hydrocarbons due to a hole in liquids export line or release from vessels/hydrocarbon storage and transfer infrastructure etc. may have physical effects on pearl oysters: including coating and/or smothering leading in certain cases to contamination and mortality; and chemical and biological effects (toxicity and bioavailability). Hydrocarbon exposure to pearl oysters may have significant impacts on oyster survival and growth. Gifford *et al.* (2006) demonstrated that *P. fucata/imbricata* is tolerant of aliphatic hydrocarbons; however, this is considered a relatively robust and tolerant species. Diesel is known to be cytotoxic to molluscs and causes mortality in adult mussels (*Mytilus spp.*) at 28 µg/L (Jones, 2006). The 1969 Torres Strait (QLD) oil spill (the Ocean Grandeur) and the subsequent use of dispersants in the clean up had significant impacts on that fishery and pearl culture industry (Southgate and Lucas, 2008).

Management of non-routine discharges (i.e. spills and leaks) would largely focus on prevention and rapid response in the unlikely event that a spill does occur, as outlined in **Section 4.6.5**. Although the likelihood of a major spill or leak occurring is very low, the impact of such an event could be significant. The potential for, and impact of, a major hydrocarbon spill will be the focus of a supplementary spill modelling exercise to be undertaken during the derived proposal stage. Such a modelling exercise would provide information concerning any significance species at risk and the actions and timeframes required to minimise potential impacts. However, it is known that LNG product is not toxic, rapidly undergoes phase transitions and evaporates following contact with warmer seawater. Such LNG spills have previously been recognised as having little impact on the marine environment generally and on water quality. Similarly, if spilled, other hydrocarbons (e.g. fuel oil, diesel or condensate) will spread from the site release point in the direction of prevailing wind and waves. The proposed implementation of measures to prevent potential loss of containment, and rapid response in the unlikely event of occurrence, are clear commitments for management by all operators within the Precinct.

Whilst the likelihood of a major hydrocarbon spill (e.g. vessel collision or pipeline rupture) is considered extremely unlikely, the consequence may be severe if appropriate response measures are not effectively implemented. The establishment of the Broome Port Authority as the statutory port authority for the BLNG Precinct will ensure supplies of oil spill response equipment are as required under the State Emergency Management Plan for Marine Oil Pollution (West Plan) to undertake an immediate oil spill response. Major hydrocarbon spills may also require deployment of additional equipment stockpiled in the Fremantle and Dampier ports, or other stockpiles under the National Plan, to minimise the extent of hydrocarbons and reduce potential impacts to sensitive environmental receptors. The oil spill modelling required by proponents of derived proposals will be used to inform a Hydrocarbon and Chemical Spill Contingency Plan, which will be implemented in the event of a large hydrocarbon or chemical spill. An Emergency Response Plan will also be developed outlining emergency response procedures to be implemented by the port authority in the event of an oil spill emergency.

Impacts associated with non-routine spills are minimised as a result of strict industry standards and procedures for product handling and storage and appropriate response planning as described in **Section 4.6.5**. It is therefore concluded that the significance of residual impacts to aquaculture and pearling from the proposed BLNG Precinct can be managed to an acceptable level.

4.6.4.3. Potential Impacts to Aquaculture and Pearling due to Sediment Deposition and Turbidity

Changes in sediment deposition and turbidity, as a result of dredging for the port, MF, access channels, spoil disposal, pipelines and also from propeller wash from the nearby shipping lane, may have the following impacts:

- increased and extended periods on sediment loading (smothering) and shading (TSS) which could force the shell to close more often, inhibiting its growth. The oysters currently close on a tidal basis when sediment loading is pronounced and then open during flushing tidal cycles. Dredge plumes would result in more constant periods of sediment loading than are naturally experienced. This would impact on the mollusc's ability to feed, and decrease the presence of food (phytoplankton); and
- pearl divers record visibility when collecting and cleaning shells. This is linked to measurements of abundance by the operators in terms of rate of collection and frequency of shells. This practice may be affected by high levels of turbidity.

DoF believe that some operators are conducting monitoring focused on collecting data on wave heights, temperature, turbidity (TSS), water quality including chlorophyll A and B, and nutrients (food sources such as phytoplankton). The results are understood to be confidential and are not made available to other operators or to the regulators (as it is not a requirement of their license or lease conditions). From an operability perspective, these measurements are used by the farm managers to understand the variation within the lease(s) and growth potential to compare one lease to another that may be held by the company. These data may assist husbandry decisions in the future and may provide guidance when reviewing annual productivity or pearl quality. Without knowing the sampling design used, it is not certain whether these data are statistically robust.

The majority of pearling licence holders consulted for the FIS believed that sediment plumes or other physical disturbance from dredging and other undersea works would not directly affect them. Clipper Pearls did, however, expect to be directly affected by sediment deposition due to their proximity to the Precinct. This particular stakeholder considered that any significant change to the existing physical conditions would have a high impact on their business. They felt that turbidity and sedimentation impacts could result in long-term changes that had the potential to significantly affect water quality and nutrient levels, with any increase in the turbidity likely to interfere with the photosynthetic processes critical to the production of plankton that constitute the pearl oysters' food supply (Big Island Research, 2009).

Figure 4.6-4 to Figure 4.6-7 display example snapshot plots for sediment plumes during summer/winter and spring/neap periods overlain by the distribution of pearling leases. The graphs in **Figure 4.6-8**, **Figure 4.6-9** and **Figure 4.6-10** portray modelled TSS levels (dredging and dumping scenario; summer conditions) at six points along a north-south gradient from the base case dredging location. These points were chosen to provide a gradient of predicted TSS levels away from the modelled dredge location as they are coincident with the location of key pearling leases. As expected the highest TSS levels are at point 1, closest to the proposed dredging location. At all points, except at point 1 where a peak of TSS was determined in October, the highest levels of TSS were evident earlier in the year during summer (i.e. January/February). Interpretation of these graphs will indicate when TSS levels are predicted to deviate from optimal conditions for *P. maxima* (i.e. average background TSS determined to be approximately 5mg/l plus elevations due to dredging and spoil disposal of 5mg/l = 10mg/l experienced by *P. maxima*). Similarly these graphs assist in interpretation of when the scope for growth of *P. maxima* may be reduced within pearling operations (see **Section 4.6.3.2**).

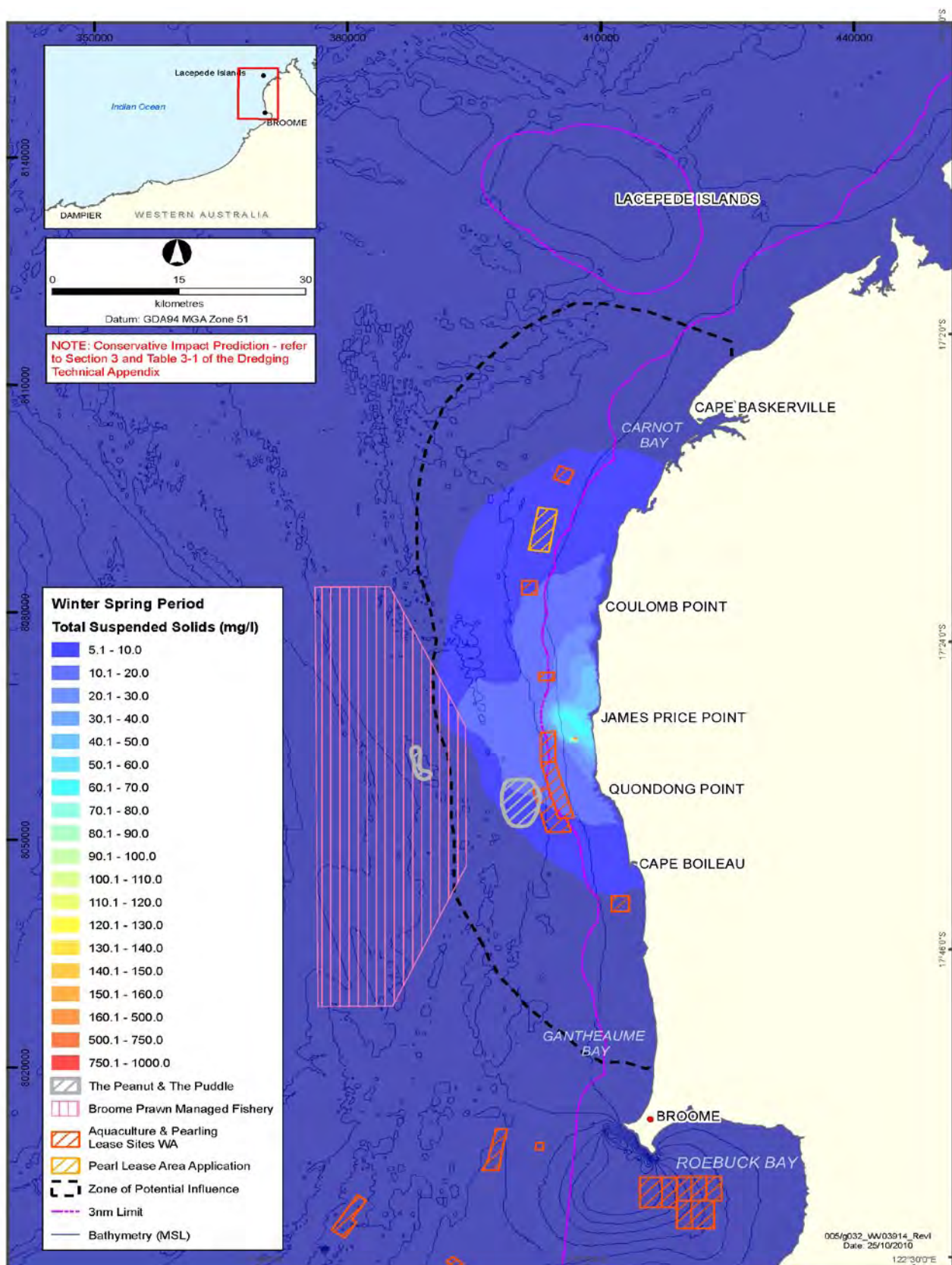
Levels of TSS in areas leased for pearling, for the most part, are not expected to increase above the range of tolerance of *P. maxima*. During summer/spring tide conditions, the northern-most section of the Clipper Pearls lease immediately west of the BLNG Precinct Port Area may be exposed to TSS levels which are slightly higher than optimum for pearl oysters. However, these levels are not expected to exceed those at which growth may be affected (**Figure 4.6-6**). During summer and winter neap tide conditions, dredging and spoil disposal activities are unlikely to elevate TSS levels to greater than those experienced naturally by *P. maxima* during average background conditions (5mg/l) in any of the leased areas (**Figure 4.6-5** and **Figure 4.6-7**).

The predicted extent of the sediment plume during winter – spring conditions is likely to impinge on only the northern-most section of the Clipper Pearls lease boundary directly west of the BLNG Precinct Port Area. These sections of the lease boundary may be exposed to TSS levels above which *P. maxima* growth is known to be affected. These elevated levels of TSS are likely to be experienced for small proportion of the year.

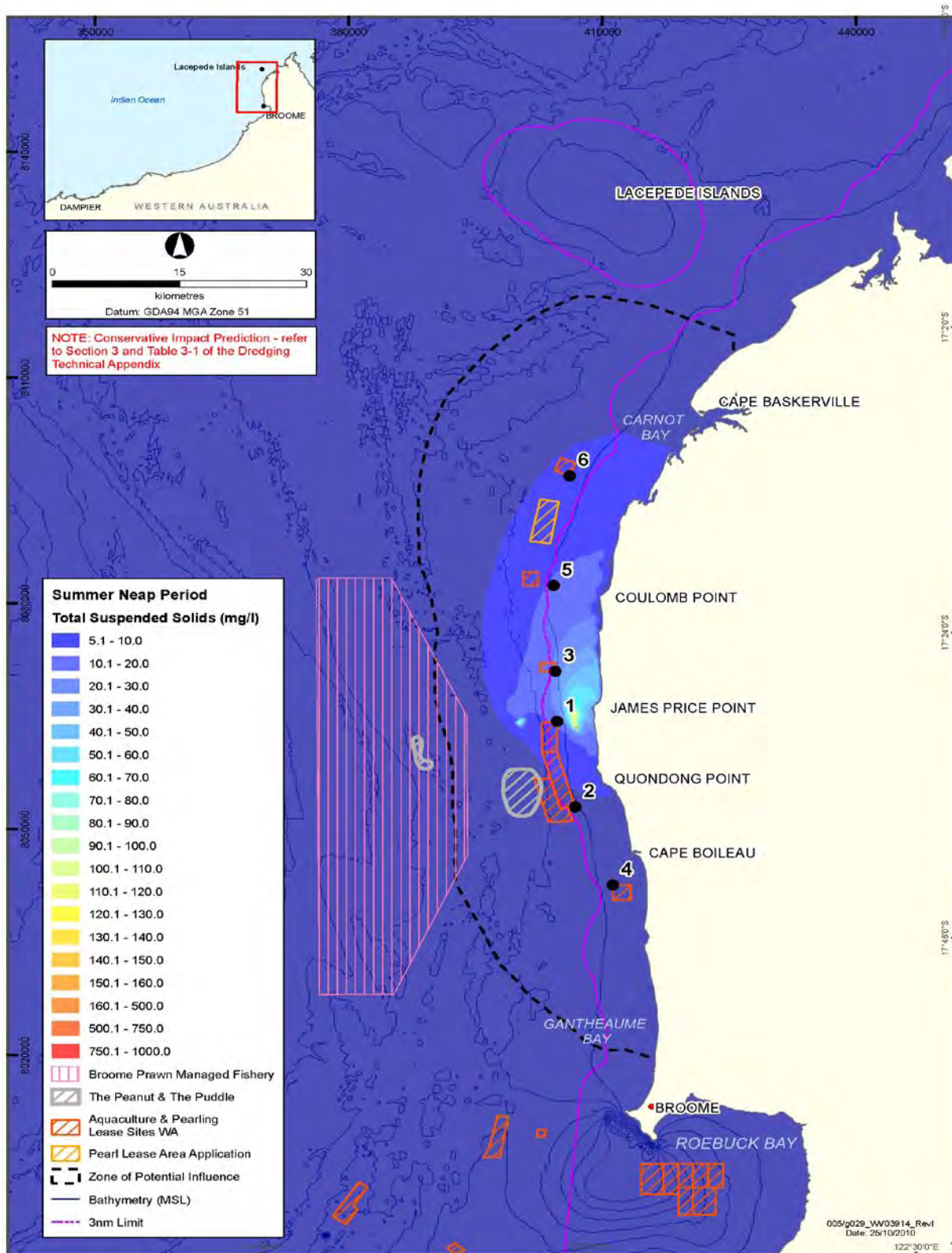
Additional mitigation measures to address sedimentation and turbidity are provided in **Part 3, Section 2.2** (Marine Sediment Quality) and **Part 3, Section 2.3** (Marine Water Quality).

Recent dredging programmes on the North West Shelf have demonstrated that given appropriate management and contingency procedures, prolonged dredging campaigns can successfully mitigate water quality impacts and achieve acceptable outcomes. Prior to commencement of dredging, proponents of derived proposals would be required to prepare and implement a Dredging and Dredge Spoil Disposal Management Plan (DSDMP) to demonstrate best practice management techniques and technologies which would be applied to minimise potential dredging impacts. A more detailed description of proposed mitigation measures is presented in **Section 4.6.5**.

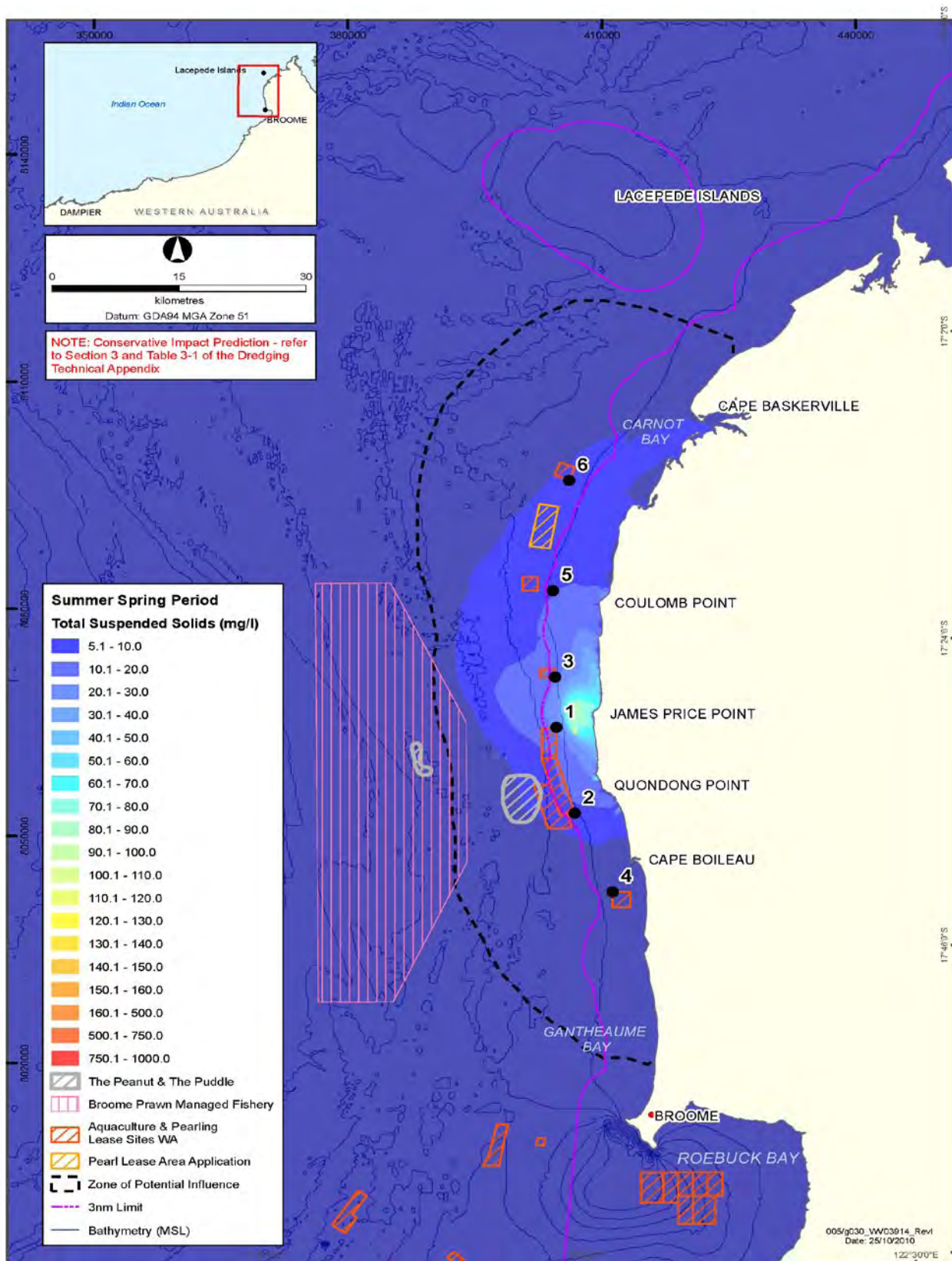
The significance of residual impacts associated with sediment deposition and turbidity associated with the BLNG Precinct on pearling and aquaculture activities are considered to be low. It is considered by the proponent that, based on industry experience, design and active management and monitoring measures, impacts can be managed to achieve acceptable outcomes.



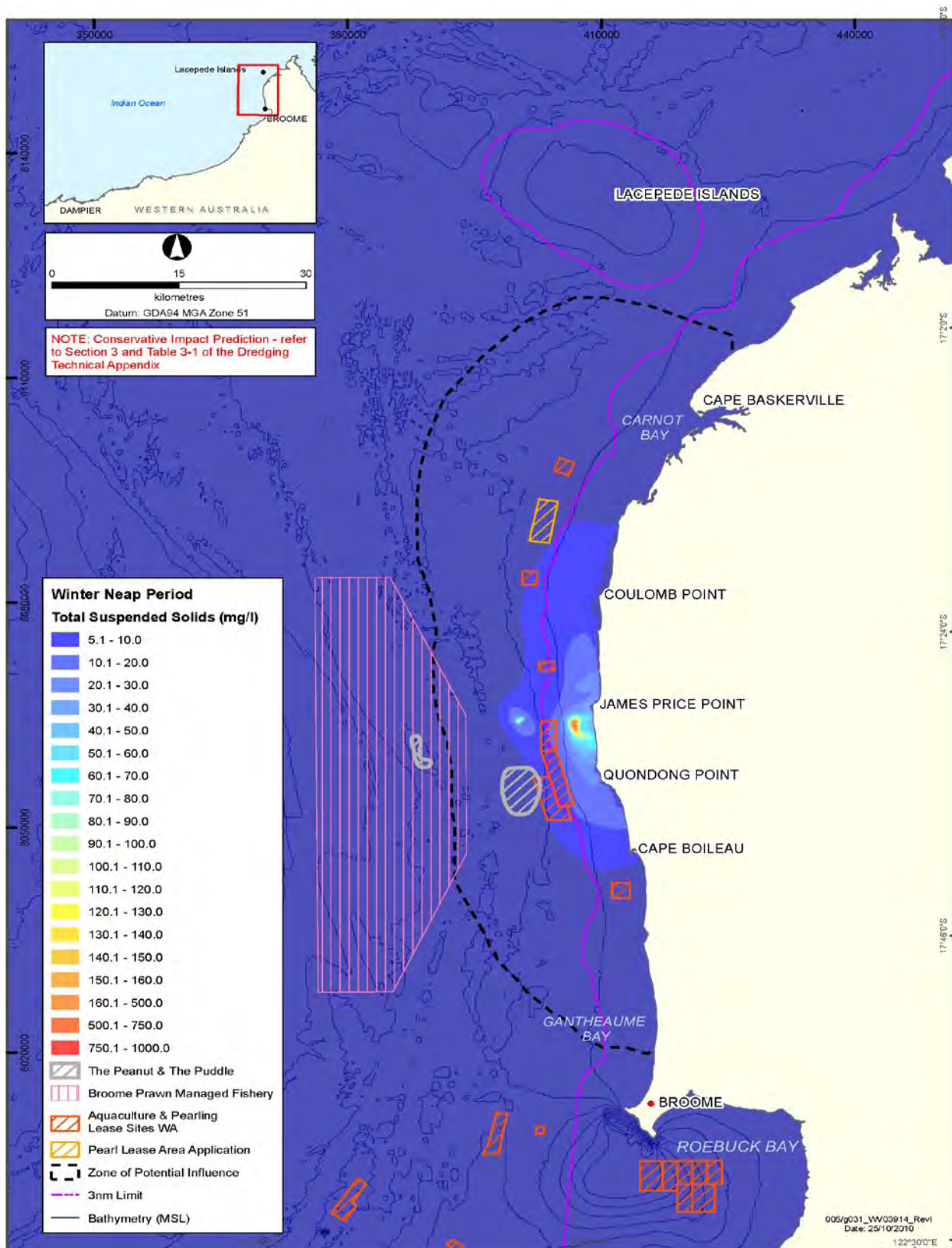
■ **Figure 4.6-4 Water Quality Model 'Snapshot' (i.e. a Particular Point in Time) Showing the Contribution of Suspended Solids (i.e. Above Background) during Winter Spring Tide Conditions and the Location of Pearling Leases in the James Price Point Area.**



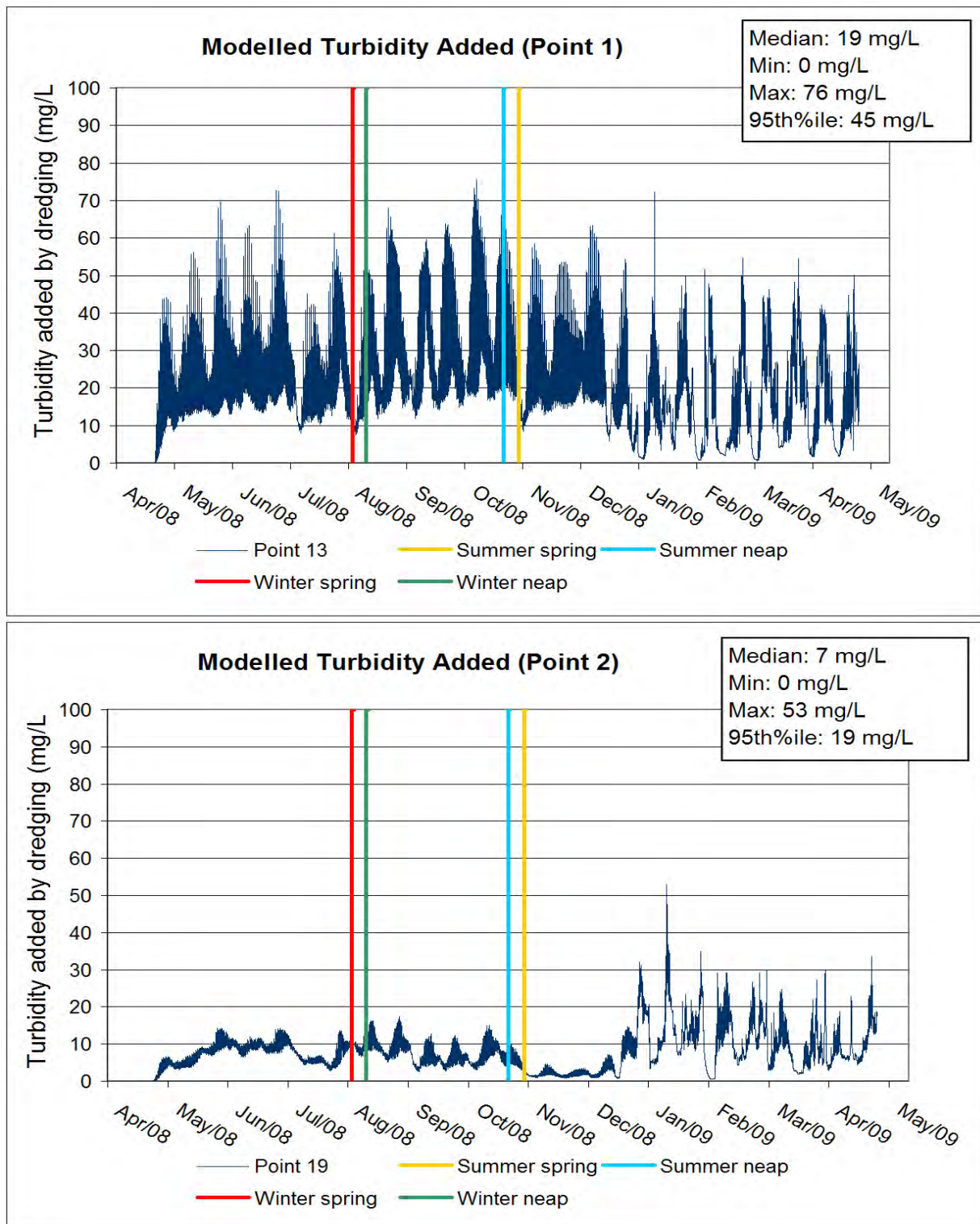
■ **Figure 4.6-5 Water Quality Model 'Snapshot' (i.e. A Particular Point in Time) Showing the Contribution of Suspended Solids (i.e. Above Background) during Summer Neap Tide Conditions and the Location of Pearling Leases in the James Price Point Area.**



■ **Figure 4.6-6 Water Quality Model 'Snapshot' (i.e. a Particular Point in Time) Showing the Contribution of Suspended Solids (i.e. Above Background) during Summer Spring Tide Conditions and the Location of Pearling Leases in the James Price Point Area.**

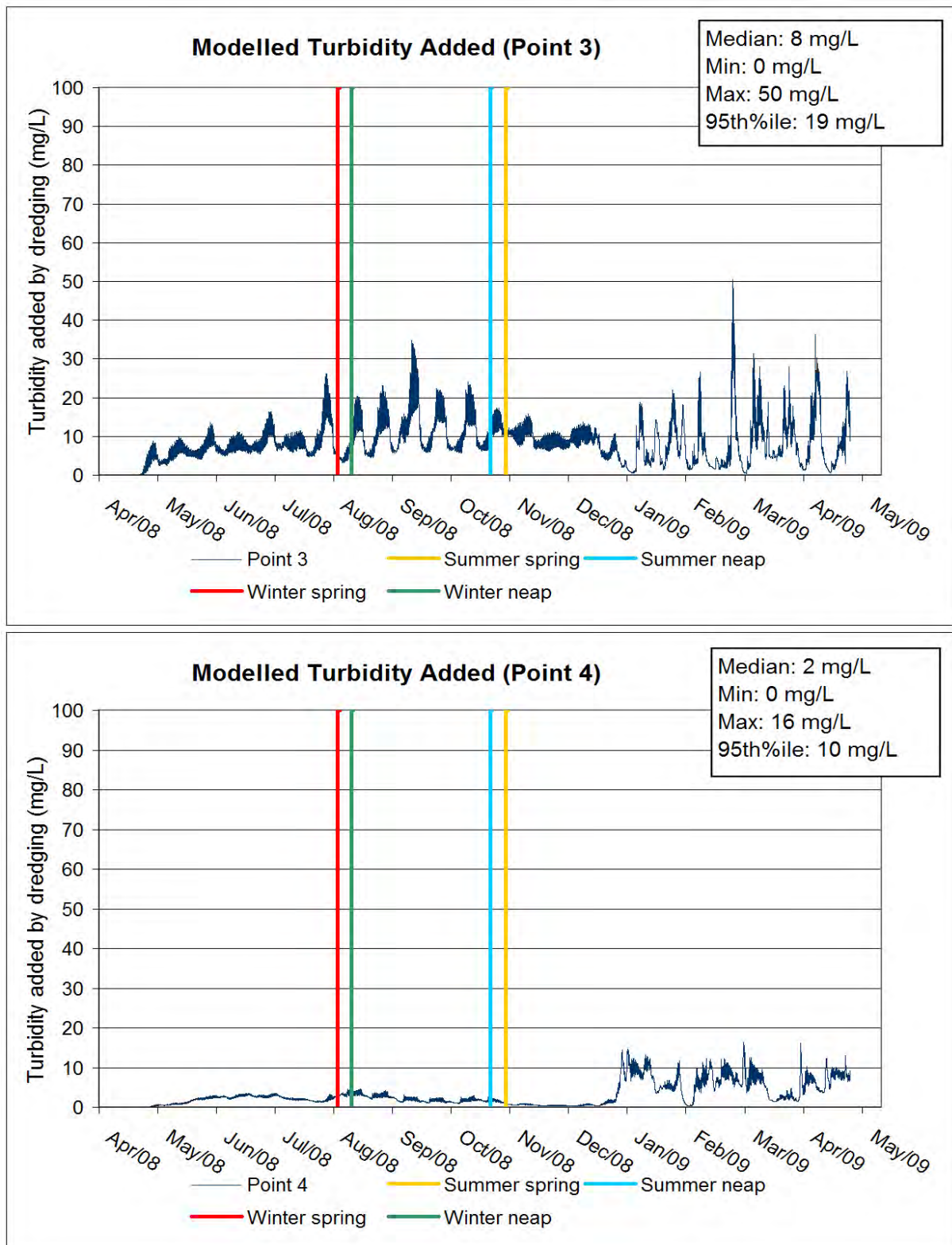


■ **Figure 4.6-7 Water Quality Model 'Snapshot' (i.e. A Particular Point in Time) Showing the Contribution of Suspended Solids (i.e. Above Background) during Winter Neap Tide Conditions and the Location of Pearling Leases in the James Price Point Area.**



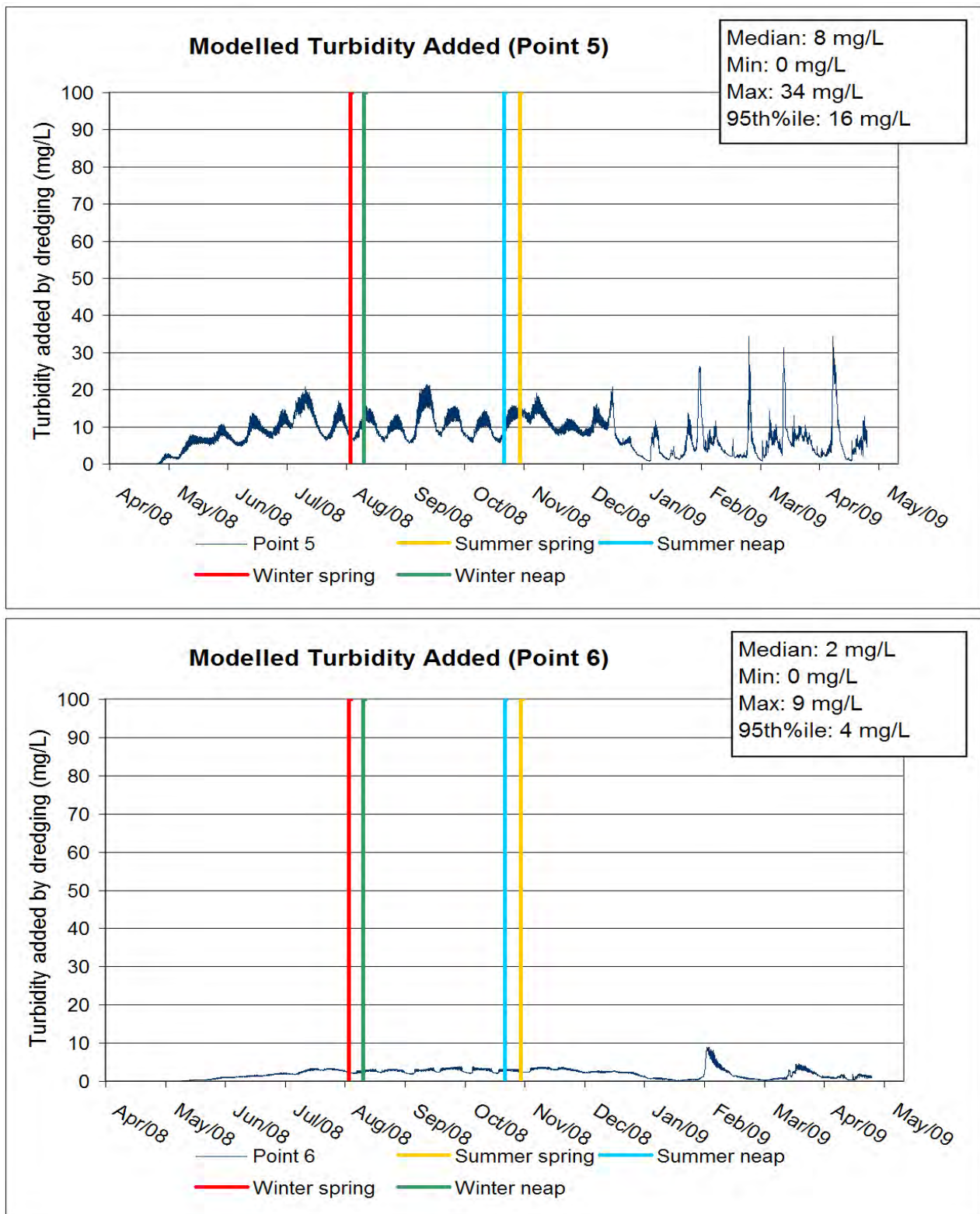
■ **Figure 4.6-8 Modelled Total Suspended Sediment (TSS) Levels during the Simulated ‘Summer’ Dredging and Dumping Scenario at Points (1 and 2) along a North-South Gradient from the Proposed Dredging Location.**

See Figure 4.6-5 and Figure 4.6-6 for the location of points.



