

4. Topography, geology and soils

4.1 Summary

The changes proposed as part of WEXP1 and WEXP2 will not result in an increase to potential impacts on soils, including acid sulfate soils, land contamination and good quality agricultural land. Any potential impacts will be managed by implementing existing management plans during detailed design, construction and operation.

The excavation of previously deposited dredged materials to create a new settlement pond at the southern end of Reclamation Area B (WEXP1) and the construction of the new outfall may potentially expose ASS, however this will be managed via the approved Acid Sulfate Soil Management Plan (Appendix 23.4) or an amended version of this plan. Recent testing of Berth Pockets 2 and 3 did not identify the presence of ASS.

The new stockyard proposed for Reclamation Area B will require a ground improvement strategy. This process will be managed using the existing WICET Soil and Water Quality Management Plan (refer Appendix 23.15) or via an amended version, if required.

4.2 Introduction

This chapter describes the existing environment and potential impacts relating to topography, geomorphology, geology and soils for the changed Project. Potential impacts relating to topography, geology and soil were originally outlined in the WICT EIS and SEIS (refer Appendix 1).

This Request for Project Change provides an updated assessment to address changes to the Project which were assessed in the Coordinator-General's (CG) Report (January 2008) and EPBC Act controlled action approval (April 2008). Proposed changes to the Project as part of WEXP1 and WEXP2 (previously Stage 2 and Stage 3) are wholly contained within the Project footprint approved under the EIS and areas subsequently approved for WICET Stage 1. It should be noted that the majority of construction impacts to topography, geology and soils will be addressed as part of Stage 1 works.

4.3 Methodology

The topographical and geological characteristics of the WICET Stage 1 area, along with the potential impacts to soils from Stage 1 works, are outlined in Chapter 4 of the WICT EIS. The assessment for this Change Request was based on a review of available information and field investigations.

Due to the large size of the Project footprint, the site has been divided into four areas:

- Golding Point
- Reclamation Area B (Stockyard Area B)
- Reclamation Area C
- Conveyor and dump station

Since the EIS was approved, all rail infrastructure works associated with the WICET Project development are now classified as an individual project (ie Wiggins Island Rail Loops Project) and under the responsibility of QR National. The changed WICET Project footprint is illustrated in Figure 4.1.

4.3.1 Topography and landforms

The topographical and landform patterns within the Project area were investigated during the EIS through a combination of reviewing the relevant aerial photographs and maps, and by undertaking a landform survey in accordance with the principles and intent of the guidelines outlined in Gunn *et al* 1988. Observations recorded during the landform survey were



Legend

Project Area

Port Cardle

Mad Island

Wiggins Island

Golding Point

Reclamation Area B

Reclamation Area C

Ancheronah

Calliope River

Arctland Limited

Gladstone

Port Cardle

Port Cardle

Gladstone Harbours Board

Reid Road

described in accordance with McDonald *et al* 1990. Field inspections were undertaken by the project team during May 2006 and September 2011.

The assessment of the existing environmental values for the topography and landforms involved the following activities:

- Review of existing information, including relevant maps, aerial photographs and previous reports
- Field inspection and landform survey of the Project area during May 2006, which included surface observations and soil profile descriptions at selected locations
- Field inspection of the Project area during September 2011

4.3.2 Geology and geomorphology

Onshore and offshore geotechnical investigations (including preliminary ASS investigations) for the Project area during the EIS were undertaken by Douglas Partners.

The following documents have been used to describe the soil properties of the Project area:

- Douglas Partners (May 2006) Report on Preliminary Onshore Geotechnical Investigation and ASS Evaluation
- Douglas Partners (October 2006) Draft Report on Geotechnical, Environmental and Acid Sulfate Soil Investigation, Proposed Offshore Works (Volumes 1 & 2)
- Connell Hatch (October 2006) Wiggins Island Coal Terminal Onshore Acid Sulfate Soil Investigation

Detailed information relating to methodologies adopted for the geotechnical and ASS investigations are contained within these documents and are attached to the WICT EIS (refer Appendix 1).

Further reports have been developed since the EIS was approved, including:

- The Douglas Partners "Report on Stage 2 Onshore Geotechnical Investigation, Wiggins Island Coal Terminal, Gladstone", 4 April 2007
- The Butler and Partners "Geotechnical Investigation: Onshore Geotechnical Survey, Wiggins Island Coal Terminal, Gladstone", 22 May 2009

4.3.3 Soils, good quality agricultural land and contaminated land

The following soil aspects are described in Chapter 4 of the WICT EIS:

- Soils - an overview of site soil descriptions, including ASS desktop review and preliminary investigations
- Good quality agricultural land
- Contaminated land
- Red Imported Fire Ants - a clearing programme has since been undertaken and the Fire Ants have been removed from the area with the restricted area no longer enforced

4.4 Description of environmental values

4.4.1 Topography and landforms

The Project area contains a range of topographical elevations and landform features. The major landform patterns within and surrounding the Project area are summarised as follows:

- Low hills and rises
- Plains
- Tidal flats and marine plains

Topographical elevations range between being below sea level (less than 0 m AHD) and 80 m AHD.

Review of *Land Systems of the Capricornia Coast Map 3 Calliope Area* (DPI 1995) indicated that a number of land systems occur within the Project area. These are summarised in Table 4.1 and illustrated in Figure 4.4 of the WICT EIS (refer Appendix 1).

Field observations for each precinct within the Project area are summarised in the Section 4.2.1 of the WICT EIS.

Geology and geomorphology

As mapped by the Australia 1:100,000 Geological Series – Gladstone Sheet 9150 the geological formations which occur in the Project area are presented in Table 4.2 and Figure 4.5 of the WICT EIS (refer Appendix 1).

These geological formations include two major bedrock formations that underlie the whole Project area, the Doonside and Wandilla formation. Overlying these bedrock formations is predominantly Quaternary age depositions and the Rundle Formation.

The dominant geological characteristics in the Project footprint are summarised below.

- Golding Point – Wandilla Formation with Coastal Plains and Dunefields on the edges
- Reclamation Areas B and C – Coastal Plains and Dunefields with some outcrops of the Wandilla Formation
- Conveyor and dump station – Alluvial Plains, Residual Deposits and, Coastal Plains and Dunefields

4.4.2 Geotechnical studies

An assessment of the general geotechnical properties is based on site visits conducted by Connell Hatch staff in May 2006 and geotechnical investigations undertaken by Douglas Partners between January and October 2006. The geotechnical investigation comprised test pits, Cone Penetration Tests (CPTs) and borehole drilling, performed at locations and frequencies generally corresponding with the main elements of the Project concept design.

A summary of the findings from the preliminary geotechnical investigations completed by Douglas partners for both the onshore and offshore areas are provided in Section 4.2.3 of the WICT EIS. Appendix 4.1 contains plans of the onshore and offshore geotechnical boreholes within the Project area. Drawing 1533-C-DR-0014 in Appendix 4.1 illustrates the boreholes, test pits and CPTs undertaken in near vicinity to the proposed WEXP1 stockyard.

A geotechnical investigation for the WEXP1 stockyard is scheduled to commence in early 2012. This investigation, once complete, will supplement the information gained from the preceding Stage 1 investigations. Once this information has been received, it will be used, where appropriate, to update the various ground models and analyses that have been included in the WEXP1 technical feasibility study.

The proposed infrastructure located within the WEXP1 stockyard will be designed to satisfy both the functional constraints and specified performance criteria, including:

- Design loads
- Stability performance criteria
- Settlement/movement performance criteria
- Construction programme
- Construction sequence

4.4.3 General soil properties

Investigations as part of the WICT EIS within the Project area included the following activities:

- Reconnaissance survey and site inspections along the extent of the Project area
- Surface observations and soil profile descriptions at selected locations
- Preliminary ASS investigation completed by Douglas Partners and Connell Hatch project teams for both onshore and offshore areas
- Survey observations recorded in accordance with the recommendations contained in the Australian Soil and Land Survey Field Handbook (McDonald et al 1990) and Australian Soil Classification (Isbell 2002)

Section 4.2.4 of the WICT EIS contains a description of site soils, land survey locations, and soil chemical analysis. Figure 4.8 of the WICT EIS (refer Appendix 1) illustrates soil and landform assessment locations.

4.4.4 Good quality agricultural land

The changed Project proposed is wholly contained within the existing Project footprint and will result in no change to potential impacts on good quality agricultural land.

4.4.5 Land contamination

Potential sources of soil contamination at the Project site were identified in the WICT EIS. An environmental baseline report was also developed by Gilbert and Sutherland in June 2011 which provided an assessment of baseline environmental conditions within the WICET Project area. This included a comprehensive soil contamination assessment (refer Appendix 4.2).

The WEXP1 and WEXP2 Project is wholly contained within the existing Project footprint approved under the WICT EIS and will result in no change to potential impacts to land contamination. Management of potential contamination during construction and operation will be undertaken as per the existing WICET SWQMP (refer Appendix 23.15).

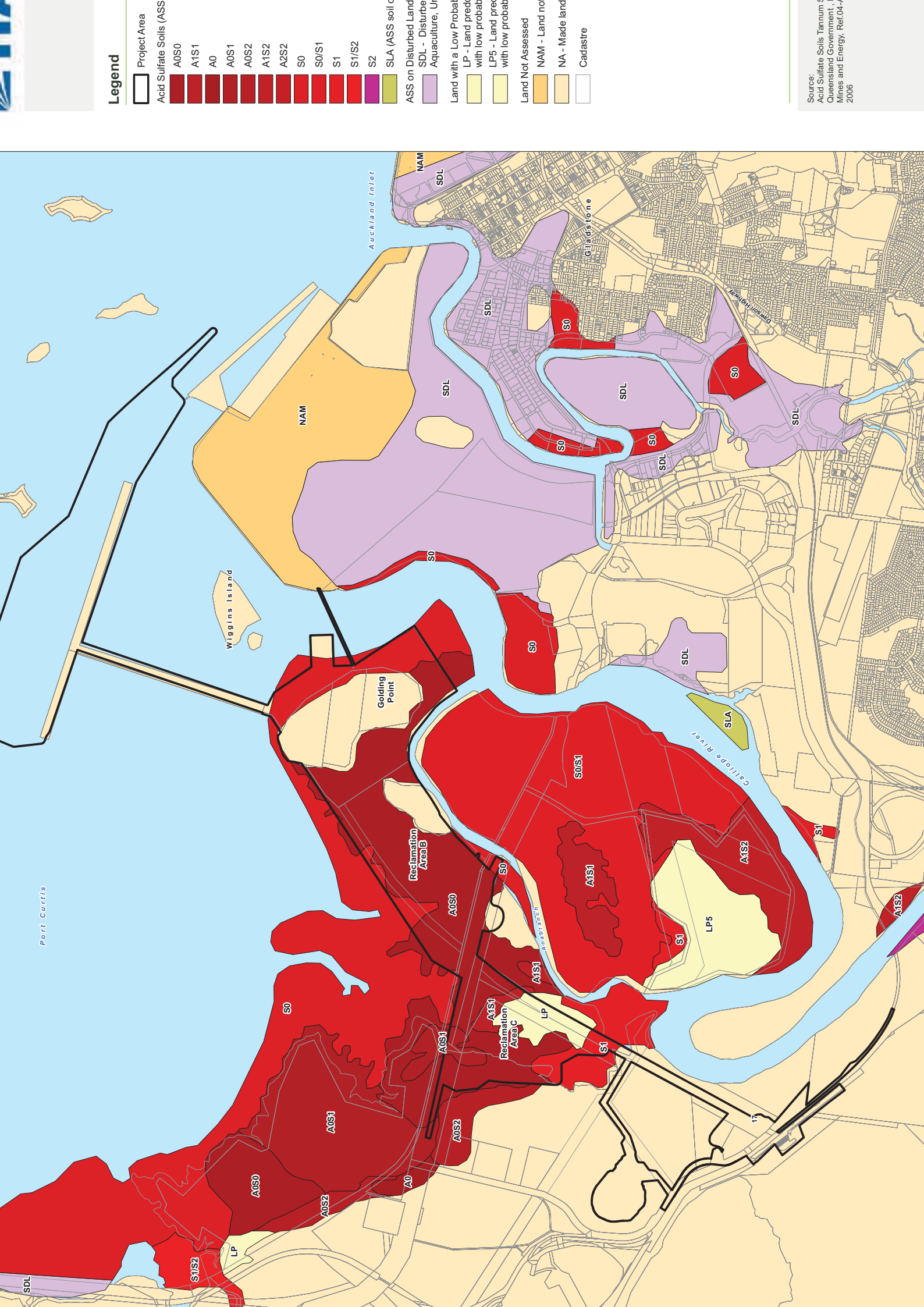
4.4.6 Acid sulfate soils

ASS are a characteristic feature of low lying coastal environments in Queensland, particularly where landform elevations are below 5 m AHD. ASS are comprised of iron sulfides generally in the form of pyritic material that is a product of the natural interaction between iron rich organic matter and sulfate rich seawater present in anaerobic low energy estuarine environments. Undisturbed, these soils are generally present in an anaerobic state within the subsurface profile (below the water table) of Holocene marine muds and sands in the form of potential acid sulfate soil (PASS). Actual acid sulfate soils (AASS) are the oxidised (disturbed) form, which may occur as the result of natural or anthropogenic disturbance from changes in groundwater levels and/or exposure to oxygen (Powell, B. & Ahern, C.R. *Nature, Origin and Distribution of Acid Sulphate Soils: Issues for Queensland* 1999).

