Terms of reference for an environmental impact statement

H2-Hub™ Gladstone

February 2023

COORDINATOR-GENERAL

Queensland Government

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Part A About these terms of reference

1. Introduction

1.1 This document outlines the terms of reference (TOR) for H2-Hub™ Gladstone (the project), proposed by The Hydrogen Utility Pty Ltd (H2U) (the proponent) on behalf of Gladstone Hydrogen Holdings Pty Ltd and being assessed under the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

1.2 The proposed project is an industrial-scale green hydrogen and ammonia production complex at Yarwun in the Gladstone State Development Area (SDA) to be built in stages, with a total capacity of up to 3 gigawatts of electrolysis plant and up to 5,000 tonnes of green ammonia production capacity.

1.3 The proposed project comprises the following development areas:

(a) production precinct – an industrial complex for the production of green hydrogen and ammonia located at Yarwun in the Gladstone SDA

(b) export precinct – co-located with existing ammonia storage and import facilities at Fisherman's Landing Wharf at the Port of Gladstone

(c) product and logistics infrastructure corridor – linking the production and export precincts via infrastructure located in the 'materials transportation and services corridor precinct' of the Gladstone SDA.

2. Statutory basis

2.1 The Coordinator-General has declared H2-Hub™ Gladstone to be a 'coordinated project for which an environmental impact statement (EIS) is required' under section 26(1)(a) of the SDPWO Act. This declaration initiates the statutory environmental impact assessment procedure of Part 4 of the SDPWO Act, which requires the proponent to prepare an EIS for the project.

2.2 This TOR sets out the matters the proponent is to address in an EIS for the project and is approved by the Coordinator-General under section 30 of the SDPWO Act following the outcomes of public consultation.

3. Accredited EIS process for controlled actions under Commonwealth legislation

3.1 On 25 March 2022, the delegate for the Australian Minister for the Environment determined the project to be a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (EPBC reference 2021/9049), triggering the following controlling provisions:

(a) World Heritage properties (sections 12 and 15A)

(b) National Heritage places (sections 15B and 15C)

(c) listed threatened species and communities (sections 18 and 18A)

(d) listed migratory species (section 20 and section 20A).

3.2 The EIS process has been accredited under the bilateral agreement between the Commonwealth and the State of Queensland under section 45 of the EPBC Act relating to environmental assessment, hence the EIS is to state the controlling provisions for the project

and describe the particular aspects of the environment that led to the controlled action decision.

4. EIS guidelines

4.1 This TOR is to be read in conjunction with the Coordinator-General's *Preparing an environmental impact statement: Guideline for proponents* (see Appendix 2), which provides guidance on the following:

(a) participants in the EIS process

(b) consultation requirements

(c) EIS format and copy requirements.

4.2 In addition, subject-specific policies and guidelines are referenced throughout this TOR and are listed in Appendix 2.

5. More information

5.1 For information about the project or the EIS process conducted under the SDPWO Act, visit **www.statedevelopment.qld.gov.au/cg**.

Part B General approach and requirements for an EIS

6. General approach

6.1 The objectives of the EIS are to:

(a) provide a detailed description of the proposed project

(b) ensure that all relevant environmental, social, economic and human health impacts of the project are identified and assessed

(c) detail the management and mitigation measures proposed to avoid, minimise and/or mitigate any adverse impacts including proposed ongoing monitoring

(d) demonstrate that the project is based on sound environmental principles and practices.

6.2 For the purposes of the EIS process, 'environment' is defined in Schedule 2 of the SDPWO Act and includes:

(a) ecosystems and their constituent parts, including people and communities

(b) all natural and physical resources

(c) the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community

(d) the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).

6.3 The EIS must address other matters not covered in the TOR in the following circumstances:

(a) studies reveal a matter that had not been foreseen when the TOR was finalised

(b) an issue not previously identified but is in the public interest to be addressed

(c) the Coordinator-General directs the proponent in writing to address a matter as an information request under section 34B of the SDPWO Act

(d) new or amended legislation or policies come into effect after the TOR has been finalised, regardless of whether or not the legislation or policies have been listed in the TOR. Transitional arrangements or exemptions may apply for individual projects

(e) the proponent makes amendments to the proposed project that would result in a change in the nature, timing or location of any impacts.[1]

7. Requirements of an EIS

7.1 The EIS is to:

(a) be prepared in accordance with, and meet the minimum requirements of, Schedule 1 of the State Development and Public Works Organisation Regulation 2020

(b) be prepared in accordance with relevant policies, standards and guidelines, including but not limited to those listed in Appendix 2. Application of such guidelines, standards and policies will be confirmed throughout the development of the EIS in consultation between the Coordinator-General, the proponent and advisory agencies

(c) be prepared and completed by suitably qualified and experienced professionals, relevant to the field of expertise required for each subject matter

(d) provide all available baseline information relevant to the environmental risks of the project including seasonal and long-term variations. Site-specific baseline data should be used. Include detail about the quality of the information provided, in particular: the source of the information; how recent the information is; how the reliability of the information was tested, and any assumptions, exclusions and limitations.[2] All data, modelling and input/output information used in the EIS to determine the existing environment and/or assess impacts must be provided in an appropriate electronic format (e.g. shapefiles)

(e) assess and justify the extent to which there is a need and demand for the project