■ **Figure 4.6-9 Modelled Total Suspended Sediment (TSS) Levels during the Simulated ‘Summer’ Dredging and Dumping Scenario at Points (3 and 4) along a North-South Gradient from the Proposed Dredging Location.**

See **Figure 4.6-5** and **Figure 4.6-6** for the location of points.



■ **Figure 4.6-10 Modelled Total Suspended Sediment (TSS) Levels during the Simulated ‘Summer’ Dredging and Dumping Scenario at Points (5 and 6) along a North-South Gradient from the Proposed Dredging Location.**

See **Figure 4.6-5** and **Figure 4.6-6** for the location of points.

4.6.4.4. Potential Impacts to Aquaculture and Pearling due to Marine Site Disturbance and Excavation

Site disturbance and excavation associated with the construction of marine infrastructure may affect pearling in the following way:

- access to wild stock grow-out locations may be restricted or excluded during site disturbance and excavation works, thereby limiting the accessibility of lease areas. This will include exclusion from areas during pipelay and trenching activities, which may have a 2 km anchor radius. Pearling operator vessel movements are unknown. However, anecdotal information suggests that wild grow-out longlines are accessed on a daily basis during the season, with every longline cleaned on a two week rotation; and
- potential loss of benthic primary producer habitat (BPPH) in and near to the lease area may have an impact on the water quality and feeding opportunities. The ecosystem services of the benthic habitat would need to be understood to determine an impact on pearl production.

Site disturbance and excavation will result in some temporary and permanent loss of benthic habitat. Aside from those areas directly affected by the physical presence of marine infrastructure, the recovery of local ecosystem stability and productivity is predicted to occur within the short-term (<5 years). Certain activities will cause habitat loss through the removal or disturbance of benthic habitat. This will cause a limited reduction in localised species numbers, richness and abundance. These changes present a risk to ecosystem stability and function within the immediate vicinity of the BLNG Precinct. For further detail of the impacts associated with marine site disturbance and excavation, refer to **Part 3, Section 2.4** (Benthos including BPP).

It is expected that potential impacts can be successfully mitigated by application of management and mitigation measures such as identification of key environmental values and development of water quality objectives and criteria within the Port through a BPEMP including management of exclusion zones, DSDMP and effective stakeholder engagement with relevant operators. A more detailed description of proposed mitigation measures is presented in **Section 4.6.5** and also in **Part 3, Section 2.4**. The significance of the residual impact on aquaculture and pearling is assessed as very low.

4.6.4.5. Potential Impacts to Aquaculture and Pearling due to Marine Physical Presence

The export pipeline will be installed through a portion of the Clipper Pearls lease area (**Figure 4.6-3**). Potential impacts from the presence of this permanent infrastructure are:

- creation of artificial habitat and modification of existing habitat. The installation of the export pipeline through the lease has the potential to create an artificial habitat for the settlement of marine organisms that would not otherwise be successful in colonising the area. Habitat may also be modified from soft sediment seabed (sandy and muddy substrata with occasional patches of coarser sediment) to harder substrate which may alter flora and fauna assemblages. These changes may alter the local marine community and subsequently affect suitable pearl farm habitat.
- localised disturbance to current and hydrodynamic processes. Pipeline installation on the seabed has the potential to act as a minor water obstruction and cause minor and localised alterations to the hydrodynamic regime in the lease area. Altered water movement may affect water quality, in particular suspended solids and turbidity, and seabed features and bathymetry, and
- interference with and exclusion of pearling vessels. Pearling vessels would be subject to exclusion zones with “no anchoring” zones 500m either side of the pipeline. This would reduce availability of accessible area for pearling activities. If there is a no anchoring exclusion zone in effect, this would also mean no longlines. The location of the pipelines is not yet known, however, it is expected that the southern pipeline would be located within 500m of the Clipper Pearls lease, and so impacts due to exclusion zones may occur.

Marine infrastructure associated with the BLNG Precinct will result in some localised loss of benthic habitat whilst creating new habitat structures, potentially increasing species diversity and abundance. This resulting change would be localised to the BLNG Precinct area and would not affect marine ecosystem integrity at a wider bioregional scale.

It is expected that potential impacts from physical presence of infrastructure will be mitigated by the application of management and mitigation measures such as the requirement for proponents of derived proposals to demonstrate the minimisation of impacts on coastal processes from on shore and nearshore marine infrastructure, in line with best practice principles, and a commitment to continue engaging with potentially affected aquaculture and pearling operators and permit holders as a basis for determining measures to avoid, reduce or mitigate impacts on existing operations. A more detailed description of proposed mitigation measures is presented in **Section 4.6.5** and also in **Part 3, Section 2.1** and **Part 3, Section 2.4**. The significance of the residual impact on aquaculture and pearling is assessed as high, recognising the proximity of existing lease areas.

For further detail of the impacts associated with the physical presence of marine infrastructure, refer to **Part 3, Section 2.1** (Tidal Regimes, Wave climate, Currents and Hydrodynamics) and **Part 3, Section 2.4** (Benthos including BPP).

4.6.4.6. Potential Impacts to Aquaculture and Pearling due to Vessel Movements

While most fisheries sectors felt that the increased vessel traffic associated with the development of the Precinct would result in navigation challenges, pearl farm leaseholders expressed a concern that the Precinct development would increase the risk of vessel collision or other interference with pearl farm infrastructure (Big Island Research, 2009).

Increased vessel movements associated with the BLNG Precinct may also result in a reduction in the accessibility of wild stock grow-out locations by pearling vessels due to the presence and movement of Precinct construction and operation vessels. Operational movements of LNG, LPG and condensate tankers are unlikely to affect pearling leases as they are geographically separated from the BLNG Access Channel. The DoF has an aquaculture farm and pearling lease lighting policy which specifies the category of navigational aids required on each farm. Assessment of risk of collision is a key aspect of this policy and high risk sites are accordingly required to make a greater investment in installation of navigational markers.

It is expected that potential impacts can be successfully mitigated through application of management and mitigation measures such as regulation of vessel navigation, operations and movements within the port area by the Port Authority, and control of vessel movements through a Vessel Management Plan. A more detailed description of proposed mitigation measures is presented in **Section 4.6.5** and also in **Part 3, Section 2.6**. The significance of the residual impact is assessed to be very low.

4.6.4.7. Potential Impacts to Aquaculture and Pearling due to Marine Noise and Vibration

The BLNG Precinct may introduce numerous sources of noise and vibration including piling, blasting, pipelaying and vessel movements. Prior to movement of oysters to 'grow out' areas, noise and vibrations can cause spat to unsettle. Strong spat growth in nursery culture means strong byssal attachment to the culture gear. Pearl farm vessels in close proximity to longlines and the shell cleaning process would generate significantly more measurable noise and vibration than a relatively distant vessel or activity. Therefore, marine noise and vibration generated by construction activities is unlikely to exceed levels associated with regular pearling vessel movements in leased areas. While vibration may be a stress on the oysters which may induce spawning there is no evidence to suggest this.

Noise impacts during construction will be managed through a Port Facilities Construction Environmental Management Plan. A more detailed description of proposed mitigation measures is presented in **Section 4.6.5**. The significance of the residual impact is assessed to be very low.

4.6.5. Mitigation and Management Measures

Mitigation measures and safeguards that have been identified to manage potential impacts to aquaculture and pearling are outlined below in **Table 4.6-2**, **Table 4.6-3** and **Table 4.6-4**.

■ **Table 4.6-2 State Government Measures for Aquaculture and Pearling.**

State Government measure	Responsibility	Timing
Undertake an engagement process with potentially affected aquaculture and pearling operators and permit holders as a basis for determining measures to avoid, reduce or mitigate impacts on existing operations.	Commercial proponents	Prior to commencement of dredging activities
Establish the Broome Port Authority as the statutory Port Authority for the BLNG Precinct, and an associated port area, which would have functions including regulation of: <ul style="list-style-type: none"> marine construction within the port area; long term dredging and spoil disposal program and management strategy to service the port area; vessel navigation, operations and movements within the port area; establishment and management of exclusion zones; and environmental and risk management within the port area. 	Department of Transport (DoT)	On approval of BLNG Precinct

■ **Table 4.6-3 Proposed Environmental Conditions for the Strategic Proposal Potentially Affecting Aquaculture and Pearling.**

Condition No.	Proposed Environmental Conditions for the Strategic Proposal
Proposals involving marine discharges	
M2.1	Proponents of derived proposals shall ensure that within the Low Ecological Protection Area (i.e. the discharge mixing zone) the 95th percentile of bioaccumulation toxicant concentrations meets ANZECC/ARMCANZ (2000) NWQMS 80 percent species protection guideline levels. Beyond the boundary of the mixing zone the proponent will ensure that the 95th percentile of toxicants meets ANZECC/ARMCANZ (2000) NWQMS 95 percent species protection levels.
M2.2	Proponents of derived proposals shall verify the performance of outfalls in terms of achieving the required dilutions, under a range of flow rates, meteorological and sea state immediately following commissioning of wastewater plants.
M2.3	Within 18 months of commissioning outfalls to the marine environment, proponents of derived proposals shall submit a report containing monitoring results and a discussion of non-conformances and the operating limitations necessary to ensure ongoing compliance to the Chief Executive Officer of the DEC.
M2.1	Proponents of derived proposals shall ensure that within the Low Ecological Protection Area (i.e. the discharge mixing zone) the 95th percentile of bioaccumulation toxicant concentrations meets ANZECC/ARMCANZ (2000) NWQMS 80 percent species protection guideline levels. Beyond the boundary of the mixing zone the proponent will ensure that the 95th percentile of toxicants meets ANZECC/ARMCANZ (2000) NWQMS 95 percent species protection levels.
Proposal involving dredging	
M2.4	<p>Prior to commencement of dredging, proponents of derived proposals shall prepare and implement a Dredging and Dredge Spoil Disposal Management Plan, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts. The Plan shall include:</p> <ul style="list-style-type: none"> consideration of the re-use of suitable dredge material for MOF construction, where practicable; design of the MOF including construction of bunds to isolate fill material from wind and wave action; consideration of applicability of management techniques and technology in meeting location specific WQ environmental values and environmental quality objectives; consideration of re-use of reclaimed material to minimise ocean disposal; measures to minimise dredging impacts during sensitive ecological windows; A monitoring strategy for ecological receptors and health during marine construction (including baseline surveys); the development of trigger levels for benthic communities and water quality that define additional management responses; mechanisms to audit and assess environmental performance of proponents during construction; and a communications strategy to inform other local marine users of times of peak construction

Condition No.	Proposed Environmental Conditions for the Strategic Proposal
	activity that may influence non-construction related activities within the area. The DSDMP will be subject to assessment under the <i>Environment Protection (Sea Dumping) Act 1981</i> (Cwth), including appropriate stakeholder consultation.
Proposal involving invasive marine species	
M4.1	Proponents of derived proposals shall prepare and implement an Invasive Marine Species Management Plan, to the satisfaction of the Western Australian Minister for Environment, to minimise the risk of introducing IMS into Australian waters during the life of the activity. The plan shall be developed in consultation with the Australian Quarantine Inspection Service (AQIS) and will be applied to vessels, barges and immersible equipment that plan to enter and operate within the Precinct.
M4.2	The IMSMP will be consistent with the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry.
M4.3	The IMSMP will adhere to the AQIS Australian Ballast Water Management Requirements under the Quarantine Act (1908).
M4.4	Proponents of derived proposals shall, for the life of the activity, notify the DEC, the DoF, AQIS and the Broome Port Authority of any IMS detected in the waters of the BLNG Precinct.

■ **Table 4.6-4 Requirements to be Addressed via Development of a Management Plan to support a Derived Proposal Potentially Affecting Aquaculture and Pearling.**

Requirements for Derived Proposals	Timing
Prepare and implement a Hydrotesting Procedure and a Pipeline Pre-commissioning Plan prior to such activities being carried out. See Part 3, Section 2.3 (Marine Water Quality).	Prior to commissioning
Prepare and implement a Hydrocarbon and Chemical Spill Contingency Plan, to the satisfaction of the Western Australian Minister for Environment. See Part 3, Section 2.3 (Marine Water Quality).	Prior to commencement of associated construction activities
All vessels will be required to have in place a Ship-Board Oil Pollution Emergency Plan (SOPEP) and will be required to comply with MARPOL 73/78 regulations with regards to discharges at sea.	Prior to construction and updated for ongoing operational requirements
Prepare and implement a Marine Wastewater Discharge Management Plan (MWDMP), to the satisfaction of the Western Australian Minister for Environment. See Part 3, Section 2.3 (Marine Water Quality).	Prior to construction of marine discharge facilities
Proponents of derived proposals shall prepare and implement a Port Facilities Construction Environmental Management Plan (PFCEMP), to the satisfaction of the Western Australian Minister for Environment, which addresses the following: <ul style="list-style-type: none"> • schedule of construction activities; • details of the construction methods to be used; • environmental training and inductions; • environmental monitoring, contingencies and reporting; • stakeholder consultation; and • consistency with requirements of Broome Port Authority and BLNG Precinct Environmental Management Framework. 	Prior to commencement of associated construction activities

4.6.6. Environmental Outcomes

During precinct construction and operation, plans will be developed to mitigate negative effects on the pearling industry. This will include but not be limited to quarantine management systems and IMS management plans to reduce the risk of

invasive marine species entering. It is envisaged that these would significantly reduce the likelihood of IMS introductions into the marine bioregion. These practices have been successfully implemented in other ports in the North West region (such as the Dampier Port) where no marine pest species that could affect pearling and aquaculture occur.

4.6.6.1. Direct Impacts

The construction of the BLNG Precinct has the potential to cause the following direct impacts to aquaculture and pearling in the North West Bioregion:

- disruption of feeding or reproduction and direct mortality of individuals from site disturbance during the construction and operation phases;
- clogging of gills with sediment from dredging and disposal activities;
- behavioural changes, physiological affects and mortality from noise and vibration;
- physiological affects, toxicity and mortality from contact with marine discharges; and
- increased risk of introduction of IMS.

Through the implementation of appropriate management measures, it is predicted that impacts are manageable to achieve acceptable outcomes.

4.6.6.2. Indirect Impacts

The construction of the BLNG Precinct has the potential to cause the following indirect impacts to aquaculture and pearling in the North West Bioregion:

- reduction in quality of current pearling lease areas through changes in temperature, water quality and TSS;
- reduction in the quality of pearls produced due to changes in temperature, water quality and TSS in lease areas; and
- reduction in the quality of pearl meat and potential human health issues associated with the potential accumulation of toxicity from contact with marine discharges.

4.6.7. Cumulative Impacts of the Proposal and Associated Activities

4.6.7.1. Category B Activities

The construction and operation of a minimum of two LNG projects at the Precinct has the potential to increase pressure on marine infrastructure and services that could have flow-on effects for the aquaculture and pearling sector.

During discussions with pearling stakeholders, all those interviewed commented on “the difficult situation at the Broome Wharf”, particularly constraints on the use of existing infrastructure and the difficulty of access by smaller vessels due to the requirements for inductions and other security measures (Big Island Research, 2009).

There was also a call for an investigation into alternative berthing facilities to service the pearling and other marine interests in Broome, due to a concern that pearling vessels would be prevented access to the Broome Wharf by the increased demand for the existing infrastructure.

The infrastructure assessment completed to support the Strategic Assessment process (AECOM, 2010d; **Appendix D-6**) has identified that the Broome Port, including planned upgrades and expansion, should be adequate for the anticipated increase in vessel traffic as a result of the Precinct’s construction and operational activities.

A major concern for the pearling industry was the capacity of the industry sector to retain trained staff. Industry representatives reported that the sector had experienced employment difficulties as a result of the recent mining boom, with many potential workers being attracted to the large salaries offered by mining companies.

Although several of the pearling companies are substantial businesses, they have said that they cannot compete with the oil and gas sector and would inevitably lose their best and most highly trained employees to the mining sector.

Another related concern was the likelihood of an increase in living costs and demands for housing caused by the demand for personnel and accommodation in the region. This was predicted to have inevitable flow-on inflationary effects for local industries.

4.6.8. Mitigation and Management Strategy

Mitigation and management measures to address these impacts are in **Part 5, Section 2** (Social Impact Assessment). The key mitigation and management measure that applies to all marine resources requires proponents of derived proposals to develop a fishing industry mitigation and management strategy with the commercial and recreational fishers and tourism operators to mitigate and manage the impacts from the development of the Precinct at James Price Point.

Objective: Minimise, mitigate and manage the impact of the LNG Precinct on marine resources including commercial and recreational fishing activity in the James Price Point region.				
Outcomes	Time	Phase/s	Responsibility	
A commercial, recreational and customary fishing, pearling and aquaculture mitigation and management strategy that enables coexistence with the LNG Precinct.	On-going	Construction and Operation	Lead Commercial Proponent	Secondary Precinct Management; State Government; Traditional Owners; Commercial and Recreational Fishing, Aquaculture and Pearling Organisations.
Output				
A management plan to ensure the effective mitigation of commercial, recreational and customary fishing, pearling and aquaculture, developed with relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none"> the number of initiatives implemented to support coexistence of fishing, pearling and aquaculture within impacted area. 	Pre-Construction	Construction and Operation		

4.6.8.1. Category C Activities

Localised cumulative impacts with Category A and C are likely to be evident on pearling operations offshore from James Price Point from activities that would coincide at the same time in close proximity to the 3Nm Commonwealth Marine Area boundary. These activities include pipeline construction and operation and dredging and dredge spoil disposal. Category C aspects which have the potential to impact pearling are limited to marine site disturbance and excavation (when pipeline and marine infrastructure construction occurs at the same time), physical presence of marine infrastructure (most notably exclusion areas in the vicinity of pipeline and other marine infrastructure) marine noise and vibration and sediment deposition and turbidity (when dredging and spoil disposal is being undertaken near the 3Nm boundary). The upstream development activities would involve the direct and indirect disturbance and loss of benthic habitats which may indirectly impact on broader ecosystem functioning for pearling, however, this disturbance is expected to be very localised (and typically away from shallow nearshore concentrations of BPPH and pearling leases). In addition, circulation in areas beyond the 3Nm boundary is likely to reduce the extent of dredge plumes associated with pipeline construction and spoil disposal in the vicinity of pearling leases.

Increased vessel movement during exploration, construction and operation of the gas fields may impact aquaculture and pearling activities by increasing the risk of vessel collision and restricting access to pearl lease areas.

Overall, the predicted impacts are not expected to significantly compromise the main objective associated with this factor (as stated in the **Pearling Act 1990**) to “*conserve the pearling resource, maintain and protect the marine environment in which pearl farming is carried out, and maximise the net economic, social and other benefits from pearling activities to the Western Australian community and pearling industry*”.

■ **Table 4.6-5 Impact Assessment Summary for Pearling and Aquaculture.**

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future proponent Management Plans	
Noise and vibration	<i>Disturbance to existing and future activities</i> Prior to movement of oysters to 'grow out' areas, noise and vibrations can cause spat to unsettle. Strong spat growth in nursery culture means strong byssal attachment to the culture gear. While vibration may be a stress on the oysters which may induce spawning, there is no evidence to suggest this.	Establish the Broome Port Authority as the statutory Port Authority for the BLNG Precinct, and an associated port area, which would have functions including regulation of: <ul style="list-style-type: none"> marine construction within the port area; long term dredging and spoil disposal program and management strategy to service the port area; 	Prior to commencement of dredging, proponents of derived proposals shall prepare and implement a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts. The Plan shall include: <ul style="list-style-type: none"> Consideration of the re-use of suitable dredge material for MOF construction, where practicable. 	Undertake an engagement process with potentially affected aquaculture and pearling operators and permit holders as a basis for determining measures to avoid, reduce or mitigate impacts on existing operations. Proponents of derived proposals shall prepare and implement a PFCEMP, to the satisfaction of the Western Australian Minister for Environment, which addresses the following: <ul style="list-style-type: none"> schedule of construction activities; 	Very low
Sediment deposition and turbidity	<i>Disturbance to existing and future activities</i> Increased and extended periods on sediment loading (smothering) and shading (TSS) which could force the shell to close more often, inhibiting its growth.	<ul style="list-style-type: none"> vessel navigation, operations and movements within the port area; establishment and management of exclusion zones; and environmental and risk management within the port area. 	<ul style="list-style-type: none"> Design of the MOF including construction of bunds to isolate fill material from wind and wave action. Consideration of applicability of management techniques and technology in meeting location specific WQ environmental values and environmental quality objectives. Consideration of re-use of reclaimed material to minimise ocean disposal. Measures to minimise dredging impacts during sensitive ecological windows. A monitoring strategy for ecological receptors and health during marine construction (including baseline surveys). The development of trigger levels for benthic communities and water quality that define additional management responses. Mechanisms to audit and assess 	<ul style="list-style-type: none"> details of the construction methods to be used; environmental training and inductions; environmental monitoring, contingencies and reporting stakeholder consultation; and consistency with requirements of Broome Port Authority and BLNG Precinct Environmental Management Framework. 	Low
Marine site disturbance and excavation	<i>Disturbance to existing and future activities</i> Access to wild stock grow-out locations may be restricted or excluded during site disturbance and excavation works, thereby limiting the accessibility of lease areas. Potential loss of benthic primary producer habitat (BPPH) in and near to the lease area may have an impact on the water quality and			Prepare and implement a Hydrotesting Procedure and a Pipeline Pre-commissioning Plan prior to such activities being carried out. See Part 3, Section	Very low

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future proponent Management Plans	
	feeding opportunities.		environmental performance of proponents during construction.	2.3 (Marine Water Quality).	
Vessel movements	<i>Disturbance to existing and future activities</i> Reduction in the accessibility of wild stock grow-out locations by pearling vessels due to the presence and movement of Precinct construction and operation vessels.		<ul style="list-style-type: none"> A communications strategy to inform other local marine users of times of peak construction activity that may influence non-construction related activities within the area. <p>The DSDMP will be subject to assessment under the <i>Environment Protection (Sea Dumping) Act 1981</i> (Cwth), including appropriate stakeholder consultation.</p>	<p>Prepare and implement a Vessel Management Plan. See Part 3, Section 2.6 - Marine Mammals.</p> <p>Prepare and implement a Marine Wastewater Discharge Management Plan (MWDMP), to the satisfaction of the Western Australian Minister for Environment. See Part 3, Section 2.3 - Marine Water Quality.</p>	Very low
Physical presence	<i>Disturbance to existing and future activities</i> Creation of artificial habitat and modification of existing habitat.		Proponents of derived proposals shall prepare and implement a PFCEMP, to the satisfaction of the Western Australian Minister for Environment, which addresses the following:	Prepare and implement a Hydrocarbon and Chemical Spill Contingency Plan, to the satisfaction of the Western Australian Minister for Environment. See Part 3, Section 2.3 - Marine Water Quality.	High
Invasive marine species	<i>Disturbance to existing and future activities</i> Increased shipping and vessel movements may increase the potential for introduction of invasive marine species (IMS). IMS may be introduced into the marine environment by various sources including on the hulls of vessels and ballast water discharge from vessels associated with the BLNG Precinct.		<ul style="list-style-type: none"> schedule of construction activities; details of the construction methods to be used; environmental training and inductions; environmental monitoring, contingencies and reporting stakeholder consultation; and consistency with requirements of Broome Port Authority and BLNG Precinct Environmental Management Framework. 	All vessels will be required to have in place a Ship-Board Oil Pollution Emergency Plan (SOPEP) and will be required to comply with MARPOL 73/78 regulations with regards to discharges at sea. See Part 3, Section 2.3 - Marine Water Quality.	Low
Marine discharges	<i>Disturbance to existing and future activities</i> Acute and chronic chemical pollution may have different expressions in pearl oyster growth, reproduction and survival. Sub lethal effects include poor growth and unusual reproductive reversals.		Proponents of derived proposals shall prepare and implement an Invasive Marine Species Management Plan, to the satisfaction of the Western Australian		Low

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future proponent Management Plans	
Non-routine discharges (spills and leaks)	<p><i>Disturbance to existing and future activities</i></p> <p>Physical effects on pearl oysters: including coating and/or smothering leading in certain cases to contamination and mortality; and chemical and biological effects (toxicity and bioavailability).</p>		<p>Minister for Environment, to minimise the risk of introducing IMS into Australian waters during the life of the activity. The plan shall be developed in consultation with the AQIS and will be applied to vessels; barges and immersible equipment that plan to enter and operate within the Precinct.</p> <p>The IMSMP will be consistent with the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry and will adhere to the AQIS Australian Ballast Water Management Requirements under the Quarantine Act (1908).</p> <p>Proponents of derived proposals shall, for the life of the activity, notify the DEC, the DoF, AQIS and the Broome Port Authority of any IMS detected in the waters of the BLNG Precinct.</p> <p>Proponents of derived proposals shall ensure that within the Low Ecological Protection Area (i.e. the discharge mixing zone) the 95th percentile of bioaccumulation toxicant concentrations meets ANZECC/ARMCANZ (2000) NWQMS 80 percent species protection guideline levels. Beyond the boundary of the mixing zone the proponent will ensure that the 95th percentile of toxicants meets ANZECC/ARMCANZ (2000) NWQMS 95 percent species protection levels.</p>		Low

Environmental Aspect (Stressor)	Potential Impacts	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Conditions	Future proponent Management Plans	
			<p>Proponents of derived proposals shall verify the performance of outfalls in terms of achieving the required dilutions, under a range of flow rates, meteorological and sea state immediately following commissioning of wastewater plants.</p> <p>Within 18 months of commissioning outfalls to the marine environment, proponents of derived proposals shall submit a report containing monitoring results and a discussion of non-conformances and the operating limitations necessary to ensure ongoing compliance to the Chief Executive Officer of the DEC.</p> <p>Proponents of derived proposals shall ensure that within the Low Ecological Protection Area (i.e. the discharge mixing zone) the 95th percentile of bioaccumulation toxicant concentrations meets ANZECC/ARMCANZ (2000) NWQMS 80 percent species protection guideline levels. Beyond the boundary of the mixing zone the proponent will ensure that the 95th percentile of toxicants meets ANZECC/ARMCANZ (2000) NWQMS 95 percent species protection levels.</p>		

4.7. Relevant Factor: Tourism

The DSD conducted an SIA of the proposed Precinct at James Price Point. This SIA included a TIA undertaken by Tourism WA and conducted by Kadar Pearson and Partners (KPP Business Development, 2009; **Appendix D -5**). Unless otherwise stated, this section is summarised largely from the TIA and also from the DSD three-volume Strategic SIA (DSD, 2009a; **Appendix D-1**, DSD, 2009b; **Appendix D-2** and DSD, 2009c; **Appendix D-3**). This section should be read in conjunction with **Part 5, Section 4.8** (Sport, Recreation and Land Use (including Recreational Fishing)) and **Part 5, Section 4.5** (Commercial Fishing).

4.7.1. Current Knowledge

A TIA was undertaken to assess the impacts on the tourism industry in Broome and the West Kimberley region, of the construction and ongoing operation of the proposed BLNG Precinct in the vicinity of James Price Point.

Tourism is significant in the Kimberley region and is based predominantly on the exceptional natural and cultural assets that the region has to offer. Broome is the major gateway to the Kimberley region that includes internationally significant and recognised areas such as Ramsar wetlands, Purnululu National Park, the Kimberley coastline, Aboriginal rock art sites and areas of international geological significance.

Tourism supports a large proportion of jobs in retail trade, accommodation and food services with approximately 25% of jobs in Broome in these sectors, compared to 17 percent in the Kimberley and the State generally.

As discussed in Volume 1: SIA Scope and Profile, on census night in 2006, about 37% of people were visitors to the Kimberley compared to the State average of 7%. In the Shire of Broome of the 19,783 people counted on census night, 8030 (or 40.6%) were visitors.

In the year ending March 2010 total passengers (arrivals and departures) excluding non-fare paying passengers for Broome was 321,158, which was a 6.3% increase on March 2009 figures (302,021)¹, however it must be noted that air travel is often used significantly for business purposes and therefore air travel growth is likely to also reflect business growth in the state.

The average annual visitors per year over the period from 2001 to 2009 to the Shire of Broome was 216,300, of this 46% were intrastate, 35% interstate and 18% international, with the average length of stay estimated at 7.2 nights. 63% of domestic visitors visited for holiday and leisure with 20% visiting for business. 89% of international visitors visited for holiday and leisure².

The TIA has also identified that tourism is an important industry to the Indigenous community, with approximately 20 Indigenous cultural tourism organisations operating in the Broome and Dampier Peninsula area, that offer a range of tourist activities from bush retreats to wilderness experiences, dreamtime and off-road tours (**Figure 4.7-1**).

The principle tourism receptors in close proximity to the James Price Point coastal area are informal camp grounds and natural features such as beaches and the near shore environment. The location of tourism receptors which also provide value as sports and recreational features are shown in **Figure 4.8.1** in **Part 5, Section 4.8** (Sport, Recreation and Land Use (including Recreational Fishing)).

¹ Tourism Western Australia. Quarterly Tourism Snapshot – Year Ending March 2010. Prepared by Research Tourism Western Australia. June 2010.

² Tourism Western Australia. Shire of Broome Overnight Visitor Fact Sheet. Years Ending December 2007, 2008 and 2009



Source: KPP Business Development, 2009; Appendix D-5.

■ Figure 4.7-1 Indigenous Tourism Products – Broome and Dampier Peninsula.

A key characteristic of the Kimberley tourism sector is the strong interdependency that exists between tourism groups, operators, accommodation providers and support services.

4.7.1.1. Kimberley Region and Broome Tourism

Broome has a range of accommodation options including:

- luxury hotels (4-5 star rating);
- standard hotels (3-3.5 star rating);
- self contained apartments (4-4.5 star rating); and
- bed and breakfasts, backpacker hostels and caravan parks.

The TIA identified 58 accommodation establishments with 3,571 available rooms in the Broome township (excludes campsites). A breakdown of room numbers by accommodation is provided in Table 4.7-1.

■ Table 4.7-1 Broome Short Stay Accommodation – Room Numbers by Type.

	Luxury Hotels	Standard Hotels	Self Contained Apartments	B & B	Camp/Caravan	Backpacker	Total
Rooms	908	150	420	49	1,542	502	3,571

Consultation undertaken with accommodation providers, land and marine based tour operators, retailers and providers of goods and services to visitors, as part of the TIA, revealed the following key characteristics of the tourism industry (**Table 4.7-2**).

■ **Table 4.7-2 Key Characteristics of Kimberley Tourism Industry.**

Parameter	Value (2008)
Number of visitors to the Kimberley	274,200
Number of visitors to Broome	260,990
Contribution to the Kimberley economy (including multipliers)	\$637.3m
Tourism core industry (direct impact of end providers of goods and services to visitors)	\$369m 20.7% of Gross Regional Product (GRP)
Tourism industry employees	2,175

Information provided by tourism stakeholders consulted during the TIA, including accommodation providers, land and marine tour operators, retailers and providers of goods and services to visitors shows that 1,361 persons are estimated to be employed directly in servicing the visitor market in Broome and 2,175 persons are employed directly in servicing the visitor market in the Kimberley.

On the basis of this analysis, 16.8% of the labour force in the Shire of Broome is employed directly in the servicing or provision of goods and services to visitors, comprising 12.25% of the Kimberley workforce.

4.7.1.2. Dampier Peninsula Tourism

It is not possible to accurately describe the nature and extent of tourism activity (i.e., volume and frequency of activity by locality and season) in the James Price Point and Dampier Peninsula areas due to the absence of current survey data on tourism and recreational use of these areas.

The volume of tourists travelling into the Dampier Peninsula includes estimates of up to 35,000 visitors per annum with the number of tourists visiting the James Price Point being area only a small proportion of this number. It is expected that the majority of recreational users in the James Price Point area are local (Vaughan Davies TWA, pers comms). Land based tourism activity occurring in the James Price Point area is likely to involve recreational fishing, camping and sightseeing. Tourists are more likely to access the area while on a fishing charter tour.

4.7.1.3. Regional Charter and Cruise Ship Tourism

Broome's tourism sector also benefits from cruise ship tourism. The Kimberley coast is the focus of a small but important expedition cruise industry that operates mostly from Broome and trades on the exceptional wilderness values that exist along the entire Kimberley coast. Commercial expedition cruising to this wild and remote part of the Kimberley coast has grown rapidly over the past 10 years. In 2006/07 twenty-eight companies, operating 30 vessels were conducting coastal expedition cruises between Broome and Wyndham (Scherrer *et al*, 2008).

Large international cruise ships also visit and berth at Broome's port. Broome hosts around 24,000 transit passengers from large cruise ships each year. The TIA stated that cruise ship movements through the port of Broome are anticipated to increase by 25.8% in the 2009/2010 financial year.

Approximately ten charter fishing operators are currently based in Broome. Of these, some operate more than one vessel. Around 15 active vessels currently offer fishing tours from Broome. Other operators include:

- aquatic eco-tour operators;
- land-based fishing tour operators; and
- land and boat based fishing tour operators.

Fishing tour operators range from small specialists offering tours such as kayak fishing and creek-based fishing for barramundi, threadfin, sail fishing and other near-coast species and viewing marine life off the Quondong Point-James Price Point area, to operators with large and expensive vessels that utilise a range of areas along the Kimberley coast into and beyond the Buccaneer Archipelago.

4.7.1.4. Statutory Requirements, Policy and Guidance

The following relevant legislation, policies and guidance are applicable to the management of tourism:

Commonwealth

- *Tourism Australia Act 2004.*
- SEWPAC National Estate Register.
- Current national heritage assessment of the Kimberley Region (refer to **Part 5, Section 4.1**).

State

- Australia's North West, Tourism Development Priorities 2010- 2015. Tourism Western Australia.
- State Coastal Planning Policy 2.6 – (WAPC 2003).
- The Shire of Broome Town Planning Scheme 4 (Planning WA 2010).

4.7.1.5. Description of factor

Tourism is a key contributor to the Kimberley economy, and is a key sector employer. The industry is highly integrated with all elements of the sector (tour operators/accommodation operators etc) inter dependent. In recent years Broome has become a high profile tourist destination and is perceived as an access point for the Kimberley with tourists travelling on for extended luxury Kimberley coastal cruising, adventure based land based tours, Indigenous and eco experiences and as a service town to many free and independent tourists.