The DNRMW (now DEHP) - Acid Sulfate Soils - Tannum Sands Gladstone Area Central Queensland Coast (2004) found the ASS in the survey area are almost exclusively associated with tidal lands or the tidal zone (refer Figure 4.2). The areas include:

- Perimeter areas of Golding Point
- Reclamation Areas B and C
- Area directly north of the Powerlink easement

Findings of the preliminary ASS investigation (Connell Hatch 2006) are provided in Appendix E3 of the WICT EIS (refer Appendix 1).



Legend

- Project Area
- Acid Sulfate Soils (ASS)**
- A0S0
- A1S1
- A0
- A0S1
- A0S2
- A1S2
- A2S2
- S0
- S0/S1
- S1
- S1/S2
- S2
- SLA (ASS soil d
- ASS on Disturbed Land (SDL)**
- SDL - Disturbed
- Land with a Low Probability of Acidification (LP)**
- LP - Land pre
- LP5 - Land pre
- with low probab
- with low probab
- Land Not Assessed (NAM)**
- NAM - Land not
- NA - Made land
- Cadastre

Source:
 Acid Sulfate Soils Tannum
 Queensland Government,
 Mines and Energy, Ref.04-
 2006

An Acid Sulfate Soil Management Plan (ASSMP) (refer Appendix 23.4) for Stage 1 has been developed by Gilbert and Sutherland to define operational works and environmental protective measures required for the onsite handling and management of ASS and groundwater. The WICET ASSMP was approved by DEHP in February 2010. A revised ASSMP is currently being developed to incorporate the management of potential ASS risks from WEXP1 dredging (Berths 2 and 3). The testing undertaken as part of the Berths 2 and 3 assessment did not identify the presence of ASS. The ASSMP will be amended for future dredging works (Berth 4).

New settlement ponds will involve excavation of previously deposited dredged materials and the outfall will require excavation of some soils, and associated ASS risks.

4.5 WEXP1 and WEXP2 potential impacts

The majority of disturbance and soil potential impacts as a result of the Project have been addressed as part of Stage 1 works. The potential impacts to topography, geology and soils as a result of the proposed Project changes are as follows:

- The excavation of previously deposited dredged materials to create a new settlement pond at the southern end of Reclamation Area B (WEXP1) and the construction of the new outfall may potentially expose ASS (although this is not expected)
- A new stockyard proposed for Reclamation Area B will require a ground improvement strategy

4.6 Mitigation measures

Mitigation measures are proposed for preventing/minimising potential soil impacts during the design, construction and operational phases of the Project.

4.6.1 Design

To minimise the potential impacts resulting from the Project changes the following mitigation measures will be applied during design, in addition to the mitigation measures identified in the WICT SEIS:

- Design engineers will review the geotechnical model developed for the site as an outcome of the detailed geotechnical investigations that will be undertaken during detailed design
- Develop and implement design measures to ensure the safety and stability of stockyard and wharf infrastructure:
 - Barge ramp
 - Stockyard perimeters and bunding intercepting tidal drainage lines and mudflat areas
 - Footings of stockyard structures and subsurface structures
 - Ponds, buildings and structures associated with the wharf
- Geotechnical engineers will provide input into the design of geotechnical protection measures required to protect existing infrastructure in areas that have been identified as vulnerable to variable, excessive or long term settlement and/or subsidence. These will include:
 - Dredge spoil disposal areas (Reclamation Areas B and C)
 - Gladstone-Mount Larcom road corridor
 - High pressure gas pipeline
 - Water and electricity supply infrastructure
 - Southern end, eastern side and perimeter of stockyard
 - Coal terminal facility area
 - Overland conveyor route from dump station to coal terminal
- Design of temporary and permanent erosion control measures and surface drainage diversion systems associated with conveyor footings and laydown/storage areas will adopt the design principles specified in the erosion control and landscape plans

- A specific ground improvement strategy has been developed to address areas of unconsolidated, incompetent and/or weak geological features, to be adopted prior to and/or during site preparation activities
- Consideration of further assessment of the contaminant status of sites where contaminated soil is required to be relocated between land parcels within the Project area
- Updating/amending WICET SWQMP to incorporate Project changes

4.6.2 Construction

The WICET SWQMP, approved by DEHP in June 2011 (refer Appendix 23.15) outlines environmental management requirements to address potential impacts of construction works involving or impacting the topography, geology and soils of the site, including:

- Bulk earthworks
- Excavation works
- Stockpiling
- Contaminated spoil management
- Vegetation clearing

As part of developing a bulk earthworks borrow source strategy for the WEXP1 feasibility study, consideration has been given to securing fill material from a number of different sources. Details of the bulk fill sourcing strategy are contained in the WEXP1 Technical Feasibility Study.

The WICET Construction Phase ASSMP for Stage 1 will be amended to address any changes as a result of WEXP1 and WEXP2 prior to construction of WEXP1 and WEXP2 commencing, and will be implemented during construction.

4.6.3 Operation

To minimise the potential impacts resulting from the Project changes the following mitigation measures will be applied during operation and maintenance activities, in addition to the mitigation measures identified in the WICT SEIS:

- Settlement and geotechnical conditions will be monitored throughout the nominated settlement period for specific areas of the site and/or structures
- Temporary erosion control measures will be monitored and maintained until the area of direct disturbance has been stabilised
- Temporary erosion control measures will be removed once the disturbed area has been stabilised
- Temporary erosion control and surface water diversion systems will be installed during maintenance activities
- Permanent erosion control measures and surface water diversion systems/structures will be monitored and maintained throughout operation of the coal terminal facilities

4.7 Conclusion

Potential impacts relating to topography, geology and soil were originally outlined in the WICT EIS and SEIS. The proposed WEXP1 and WEXP2 changes are wholly contained within the Project footprint approved under the WICT EIS and areas subsequently approved for WICET Stage 1. It should be noted that the majority of impacts to topography, geology and soils will be addressed as part of Stage 1 works.

The WICET Soil and Water Quality Management Plan (SWQMP) (refer Appendix 23.15) has been prepared to mitigate construction impacts associated with erosion, sedimentation and the transportation of soils. The WICET SWQMP will be reviewed and amended during the detailed design phase to mitigate impacts from WEXP1 and WEXP2 works.

The most significant potential impact to soils as a result of WEXP1 and WEXP2 changes is the excavation of materials that may contain ASS, although it should be noted that testing to date (Berths 2 and 3) has not identified ASS. New settlement ponds on Reclamation Area B will require excavation of previously deposited dredged materials. All material excavated from ASS risk areas will be managed in accordance with the WICET Stage 1 ASSMP (refer Appendix 23.4), which was approved by DEHP in November 2009. The WICET Stage 1 ASSMP will be amended to mitigate impacts from WEXP1 and WEXP2 during construction.

A new stockyard area is proposed for Reclamation Area B as part of WEXP1. A ground improvement strategy has been developed as part of the WEXP1 Technical Feasibility Study to treat the sediment (both residual and reclaimed) that have inadequate geotechnical strength for the safe construction and/or operation of the stockyard.

Overall the potential impacts to soils as a result of WEXP1 and WEXP2 changes are considered minor and manageable by implementing existing and proposed management plans during detailed design, construction and operation.

Conclusion 1: The changed Project is wholly contained within the existing Project footprint approved under the WICT EIS and will result in no change to potential impacts on good quality agricultural land.

Conclusion 2: The changed Project is wholly contained within the existing Project footprint approved under the WICT EIS and will result in no change to potential impacts to land contamination.

Conclusion 3: A revised ASSMP will be developed to incorporate the management of potential ASS risks for future dredging (Berths 2, 3 and 4). ASS sampling of Berth Pockets 2 and 3 did not identify ASS.

5. Land use and project approvals

5.1 Summary

The proposed changed Project will be wholly contained within the Project footprint which includes areas approved under the EIS and areas subsequently approved for WICET Stage 1 and will not impact on any additional State or privately owned land.

WEXP1 and WEXP2 complies with the future development intent of the immediate area and wider Central Queensland region, as well as the relevant statutory land use instruments for this area. All additional approvals for the Project will be obtained prior to the commencement of works and / or operations.

5.2 Introduction

The proposed changes to the Project are consistent with the Project approved under the EIS, as the changes will not exceed the ultimate nominal capacity of 84 Mtpa, nor the three inloading systems, three outloading systems and four coal berths. The proposed Project components are to occur within the Project footprint and will not impact on any additional State or privately owned land.

The Project remains consistent with the land use designations and surrounding land uses of the area. The changes proposed in WEXP1 and WEXP2 will, however, require a number of additional statutory approvals, including a land use permit and an Operational Works (Bulk Earthworks) permit associated with the expansion of the land use coverage within Reclamation Area B of the Project footprint, as well as additional Operational Works Permits for Tidal Works, the Disturbance of Marine Plants and Waterway Barrier Works associated with the new outfall to the Anabranch.

It should be noted that the offshore components of the Project are not impacted by physical changes under this application for a project change, which remains within the nominal ultimate capacity of the Project approved under the EIS. Similarly, there are to be no physical changes to the rail portion of the WICET Project located south of the GSDA, and the infrastructure associated with the Project is now being managed by QR National.

As such, the land use and project approval issues dealt with in this chapter have been limited to the overland conveyors and coal terminal which are managed by WICET.

5.3 Land Tenure and Jurisdiction

The WEXP1 and WEXP2 Project will not impact on additional land holdings. While tenure (being tenure types and descriptions) and jurisdictions within the Project area have changed since the issuing of EIS 'Significant Project' and 'Controlled Action' approvals in 2008, tenure arrangements remain conducive to the development of the Project.

Current tenure and jurisdictional arrangements are summarised in Table 5.1 and illustrated in Figure 5.1. Tenure arrangements at the time of the WICT EIS (November 2006) and SEIS (August 2007) (refer Appendix 1) are shown in Figure 5.2 for comparison.

The areas likely to be affected by changes from WEXP1 and WEXP2, including both stockyard arrangements, the additional discharge outlet and the overpass, are as follows:

- Golding Point
- Reclamation Area B (Stockyard Area B)



Legend

- Project Area
- Cadastre

Refer to Table 5.1 for the location of the WEXP1 and WEXP2 projects.

Source: Cadastre, DERM, August 2018.
 Based on or contains data provided by Queensland Department of Environment and Heritage Protection (Department Management) in consideration of this data you acknowledge and accept no liability (including consequential damage) resulting from any loss of accuracy, reliability, completeness or timeliness of the data. Data must not be used for purposes that constitute a breach of the privacy laws.



Legend

- Project Area (N)
- Land Parcel Boundary

Source: DERM, August 2014
 Based on or contains data from Queensland Department of Environment and Heritage Resources (Department Management). In consideration of this data you acknowledge and accept that the data is provided as is and accuracy, reliability, completeness and availability is not guaranteed. Queensland Department of Environment and Heritage Resources (Department Management) does not accept any liability (including consequential damage) for any loss or damage arising from the use of this data. Data must not be used for any purpose other than that for which it was provided. Data must not be used for any purpose that may constitute a breach of the privacy laws.

Table 5.1 Current land tenure and jurisdiction of properties within the WEXP1 and WEXP2 Project area

Area	Lot	Plan	Tenure	Ownership/Lessee	Jurisdiction	Implications of WEXP1 and WEXP2 proposed project change
Wiggins Precinct						
Offshore	105	SP228177	Leasehold	Owned by the State of Queensland (Represented by Department of Natural Resources and Mines (DNRM)) and leased to Gladstone Ports Corporation Ltd (GPC), subleased to WICET Pty Limited	Strategic Port Land	No change
Offshore	104	SP228177	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to GPC	Strategic Port Land	No change
Reclamation Area B and Calliope River	1	SP224171	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to GPC	Strategic Port Land	Lot for the approved Calliope River Cable Crossing (no longer anticipated as part of the Approved Project or WEXP1/WEXP2)
Golding Point	107	SP241807	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to GPC	Strategic Port Land	Impacted by WEXP2 stockyard arrangement
Golding Point	98	CTN279	Freehold	Owned by GPC and subleased to WICET Pty Limited	Strategic Port Land	Impacted by WEXP2 stockyard arrangement
Golding Point	99	CTN279	Freehold	Owned by GPC and subleased to WICET Pty Limited	Strategic Port Land	Impacted by WEXP2 stockyard arrangement
Golding Point	100	CTN279	Freehold	Owned by GPC and subleased to WICET Pty Limited	Strategic Port Land	Impacted by WEXP2 stockyard arrangement
Hanson Road Precinct						
Reclamation Area B	28	CTN279	Freehold	Gladstone Ports Corporation	Strategic Port Land	Impacted by WEXP1 stockyard arrangement