4.7.2. Identification of Key Aspects

4.7.2.1. Definition of relevant aspects

Aspects associated with the development and operation of the BLNG Precinct and associated infrastructure that may have a social-economic impact in relation to Tourism were identified in the Scope of the Strategic Assessment and considered in the impact assessment to be of medium to high significance. These aspects include:

- altered fire regime;
- atmospheric emissions;
- use of infrastructure and services;
- restricted areas;
- increased demand for labour;
- introduced pests – terrestrial;
- light emissions – marine;
- marine noise and vibration;
- marine discharges including non routine events;
- physical presence marine and terrestrial;
- sediment deposition and turbidity;
- site disturbance and excavation – marine and terrestrial;
- terrestrial wastes and discharges;
- vegetation/habitat clearing;
- vehicle movements; and
- vessel movements.

The potential impact on tourism from terrestrial wastes and discharges and marine site disturbance/excavation was found to be low during the scoping of the proposal and these aspects have not been addressed any further in this assessment.

4.7.3. Sources of Potential Impact

Currently no large scale development activities occur within the James Price Point coastal area. The presence of the BLNG Precinct has the potential to impact upon tourism.

Activities, facilities and infrastructure associated with the development and operation of the BLNG Precinct that may have the potential to impact include:

- clearing;
- drilling;
- piling;
- earthworks;
- dredging; and
- overall construction.

Interviews undertaken with tourists and tourist providers to support the preparation of the TIA also identified a range of additional perceived potential impacts and issues of concern and/or interest to the tourism industry, visitors and the local community.

Interviews held with smaller charter operators for the Fishing Impacts Study revealed a number of potential issues of concern, with the primary concern related to construction of marine infrastructure and on-going dredging associated with the James Price Point development affecting the sailfish and other local fish stocks. When the TIA was undertaken in early 2009, the charter fishing sector indicated that there was “little or no information available to assess the potential impacts on their business

4.7.3.1. Sensitivity and Resilience

The Tourism and Impact Assessment identified that overall industry stakeholders and residents considered that the BLNG precinct could co-exist with tourism in the area. The area is known for its remote natural and environmental heritage values and is therefore sensitive to change. However in the context of the scale of the region and the location and size of the site it is considered that the tourism industry would be relatively resilient, and as such there is the potential impact of displaced activities that need to be considered.

4.7.4. Predicted Impacts

The predicted impacts on tourism from the construction and operation of the BLNG Precinct are discussed in detail in the following sub-sections, taking into consideration the assessment of impact relevant to this factor.

Both direct and indirect impacts are considered. For the purpose of this assessment it is considered that direct impacts would largely be confined to areas of direct disturbance within the BLNG Precinct, and other locations where development activities are proposed to occur.

The impact assessment focused on those key aspects and receptors identified to be of particular relevance to the proposed BLNG Precinct activities.

The inherent impact on tourism from terrestrial wastes and discharges and site disturbance/excavation marine was found to be low during the scoping of the proposal and these aspects have not been addressed any further in this assessment.

4.7.4.1. Potential Impacts on Tourism due to Atmospheric Emissions

The potential for increased fugitive dust emissions during construction of the Precinct to impact tourists from both a human health and amenity perspective, and associated management and mitigation measures, have been addressed in **Part 4, Section 2.8** (Air Quality), **Part 5, Section 4.4** (Visual Amenity, Light and Landscape Character) and **Part 5, Section 4.9** (Human Health).

Regardless of whether human exposure to dust emissions eventuates, the perception of emissions from an industrial facility during operations also has the potential to change behaviours of existing users (they may choose to not access the area), with unforeseen impacts on the tourism sector. This potential impact and recommended management measures can be found in **Part 5, Section 5**.

4.7.4.2. Potential Impacts on Tourism due to Light Emissions – marine

As detailed in **Part 5, Section 4.4** (Visual Amenity, Light and Landscape Character), light sources from the LNG Precinct have the potential to affect visual amenity values or activities in the vicinity of the Precinct, during night hours. This may affect night-time tourism activities in the area, particularly those that capitalise on providing a remote and natural tourism experience.

The most visible elements of the Precinct are likely to be the Port Facility and LNG and condensate tankers. Depending on the final siting of the precinct, partially visible light sources from beyond the sand dunes may include taller elements such as flares, LNG storage tanks and processing trains. From further out to sea, beyond 37 kilometres, the light glow may be visible on the horizon. However, potential impacts from lighting at the site can be minimised by the careful placement and direction of lighting used, in accordance with relevant Australian Standards.

Cruise ships tend to travel past the proposed Precinct site and the Dampier Peninsula at sunset. As peak light emissions from the Precinct would occur after sunset, the impact of light emissions on cruise tourism is unlikely to be significant.

Further detail on assessment and proposed management measures to address visual amenity and light emissions is provided at **Part 5, Section 4.4** (Visual Amenity, Light and Landscape Character).

4.7.4.3. Potential Impacts on Tourism due to Marine Noise and Vibration

Potential sources of marine noise and vibration associated with the Precinct include:

- vessels (engines and propellers);
- drilling;
- blasting;
- piling activities;
- dredging;
- pipeline installation; and
- breakwater construction.

Activities that generate noise and vibration would occur throughout the construction and operation phases of the LNG Precinct, thereby potentially affecting the amenity of the local area, with flow-on effects for local tourism.

The potential for marine noise and vibration produced by the Precinct to affect tourism activities and users would be influenced to a large extent by the level of noise, the distance between the noise source and the activity, and the sensitivity of tourists and users to noise. An appropriate buffer zone has been defined to maintain a suitable separation distance between the Precinct and tourism users and other users of the broader coastal area, and would go some way to managing these impacts. Alternative tourism and recreational fishing sites located along the Dampier Peninsula are readily accessible to fishers and access to these locations and their amenity would not be impacted by the proposed precinct.

Taking into account the localised nature of near shore noise-generating activities, noise and vibration is unlikely to result in significant disturbance to tourism activities in the region. An Engagement Plan with public users of the marine and terrestrial environment in the area, including recreational users and tourism operators, will be undertaken by the State.

Most fishing charters operate between Broome and areas north of Broome. Interviews held with smaller charter operators as part of the Fishing Impacts Study, revealed a concern that seismic and other marine disturbances may damage their fisheries/sailfish aggregations and associated tours. There was also a view that dredging activities may be disruptive to their businesses but it was conceded that there was not currently enough information to assess any impact on their respective businesses.

4.7.4.4. Potential Impacts on Tourism due to Other Noise and Vibration

The TIA identified aircraft movements as an additional source of noise that may potentially impact the amenity of tourists. In particular, this addressed the potential for increased helicopter activity and noise over the Cable Beach and Chinatown tourism precincts to impact on the character, ambience, holiday atmosphere and overall destination appeal of Broome.

Operations by heavy helicopters would increase as Broome becomes the base for exploration and product well drilling in the Browse Basin.

An alternative airport site, 13 kilometres north-east of the Broome township, has been identified as a contingency if the current airport becomes capacity constrained, or other environmental factors (such as noise and amenity) impinge on the airport operations. However, the Broome International Airport Masterplan (June 2008) indicated that the airport would remain in its current location until at least 2025.

An infrastructure workshop held in Broome in September 2009 and facilitated by the DSD to support the department's SIA process (DSD 2009) has identified that helicopter companies have expressed a desire to work closely with the community, to minimise impacts associated with helicopter movements.

The TIA rated the potential for the project to negatively affect visitor perceptions of Broome and the Kimberley destination appeal as a critical risk factor as a result of current and potentially future negative publicity on the project and its development. Noise and vibration in particular were identified as factors that could potentially affect the amenity of the region and the tourist values associated with the Kimberley along with marine physical presence and vessel movements.

The TIA characterised the BLNG Precinct as having potential to result in significant increases in activities to a relatively remote area of the Shire of Broome that has traditionally only been accessed by local Indigenous communities, tourism operators, aquaculture operators and recreational users.

Management measures to address visitor perceptions are outlined in the SIA Summary for Strategic Assessment Report.

4.7.4.5. Potential Impacts on Tourism due to Marine Discharges - Including Non-Routine Events

Marine discharges may impact the sense of place and local amenity of the area, and in turn affect tourism values as a result of a major discharge or spill into the marine environment.

An appropriate zone has been defined to maintain suitable separation distances between the LNG Precinct and tourism and other users of the broader coastal area.

Additional measures to address this potential impact are outlined in **Part 3, Section 2.3** Marine Water Quality and **Section 2.8** Marine Ecosystem Integrity.

4.7.4.6. Potential Impacts on Tourism due to Physical Presence – Marine

The SoSA has identified that physical presence of the Precinct and associated infrastructure has the potential to affect tourism values through:

- exclusion zones;
- introduction of large vessels to the region;
- increased marine traffic; and
- installation of marine facilities.

Impacts associated with these activities have been addressed under the heading of Vessel Movements below.

4.7.4.7. Potential Impacts on Tourism due to Physical Presence – Terrestrial

The SoSA identified that the “physical presence of the LNG Precinct would affect amenity of the local area with flow-on effects for tourism”.

The Precinct development would result in permanent restrictions of some local tourism activities and potential loss of features of tourism value in the immediate James Price Point area, which would affect the number of tourists visiting the area.

The TIA identified that the presence and visibility of a fly-in fly-out workforce has the potential to compromise the region's tourism values and destination appeal through the increased presence of an industry workforce in the locality, for example workers dressed in fluorescent uniforms and boots or orange flags on 4WDs.

4.7.4.8. Potential Impacts on Tourism due to Altered Fire Regime

The presence of the Precinct may result in alterations to existing fire regimes on the Dampier Peninsula, through the introduction of new ignition sources and fire management practices.

Impacts associated with altered fire regimes would be primarily positive in nature due to the presence of the BLNG Precinct. For example, risk of significant and/or uncontrolled bush fires may be reduced, thus improving tourist safety and safeguarding of property, structures and facilities in the area (for example campsites).

4.7.4.9. Potential Impacts on Tourism due to Sediment Deposition and Turbidity

Any increase in turbidity, or visible dredge plumes in areas accessed by the public or commercial tourism operators, has the potential to affect visual amenity, perception of environmental values, and impact on the ‘Broome brand’ which are all of significance to the residential population of Broome, the wider region and to visitors from a cross Australia and internationally.

Marine life is considered to be the drawcard for many tourists, therefore turbidity or sedimentation would also have negative indirect impacts on tourism.

The turbidity caused by dredging is temporary and these impacts are anticipated to be restricted to the area around James Price Point and surrounding nearshore waters. **Part 5, Section 4.5** includes an assessment of the visual amenity impacts of a visible dredge plume.

4.7.4.10. Potential Impacts on Tourism due to Site Disturbance and Excavation – Marine

A sustained period of marine construction activity may also impact passing tourist vessels and cruise ships as they sail along the coast. This impact is likely to be mostly visual (from turbidity – refer above), with potential ‘brand’ issues for Kimberley tourism, which has traded on the concept of the ‘undisturbed’ Kimberley coastline.

4.7.4.11. Potential Impacts on Tourism due to Site Disturbance and Excavation – Terrestrial

Clearing activities would be limited to the development area within the Precinct footprint and minimised to the greatest extent possible. However, site disturbance and excavation works to facilitate the construction of the Precinct may result in a loss of tourist features, such as camp grounds, and disturb current tourism activities.

Restricted accessibility to areas used by tourists may also occur during site disturbance activities.

A Sport and Recreation workshop facilitated by the DSD in Broome in September 2009 to inform the preparation of DSD's SIA revealed that day trips and informal camping at James Price Point were popular pastimes among some locals, particularly during the school holidays with many people camping and participating in shore fishing.

Illegal camping was seen by workshop participants as a significant issue, with the need for formal campsites to be identified and alternative campsite locations developed at Barred Creek and Quondong Point.

Visitor surveys that were undertaken during the TIA were primarily to identify visitor perceptions of the proposed Precinct development, associated development activities and perceptions of co-existence. Consultation undertaken to inform the TIA did not determine current areas of interest/use.

Mitigation measures to address this potential impact are also addressed in **Part 4, Section 2.4** (Terrestrial Flora and Vegetation), **Section 2.7** (Terrestrial Ecosystem Integrity) and below under the sub-heading of Restricted Areas.

4.7.4.12. Potential Impacts on Tourism due to Restricted Areas Access

Marine and terrestrial restricted areas associated with the construction and operation of a minimum of two LNG projects within the Precinct would constrain the access of tourists in and around James Price Point.

The FIS (Big Island Research 2009) reports that many of the tourists that visit Broome by car bring a small boat with them, either on a trailer or on the car roof-top. This assessment assumes that most tourists who bring a boat to Broome are likely to undertake some fishing, with a portion returning to Broome year after year. There is at least one tourism operator presently using the James Price Point land features for photography class purposes.

Interviews with tackle-shop owners noted that most visitors do at least some fishing. Preferred fishing locations have been detailed in **Part 5, Sections 4.5** Commercial Fishing and **Section 4.8** (Sport, Recreation and Land Use (including Recreational Fishing)) and included Barred Creek, Quondong, and James Price Point, as favoured locations for tourists to participate in shore-fishing activities. While there appears to be "somewhat less recreational shore-based fishing at James Price Point" due to the presence of cliffs and steep hills, the Point does provide excellent fishing reefs.

Access restrictions have the potential to interrupt the Goolarabooloo eight day song line walk (the Lurujarri Trail, which extends along the coast from Minyirr to Coulomb Point). This is addressed further in **Part 5, Section 3**.

4.7.4.13. Potential Impacts on Tourism due to Vegetation/Habitat Clearing

With respect to impacts on tourism, potential impacts associated with vegetation and habitat clearing, are closely related to site disturbance and excavation activities addressed above. Therefore, the same mitigation measures will apply.

Assessment and mitigation measures are addressed in **Part 4, Section 2.4** (Terrestrial Flora and Vegetation) and **Section 2.7** (Terrestrial Ecosystem Integrity).

4.7.4.14. Potential Impacts on Tourism due to Vehicle Movements

The SoSA indicated that an increase in traffic due to the construction and operation of Precinct facilities on the Dampier Peninsula may disrupt tourist traffic.

The Infrastructure Assessment completed by AECOM (2010d) reports that in general the regional and local road networks should be capable of supporting Category A, B and C activities given initial road capacity analysis.

The Infrastructure Assessment also reports that the recent construction of the Gubinge Road link between Port Drive and Gantheaume Point Road has been pivotal in separating heavy vehicles from residential, tourism and public transport within the town of Broome and contributes to the safety of local residents and tourists. There are however, conflict points from central Broome across Gubinge Road to Cable Beach, as well as the further development of Broome North, which would be carefully planned to ensure safety and accessibility objectives are achieved.

The Shire of Broome and Main Roads WA are constantly maintaining important regional connector road links to connect Broome to areas such as James Price Point, Beagle Bay and Cape Leveque. This includes Manari Road (for tourist destinations) and Broome Cape Leveque Road (to ensure accessibility to local and Indigenous communities further north of Broome).

4.7.4.15. Potential Impacts on Tourism due to Vessel Movements

Vessel movements associated with the Precinct and associated marine traffic have the potential to restrict existing marine based tourism such as cruising and whale watching operations through the application of temporary and permanent exclusion zones in the area. Tourist camping activities along the coastal zone may also be affected.

4.7.5. Mitigation and Management Measures

Table 4.7-3 summarises the predicted impacts and mitigation measures to be undertaken in relation to aspects or activities that may have an impact upon tourism.

The Strategic Social Impact Management Plan is presented in **Part 5, Section 5** which outlines the management framework for the BLNG Precinct in order to mitigate any potential social-economic impacts, including mitigation and management measures to address visitor perception, and should be referred to for further detail. As some of the social-economic impacts are indirect environmental management plans will also be relevant in terms of mitigating social impacts and these are presented in detail within each of the relevant environmental sections.

The relevant State Government measures comprise:

- The management of Roebuck Bay and 80 Mile Beach through the establishment of the Roebuck Bay Management Plan, and on-going management of 80 Mile Beach by DEC.
- The State Government intends, through the implementation of the Dampier Peninsula Land Use and Infrastructure Plan, to facilitate the establishment of additional nature reserves and/or national parks within the Dampier Peninsula to secure representative vegetation of the Peninsula in reserves, protect fauna habitat of rare and specially protected fauna and to protect Aboriginal culture and heritage. The establishment of a National Park and its location will be in accordance with an Indigenous Land Use Agreement with the Goolarabooloo Jabirr Jabirr Native Title Claimants.
- Mitigation measures to avoid impacts on terrestrial conservation areas from indirect activities associated with the implementation of the Plan including:
 - fire and weed management in and around Coulomb Point Nature Reserve and any other nature reserves established in the vicinity of the Plan area in collaboration with the DEC;
 - DEC to monitor visitor numbers to Coulomb Point Reserve camping area; and
 - DEC to develop a management plan for the Coulomb Point Reserve.
- Prepare and implement a Fire Management Strategy for the Dampier Peninsula to align with existing fire management strategies to reduce the frequency of fires and the occurrence of late dry season burns to the Peninsula.
- Prepare and implement an Engagement Plan to manage all interactions with public users of the marine and terrestrial environment in and around James Precinct Point, including recreational users and tourism operators.
- Ensure planning and layout of the BLNG Precinct is subject to appropriate strategic land use buffer zoning in alignment with State Planning Policy (Industrial Buffer Policy) and EPA Requirements (Guidance Statement No.3) to ensure appropriate separation distances between industrial and other land uses.
- Establish the Broome Port Authority as the statutory Port Authority for the BLNG Precinct, and an associated port area.

- The Port Authority will prepare a BPEMP for the port area.
- Proponents of derived proposals shall demonstrate application of best practice measures to be implemented to minimise the impacts on coastal processes from onshore and near shore marine infrastructure.
- Develop and implement a Management and Monitoring Strategy for Vegetation of Medium to High Conservation Significance which will inform proponents of derived proposals of requirements for detailed management plans specifically relating to:
 - Fire Management Plan;
 - Terrestrial Fauna Management Plan;
 - Terrestrial Weed Management Plan; and
 - Appropriate management of hydrology (both surface water and groundwater).

Other relevant mitigation and management measures (as outlined in **Part 5, Section 5**) comprise;

- Management of Tourism Impacts (Tourism Management Strategy);
- Management of impacts of recreational use;
- Broome sense of place management;
- Controlled-access construction camp; and,
- Precinct Governance

The Tourism Management Strategy is the main strategy to address the potential impact to recreational activities. The intention of this strategy is that the TourismWA lead the development of a strategy that maintains the current tourism image of Broome, while providing a framework for the ongoing development of the LNG Precinct

A key concern from a tourism perspective relates to the potential impacts from the FIFO workforce. A number of mitigation measures have already been identified by the potential Foundation Proponent, Woodside, to mitigate the perceived impacts associated with the presence of a FIFO workforce. These mitigation and management measures are discussed in detail in **Part 5, Section 5**. The measures are designed to reduce the likelihood of the identified impacts, including short term accommodation shortages, airport activity and contact between a fly-in-fly-out workforce and leisure visitors to Broome.

Key proponent management plans comprise:

- Preparation and implementation of a Construction Environment Management Plan (**CEMP**).
- Preparation and implementation of a Port Facilities Construction Environmental Management Plan (PFCEMP).
- Preparation and implementation of a Hydrocarbon and Chemical Spill Contingency Plan.
- Preparation and implementation of a Waste Management Plan.
- Preparation and implementation of a Rehabilitation Plan.
- Preparation and implementation of a Quarantine Management Plan.
- Preparation and implementation of an Air Quality Management Plan.
- Invasive Marine Species will be managed in accordance with International, Commonwealth and State legislation, which will be outlined in an IMSMP. The IMSMP would be developed in consultation with the Australian Quarantine Inspection Service (AQIS) and will be applied to vessels, barges and immersible equipment that plan to enter or operate within the precinct and will be conducted in a manner that is consistent with relevant conventions and associated guidance, including, but not limited to:
 - IMO – ‘International Convention for the Control and Management of Ships’ Ballast Water and Sediments’;
 - Convention on Biological Diversity - specifically identifies the need to “control or eradicate those alien species which threaten ecosystems, habitats or species”;
 - United Nations Convention of the ‘Law of the Sea’ - specifically protection and preservation of the marine environment;
 - ANZECC/ARMCANZ Code of Practice for Antifouling and In-water Cleaning and Maintenance; and
 - Voluntary Biofouling Management Guidance Documents.

- Proponents of derived proposals shall demonstrate application of best practice measures to be implemented to minimise the impacts on coastal processes from onshore and near shore marine infrastructure.
- All vessels will be required to have a SOPEP.
- Preparation and implementation of a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts.
- Preparation and implementation of a VMP.

The Transport Management Strategy discussed in **Part 5, Section 5** will address transport-related impacts.

4.7.6. Socio-economic Outcome of Category A Activities

Based on currently available information there will be some disturbance to marine and land based tourism activities in the vicinity of James Price Point during construction and operation of the Precinct, with changes to access occurring upon commencement of construction through to decommissioning.

Actioning the mitigation measures described above and those necessary to meet environmental obligations, in conjunction with ongoing consultation with the tourism and related sectors, should ensure that the Precinct construction and operation is unlikely to result in a significant detrimental, permanent effect on tourism/visitor activities or compromise the tourism industry. With appropriate consultation and management, the environmental protection objective would be met.

4.7.7. Cumulative Impacts of the Proposal and Associated Activities and Projects

The construction and operation of a minimum of two LNG projects within the Precinct has the potential to increase pressure on existing tourism activities particularly in relation to land use and perception of the wider area. However Consultation during the TIA determined that 51% of Broome residents believe that the BLNG Precinct can co-exist with tourism with 45% disagreeing that this was possible. The remaining 4% was undecided. Furthermore, while the industry stakeholders, visitors and resident groups surveyed considered that the proposed development would have a negative impact on the Kimberley's reputation and image, half of those surveyed felt that the LNG development would increase the economic base and economic diversity of the region.

■ Table 4.7-3 Impact Assessment Summary for Tourism.

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
Atmospheric Emissions	There is the potential for fugitive dust emissions during construction and other emissions associated with operation that may impact on tourists if present within the immediate area of the precinct.	Prepare and implement a Management Plan for Roebuck Bay and on-going Management of 80 Mile Beach.	Proponents of derived proposals shall prepare and implement an IMSMP, to the satisfaction of the Western Australian Minister for Environment,	Prepare and implement a Construction Environmental Management Plan. Preparation and implementation of a PFCEMP.	Very Low
Light emissions - marine	The presence of the Precinct will alter the exiting light environment, and therefore has the potential to impact on the visual amenity of the area due to night time sky glow effects.	Implementation of Dampier Peninsula Land use and Infrastructure Plan to facilitate the establishment of additional nature reserves and/or national parks.	to minimise the risk of introducing IMS to Australian waters during the life of the activity. The plan shall be developed in consultation with the AQIS and will be applied to vessels; barges and immersible equipment that plan to enter and operate within the Precinct.	Prepare and implement a Dredging and Dredge Spoil Management Plan (DSDMP), to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts.	Low
Noise and vibration	The construction and operation of the Precinct will later the exiting noise environment, so there is the potential to impact on tourist using the area from an amenity perspective.	Mitigation measures to avoid impacts on terrestrial conservation areas from indirect activities associated with the implementation of the Plan including;			Very Low
Marine Discharges - Including Non-Routine Events	Marine discharges may impact the sense of place and local amenity of the area, and in turn affect tourism values as a result of a major discharge or spill into the marine environment		Prior to commencement of dredging, proponents of derived proposals shall prepare and implement a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging	Prepare and implement an IMSMP. Preparation and implementation of a Quarantine Management Plan.	Very Low
Physical Presence	The physical presence of the Precinct will result in a permanent alteration to the area, with associated restriction, traffic movement and visual amenity issues.	<ul style="list-style-type: none"> Fire and weed management in and around Coulomb Point Nature Reserve and any other nature reserves established in the vicinity of the Plan area in collaboration with the DEC; DEC to monitor visitor 		Preparation and implementation of an Air Quality Management Plan.	Low
Altered Fire regime	Impacts associated with altered fire regimes would be primarily positive in nature. For example, risk of significant and/or uncontrolled bush fires may be reduced, thus improving tourist safety and safeguarding of property, structures and facilities in the area (for			Proponents of derived proposals shall demonstrate application of best practice measures to be implemented to minimise the impacts on coastal processes from onshore and near shore marine infrastructure.	Very Low

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
	example campsites).				
Sediment deposition and turbidity	Any increase in turbidity, or visible dredge plumes in areas accessed by the public or commercial tourism operators, has the potential to affect visual amenity, perception of environmental values	numbers to Coulomb Point Reserve camping area; and <ul style="list-style-type: none"> DEC to develop a management plan for the Coulomb Point Reserve. 	impacts. The Plan shall include: <ul style="list-style-type: none"> Consideration of the re-use of suitable dredge material for MOF construction, where practicable. Design of the MOF including construction of bunds to isolate fill material from wind and wave action. Consideration of applicability of management techniques and technology in meeting location specific WQ environmental values and environmental quality objectives. Consideration of the re-use of reclaimed material to minimise ocean disposal. Measures to minimise dredging impacts during sensitive ecological windows. A monitoring strategy for ecological 	All vessels will be required to have a SOPEP. Preparation and implementation of a VMP. Preparation and implementation of a Transport management Plan. Proponents of derived proposals shall demonstrate application of best practice measures to be implemented to minimise the impacts on coastal processes from onshore and near shore marine infrastructure.	Very Low
Site Disturbance and excavation	During the construction phase there will be disturbance which has the potential to impact on tourism amenity of the area which is perceived to be 'undisturbed'.	Prepare and implement a Fire Management Strategy for the Dampier Peninsula to align with existing fire management strategies to reduce the frequency of fires and the occurrence of late dry season burns to the Peninsula.			Very Low
Restricted Access	Impacts on areas that tourists currently potentially access.				Low
Vegetation clearance	Similar impacts as those experienced as a result of site disturbance could be encountered, as well as potential loss of habitats that are visited for tourism.	Prepare and implement an Engagement Plan to manage all interactions with public users of the marine and terrestrial environment in and around James Precinct Point, including recreational users and tourism operators.			Very Low
Vehicle movements	Increased traffic may be as a result of the Precinct Operation may impact on tourism use of the area.				Very Low
Vessel movements	Vessel movements associated with the Precinct and associated marine traffic have the potential to restrict existing marine based tourism such as cruising and whale watching operations through the application of temporary and permanent exclusion zones in the area. Tourist camping activities along the coastal zone may also be affected.	Ensure planning and layout of the BLNG Precinct is subject to appropriate strategic land use buffer zoning in alignment with State Planning Policy (Industrial Buffer Policy) and EPA Requirements (Guidance Statement No.3) to ensure			Very Low

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
		<p>appropriate separation distances between industrial and other land uses.</p> <p>Establish the Broome Port Authority as the statutory Port Authority for the BLNG Precinct, and an associated port area.</p> <p>The Port Authority will prepare a BLNG Precinct Environmental Management Plan (BPEMP) for the port area.</p> <p>Develop and implement a Management and Monitoring Strategy for Vegetation of Medium to High Conservation Significance which will inform proponents of derived proposals of requirements for detailed management plans specifically relating to</p> <ul style="list-style-type: none"> • Fire Management Plan; • Terrestrial Fauna Management Plan; • Terrestrial Weed Management Plan; and • Relevant management of 	<p>receptors and health during marine construction (including baseline surveys).</p> <ul style="list-style-type: none"> • The development of trigger levels for benthic communities and water quality that define additional management responses. • Mechanisms to audit and assess environmental performance of proponent during construction. • A communications strategy to inform other local marine users of times of peak construction activity that may influence non-construction related activities within the area. <p>The DSDMP will be subject to assessment under the <i>Environment Protection (Sea Dumping) Act 1981</i> (Cwth), including</p>		

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
		<p>hydrology (both surface water and groundwater).</p> <p>Development and implementation of a Tourism Management Strategy in conjunction with TourismWA to ensure maintenance of the current tourism industry in Broome, but also to provide an ongoing framework for development</p>	appropriate stakeholder consultation.		

4.8. Relevant Factor: Sports, Recreation and Land Use (including Recreational Fishing)

The DSD conducted an SIA of the BLNG Precinct at James Price Point. This SIA included a TIA commissioned by Tourism WA and a Fishing Industry Impact Assessment (FIS) (Big Island Research (2009)¹ commissioned by the DoF. Unless otherwise stated, this section is summarised from these studies and the DSD three-volume Strategic SIA (DSD 2009). This section should be read in conjunction with **Part 5, Section 4.7** Tourism. In addition to impacts on sport and recreation, this section addresses potential impacts on existing landscape values, including customary values.

4.8.1. Current Knowledge

The Kimberley region of WA supports leisure activities including fishing and camping, with recreational uses reflecting the unique environment, remoteness, wilderness, culture and lifestyle of the region.

In general, the Dampier Peninsula is used for camping, day trips and other outdoor pursuits by residents of Broome, the Peninsula and occasional tourists. The Dampier Peninsula has a number of four-wheel drive access tracks, making it a popular destination for self sufficient tourists.

The land and sea area surrounding the proposed BLNG Precinct site at James Price Point has a number of community and recreational characteristics which are valued by the community and visitors to the area.

It is not possible to accurately describe the nature and extent of recreational use (i.e. volume and frequency of activity by locality and season) in the Broome and Dampier Peninsula areas due to the absence of current survey data on recreational and tourism use in this area.

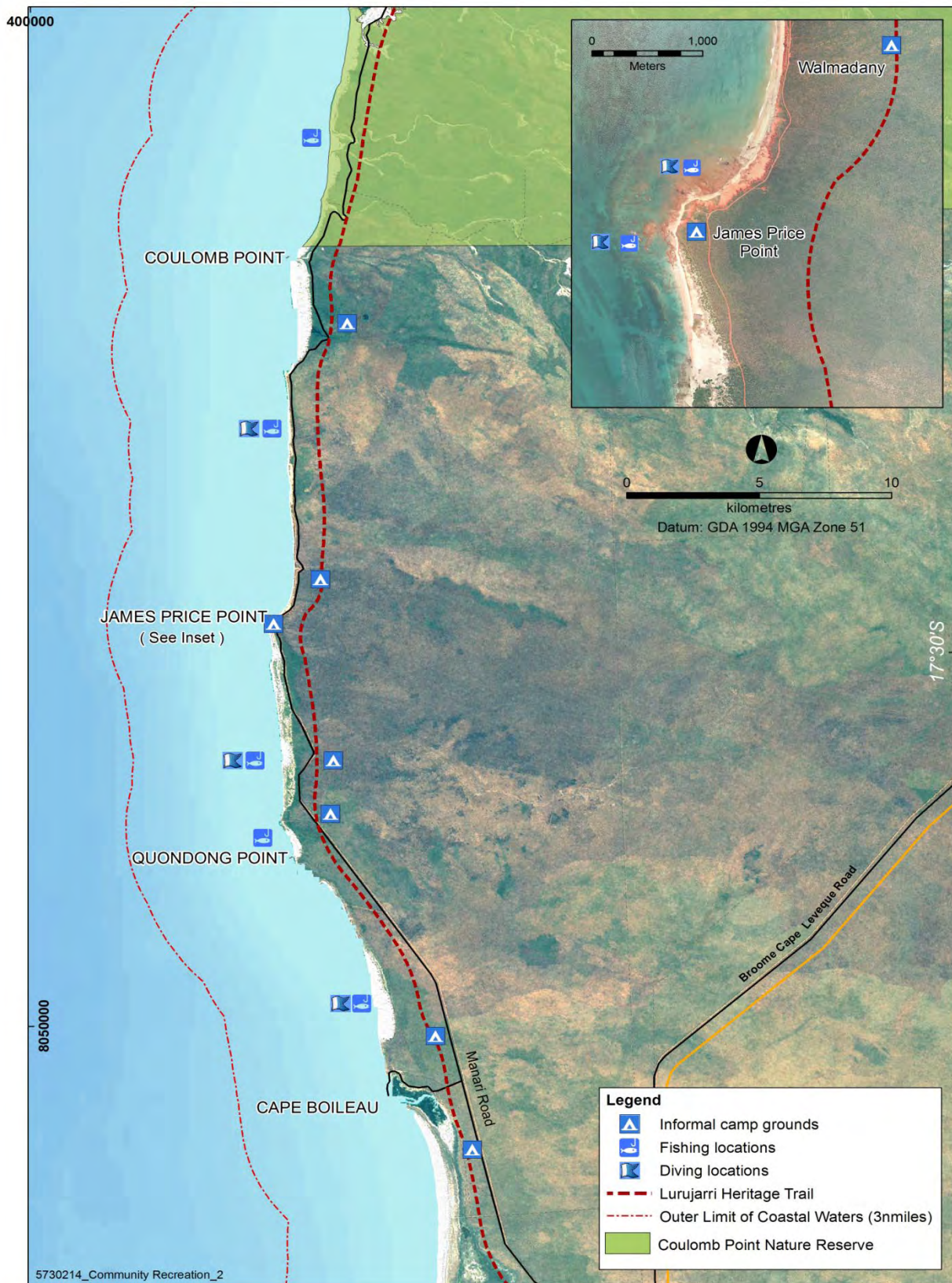
Additional areas valued more broadly for recreation and leisure activities are summarised in **Table 4.8-1**.

¹ Information in the report is based on interviews with representatives of the commercial and recreational fishing community. Inevitably, information collected in this fashion is qualitative and anecdotal. The report should be considered a reflection of the impacts expected by those who were interviewed and is not necessarily the State's view.

■ **Table 4.8-1 Key Recreational Areas and Associated Values.**

Location	Recreational Significance
Dampier Peninsula	
James Price Point	<ul style="list-style-type: none"> • unallocated Crown land, with unregulated free, self sufficient and unpowered camping occurring on and in the immediate vicinity of the James Price Point headland on the coastal fringe; • popular recreational area for day trips, camping and fishing; • there are several campsites within the site boundary; camp sites are highly likely in other areas along the coast; • photographic tours/classes and picnic destination; tours generally stay in the area for approximately half a day; • Willie Creek and Manari areas are popular for fishing (and launching of boats); both areas are popular destinations for day-trippers; • James Price Point, Willie Creek and Manari are seen by Broome residents as fishing (and less frequently camping) spots that 'only locals tend to use' as opposed to the general tourist population who drive past these turn-offs on their way to Beagle Bay and Kooljaman at One Arm Point; and • James Price Point is seen by Broome residents as fishing (and less frequently camping) spots that 'only locals tend to use'.
Willie Creek and Manari	<ul style="list-style-type: none"> • Willie Creek and Manari areas are popular for fishing (and launching of boats). Both areas are popular destinations for day-trippers which are typically frequented by locals.
Coulomb Point Nature Reserve	<ul style="list-style-type: none"> • a Class Nature Reserve with an area of 28,676 hectares; • situated immediately adjacent to the northern boundary of the site and is managed by the DEC; • primary purpose is for flora and fauna conservation; • recreation is not a permitted use; • currently accessible via Manari Road; • an unpowered camping site is located on the southern boundary of the Reserve at Point Coulomb immediately outside the Nature Reserve; and • illegal and uncontrolled camping is likely to occur throughout the accessible coastal fringe of the Nature Reserve.
Broome	
Cable Beach	<ul style="list-style-type: none"> • extensive recreational beach (approximately 22 kilometres) to the west of Broome town centre; • many of the residents who enjoy fishing in Broome and own boats, launch from Gantheaume Beach (adjacent to Gantheaume Point); and • surf lifesaving competition activities occur regularly on the beach during the dry season.
Gantheaume Point	<ul style="list-style-type: none"> • beach at Gantheaume Point the main mooring and launching facility for recreational, charter and small to medium sized commercial vessels; • predominantly used by tourists to observe its visual splendour and the lighthouse; • many local Broome residents also use it as a spot for sunset picnics; and • an area of extreme cultural significance (known as 'Minyirr'); a very special place not just to Yawuru but many Aboriginal communities surrounding Broome, as it is the point at which several songlines intersect.

Figure 4.8-1 illustrates the location of the key recreation and landscape values as identified through a review of relevant strategic and statutory, published and unpublished documents applicable to the James Price Point locality (Urbanplan 2009); the Tourism Impact Assessment (KPP Business Development 2009) and the FIS (Big Island Research, 2009) as well as outcomes of consultation activities undertaken by DSD to support the DSD-led SIA process (DSD 2009). This review has established that the Kimberley coast has outdoor recreational value for both tourists and locals.



■ Figure 4.8-1 Community Recreation and Landscape Values – Site Location and Context.

Recreational fishing is a key aspect of the “Broome lifestyle” and is a valued pastime by many local residents as well as tourists. Recreational fishing is concentrated around Broome itself and dissipates with distance from Broome. There are around 1,200 registered boats in the Shire of Broome and recreational fishing is greatest during the dry season with many tourists travelling to the region with small boats.

About 10 charter fishing operators are based in Broome, operating 15 vessels. The operations range from small tours, such as kayak fishing, to large fishing tours (‘adventure’ fishing) that operate along the length of the Kimberley coast. At least four charter boats provide specialised tours near or offshore from Quondong Point to James Price Point (Big Island Research 2009).

The area between Quondong Point and James Price Point is an important area for recreational fishing for locals and tourists for both shore-based and vessel-based fishing. The aggregation of sailfish in particular is considered by locals as a valuable aquatic charter and recreational resource (Chris Nisbet pers comms).

Key sailfish areas have been identified at a location known as “the Peanut” which is 22km south west of James Price Point. Six charter boats have a commercial interest in sailfish fishing which attracts tourists from all over Australia and the world. Fishing for sailfish usually involves tag and release procedures. The season extends from April to November and typically involves between 65 and 80 fishing days with between 600 and 800 sailfish raised per season. The economic value of sailfish tourism is not known.

There is substantial use of the system of tracks and roads up the western side of the Dampier Peninsula to access fishing grounds for shore-based fishing. Boating access to these areas is mostly from the sea as it is difficult to tow boats up the coastal tracks.

It is not possible to accurately describe the nature and extent of recreational fishing activity (i.e. volume and frequency of activity by locality, fish species and season) in the Dampier Peninsula due to the absence of current survey data on recreational fishing in this area.

The preferred locations for shore and off-shore based recreational fishing activities are summarised in **Table 4.8-2**.

The Department of Fisheries commissioned a Fishing Industry Impact Study as part of the SIA (Big Island Research, 2009) which forms the basis for the following section. The study was based on interviews with representatives of the commercial and recreational fishing community and is largely based on qualitative and anecdotal information. As such, the report is not highly science based and reflects the impacts expected by the people interviewed at an early stage in the Precinct development process. It presents mitigation strategies suggested by fishers, rather than based on an analysis of impact.

The recreational fishers raised fears that the Precinct would cause:

- a decline in fish biomass;
- reduced fishing efficiencies caused by an increase of target by catch or an increase in fouling of fishing gear, increasing maintenance, reducing performance and fishing efficiencies; and
- reduced access to fishing areas, if there were an establishment of an Invasive Marine Species (IMS).

■ **Table 4.8-2 Preferred Recreational Fishing Locations.**

Location	Value
Barred Creek (Nearest significant coastal feature north of Willie Creek, scenic and sheltered embayment)	<ul style="list-style-type: none"> favoured for shore and coastal fishing and beach camping .
Between Quondong and James Price Point (Optimum distance (two hours) for a boating day-trip from Broome)	<ul style="list-style-type: none"> boating; and fish Productivity - the only known concentration of black marlin (billfish) in the area.
James Price Point	<ul style="list-style-type: none"> steep hills and cliffs, so less recreational shore-based fishing; excellent fishing reefs; two main reefs at James Price Point with good fishing for recreational fishers; catches include: green snapper, maori perch (gidit), mangrove jack, threadfin, whiting, painted crayfish; and unique and productive marine ecosystem.
North of James Price Point (Sheltered from southerly and easterly winds by the point, protected by the reefs)	<ul style="list-style-type: none"> only safe anchorage on the coast south of Cape Leveque to Broome; and used regularly by recreational and charter fishers.
Quondong Point	<ul style="list-style-type: none"> favoured place for locals for reef fishing.
The Peanut	<ul style="list-style-type: none"> strongest aggregation point for sailfish; and identified by boat-based recreational fishers as a special place for recreational fishing out of Broome.
The Puddle	<ul style="list-style-type: none"> identified by boat-based recreational fishers as a special place for recreational fishing out of Broome.
Gantheume Point	<ul style="list-style-type: none"> recreational fishers launch their boats from the beach at Gantheume Point as existing three boat ramps in Broome are problematic in most weather and tide conditions; and also favoured for shore fishing.

4.8.1.1. Tourism Recreational Values

Anecdotal information indicates that the area around James Price Point is used mainly by residents of Broome, for fishing day trips and for overnight camping associated with fishing and other recreational activities. The area is particularly attractive to locals and tourists because camping is free.

The existing state of sport and recreation and potential impacts from the development of the Precinct were discussed with local sport and recreation representatives during a sport and recreation workshop facilitated by DSD in September 2009 to support the Department's SIA process. Issues identified through this workshop process included the following:

- informal and illegal camping activities** – the area along the coast north of Broome, including James Price Point is a popular informal camping area, with locals and tourists alike and as there are no formal facilities for camping, “illegal” camping is considered a current issue for the Broome Shire.
- current status of sport and recreational facilities** – workshop participants considered that the current condition of sport and recreation facilities were “behind the eight ball” due to a low ratepayer base (6,000 ratepayers) but high population (due to significant tourists influxes during the tourist season). Consequently, it was expressed that, should the Precinct be developed, contrasts may be made between the perception of ‘elite’ facilities at the Precinct’s workers accommodation and poorer quality facilities in Broome.
- community participation and volunteerism** – concerns were raised regarding potential declines in community participation/volunteerism due to the workplace arrangements, for example long shifts associated with oil and gas industry workers.
- opportunities for Indigenous sport and recreation** – Indigenous communities expressed a need for both ‘hard’ and ‘soft’ sport and recreational facilities to keep Indigenous children occupied. Concern was also expressed about the potential closure of marginal outstations and the consequential movement of population to Broome and other larger communities, with concurrent pressure on resources. The Department of Sport and Recreation is currently developing an Indigenous Sport and Recreation Plan to invest in existing communities.

4.8.1.2. Statutory Requirements, Policy and Guidance

The following relevant legislation, policies and guidance are applicable to the management of recreation:

Commonwealth

- *Tourism Australia Act 2004*.
- SEWPAC National Estate Register.
- Current national heritage assessment of the Kimberley Region (refer to **Part 5, Section 4.1**).
- Fisheries Management Act 1991.

State

- State Coastal Planning Policy 2.6 – (WAPC 2003).
- The Shire of Broome Town Planning Scheme 4 (Department of Planning 2009).
- *Fish Resources Management Act 1994*.
- Fish Resources Management Regulations 1995.
- Fisheries Legislation Amendment Act 2010.

4.8.1.3. Description of Factor

Similar to tourism recreation and in particular recreational fishing are key past-time in the region for existing residents and people that visit the area. Further information is provided in the Tourism Impact assessment that was undertaken on behalf of DSD and can be found at http://www.dsd.wa.gov.au/documents/2Kimberley_LNG_Tourism_Impact.pdf.

4.8.2. Identification of Key Aspects

4.8.2.1. Definition of Relevant Aspects

Aspects associated with the development and operation of the BLNG Precinct and associated infrastructure that may have a social-economic impact in relation to sport and recreation, including recreational fishing, were identified in the Scope of the Strategic Assessment and considered in the risk assessment to be of medium to high risk. These aspects include:

- altered fire regime;
- atmospheric emissions;
- introduced pests – terrestrial;
- light emissions – marine;
- use of infrastructure and services;
- restricted areas;
- marine discharges – including non routine events;
- physical presence – marine;
- physical presence – terrestrial;
- sediment deposition and turbidity;
- site disturbance and excavation – marine;
- site disturbance and excavation – terrestrial;
- terrestrial wastes and discharges;
- vegetation/habitat clearing;
- vehicle movements; and
- vessel movements.

4.8.3. Sources of Potential Impact

Activities, facilities and infrastructure associated with the development and operation of the BLNG Precinct that may have an impact on sport and recreation (including recreational fishing) include:

- clearing;
- drilling;
- piling;
- earthworks;
- dredging activities;
- spoil disposal areas;
- vessel movements, anchoring and mooring;
- pipeline installation; and
- wastewater disposal.

Potential impacts on sport and recreation associated with air emissions, site disturbance (terrestrial and marine), use of infrastructure and services, terrestrial wastes and discharges and vegetation habitat and clearing, have since been identified in the SoSA as being of low significance based on currently available information and have not been addressed in detail below.

Terrestrial Wastes and Discharges was identified in the SoSA as an aspect with potential to cause impact to recreational fishing. This aspect was considered to have a low risk of affecting recreational fishing as any non-routine terrestrial discharge is considered to have low probability of occurrence and is unlikely to impact areas outside of the development area of the BLNG Precinct. Therefore, this aspect has not been further assessed in this section.

Site Disturbance and Excavation (Marine) and Noise and Vibration (Marine) were also considered as low risk in the SoSA; however, following consultation with recreational fishers, impacts in relation to these aspects have been further addressed in this section.

However, known values applicable to the James Price Point locality have been identified through a desktop review of strategic and statutory, published and unpublished documents to complement the ASIA (Urbanplan 2009).

4.8.4. Predicted Impacts

The most significant social impacts identified over the 30 year term of the assessment arise from the significant predicted population growth anticipated for the Shire of Broome. This would impact on access to current recreational facilities.

The majority of the above identified impacts relate to reduced access to areas/access routes currently used for marine and land recreational activities such as camping and changes to the local and natural amenity of the area.

The section immediately below addresses the potential sources of impact identified collectively. Impacts with elements additional to access have been specifically raised under the relevant aspects as appropriate.

4.8.4.1. Potential Impacts on Sport and Recreation due to Restricted Areas

James Price Point is currently a popular recreational area for camping and fishing as are nearby coastal areas. Coulomb Point Nature Reserve, situated immediately adjacent to the northern boundary of the site, is also partially accessible for recreational use.

The retention and maintenance of public access to the current recreation areas along the coastline was a concern of a significant number (65%) of the Broome community surveyed in the SIA. Access to current fishing areas was also a major concern expressed by local fishers during preparation of the Fishing Impact Assessment.

The improved access to the Dampier Peninsula and the significant natural population growth anticipated for the Shire of Broome is likely to increase the number of people visiting the Dampier Peninsula and using the recreational facilities of the region.

The draft Dampier Peninsula Land Use Plan emphasises the environmental and cultural significance of the land and surrounding James Price Point for Aboriginal people, conservation and recreation and tourism opportunities, and accordingly proposes that a large portion of the former station be set aside as a Reserve for Conservation and Aboriginal Heritage (including nature based tourism).

The construction and operation of the Precinct and the establishment of associated buffer zones to maintain public health and safety would restrict the existing pattern of access to onshore and of fshore recreational activities in and around James Price Point. The patterns of use of the James Price Point area are anticipated to change when early works commence for the Precinct and restrictions on land use are introduced (both direct restrictions and buffer zones). As a result, the current recreational values would potentially be affected with users choosing to use the buffer area surrounding the Precinct, other locations along the coastline, or ceasing to use the area all together.

Given that a key reason for wanting to access James Price Point is the area's remoteness, the presence of a large construction project and subsequent operation of an industrial facility may deter some recreational users.

Existing coastal recreational areas and coastal vehicle access around the Precinct site would be maintained to the greatest extent possible with access to James Price Point maintained through the construction of a bypass track around the Precinct. Investigation into options for the establishment of alternative access routes and recreational use areas will be undertaken as required.

4.8.4.2. Potential Impacts on Sport and Recreation due to Altered Fire Regimes

The presence of the Precinct may result in alterations to existing fire regimes on the Dampier Peninsula through the introduction of new ignition sources and fire management. The impact assessment for this factor concluded that potential negative impacts associated with altered fire regimes are thought to be of low significance. These have therefore not been considered further in this section.

The impacts associated with altered fire regimes may be primarily positive in nature due to, for example, a reduced risk of significant and/or uncontrolled bush fires in the region thus improving safety for sport and recreational users and the safeguarding of property, structures and recreational facilities in the area (for example campsites). There is also the potential to maintain visual amenity and prevent bush fire scarring of the landscape.

4.8.4.3. Potential Impacts on Sport and Recreation due to Terrestrial Introduced Pests

The impact of terrestrial introduced pests was assessed as a medium risk in the BLNG SoSA. The socio-economic risk assessment, assumes that existing introduced pest species do not currently impact significantly on social and economic receptors and that an effective risk based quarantine management plan can be implemented to minimise the introduction of new flora and fauna species.

4.8.4.4. Potential Impacts on Sport and Recreation due to Invasive Marine Species

The successful establishment of an IMS is very unlikely, however, if an IMS becomes established, the consequences are substantial, potentially leading to a loss of fishing productivity, exclusion from fishing areas or increased maintenance costs. These impacts, if they were to occur, are likely to be irreversible.

The risk to recreational fishing interests from IMS will be mitigated through the implementation of measures to minimise incursions, support early detection and response, and control and/or stop activities likely to lead to the introduction or spread of IMS.

4.8.4.5. Potential Impacts on Sport and Recreation due to Light Emissions

Light sources from the LNG Precinct have the potential to affect visual amenity values of recreational marine activities such as recreational fishing and also recreational use of areas along the coast including camping.

Most visible elements of the Precinct are likely to be the jetties, material offloading facility and LNG and condensate tankers. Depending on the final site of the BLNG Precinct, partially visible light sources rising from beyond the sand dunes may also be associated with taller elements such as flares, LNG storage tanks and processing trains. From further out to sea, beyond 37 kilometres, the light glow may be visible on the horizon.

The Tourism Impact Assessment identified that the Kimberley coastline is highly regarded as a tourism experience due to its wilderness qualities. Those users of the terrestrial environment that feel that their current use of the coastal area is impinged by the existence of the Precinct will find alternative coastal areas to access and use for recreational activities. The marine environment adjacent to James Price Point is primarily accessed by cruises that tend to travel past the Dampier Peninsula at sunset when cruise patrons focus on the sunset and away from the Dampier Peninsula.

Further detail on assessment of visual amenity and light emissions is provided in **Part 5, Section 4.4** (Visual Amenity, Light and Landscape Character).

4.8.4.6. Potential Impacts on Sport and Recreation due to Marine Discharges (Including Non-Routine Events)

Marine discharges would occur during both construction and operation of the Precinct. While planned discharges would be designed to comply with acceptable limits and regulated under licence conditions; in the remote event of non-routine events (for example accidental spills or leaks) from the Precinct facilities and/or associated vessels, such as collisions or a rupture of an LNG/condensate tanker or catastrophic failure of a production pipeline, the rapid release of a large volume of LNG or condensate may occur.

Non-routine discharges may lead to contamination of the marine environment and have the potential to change marine habitat, resulting in altered visual amenity, for example reduced attractiveness for tourists and other marine users. Any contamination of the marine environment may also generate health issues or perceptions about marine or coastal area values.

Additional measures to address this potential impact area are outlined in **Part 3, Section 2.3** (Marine Water Quality), **Section 2.8** (Marine Ecosystem Integrity) and **Part 5, Section 4.9** (Human Health).

4.8.4.7. Potential Impacts on Sport and Recreation due to Sediment Deposition and Turbidity

There are potential indirect social impacts resulting from impacts to the physical environment. The area around James Price Point hosts recreational and commercial marine ventures. If sediment deposition or turbidity were to reach levels that significantly impacted the marine environment, this could result in indirect social impacts. The factors most likely to be impacted are tourism, sports and recreation and recreational fishing. Mitigations and management measures are discussed in **Part 3, Section 2.3** (Marine Water Quality) and **Section 2.8** (Marine Ecosystem Integrity).

4.8.4.8. Potential Impacts on Sport and Recreation due to Physical Presence – Marine

The James Price Point area is not highly used for formal tourist activities, although anecdotally, it is accessed occasionally by self-drive tourists and on a frequent basis by the local community for camping, recreational fishing and other sport and recreation activities. The marine elements of this largely relate to boating, with informal launching points at James Price Point for recreational fishing in the area, which is likely to be completely restricted from public access. There will be restrictions on access to areas used for informal recreation, including camping areas and boat launching sites. The interplay between the marine and terrestrial restrictions to access would affect user groups in different ways.

Some of these users would adapt and select alternate locations for recreational activities. However, due to the changed nature of the landscape, some individuals and/or groups may be upset that habitual locations may have permanently

altered values for them and may therefore be effectively damaged or lost to them permanently². While it is difficult to quantify these psychological effects without access to sensitivity data, it can be assumed that in such instances this group would be more reluctant to seek alternate locations for long held activities.

The TIA rated the potential for the project to negatively impact visitor perceptions of Broome and the Kimberley's destination appeal as a critical risk factor as a result of current and potentially future negative publicity on the project and its development. In particular, marine physical presence, vessel movement, and noise and vibration were identified as factors that could potentially impact the amenity of the region, and the tourist values associated with the Kimberley.

4.8.4.9. Potential Impacts on Sport and Recreation due to Noise and Vibration

Recreational fishing activities may be affected by noise through the loss of the amenity and seascape value of the James Price Point coastal area.

Marine noise may also result in temporary impacts on the distribution of recreational fish species which may affect the distribution of recreational fishing effort.

Consultation with recreational fishers undertaken for the FIS (Big Island Research 2009) identified concerns surrounding potential disturbances to sailfish aggregations as a result of BLNG Precinct activities such as dredging.

The FIS (Big Island Research 2009) also identified that, although there has been much tagging of sailfish in research projects in Australia, there appears to be little analysis or scientific examination of data to enable a quantitative assessment of potential impacts.

It is possible that the development of the BLNG Precinct may impact on the accessibility of The Peanut and The Puddle, which have been identified as key recreational fishing areas in close proximity to James Price Point. However, given that recreational fishing covers a broad geographical area and is not limited to the James Price Point coastal area only, the BLNG Precinct development is not likely to result in significant impacts on recreational fishing activities across the region.

Recreational fishers would be excluded from areas where the key noise generating activities within the BLNG Precinct occur. Also, fishers are likely to choose other locations with greater amenity, given that the marine environment in the immediate vicinity of James Price Point is not determined to be unique in terms of fish species or catch.

4.8.4.10. Vehicle Movements

Refer to discussion of vehicle movements in **Part 5, Section 4.7 Tourism**.

4.8.4.11. Vessel Movements

Exclusion areas to be established as a part of the BLNG Precinct, and the introduction of large vessels, have the potential to disturb recreational fishing activities. Increased vessel traffic also increases the risk of collision or displacement of fishers in areas where vessel movements occur.

During the FIS (Big Island Research 2009), most fisheries sectors felt that the increased vessel traffic would cause navigational challenges, a general increase in maritime congestion and an issue of safety for local traffic co-using areas with oil and gas vessel operators.

The two most prominent areas for recreational fishers near James Price Point are located approximately 15 kilometres (Puddle) and 22 kilometres (Peanut) southwest of James Price Point (Big Island Research 2009). Smaller recreational fishing vessels are known to utilise areas such as Barred Creek, Quondong Point and the coastal area to the north of

² Consultation during the FIS (Big Island Research 2009) identified the retention of designated public access to the coastline (for camping, fishing, boating, picnics and various water activities for both local residents and tourists) and the capacity to maintain this access beyond the BLNG Precinct as a major local community concern.

James Price Point. Further recreational fishing activity occurs in the James Price Point coastal area with small fishing boats launching from beaches in the vicinity of the Point.

During surveys for marine mammals (RPS 2010a, **Appendix C-8**), vessel numbers were also recorded. The results from surveys undertaken indicate that recreational motor vessels contribute to the majority of vessel traffic, mostly concentrated in the area between Quondong Point and Roebuck Bay south of James Price Point. This survey was undertaken during peak recreational fishing activity and lower numbers of recreational vessels are anticipated in this area during the wet season.

4.8.5. Mitigation and Management Measures

Table 4.8-3 summarises the predicted impacts and mitigation measures to be undertaken in relation to aspects or activities that may have an impact upon sports, recreation and land use (including recreational fishing).

The Strategic Social Impact Management Plan is presented in **Part 5, Section 5** which outlines the management framework for the BLNG Precinct in order to mitigate any potential social-economic impacts and should be referred to for further detail. As some of the social-economic impacts are indirect environmental management plans will also be relevant in terms of mitigating social impacts and these are presented in detail within each of the relevant environmental sections.

The relevant State Government measures comprise:

- Prepare and implement an Engagement Plan to manage all interactions with public users of the marine and terrestrial environment in and around James Precinct Point, including recreational users and tourism operators.
- Establish the Broome Port Authority as the statutory Port Authority for the BLNG Precinct, and an associated port area.
- The Port Authority will prepare a BPEMP for the port area.
- Proponents of derived proposals shall demonstrate application of best practice measures to be implemented to minimise the impacts on coastal processes from onshore and near shore marine infrastructure.
- Develop and implement a Management and Monitoring Strategy for Vegetation of Medium to High Conservation Significance which will inform proponents of derived proposals of requirements for detailed management plans specifically relating to:
 - Fire Management Plan;
 - Terrestrial Fauna Management Plan;
 - Terrestrial Weed Management Plan; and
 - Appropriate management of hydrology (both surface water and groundwater).

Key management plans (discussed in further detail in **Part 5, Section 5**) include:

- Management of Marine Resource Use Impacts; and
- Management of Impacts of Recreational Use.

Additional relevant mitigation measures are identified below:

- Preparation and implementation of a CEMP.
- Preparation and implementation of a PFCEMP.
- Invasive Marine Species will be managed in accordance with International, Commonwealth and State legislation, which will be outlined in an IMSMP. The IMSMP would be developed in consultation with the AQIS and will be applied to vessels, barges and immersible equipment that plan to enter or operate within the precinct and will be conducted in a manner that is consistent with relevant conventions and associated guidance, including, but not limited to:
 - IMO – ‘International Convention for the Control and Management of Ships’ Ballast Water and Sediments’;
 - Convention on Biological Diversity - specifically identifies the need to “control or eradicate those alien species which threaten ecosystems, habitats or species”;
 - United Nations Convention of the ‘Law of the Sea’ - specifically protection and preservation of the marine environment;
 - ANZECC/ARMCANZ Code of Practice for Antifouling and In-water Cleaning and Maintenance; and
 - Voluntary Biofouling Management Guidance Documents.
- Preparation and implementation of a Hydrocarbon and Chemical Spill Contingency Plan;
- Preparation and implementation of a Waste Management Plan;
- Preparation and implementation of a Rehabilitation Plan;
- Preparation and implementation of a Quarantine Management Plan;
- Preparation and implementation of an Air Quality Management Plan;
- Proponents of derived proposals shall demonstrate application of best practice measures to be implemented to minimise the impacts on coastal processes from onshore and near shore marine infrastructure;
- All vessels will be required to have a SOPEP;
- Preparation and implementation of a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts;
- Preparation and implementation of a MWDMP, to ensure that disposal of treated wastewater from operation of the BLNG Precinct facilities is undertaken and managed in a way that minimises the environmental impacts and is consistent with the local water quality environmental values; and
- Preparation and implementation of a VMP.

Potential impacts resulting from increased lighting at the site can be minimised by the careful placement and direction of lighting used, in accordance with relevant Australian Standards. Further detail on proposed management measures to address visual amenity and light emissions is provided in **Part 5, Section 4.4** (Visual Amenity, Light and Landscape Character). A defined buffer zone will be established to maintain suitable separation distances between the LNG Precinct and users of the broader coastal area.

4.8.6. Socio-economic Outcome of Category A Activities

The recreation and landscape values most likely to be affected by the implementation of the Plan include current access to the coast line in the James Price Point area for active or passive recreation purposes such as camping, fishing, boating, picnics and various water activities for both local residents and tourists.

With the mitigation measures described above and in conjunction with planned infrastructure upgrades and expansion activities at the Port of Broome, the implementation of the Plan appears unlikely to result in a significant detrimental effect on sport or recreation including recreational fishing activities in the region.

While there is not expected to be any significant increase in demand on existing sport and recreational infrastructure and attractions as a consequence of the construction and operations workforces, pressures as a result of non-precinct related population increases are identified by population modelling as having the potential to result in a significant impact. This issue is addressed in **Part 5, Section 2** of the strategic SIA Summary.

4.8.6.1. Cumulative Impacts of the Proposal and Associated Activities and Projects

The construction and operation of a minimum of two LNG projects within the Precinct has the potential to increase pressure on existing sport and recreation activities particularly in relation to land use and marine infrastructure and services that may have flow-on effects for recreational fishing activities.

Consultation with recreational fishers to inform the FIS (Big Island Research 2009) identified that there is a shortage of marine infrastructure in the Port of Broome. A common concern amongst many of the commercial and recreational fishers interviewed was that development of the BLNG Precinct would create extra pressure on the Port, further stretching current limited facilities and making it harder to unload product and take on fuel and stores.

The BLNG Precinct Infrastructure Assessment Study (AECOM 2010d) identified that the Broome port, including planned upgrades and expansion, should adequately handle the anticipated increase in vessel traffic as a result of the Precinct's operation and construction activities.

Consultation with recreational and occupational marine users also identified that the main positive outcome associated with the BLNG Precinct is the opportunity for substantial improvements in the existing marine and boating infrastructure and services in Broome. In particular, it was felt that the Project may have a positive impact via the following:

- Improvements to existing recreational facilities and further development of new recreational facilities, such as a new fishing jetty.
- Additional recreational opportunities due to an increase in population, such as more sporting teams - many sporting and recreational clubs saw the BLNG Precinct as a potential opportunity to increase membership and sponsorship opportunities as a direct result of increased population and increased revenue to develop new recreational facilities (KPP Business Development 2009).
- Increased commercial ventures that have recreational value, such as a café or video store, as a result of population growth.

■ **Table 4.8-3 Impact Assessment Summary of Impacts Table for Sports, Recreation and Land Use (Including Recreational Fishing).**

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
Light emissions - marine	The presence of the Precinct will alter the existing light environment, and therefore has the potential to impact on the visual amenity of the area due to night time sky glow effects.	Prepare and implement a Management Plan for Roebuck Bay and on-going Management of 80 Mile Beach. Implementation of Dampier Peninsula Land use and Infrastructure Plan to facilitate the establishment of additional nature reserves and/or national parks. Mitigation measures to avoid impacts on terrestrial conservation areas from indirect activities associated with the implementation of the Plan including:	Proponents of derived proposals shall prepare and implement an Invasive Marine Species Management Plan (IMSMP), to the satisfaction of the Western Australian Minister for Environment, to minimise the risk of introducing invasive marine species (IMS) to Australian waters during the life of the activity. The plan shall be developed in consultation with the AQIS and will be applied to vessels; barges and immersible equipment that plan to enter and operate within the Precinct. Prior to commencement of dredging, proponents of derived proposals shall prepare and implement a DSDMP, to the satisfaction of the Western Australian Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts. The Plan shall include:	Prepare and implement a Construction Environmental Management Plan. Preparation and implementation of a PFCEMP. Prepare and implement a DSDMP, to the satisfaction of the Minister for Environment, demonstrating the application of best practice management techniques and technologies to minimise potential dredging impacts. Prepare and implement an IMSMP. Preparation and implementation of a Quarantine Management Plan. Preparation and implementation of an Air Quality Management Plan. All vessels will be required to have a SOPEP. Proponents of derived proposals shall demonstrate application of best practice measures to be implemented to minimise the impacts on coastal processes from onshore and near shore marine infrastructure.	Low
Noise and vibration	The construction and operation of the Precinct will alter the existing noise environment, so there is the potential to impact on recreational users of area from an amenity perspective. There may also be associated noise and vibration issues impacts associated with marine aspects.			Proponents of derived proposals shall demonstrate application of best practice measures to be implemented to minimise the impacts on coastal processes from onshore and near shore marine infrastructure. Preparation and implementation of a MWDMP, to ensure that disposal of treated wastewater from operation of the	Very Low
Marine Discharges - Including Non-Routine Events	Marine discharges may impact the sense of place and local amenity of the area, and in turn affect recreational use as a result of a major discharge or spill into the marine environment.			BLNG Precinct facilities is undertaken and managed in a way that reduces the environmental impacts to as low as reasonably practicable and is consistent with the local water quality environmental values.	Very Low
Physical Presence	The physical presence of the Precinct will result in a permanent alteration to the area, with associated restriction, traffic movement and visual amenity issues.	• Fire and weed management in and around Coulomb Point Nature Reserve and any other nature reserves established in the vicinity of the Plan area in collaboration with the DEC; • DEC to monitor visitor numbers to Coulomb Point Reserve	• Consideration of the re-use of suitable dredge material for MOF construction, where practicable. • Design of the MOF including construction of		Low
Altered Fire regime	Impacts associated with altered fire regimes would be primarily positive in nature. For example, risk of significant and/or uncontrolled bush fires may be reduced, thus safety and safeguarding of property, structures and facilities in the area (for example campsites).				Very Low

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
Sediment deposition and turbidity	Any increase in turbidity, or visible dredge plumes in areas accessed for recreation, has the potential to affect visual amenity, perception of environmental values, as well as fishing resources.	camping area; and • DEC to develop a management plan for the Coulomb Point Reserve.	bunds to isolate fill material from wind and wave action. • Consideration of applicability of management techniques and technology in meeting location specific WQ environmental values and environmental quality objectives.	Preparation and implementation of a VMP.	Very Low
Site Disturbance and excavation	During the construction phase there will be disturbance which has the potential to impact on recreational use of the area which is perceived to be 'undisturbed'.	Prepare and implement a Fire Management Strategy for the Dampier Peninsula to align with existing fire management strategies to reduce the frequency of fires and the occurrence of late dry season burns to the Peninsula.	• Consideration of the re-use of reclaimed material to minimise ocean disposal.		Very Low
Restricted Access	Area currently used for recreational camping and fishing. Restricted access will therefore impact on current users of the site.	Prepare and implement an Engagement Plan to manage all interactions with public users of the marine and terrestrial environment in and around James Precinct Point, including recreational users and tourism operators.	• Measures to minimise dredging impacts during sensitive ecological windows.		Low
Vehicle movements	Increased traffic may be as a result of the Precinct Operation may impact on recreational use of the area.	Ensure planning and layout of the BLNG Precinct is subject to appropriate strategic land use buffer zoning in alignment with State Planning Policy (Industrial Buffer Policy) and EPA Requirements (Guidance Statement No.3) to ensure appropriate separation distances between industrial and other land uses.	• A monitoring strategy for ecological receptors and health during marine construction (including baseline surveys).		Very Low
Vessel movements	Vessel movements associated with the Precinct and associated marine traffic have the potential to restrict existing marine based recreation, primarily recreational fishing. Camping activities along the coastal zone may also be affected.		• The development of trigger levels for benthic communities and water quality that define additional management responses.		Very Low
Introduced pests – terrestrial and marine	The impact on sport and recreation as a result of current terrestrial pests in the area is minimal. There is the potential for recreational fishing to be impacted by Invasive Marine Species (IMS). If IMS become present in the area and take hold there is the potential for current marine biota to be impacted.		• Mechanisms to audit and assess environmental performance of proponent during construction. • A communications strategy		Low

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
		<p>Establish the Broome Port Authority as the statutory Port Authority for the BLNG Precinct, and an associated port area.</p> <p>The Port Authority will prepare a BPEMP for the port area.</p> <p>Develop and implement a management and Monitoring Strategy for Vegetation of Medium to High Conservation Significance which will inform future Proponents of requirements for detailed management plans specifically relating to</p> <ul style="list-style-type: none"> • Fire Management Plan; • Terrestrial Fauna Management Plan; • Terrestrial Weed Management Plan; and • Appropriate management of hydrology (both surface water and groundwater). <p>Development and implementation of a Tourism Management Strategy in conjunction with TourismWA to ensure</p>	<p>to inform other local marine users of times of peak construction activity that may influence non-construction related activities within the area.</p> <p>The DSDMP will be subject to assessment under the <i>Environment Protection (Sea Dumping) Act 1981</i> (Cwth), including appropriate stakeholder consultation.</p>		

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
		maintenance of the current tourism industry in Broome, but also to provide an ongoing framework for development.			

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4.9. Relevant Factor: Human Health

DSD SIA Volume 1 provides a baseline analysis of the current health landscape in the Kimberley region, while SIA Volume 2 assesses the impact of the Precinct upon local population health and the associated health service infrastructure (**Appendix D**). The present assessment considers health impacts to individuals and communities arising from the Precinct directly and its flow-on impacts for local communities. As part of this assessment, DSD conducted consultation workshops with health stakeholders, which has assisted in informing its three volumes and the present assessment. Unless otherwise specified, this section is summarised from DSD SIA: Volumes 1 and 2.

4.9.1. Current Knowledge

This section summarises the existing state of public health and health services in the Kimberley region.

4.9.1.1. Population Health in the Kimberley

Health profiling of the Kimberley region in 2005 recorded that its premature death rate (categorised as life ending before 74 years of age) was higher than anywhere else in country WA, and indeed the rest of Australia (PHIDU, 2005).

Similar to Australia and WA generally, the highest causes of premature mortality in the region were cancer and circulatory diseases. However, there were a number of other major fatal conditions recorded as being exceptional to the Kimberley which were deaths from poisoning, respiratory conditions and diabetes. The region was also recorded as possessing the highest death toll from suicide (Taylor, 2008).

The Kimberley region has a high percentage of Indigenous people at 42.1% compared with three percent for WA as a whole and Indigenous health is a significant issue for the region. Indigenous people in the Kimberley have a relatively poor health status with associated high morbidity and mortality rates; exacerbated by limited access to adequate health services due in part to the remote location of communities (**Appendix D**).

Taylor (2008 in DSD 2009a) identified chronic diseases as the dominant causes of morbidity and mortality rates for Indigenous Australians in the Kimberley. The most significant health issues affecting Indigenous people particularly the west Kimberley, are mental illness, cardiovascular diseases, metabolic diseases including diabetes, renal failure, infectious diseases including sexually transmitted diseases (**STIs**), poor nutrition, premature and low birth-weight deliveries, recurring infections and injury (Zubrick *et al.* 2004 and Atkinson *et al.* 1999). Among young Indigenous people, ear health is a chronic problem causing cascading impacts on education and a number of other factors (Zubrick *et al.* 2004, 2005 and 2006). Injury inflicted by other persons was the leading cause of hospitalisation for injury and poisoning among Indigenous people was more than 25 times the WA rate in the Kimberley Region (WACHS 2008).