Area	Lot	Plan	Tenure	Ownership/Lessee	Jurisdiction	Implications of WEXP1 and WEXP2 proposed project change
Overland Conveyors/ Reclamation Area B	106	SP238408	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to GPC, subleased to WICET Pty Limited	Strategic Port Land	May be impacted by WEXP1 stockyard arrangement
Reclamation Area B/Gladstone Mt Larcom Rd overpass/Terminal Access Rd	108	SP238408	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to GPC, subleased to WICET Pty Limited	Strategic Port Land	Impacted by WEXP1 stockyard arrangement, additional discharge outlet and overpass
Reclamation Area B	1	SP225917	Freehold	Owned by GPC	Gladstone State Development Area	Impacted by WEXP1 stockyard arrangement
Gladstone-Mt Larcom Road (State-controlled road)						
Overland Conveyors/ Reclamation Area C	109	SP238409	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to GPC, subleased to WICET Pty Limited	Gladstone State Development Area/ Strategic Port Land	No change
Reclamation Area C / Gladstone Mt Larcom Rd overpass	110	SP238409	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to GPC, subleased to WICET Pty Limited	Gladstone State Development Area/ Strategic Port Land	No change for Reclamation Area C.
Reclamation Area C	4	SP200842	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to GPC	Gladstone State Development Area	No change
Reclamation Area C	5	SP200840	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to GPC	Gladstone State Development Area	No change
Overland Conveyors (underneath Gladstone-Mt Larcom Road) (Volumetric)						
Gladstone Mt Larcom Rd overpass (Materials Transport Corridor)						
				Owned by the State of Queensland (Represented by DTMR)	Future Strategic Port Land	No change for overland conveyor.
				Owned by the State of Queensland (Represented by DTMR)		No change

Area	Lot	Plan	Tenure	Ownership/Lessee	Jurisdiction	Implications of WEXP1 and WEXP2 proposed project change
Forest Precinct						
Reclamation Area C (Portion) and GPN Borrow Source	1	SP245935	Freehold	The Minister for Industrial Development of Queensland	Gladstone State Development Area	No change
Overland Conveyors	4	SP218648	Freehold	Owned by GPC and subleased to WICET Pty Limited	Gladstone State Development Area/ Strategic Port Land	No change
Overland Conveyors	2	SP245935	Freehold	The Minister for Industrial Development of Queensland	Gladstone State Development Area	No change
Overland Conveyors and Access Overpass	1	SP225922	Freehold	Owned by GPC and subleased to WICET Pty Limited	Gladstone State Development Area/ Strategic Port Land	No change
Access Overpass	1	SP235967	Leasehold (Volumetric)	Owned by the State of Queensland (Represented by DNRM) and leased to GPC, subleased to WICET Pty Limited	Strategic Port Land	No change
Overland Conveyors	2	SP235968	Leasehold (Volumetric)	Owned by the State of Queensland (Represented by DNRM) and leased to GPC, subleased to WICET Pty Limited	Strategic Port Land	No change
Reid Road						
	7	SP239676	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to GPC, subleased to WICET Pty Limited	Strategic Port Land	No change

Area	Lot	Plan	Tenure	Ownership/Lessee	Jurisdiction	Implications of WEXP1 and WEXP2 proposed project change
	51	SP239654	Leasehold	Owned by the State of Queensland (Represented by DNRM) and leased to DTMR, sub leased to: <ul style="list-style-type: none"> QR Network Pty Limited Queensland Rail Limited 	Gladstone Regional Council	No change
	2	SP239654	Leasehold		Gladstone Regional Council	No change

5.4 Land Use

5.4.1 Existing Land Uses

Gladstone is a centre for large-scale minerals and resource processing in Queensland, providing industries with a major strategic industrial hub for large-scale operations and access to raw minerals, energy supply, physical infrastructure, and service and support industries.

The land and water uses surrounding the Project are predominantly industrial, rural or conservation uses (eg Byellee Wetland, Forest Reserves), with the exception of rural residential properties to the south east of the Project.

Stockyard Area A is sited on Golding Point, and is subject to earthwork activities associated with the Stage 1 of the Project. Wiggins Island and Mud Island are located offshore from Golding Point, which are undeveloped and covered by dense mangrove communities.

Gladstone-Mount Larcom Road (formerly Hanson Road) separates Reclamation Areas B and C, and provides the main access to the western sections of Gladstone City and the major industries within the Gladstone State Development Area (GSDA). These include:

- Yarwun Alumina Refinery
- Mount Miller Rail Yard
- Orica
- GRC Wastewater Treatment Plant
- Gladstone Area Water Board Water Treatment Plant

Reclamation Area B is located to the north of Gladstone-Mount Larcom Road, and Reclamation Area C to the south, both of which are predominantly intertidal flats. Reclamation (Tidal Works) approvals have been obtained for these areas for future industrial / port-related development. Reclamation works have commenced with these areas as part of the Stage 1 Project.

The conveyor and dumpstation area includes the area along the North Coast Line, a 275 kV powerline from the Gladstone Power Station and the Yarwun Precinct of the GSDA.

5.4.2 Future Land Uses

The proposed changed Project remains within the Project area approved under the EIS and subsequently approved for Stage 1, and much of the surrounding area has either been developed, or identified, for future industrial development.

There are a number of proposed new industries and expansions of existing industries within the GSDA and surrounding areas, including:

- Yarwun Alumina Refinery expansion
- Queensland Alumina Refinery
- Queensland Curtis LNG
- Gladstone LNG
- Shell LNG
- Australia Pacific LNG
- RG Tanna Coal Terminal expansion
- Orica expansion

From a regional perspective, the Central Queensland Regional Growth Management Framework (CQRGMF) (2002) recognises the region for its major contribution to the Australian and Queensland economies, and the many natural assets of State and National significance. The CQRGMF identifies the regional drivers for Central Queensland as future economic growth, as well as social and environmental growth, and the need to capitalise on its competitive advantages for the benefit of the region.

Gladstone is recognised as a major urban centre with its future prosperity generated by its port, infrastructure, and the high level of major industrial development, both existing, and planned.

The Project is consistent with existing and future surrounding land uses of the area. Providing for the expansion of operations associated with the Project will ensure that the economic advantage of the area is retained and that the Port of Gladstone remains a world class port that is able to satisfy the transport demands of the rapidly increasing coal export market.

5.5 Compliance with Planning Framework

The Project will continue to traverse land under a number of planning jurisdictions:

- Gladstone State Development Area (GSDA)
- Gladstone Regional Council (GRC)
- Gladstone Ports Corporation (GPC)

Figure 5.3 identifies the Project area's current zoning from the relevant land use planning instruments.

Development within the GSDA is subject to the Development Scheme for the Gladstone State Development Area 2010 (the GSDA Development Scheme), amended to replace the 2006 version referred to in the WICT EIS, with only minor changes that do not impact the Project.

Following the Queensland local government amalgamations in March 2008, the former local government areas of Gladstone City, Calliope Shire and Miriam Vale Shire Councils were brought together to form the GRC. Whilst GRC is currently drafting a single planning scheme to encompass the amalgamated Council areas within the region, until such time as this is finalised and adopted, each component council area remains subject to the provisions of their respective former planning schemes.




























GPC is a Government Owned Corporation responsible for the operation and management of the Port of Gladstone. Previously the Central Queensland Port Authority (CQPA), GPC is the relevant port authority for the Port of Gladstone and has statutory management authority, established under the *Transport Infrastructure Act 1999* (TIA) over its Strategic Port Land (SPL). GPC as a landowner and land manager, manages development on its SPL within the Port of Gladstone through the Port of Gladstone Land Use Plan 2012.

The Project remains compliant with the relevant statutory documents of each planning jurisdiction, as outlined below. Assessment requirements within this framework are discussed in Section 5.6.

5.5.1 Compliance with the GSDA Development Scheme

The GSDA Development Scheme applies to the portions of the Project that lie within the area that is bounded by the Materials and Transport Services Corridor located immediately to the north and parallel to, Gladstone-Mt Larcom Road, and the rail dump station to the south. Raising of the Reclamation Area C bundwalls may be required in this area, with overall bund height not exceeding RL8 m. The conveyors will be used to transfer the increased product throughput from approximately 27 Mtpa (Stage 1) to 84 Mtpa (approved development).

Legend

-  Project Area
- Gladstone Planning S**
-  Commercial
-  Community Pur
-  Major Industry &
-  Gladstone State
-  Heavy Industry
-  Island Settlement
-  Local Industry
-  Mixed Industry
-  Not Known
-  Open Space
-  Park Residential
-  Reserve
-  Residential (Hig
-  Residential
-  Rural
-  Rural Resident
-  Special Facilitie
-  Special Purpos
-  Strategic Port L
-  Urban Expansio
-  Village
- Gladstone State Deve**
-  Aldoga Precinct
-  Clinton Precinct
-  Materials, Trans
-  Targinnie Precinct
-  Yanwun Precinct



Wiggins Island

Gladstone

Under the previous GSDA Scheme, the Project was captured under the broad definition of a 'Public Utility'. Although the type of development has not changed, the current GSDA Scheme has modified a number of definitions, and the elements of the Project within the GSDA are now defined as:

"Materials transport infrastructure

- a) *Means infrastructure used to transport materials*
- b) *Includes pipes used to transport materials (other than for utility gas) and conveyors used to transport raw material and products."*

The Project traverses the GSDA through the designated 'Yarwun Precinct' and the 'Materials Transportation and Services Corridor (Boat Creek Corridor Sub-Precinct)'.

The 'Yarwun Precinct' and 'Materials Transportation and Services Corridor Precinct (Boat Creek Corridor Sub-Precinct)' have several purposes under the GSDA Scheme, including:

"To provide for infrastructure that may or may not be associated with activities in the GSDA".

The 'Consistent Use Tables' for both GSDA precincts identify development that is defined as 'materials transport infrastructure' (ie WEXP1 and WEXP2) as 'uses that are considered highly likely to meet the Objectives of the Gladstone State Development Area'.

Further, development in the 'Materials Transportation and Services Corridor Precinct (Boat Creek Corridor Sub-Precinct)' also seeks:

"To provide an efficient and effective route for infrastructure and utility services to link the Port of Gladstone with GSDA precincts and areas external to the GSDA."

The Project remains consistent with the purposes of these precincts within the GSDA.

5.5.2 Compliance with the Gladstone Port Land Use Plan 2012

The Gladstone Port Land Use Plan 2012 (LUP 2012) applies to the portion of the Project located on land designated as SPL. The LUP 2012 was adopted by the Minister for Transport under TIA and gazetted on 9 March 2012, replacing the previous Gladstone Port Land Use Plan 1999 (referred to in the WICET EIS) and the Port of Gladstone Draft Land Use Plan 2010.

The LUP 2012 identifies new areas of SPL, with the majority of the Project footprint, and the physical infrastructure of the Project including WEXP1 and WEXP2, with the exception of a portion of Reclamation Area C, being within SPL.

The LUP 2012 identifies the Wiggins Island Locality, which is intended to provide for

'A new coal export terminal, rail infrastructure and supporting infrastructure to service the increasing demand for the export of coal from the Queensland coalfields. The facility will provide six new berths at Wiggins Island to cater for Cape size vessels. Stage 1 of the Wiggins Island Coal Export Terminal has been approved and development has commenced'

Furthermore, the LUP 2012 notes the future intent of the locality as representing site for future industrial and port development, and identifies an area of Future SPL associated with the overland conveyor underneath Gladstone-Mt Larcom Road.

The LUP 2012 divides the Wiggins Island Locality into a number of precincts, these being 'Port Industry', 'Wharves (Off-Shore)', 'Port Operations Support' and 'Marine Industry'. Figure 5.4 illustrates the proposed new SPL boundaries within the Wiggins Island Locality, in relation to the Project footprint.



Legend

-  Project Area
-  Strategic Port Land
-  Future Strategic Land

Source:
 Strategic Port Land: Data c
 Gladstone Land Use Plan 2
<http://www.gpac.com.au/Port>
 Draft_Land_Use_Plan_201

Overall, the Project is consistent with the intent of the LUP 2012.

5.5.3 Compliance with the Gladstone Plan 2006

Prior to the LUP 2012 coming into effect, and as described in the EIS, The Gladstone Plan 2006 (Gladstone Plan) applied to the majority of the Project area north of Gladstone-Mt Larcom Road.

Since the adoption of additional areas of SPL under the LUP 2012, only the portion of the Project that relates to the Gladstone Plan is Lot 1 on SP225917, which has not been gazetted as SPL (refer Table 5.1). The Project remains defined by the Gladstone Plan as:

“Major Infrastructure (Industry (High Impact)) means the use of premises for the purpose of the provision of facilities and services providing services such as electricity, gas, raw water, transport (air, rail, road and sea), rail terminals, pipelines and conveyors, and telecommunications which is likely to have a notable impact.”

The Project traverses land within the ‘North West Locality’, zoned as ‘Major Industry / Infrastructure’ under the Gladstone Plan.

In the assessment of a development application for ‘Major Infrastructure (Industry (High Impact))’ in this locality, the provisions of the whole planning scheme would be applied. From the perspective of a broad compliance assessment, the Gladstone Plan provides several codes which apply to the Project, predominantly the North West Locality Code.

This Code seeks to promote and protect industrial development in the locality, ensuring that:

“the character of the North West Locality as an area dominated by major industry activities and major infrastructure is protected by keeping these activities separated and protected from other activities...”

Other applicable codes within the Gladstone Plan include:

- Airport Noise and Safety Overlay Code
- Acid Sulfate Soils (ASS) Overlay Code
- Coastal Management Overlay Code

These codes provide development/design-specific outcomes, compliance with which was demonstrated in the EIS/SEIS, and will be continued in the detailed design and development of the Project.

Overall, the Project remains consistent with the intent of the Gladstone Plan.