The rate of STIs in the Kimberley is the highest in Western Australia. In 2007, chlamydia, gonorrhea and syphilis (infectious and non-infectious) rates in the Kimberley were the highest in WA, with most cases occurring in those under 30 years of age. The prevalence of HIV/AIDS is low in the Kimberley while Hepatitis B notifications for the Kimberley in 2007 were more than double the WA rate. The highest rate of Hepatitis C notifications in 2007 also occurred in the Kimberley (DOH, 2009).

Mental health remains one of the most pressing issues within the Kimberley. This is particularly severe for Aboriginal people living in the region; approximately one in six Aboriginal young people in the Broome region are at high risk of mental illness (Zubrick *et al.*, 2005). The present lack of resources to meet mental health needs in the Kimberley has been regularly a matter of media attention. Peak bodies have argued the region has less than half the required mental health professionals needed to support the community (ABC News, 2007).

Taylor's (2008 in DSD 2009a) investigations identified diabetes and related renal diseases as having the largest difference in mortality and morbidity rates between non-Indigenous and Indigenous people in the west Kimberley. These investigations are supported by Western Australian Country Health Service (**WACHS**) concerns regarding the renal health of Aboriginal people in WA. Although Aboriginal people constitute only 2.7% of the State's population, they represent 22.2% of all patients receiving dialysis therapy and over a third of these patients are from the Kimberley. Indigenous life expectancy has been estimated at approximately 20 years less than other Western Australians (however, the integrity of the data quantifying this figure is presently being reviewed¹). The best available estimates from the ABS for Western Australians indicate Indigenous life expectancy at birth to be 58.5 years for males and 67.2 years for females. These compare with estimates of 79.1 years for all males in WA and 83.8 years for all females.

4.9.1.2. Health Services

Health services are delivered through a range of integrated services within facilities located across the region. The Kimberley has six hospitals ranging from the Broome Hospital (which is the referral hospital and the Regional Resource Centre for the region), to Integrated District Health Services at Derby and Kununurra hospitals. There are rural hospitals at Halls Creek, Wyndham and Fitzroy Crossing. These hospitals are complemented by community clinics in remote localities. The region has access to a range of specialist services, including aged care facilities, rehabilitation and mental health services and a renal dialysis facility (KDC, 2009).

The WACHS provides a range of acute, primary, community and population based services. Community health is managed through the Kimberley Population Health Unit. Aged care services are managed through Kimberley Aged and Community Services (WACHS, 2008).

The Commonwealth Department of Health and Ageing maintains an office in Broome and the WA Department of Health has administrative offices in Derby and Broome. A significant upgrade to the Broome Hospital was completed in 2008 and includes the establishment of doctors' consultancy areas, X-ray and pathology rooms and allied health areas.

The Kimberley Royal Flying Doctor Service base at Derby conducts routine clinical and medical consultations in remote communities and pastoral properties. It also provides a 24-hour emergency aero-medical service across the region (WACHS, 2008).

In 2008, the region had six day beds and 36 overnight beds at the Broome Regional Resource Centre and 142 in-patient beds distributed throughout the hospitals in the region. The number of public hospital beds in the Kimberley as at December 2007 was 135, accounting for approximately 4.1 beds per 1,000 people. During this time, the maximum number of licensed private hospitals beds was 10 (DLGRD 2008). The Broome Hospital is currently under redevelopment and in January 2012, it will have 45 overnight acute beds, six same-day beds and 14 mental health beds. There were 39 overnight beds in Derby, 12 in Fitzroy Crossing, eight in Halls Creek, 32 in Kununurra and four in Wyndham (as reported in B Volume 1 of the strategic SIA in **Appendix D**).

Broome has a satellite dialysis facility, managed by the Kimberley Aboriginal Medical Services Council (**KAMSC**) that enables up to 40 patients per week to receive treatment. This is currently the only dialysis service for the entire Kimberley region. Demand on the facility strongly exceeds its treatment capacity. Numerous clients are therefore required to travel to Perth (and remain there) for their weekly dialysis treatment. This creates a number of flow-on impacts, including a disincentive for seeking treatment. Plans are underway to provide some dialysis treatment clinics in both Derby and Kununurra. This is anticipated to relieve the Broome-based clinic of some of its burden, although it is still expected to be under substantial strain.

Mental health treatment and response services are provided by the Kimberley Mental Health and Drug Service Team and youth mental health (non-acute) services are provided by Kimberley Headspace (auspiced by KAMSC).

There are three small health clinics on the Dampier Peninsula at Beagle Bay, Lombadina (also provides services to Djarindjin) and Ardyaloon. The clinic at Beagle Bay is provided by KAMSC, which also provides a further clinic in the secondary impact area, at Bidyadanga. Both clinics are staffed by a doctor and a number of Aboriginal Health Workers.

¹ See Department of Families, Housing, Community Services and Indigenous Affairs 2009, *Closing the Gap on Indigenous Disadvantage: The Challenge for Australia*, Australian Government, Canberra.
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Currently, the clinics are also involved in health promotional activities conducted by KAMSC for the relevant communities.

Changes in the health care sector are being driven by factors such as workforce shortages, quality and safety of service provision, clinical and financial sustainability, community demands for access and international trends towards greater specialisation. WACHS has noted that regardless of the adequacy of the region's health infrastructure, challenges for health services in adequately meeting demand lie in critical workforce challenges. The health sector experiences extremely high staff turnover and is affected by the disincentive of high housing costs and the small subsidies it can offer the staff it wishes to attract. WACHS has already stated that it is affected by 'competition with mining and other industry developments for staff and accommodation'.

4.9.1.3. Sensitive Receptors

Eight sensitive receptors were identified as being relevant for the air quality dispersion modelling detailed in **Part 4, Section 2.8**, these being Broome, Coconut Wells (approximately 37km from James Price Point), Country Downs station, Kiltostaton, Beagle Bay settlement (approximately 81km from James Price Point), 12 Mile, Willie Creek Pearl Farm and the likely location for the BLNG workers accommodation facilities. There are no permanent settlements within 37km of the BLNG Precinct.

4.9.1.4. Statutory Requirements, Policy and Guidance

The following relevant legislation, policies and guidance are applicable to the management of human health:

- EPA Guidance Statement No. 18 Prevention of Air Quality Impacts from Land Development Sites (EPA 2000d);
- State Industrial Buffer Statement of Planning Policy 4.1 (WAPC 2004);
- Ministerial Statement 740 issued in 2007;
- *Health Act 1911*;
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ 2000);
- Mosquito-borne Disease in Western Australia Factsheet (Department of Health 2010a);
- Department of Health's Strategic Intent 2005-10 (Department of Health 2010b); and
- Landfill Waste Classification and Waste Definitions 1996 (as amended) (DoE 2005).

4.9.1.5. Description of factor

The construction and operation of the BLNG Precinct has the potential to impact on human health in the local area through emission of particulates (dust) and potential other emissions. Other aspects that can indirectly impact include exposure to nuisance insects, potential contamination from inappropriate disposal of wastes and increased transmission of sexually transmitted diseases and drug and alcohol abuse among the local community. As well as pressure on existing services due to changes in population.

4.9.2. Identification of Key Aspects

4.9.2.1. Definition of relevant aspects

Aspects associated with the development and operation of the BLNG Precinct and associated infrastructure that may have a social-economic impact in relation to human health were identified in the Scope of the Strategic Assessment and considered in the risk assessment to be of medium to high risk. These aspects include:

- Air emissions – particulate matter;
- Physical presence – resulting in changes to waste management and disposal and presence of standing water;
- Vehicle movements – increases in traffic;
- Work force – increased population in areas due to fly in fly out workers; and
- General population.

4.9.3. Sources of Potential Impact

Currently no large scale development activities that occur within the James Price Point coastal area. The presence of the BLNG Precinct has the potential to impact upon human health.

Activities, facilities and infrastructure associated with the development and operation of the BLNG Precinct that may have the potential to impact human health within the BLNG Precinct footprint include:

- Clearing;
- Drilling;
- Piling;
- Earthworks; and
- Dredging.

4.9.4. Predicted Impacts

As stated in **Part 2, Section 5**, during peak construction, the Precinct is expected to require around 6,000 direct workers. Construction under Scenario 2 (potential Foundation Development) is expected to last five years (with the peak lasting up to two years of this period) and the workforce is anticipated to be predominantly fly-in-fly-out based (up to 90 percent). During the more permanent operations phase (that follows construction), the peak workforce is anticipated to drop initially to 400 to 600 workers.

4.9.4.1. Potential Impacts on human health due to air emissions

It is recognised that there are potential health aspects associated with inhalation of airborne dust. The risks are related to a range of factors including concentration, particle size, chemical composition and exposure duration.

Fine and coarse particles (less than 10 µm) can build up in the respiratory system and excessive levels are linked to numerous health effects such as asthma, decreased lung function, and in severe cases, premature death. Seniors, children and people with heart and lung disease appear to be at greatest risk. Long-term exposures, such as those experienced by people living for many years in areas with high particle levels, have been associated with reduced lung function and chronic bronchitis and may also increase susceptibility to respiratory infections. Healthy adults and children have not been reported to suffer serious effects from short-term exposure, although they may experience temporary minor irritation when particle levels are high.

As stated in **Part 4, Section 2.8**, regional modelling concludes that bush fires would be the dominant existing source of air-borne pollutant even with the inclusion of predicted BLNG emissions. The predicted ozone concentrations due to the BLNG Precinct are relatively low, up to 40-50% of the NEPM 1-hour standard for a maximum development scenario of 50 Mtpa facilities. Background ozone levels vary between 10 to 28 parts per billion indicating the contribution is about 12 and 22 parts per billion above the clean air background values. Based on air quality modelling, the contribution of emissions from the BLNG Precinct to ambient air quality is much less than the contribution from existing emission sources, and bushfires in particular. The primary modelled changes to NO₂ concentrations occur within 20 km of the plant.

4.9.4.2. Potential Impacts on human health due to physical presence

The physical presence of the BLNG Precinct would alter the existing environment in terms of issues such as waste management and disposal, the potential for contamination due to spills or pollution incidents and the creation of standing waterbodies that may result in increases in insect borne disease. This may result in the following impacts:

- Solid and liquid wastes which may also be considered as hazardous include water treatment chemicals, hydrocarbons (lubricants, oils, diesel), sewage and specialised cleaning fluids. These wastes may prove toxic to humans.
- An increase in mosquito-borne diseases may result in increased pressure on health services. Ponded water during construction and operation may provide habitat for the breeding of nuisance insects, such as mosquitoes. Such water bodies would include temporary water storage areas established for construction, bunded storage areas and stormwater ponds following rainfall.

4.9.4.3. Potential impacts on human health due to vehicle movements

Impacts to road safety that may be caused by the Precinct are addressed by the Transport Management Plan in **Part 5, Section 2** and within the DSD SIA (**Appendix D**), however, in summary an increase in population due to a large temporary construction workforce and a smaller operational workforce may affect road safety in and around Broome. Transport may include shuttle bus services to and from the BLNG Precinct. As most workers are likely to be fly-in-fly-out, the use of private vehicles by the workforce is expected to be negligible.

If unmanaged, the most likely local impacts are likely to arise from the movement of project-related traffic on local roads. A strategy will therefore be developed to address potential increased heavy vehicle use on the Broome - Cape Leveque Road and general increases in traffic in the Broome centre (**Part 5, Section 5.4.11**).

4.9.4.4. Potential Impacts on human health due to workforce

For the purposes of this assessment, workers are assumed to be subject to health assessments to ensure their health and fitness before commencing employment at the Precinct.

The oil and gas industry is subject to an occupational health and safety legislative regime that is one of the most rigorously regulated in the country. Impacts are discussed below under the assumptions that all proponents will adhere to worker health and safety (and the risk exposure minimisation) required by these laws.

Immediate health concerns of workers will be addressed by a clinic that will be based at (or in close proximity to) the accommodation camp (See Public Information Booklet).

Should a health emergency occur at the Precinct, the scale of event will determine whether local facilities are used or whether workers might need to be airlifted to Royal Darwin Hospital (as occurred in 2009 when Broome rescue facilities were mobilised to retrieve people from the fire that occurred aboard a refugee boat from Afghanistan). In December 2009, the potential Foundation Proponent conducted a brief initial audit of the region's capacity to deliver physical health services, including its ability to provide health emergency responses that may require immediate evacuation of the Precinct or offshore facilities under Development Scenario 2 (**Part 2, Section 5**). While services in the region may be mobilised quickly and effectively by Broome Hospital (as occurred in the above-mentioned instance), it is clear that resources within health services in the region are stretched. A more comprehensive, Precinct-wide (multi-scenario based) assessment of the regional services' capacity in this respect will need to be explored if and when the Precinct is approved. Service capacity is explored in more detail in the summary of the strategic SIA **Part 5, Section 2** with management measures detailed in **Part 5, Section 5.4.10**.

The increase in transient construction population may potentially increase the transmission of sexually transmitted diseases, and drug and alcohol abuse placing additional pressure on local health services. A recent public discussion paper suggests that FIFO workforces can be sensitive to substance abuse, including the range of issues that give rise to substance-abuse as a form of self-medication. The paper reviews the social impacts of the FIFO workforce in the Pilbara, citing family dysfunction, guilt, loneliness, substance abuse, depression and reduced commitment to operations as commonly experienced by FIFO workers (Planning WA 2009). This impact is not specific to the Precinct but rather a consideration of all industries that use FIFO workforces. It is a matter presently on government and industry agendas (as demonstrated by the discussion paper's circulation) and will be dealt with at an industry-government wide level.

Compulsory random alcohol and drug testing may also limit prevalence of substance misuse by Precinct workers. Additionally, although it is likely that a 'wet mess' will be present in the camp (see DSD 2009d), limits as to consumption may be imposed and compulsory testing may act as a disincentive for excess consumption.

The scope and possibility for this impact to affect the local population is addressed in **Part 5, Section 2**. That section also addresses the potential for STI transmission between the local community and the workforce population (a concern raised by a stakeholder at the relevant consultation convened by DSD in Broome). The regulation of entry into, and exit out of the workers' accommodation should restrict the ability for sexual relations with the local community during non-work periods.

The capacity for changes to alcohol consumption outside of the workers' camp is restricted by the features of the proposed 'managed-access' camp. This will also facilitate better management of alcohol supply to workers on roster.

There is also a potential for mental health services to be utilised by the construction population.

4.9.4.5. Potential (indirect) impacts on human health due to general population factors

Population health impacts and transmission of illness between the population and the workforce will be largely mitigated by a managed access camp. However, the health sector in Broome is currently under extreme pressure. The exceptional non-Precinct related increase in population anticipated for the Shire of Broome, unless addressed, would bring significant additional demand for health services. Population modelling undertaken for the purposes of SIA Volumes One, Two and Three (**Appendix D**) indicated that the population growth generated by the Precinct for the town of Broome is relatively manageable. As stated above, during construction (including its peak), up to 90 percent of the workforce will be fly-in-fly-out-based and therefore, not resident in Broome. The population modelling for the Precinct indicates that, under the medium case scenario 2A, the new Broome residents from the direct, indirect and opportunistic workforce are likely to peak at around 300 about four years after the start of construction.

Key social issues that impact upon health in the Kimberley (both non-Indigenous and Indigenous) also include the region's large and fluctuating number of tourists, alcohol issues and the crime rates.

Much of the medical service delivery in Broome is already operating beyond capacity. For example, Broome Regional Aboriginal Medical Service services up to 150 patients per day and has consequently had to stop taking on new patients indefinitely. Approximately 19% of its patients are non-Indigenous. The closure of Dakas Street Medical Centre in July 2008 and the clinic of Dr Neil Jenkins in 2009 have created an increased demand for Broome Regional Aboriginal Medical Service services however, the subsequent opening of Broome Doctors Clinic is expected to have counteracted the Dakas Street Medical Centre closure slightly.

Dentistry is presently a major problem in the region. Presently there is only one private dentist in Broome for whose services there is approximately an eight-week waiting period. There is no longer a dentist provided by the public health system, or any dentist that circuits the surrounding areas. Some health services are reporting an inability to acquire urgent services for serious dental problems (some that can be fatal if not treated) to areas outside of Broome, or through the public system (personal comm. Foundation Proponent and Derby Aboriginal Health Service).

Other plans for Broome health service delivery that may affect the region's existing health delivery landscape and population influx include:

- The establishment of the new Mental Health Unit (previously 'Acute Psychiatric Unit'), consisting of 14 beds for both the Pilbara and Kimberley. While the architectural plans include temporary housing for the families of patients brought to the facility, it is likely that the unit may bring more than the estimated number of patient family and supports to Broome. It is also possible that certain families may not wish to reside at the accommodation provided at the facility. This may have some implications for housing and homelessness in Broome (albeit small).
- The establishment of a new, specialised paediatric unit at Broome Hospital.

The population impacts caused by the Precinct across all Scenarios place additional demand on existing health service delivery. This is due to anticipated movement of the transient or opportunistic workforce to Broome. However, assuming the implementation of the mitigation and management plans contained in **Part 5, Section 5** these impacts are likely to be manageable. However, it is again noted that small impacts can have major ramifications for a service system that is already operating beyond its capacity, and that is set to undergo greater stress with the natural population incline of the Broome region.

WACHS has noted that regardless of the adequacy of the region's health infrastructure, challenges for health services to adequately meet demand lie in critical workforce challenges. The health sector experiences extremely high staff turnover and is affected by the disincentive of high housing costs and the small subsidies it can offer the staff it wishes to attract. WACHS has already stated that is affected by 'competition with mining and other industry developments for staff and accommodation'.

Even under a low development scenario, the present capacity of existing medical services is unable to meet the projected demand, from both predicted and Precinct-related growth. This requirement steadily escalates across all scenarios between 2011 and 2041.

Similarly, population modelling illustrates that around six community health centres may be needed in Broome in 2011, regardless of whether the development scenario is low, medium or high. Presently in Broome, there is only one community health centre (no GPs operate from this, only the hospital) and an Aboriginal Medical Service designed to provide community health services to Broome's Aboriginal population. While two Aboriginal Medical Services are based in Broome, only Broome Regional Aboriginal Medical Services (BRAMS) provides direct health service delivery to Broome's Indigenous residents (whereas Kimberley Aboriginal Medical Service is an umbrella service whose only direct service delivery is to Bidjardanga, Beagle Bay and Balgo).

Even small increases of stress upon Broome-based Aboriginal health services may result in some Indigenous residents who traverse between Broome and the local communities of Bidjardanga and Beagle Bay, preferring to access health services in those communities instead of Broome. This may therefore affect the capacity of the clinics in these communities.

The magnified demand upon health services caused by even the small predicted population increase to the town of Broome by the Precinct, will be addressed by the development of a strategy to increase the capacity of human and social service provision to accommodate any potential direct and indirect employment and population increases it generates.

4.9.5. Mitigation and Management Measures

Table 4.9-1 summarises the predicted impacts and mitigation measures to be undertaken in relation to aspects or activities that may have an impact upon human health.

The Strategic Social Impact Management Plan is presented in **Part 5, Section 5** which outlines the management framework for the BLNG Precinct in order to mitigate any potential social-economic impacts, and should be referred to for further detail. Some of the social-economic impacts are indirect environmental management plans which will also be relevant in terms of mitigating social impacts. These are also presented where relevant to an impact.

The relevant State Government measures comprise:

The preparation and implement a closure and decommissioning strategy for the Browse LNG Precinct and related activities for the purpose of providing a timely and consistent approach to removal or retention of plant and infrastructure, rehabilitation of disturbed areas.

The preparation of an overarching Emergency Response Plan that addresses:

- risk assessment of potential emergencies (including bushfires, introduction of foreign pests, flooding and spills);
- emergency response equipment and training;
- emergency response procedures;
- responsibilities during emergency response; and
- Reporting, review and improvement as required.

The key strategy that will manage the health impacts of the Precinct is the Precinct Health, Emergency Services, Policing and Security, which is a condition for commercial proponents at the Precinct. The intention of this strategy is that health and emergency services will be required to service the BLNG Precinct in a manner that does not impact upon the provision of these services in Broome. This strategy is outlined in **Part 5, Section 5**.

Other relevant mitigation and management measure include:

- Preparation and implementation of a Construction Environmental Management Plan; and
- Preparation and implementation of an Air Quality and Noise quality Management Plan.

Air quality and a range of other potential exposure risks are regulated by the National Environmental Protection Measures (NEPMs) that have been implemented by the *National Environmental Protection Council (Western Australia) Act 1996*. Proponents will be bound to adhere to the NEPMs. Further details are provided in **Part 4, Section 2.8**.

The capacity for human exposure to the range of emissions generated by a gas processing plant are largely minimised by the design of a 'buffer zone' surrounding the Precinct. Layout of the Precinct and its major components will be subjected to land use buffer zoning to account for State Planning Policy (Industrial Buffer Policy) and EPA requirements as per Guidance Statement No 3 – Separation Distances between Industrial and Sensitive Land Uses. Two buffer zones are proposed for the BLNG Precinct, they are:

- 2,000 metre Land Use Buffer Zone - industrial land use; and
- 3,000 metre Land Use Buffer Zone - sensitive land use.

Within the 3,000 metre land use buffer zone (sensitive land use) all permanent structures and sensitive land uses such as accommodation of any type, general commercial use or land uses related to prolonged public presence (>24 hrs) will be excluded. This ensures that appropriate buffers are maintained between these types of activities and the LNG processing facilities.

The scope and specification of protection created by the buffer zone will be enhanced by:

- the alignment of the proposed buffer areas for the BLNG Precinct with the principles and objectives of the State Industrial Buffer Statement of Planning Policy 4.1, as agreed by the WAPC, in consultation with local government and other appropriate regulatory authorities;
- identification of the nature of offsite impacts which may affect more sensitive land uses (noise, smoke, dust, odour, vibration and light) or create potential risks, in line with WA EPA Guidance Statement No. 3 – Separation Distances between Industrial and Sensitive Land Uses;
- identification of appropriate land uses that may be compatible within and surrounding the buffer area, and appropriate control measures to ensure that social amenity and heritage values in the vicinity of the Precinct Project Area are maintained; and
- demonstration that cumulative emissions from a minimum of two premises in the BLNG Precinct will comply with NEPM standards outside buffer zones. Management of the BLNG Precinct may require development of a cumulative air quality model, to enable individual operators within the Precinct to quantify their contribution and management targets in order to meet air quality standards and guidelines.

Further, ambient air quality monitoring will be undertaken at appropriate off-site locations to measure ambient air quality outside the industrial zone. Reporting of key substances will be undertaken in accordance with the National Environmental Protection Council's NEPMs, and to comply with Ministerial Conditions and Operating Licences. A detailed assessment of air quality impacts, and proposed management measures, is provided in **Part 4, Section 2.8** (Air Quality).

The potential for effects on human health arising from marine discharges (including to fish caught and eaten) from the area are addressed by the marine discharge, recreational fishing, commercial fishing, sports and recreation and tourism impact assessment factors in this report.

A Waste Management Plan will also be implemented and prepared by commercial proponents.

4.9.5.1. Environmental Outcome of Category A Activities

Health impacts related to Category A Activities relate to regional human exposure to emissions, workforce practices and workforce health. They are difficult to quantify for the construction phase of the BLNG as they are driven largely by associated temporary population increases, which vary under the possible scenarios.

Due to the relatively small population impacts caused by the BLNG once operational across all scenarios (other than the upper case of Scenario 4 which is deemed as the 'unlikely case'), escalated demand upon health service delivery is anticipated to be minimal. However, it should be noted that small impacts can have major ramifications for a service system that is already operating beyond its capacity, and that is set to undergo greater stress with the projected natural population increase of the Broome region.

4.9.5.2. Cumulative Impacts of the Proposal and Associated Activities and Projects

Assuming the implementation of the mitigation and management plans as described in **Part 5, Sections 5** the impact of Broome's health services should be manageable. However, this small impact can have major ramifications for a service system that is already operating beyond its capacity.

Even under a 'low development' scenario, the present capacity of existing medical services is unable to meet the projected demand, from both non-Precinct related and Precinct-related growth. This requirement steadily escalates across all scenarios between 2011 and 2041.

It is anticipated that the management measures proposed to consolidate health and human service infrastructure in the Shire of Broome will seek, at minimum, to address Precinct-related population growth impacts to the demand for these services.

■ Table 4.9-1 Impact Assessment Summary for Human Health.

Socio-Economic Aspect (stressor)	Potential Impact	Mitigation Measures			Significance of Residual Impact
		State Government Measures	Proposed Environmental Condition (where relevant to socio-economic factors)	Future proponent management plans	
Air emissions	Potential health impacts associated with air emissions, primarily potential increase in particulate matter.	Prepare and implement a closure and decommissioning strategy for the Browse LNG Precinct and related activities for the purpose of providing a timely and consistent approach to removal or retention of plant and infrastructure, rehabilitation of disturbed areas. Prepare an overarching Emergency Response Plan that addresses:	No specific environmental condition proposed.	Development of Precinct Health, Emergency Services, Policing (State will be responsible for policing) and Security to ensure that health and emergency services required to service the BLNG Precinct do not impact on Broome services. Prepare and implement a CEMP to the satisfaction of the Western Australian Minister for Environment, which addresses the following: <ul style="list-style-type: none"> • schedule of construction activities; • details of the construction methods to be used; • objectives and targets; • environmental management • environmental training and inductions; and • environmental monitoring, contingencies and reporting, and stakeholder consultation. 	Very Low
Physical Presence	Potential impacts resulting from potential pollution incidents, creation of areas of standing water (increasing the likelihood of insect borne disease), waste management.				Very Low
Vehicle movements	Potential impacts from increase vehicle numbers, particularly in relation to increases in heavy vehicle during the construction period.				Very Low
Workforce	There is the potential impacts of the work force potentially require use of existing facilities which may result in increased pressure on existing services. There is also the potential impact on the current population in terms of increased risks of STIs and drug and alcohol abuse, associated with the workforce.	<ul style="list-style-type: none"> • risk assessment of potential emergencies (including bushfires, introduction of foreign pests, flooding and spills); • emergency response equipment and training; 		<ul style="list-style-type: none"> • emergency response procedures; • responsibilities during emergency response; and • reporting, review and improvement as required. 	Low
General population factors	Wider indirect impacts associated with general population increase that may be accelerated due to the presence of the BLNG Precinct, and the impacts associated with increased pressure on existing resources.			<ul style="list-style-type: none"> • emergency response procedures; • responsibilities during emergency response; and • reporting, review and improvement as required. 	Low

5. Strategic Social Impact Management Plan (SSIMP)

5.1. Overarching Strategic Framework

The BLNG Strategic Social Impact Management Plan (**SSIMP**) provides a framework for the further development of strategies to enhance opportunities and avoid, mitigate or manage the social impacts arising from the establishment of the LNG Precinct. It adopts adaptive management principles and seeks a balanced approach which maximises benefits through negotiated outcomes. The adaptive management principles allow the strategies to be adjusted in response to changed or new conditions, should they eventuate.

As discussed, concern around workforce impacts and Broome's current social and environmental vulnerability to further population increases has led to the development of 'overarching' or higher-order management strategies that set the context for the development of more specific strategies. Addressing the core higher strategies will mitigate many potential negative impacts that could occur through the construction and operation of the Precinct. These higher-order strategies focus on managing the separation of the construction workforce from the communities of Broome and the Dampier Peninsula, thus mitigating against many of the concerns regarding social and environmental impacts that might otherwise arise. The strategies are adaptive so changes can be made in future should local conditions change.

A SSIMP matrix that tabulates the strategies against the social impact factors can be found in **Table 5-1** and uses colour to indicate the likelihood of the impact and illustrates where the strategies respond to more than one social impact.

It is important to recognise that the strategic nature of the SIA restricts the SSIMP to providing a strategic framework from which more detailed management strategies can be developed when there is greater certainty about the Precinct, its development and potential social and economic impacts.

The SSIMP provides strategic direction for the future development of the project-level management plans. The specific nature of some of the ASIA recommendations were not appropriate to capture at this stage and could be used in the further development of the strategies and plans outlined in this document. Further information is provided in **Annexure C**.

As discussed in **Part 5, Section 3.8** the ASIA assessed the potential impact of the Precinct development on Indigenous people in the area. It described the specific measures to avoid, minimise and mitigate the potential Indigenous impacts of the development and any measures to address impacts on Indigenous people's lives values and culture. It included 75 recommendations to address both the existing Indigenous disadvantage in the area, as well as the impacts of Precinct development. These recommendations incorporate agreements reached in a number of other parallel agreements and processes. The mitigation and management measures relevant to the Precinct have been incorporated into this SSIMP. **Table 5-1** shows where the ASIA recommendations have been addressed by the management measures within the SSIMP.

■ Table 5-1 Social Impact Management Matrix.

Likelihood of Impact*: Very High: **Red**_High: **Orange**_Medium: **Yellow**_Low: **Green**

Mitigation and Management Measure	Part 5 Section Reference	ASIA Recommendation	Housing and Land	Education and Training	Employment	Health & Social Services	Tourism & Recreation (inc Fishing)	Emergency Services	Transport and road safety	Broome Image/ Sense of Place	Cost of living	Work-force competition	Local & Regional Economy
Precinct Conditions													
Managed-Access Construction Camp	5.4.1	28,42,49	√			√	√	√	√	√	√		
Access to Broome and Dampier Peninsula	5.4.2	27	√			√	√		√	√			
Workforce behaviour management	5.4.3	42, 50				√	√			√			
Local living	5.4.4		√			√	√		√	√	√		
Cross-cultural training	5.4.5	29, 47		√			√						√
Education training and employment	5.4.6	55, 59,60		√	√	√	√					√	√
Indigenous workforce development	5.4.7	46,48,61, 62, 47		√	√							√	√
Transient workforce development	5.4.8		√		√	√						√	
Strategies to retain local benefits	5.4.9	58,63,64			√				√		√	√	√
Precinct health, emergency services & policing	5.4.10	44				√		√					
Transport management	5.4.11							√	√	√			
General Social Management Strategies													
Marine resource use management	5.5.1	33,34,35					√			√	√	√	
Management of tourism impacts	5.5.2						√			√			√
Management of impacts of recreational use	5.5.3	27,30,31, 32			√		√			√			
Sense of place and community identity	5.5.4	10,11, 27-37 72-74					√			√			√
Housing strategy	5.5.5	52, 53	√	√		√				√	√		√
Broome Social Services Strategy	5.5.6	66, 68				√		√			√	√	
West Kimberley Socio-Economic Strategy	5.5.7	46, 54-64											
Social Monitoring	5.5.8	5-8, 10,11, 27-37	√	√	√	√	√	√	√	√	√	√	√
Precinct Governance	5.5.9	1-4, 12-14, 38, 75	√	√	√	√	√	√	√	√	√	√	√
Matters of NES	5.6												

5.2. Precinct-level Management Strategies

Within the overarching framework of the SSIMP, the detailed management plans for specific projects, including monitoring and evaluation, should be prepared by the commercial proponents or relevant party in collaboration with Government, stakeholders and community within the specified timeframe.

Management strategies will consist of:

- A series of measures to enhance the project's benefits and minimise the adverse effects;
- A plan to manage the identified impacts and adverse effects;
- Clear performance targets, performance measures, key performance indicators, reporting and governance arrangements as well as the response to the target shortfall;
- A plan to monitor the identified impacts and adjust the management plan as needed; and
- Measures to evaluate the effectiveness of the management measures.

Performance Indicators

Performance indicators are required to monitor the effectiveness of management strategies over time. They will be developed during development of the detailed strategy together with relevant targets and timeframes. Where appropriate, indicative performance indicators have been identified in this document.

Monitoring

Monitoring these measures is a key aspect of social mitigation and management plan implementation. The monitoring of the detailed management plan is particularly important for the population impacts. The actual population changes should be monitored against the projected workforce assumptions and the management plan reviewed.

Governance

The social management measures will be supported by a BLNG Precinct governance structure. This structure includes an overall Precinct management structure as well as structures to ensure the involvement of Traditional Owners and the Broome community in the process. The proposed interim governance structure for the Precinct is discussed in **Part 5, Section 5.5.8**.

5.3. Precinct Governance and Social Monitoring

Effective Precinct governance and social monitoring mechanisms will support the implementation of the management measures described in this report.

5.3.1. Governance

The Precinct Governance arrangements are shown in **Part 1, Figure 11-1**. These arrangements need to be further developed, for example in a Precinct Governance Plan and a Precinct Engagement Plan. The Engagement Plan or similar document should appropriately address non-Indigenous and Indigenous engagement and be developed in accordance appropriate State documents such as Engaging with Aboriginal Western Australians guide. <http://www.dia.wa.gov.au/Documents/ReportsPublications/ConsultingCitizensSept2005.pdf>

Effective governance mechanisms will be important for involving interested and/or affected stakeholders in the management and mitigation of impacts, particularly those requiring the input of multiple stakeholders such as employment, housing, infrastructure and services. Timely and transparent communication of information regarding environmental management will be particularly important for Traditional Owners and other Indigenous members of the community to be kept informed about environmental issues and management responses on Country.

5.3.2. Social Monitoring

The monitoring system includes monitoring and regular review by both the commercial proponents and the Precinct Management.

5.3.2.1. Commercial Proponents Monitoring System

The commercial proponents should establish a monitoring system to monitor the social and economic impacts of their construction and operation over time, using both quantitative and qualitative measures. Although the current social impact assessment has identified a range of potential social and economic impacts which may occur in the future, the range and magnitude of actual social and economic impacts occurring at the time of Precinct construction and operation may differ from the impacts predicted. Monitoring processes (including for example a feedback system and community based monitoring process) need to be established to monitor impacts during the time of Precinct construction and operation. Fundamental to these monitoring processes is that the community has an opportunity to participate in the development and implementation of any monitoring systems.

The commercial proponents monitoring system would include:

- Monitoring of relevant mitigation and management measures including issues that bridge Precinct and non-Precinct directly attributable to the commercial proponents;
- Decision-making processes, based on the outputs of monitoring, to adapt management measures to meet evolving requirements, based on agreement with Broome leadership and community input; and
- Reporting to Precinct Management;

The commercial proponents monitoring system should feed into the Precinct-level monitoring system.

5.3.2.2. Precinct-level Monitoring System

The Precinct social monitoring system should monitor social and economic change in relation to core social and economic indicators during both the construction and operational phases of all commercial proponents at the Precinct.

The Precinct-level monitoring system would include:

- Core social and economic indicators applicable to both the construction and operational phases of all commercial proponents at the Precinct;
- Arrangements for independent auditing;
- Mechanisms to review and adapt mitigation and management if existing measure prove inadequate; and
- Relevant reporting arrangements.