5.5.4 Compliance with the Calliope Shire Planning Scheme

The former Calliope Shire Planning Scheme 2007 (Calliope Planning Scheme) applies to the portions of the Project that are predominately south of Gladstone-Mt Larcom Road and which have not been gazetted as SPL under the LUP 2012 (portion of Reclamation Area C).

The Project remains defined by the Calliope Planning Scheme as ‘Major infrastructure (Industry (High Impact))’ which is consistent with the definition under the Gladstone Plan

The Project traverses land within both the ‘Calliope Rural Locality’ and the ‘Gladstone State Development Area Locality’ under the Calliope Planning Scheme.

In the assessment of a development application for ‘Major Infrastructure (Industry (High Impact))’ in this locality, the provisions of the whole planning scheme would be applied. From the perspective of a broad compliance assessment, the Calliope Planning Scheme provides several codes which apply to the Project, predominantly the Gladstone State Development Area Locality Code.

The Gladstone State Development Area Locality Code seeks to promote industrial development by providing for the following:

“Industrial development of regional, State and national significance within the Gladstone State Development Zone”

Other applicable codes within the Calliope Planning Scheme include:

- Airport Noise and Safety Overlay Code
- Acid Sulfate Soils (ASS) Overlay Code
- Bushfire Management Overlay Code
- Coastal Management Overlay Code

These codes provide development/design-specific outcomes, compliance with which was demonstrated in the EIS/SEIS, and will be continued in the detailed design and development of the Project.

Overall, the Project remains consistent with the intent of the Calliope Planning Scheme.

5.5.5 Queensland Coastal Plan

The Queensland Coastal Plan (the Coastal Plan) was introduced by the Queensland Government on 9 February 2012, replacing the State Coastal Management Plan (2001) and associated regional coastal management plans. The Coastal Plan seeks to manage coastal resources and protect infrastructure and livelihoods from coastal hazard impacts. The Coastal Plan applies to the ‘coastal zone’ and comprises two parts:

- State Policy for Coastal Management; and
- State Planning Policy 3/11: Coastal Protection (SPP 3/11)

The State Policy for Coastal Management details a suite of management policies to assist the managers of coastal land and owners of private coastal land in their decision-making processes, including EIS assessments (and Change Request Assessments) and decisions under Part 4 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

The impact of the Project on the coastal environment was assessed by the State and Commonwealth through the EIS/SEIS. The changes proposed in WEXP1 and WEXP2 will not result in any additional adverse impacts on these coastal elements, as all physical works and accommodation of the increased throughput will be located within the Project footprint approved under the EIS.

SPP 3/11 applies to development in the coastal zone and seeks to manage coastal hazards and resources, in addition to the preferential allocation of coastal land for coastal-dependant development.

The Project is located within the Central Queensland region of the Coastal Plan. As a statutory instrument, the State Government will be required to consider SPP 3/11 when making decisions relating to coastal development assessment that are assessable under the *Sustainable Planning Act 2009* (SPA).

5.6 Project Approvals

In January 2008, the Wiggins Island Coal Terminal Project Coordinator-General’s Report evaluating the EIS pursuant to section 35 of the *State Development and Public Works Organisation Act 1971* was released. In April 2008, the Project was given ‘controlled action’ approval under the *Environment Protection and Biodiversity Conservation Act 1999*.

A number of statutory approvals were also required for the Project through the State’s Integrated Development Assessment System (IDAS) under the SPA.

Table 5.2 identifies these approvals, and provides commentary on the status of these applications, as well as any changes or new development applications required to accommodate the changes associated with WEXP1 and WEXP2. The changes or new development approvals required for WEXP1 and WEXP2 are preliminary, and subject to detailed design.

As above, it should be noted that the rail and offshore portions of the Project are not impacted by physical changes under this application for a project change. As such, the land use and project approval issues dealt with in this section have been limited to the overland conveyors and coal terminal infrastructure.

Table 5.2 Environmental approvals associated with WEXP1 and WEXP2

Applicable legislation	Approval required	Approval status (as at March 2012)	Implications of WEXP1 and WEXP2 proposed project change
General high level approvals (EIS and Land Use Approvals)			
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	'Controlled Action' Approval	Approval issued by the Commonwealth in April 2008 (EPBC No 2005/2374)	SEWPaC has confirmed that the changes to the Project do not require amendment to the existing controlled action approval (refer Appendix 5)
<i>State Development and Public Works Organisation Act 1971</i>	'Significant Project' Declaration	Coordinator-General evaluation report issued in January 2008	Application for a 'Project Change' required SUBJECT OF THIS APPLICATION
<i>State Development and Public Works Organisation Act 1971</i>	Development Permit for a Change of Land Use within the Gladstone State Development Area (GSDA) assessable against the GSDA Development Scheme	Development Approval issued by the Coordinator-General in August 2009 (Department of State Development, Infrastructure and Planning (DSDIP) reference: 09/20395/T6394/TR15/DIP)	None WEXP1 and WEXP2 may proceed under existing approval
<i>Sustainable Planning Act 2009</i>	Development Permit for a Material Change of Use (MCU) for a Greenfield Coal Terminal assessable under the Calliope Shire and Gladstone City Council Planning Schemes	Approval for Stockyard Area A issued by GRC in December 2010 (DA/33/2009)	None WEXP1 and WEXP2 may proceed under existing approval where consistent with the Port of Gladstone Land Use Plan 2012
Environmental Approvals			
<i>Aboriginal Cultural Heritage Act 2003</i>	Aboriginal Cultural Heritage Investigation and Cultural Heritage Management Plan required under s87 of the Act	A Cultural Heritage Investigation was undertaken as part of the EIS; a Cultural Heritage Management Plan was agreed between the relevant parties on 8 February 2010	None The Cultural Heritage Investigation and Cultural Heritage Management Plan encompass the WEXP1 and WEXP2 area
<i>Coastal Protection and Management Act 1995</i> <i>Sustainable Planning Act 2009</i>	Development Permit for a MCU involving ERA 16 – Extractive Activities and an approved Dredge Management Plan (DMP) for the WICET Staged Dredging Works	DMP submitted to DEHP and currently in the Decision Stage	None WEXP1 and WEXP2 will not alter dredging operations. The current DMP seeks approval to undertake additional dredging works associated with WEXP1. Additional approval will be required to undertake dredging works associated with WEXP2

Applicable legislation	Approval required	Approval status (as at March 2012)	Implications of WEXP1 and WEXP2 proposed project change
<i>Dangerous Goods Safety Management Act 2001</i>	Permit to establish a large dangerous goods location	To be obtained / notified prior to commencement of operations based on volumes of fuel / chemical storage	None WEXP1 and WEXP2 does not change approval requirement
<i>Environmental Protection Act 1994</i> <i>Sustainable Planning Act 2009</i>	Development Permit for MCU and Registration Certificates required for: Construction Environmentally Relevant Activities (ERA): <ul style="list-style-type: none"> • ERA 8: Chemical storage • ERA 16: Extractive and screening activities (dredging) • ERA 17: Abrasive blasting • ERA 43: Concrete batching Operational ERAs: <ul style="list-style-type: none"> • ERA 50: Bulk material handling • ERA 21: Motor vehicle workshop • ERA 57: Regulated waste transport • ERA 63: Sewage treatment plant 	ERA 16 application currently in the Decision Stage of assessment ERA50 Development Permit Application for Stage 1 to be lodged in Q2 2012 Approval for ERA 63 obtained August 2010 (DEHP Reference SPDE00684110) Development Permits and Registration Certificates to be obtained prior to commencement of activities	Amendment to the MCU for Bulk Material Handling (ERA 50) will be required to include volumes associated with WEXP1 and WEXP2
<i>Gladstone Port Corporation Landuse Plan 2012</i>	Approval for undertaking development on Strategic Port Land	To be obtained.	Application for Development Permits within Strategic Port Land for development associated with: <ul style="list-style-type: none"> • Reclamation Areas B and C and part of Haul Road (within SPL) • Rail Reveal and Overland Conveyer Crossing, Reid Road • Overland Conveyer Crossing • Hanson Road Overpass • North of Hanson Road • Marine structures (jetty upgrade, Berths 2 and 3 etc) • Bund raise for Reclamation Area B and C (within SPL)

Applicable legislation	Approval required	Approval status (as at March 2012)	Implications of WEXP1 and WEXP2 proposed project change
<p><i>Harbours Act 1955/ Sustainable Planning Act 2009</i></p>	<p>Amendment of existing Reclamation Approval issued under Section 91 of the <i>Harbours Act 1955</i> (repealed) to extend the relevant period</p>	<p>Amendment Approval issued 13 July 2011 granting extension of the relevant period until 5 October 2021</p>	<p>None</p>
<p><i>Integrated Planning Act 1997 / Sustainable Planning Act 2009</i> <i>Coastal Protection and Management Act 1995</i> <i>Fisheries Act 1994</i></p>	<p>A number of Development Permits for Operational Works (Tidal Works), Operational Works (Removal, Destruction or Damage to Marine Plants) and Operational Works (Waterway Barrier Works)</p>	<p>A number of approvals issued:</p> <ul style="list-style-type: none"> • IPDC01748109 • 2006DB0084 • IPCD01239908 • IPCD01273908 • 04S0DB0287 • DA2009/20 • ROK5262 • SPDC00470910 • SPDC00428810 • SPDC00419210 • SPDC00682310 	<p>Additional and/or amendments to existing Development Permits for Operational Works (Tidal Works) and Operational Works (Removal, Destruction or Damage to Marine Plants) are likely to be required, including:</p> <p>Operational Works Tidal Works and Marine Plants Disturbance for:</p> <ul style="list-style-type: none"> • Beales Ck Bridge Stage 2 • Additional stormwater discharge outlet (Stockyard Area B) • Excavation of Rec Area B for new settlement pond • Pyeally Ck overland conveyor culvert extension • Hanson Road Overpass • Marine Structures (jetty upgrade, Berths 2 and 3) • Dredging of Berths 2 and 3 <p>Waterway barrier works:</p> <ul style="list-style-type: none"> • Beales Ck Bridge extension • Pyeally Ck overland conveyor culvert extension • Additional stormwater discharge outlet (Stockyard Area B)

Applicable legislation	Approval required	Approval status (as at March 2012)	Implications of WEXP1 and WEXP2 proposed project change
<i>Nature Conservation Act 1992</i>	Permit for the taking, using, keeping or interfering with a protected fauna or flora (Sections 88 and 89)	Approval issued in March 2012 for a six month relevant period (Permit No WICL10900912)	None WEXP1 and WEXP2 does not require additional works impacting protected fauna or flora. Extension of the permit validity period and minor amendments to address agency conditions/requirements may be required
<i>Sustainable Planning Act 2009</i>	Species Management Plan (SMP)	SMP was approved by the Department of National Parks, Recreation, Sport and Racing (DNPRSR) in November 2011	None WEXP1 and WEXP2 does not require additional works impacting protected fauna or flora
<i>Sustainable Planning Act 2009</i>	Development Permit for Operational Works ((Excavation and Filling) associated with the Stage 1 Bulk Earthworks	Approval issued 6 January 2012 (GRC Reference OPW/171/2011)	Additional Operational Works (Bulk Earthworks) approval required for works that remain within GRC's jurisdiction (Reclamation Area C)
<i>Transport Infrastructure Act 1994</i>	Port Development Approval	-	Port Development Approval is likely to be required to carry out additional Operational Works on Strategic Port Land
<i>Sustainable Planning Regulation 2009</i> <i>State Planning Policy 2/02 – Planning and managing development involve Acid Sulfate Soils</i>	Development Permit where the works are assessable against a Planning Scheme and where the surface of the land is at or below 5 m AHD or the development involves filling the development site with 1,000 m ³ or more of material	Acid Sulfate Soil Management Plan (ASSMP) was approved by DEHP in January 2010	ASSMP to be updated to reflect WEXP1 and WEXP2 and submitted to DEHP for review and approval
<i>Vegetation Management Act 1999</i> <i>Sustainable Planning Act 2009</i>	Development for Operational Works for the removal of Regional Ecosystems (RE) as defined by the DEHP under the Act	Development Permit obtained in May 2011 (DEHP Reference 2009/011262)	None WEXP1 and WEXP2 does not require additional clearing of protected RE vegetation

5.7 Conclusions

The proposed changed Project will be wholly contained within the Project footprint which includes areas approved under the EIS and areas subsequently approved for WICET Stage 1 and will not impact on any additional State or privately owned land.

WEXP1 and WEXP2 complies with the future development intent of the immediate area and wider Central Queensland region, as well as the relevant statutory land use instruments for this area. All additional State approvals for the Project will be obtained prior to the commencement of works and / or operations.

Construction and operation of WEXP1 and WEXP2 as part of the overall Project will ensure that the economic advantage of the area is enhanced, and will allow the Port of Gladstone to remain a world class port that is able to satisfy the transport demands of the rapidly increasing coal exports market.

Conclusion 1: The proposed changed Project will be wholly contained within the Project footprint approved under the EIS and will not impact on any additional State or privately owned land.

Conclusion 2: WEXP1 and WEXP2 comply with the State and Local Government land use and transport planning Policies, Strategies and Guidelines.

Conclusion 3: WEXP1 and WEXP2 will have minimal impact on adjoining existing and future land uses due to the industrial and port nature of the area.

Conclusion 4: Additional statutory approvals will be required, including a Material Change of Use and various Operational Works (Bulk Earthworks, Tidal Works and the Disturbance of Marine Plants)

6. Transport

6.1 Summary

The changes proposed as part of WEXP1 and WEXP2 may result in a potential increase to impacts on transport in the Gladstone area, primarily due to construction traffic.

Construction traffic as a result of the changed Project is expected to impact on traffic in the wider area for a longer duration than that predicted in the WICT EIS and SEIS. It is important to note that the daily traffic counts/intensity is not expected to be increased as a result of the WEXP1 and WEXP2 works. This is due to the programming of the Expansion Phases, ie WEXP1 and WEXP2.

A detailed traffic management plan has been prepared and approved by the Department of Transport and Main Roads for Stage 1 to manage potential impacts. The traffic management plan will be updated for subsequent expansion phases prior to construction of the expansion phases commencing. The construction of the Gladstone-Mt Larcom Road overpass is planned to be accelerated to further manage traffic and reduce risk.

No additional shipping movements or impacts from shipping are expected as part of the proposed changes, as the overall Terminal capacity will remain the same as the approved Project.

There are no changes proposed for the rail infrastructure detailed and approved in the WICET EIS and SEIS.

6.2 Introduction

This chapter provides a description of the potential impacts of the Project changes associated with WEXP1 and WEXP2 on the existing road network, shipping and rail infrastructure. Potential transport impacts associated with the WICET Project were originally outlined in the EIS and SEIS (refer Appendix 1).

This Request for Project Change provides an updated assessment to address changes to the Project which were assessed in the Coordinator-General's (CG) Report (January 2008) and EPBC Act controlled action approval (April 2008). Proposed changes to the Project as part of WEXP1 and WEXP2 (previously Stage 2 and Stage 3) are wholly contained within the Project footprint approved under the EIS and areas subsequently approved for WICET Stage 1.

6.3 Description of Existing Infrastructure

6.3.1 Roads

The WICET site is serviced by a high standard road network connecting to the Gladstone urban area and the wider region via the Bruce Highway (north and south) and the Dawson Highway (west). The main connecting roads of Gladstone-Mount Larcom Road and Reid Road are under the control of Department Transport and Main Roads (DTMR) Central District Office and the Gladstone Regional Council (GRC), respectively. The supporting road network comprises GRC roads, namely Calliope River Road, Blain Drive, Don Young Drive and Red Rover Road.

Coordination with the key stakeholders affected by the Project development was conducted during the EIS/SEIS and Stage 1 detailed design to confirm that the current capacity of existing public roads and their future term planning were taken into account in the proposed development staging of the Project.

A Road Impact Assessment was undertaken as part of the EIS process, which identified and assessed the impact of heavy vehicle movements on the road network, with the following principal roads identified for heavy vehicle movements, namely:

- Gladstone-Mount Larcom Road
- Bruce Highway
- Dawson Highway (excluding section Glen Lyon Road to Don Young Drive)
- Port Access Road
- Blain Drive
- Red Rover Road
- Don Young Drive
- Reid Road

With the origin/destination routes identified as:

- Movements to and from south and west (Calliope area) of Gladstone – Bruce Highway, Dawson Highway, Don Young Drive, Red Rover Road, Gladstone-Mount Larcom Road
- Movements to and from north of Gladstone – Bruce Highway, Gladstone- Mount Larcom Road
- Movements to and from Gladstone – Gladstone-Mount Larcom Road, Port Access Road, Blain Drive, Red Rover Road

The extent of the traffic impact is dependent on a number of factors, some within the control of the Project and others external to the Project. Project controlled factors comprise:

- Provision for construction workforce – the impact has been assessed on the basis that the majority of the workers will be housed within the Gladstone urban area and that they will be bussed to the site of work, similar to the system implemented by Comalco Alumina Refinery (CAR) for their recent project implementation. The WICET Traffic Management Plan (TMP) identifies a target of a minimum of two thirds (67%) of the workforce to utilise this service
- Provision for construction materials and general freight movements – the project proponents shall nominate within supply and construction contracts specific routes for the delivery of materials to the site

Gladstone-Mount Larcom Road is a major public road (state controlled) that passes through the Project site. Significant upgrade works are required for Gladstone-Mount Larcom Road during Stage 1, which include:

- Raising and duplicating the existing alignment
- Construction of two bridges to provide through access for overland conveyors
- Providing safe turn-off access into the Terminal and other works to satisfy EIS approval conditions

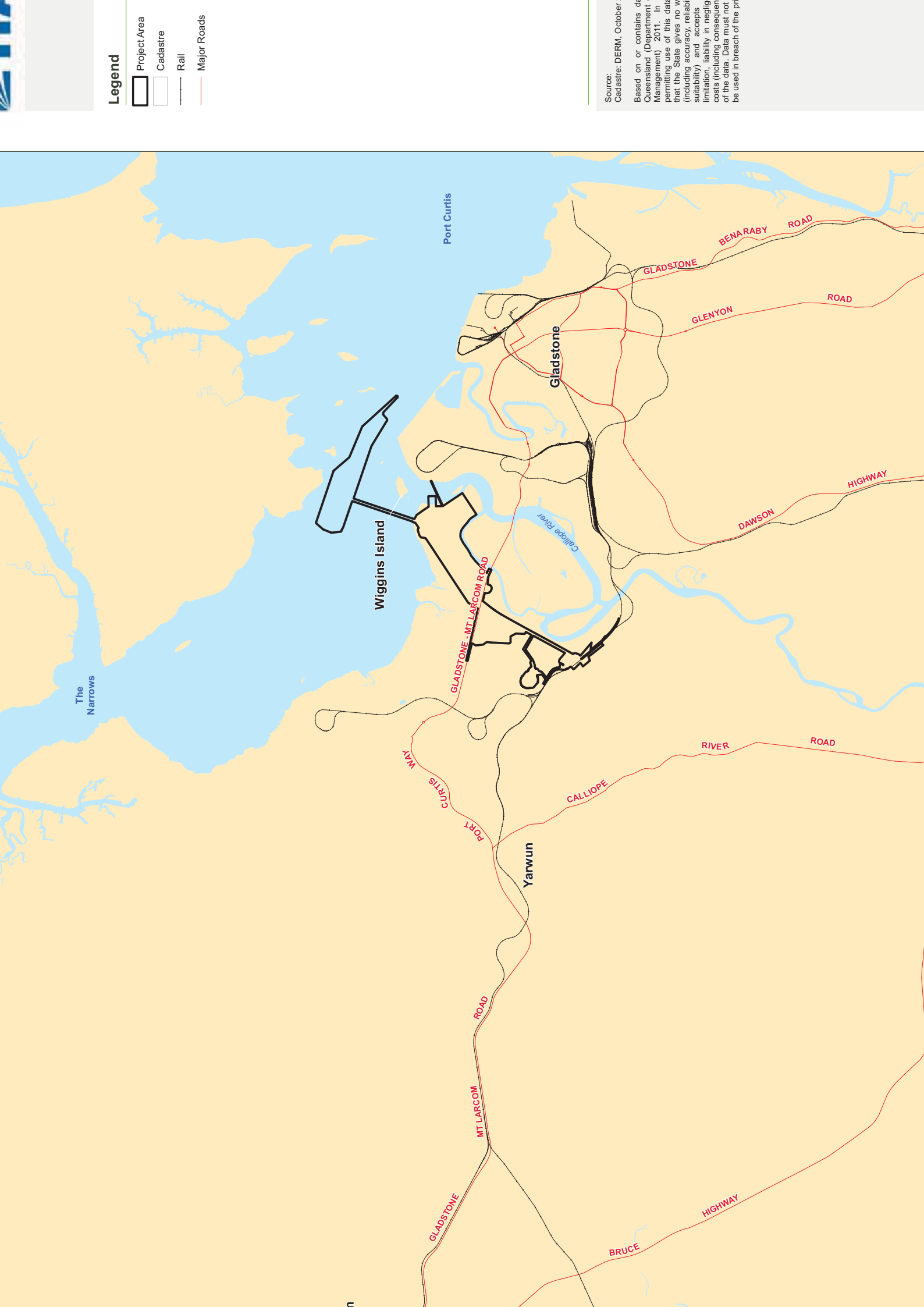
The existing road network in the Gladstone area is shown in Figure 6.1. Further details of the roads expected to be effected by the Project are included in the WICT EIS and SEIS. The road network surrounding the proposed development site and key major links are described in detail in the Supplementary Traffic Report, included in Appendix G2 of the WICT EIS (refer Appendix 1). A Supplementary Traffic Report was also completed and issued as an Addendum to the SEIS.

The construction of the Gladstone-Mt Larcom Road overpass is planned to be accelerated to further manage traffic and reduce risk.

6.3.2 Rail

There are no changes proposed for the rail infrastructure detailed and approved in the WICET EIS and SEIS.

The existing rail network in the vicinity of the WICET Project area comprises three sections. These are described as the North Coast Line, the Moura Line and the Callemondah Rail Yards. The existing rail network in the Gladstone area is shown in Figure 6.1. Further information on the existing rail network can be found in the WICT EIS and SEIS.



Legend

- Project Area
- Cadastre
- Rail
- Major Roads

Source: DERM, October
 Cadastre: DERM, October
 Based on or contains data from Queensland Department of Transport and Main Roads (Department of Transport and Main Roads) 2011. In permitting use of this data, the State gives no warranty (including accuracy, reliability) and accepts no liability in negligence (including consequential costs) for any errors or omissions of the data. Data must not be used in breach of the privacy policy.

It should be noted that the WICT EIS (Appendix 1) scope and approvals for the WICET Project included the additional rail infrastructure (ie rail east of Yarwun inclusive of the unloading loop, to supply coal to the Rail Receiving Area) with QR National as the party responsible for the delivery and operation of the rail support infrastructure.

WICET / QR National Interface

Given that the coal terminal and rail infrastructure components will utilise the same road network to support their project construction activities, and that they shall be constructed in parallel, the two projects may have a cumulative impact on parts of the road network. The principal road affected by the joint construction activities will be Reid Road, which will be utilised by both projects to access their projects areas south of Gladstone-Mount Larcom Road.

6.3.3 Shipping

No additional shipping movements, or impacts from shipping are expected as part of the changed Project, as the overall Terminal capacity will remain the same as the approved Project.

Details of the existing shipping capacity in 2006 of the Port of Gladstone, as well as the impacts of the growth of trade through the port are described in Section 6.2.3 of the WICET EIS.

6.3.4 Proposed Road Changes

Gladstone-Mount Larcom Road

It is intended that the Gladstone-Mount Larcom Road overpass will be constructed during the early works of WEXP1 (refer Appendix 6.1), in order to minimise the impact of construction traffic and improve traffic safety.

Reid Road

The initial intent was to upgrade the existing gravel section of the road to standard sealed bitumen with an approximate distance of 2.0 km to the proposed dumpstation. This option was replaced with a new road alignment for a low standard sealed road from the existing bitumen surfacing, past the Mt Miller Rail Siding for an approximate distance of 1.4 km. The proposed new road alignment was derived to negate the potential issues with the Gladstone Area Water Board (GAWB) existing raw water mains and future raw water duplication.

GPC and QR National have advised that the service road will have minimal and intermittent traffic and a high standard road is not necessary. Required standards were derived after consultations with GRC and GAWB considering the impacts to existing road and services and their future term planning.

Mandatory conditions for road access to the dump station include:

- Provision of new road alignment with a design speed of 60-80 km/h
- Road standards shall be in accordance with GRC Road and Transport Standard 2005
- Allowance for Mt Miller Raw Water Main Duplication
- Access to the rail loop and dump station from the Reid Road extension was to be an "At Grade" crossing of the NCL. This was changed late in the original Feasibility Study to a grade separated crossing
- GRC advised that the design traffic volume for the intended road upgrade will determine the required design criteria

6.4 Potential Impacts

6.4.1 Previous Impact Assessments

Cardno Eppell Olsen, a specialist traffic consultant, undertook a detailed Road Impact Assessment, for the original WICT EIS, under the DMR Guidelines for the Assessment of Road Impacts of Development Proposals (November 2000). This is included as an Appendix to the WICT EIS. A Supplementary Traffic Report was also completed and issued as an Addendum to the SEIS in September 2007.

6.4.2 Impacts on Local Road Networks

WICET Stage 1 potential impacts to the local road network are outlined in the SEIS including:

- Intersection assessment
- Mid-block link capacity assessment
- State controlled road network
- Council controlled road network
- Pavement impact assessment
- Pedestrian and cycle networks
- Mitigation measures for transport and traffic during construction and operational phases

6.4.3 Site Access

Access to the Terminal is provided during WICET Stage 1 works via a new publicly accessible road connecting Gladstone-Mount Larcom Road to the administration area. This road will be sealed, and is formed on a raised embankment primarily over mud flats. Within the secure Terminal area, a network of internal access roads allows for vehicular traffic through the administration area, jetty and wharf, transfer tower area and around the stockyard. An unsealed road will be provided adjacent to the overland conveyor for maintenance access between the Terminal and the rail receipt. An overpass bridge will be provided to allow access from the overland conveyor, over Reid Road and the NCL railway and into the rail receipt.

It is intended that during WEXP1 and WEXP2 the site access for WICET Stage 1 will continue to be used for site access, and the new Gladstone-Mt Larcom Road overpass be dedicated to haulage of bulk fill material as a safety measure.

The WICET TMP (refer Appendix 6.2) includes further details on site access. Section 4 of the TMP also includes specific impacts that Stage 1 works are expected to have on the wider road network, along with proposed mitigation measures.