5.4. Precinct Condition Strategies

The key social mitigation and management strategies are central to the assumptions made in the strategic SIA and mitigate flow on impacts. The strategies would take the form of Precinct conditions or other similar mechanisms for proponents. The arrangements would have a mechanism to change the conditions, subject to agreement from relevant parties. These Precinct conditions would be audited on a regular basis. Suggested management strategies that should be included as Precinct conditions are those related to:

- 1) A managed-access construction camp;
- 2) Access to Broome and Dampier Peninsula;
- 3) Management of Worker behaviour;
- 4) Local living incentives;
- 5) Cross-cultural training;
- 6) Education, training and employment;
- 7) Indigenous workforce development;
- 8) Transient/opportunistic workforce management;
- 9) Strategies to retain local benefits;
- 10) Precinct emergency services and policing; and
- 11) Transport management.

5.4.1. Managed-access Construction Camp

A managed access construction camp will manage the exit and entry of the workforce and external entry by people not legitimately at the Precinct. This measure is also a key mitigation and management strategy supported by the ASIA to manage worker impacts on Broome and the Dampier Peninsula and its communities.

Strategy

Commercial Precinct proponents will house FIFO workers for the construction of the port and LNG facility at accommodation near the Precinct where external entry and exit is managed.

Objective: <ul style="list-style-type: none">To mitigate the potential for negative impact on the communities and environment of Broome and the Dampier Peninsula from the construction work force associated with the LNG Precinct.				
Outcomes	Time	Phase/s	Responsibility	
Responsible management of the effects of a large scale construction workforce on the local communities.	On-going	Construction	Lead Commercial Proponent(s)	Secondary Precinct Management
Planned and managed interaction with the local population during transit between the airport, the accommodation camp and Precinct and when on recreational breaks.	On-going	Construction		
Output				
A management plan to ensure the effective management of the construction workforce (especially FIFO workers), developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicators such as: <ul style="list-style-type: none">the percentage of workforce living at the managed access camp versus those living in Broome and the region.	Pre- Construction	Construction		

5.4.2. Access to Broome and the Dampier Peninsula

Stakeholders hold concerns around the unregulated impacts of a large scale construction workforce on Broome and the Indigenous communities of the Dampier Peninsula. The ASIA shared these concerns and included recommendations to minimise any potential negative tourism and recreation effects of the workforce on the Dampier Peninsula

Strategy

Develop and implement policy and procedures to manage access to Broome and the region by the construction workforce at the accommodation camp. This includes managing access to recreational fishing and tourism in the region.

Objective:				
<ul style="list-style-type: none">To manage the interaction between a large scale construction workforce and the communities of Broome and the Dampier Peninsula.				
Outcomes	Time	Phase/s	Responsibility	
An agreed plan to manage the interaction between the construction workforce and the Broome and Dampier Peninsula communities when they are not at work.	Pre-Construction	Construction	Lead Commercial Proponent(s)	Secondary Precinct Management
Support for small businesses, particularly Indigenous, to provide recreational, fishing and other tours for construction workers.	On-going	Construction		
Output				
A management plan to ensure the appropriate management of the construction workforce developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none">the number of workforce using local recreation, fishing and other tours.	Pre-Construction	Construction		

5.4.3. Workforce Behaviour Management

There are stakeholder concerns around worker behaviour and its influence on the local community (both Indigenous and non-Indigenous) and tourists. Attendees at the health workshop and other community members have expressed concern about the potential impact of the Precinct construction workers on Broome and the Dampier Peninsula. Most of these potential impacts would be mitigated by employing a largely FIFO workforce within a managed access residential camp located in proximity to the James Price Point BLNG Precinct (outside of Broome). The SIA process identified that the concerns of health professionals and community members revolve around sexual behaviour, social behaviour as well as access to drugs and alcohol. Given that the Dampier Peninsula is an alcohol restricted area, there is also concern about the availability of alcohol to local Indigenous residents of the Dampier Peninsula. These same concerns were raised in the ASIA which highlighted the potential that the presence of workers on the peninsula could increase the availability of alcohol, drugs and undesirable behaviours among the Indigenous community. A managed-access camp, with the enforcement of relevant workforce management strategies such as a code of conduct, would help to alleviate these issues and reassure concerned stakeholders.

Strategy

Develop and implement policy and procedures to manage potential undesirable worker behaviour including:

- Measures to manage worker visibility when not at the Precinct or related areas so as to not diminish the tourism value of surrounding communities ;
- Workforce management practices to control access to drugs and alcohol; and
- Measures to prevent and manage unacceptable employee behaviour when visiting Broome and other areas in the Kimberley, including behaviour on transfer flights.

Objective:				
<ul style="list-style-type: none"> • To manage the potential for worker behaviour to have a negative effect on the communities of the surrounding areas. 				
Outcomes	Time	Phase/s	Responsibility	
Clear policies and procedures established to control access to drugs and alcohol and manage worker behaviour.	Pre-Construction	Construction	Lead Commercial Proponent(s)	Secondary Precinct Management; Traditional Owners; Broome Police
Output				
A management plan to ensure the appropriate management, developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none"> • Register of feedback from community feedback email or hotline. 	Pre-Construction	Construction		

5.4.4. Local Living

Broome currently has significant service constraints and would have difficulty coping with a large influx of families beyond the usual tourism cycle. Until Broome can accommodate a significant short term increase in the number of additional households, commercial proponents should not provide incentives for their construction workforce to live in Broome unless they are able to demonstrate appropriate management strategies, including available housing and access to services.

Strategy

Commercial proponents should avoid providing incentives for the large scale construction work force to live in Broome.

Objective:				
<ul style="list-style-type: none">Commercial proponents should provide sufficient accommodation in the Precinct accommodation camp for the construction workforce and not encourage the construction workforce to move to Broome.				
Outcomes	Time	Phase/s	Responsibility	
Avoid unmanageable population influx into Broome during the construction phase of LNG facilities.	On-going	Construction	Lead Commercial Proponent(s)	Secondary Precinct Management
Sustained coexistence of the community with LNG development.	On-going	Construction and Operation		
Output				
A management plan to ensure the effective control of Broome-based construction workers, developed with relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none">the percentage of construction workers accommodated in Broome.the number of commercial proponents residential units (owned/rented) in Broome.	Pre-Construction	Construction		

5.4.5. Cross-Cultural Training

The Precinct is located on and surrounded by land which is the subject of a native title claim. The State and the Foundation Proponent are committed to encouraging the employment of Indigenous people, particularly those from the local area. As such, the ASIA recommends cross-cultural training for all Precinct workers.

Strategy

Proponents should provide cross-cultural training for all Precinct workers.

Objective:				
<ul style="list-style-type: none"> All workers at the Precinct are aware of the culture and the cultural obligations of their Indigenous colleagues, their heritage and the heritage values within and near the Precinct and surrounding area, including their importance and legal obligations of managing or avoiding impacts to heritage sites. 				
Outcomes	Time	Phase/s	Responsibility	
Workers are sensitive to the culture and heritage associated with the Precinct, to their Indigenous colleagues and their possible cultural obligations.	On-going	Construction	Lead Commercial Proponent(s); Traditional Owners	Secondary Precinct Management
Output				
A management plan to ensure that all construction workers have undergone cross-cultural training as soon as practicable. The plan should include performance indicators such as: <ul style="list-style-type: none"> the percentage of commercial proponents employees undertaken cross-cultural training. 	Pre-Construction	Construction		

5.4.6. Education, Training and Employment

While the operation of a FIFO construction workforce might mitigate the population impacts of the Precinct on Broome, this measure also has the potential to reduce the local economic benefits of the Precinct to Broome and the Kimberley. There are significant potential benefits from the development of the Precinct for local people, including business opportunities, training and employment. These economic benefits are not automatic as it is often more effective for commercial Precinct proponents to utilise a trained construction workforce and services from other operations and locations.

Where practicable, adopting a local, regional and State purchasing strategy for labour, services, and materials, would increase direct and indirect economic benefits in the local, regional area and State.

During stakeholder engagement, many stakeholders stated that they expected the development of the Precinct to provide employment for existing residents of Broome and the Dampier Peninsula as well as education and training opportunities for the younger generation within the impact areas. Commercial proponents are expected to fund similar education and training ventures within the broader community. A number of education and training initiatives currently exist and the strategies outlined below should build on and further develop these initiatives.

Strategy

Develop education, training and employment strategies with all relevant government and non-government service providers, to increase local employment in both construction and operational phases of the Precinct over time in order to retain benefits and promote residence within the Kimberley. The strategies should include:

- The coordination and development of mechanisms to assist people, including Indigenous people to overcome barriers to education, training and employment; and
- The promotion of additional Indigenous apprenticeships.

Objective:				
<ul style="list-style-type: none">Maximise education, training and employment opportunities for the local community and ensure a coordinated approach to the range of education, training and employment strategies implemented to support the development of the BLNG Precinct.				
Outcomes	Time	Phase/s	Responsibility	
A trained local workforce that can be deployed during Precinct construction.	On-going	Construction and Operation	Lead Commercial Proponent(s)	Secondary Precinct Management; Commonwealth Government; NGO Training Associations.
Increased local employment at the Precinct, including Indigenous peoples.	On-going	Construction and Operation		
Up skilling of the regional workforce in the longer-term.	On-going	Construction and Operation		
Output				
A management plan for education, training and employment that ensures a coordinated approach and maximises opportunities for the local community, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none">the number of local (Indigenous and non-Indigenous) employees in the construction and operational workforce.Local (Indigenous and non-Indigenous) project related participants in education and training programs.	Pre-Construction	Construction and Operation		

5.4.7. Indigenous Workforce Development

The ASIA emphasises the importance of overcoming education barriers to enable Indigenous people to access training and employment opportunities. The Heads of Agreement committed the State to establish an Education Development Fund to support scholarships and other training programs for Indigenous people.

Strategy

Develop a strategy to increase the number of Indigenous workers related to the LNG Precinct.

Objectives: <ul style="list-style-type: none">• Ensure a coordinated approach to the range of Indigenous education, training and employment strategies.• Develop and implement a strategy to increase the number of Indigenous workers on the project.• Develop or link to existing programs to assist Indigenous people to overcome barriers to education, training and employment.• Provide opportunities for Indigenous people to work on cultural and environmental values relevant to precinct operation.• Develop appropriate workforce arrangements that include support for Indigenous workers.				
Outcomes	Time	Phase/s	Responsibility	
Maximise the number of Indigenous workers working directly on the Precinct and on related activities.	On-going	Construction and Operation	Lead Commercial Proponent(s); (State and Commonwealth for education)	Secondary Precinct Management; Commonwealth Government; Traditional Owner Representatives; NGO Training Associations.
Maximise the number of Indigenous apprenticeships.	On-going	Construction and Operation		
Up skilling of the Indigenous workforce in the longer term.				
Measurable increase in the number of Indigenous students engaged in secondary education.	On-going	Construction		
Output				
An Indigenous education, training and employment management plan that ensures a coordinated approach and maximises opportunities for the local community, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none">• Number of Indigenous employees in the construction and operational workforce;• Number of Indigenous employees in the construction and operational workforce employed after undertaking project related education and training programs.	Pre-Construction	Construction and Operation		

5.4.8. Transient Workforce Management

A feature of the resource developments in the Pilbara has been the arrival of workers and their families hoping to find employment in what they hope to be high paying jobs. These workers have been termed “transient” or “opportunistic” workers for the purpose of this assessment and were included in the population modelling undertaken for the Precinct. These workers would potentially impact on short-term accommodation and the existing social services in Broome. Commercial proponents should discourage these workers from moving to the region and, once they have arrived, have procedures in place so these workers find employment in Broome.

Strategy

Develop policy and procedures to limit and manage the potential numbers of transient or opportunistic workers arriving in the region. This strategy will:

- minimise the number of transient/opportunistic workers arriving in Broome in the hope of finding employment at the Precinct;
- ensure sufficient temporary accommodation for the transient/opportunistic workforce to avoid impacts on Broome's short-stay accommodation in the tourist season; and
- endeavour to gainfully use the transient/opportunistic workforce that does arrive to fill employment vacancies in Broome and minimise the effect of workforce competition.

Objective:				
<ul style="list-style-type: none"> • Develop a strategy to minimise the number of transient or opportunistic workers arriving in the region and to manage those who do arrive. 				
Outcomes	Time	Phase/s	Responsibility	
Minimise transient/opportunistic workers arriving in Broome and a clear process to house and provide services for those who do arrive.	On-going	Construction	Lead Commercial Proponent(s)	Secondary Precinct Management; Broome Chamber of Commerce; State Government.
Output				
A management plan to minimise and manage the numbers of transient or opportunistic work seekers and manage those that do arrive, developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none"> • Number of opportunistic workers arriving in Broome. • Workforce recruitment strategies to minimise transient worker inflow. 	Before Construction starts	Construction		

5.4.9. Strategies to Retain Local Benefits

A key objective of locating the LNG Precinct in the Kimberley is to maximise and retain benefits for local people, both Indigenous and non-Indigenous. There are a number of mechanisms to retain economic benefits within the region, including developing education, training and employment skills and supporting local businesses where possible.

A purchasing strategy should also encourage Precinct expenditure within local businesses and industry. As Broome has a limited manufacturing base a local purchasing strategy would support its growth. The purchasing strategy would need to be based on the demands of the Precinct and related activities as well as an assessment of Broome and the region's current and future capacity to supply goods and services.

Some of the opportunities might also be short-lived and it is likely that businesses that have developed to support the construction phase of the initial Precinct development may later see a rapid decline in the demand for their services. The strategy should communicate the potential temporary nature of opportunities dependant on Precinct construction. The strategies to retain local benefits developed by the commercial proponents would contribute to the West Kimberley Socio-Economic Development Strategy that would maximise all socio-economic benefits.

Strategy

Develop a strategy to maximise economic benefits for Broome, the Kimberley and the State of Western Australia including:

- a local, regional and State purchasing strategy for labour, services, and materials during construction and operation;
- maximising LNG related local employment and local industry participation over time; and
- developing, where relevant, emerging Indigenous businesses.

Objective:				
<ul style="list-style-type: none">Maximise economic benefits for the communities of Broome and the region.				
Outcomes	Time	Phase/s	Responsibility	
Precinct proponents that provide full, fair and reasonable information and opportunity for local industry to contribute to industry activities within the Precinct and maximise local industry participation where it is capable and competitive on the basis of health, safety and environment, quality, cost and delivery.	On-going	Construction	Lead Commercial Proponent(s)	Secondary Precinct Management; Broome Chamber of Commerce; Kimberley Development Corporation; Traditional Owners.
Maximise economic benefits through local purchasing, local employment, support of local industry and relevant emerging Indigenous businesses.	On-going	Construction and Operation		
Communications strategies to ensure businesses understand the economic opportunities during construction and maintenance cycles.	On-going	Construction and Operation		
A regional strategy to maximise LNG related employment opportunities over time.	On-going	Construction and Operation		
Output				
A management plan or plans to provide local business and employment opportunities, developed with relevant stakeholders, within the stated timeframe, with relevant targets and performance indicators such as: <ul style="list-style-type: none">the value of locally bought goods and services:	Before Construction starts	Construction and Operation		

Objective:				
<ul style="list-style-type: none"> Maximise economic benefits for the communities of Broome and the region. 				
<ul style="list-style-type: none"> the percentage of existing local residents employed in the construction and operational workforce; the percentage of local Indigenous employees in the construction and operational workforce; and the number of local Indigenous business enterprises developed 				
A local content and purchasing strategy that supports local, regional and State businesses to retain benefits.	Before Construction starts	Construction and Operation		
A program to monitor local indicators of economic development such as cost of living, employment and business development.	Before Construction starts	Construction and Operation		

5.4.10. Precinct Health, Emergency Services, Policing and Security

Health and emergency services would be required to service the BLNG Precinct in a manner that does not impact upon the provision of these services in Broome. The ASIA recommends increased policing to prevent the spread of illicit alcohol and drugs. While the provision of policing services is a State Government responsibility, the proponents should ensure an appropriate level and quality of security is provided at the Precinct and the accommodation facilities.

Strategy

Ensure appropriate primary health care, emergency, security and police services are provided to the Precinct and construction camp without detracting from service provision to Broome.

Objective:				
<ul style="list-style-type: none"> Establish appropriate primary health care, emergency and security services capacity in order to meet Precinct requirements and minimise the potential impacts on existing services. 				
Outcomes	Time	Phase/s	Responsibility	
Primary health care, emergency and security services provided at the Precinct and the relevant regional services are not impacted.	On-going	Construction	Lead Commercial Proponent(s)	Secondary Precinct Management; State Police and Emergency Services.
Output				
A management plan to ensure the provision of primary health care, emergency and security services to the Precinct, developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none"> the measure of Precinct use (time spent, number of incidents) of Broome health care, police and emergency services. 	Pre-Construction	Construction		

5.4.11. Transport Management

The Cape Leveque road is the only route linking the communities on the Dampier Peninsula to Broome. Part of this road would be upgraded to provide a route to the Precinct and would therefore contain Precinct traffic as well as both tourists and residents travelling up the Dampier Peninsula. This management measure deals with the behaviour of road users, not the development or upgrading of the road.

It is envisaged that most construction workers would fly into Broome airport and then be bussed to the construction camp. Workers would then be transported between the camp and the Precinct each day.

Although it is too early to anticipate supply-base logistics for the Precinct, it is likely that some materials would be delivered to Broome Port to be transported to James Price Point, either by road or sea, or as is more likely, a combination of both. It is also possible that materials would be trucked from Perth direct to the Precinct. Consequently, there may be ongoing heavy vehicle traffic within Broome itself. In the town centre, this would translate to transport of workers from the Broome Airport and for transport of materials, on Port Drive, Gubinge Road, Broome Highway and the Cape Leveque Road.

Strategy

Limit, mitigate and manage the potential transport impacts of the Precinct and associated infrastructure. These should:

- ensure the safe and efficient transport services for traffic between the Precinct and Broome;
- ensure the safety of other users of the Precinct-related roads;
- address potential increased heavy vehicle use and any related increases in traffic in Broome centre; and
- manage airport FIFO transfers, which may include for example the development of specific facilities to accommodate FIFO transfers.

Objective:				
<ul style="list-style-type: none"> • Mitigate and manage the impacts of the Precinct development on transport and traffic. 				
Outcomes	Time	Phase/s	Responsibility	
Responsible management of the transport and traffic impacts of both the construction activities and the construction workforce.	On-going	Construction and Operation	Lead Commercial Proponent(s)	Secondary Precinct Management; Shire of Broome
Minimum disruption of recreation and tourism activities	On-going	Construction and Operation		
Safe and efficient transfer of workforce from the airport to the accommodation with no or little impact on community.	On-going	Construction and Operation		
Safe and efficient transfer of supplies and equipment from Broome port to the Precinct occurs with no or little impact on community.	On-going	Construction and Operation		
Output				
A transport management plan to ensure the safe and effective management of all Precinct-related movement of humans and goods, developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none"> • the number of road incidents directly related to LNG Precinct activity. • register of feedback via community feedback email and hotline. 	Pre - Construction	Construction and Operation		

5.5. General Social Management Strategies

In addition to those strategies which have been suggested as being included with Precinct lease conditions, the following issues and strategies should be developed to address:

- management of marine resource use impacts;
- management of tourism impacts;
- management of impacts of recreational use;
- Broome character and Sense of Place management strategy;
- housing strategy;
- west Kimberley Socio-Economic Strategy; and
- governance and monitoring.

5.5.1. Management of Marine Resource Use Impacts

A Fishing Industry Impact Study was conducted by the Department of Fisheries. The study was based largely on the perceptions of recreational and commercial fishers (including pearling and aquaculture) about the potential impacts caused by the establishment of the LNG Precinct. The report raised a number of concerns including the need for small scale boating facilities in Broome. This issue has recently been addressed with the announcement in the 2010/2011 State Budget of the staged funding of a major boat launching ramp, sheltering breakwater, dredged basin and floating jetty for Broome.

A number of further social issues were raised in the Fishing Industry Impact Study. These include:

- local over-fishing during the construction phase;
- increased access to on-shore areas near the James Price Point Area;
- a general increase in the cost of living that puts upward pressure on relatively low tourism, commercial fishing and pearling wages;
- disturbance to existing commercial fishing and pearling areas as well as favoured recreational fishing areas;
- diminished areas for fishing and pearling which may lead to the industry having to explore areas further afield; and
- increased access to fishing areas north of James Price Point and the interaction between vessel movements and commercial fishing (including pearling and aquaculture).

The ASIA highlighted Indigenous people's reliance on fish and other wild resources and documented concerns around their depletion. It also raised concerns about commercial and recreational fishing and these recommendations should be considered when the fishing industry mitigation and management strategy is developed.

Strategy

Develop a fishing industry mitigation and management strategy with the commercial and recreational fishers and tourism operators to mitigate and manage the impacts from the development of the Precinct at James Price Point.

Objective:				
<ul style="list-style-type: none"> • Minimise, mitigate and manage the impact of the LNG Precinct on marine resources including commercial and recreational fishing activity in the James Price Point region. 				
Outcomes	Time	Phase/s	Responsibility	
A commercial, recreational and customary fishing, pearling and aquaculture mitigation and management strategy that enables coexistence with the BLNG Precinct.	On-going	Construction and Operation	Lead Commercial Proponent(s)	Secondary Precinct Management (as relates to the Precinct);
Output A management plan to ensure the effective mitigation of commercial, recreational and customary fishing, pearling and aquaculture, developed with relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none"> • the number of initiatives implemented to support coexistence of fishing, pearling and aquaculture within impacted area 	Pre-Construction	Construction and Operation		State Government; Traditional Owners; Commercial and Recreational Fishing, Aquaculture and Pearling Organisations.

5.5.2. Management of Tourism Impacts

The significance of the tourism industry to the region prompted TourismWA to commission a Tourism Impact Assessment in 2009. Tourism is one of the largest sector employers in the region and represents around 64% of the Broome's total generated revenue. The TIA identified a number of issues that require management measures:

- increase in demand for short-term accommodation in Broome during construction;
- increase in demand for land and housing;
- a conflict between the tourism attributes of Broome and the requirements of the construction phase of the LNG industry particularly worker visibility; and
- increased usage of Broome's airport and marine infrastructure as a result of the BLNG Precinct.

A further issue relates to Broome's national and international image. Broome, along with Perth and Margaret River, is one of Western Australia's premier tourist destinations. The tourism impact assessment has highlighted the need to develop a strategy to separate Broome's image from that of the BLNG Precinct.

Strategy

Develop a tourism marketing strategy that maintains the current tourism image of Broome, while providing a framework for the ongoing development of the BLNG Precinct.

Objective:				
<ul style="list-style-type: none"> • Broome retains its status as one of WA's premier tourism destinations. 				
Outcomes	Time	Phase/s	Responsibility	
The tourism image of Broome is maintained or enhanced and coexists with the BLNG Precinct.	On-going	Construction and Operations	Lead TourismWA	Secondary Precinct Management; Commercial Proponents
Output				
A detailed management plan to ensure that Broome's tourism industry and the development of the LNG Precinct coexist, developed with relevant stakeholders, within the stated timeframe, with relevant targets and performance indicators such as: <ul style="list-style-type: none"> • Number of tourism visitors to Broome; and • Tourism visitor survey. 	Pre-Construction	Construction and Operations		

5.5.3. Management of Impacts of Recreational Use

The area planned for the BLNG Precinct is a popular informal recreation area for residents of Broome and the Dampier Peninsula as well as tourists. The State has made commitments to retain recreational access to James Price Point, via the Precinct access road, which will branch off the Cape Leveque Road, with Manari Road interrupted at the southern boundary of the Precinct. This will create increased limitations for current recreational users as a result of the Precinct.

The area is subject to a native title claim, and it is possible that in the long term, as recommended in the ASIA, there will be some form of access control to manage recreation in the native title claim area. This is consistent with the State's approach to the development of the broader Dampier Peninsula Land Use and Infrastructure Plan, which will consider the way the Dampier Peninsula is accessed and promote the conservation of environmental and heritage values. The State will consult with the Traditional Owners in the further development of the Dampier Peninsula Land Use and Infrastructure Plan, which together with other mechanisms such as the Cultural Heritage Management Plan, will provide appropriate mechanisms to address possible impacts of visitors accessing the area on cultural heritage, including registered and unregistered rock art and other sites on the Dampier Peninsula.

The Access to Broome and the Dampier Peninsula Strategy (**Part 5, Section 5.4.2**) requires commercial proponents to develop and implement policy and procedures to manage access to Broome and the region by the construction workforce. This strategy relates to:

- the disruption and potential displacement of existing recreation activities through commercial proponent activities; and,
- Traditional Owner concern around the recreation impacts of increasing population on country, including impacts on cultural heritage.

Strategy

There are two interrelated elements to the strategy:

- In collaboration with Traditional Owners, commercial proponents should investigate current recreational use of the area, the potential for recreation activities to be displaced to other areas and develop suitable recreational management measures, consistent with the Dampier Peninsula Land Use and Infrastructure Plan.
- In collaboration with Traditional Owners, State and Local Government should investigate managing access to the Dampier Peninsula and alternative recreation areas that support the further development of the Dampier Land Use Plan.

Objective: <ul style="list-style-type: none">To develop management arrangements for recreational activities to address local user and Traditional Owner concerns.				
Outcomes	Time	Phase/s	Responsibility	
A clear understanding of the recreational use of the area surrounding the Precinct and the potential displacement of these activities to develop a set of recreational management measures, consistent with the Dampier Peninsula Land Use and Infrastructure Plan, to manage the commercial proponent's direct and indirect recreational and cultural impacts.	On-going	Construction and Operation	Lead Commercial Proponent(s)	Secondary Precinct Management; Traditional Owners; State Government; Shire of Broome
Output				
A management plan, developed with all relevant stakeholders to address direct and indirect recreational impacts, within the stated timeframe, with relevant targets and performance indicators such as: <ul style="list-style-type: none">Access to and use of range of suitable recreational areas	Pre-Construction	Construction And Operation		
Outcome	Time	Phase/s	Responsibility	
An agreed process to manage the uncontrolled recreation on the Dampier Peninsula, consistent with the Dampier Peninsula Land Use and Infrastructure Plan.	Pre-Construction	Construction And Operation	Lead Traditional Owners; State Government; Shire of Broome.	Secondary Precinct Management; Commercial Proponents.
Output				
A management plan, developed with all relevant stakeholders to address access to the Dampier Peninsula for recreation and cultural reasons, within the stated timeframe, with relevant targets and performance indicators.	Pre-Construction	Construction And Operation		

5.5.4. Sense of Place and Community Identity Management Strategy

The concepts of community identity, 'Sense of Place' and character apply to Broome as well as to the areas on the Dampier Peninsula. Two separate but interrelated strategies are recommended.

5.5.4.1. Dampier Peninsula 'Sense of Place' Strategy

The heritage, environmental and cultural values of the Dampier Peninsula are important to Traditional Owners, Indigenous and non-Indigenous people. There is broad agreement to manage Indigenous cultural and heritage matters. These management measures are captured in a range of heritage and environmental management measures including the Cultural Heritage Management Plan, the Dampier Peninsula Land Use and Infrastructure Plan and relevant land access agreements. These agreements allow for the continuation of cultural practices and maintenance of cultural heritage values in the area. The cross-cultural training strategy, as discussed in **Part 5, Section 5.4.5**, will promote the respect and appreciation of Indigenous country and heritage among the wider workforce.

An overall plan to coordinate these activities is required to ensure the effective management of the cultural, heritage and identity of the Dampier Peninsula.

Objective:				
<ul style="list-style-type: none"> Retain the identity and 'Sense of Place' associated with the Dampier Peninsula. 				
Outcomes	Time	Phase/s	Responsibility	
The Dampier Peninsula's character, identity and 'Sense of Place' coexists with BLNG development.	On-going	Construction and Operation	Lead Traditional Owners; Precinct Management.	Secondary Precinct Management; Commercial Proponent(s).
Maintain and enhance environmental and cultural values on the Dampier Peninsula	On-going	Construction and Operation		
Output				
A management plan to address the Dampier Peninsula 'Sense of Place' and community identity, developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none"> Guidelines to maintain the Dampier Peninsula's identity and 'Sense of Place' 	Pre-Construction	Construction And Operation		

5.5.4.2. Broome ‘Sense of Place’ Management Strategy

Broome has a unique character that is closely related to its success as a tourism destination. Potential changes to the unique “Broome feel” are a major concern raised by almost all stakeholders. Broome’s identity is a combination of natural and social factors including the climate, geography, multicultural community, and its laid-back style.

Community identity is not static and changes over time. The past increases in population brought with it changes to Broome’s community identity. This is likely to continue with the population increases projected for Broome.

A number of stakeholders are concerned that the image of Broome would become linked with that of the BLNG Precinct. The BLNG Precinct would bring additional change to Broome’s Sense of Place and identity, with the Precinct ultimately becoming a part of Broome’s ongoing image and identity. The extent to which there is change to Broome’s identity and the extent to which there is separation or integration between the BLNG Precinct and Broome’s existing identity, would be dependent upon how ‘Sense of Place’, heritage, image and identity is managed in the future. Without good management, these issues could result in a sense of disruption and loss for longer-term residents and a reduction in the quality of life for new residents.

Strategy

Develop a strategy to enhance Broome’s character and ‘Sense of Place’ that involves:

- engagement of the Broome community to develop a vision for Broome to guide future planning; and
- developing Sense of Place design guidelines to guide the growth of Broome and ensure the design of public places enhances Broome’s ‘Sense of Place’.

Objective:				
<ul style="list-style-type: none">To retain the unique character and ‘Sense of Place’ associated with Broome during the development of the BLNG Precinct.				
Outcomes	Time	Phase/s	Responsibility	
A clear plan, including community vision, heritage, spatial planning and Sense of Place guidelines, to maintain Broome’s character, identity and ‘Sense of Place’. Maintain and enhance environmental and cultural values in and around Broome.	On-going On-going	Construction and Operation Construction and Operation	Lead The Shire of Broome and Broome Community, including Traditional Owners	Secondary Precinct Management; Commercial Proponent(s)
Output				
A management plan to address Broome’s ‘Sense of Place’ and community identity, developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none">No significant negative change in monitoring surveys.Guidelines to manage Broome’s identity and ‘Sense of Place’.	Before Construction starts	Construction And Operation		

5.5.5. Housing Strategy

The Browse Strategic SIA (Volume 2) reported that there were fewer than 5,000 dwellings in Broome in December 2008. The population growth predicted for the Shire of Broome increases from an estimated 17,100 people in 2011 to 31,400 in 2041, an increase of 84%. Using the average Broome Shire occupancy rate of 2.9 persons per dwelling, an additional 4,931 houses would be needed to house the predicted population increase. The development of the 694ha Broome North is intended to meet Broome's long-term housing needs. LandCorp is the facilitator of the land development at Broome North and plans to enable development of the full spectrum of housing, from social housing and service worker accommodation through to medium income housing and first home owner housing.

The predicted housing requirement as a result of the development of the Precinct is comparatively small and depends on whether the development follows the low, medium or high case scenario. The estimated Precinct-led housing demand would also follow distinct peaks and troughs as it is driven by Precinct construction phases.

It is likely that there would be increased demand for a range of accommodation from a number of sources in Broome. During the initial and pre-construction phase of the Precinct, some employees may need to be accommodated in Broome in short-stay accommodation and commercial proponents should ensure they provide fit for purpose accommodation which does not impact on tourism related accommodation supply. Families may require housing when they move to Broome to be closer to workers at the Precinct. A range of housing types would be required for people moving to take up indirect employment opportunities. In particular, experience in the Pilbara shows that opportunistic workers move to resource towns expecting to be able to access low-cost short-term accommodation such as that offered by caravan parks. This accommodation is oversubscribed in the peak tourist season in Broome and the commercial proponents would need to manage these impacts.

The demand for temporary and permanent housing in Broome needs to be closely monitored so that housing supply is able to meet the demand. In addition the development of the Precinct may exacerbate or highlight current social housing issues in Broome and more specifically the issue of homelessness.

The A SIA points out a baseline issue, that housing is already a problem for Indigenous people in Broome and the Dampier Peninsula. The existing issues include the lack of affordable housing, scarce public housing, the low standard of housing in communities, no short-term emergency housing in Broome, and limited accommodation for those studying in Broome, as well as major issues with homelessness in Broome. The A SIA also identifies opportunities to train Indigenous people to construct the additional houses needed to support both the projected population increase as well as the Precinct-led population increase.

Funding for Indigenous housing in the west Kimberley is being provided under the National Partnership Agreement on Remote Indigenous Housing.

This is an issue where the existing housing landscape will need to be addressed in addition to each proponent's close management of its housing requirements in order to prevent more serious social housing issues developing.

Strategy

Develop an overall mitigation and management strategy that:

- provides an understanding of current housing issues in Broome;
- manages the impacts of the Precinct development on local and regional housing;
- identifies potential impacts on different types of housing during the different phases of Precinct construction;
- monitors housing supply and demand;
- ensures timely release of land for housing and corresponding construction capability; and
- addresses short-term accommodation deficits, affordable housing, social housing and homelessness issues.

Objective:				
<ul style="list-style-type: none"> Ensure the timely delivery of appropriate land and housing requirements for Broome in order to meet projected population increases, including those associated with Precinct requirements. 				
Outcomes	Time	Phase/s	Responsibility	
A clear understanding of the potential impact of the Precinct on housing in Broome and the Dampier Peninsula to address the housing needs of the Precinct while at the same time addressing the issues in Broome	On-going	Construction	Lead LandCorp	Secondary Commercial Proponent(s); Precinct Management; Shire of Broome, Department of Housing.
A housing monitoring program to monitor the need for housing, which ensures that the supply of land and construction of suitable housing keeps pace with the demand.	On-going	Construction		
Output				
A land and housing management plan to ensure that the supply of land and housing meets the needs of Broome and the Precinct, developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicators.	Pre-Construction	Construction		

5.5.6. Broome Social Services Strategy

The strategic SIA (Volumes 1 and 2) illustrates that most social services in Broome are currently at or exceeding their delivery-capacity. Although the potential impacts arising from the development of the Precinct are likely to be small, these additional pressures are being assessed within the context of a service-system under considerable pressure.

Volumes 1 and 2 of the strategic SIA show that Broome is predicted to experience considerable population growth over the next 30 year period. Given the Precinct condition of a managed access FIFO accommodation camp, the impact on services from the Precinct is likely to be comparatively minor when compared to overall growth. Nevertheless, small increases in demand can be amplified if a services system is already under pressure from demands as is the case with Broome. The ASIA raises several potential health impacts including access to drugs, alcohol and other concerns. In as much as these relate to the BLNG Precinct, they have been addressed by the managed access camp and the worker code of conduct. These issues are also likely to be further exacerbated by the natural growth predicted for Broome. The ASIA also raises the need for increased Indigenous mental health funding within the area of impact, which is already an existing baseline issue. The ASIA also identified the lack of existing recreation services for the youth, particularly Indigenous youth and consideration should be given to this in the overall strategy.

Given the current vulnerability of health and social service provision, a strategy for services such as health, education, child care, counselling, therapeutic and emergency services should be developed in the short term to increase the current capacity of the social services to prevent further pressure, and in the longer term to increase the capacity of health and social service provision to accommodate any potential direct and indirect employment and population increases from the Precinct. The West Kimberley Socio-Economic Strategy will be an across government initiative to address the social services deficits in Broome. It is planned to address social service issues in the west Kimberley with two, five and ten year strategic plans and will be developed in close consultation with the Broome community.