6.4.4 Rail

There has been no change in predicted impacts on the rail network as a result of the Project, from those assessed in the WICT EIS and SEIS (refer Appendix 1).

6.4.5 Shipping

No additional shipping movements, or impacts from shipping are expected as part of the changed Project, as the overall Terminal capacity will remain the same as the approved Project.

6.4.6 Construction Impacts

WEXP1 works involve the development of a stockyard facility on Reclamation Area B (Stockyard Area B). It is intended that Reclamation Area B will be used as a dredge spoil deposition area for both the Stage 1 and WEXP1 dredging campaigns. The combination of existing foundation conditions and proposed dredge spoil deposition means that a significant

ground improvement and earthworks programme has been proposed for Reclamation Area B as part of WEXP1 works.

A significant volume of imported fill is required to complete WEXP1 earthworks. An increase in earthworks, as well as construction traffic in general, is expected to have an impact on traffic in the wider area. According to the current earthworks schedule for the WEXP1 stockyard area, supply and placement of bulk fill will start in July 2013 and run for a duration of approximately 13 months.

WEXP2 works involve the development of a stacker-reclaimer yard on the eastern half of Golding Point in lieu of the approved bridge stacker/dozer reclaim yard in this area, with the Stage 1 bridge stacker with dozer reclaimer remaining on the western half of Golding Point.

Construction traffic is expected to impact on traffic in the wider area for a longer duration than that predicted in the WICT EIS and SEIS (refer Appendix 1). Daily traffic counts/intensity is not expected to increase as a result of the WEXP1/2 works due to a proposed staged works programme (excluding bulk fill importation).

A traffic management study will be undertaken in consultation with DTMR and GPC to assess potential impacts and management measures.

Other potential traffic impacts as a result of construction and hauling of materials are outlined in the SEIS. This includes potential impacts on road users, along with general impacts on road safety.

The general waste contractor will either transport general waste to the Gladstone transfer station or directly to the Benaraby landfill, or in line with the WICET Waste Management Plan (refer Appendix 23). The small increase in waste from expansion operations is expected to have negligible impact on traffic in the area due to the transporting of waste.

6.4.7 Mitigation

The WICET Project has the potential to impact upon a number of State and Council Controlled Roads during the construction and operational phases of the development as detailed fully within the Supplementary Traffic Report. WICET has entered into an Infrastructure Agreement with the relevant road authorities to address impacts identified by the WICT EIS and SEIS (refer Appendix 1). The WICET TMP has also been developed by WICET to address the potential impacts that WICET Stage 1 construction and operation will have on the traffic of the Gladstone area. This TMP was approved by the DTMR in April 2011. The TMP will be updated for subsequent expansion phases.

6.5 Conclusion

The Project is expected to have some impact on the local traffic for the surrounding road network. As identified in the WICT EIS this includes:

- Increased construction vehicle traffic on surrounding road networks
- Disruption, general safety and access issues, including temporary and permanent road closures during construction
- Potential need for increased road maintenance, due to increased traffic over time

Overall it is expected that traffic in the Gladstone area will be affected for a longer time period (of that predicted in the WICT EIS and SEIS), given the staged construction schedule of Stage 1, WEXP1 and WEXP2. It is important to note that the daily traffic counts/intensity is not expected to be increased as a result the WEXP1 and WEXP2 works. This is due to the programming of the Expansion Phases, ie WEXP1 and WEXP2.

The construction of the Gladstone-Mt Larcom Road overpass is planned to be accelerated to further manage traffic and reduce risk.

Since the EIS was approved, all rail infrastructure works associated with the WICET Project development are now classified as a separate project (ie Wiggins Island Rail Loops Project) and the responsibility of QR National.

A TMP has also been developed by WICET to address the potential impacts that Project construction and operation will have on the traffic of the Gladstone area. This was approved by DTMR in April 2011.

Conclusion 1: No additional shipping movements, or impacts from shipping are expected as the overall Terminal capacity will remain the same as the approved Project.

Conclusion 2: It is intended that the Gladstone-Mount Larcom Road overpass will be constructed during the early works of WEXP1.

Conclusion 3: Construction traffic is expected to impact on traffic in the wider area for a longer duration than that predicted in the WICT EIS and SEIS.

Conclusion 4: A detailed traffic management plan has been prepared and approved by the Department of Transport and Main Roads for Stage 1. The traffic management plan will be updated for subsequent expansion phases.

7. Climate, climate change and sustainability

7.1 Summary

The proposed Project changes associated with WEXP1 and WEXP2 represents a reduction in impact on climate and climate change from the approved Project.

The changes as part of WEXP1 and WEXP2 result in an estimated reduction in diesel consumption of 3.67 ML per year, and a corresponding reduction in CO₂ emissions of 14.68 kt CO₂-e per year, from the Approved Project. Sustainability elements were factored into the WEXP1 and WEXP2 design, and have been developed to ensure that the Project continues to adopt sustainability measures across the construction and operation of the Project.

Reporting under the NGER Act is now required for energy consumption during the construction phase and GHG emissions of the operational phase of the Project. The Project may also be subject to the Carbon Price Mechanism and may therefore be financially liable for each tonne of CO₂-e emitted.

7.2 Introduction

This chapter provides an update of the existing climatic conditions within the Gladstone region, using Bureau of Meteorology (BoM) data. Potential impacts to the existing climate were originally outlined in the WICT EIS and SEIS (refer Appendix 1). However, it should be noted that since then, climate change and sustainability assessments are becoming a common requirement to include in Terms of Reference for EISs. This chapter provides an updated assessment of the existing climate, including identifying the potential risks to the Project as a result of climate change, and a sustainability assessment of the Project, where opportunities to incorporate sustainability measures into the Project are considered.

The potential climate change risks to the Project are discussed in this chapter and a Project climate change risk assessment was undertaken. Data was drawn from the BoM, the Intergovernmental Panel on Climate Change (IPCC), the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Queensland Office of Climate Change (QOCC) to determine the potential climate change impacts that may occur within the Gladstone region. The chapter also provides a summary of the sustainability elements that have been incorporated into the changed Project design and the sustainability measures that may be considered for implementation during construction and operation by the Construction Contractor and the Operator of the changed Project.

This Request for Project Change provides an updated assessment to address changes to the Project which were assessed in the Coordinator-General's (CG) Report (January 2008) and EPBC Act controlled action approval (April 2008). Proposed changes to the Project as part of WEXP1 and WEXP2 (previously Stage 2 and Stage 3) are wholly contained within the Project footprint approved under the EIS and areas subsequently approved for WICET Stage 1

7.3 Climatic conditions

7.3.1 Meteorological data

Updated climate data for Gladstone has been sourced from the BoM from two monitoring sites shown (refer Table 1 in Appendix 7.1). The Gladstone Airport site has been in operation the shortest time but is only 4 km south of the Project and is closer in elevation. This site has been used for temperature, relative humidity and wind and speed direction. The Radar Hill site is located 6 km east of the Project and has been operational since 1957. Rainfall data has been obtained from this site. The Gladstone Post Office site was in operation from 1872 – 1958, and has not been used in this Change Request.

7.3.2 Rainfall

The average monthly rainfall over the period from December 1957 to June 2011 (refer Table 2 in Appendix 7.1). The mean annual rainfall at the Radar Hill site is approximately 887 mm/year with the highest maximum annual rainfall of 1,731.6 mm occurring in 1971 and the lowest minimum annual rainfall occurring in 1965, with 432.5 mm. Gladstone has a sub-tropical climate with a wet season that occurs during the summer months and a dry season during winter. The months of December, January and February account for 47.6% of the mean annual rainfall while June, July and August account for only 11.7% (refer Figure 1 in Appendix 7.1).

7.3.3 Temperature

From 1993 to 2011, the mean annual maximum and minimum temperatures were 27°C and 18.1°C, respectively. The highest mean maximum temperature at Gladstone Airport occurred in January (30.7°C), while the lowest mean minimum temperature occurred in July (13.4°C) (refer Figure 2 in Appendix 7.1). The highest recorded maximum temperature occurred in March 2007 with 42.0°C and the lowest recorded minimum temperature occurred in July 1960 with 4.4°C.

Diurnal variation in air temperature recorded between 1993 and 2011 at the Gladstone Airport was the greatest in winter with the mean maximum and minimum temperatures varying from 23.3°C to 12.6°C, a difference of 10.7°C. During summer, the temperatures ranged from 30.4°C to 22.7°C, a difference of 7.7°C (refer Table 3 in Appendix 7.1).

7.3.4 Wind

Wind speed and direction is generally measured 10 m above the ground and averaged over 10 minutes prior to the time of observation. Observations of wind speed and direction are taken at 9 am and 3 pm and these are averaged over each month. Monthly mean wind speeds at 9 am and 3 pm are indicated that wind speed varies with the month and the time of day (refer Figure 3 in Appendix 7.1). Wind speed is lower during winter than summer and is also lower in the morning hours (9 am) compared with the afternoon (3 pm). The mean wind speeds experienced at Gladstone range from 12.1 to 17 km/h at 9 am and 16.8 to 24.1 km/h at 3 pm.

The mean annual wind roses for 9 am and 3 pm for the Gladstone Airport between 1993 and 2010 have been recorded (refer Figures 4 and 5, respectively in Appendix 7.1) (BoM 2011). The temporal dependence of the wind speed and direction is clear in these figures. At 9 am, wind speeds between 20 and 30 km/h were recorded mainly from a south-easterly direction while at 3 pm, wind speeds between 20 and 30 km/h were recorded from a north-easterly direction and speeds between 30 and 40 km/h were recorded from an easterly direction. These winds tend to be coastal winds, as the Port of Gladstone is located east of the Gladstone Airport.

7.3.5 Relative Humidity

Relative humidity indicates the moisture content in the air and is presented as a percentage of the saturated moisture content. At saturation, the relative humidity would be 100%. Monthly mean relative humidity at 9 am and 3 pm at the Gladstone Airport from 1993 to 2011 have been reported (refer Figure 6 in Appendix 7.1). While there is little variation in the mean 9 am relative humidity, the mean 3 pm relative humidity was lower in the colder months, denoting drier afternoons in winter compared with summer.

7.3.6 Extreme Events

Tropical Cyclones

An average of two to four cyclones affect Gladstone every 10 years, based on 36 years of data from 1969 to 2005 (BoM 2010). BoM identified five tropical cyclones that passed within

100 km of Gladstone between 1956 and 2006 (refer Figure 7 in Appendix 7.1). Omitted from this is Tropical Cyclone Hamish, which passed near the Gladstone coastline in March 2009. While not crossing the coast, Tropical Cyclone Hamish closed down the Port of Gladstone temporarily due to severe weather conditions (GPC 2009).

Floods

The Project is situated beside the Calliope River, which is subject to flood events, usually resulting from tropical cyclones or associated rain depressions (Connell Hatch 2006). Further information relating to the flood history of the Calliope River can be found in Chapter 8 (Hydrology and Hydraulics).

Droughts

The Gladstone region experienced long-term droughts during the years:

- 1964 – 1967
- 1969 – 1970
- 1984 – 1985
- 1993 – 1995
- 1997 – 2003
- 2007 – 2010

Due to the drought between 1997 and 2003, water restrictions were implemented in Gladstone in 2002. In January 2007, the northern part of the Gladstone Regional Council (north of the Calliope River) became 'drought declared' by the Queensland Government (DERM 2011). The region remained 'drought declared' or 'partly drought declared' until April 2010.

Thunderstorms

BoM, for Connell Hatch (2006), reports the following frequencies of thunderstorms in the Gladstone region (based on data available up to 1999):

- 15 days of thunderstorms per year (based on 10 years of data from 1990 to 1999)
- One ground strike of lightning per square kilometre per year (based on approximately five years of data)

7.4 Climate Change

Since the development and approval of the EIS and the SEIS in 2006 and 2008, respectively, the Queensland Government now requires a more detailed consideration of climate change and sustainability issues in relation to their assessments of major projects. Often, as part of a Terms of Reference for an EIS, a climate change risk and sustainability assessment is required. This preliminary climate change assessment is based on the latest iteration of the Project and therefore considers all activities up to the approved 84 Mtpa output of the Project, including WICET Stage 1, WEXP1 and WEXP2.

A range of legislative and policy instruments addressing climate change are relevant to the Project (refer Appendix 7.2). A review of the potential impacts of climate change on the Project, including a description of the vulnerability of the Project to seasonable conditions, extremes of climate and natural hazards and a preliminary climate change risk assessment has been outlined in this section.

7.4.1 Climate change in Central Queensland

Climate change is a well-recognised trend occurring on a global scale, with specific trends in certain regions, which has been recognised by the IPCC in its Fourth Assessment Report (AR4). In the report, *ClimateQ: toward a greener Queensland* (QOCC 2008a), the average

annual temperature in Central Queensland has increased 0.5°C over the last decade (from 21.6°C to 22.1°C). Projections indicate an increase of up to 4.5°C by 2070, leading to annual temperatures well beyond those experienced over the last 50 years. A summary of climate projections for Central Queensland as presented in the report *Climate Change in Queensland – what the science is telling us* (DERM 2010), based on information provided by CSIRO & BoM (2007), is detailed in Table 7.1.

Annual and seasonal average rainfall is strongly influenced by natural variability, local factors such as topography and vegetation, and broader scale weather patterns, for example El Nino-Southern Oscillation (ENSO) events (QOCC 2008a). The dominant summer rainfall pattern between 1961 and 1990 was around 300 mm, compared to an autumn average of around 170 mm. Summer average rainfall has declined by 14%, however, there has been a fairly consistent decrease since the 1970s with only eight summers in this period above the 1961-1990 average (QOCC 2008a).

Projected southward shifts in the primary regions of cyclone development through the coming century (QOCC 2008a; Abbs *et al* 2006) could result in a greater cyclone impact in the Central Queensland region. With projected increases in future cyclones and projected rise in mean sea levels (CSIRO & BoM 2007), storm surges are likely further inland, increasing the risk to coastal infrastructure. The 1-in-100-year storm tide event is projected to increase by 51 cm in Gladstone if certain conditions eventuate. These conditions include a 30 cm sea-level rise, a 10% increase in cyclone intensity and frequency, as well as a 130 km shift southwards in cyclone tracks (Hardy *et al* 2004; QOCC 2008a).

Table 7.1 Summary of climate change projections for Central Queensland

Temperature			Rainfall			Evaporation		
Baseline mean (°C)	2050		Baseline mean (mm)	2050		Baseline mean (mm)	2050	
	Low (°C)	High (°C)		Low (%)	High (%)		Low (%)	High (%)
21.6	+1.2	+2.0	692	-4	-7	1997	+4	+7

- More regular bleaching and mortality of corals of the Great Barrier Reef due to increased temperature
- Increased acidification of sea water and resultant decrease in coral growth and coral reef maintenance
- Increased spread of disease (eg malaria, dengue) due to more favourable conditions for vectors
- Increased pressure on water supplies
- Increased heat-related illness
- Increased risk and intensity of bushfires

7.4.2 Climate change in Gladstone

The GRC's Local Disaster Management Plan (LDMP) details the potential hazards within the area. These include:

- Severe storms – the risk is confined to the summer months, with effects usually being localised with torrential rain to wind and/or causing structural/impact damage (GRC 2010)
- Floods – caused by continual rain and/or storm surge
- Earthquake – a 10% chance in 100 years of the Gladstone/Calliope area experiencing an earthquake exceeding velocity of 90 mm per second (GRC 2010). An earthquake of this magnitude is predicted to result in large scale property damage and some loss of life (GRC 2010)
- Cyclone – the risk of cyclone is generally considered to occur during summer months, predominantly between November and March and within 50 km from the coast (GRC 2010)

The impacts of these potential hazards are likely to intensify as a result of climate change effects. Sea level rise and storm surges are considered to be the most significant of potential risks to the Project as a result of climate change.

7.4.3 Project climate change adaptation strategy

Responding to climate change involves mitigation to address the cause and adaptation through planned responses to the changes. The Strategy aims to reduce GHG emissions and to implement mitigation measures and adaptation actions. The preliminary climate change risk assessment of the Project was undertaken to identify key risks to the Project and achieve the Strategy aims.

Based on the climate change predictions and projections detailed in Section 7.4.1 of this request, the key climate change risks to the Project were identified to arise from:

- The effect of increased extreme heat days on construction and operational workers
- Inundation of critical infrastructure due to more intense storm systems, such as cyclones and intense rainfall events
- Impacts to soil stability causing erosion and slips as a result of increasing rainfall intensity
- The speed and direction of winds, affecting the level of wind-blown dust impacts of sea level rise and storm surges on critical infrastructure

A number of smaller risks were also considered during the risk assessment process.

Climate change risk assessment methodology

The climate change risk assessment process examines the potential hazards associated with the detailed design, construction and operation of the Project, and assesses the likelihood and consequences of risks associated with each potential climate change hazard (refer Appendix 7.2).

Design components, mitigation and adaptation strategies

The climate change risk assessment in (refer Table 4 of Appendix 7.2) has identified potential mitigation and adaptation options to be adopted to reduce the level of risk identified for each potential environmental impact.

The following design components were identified and incorporated into the climate change risk assessment process:

- Relevant Australian Standards were incorporated into the design of the Project infrastructure
- The Project infrastructure has been designed with an allowance for a temperature range either side of the mean temperature experienced at the Project site (eg 23°C below and +44°C above the mean temperature)
- Opportunities for energy efficiency measures have been incorporated into the design, for example lighting, motors, variable speed drivers, low glare lights, shielding of lights, low noise sirens and minimisation of use of devices across the site, wherever possible
- The Project has been designed taking into account relevant criteria to address the potential impact of sea level rise on Project infrastructure

Many of the mitigation and adaptation measures identified during the climate change risk assessment (refer Table 4 of Appendix 7.2) have already been incorporated into the design of the Project, or will be able to be implemented through the EMP (refer Chapter 23).

7.5 Greenhouse Gas Emissions Assessment

A greenhouse gas (GHG) emissions assessment has been completed to provide a preliminary quantitative and qualitative investigation of potential GHG emissions associated with the Project.

7.5.1 Description of existing environment

The latest overview of GHG emissions estimates for Australia was published by the Department of Climate Change and Energy Efficiency (DCCEE) in April 2011 for the financial year ending June 2009. Estimates for Australia, Queensland and for the sectors relevant to this Project for the 2009 financial year are provided in Table 7.2.

Table 7.2 Total greenhouse gas emissions for Australia and Queensland

	Australia	Queensland	
	Emissions (Mt)	Emissions (Mt)	% Contribution to national emissions
Total Net Emissions¹	564.5	155.1	27.5
Manufacturing and Construction	44.5	11.2	25.2

¹including emissions from land use, land use changes and forestry activities
Source DCCEE 2011a

This data provides a general indication of the GHG emissions reported for the manufacturing and construction industry (which is what this Project is considered to represent) within Queensland. It was not possible to generate data for Central Queensland, where the Project is proposed to be located.

7.5.2 Project review against the *National Greenhouse and Energy Reporting Act 2007*

It is considered that the Project is likely to meet one of the thresholds specified in the *National Greenhouse and Energy Reporting Act 2007* (NGER Act), during construction and operation (Refer Table 1 of Appendix 7.3). The GHG and energy thresholds which trigger the requirement for registration and reporting obligations by corporations are shown in Table 7.3 below. However, registration is mandatory for corporations with facilities under their operational control which exceed any of the values in Table 7.4 below.

The GHG emissions and total energy consumed by the Project during construction and operation has been calculated as per the methods detailed in the *National Greenhouse Accounts Factors (NGA)* workbook (DCCEE 2011b) and the *National Greenhouse and Energy Reporting (Measurement) Determination 2011* (the Determination). Specific data for the Project was collected on GHG emissions from combustion of fuel, energy production and energy consumption (refer Appendix 7.3).

Table 7.3 Whole of Corporation Greenhouse gas and energy thresholds

Year Beginning	GHG Emissions (kt)	Energy Produced (TJ)	Energy Consumed (TJ)
1 July 2008	125	500	500
1 July 2009	87.5	350	350
Subsequent years	50	200	200

Table 7.4 Facility greenhouse gas emissions and thresholds

GHG Emissions	Energy Produced	Energy Consumed
25 kt	100 TJ	100 TJ

Identification of GHG sources

Sources of GHG emissions that have been identified for the Project are:

- Scope 1 (direct emissions): Diesel fuel consumption of on-site machinery (bulldozers, heavy vehicles, light vehicles), fugitive emissions (CH₄ emissions from post mining activities) (NB: refers to fugitive emissions from exposed coal in the coal stockpiles at the Terminal)
- Scope 2 (indirect emissions): Stationary combustion (consumption of purchased electricity)

The NGA factors workbook provides a method of calculation of GHG emissions from coal mines, however, this is focused on the fugitive emissions associated with the coal extraction at the mine itself and it is unclear from this document whether fugitive emissions apply to a coal terminal facility. It is also unclear where the coal to be temporarily stored and handled at the coal terminal facility has been sourced from, and the portion, if any, is associated with gassy underground mines. DCCEE should be contacted to determine if fugitive emissions need to be reported. However, to determine a worst case emissions estimate, fugitive emissions from post mining activities have been estimated.

Estimation of GHG emissions

Estimated GHG emissions are summarised for Stage 1, WEXP1 and WEXP2 in Table 7.5. Estimates for the Ultimate Facility (84 Mtpa) with the changed components compared with the Ultimate Facility as per the SEIS have been provided in Table 7.6. A number of assumptions have been made for the Project to estimate GHG emissions (refer Table Notes below).

Table 7.5 Estimate of GHG emissions for Stage 1, WEXP1 and WEXP2 independently

Emission Source	Annual Activity Level ¹		Emissions Factor (CO ₂ -e per unit of activity)	Emissions (kt CO ₂ -e)	
	Stage 1 ⁶	WEXP1		Stage 1	WEXP1
		WEXP2			WEXP2
Construction					
Diesel consumption	-	4 ML	69.9 kg/GJ ²	-	10.7926
Electricity consumption	-	800 kWh	0.88 kg/kWh ³	-	0.0007
Construction Total				-	10.7933
Operation					
Diesel consumption	1.4 ML	0.083 ML	69.9 kg/GJ ²	3.7774	0.2239
Electricity consumption	15,230 kWh	20,095 kWh	0.88 kg/kWh ³	0.0134	0.0177
Fugitive methane ⁵	1.7 Mt	2 Mt	0.014 tonnes CO ₂ -e/ tonnes coal ⁴	23.8	28
Operation Total				27.59	28.24

Table Notes: ¹ The activity level refers to the quantity of consumption on an annual basis.

² The emission factor for diesel consumption includes an oxidation factor and allows for CO₂ and non-CO₂ gases. The energy content of the diesel considered is 38.6 GJ/kL.

³ The emission factor for electricity consumption is based on Scope 2 emissions only and allows CO₂ and non-CO₂ gases.

⁴ Since the source of coal is unknown, the emissions factor for fugitive emissions is based on gassy underground mines to provide a worst case scenario.

⁵ The estimation of fugitive methane has assumed that the Terminal will be running at full capacity. The emission factor for methane calculates the quantity of methane released as a post mining activity for each tonne of raw coal.

⁶ Annual activity levels for Stage 1 are only available for the operational phase of the Project.

Table 7.6 Comparison of GHG emissions estimates of the changed Ultimate Facility against the Ultimate Facility as described in the SEIS

Operation Emission Source	Annual Activity Level ¹		Emissions Factor (CO ₂ -e per unit of activity)	Emissions (kt CO ₂ -e)	
	Ultimate Facility (Stage 1 + WEXP1 + WEXP2)	Ultimate Facility (as per SEIS)		Ultimate Facility (Stage 1 + WEXP1 + WEXP2)	Ultimate Facility (as per SEIS)
Diesel consumption	1.53 ML	5.2 ML	69.9 kg/GJ ²	4.14	14.03
Electricity consumption	55,945 kWh	5,500,000 kWh ⁵	0.88 kg/kWh ³	0.049	4.84
Total⁴				4.19	18.87

Table Notes: ¹ The activity level refers to the quantity of consumption on an annual basis.

² The emission factor for diesel consumption includes an oxidation factor and allows for CO₂ and non-CO₂ gases. The energy content of the diesel considered is 38.6 GJ/kL.

³ The emission factor for electricity consumption is based on Scope 2 emissions only and allows CO₂ and non-CO₂ gases.

⁴ The storage capacity of the ultimate facility as per the SEIS is not available. As such, fugitive methane emissions have not been calculated.

⁵ Electricity consumption of the ultimate facility as per the SEIS includes the rail infrastructure, which is now being managed by QR National.

Estimation of energy consumption

In addition to reporting of GHG emissions, the NGER Act requires reporting of energy consumption. Energy consumption for the Project includes the consumption of diesel and the consumption of electricity. The quantity of energy consumption is summarised in Table 7.6 for Stage 1, WEXP1 and WEXP2. The quantity of energy consumption of for the Ultimate Facility (84 Mtpa) with the changed components compared with Ultimate Facility as per the SEIS has been provided in Table 7.8. The Project will not produce energy (refer Appendix 7.3).

Table 7.7 Estimate of annual energy consumption for Stage 1, WEXP1 and WEXP2 independently

Emission Source	Annual Energy Consumption ²			Annual Energy Consumption (TJ)		
	Stage 1 ³	WEXP1	WEXP2	Stage 1	WEXP1	WEXP2
Construction						
Diesel ¹	-	4 ML	3.6 ML	-	154.4	138.96
Electricity	-	800 kWh	800 kWh	-	0.0029	0.0029
Construction Total				-	154.40	138.96
Operation						
Diesel ¹	1.4 ML	0.083 ML	0.05 ML	54.04	3.2	1.93
Electricity	15,230 kWh	20,095 kWh	20,620 kWh	0.0548	0.07	0.07
Operation Total				54.09	3.28	2.00

Table Notes 1 The energy content of the diesel considered is 38.6 GJ/kL.

2 Assumes the data supplied is for diesel and electricity consumption on an annual basis for Stage 1, WEXP1 and WEXP2.

3 Annual activity levels for Stage 1 are only available for the operational phase of the Project.

Table 7.8 Estimate of annual energy consumption of the changed Ultimate Facility against the Ultimate Facility as described in the SEIS

Operation Emission Source	Annual Energy Consumption ²			Annual Energy Consumption (TJ)		
	Ultimate Facility (Stage 1 + WEXP1 + WEXP2)	Ultimate Facility (as per SEIS)	Ultimate Facility (Stage 1 + WEXP1 + WEXP2)	Ultimate Facility (Stage 1 + WEXP1 + WEXP2)	Ultimate Facility (as per SEIS)	Ultimate Facility (as per SEIS)
Diesel ¹	1.53 ML	5.2 ML	59.17	59.17	200.72	200.72
Electricity	55,945 kWh	5,500,000 kWh ³	0.2014	0.2014	19.80	19.80
Operation Total			59.38	59.38	220.52	220.52

Table Notes 1 The energy content of the diesel considered is 38.6 GJ/kL.