The West Kimberley Socio-Economic Strategy will map existing services (State, Local, Commonwealth and N GO), identify gaps or serious deficits and will engage with the community to identify priorities. This will provide better coordination of existing service provision, better use of existing funds and identify the areas of greatest need. In addition to dedicated State and Commonwealth service delivery, it is envisaged that as LNG companies located at the Precinct would be using Broome services either directly or indirectly, they would also contribute funding for the strategy. This strategy will clearly align with Precinct specific measures outlined in **Section 5.4.10**.

Strategy

- develop two, five and ten year plans to reasonably address the current service deficits in the west Kimberley.
- on collaboration with the community leadership, develop and implement a strategic and collaborative west Kimberley Socio-economic Strategy to address social services deficits and impacts in the region.
- ensure close links with the social strategies developed for the Precinct.

Objective:				
<ul style="list-style-type: none"> • Government services are delivered to reasonably meet the social impact assessment baseline of existing community requirements and population growth projections. 				
Outcomes	Time	Phase/s	Responsibility	
Current service delivery levels to reasonably meet accepted service delivery standards in Broome, according to a two, five and ten year plan.	On-going	Construction and Operation	Lead State Government	Secondary Commercial Proponents; Precinct Management; Commonwealth Government; NGOs Traditional Owners
Planned and managed interaction with the local population during transit between the airport, the accommodation camp and Precinct and when on recreational breaks.	On-going	Construction and Operation		
Output				
A management plan, to ensure appropriate Broome social services, developed with relevant stakeholders, within the stated timeframe, with relevant targets and performance indicator such as: <ul style="list-style-type: none"> • The number of service users against service use thresholds. 	Before Construction starts	Construction and Operation		

5.5.7. West Kimberley Socio-economic Strategy

Many of the Social Management Strategies include measures to generate and improve the socio-economic opportunities offered through the development of the Precinct. These include the following opportunities (reference to the relevant management measure in brackets):

- Opportunities to service the accommodation village (**Section 5.4.1**);
- Recreation business opportunities for construction workers on work breaks (**Section 5.4.2**);
- Cross-cultural training and awareness-raising opportunities (**Section 5.4.5**);
- Local training and employment opportunities (**Section 5.4.6**);
- Specific Indigenous education, training and employment opportunities (**Section 5.4.7**);
- The availability of additional workers in Broome from the transient/opportunistic workers likely to arrive in Broome (**Section 5.4.8**);
- Strategies to retain local benefits such as a local and regional purchasing strategy (**Section 5.4.9**);
- Business development opportunities in support of the Precinct; (**Section 5.4.9**); and
- Housing development (**Section 5.5.5**).

This over-arching strategy will ensure the economic development opportunities are maximised by co-ordinating the raft of initiatives. There are also likely to be synergies between the opportunities listed in this document and through other initiatives. This strategy will ensure that the development of the Precinct has the greatest positive local benefit in creating a more resilient community.

Objective:				
<ul style="list-style-type: none"> Maximise the socio-economic opportunities resulting from the Development of the Precinct for the West Kimberley 				
Outcomes	Time	Phase/s	Responsibility	
On-going coordination to maximise the socio-economic opportunities offered through the development of the Precinct.	On-going	Construction and Operation	Lead State Government	Secondary Kimberley Development Commission Broome Chamber of Commerce; Precinct Management; Commercial Proponents; Traditional Owners.

5.5.8. Social Monitoring

The monitoring system includes monitoring and review by both the commercial proponents and the Precinct Management.

5.5.8.1. Commercial Proponents Monitoring System

The commercial proponents should establish a monitoring system to monitor the social and economic impacts of their construction and operation over time, using both quantitative and qualitative measures. Although the current social impact assessment has identified a range of potential social and economic impacts which may occur in the future, the range and magnitude of actual social and economic impacts occurring at the time of Precinct construction and operation may differ from the impacts predicted. Monitoring processes, including for example a feedback system and community based participatory monitoring process need to be established to monitor impacts during the time of Precinct construction and operation. Fundamental to these monitoring processes is that the community has an opportunity to participate in the development and implementation of any monitoring systems.

The commercial proponents monitoring system would include:

- monitoring of relevant mitigation and management measures including issues that bridge Precinct and non-Precinct directly attributable to the commercial proponents;
- decision-making processes, based on the outputs of monitoring, to adapt management measures to meet evolving requirements, based on agreement with Broome leadership and community input; and
- reporting to Precinct Management.

The commercial proponents monitoring system should feed into the Precinct-level monitoring system.

5.5.8.2. Precinct-level Monitoring System

The Precinct social monitoring system should monitor social and economic change in relation to core social and economic indicators during both the construction and operational phases of all commercial proponents at the Precinct. The focus of the Precinct Monitoring System is on cumulative social impacts.

The Precinct-level monitoring system includes:

- core social and economic indicators applicable to both the construction and operational phases of all commercial proponents at the Precinct;
- arrangements for independent auditing;
- mechanisms to adapt mitigation and management if existing measure prove inadequate; and
- relevant reporting arrangements.

Objective:				
<ul style="list-style-type: none"> • A comprehensive and integrated Proponent and Precinct-level social monitoring system. 				
Outcomes	Time	Phase/s	Responsibility	
An integrated commercial proponents and Precinct-level social monitoring system, using both quantitative and qualitative measures to monitor social and economic change across time in relation to core social and economic indicators during both the construction and operational phases of the Precinct.	Pre-Construction	Construction and Operation	Lead Commercial Proponents; Precinct Management	Secondary Traditional Owners; Shire of Broome; Broome Community.
Output				
A detailed adaptive commercial proponents social monitoring plan, developed with all relevant stakeholders, within the stated timeframe, with relevant targets, performance indicators and external audit requirements.	Pre-Construction	Construction and Operation		
A detailed adaptive Precinct social monitoring plan to monitor cumulative social and economic change across time in relation to core social and economic indicators developed with all relevant stakeholders, within the stated timeframe, with relevant targets, performance indicators and independent audit requirements.	Pre-Construction	Construction and Operation		

5.5.9. Governance

Effective governance mechanisms would be important for involving interested and/or affected stakeholders in the management and mitigation of impacts, particularly those requiring the input of multiple stakeholders such as employment, housing, infrastructure and services. Timely and transparent communication of information regarding environmental management would be particularly important for Traditional Owners and other Indigenous members of the community to be kept informed about environmental issues and management responses on Country.

The Precinct Governance arrangements are presented in **Part 6**. These arrangements need to be further developed, for example in a Precinct Governance Plan and a Precinct Engagement Plan. The Engagement Plan or similar document should appropriately address non-Indigenous and Indigenous engagement and be developed in accordance appropriate State documents such as Engaging with Aboriginal Western Australians guide.

<http://www.dia.wa.gov.au/Documents/ReportsPublications/ConsultingCitizensSept2005.pdf>

Objective:				
<ul style="list-style-type: none">Appropriate governance structures to manage the Precinct and include the concerns of all stakeholders, including Traditional Owners.				
Outcomes	Time	Phase/s	Responsibility	
A clear understanding of the functions, roles and responsibilities and outputs of the different governance structures.	Pre-Construction	Construction and Operation	Lead Precinct Management	Secondary Commercial Proponents; LandCorp; Shire of Broome; Traditional Owners; Broome Community.
A communication and consultation plan to guide communication with and engagement of all stakeholders in a culturally sensitive manner.	Pre-Construction	Construction and Operation		
Outputs				
A detailed governance structure and plan, with clear roles and responsibilities, developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicators.	Pre-Construction	Construction and Operation		
A detailed Precinct engagement plan to guide communication with and engagement of stakeholders in the Precinct, developed with all relevant stakeholders, within the stated timeframe, with relevant targets and performance indicators.	Pre-Construction	Construction and Operation		

5.6. Social Aspects and Matters of National Environmental Significance

The SIA contributes to the Strategic Assessment Report which categorises activities in terms of their need for environmental approval under the *Environmental Protection Act 1986* and *Environment Protection and Biodiversity Conservation Act 1999*. Importantly, this SIA is not being considered under those environmental acts, but under the Terms of Reference for the Strategic Assessment as agreed by the Western Australian and Commonwealth Governments. The direct Precinct-related activities constitute Category A impacts, whereas Category B impacts are caused indirectly by the establishment of the Precinct and Category C impacts constitute cumulative impacts from the Precinct and other developments.

As there are no people living permanently within 20km of the Precinct (i.e. Category A) the social impacts focus on recreation and tourism activities and the majority of the social impacts form Category B impacts. In terms of the EPBC Act, the most significant impact on Matters of National Environmental Significance (NES) is likely to be the population increase in the area and the potential displacement of recreational activities from the Dampier Peninsula. Both factors could potentially impact on the Ramsar wetland at Roebuck Bay.

The social summaries follow a different format to those of the environmental sections of the SAR because of the interdependence of the social issues and the related mitigation and management strategies, and because there are virtually no direct Precinct (Category A) impacts on social factors. The EPBC Act defines matters of National Environmental Significance and social impacts on the relevant Matters of NES are shown in the table below.

Comprehensive details on management arrangements for Matters of NES are provided in **Part 6, Section 3.7** with a summary provided below.

■ **Table 5-2 Matters of NES as relevant to Social Aspects.**

NES Matter	Potential impact from Category A Activities	Potential cumulative Impact from Category A, B and C activities	Management Arrangement
Wetlands of International Importance	None	Potential impacts from increased population and displaced recreation activities.	Proposal to establish the Roebuck Bay Management Plan
Threatened Species and Ecological Communities	None	Potential impacts from increased population and displaced recreation activities.	Various measures detailed in Part 6, Section 3.7 of the SAR and Managed Access Construction Camp (Section 5.4)
Migratory species protected under International Agreements	None	Potential impacts from increased population and displaced recreation activities.	Various measures detailed in Part 6, Section 3.7 of the SAR and Managed Access Construction Camp (Section 5.4)
Commonwealth marine areas	None	Potential impacts from increased population and displaced recreation activities.	Preparation of various management plans including: Port Facilities Construction Environmental Management Plan; Vessel Management Plan; Dredge and Dredge Spoil Disposal Management Plan; Hydrocarbon and Chemical Spills Response Plan Ship-board Oil Pollution Emergency Plan; and Invasive Marine Species Management Plan.

5.7. Environmental Management Measures Relating to Social Factors

As identified in **Part 5, Section 4** there are a number of direct social surrounds and social-economic factors associated with the project. The management measures associated with these factors are detailed in Impact Assessment Summary of impact tables at the end of **Section 4.1 – Section 4.9**, as outlined below. These management measures are typically drawn from the social management measures identified in **Part 5, Section 5.1 to 5.6** and the environmental management measure that have been identified in **Part 3** and **Part 4**, where appropriate.

Factor chapter	Table reference
Environmental Heritage and Conservation Areas	Table 4.1-2
Palaeontology	Table 4.2-1
Colonial Heritage	Table 4.3-2
Visual amenity, Light and Landscape Character	Table 4.4-14
Commercial Fishing	Table 4.5-3
Aquaculture and Pearling	Table 4.6-5
Tourism	Table 4.7-3
Sports, Recreation and Land Use (including Recreational Fishing)	Table 4.8-3
Human Health	Table 4.9-1

5.8. Conclusion

Establishing a major (multi-proponent) project in any area can bring both impacts and opportunities for local people. Managing these social impacts and maximising opportunities is an important consideration when establishing such a project. Not only must impacts be managed resulting from changes brought about by an increase in population due to the project but, in addition, local people's perceptions of how the project might affect the way they live should be addressed and managed.

The Strategic Social Impact Assessment has been the culmination of 18 months' data collection, modelling and assessment using the best available baseline social data and information for Broome and the west Kimberley. Along with best estimate workforce projections provided by the Foundation Proponent, assessments have been made about the possible impacts on the area and its communities in establishing the Precinct. The assessments have been used to develop strategies to overcome or minimise impacts and to maximise opportunities from development.

It is important to recognise that inherent social infrastructure deficits and areas of social stress in Broome already exist and are well documented. Given the significant projected increase in population attributed to the region's natural growth these will need to be addressed and managed into the future regardless of the establishment of the Precinct.

There are important social issues that will need careful management by commercial proponents, including for example those caused by the use of a FIFO workforce and those that could reduce employment barriers for local Aboriginal people.

Existing pressures from population growth would increase the vulnerability of the social and economic environment of Broome to Precinct-related impacts; however the opportunity exists for the region to relieve itself of this burden to some extent, by garnering the strength of commercial development to address existing baseline problems, whether by partnering with the State Government, commercial proponents and local government or otherwise.

Subject to the Strategic Assessment approval outcomes, the Foundation Proponent would conduct a Project-level Social Impact Assessment at a more detailed level than the present SIA. It would seek more extensive consultation, more detailed data on particular issues and refine statistics where gaps exist given what is presently available. This would be supported by clearer project specifications that would be available at that time. This would in turn facilitate the creation of more detailed social impact management commitments.

It is important to note that, simultaneous to this process, ongoing work proceeds both within State Government, and between the potential Foundation Proponent, the Traditional Owners and the State to further develop the strategies that are referred to in the Social Impact Management Plan (which appear in the sections above). Implicit to the development of the management strategies will be specific monitoring and evaluation measures, including the creation and implementation of management and monitoring governance structures to ensure accountability for implementation and currency.

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Annexure A Predicted Housing Demand

a) Number of new residential dwellings required in Broome for the direct and indirect construction and operational workforces (Low Case) EBC (2010)

Number of Dwellings Required for New Employees (Direct, Indirect and Opportunistic) Resident in Broome

Year	Scenario 1				Scenario 2				Scenario 3A				Scenario 3B				Scenario 4			
	CAPEX	OPEX	TOTAL	MaxLag	CAPEX	OPEX	TOTAL	MaxLag	CAPEX	OPEX	TOTAL	MaxLag	CAPEX	OPEX	TOTAL	MaxLag	CAPEX	OPEX	TOTAL	MaxLag
2011	1	0	1	-14	1	0	1	-71	1	0	1	-155	1	0	1	-176	1	0	1	-231
2012	2	0	2	-13	5	0	5	-66	5	0	5	-151	5	0	5	-171	5	0	5	-227
2013	3	0	3	-12	21	0	21	-51	21	0	21	-135	21	0	21	-156	21	0	21	-212
2014	4	0	4	-12	51	0	51	-21	51	0	51	-105	51	0	51	-126	51	0	51	-181
2015	7	0	7	-9	35	0	35	-37	35	0	35	-121	38	0	38	-138	35	0	35	-197
2016	14	0	14	-2	25	0	25	-47	25	0	25	-131	30	0	30	-147	26	0	26	-206
2017	5	0	5	-10	15	5	20	-52	15	5	20	-136	22	5	27	-150	18	5	23	-209
2018	2	1	3	-13	2	5	7	-65	2	5	7	-149	22	5	27	-159	7	5	12	-220
2019	1	1	2	-14	5	5	10	-62	6	5	11	-145	44	5	49	-128	13	5	18	-214
2020	1	1	2	-14	24	5	29	-43	18	5	23	-133	31	9	41	-136	38	9	47	-185
2021	2	6	8	-7	12	42	55	-17	18	42	60	-96	18	80	98	-79	64	80	144	-88
2022	1	6	8	-8	22	39	62	-10	43	39	83	-74	52	77	129	-48	74	77	151	-81
2023	2	6	8	-7	14	41	55	-17	23	41	64	-92	21	78	100	-77	60	78	139	-94
2024	1	6	8	-8	4	41	45	-27	12	41	53	-104	6	78	84	-93	25	78	104	-129
2025	9	6	15	0	2	41	42	-29	3	44	47	-109	9	82	90	-86	9	82	91	-142
2026	3	6	10	6	13	45	58	-14	20	49	68	-88	47	86	133	-44	59	86	145	-87
2027	1	6	8	8	7	41	48	-24	39	44	83	-73	14	82	95	-81	64	82	146	-87
2028	1	6	7	8	5	41	45	-27	12	44	56	-100	17	82	99	-78	27	82	109	-124
2029	0	6	6	9	11	41	51	-20	11	47	58	-98	59	85	143	-34	59	88	147	-86
2030	0	6	6	9	0	41	41	-31	2	47	49	-107	7	85	92	-85	21	88	109	-123
2031	0	10	10	6	4	68	72	0	4	78	82	-74	14	134	148	-29	84	139	223	-9
2032	0	10	10	6	3	61	65	7	25	71	95	-61	50	127	177	0	24	137	160	-72
2033	1	10	10	5	1	61	62	10	85	71	156	0	43	127	170	7	9	137	145	-87
2034	0	10	10	6	0	61	61	11	12	71	83	73	5	127	133	44	21	137	158	-75
2035	0	10	10	6	0	61	61	11	0	76	76	81	3	132	135	42	91	142	232	0
2036	0	10	10	6	2	68	70	2	2	83	85	71	2	139	141	36	16	153	169	63
2037	0	10	10	6	3	61	65	7	3	76	79	77	3	132	135	41	16	146	163	70
2038	0	10	10	6	1	61	62	10	5	76	81	75	1	132	133	44	21	146	168	64
2039	0	10	10	6	0	61	61	11	0	76	76	81	0	132	132	45	50	146	196	36
2040	0	10	10	6	0	61	61	11	2	76	78	78	3	132	135	42	17	146	163	69
2041	0	10	10	6	0	61	61	11	0	76	76	81	0	132	132	45	0	146	146	86

This table indicates the number of dwellings required to house all new employees (direct, indirect and opportunistic) who will become residents of Broome
MAXLag shows the deficiency and surplus of dwellings for employees against a peak in housing demand.

b) Number of new residential dwellings required in Broome for the direct and indirect construction and operational workforces (Medium Case) EBC (2010)

Number of Dwellings Required for New Employees (Direct, Indirect and Opportunistic) Resident in Broome

Year	Scenario 1				Scenario 2				Scenario 3A				Scenario 3B				Scenario 4			
	CAPEX	OPEX	TOTAL	MAXLag	CAPEX	OPEX	TOTAL	MaxLag	CAPEX	OPEX	TOTAL	MaxLag	CAPEX	OPEX	TOTAL	MaxLag	CAPEX	OPEX	TOTAL	MaxLag
2011	7	0	7	-67	5	0	5	-268	5	0	5	-626	5	0	5	-645	5	0	5	-884
2012	11	0	11	-62	26	0	26	-247	26	0	26	-605	26	0	26	-625	26	0	26	-864
2013	15	0	15	-59	96	0	96	-177	96	0	96	-535	96	0	96	-554	96	0	96	-793
2014	17	0	17	-57	238	0	238	-35	238	0	238	-393	238	0	238	-413	238	0	238	-652
2015	32	0	32	-42	163	0	163	-110	163	0	163	-468	179	0	179	-471	163	0	163	-726
2016	63	0	63	-10	118	0	118	-155	118	0	118	-513	141	0	141	-510	123	0	123	-767
2017	24	0	24	-50	68	34	102	-171	68	34	102	-529	101	34	135	-515	84	34	118	-771
2018	9	5	14	-60	9	34	43	-230	9	34	43	-588	101	34	135	-515	31	34	65	-824
2019	5	5	10	-63	25	31	56	-217	29	31	60	-571	207	31	238	-412	62	31	93	-796
2020	5	5	10	-63	114	31	145	-128	84	31	115	-516	146	62	208	-442	177	62	239	-651
2021	8	24	33	-41	68	162	230	-43	97	162	260	-371	99	307	406	-244	349	307	656	-234
2022	7	24	31	-42	121	152	273	0	234	152	386	-245	282	296	578	-73	405	296	701	-189
2023	10	24	34	-40	79	157	235	37	126	157	282	-349	117	301	418	-233	328	301	629	-260
2024	7	24	31	-42	22	157	179	94	64	157	221	-410	30	301	331	-319	138	301	439	-450
2025	49	24	73	0	9	157	166	107	16	169	185	-446	48	313	362	-289	50	313	364	-526
2026	19	24	43	30	68	175	243	30	107	187	295	-336	253	331	585	-66	322	331	653	-236
2027	7	24	31	42	40	157	197	76	214	169	383	-248	75	313	389	-262	349	313	663	-227
2028	4	24	29	45	25	157	182	91	67	169	236	-395	94	313	407	-243	148	313	461	-428
2029	0	24	24	49	58	157	215	58	58	181	239	-392	318	326	644	-6	320	338	658	-232
2030	0	24	24	49	0	157	157	116	11	181	192	-439	40	326	366	-284	116	338	454	-435
2031	0	31	31	42	17	225	242	31	20	256	277	-354	63	442	505	-145	392	458	850	-39
2032	0	31	31	42	16	201	217	55	114	233	347	-284	232	419	650	0	111	451	561	-328
2033	4	31	35	38	4	201	205	67	398	233	631	0	199	419	618	32	40	451	491	-399
2034	0	31	31	42	0	201	201	71	56	233	289	342	26	419	444	206	98	451	549	-341
2035	0	31	31	42	0	201	201	71	0	249	249	382	12	435	447	204	423	466	889	0
2036	0	31	31	42	10	225	235	38	10	272	282	349	10	458	468	182	73	506	579	311
2037	0	31	31	42	16	201	217	55	16	249	265	366	16	435	451	200	75	482	557	332
2038	0	31	31	42	4	201	205	67	24	249	273	358	4	435	439	212	100	482	582	307
2039	0	31	31	42	0	201	201	71	0	249	249	382	0	435	435	216	233	482	715	174
2040	0	31	31	42	0	201	201	71	10	249	259	372	12	435	447	204	78	482	560	329
2041	0	31	31	42	0	201	201	71	0	249	249	382	0	435	435	216	0	482	482	407

This table indicates the number of dwellings required to house all new employees (direct, indirect and opportunistic) who will become residents of Broome
MAXLag shows the deficiency and surplus of dwellings for employees against a peak in housing demand.

c) Number of new residential dwellings required in Broome for the direct and indirect construction and operational workforces (High Case) EBC (2010)

Number of Dwellings Required for New Employees (Direct, Indirect and Opportunistic) Resident in Broome																				
Year	Scenario 1				Scenario 2				Scenario 3A				Scenario 3B				Scenario 4			
	CAPEX	OPEX	TOTAL	MAXLag	CAPEX	OPEX	TOTAL	MAXLag	CAPEX	OPEX	TOTAL	MAXLag	CAPEX	OPEX	TOTAL	MAXLag	CAPEX	OPEX	TOTAL	MAXLag
2011	16	0	16	-153	12	0	12	-617	12	0	12	-1454	12	0	12	-1472	12	0	12	-2015
2012	28	0	28	-142	62	0	62	-567	62	0	62	-1404	62	0	62	-1422	62	0	62	-1965
2013	36	0	36	-134	234	0	234	-395	234	0	234	-1232	234	0	234	-1250	234	0	234	-1793
2014	41	0	41	-129	577	0	577	-51	577	0	577	-889	577	0	577	-907	577	0	577	-1450
2015	77	0	77	-93	396	0	396	-233	396	0	396	-1070	435	0	435	-1049	396	0	396	-1631
2016	153	0	153	-16	287	0	287	-342	287	0	287	-1179	341	0	341	-1143	298	0	298	-1730
2017	57	0	57	-112	165	73	238	-390	165	73	238	-1228	245	73	319	-1165	204	73	277	-1750
2018	21	11	32	-137	21	73	94	-534	21	73	94	-1372	246	73	319	-1165	75	73	149	-1879
2019	12	11	23	-147	61	66	128	-501	70	66	136	-1330	503	66	570	-914	151	66	217	-1810
2020	12	11	23	-147	242	66	308	-320	205	66	271	-1195	356	133	488	-996	429	133	562	-1465
2021	19	56	75	-94	157	373	530	-99	225	373	598	-868	230	705	934	-550	807	705	1,511	-516
2022	16	56	72	-98	281	348	629	0	542	348	890	-576	652	680	1,331	-153	936	680	1,616	-412
2023	22	56	78	-91	182	360	542	87	291	360	651	-815	270	691	961	-523	758	691	1,450	-577
2024	16	56	72	-98	52	360	411	217	149	360	509	-957	69	691	761	-723	319	691	1,010	-1017
2025	113	56	170	0	21	360	381	248	38	388	426	-1040	111	720	831	-653	116	720	836	-1191
2026	44	56	100	70	158	401	559	70	248	430	678	-788	585	761	1,347	-137	744	761	1,506	-521
2027	16	56	72	98	92	360	452	177	495	388	883	-583	174	720	894	-590	808	720	1,528	-499
2028	10	56	66	103	58	360	418	211	155	388	543	-923	217	720	937	-548	341	720	1,061	-966
2029	0	56	56	113	134	360	494	135	134	417	551	-916	736	748	1,484	0	740	776	1,516	-511
2030	0	56	56	113	0	360	360	269	25	417	442	-1025	93	748	841	643	268	776	1,045	-983
2031	0	67	67	102	42	482	523	105	49	550	599	-867	153	948	1,101	383	953	982	1,934	-93
2032	0	67	67	102	39	432	471	158	277	500	777	-689	563	898	1,460	24	268	966	1,234	-793
2033	10	67	77	93	10	432	442	187	966	500	1,466	0	484	898	1,382	102	97	966	1,063	-964
2034	0	67	67	102	0	432	432	197	137	500	636	830	62	898	960	524	239	966	1,204	-823
2035	0	67	67	102	0	432	432	197	0	534	534	932	29	932	961	523	1,027	1,000	2,027	0
2036	0	67	67	102	24	482	506	123	24	584	608	858	24	982	1,006	478	178	1,084	1,261	768
2037	0	67	67	102	39	432	471	158	39	534	573	893	39	932	971	514	183	1,034	1,216	811
2038	0	67	67	102	10	432	442	187	58	534	592	874	10	932	941	543	243	1,034	1,277	750
2039	0	67	67	102	0	432	432	197	0	534	534	932	0	932	932	552	566	1,034	1,600	427
2040	0	67	67	102	0	432	432	197	24	534	558	908	29	932	961	523	189	1,034	1,223	804
2041	0	67	67	102	0	432	432	197	0	534	534	932	0	932	932	552	0	1,034	1,034	993

This table indicates the number of dwellings required to house all new employees (direct, indirect and opportunistic) who will become residents of Broome
MAXLag shows the deficiency and surplus of dwellings for employees against a peak in housing demand.

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Annexure B Key Dates and Events, Site Selection Process and Traditional Owner Task Force Processes, December 2007 - December 2008

Date	Event
1 December 2007	Senior Kimberley Traditional Owners meet in Broome to discuss the possibility of hydrocarbon development in the Kimberley and the role that Aboriginal people must play in any development and site selection process.
14 February 2008	Senior Aboriginal men and women meet in Broome to discuss process and methodologies for community and native title claim group meetings and final formation of a Senior Leadership Group.
1 March 2008	KLC's Senior Leadership Team visits coastal communities to introduce the KLC's consultation process and to assist the KLC with presenting a range of information relating to hydrocarbon development. KLC holds ten separate meetings with fifteen Kimberley Coastal native title claim groups and groups culturally associated with them: 11 March, Kalumburu: Wanjina Wungur Uunguu, Balangarra, Wanjina Wungur Willinggin 12 March, Wyndham: Wanjina Wungur Uunguu, Balangarra, Wanjina Wungur Willinggin 13 March, Kununurra: Miriuwung Gajerrong 14 March, Broome: Djabera Djabera, Nyul Nyul, Goolarabooloo / Jabirr Jabirr 17 March, Beagle Bay: Southern Peninsula Groups 18 March, One Arm Point: Mayala, Bardi & Jawi, Nimunburr, Nyul Nyul 25 March, Mowanjumb: Wanjina Wungur Dambimangari, Wanjina Wungur Willinggin, Wanjina Wungur Uunguu 26 March, Derby: Nykina Mangala, Warawa 27 March, Broome: Yawuru 28 March, Bidyadanga: Karajarri
14-15 April 2008	KLC staff, the Senior Leadership Team, and KLC consultants participate in a workshop in Broome at which cultural, technical, environmental and social issues arising in respect of hydrocarbon related development are discussed. A broad strategy is established, which forms the basis for continuing consultations, information gathering and dissemination and the establishment of project specific tasks.
1 May 2008	KLC holds seven 'Cultural Bloc' meetings in Derby, One Arm Point, Broome, Wyndham and Kununurra. May 5 - Nykina Mangala, Warawa, Karajarri May 6 - Wanjina Wungur Dambimangari, Wanjina Wungur Willinggin, Wanjina Wungur Uunguu May 8 - Bardi Jawi, Nyul Nyul, Mayala, Nimunburr May 9 - Yawuru May 12 - Balangarra May 13 - Miriuwung Gejerrong May 19 - Djerbera Djerbera, Goolarabooloo / Jabirr Jabirr
7 May 2008	KLC and the State of Western Australia enter into a Studies Agreement, which relates to all studies undertaken by the State in relation to the NDT site selection processes for hydrocarbon development, and requires that the State work with Traditional Owners to ensure that all studies are undertaken in a culturally appropriate manner, and provides for the conduct of ethno-biological studies by Traditional Owners.
7- 8 May 2008	KLC and Traditional Owners participate in intertidal studies being undertaken by the NDT at Gourdon Bay.
16 May 2008	KLC informs the NDT that the Wanjina Wungur Uunguu native title claim group has conditionally nominated Anjo Peninsula and Cape Voltaire as potential locations for development in the North Kimberley.
19 - 28 May 2008	KLC and Traditional Owners participate in flora and fauna studies being undertaken by the NDT at Perpendicular Head.

Date	Event
27- 29 May 2008	KLC convenes the first TOTF meeting over three days. The TOTF is initially comprised of 60 Traditional Owner representatives, plus Senior Advisers, the KLC Chairman and the KLC Deputy Chairman. KLC presents information to Traditional Owners that has been sourced from Woodside and the NDT, as well as information and advice from relevant independent experts.
June - Sept 2008	TOTF meets on the following dates: 10-12 June 2008; 23-26 June 2008; 22-24 July 2008; 19-21 Aug 2008; 3-4 Sept 2008. All meetings were held in Broome to simplify logistics and to ensure adequate space and facilities for the large group of participants.
3 - 13 June 2008	KLC and Traditional Owners participate in flora and fauna studies being undertaken by the NDT at Packer Island.
17 - 26 June 2008	KLC and Traditional Owners participate in flora and fauna studies being undertaken by the NDT at Gourdon Bay.
25 June 2008	TOTF and KLC visit Woodside's hydrocarbon processing facility on the Burrup Peninsula. This trip is facilitated by Woodside in conjunction with the NDT.
23-25 July 2008	TOTF and KLC attend some key presentations of the NDT's Site Selection Workshop in Broome. Scientists involved in the site selection and impact assessment process present their findings from the flora and fauna studies, in order to assist Traditional Owners with their decision-making.
30 July 2008	KLC Women's Executive meeting discusses regional impacts of LNG development and benefits.
8 - 14 Aug 2008	KLC and Traditional Owners participate in flora and fauna studies being undertaken by the NDT on Anjo Peninsula.
20 - 26 Aug 2008	KLC and Traditional Owners participate in flora and fauna studies being undertaken by the NDT at Quondong Point.
Late Aug and early Sept 2008	KLC meets separately with members of the native title claim groups still considering hydrocarbon development on their country, namely: 27 Aug: Goolarabooloo / Jabirr Jabirr 29 Aug: Nyul Nyul 1 Sept: Wanjina Wungu Uunguu 2 Sept: Karajarri
1 September 2008	KLC and Traditional Owners participate in engineering-related walkovers of each of Anjo Peninsula, Gourdon Bay, North Head and Quondong/James Price Point with representatives from Worley Parsons, the NDT, Woodside and (in the case of Anjo Peninsula) Inpex Browse Ltd.
6 September 2008	State Government election - results undecided for more than a week.
10 September 2008	KLC announces publicly the four locations that Traditional Owners are willing to consider further as potential LNG development sites: Anjo Peninsula, North Head, James Price Point, Gourdon Bay
13 September 2008	Liberal/National Party forms coalition to become State Government of Western Australia.
22-24 Sept 2008	A meeting of the full TOTF is held at the KLC's Annual General Meeting at Old Mount Barnett Station.
30 Sept – 1 Oct 2008	KLC meets with the TOTF representatives of the four remaining Claim Groups considering hydrocarbon development in Broome.
3-4 Nov 2008	KLC meets with Nyul Nyul native title claim group in Broome to discuss the possibility of hydrocarbon development at North Head and to seek instructions about this issue.
18-19 Nov 2008	KLC meets with Jabirr Jabirr (Goolarabooloo / Jabirr Jabirr, Djaberra Djaberra) native title claim groups in Broome to discuss the possibility of hydrocarbon development at James Price Point and to seek instructions about this issue.
25 November 2008	KLC meets with the TOTF representatives of the four remaining Claim Groups.
26 November 2008	KLC meets with the TOTF representatives of the four remaining Claim Groups.
16 December 2008	KLC meets with Karajarri native title claim group in Bidyadanga hydrocarbon development at Gourdon Bay. The Traditional Owners remove the site from further consideration.

Annexure C ASIA Recommendations

The ASIA developed a series of 75 recommendations that are reflected here. These detailed recommendations have been included in the higher-level Precinct mitigation and management measures included in **Part 5, Section 3** and **Section 5**, where appropriate. **Annexure D** provides a table showing how these recommendations have been addressed in the SSIMP and other agreements.

Recommendation 1

The Proponent, the State, the Commonwealth, and Precinct Operators must commit themselves to developing the capacity to hear, understand and respond to the aspirations of Traditional Owners and other Indigenous people affected by the LNG Precinct, and demonstrate that commitment in tangible ways.

Recommendation 2

As one such tangible demonstration, the Proponent, the State, the Commonwealth, and Precinct Operators must commit themselves to negotiating time frames for future or ongoing impact assessment and negotiation processes that balance a realistic assessment of commercial requirements with the need for Kimberley Land Council 275 culturally appropriate decision-making processes and Indigenous informed consent.

Recommendation 3

The KLC must reconsider its approach to the setting of time frames for impact assessment and negotiation processes related to major project developments. It must assess whether it is practical and desirable for the KLC and Traditional Owners to establish time frames they consider will allow for culturally appropriate consultation and decision-making and are also commercially realistic. If the State and private developers reject these time frames, the KLC must reconsider its willingness to engage with the State and private developers in relation to approval of large-scale resource projects.

Recommendation 4

The Proponent, the Commonwealth, the KLC and other relevant Indigenous regional organizations, and Traditional Owner representatives must establish an LNG Precinct Indigenous Social Impact Monitoring and Management Board ('the Board') immediately following any approval of the Plan, and must maintain the Board throughout the life of the LNG Precinct. The State and Kimberley Land Council 280 Commonwealth must, at the earliest possible opportunity, establish a legislative basis for the Board to ensure its continued existence and the ongoing availability of funds to support its operations.

Recommendation 5

The Proponent must, immediately on the grant of any approval for the Plan, provide funding for a full household survey of Indigenous households in the Area of Impact, if such a survey has not already been conducted.