2 Assumes the data supplied is for diesel and electricity consumption on an annual basis for Stage 1, WEXP1 and WEXP2.

3 Electricity consumption of the ultimate facility as per the SEIS includes the rail infrastructure, which is now being managed by QR National.

7.5.3 Recommendations regarding registration and reporting requirements

The calculation results for GHG emissions summarised in Table 7.5 indicate the following:

- During construction of WEXP1, diesel and electricity consumption is approximately 10.79 kt CO₂-e, which does not exceed the 25 kt threshold for a facility
- During construction of WEXP2, diesel and electricity consumption is approximately 9.71 kt CO₂-e, which does not exceed the 25 kt threshold for a facility
- During the operation of Stage 1, diesel and electricity consumption and fugitive methane emissions was calculated to be approximately 27.59 kt CO₂-e, which exceeds the 25 kt threshold for a facility
- During the operation of WEXP1, diesel and electricity consumption and fugitive methane emissions was calculated to be approximately 28.24 kt CO₂-e, which exceeds the 25 kt threshold for a facility
- During the operation of WEXP2, diesel and electricity consumption and fugitive methane emissions were calculated to be approximately 25.35 kt CO₂-e, which exceeds the 25 kt threshold for a facility

Therefore, reporting under the NGER Act is required for the GHG emissions of the operational phase of the Project as the Project will exceed the 25 kt threshold for a facility. Table 7.6 indicates that GHG emissions from the operation of the changed Project will be significantly less than the emissions from the operation of the Ultimate Facility as described in the SEIS.

The calculation results for energy consumption summarised in Table 7.7 indicate the following:

- The WEXP1 and WEXP2 changes result in an estimated reduction of diesel consumption of 3.67 ML per year for the Ultimate Facility
- As a result of the WEXP1 and WEXP2 changes, estimated emissions of CO₂ from electricity and diesel consumption have reduced by 14.68 kt CO₂-e annually for the Ultimate Facility
- Annual energy consumption for diesel and electricity during construction of WEXP1 and WEXP2 is 154.4 TJ, and 138.96 TJ respectively, both of which exceed the 100 TJ threshold for a facility
- Annual energy consumption for diesel and electricity during operation of Stage 1, WEXP1 and WEXP2 is approximately 54.09 TJ, 3.28 TJ and 2.00 TJ respectively. However, this does not exceed the 100 TJ consumption threshold

Reporting under the NGER Act is required for the energy consumption of the construction phases of the Project, as each phase will exceed the 100 TJ consumption threshold. Table 7.8 indicates that the annual energy consumption from the operation of the changed Project will be significantly less than that of the Ultimate Facility described in the SEIS. This difference is from a lower estimated consumption of diesel during the changed Project operation when compared to that predicted in the SEIS.

Clean Energy Bill 2011

The *Clean Energy Bill 2011* was passed by the House of Representatives on 12 October 2011 along with 17 other bills which make up the legislative framework for the 'Clean Energy Future Plan'. The Bill was then passed by the Senate on 8 November 2011 and is expected to be implemented in July 2012 introducing a 'Carbon Price Mechanism' (CPM) which is proposed to consist of two stages (Mondaq 2011):

- i) A fixed price on carbon for an initial period (first three years of implementation)
- ii) A flexible price period governed by a price cap and trading system (proposed from the 1 July 2015)

The GHG emissions data presented in this section suggests that the Project may be subject to the CPM and may therefore be financially liable for each tonne of CO₂-e emitted.

7.5.4 Mitigation measures addressing GHG emissions

Construction

GHG emissions from the construction of the Project will be minimised through:

- Maintaining construction equipment in good working order so fuel efficiency of equipment is maximised
- Fuel saving initiatives on site such as implementing efficient driving practices has the potential to reduce GHG emissions
- The potential to switch to the use of bio-fuels for the onsite machinery should be investigated to reduce GHG emissions
- Improve energy efficiency with intelligent light approaches, light dimmers, light spacing, solar lighting and directional lighting

Operation

Aspects of the Project design which reduce energy demand and reduce GHG emissions include:

- A range of energy efficiency measures adopted across all stages of the Project such as:
 - The design team has considered all forthcoming ideas to achieve effective and efficient use of resources
 - Identifying the most appropriate energy type and/or source for the application
 - Implement systems to drive effective and efficient use of resources whilst providing a means to measure, monitor and benchmark for continuous improvement. Such systems will also assist resource management to achieve effective waste minimisation
 - Addressing plant energy efficiency level to meet the intent of the *Energy Efficiency Opportunities Act 2006* (EEO Act)
 - Measuring and monitoring systems and processes that capture energy usage at the equipment level and achieve an accuracy level of $\pm 5\%$ (EEO Act requirement)
 - Energy and materials balance models to an accuracy level of $\pm 5\%$ (to support achieving EEO Act requirement)
 - If appropriate, use construction materials that have lower environmental impacts than other materials, where such options exist and are feasible
 - Select and use water at quality levels most suitable for the application and reduce, reuse and recycle water wherever practical
- An Energy and Water Use Management Plan will be developed for the construction, operational and decommissioning phases of the Project
- Adopt a commitment across the Project to minimise electricity and water use
- Coal terminal lighting design to minimise visual impact on adjacent sensitive receptors (eg directional lighting, low pressure sodium bulbs, shrouding etc)
- Lighting design to limit the escape of light from the facility, minimising the visual impact on adjoining habitats
- Intelligent control of lighting to minimise the effects of light pollution in areas with no operational activity

These measures will be incorporated into the Project through the EMPs and relevant design documentation.

7.6 Sustainability

This section provides an overview of how the Project to date has addressed sustainability and how sustainability considerations would be incorporated into construction and operational phases of the Project. A review of the relevant sustainability policy and legislation and its applicability to the Project has been provided (refer Appendix 7.4).

7.6.1 Sustainability tool development

A preliminary sustainability tool has been developed for the Project, which has enabled a sustainability review of the Project to be undertaken. The tool aims to track the progress of the proposed sustainability measures throughout the Project. A number of indicators have been developed based on the three themes of environmental, social and economic. The sustainability tool identifies implementation actions, project phase, implementation ownership and further actions required (refer Figure 1 of Appendix 7.4).

The sustainability tool was developed as a result of the sustainability workshop that was held during the WEXP1 and WEXP2 design process. The workshop process involved identifying those design elements which contribute to, or have the potential to contribute to, the achievement of the sustainability goals and objectives. Measures were identified as “already incorporated into the design of the Project”, “ongoing” and “for future consideration”.

7.6.2 Sustainability outcomes for the Project

Sustainability elements factored into the Project design

Sustainability elements factored into the design have been developed to ensure that the Project continues to adopt sustainability measures across the construction and operation of the Project. This section lists the actions which have been committed to in the design process and those actions which require further investigation at a later stage of project delivery.

Agreed actions

Sustainability measures which will be addressed in the design include:

- Measures to reduce energy demand and minimise energy consumption
 - Monitoring site energy use across the life of the Project by undertaking an energy report across the site for WEXP1 and WEXP2
 - Investigation of energy efficiency measures in temporary site offices during construction and permanent office buildings during operation, including opportunities to utilise energy saving technologies such as energy saving lighting and air conditioning
 - Implementation of energy efficiency measures during construction phase activities
- Measures to ensure water reduction and efficiency is maximised throughout the Project, by minimising use of potable water during construction and operational phases, and protecting the quality of existing resources through:
 - Assessing the potential for treated stormwater to wet down stockpiles on site, particularly during extreme weather events or on windy days
 - Adoption of groundwater and surface water quality mitigation measures as detailed in the EIS/SEIS and Project-specific EMPs
 - Investigation of potential water efficiency measures and review all designs in order to incorporate these measures
- Measures that protect existing and proposed Project assets from the risk of sea level rise and storm tide inundation through:
 - Designing the Project to take account for the risk of sea level rise and storm tide inundation, including climate change allowance
 - All Project infrastructure to meet the 0.8 m 2100 sea level rise scenario
- Measures that promote the use of sustainably sourced materials and minimise the use of materials required for the design through:
 - The use of supply contracts to source materials as close as possible to the Project area
 - Pre-fabricate segments used for the Project, wherever possible
 - Re-use of dredged material onsite
- Actions that promote effective waste management beyond regulatory compliance (EPP(Waste)) by applying the principles of the waste management hierarchy by:

- Identifying the waste streams applicable to the Project and developing a waste management plan which complies with the waste management hierarchy
- Actions that allow for infrastructure upgrades which are beneficial for wider community use by:
 - Undertaking an upgrade of Gladstone-Mt Larcom Road as part of the Project
- Measures which increase health and wellbeing of residents on site and sensitive receptors within proximity to the Project by:
 - Implementing coal terminal lighting that minimises visual impact on adjoining sensitive receptors (eg directional lighting, low pressure sodium bulbs, shrouding, low glare lighting etc)
 - Implementing the use of low noise alarms across the site
- Measures which minimise the Project's contributions towards climate change by reducing GHG emissions through:
 - Undertaking a preliminary GHG emissions assessment for construction and operation of the Project (refer Section 7.4)
 - Undertaking a preliminary climate change risk assessment to identify risks and management options (refer Section 7.3.3)

Future actions

Further actions to be considered and developed where viable during detailed design, construction and operation are as follows:

Detailed design

- Investigate feasible renewable energy alternatives to determine their suitability for implementation during construction and operation of the Project
- Local suppliers will be assessed and selected on the basis of cost-competiveness and sustainability (must occur prior to procurement)
- Avoid/reduce consumption of materials during construction and operation, by finding alternatives appropriate for the same use
- Identify suitable locations for revegetation of native vegetation (ie where it will not interfere with Project facilities, operations etc)
- Biodiversity values incorporated into landscape designs
- Comply with the relevant components of the carbon price mechanism (once implemented)

Construction

- Use supply contracts to source sustainably accredited materials
- Prior to construction, review and update as required the existing WICET Waste Management Plan for implementation during WEXP1 and WEXP2 construction and operation of the Project
- Implement all fauna protection measures presented in the WICET Management Plans and this Change Request
- Implement all vegetation mitigation measures presented in the WICET Management Plans and this Change Request
- Implement all nuisance avoidance measures presented in the WICET Management Plans and this Change Request
- Ensure that site supervision is provided during construction to minimise risk of damage to cultural heritage items within the Project area
- Undertake a revised GHG emissions assessment with updated diesel and electricity consumptions details for the construction phase of the Project, to ensure that the Construction Contractor complies with the relevant legislation
- Comply with the relevant components of the carbon price mechanism (once implemented)
- Use local workforce where possible
- Develop and implement a local procurement policy for goods and services
- Generate economic benefits for the local community, providing access to employment opportunities on the Project

Operation

- Undertake a revised GHG emissions assessment with updated diesel and electricity consumption details for the operational phase of the Project, to ensure that the Operator complies with the relevant legislation
- Comply with the relevant components of the carbon price mechanism (once implemented)
- Prepare and implement a Carbon Management Plan for the operational phase of the Project
- Seek accreditation for the Carbon Management Plan (if deemed necessary)

7.6.3 Sustainability review and reporting

The management of sustainability issues through the sustainability tool allows for an ongoing review process at regular intervals to allow refinement of implementation actions and future actions during construction and operation of the Project. The EMP (refer Chapter 23) provides a summary of the WICET Management Plans and mitigation measures to be incorporated across all stages of the Project.

7.7 Climate change and sustainability commitments for the Project

Since the development of the EIS and SEIS in 2006 and 2007, respectively, climate change and sustainability assessment has become an important consideration of the environmental impact assessment process. This chapter has provided a review of the Project as it stands in 2011 in relation to climate change and sustainability policies and has undertaken a climate change risk assessment for the Project. A preliminary sustainability assessment tool has been developed and is recommended to be further developed and monitored through the construction and operational phases of the Project.

A range of mitigation and adaptation measures for the Project have been identified (refer Section 7.3.3 and 7.5.2 of this request). To ensure favourable climate change and sustainability outcomes for the subsequent phases of the Project, the Construction Contractor and Operator are responsible for making final commitments to the measures recommended previously in Section 7.5.2.

Mitigation and adaptation responses will need to be reviewed and updated over time, given that research in climate change science and sustainability is continuously evolving.

Conclusion 1: The changed Project results in an estimated reduction in diesel consumption of 3.67 ML per year from the Approved Project.

Conclusion 2: The changed Project results in an estimated reduction in CO₂ emissions of 14.68 kt CO₂-e per year from the Approved Project.

Conclusion 3: Reporting under the NGER Act is now required for energy consumption during the construction phase and GHG emissions of the operational phase of the Project.

Conclusion 4: The Project may be subject to the Carbon Price Mechanism and may therefore be financially liable for each tonne of CO₂-e emitted.

Conclusion 5: Sustainability elements factored into the design have been developed to ensure that the Project continues to adopt sustainability measures across the construction and operation of the Project.