The household survey must be commissioned by the KLC, which must ensure that Indigenous people are centrally involved in its design, administration and interpretation of the survey, and must retain appropriately qualified specialist staff to support this work. The survey instrument must be consistent with the Draft Household Survey developed by the ASIA and the TONC.

Additional Recommendation 6

The ASIA strongly recommends that the household survey should be conducted regardless of the outcome of the Strategic Assessments and should commence as soon as possible.

Recommendation 7

The Proponent must, immediately on the grant of any approval for the Plan, provide funding to undertake a detailed analysis of the official unpublished IFSNA data from the region. The analysis must be conducted with input from relevant Traditional Owners, especially those from communities that provided survey data. The analysis must be conducted by an appropriate Indigenous organisation and overseen by the Social Impact Monitoring and Management Board.

The second step is to undertake, within 12 months of any approval for the Plan, a comprehensive regional harvest study, as this is the most effective way to produce a baseline of customary use that is reliable and up-to-date (e.g. as at 2011). It must include a strong focus on aquatic resource use particularly along the coast of the Broome/Dampier Peninsula region, given that the existing data suggests that this category of wild resource use makes the greatest nutritional and economic contribution within the region. A comprehensive regional harvest study must be community-based, with Traditional Owners involved in and guiding the design, implementation, analysis and reporting stages (see Chapter 2.3.10 for more detail).

Recommendation 8

The Proponent must fund a comprehensive regional harvest study within 12 months of any approval for the Plan. The study must be community-based, with Kimberley Land Council 284 Traditional Owners guiding its design (including the choice of specific study locations), implementation, and the analysis and reporting of data. The study must be conducted by an appropriate Indigenous organisation and overseen by the Board. Affected Traditional Owners may impose constraints on the use of the study information to the extent that the information may affect cultural interests or legal interests related to ongoing native title proceedings.

The third step involves the conduct of a comprehensive regional harvest study at 10-yearly intervals over the life of the LNG Precinct to allow updating of baseline data and ongoing monitoring of use of wild resources, and of the effectiveness of any management responses taken in response to observed, adverse impacts arising from the LNG Precinct and related developments such as population increases.

Recommendation 9

The Proponent must fund periodic regional harvest studies at 10-yearly intervals over the life of the LNG Precinct. These studies must be community-based, with Traditional Owners guiding their design and implementation and the analysis and reporting of data. The studies must be conducted by an appropriate Indigenous organisation and overseen by the Board. Affected Traditional Owners may impose constraints on the use of the study information to the extent that the information may affect cultural interests or legal interests related to ongoing native title proceedings.

Recommendation 10

Traditional Owners and other Indigenous users of country in the Area of Impact must play a central and ongoing role in identification and definition of environmental issues and impacts, and in environmental monitoring and management.

Recommendation 11

Any approval for the LNG Precinct must have as a condition the conclusion of an Indigenous Land Use Agreement between Woodside (to the extent Woodside remains the lead proponent), the State, the KLC and Traditional Owners, that guarantees to Traditional Owners substantive and effective participation in environmental management of the LNG Precinct and associated development. The endorsement of the Plan will be conditional on the ILUA containing provisions to ensure that Traditional Owners:

- Have decision-making, and not just advisory, roles in relation to environmental management through:

substantial representation on committees or boards with decision making powers; or
a capacity to require suspension of any activity that is resulting in environmental damage, or
appears likely to do so, until the danger of damage is removed; or
such similar mechanisms that meets this requirement to the satisfaction of Traditional Owners acting reasonably.

- Have access to independent technical advice that allows them to engage with and challenge Western scientific information, in part by reviewing technical documents compiled by proponents or government regulators
- Have the capacity to inspect, accompanied by their technical advisers, all industrial areas of the LNG Precinct as required
- Have automatic access to all environmental reports provided by the Proponent to State or Federal regulatory authorities
- Are able to comment on all applications for environmental approvals prior to the provision of those applications to the relevant regulatory authorities and have those comments included
- Are involved in design and review of environmental planning and management systems
- Are centrally involved in design and implementation of rehabilitation and decommissioning and rehabilitation plans.

Recommendation 12

Commencing within six months of any approval for the Plan, the Proponent, responsible State and Commonwealth authorities and the KLC must convene six-monthly Regional Environmental Forums with representatives of native title Kimberley Land Council 288 claim groups within the Area of Impact and of other affected Indigenous people. At these forums the Proponent and responsible Commonwealth and State authorities must report on the results of environmental monitoring and management programs, including reporting on any environmental incidents and measures taken to address them, and respond to environmental concerns or issues raised by Indigenous participants, immediately or within time frames agreed at the Forum. The KLC and Indigenous representatives must share their perspectives on relevant

environmental issues, report on any environmental monitoring activity in which they are involved, and express any concerns they have regarding specific environmental impacts or issues.

Recommendation 13

The Proponent must, in cooperation with responsible State and Commonwealth Authorities, the KLC and Traditional Owners, ensure a regular flow of accurate Kimberley Land Council 289 and comprehensive information regarding LNG Precinct environmental issues and impacts to affected Indigenous people. This must include at a minimum:

- Production and dissemination throughout the Area of Impact of a quarterly newsletter summarising, in plain English and with photographic illustrations, outcomes of environmental monitoring and management programs, and reporting on the reasons for, and action taken to address, any incidents that cause environmental harm or threaten to do so.
- Regular information bulletins in local newspapers and on radio and television. Particular care must be taken to provide information through the latter channels if environmental incidents occur, as soon as possible after the occurrence and at regular intervals until they are resolved.
- The form and content of the newsletter and information bulletins must be approved by the Board.

Recommendation 14

The LNG Precinct Environmental Management Plan must contain provisions that explicitly recognise the value and importance of Indigenous environmental knowledge, and specific measures to ensure that Traditional Owners can apply this knowledge to environmental monitoring and management systems, in a manner that is consistent with their cultural values. These measures must include, but may not be limited to:

- provision by the Traditional Owners of cross-cultural awareness training for Proponents' environmental staff and consultants
- conduct of specific environmental monitoring and management activities jointly by the Proponent's environmental specialists and Traditional Owners
- training of Traditional Owners in environmental monitoring to ensure real and effective participation and skills development
- use of information from customary resource use surveys in environmental monitoring activities.

Recommendation 15

Representatives of the Proponent and of responsible State and Commonwealth authorities attending Regional Environmental Forums must undertake cross cultural awareness training provided by Traditional Owners that includes Kimberley Land Council 291 information on Indigenous understandings of country, environmental knowledge, and use of wild resources.

Recommendation 16

It must be a condition of any approval that:

- The Proponent must employ 'world's best practice' in ensuring that the impacts of dredging and blasting on sea country are minimised;
- The Proponent must involve Traditional Owners in decisions that help determine the location and duration of impacts on sea country from blasting and dredging;
- The Proponent must closely monitor the conduct of blasting and dredging and its environmental impacts must be closely monitored, with the participation of Traditional Owners;
- The Proponent must regularly inform Indigenous people who use sea country affected by dredging and blasting about its impacts (see Recommendation 13).

Recommendation 17

Prior to commencement of dredging, the Proponent must undertake an assessment of the potential impacts of the dredging program on marine and terrestrial environments ('Dredging Assessment'). The Assessment must:

- address the degree of certainty of the identified impacts and the significance of those impacts
- include an analysis of the impact of the proposed dredging program on wild resources and their use by Traditional Owners and Indigenous communities (see recommended conditions 7 - 9)
- include a period of consultation with Indigenous communities and Traditional Owners

- generate a 'Dredging Assessment Report' which must be approved by the Board.

Following its approval by the Board the Dredging Assessment Report must be provided to the Minister. The Minister may accept the Dredging Assessment Report if, in accordance with clause 7.3(e) of the Strategic Assessment Agreement, the Minister is satisfied that it addresses the impacts of the actions.

Within 2 years of commencement of dredging, and every three years thereafter, the Proponent must undertake a review of the impacts of the dredging program on the marine and terrestrial environment ("Dredging Impact Review"). The Dredging Impact Review must:

- include an assessment of whether the projected significance of impacts in the Dredging Assessment Report was accurate
- identify any new or unanticipated impacts
- include an analysis of the impact of the dredging program on wild resources and their use by Traditional Owners and Indigenous communities
- include a period of consultation with Indigenous communities and Traditional Owners and
- the Dredging Impact Review Report must be approved by the Board.

Recommendation 18

In order to ensure that any oil or gas spills or similar incidents are addressed quickly and effectively, the Proponent must maintain an insurance policy in favour of Traditional Owners and Indigenous communities on the Peninsular to pay for any remediation that is required as a result of oil and gas spills. The value of the policy must reflect the likely cost of dealing with a major shipping accident or oil or gas leak and the impact of such an incident on Traditional Owners and Indigenous communities having regard to matters such as reliance on wild resources, reliance on cultural and nature based tourism, and existing vulnerabilities associated with lack of infrastructure, access to health care, and limited transport.

Recommendation 19

The Proponent, including any party who is responsible for management of port facilities and movements, must not permit shipping movements into or out of the Kimberley Land Council 294 Precinct, and must require vessels to stand no less than 30km off the coastline, if a cyclone is imminent.

Recommendation 20

The Proponent must work with responsible State or Commonwealth authorities to prepare an upgraded and comprehensive disaster management strategy for Broome and the Dampier Peninsula, to reflect the additional risks and responses required as a result of the presence of an LNG Precinct.

Recommendation 21

The following conditions are recommended to minimise the risk that shipping activity associated with the LNG Precinct might result in the introduction of exotic species. The Proponent, including any party who is responsible for management of port facilities and movements, must not permit any ships to enter into the waters of the LNG Precinct unless these conditions are fully implemented.

- The Proponent and responsible State and Commonwealth authorities must ensure that all ships travelling to the LNG Precinct site are inspected prior to departing their country of origin to ensure that no exotic marine life is attached to their hulls.
- The Proponent and responsible State and Commonwealth authorities must ensure that ships' ballast water is tested prior to departure from country of origin and again prior to its discharge to ensure it does not contain any organisms or toxins that might threaten marine life. Reports on testing must be provided to Traditional Owners on a regular basis (see also Recommendation 13 above).
- The Proponent and responsible State and Commonwealth authorities must ensure that measures to deal with the potential introduction of exotic species comply with relevant Australian policies and standards.
- Responsible State and Commonwealth authorities must maintain a presence in overseas ports and on board ships to ensure these requirements are complied with.
- Traditional Owners must, in advance of the commencement of shipping movements to the LNG Precinct site, develop and implement a program to monitor sea country for any indications of exotic species. The program must be developed and implemented in conjunction with AQIS. The program costs must be met by the Proponent.

Recommendation 22

The Proponent must manage the LNG Precinct so as to minimise the impact of waste from the Precinct on the water resources of the Dampier Peninsula, and so as to minimise use of water in the development and operation of the LNG Precinct.

Recommendation 23

Prior to the commencement of activities under the Plan, the Proponent must undertake a thorough assessment of water resources on the Dampier Peninsula ("Water Resources Assessment"). The Water Resources Assessment must include the following.

- Availability of water resources on the Dampier Peninsula, and an evaluation of their adequacy to meet the long-term demands of Broome, the Dampier Peninsula communities, nature and culture based tourism and other existing commercial operations, the LNG Precinct, and other potential commercial activities.
- An assessment of existing water quality, in particular whether existing resources are likely to provide sufficient amounts for domestic use by residential communities on the Dampier Peninsula.
- An assessment of the potential impacts of the Plan on the availability of water for other uses, including as a result of competing allocations, reduction of quality, and changes to water table levels.
- A draft plan for the allocation of water over the life of the LNG Precinct to ensure that the needs of Traditional Owners and other Indigenous residents of the Peninsula, including commercial needs for activities such as nature and culture based tourism and environmental allocations, are met into the future.

Recommendation 24

Within 2 years of commencement of activities under the Plan, and every three years thereafter, the Proponent must undertake a review of the impacts of those activities on water resources on the Dampier Peninsula ("Water Resources Impact Review"). The Water Resources Review must:

- include an assessment of whether the projected significance of impacts in the Water Resources Assessment Report was accurate
- identify any new or unanticipated impacts
- include an analysis of the impact of activities done under the Plan on other users of water resources on the Dampier Peninsula
- include a period of consultation with Indigenous communities and Traditional Owners
- include an assessment of the effectiveness of the plan included in the Water Resources Assessment Report in managing and mitigating the impacts of activities under the Plan on water resources and other users of those resources and
- the Water Resources Review Report must be approved by the Board.

Recommendation 25

The State must provide adequate resources to Dampier Peninsula communities to mount effective fire prevention and fire management programs. The State will afford communities the degree of control over allocation of these resources required to deal with fire risks in a timely and effective manner.

Recommendation 26

Responsible State authorities must, in cooperation with the Dampier Peninsula communities, develop a single and coordinated fire management plan for the Peninsula.

Recommendation 27

The State must, in cooperation with the Traditional Owners and with community councils and other Indigenous organisations in Broome and the Dampier Peninsula, act to limit the numbers of, and effectively manage the activities of, the growing number of Broome residents and of short-term visitors attracted to the Peninsula as a result of the LNG Precinct and developments likely to be associated with it, including the sealing of the remainder of the Broome - Cape Leveque road.

Recommendation 28

The Proponent must operate the LNG Precinct accommodation complex as a 'controlled access' facility. Construction and operations employees and contractors from outside the Area of Impact ('Precinct workers') must all be accommodated at this facility, and it must be a condition of their employment that they do not leave the facility to engage

in recreation or other activity. The Proponent must enforce a prohibition on Precinct workers taking any form of wild resources from land or sea country.

Recommendation 29

The Proponent must, in conjunction with the Traditional Owners, provide cross cultural training for all Precinct workers, including information on land ownership, restrictions on movement and use of wild resources, the permit system (see below), and Indigenous cultural values.

Recommendation 30

The State, in cooperation with relevant Indigenous organisations including Indigenous ranger groups and community councils, must introduce a permit system that limits travel to the Dampier Peninsula by people who are not Traditional Owners and do not reside there. Permits granted to visitors to the Area of Impact or to Broome residents must specify locations in the Dampier Peninsula where the permit holder is allowed to visit and camp. The permit system must be accompanied by the establishment of visitor centres at appropriate locations, including the turn-off to the LNG Precinct from the Cape Leveque Road, which would issue permits and provide maps indicating information on land ownership and locations open to visitors and a visitor code of behaviour.

Recommendation 31

The State must provide visitor facilities including camping grounds, ablution blocks and waste disposal facilities in areas permit holders are allowed to visit.

Recommendation 32

Responsible State authorities must establish, in cooperation with relevant native title claim groups, 'exclusion zones' where only Indigenous residents of the Dampier peninsula are permitted to harvest wild resources.

Recommendation 33

The Board and responsible State authorities must monitor the number of boat and fishing licences issued for use in the Area of Impact. Should numbers increase significantly and/ or should stocks of wild resources appear to be under increased pressure (see Recommendations 7 - 9 on monitoring of wild resource use), responsible State authorities must impose restrictions on the issue of additional licences designed to address those impacts.

Recommendation 34

Responsible State authorities must introduce fees for fishing licences; licences must specify maximum catch levels; and the proceeds of licence fees must be used to fund relevant management initiatives, including Indigenous rangers (see below).

Recommendation 35

Responsible State authorities must effectively enforce existing regulatory controls on the activities of commercial fishers and the use of fish traps, gill nets and pots must be more effectively enforced. Fines must be imposed for breaches of relevant laws or regulations, and the proceeds utilised to help fund Indigenous rangers and other management initiatives.

Recommendation 36

Responsible State and Commonwealth authorities must provide support for Traditional Owners, other native title holders and Indigenous communities in the Area of Impact to live on their outstations and play an active role, in conjunction with Indigenous rangers, in monitoring and managing the activities of tourists and other visitors.

Recommendation 37

Responsible State and Commonwealth authorities must fund a substantially expanded and adequately resourced Indigenous ranger system, including female rangers, for Broome and the Dampier Peninsula, to assist in managing growing visitor numbers and pressures on wild resources. Rangers must be granted the authority to enforce relevant laws and regulations in relation to restrictions on access to areas of land and sea country, including cultural sites of significance, and on the use of wild resources. This authority must include powers to inspect boats, vehicles and fish catches and to detain individuals suspected of acting unlawfully. Indigenous Rangers must work with the support and direction of senior Traditional Owners, and in close partnership with relevant State Authorities including the WA police and fisheries and land management agencies.

Recommendation 38

Taking into account the need for protection of confidential information, parties to the negotiation of the ILUA and related agreements must ensure that information on negotiation processes and outcomes is communicated on a regular basis to

Indigenous people and groups affected by the LNG Precinct. Channels similar to those suggested for dissemination of environmental information must be utilised in disseminating this information (see Recommendation 13).

Recommendation 39

The responsible Commonwealth authorities must, as a matter of urgency, address the issue of funding for PBCs established as a result of native title determinations in the Area of Impact. The Commonwealth and the KLC must facilitate dissemination of information regarding the roles and functions of PBCs to native title claimants in the Area of Impact, and must ensure provision of relevant governance training for members of the PBCs.

Recommendation 40

Responsible State authorities must, as a matter of urgency, facilitate the establishment of a local governance structure at Beagle Bay. In doing so it must offer relevant governance training to Indigenous office holders and potential office holders, and the Beagle Bay community generally.

Recommendation 41

The Commonwealth and the State must provide material support to the KLC and Traditional Owners in establishing effective Indigenous governance structures that maximise the impact of benefits provided for in an LNG Precinct ILUA(s) and enhance the quality of service delivery to Indigenous communities in the Area of Impact. The KLC and Traditional Owners must disseminate information on such governance structures to Indigenous people in the Area of Impact to promote transparency and understanding.

Recommendation 42

The Proponent must apply a 'no drugs' policy to the LNG Precinct and the accommodation complex. Possession or sale of illicit drugs by Precinct workers must be grounds for summary dismissal.

Recommendation 43

The Proponent must operate the LNG Precinct accommodation complex as a 'controlled access' facility, with access by Precinct Workers to the Area of Impact limited to travel to and from the LNG Precinct, and no public access to the camp. Traditional Owner access to the camp for environmental monitoring or other Precinct management activities will be governed by specific arrangements set out in a Precinct Management Plan or equivalent document.

Recommendation 44

The State must supplement the resources available to WA police in the Area of Impact to enable them to address any increase in illegal activity, including sale of drugs and illicit trading of alcohol.

Recommendation 45

Responsible State and the Commonwealth authorities must provide additional funding to drug and alcohol education programs in schools and colleges, and to alcohol and drug abuse rehabilitation facilities, in the Area of Impact.

Recommendation 46

The Proponent must make provision in the employment arrangements of Indigenous workers for variations to standard rosters, and for grants of leave, that recognises their cultural and family obligations.

Recommendation 47

The Proponent must ensure that Precinct Workers who supervise Indigenous workers are provided with cross-cultural training that gives them an understanding of the family and cultural obligations of Indigenous workers.

Recommendation 48

The Proponent must, on an ongoing basis, make available counselling, including advice on financial management, to workers and their families to assist them in dealing with the pressures created by FIFO and long work rosters.

Recommendation 49

The Proponent must operate the LNG Precinct accommodation complex as a 'controlled access' facility, with no access by workers to the Area of Impact and no public access to the camp.

Recommendation 50

The Proponent must provide cross-cultural training for Precinct workers, which includes material alerting them to the personal and social costs that can result from inappropriate sexual relations.

Recommendation 51

Schools, colleges and health facilities in the Area of Impact must offer educational material on the risks involved in inappropriate sexual relations with workers and in unprotected sex.

Recommendation 52

Responsible State and Commonwealth authorities must inject substantial additional funding into construction of public housing in Broome and the Dampier Peninsula, upgrading of the existing housing stock, provision of hostels to accommodate Indigenous youth, and emergency and short-term accommodation to help address homelessness in the short term. To gain maximum value for money, Indigenous community members and their governing bodies must be closely involved in the design and management of housing programs.

Recommendation 53

Responsible State and the Commonwealth authorities must support Indigenous people to establish and develop businesses to build houses and other forms of accommodation.

Recommendation 54

Responsible State and Commonwealth authorities must review housing and related policies to ensure that these maximise Indigenous access to housing. This policy review must recognise the need for housing policies to be regionally based and in particular recognise regional differences in cost of living. Policies that result in loss of access to housing when people gain employment and higher incomes must be changed, for instance by permitting tenants to retain their public housing but at a higher rent.

Recommendation 55

Responsible State and Commonwealth authorities must act to increase the supply of Indigenous people skilled in the construction trades, for instance by funding additional Indigenous apprenticeships in the building industry.

Recommendation 56

The Proponent must provide accommodation for all of their workers and contractors. The proponent must also contribute to the cost of constructing additional housing to meet the demand associated with indirect employment created by the LNG Precinct.

Recommendation 57

The Board, discussed in Chapter 4.4.2, must establish and maintain monitoring of prices for key components of Indigenous living costs in the Area of Impact, building on price data contained in Chapter 2.3.11 above.

Recommendation 58

The Proponent, State and Commonwealth Authorities, and Indigenous organisations must encourage the establishment of Indigenous enterprises that produce food and other consumables for the local market, and that supply transport and communication services to the LNG Precinct.

Recommendation 59

The State, the Commonwealth, the Proponent and relevant Indigenous organisations must develop a program which will operate for 30 years and may be extended to the life of the project if that life exceeds 30 years, to raise the quality and effectiveness of Indigenous education in the Area of Impact and in the Kimberley generally. This program must include:

- a strong and sustained focus on numeracy and literacy from early education onwards
- initiatives to enhance parental involvement in education
- specific incentives to reduce staff turnover and retain experienced teachers
- provision of additional student accommodation in Broome and the Dampier Peninsula
- design and delivery of school, TAFE and university courses that are relevant to Indigenous students and to the employment opportunities available to them, and are readily accessible to students in the Dampier Peninsula, including on-site delivery on the Dampier Peninsula, and through distance learning
- provision of reliable IT facilities and services in the Dampier Peninsula communities to enable Indigenous students to access on-line education and training programs
- initiatives to enhance literacy and numeracy skills among adults
- major public investment to help meet the housing and health needs of Indigenous students
- a substantial scholarship scheme, funded by the Proponent and Responsible State and Commonwealth authorities, to enhance Indigenous access to university and VET education

- Child care support and services to permit Indigenous students of any age to access formal education.

Recommendation 60

The Proponent, the State and the Commonwealth must make substantial and sustained investment, starting immediately, in training and training facilities to permit the program to be effectively implemented. This investment must include:

- development of suitable training facilities in the Area of Impact, and improved access to specialist facilities in Perth or elsewhere
- building on existing training resources, programs and organisations in the Area of Impact, development of training programs which prepare Indigenous trainees for employment in skilled as well as semi-skilled positions, in construction, operation of the LNG Precinct and related industries. These programs must include on-the-job training at existing LNG facilities in the Pilbara or Darwin
- specific training initiatives that focus on allowing former and current CDEP workers to make a successful transition to 'mainstream' employment
- a focus on skills development for governance and community development and employment opportunities in areas other than the LNG Precinct
- a concerted effort to recruit and retain high-calibre trainers, recognising the keen competition that exists for such skills
- legally-binding commitments by the Proponent to provide specified training outcomes throughout the life of the LNG Precinct and to apply a preference in favour of Traditional Owners and other Indigenous people living in the Area of Impact in providing access to training opportunities.

Recommendation 61

The Proponent must establish employment programs that operate throughout the life of the LNG Precinct and include, at a minimum, the following components.

- an employment preference for Traditional Owners and other affected Indigenous people in the Area of Impact
- allocation of specific financial and other resources to employment programs Kimberley Land Council 311
- targets for local Indigenous employment that increase over time and apply to all areas of LNG Precinct operations
- mechanisms that ensure that any failure to meet these targets automatically requires additional allocation of resources and enhanced training and recruitment efforts
- specific initiatives to aid retention of Indigenous workers, including measures to make the workplace a positive environment for Indigenous people; training on anti-discrimination legislation and human rights; establishment of clear paths for career and professional development; and use of work rosters that recognise cultural and family and social obligations
- provision of transport between communities in the Area of Impact and the LNG Precinct site
- employment initiatives aimed specifically at recruiting and retaining Indigenous women
- initiatives to overcome 'threshold' issues that can prevent Indigenous people from entering the industrial workforce, including limited English language skills, lack of a driver's licence, convictions for minor criminal offences, and absence of formal qualifications. Such initiatives must include recognition of prior learning and skills
- the establishment of career pathways and the provision of ongoing professional and skills development for indigenous workers
- periodic reporting on compliance with this condition to the Board and the Minister. The reports must be made publicly available. Non-compliance with this condition will result in penalties.

Recommendation 62

Proponents and their contractors must offer their employees access to, and encourage them to participate in, personal financial counselling, and support them in efforts to channel a portion of their wages into savings.

Recommendation 63

The Proponent must support local and Kimberley Indigenous enterprises by implementing a Business Support program which includes measures as follows:

- Assisting them to obtain access to capital, for example by providing documentation regarding potential contracts to financial institutions, establishing joint ventures, or creating a revolving loan fund.

- Helping them develop relevant business skills, including planning and management skills, by sharing technical and financial expertise and appointing Indigenous business development officers.
- Assisting them in overcoming the barriers they face in seeking to compete with large, established suppliers, for instance by allocating certain types of contracts to Indigenous businesses; applying a preference clause to Indigenous businesses; offering them right of first refusal on specific contracts; waiving standard tendering procedures; unbundling large contracts into smaller ones that are within the capacity of Indigenous businesses.

Recommendation 64

The Proponent and State and Commonwealth must help address the particular difficulties facing small Indigenous businesses in the Area of Impact, and in particular must:

- address land tenure issues on the Dampier Peninsula that deny potential businesses secure tenure and so the capacity to raise loan finance
- provide specific assistance to potential business operators who previously drew on CDEP for support and/or have no credit history
- recognise the difficulty that Indigenous people can face in accessing business support services, facilitate their access to government services that support and promote newly-formed businesses or assist small businesses to expand their operations.

Recommendation 65

Prior to the commencement of activities under the Plan, the State and Commonwealth Departments of Health and other relevant agencies, in conjunction with local health organisations shall:

- review and consolidate existing data relating to Indigenous health in the Area of Impact, and develop and maintain a single data base of relevant information
- identify any gaps in available health information, and undertake health surveys of relevant populations required to fill these gaps
- on the basis of this enhanced information, expand funding for relevant health and social welfare programs, including those currently provided by NGOs and Indigenous organisations, and place funding on a more secure and long-term footing.

Recommendation 66

The Commonwealth and State Departments of Health must commit funding on a long-term basis, and at a higher level, to developing services for people suffering from mental illness in the Area of Impact.

Recommendation 67

The Commonwealth and State Departments of Health must commit additional funding to enable expansion of regional dialysis services in the Area of Impact.

Recommendation 68

Responsible Commonwealth and State authorities must expand funding for recreation and other youth activities in the Area of Impact and place funding on a more secure and long-term footing.

Recommendation 69

The KLC and Traditional Owners must develop measures to provide greater support to and recognition to youth. The Proponent will meet the cost of these measures which will include:

- using communication channels that will reach young people in providing information on the LNG Precinct
- sponsoring and promoting cultural, sporting and other events for youth;
- making specific provision for liaison with young people
- providing opportunities for work experience at the LNG Precinct and in their own organisations.

Recommendation 70

The State must act to resolve uncertainty in relation to land tenure in the Dampier Peninsula as a matter of urgency, and within 3 years of the endorsement of the Plan.

In the event that any land transfer within the area of a native title determination remains outstanding at that anniversary, then (except in relation to the area of the Beagle Bay Community or outstations), the State will transfer unconditional freehold title, under an ILUA which provides for no extinguishment of native title as a result of that future act, to the relevant Registered Native Title Bodies Corporate.

The State will pay a bond of \$100 million or some other amount negotiated between the State, the KLC and Traditional Owners, to fund a process to resolve any outstanding tenure issues in the area of the Beagle Bay Community or outstations which remain unresolved at the third anniversary of the endorsement of the Plan.

Recommendation 71

The KLC and Traditional Owners must maintain a flow of relevant and timely information regarding land tenure and other aspects of ILUA and related negotiations that have implications for other native title groups and affected Indigenous communities, employing both face-to-face meetings and regular updates via newsletter and electronic media.

Recommendation 72

Any endorsement of the Plan must be subject to the conclusion of an ILUA which allows the Traditional Owners to ensure that any impact of the LNG Precinct and associated developments on their cultural heritage is avoided where possible and, where avoidance is not possible, is minimised. Recognising the principle of Indigenous Free Prior Informed Consent (KLC 2010a), no damage to Indigenous cultural heritage must be permitted without the informed consent of Traditional Owners.

Recommendation 73

All Precinct Workers and State and Commonwealth employees and consultants required to interact with Traditional Owners in a substantive manner should undergo cross-cultural training provided in conjunction with the Traditional Owners.

Recommendation 74

The Proponent and relevant State and Commonwealth authorities must take specific measures to support the practice of Indigenous culture in the Area of Impact, for example by supporting:

- oral history projects conducted by organisations such as Goolarri media
- cultural festivals and other activities conducted by KALACC
- Indigenous language programs offered in schools
- women's law groups
- establishment of an interpretative display on the history of Jabirr Jabirr people, possibly as part of a Visitor's centre established on the Cape Leveque Road (see Recommendation 30)
- flexible work practices, particularly in the period December – February.

Recommendation 75

The Proponent, the State, the Commonwealth, the KLC and Traditional Owners must:

- promote transparency and the free flow of information in relation to LNG development, so that misunderstandings regarding processes and decisions relating to gas development are minimised.
- promote adherence to values of mutual tolerance and respect, through a public information campaign using local media, and stressing the benefits to all of maintaining such values in the face of conflict over gas development

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Annexure D How the ASIA Recommendations are Addressed

No	ASIA Recommendation	Where captured
1	Capacity to address indigenous issues	Heads of Agreement
2-3	Culturally appropriate time-frames	HoA and Indigenous Land Use Agreement or similar agreement
4	SIA monitoring and management	Social Monitoring at Precinct and commercial proponent level (Section 5.5.8) Governance (Section 5.5.9)
5,6	Baseline household survey and regional harvest study	Subject to funding
7-26	Environmental Recommendations	Covered by Environmental Regulations or elsewhere within the SAR
27	Manage population impacts on the Dampier Peninsula	Access to Broome and the Dampier Peninsula (Section 5.4.2) Management of Impacts of recreational use (Section 5.5.3)
28	Controlled-access construction camp	Managed-access construction camp (Section 5.4.1)
29	Cross cultural training for all Precinct workers	Cross-cultural training (Section 5.4.5)
30	Permit System for the Dampier Peninsula	Dampier Peninsula Land Use and Infrastructure Plan
31	Recreational Management near the Precinct	Management of Impacts of recreational use (Section 5.5.3)
32	Wild resource harvest areas	Dampier Peninsula Land Use and Infrastructure Plan
33	Marine resource impacts	Management of Marine resource use impacts (Section 5.5.1)
34	Fishing licences	Management of Marine resource use impacts but already captured in State policy (Section 5.5.1)
35	Regulation of commercial fishing	Management of Marine resource use impacts (Section 5.5.1)
36	Traditional Owners and indigenous people to be active in tourist and visitor management	Management of Impacts of recreational use (Section 5.5.3) Governance (Section 5.5.9)
37	Indigenous Ranger System	Indigenous Land Use Agreement or similar agreement
38	Regular communication with indigenous people	Indigenous Land Use Agreement or similar agreement Governance (Section 5.5.9)
39	Funding for Prescribed Bodies' Corporate	Heads of Agreement
40	Beagle Bay local governance	Priority of the Remote Service Delivery National Partnerships Agreement
41	Indigenous Governance Structures	Heads of Agreement
42	No-Drug policy at the Precinct	Workforce behaviour management (Section 5.4.3)

No	ASIA Recommendation	Where captured
43	Controlled-access construction camp	Managed-access construction camp (Section 5.4.1)
44	Additional policing resources for area	Precinct health, emergency services and policing and security (Section 5.4.10) Workforce behaviour management (Section 5.4.3)
45	Drug and alcohol education	Already subject to Government Alcohol and Drug strategy.
46	Indigenous worker arrangements	Indigenous workforce development (Section 5.4.7)
47	Cross-cultural training for all workers	Cross-cultural training (Section 5.4.5)
48	Counselling and financial management advice for workers	Indigenous workforce development (Section 5.4.7)
49	Controlled access construction camp	Managed-access construction camp (Section 5.4.1)
50	Cross-cultural training including inappropriate sexual relations	Cross-cultural training (Section 5.4.5) Workforce behaviour management (Section 5.4.3)
51	Education in inappropriate sexual relations for educational facilities in impact area	Workforce behaviour management (Section 5.4.3) Possibly extension to current Government Alcohol and Drug strategy in region
52	Housing on the Dampier Peninsula	Remote Communities Housing National Partnerships Agreement Housing Strategy (Section 5.5.5)
53	Indigenous housing businesses	Heads of Agreement
54	Review public housing policy	Housing Strategy (Section 5.5.5)
55	Additional indigenous employment	Indigenous workforce development
56	Commercial proponent to provide housing for all direct and indirect employees	Managed-access construction camp (Section 5.4.1) Housing Strategy (Section 5.5.5)
57	Price Monitoring	Retain local benefits (Section 5.4.9) Social Monitoring at Precinct and commercial proponent level (Section 5.5.8)
58	Local indigenous business development	Indigenous workforce development (Section 5.4.7) Education, training and employment (Section 5.4.6)
59	Indigenous education	Education, training and employment (Section 5.4.6) Indigenous workforce development (Section 5.4.7)
60	Indigenous education and training	Education, training and employment (Section 5.4.6) Indigenous workforce development (Section 5.4.7)
61	Indigenous employment	Indigenous workforce development (Section 5.4.7) Education, training and employment (Section 5.4.6) Cross-cultural training (Section 5.4.5)
62	Worker support including financial counselling	Indigenous workforce development

No	ASIA Recommendation	Where captured
63	Indigenous business development	Heads of Agreement Retain local benefits Indigenous workforce development
64	Indigenous business support	Retain local benefits Indigenous workforce development
65	Regional health coordination and funding	Already underway as part of the Community Health National Partnership Agreement.
66	Mental health facilities	New Broome-based mental health facility West Kimberley Socio-Economic Strategy
67	Expand regional dialysis in region	To note
68	Expand recreation and youth funding	Heads of Agreement
69	Support and recognise youth	Heads of Agreement
70	Land Tenure reform	Dampier Peninsula Land Use and Infrastructure Plan
71	Regular updates and communications	Governance Indigenous Land Use Agreement or similar agreement
72	Avoid and minimise cultural heritage impacts	KLC's Heritage Impact Assessment Report
73	Cross-cultural training for all employees and consultants	Cross-cultural training
74	Support for indigenous culture	Heads of Agreement Indigenous Land Use Agreement or similar agreement
75	All parties promote transparency, flow of information and mutual tolerance	Heads of Agreement

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