(f) present the feasible project options that were considered in selecting the preferred option including the consequences of not proceeding with the project (the 'do nothing' option). Demonstrate why the preferred option has been selected by summarising the comparative environmental, social and economic impacts of each project option, with particular regard to the principles of ecologically sustainable development (ESD)

(g) provide detailed strategies regarding all matters for the protection, or enhancement (as desirable), of all relevant environmental values in terms of outcomes and possible conditions that can be measured and audited. In general, the preferred hierarchy for managing likely impacts is: (a) to avoid; (b) to minimise or otherwise mitigate; (c) remedy and (d) if necessary, and possible, to offset

(h) include a consolidated commitment register that lists all measures (including monitoring programs and management plans) demonstrated in the EIS assessment to avoid, minimise or otherwise mitigate, remedy or offset project impacts and that would need to be implemented during construction and operation, to meet the predicted project outcomes

[1] The proponent is to notify the Coordinator-General of any amendments to the proposed project as described in the project's initial advice statement.
[2] Any technical reports supporting the assessment and conclusions made in the EIS should be provided. These reports can be provided as appendices.

(i) include environmental management plans (EMPs) for both the construction and operation phases of the project. The EMPs should be developed from, and be consistent with, the information in the EIS and set specific commitments to implement best practice environmental management in order to protect the identified environmental values. The EMPs are to be presented as stand-alone documents without reference to other parts of the EIS.

7.2 The contents of the EMPs are to comprise:

(a) the project's commitments to acceptable levels of environmental performance, including environmental objectives (i.e. levels of expected environmental harm, performance standards and associated measurable indicators, including progressive and final rehabilitation, performance monitoring and reporting)

(b) impact prevention and control strategies to satisfy the commitments

(c) corrective actions to rectify any deviation from performance standards.

7.3 Each matter assessed in the EIS (as described in sections 13 and 14 of this TOR) is to:

(a) include a concise description of the potential impacts of the project

(b) describe the measures proposed to avoid, minimise or otherwise mitigate, or remedy impacts to meet environmental standards and acceptable outcomes, and where necessary to offset those impacts

(c) demonstrate how monitoring will be used to confirm environmental objectives are being met, including using baseline data to track environmental outcomes.

7.4 Assess the extent to which the construction, commissioning, operation, decommissioning and rehabilitation (to the extent known) of the project meets all statutory and regulatory requirements of the State and Commonwealth and that the intended outcomes are consistent with current state and commonwealth legislation, assessment benchmarks (e.g. State Development Assessment Provisions), policies (including passed and uncommenced legislation), plans, schemes and guidelines. If there is a conflict, explain how the project can be approved.

7.5 For all the relevant matters, identify and describe the environmental values that are to be protected. Environmental values are specified in the *Environmental Protection Act 1994* (EP Act), the Environmental Protection Regulation 2019 (EP Regulation), environmental protection policies (EPPs), State Planning Policy 2017, State Development Assessment Provisions (SDAP), and relevant guidelines.[3]

7.6 Include, as an appendix to the EIS, a table cross-referencing where each requirement of the TOR is addressed in the EIS, to the lowest available subsection.

7.7 Describe the stakeholder engagement activities that have occurred during the preparation of the EIS, identify the issues raised during consultation, and explain how the responses from the community and agencies have and will be incorporated into the design and outcomes of the project.

7.8 The EIS is to be prepared and submitted electronically (USB or large file transfer) inclusive of all plans and documents that form the EIS. The electronic documents submitted are to satisfy the criteria detailed in Table 1 below.

[3] Examples are included in Appendix 2.

Table 1 Format requirements

Format requirements	
Document size	The EIS and accompanying appendices are to be produced on A4 size and are to be capable of being photocopied. Each PDF file should not be larger than 10 MB and must meet the accessibility requirements described in the *Adobe Acrobat X Pro Accessibility Guide: PDF Accessibility Overview*, available at: www.adobe.com/accessibility/products/acrobat/training.html
Format and style	The format and style of the document is to be appropriate for publication on the Internet.
Plans, maps, diagrams and other illustrative material	All plans, maps, diagrams, and other illustrative material is to be provided at a suitable scale and must be included in a PDF format so that they are legible and easily understood.
	Plans, maps and diagrams are to be located within the appropriate EIS chapter/s, as close as possible to where referenced in the text.
	Plans, maps and diagrams are to be to scale on A4 or A3 size with the scale clearly displayed on each. The plan, map or diagram is also to state the original size (e.g. A1). Each should be in colour, where possible, and have a resolution between 300 and 900 dot points per inch (DPI).
Locations	All geographical coordinates throughout the EIS are to be provided in latitude and longitude against the Geocentric Datum of Australia 2020 (GDA2020).
Elevations	Elevations detailed in the EIS are to be provided to Australian Height Datum (AHD). Plans, maps and diagrams included in the EIS should have contours at suitable increments relevant to the scale, location, potential impacts and components of the project.
References	All sources must be appropriately referenced using the Harvard standard. The reference list should include the address of any Internet webpages used as data sources.
Spatial data file format requirements	
Guidelines	Refer to DES *Guideline – Spatial information submission* (see Appendix 2).
File names	File names are to be descriptive and provided in one of the following formats: ESRI file geodatabase (.GDB) - preferred ESRI Shapefiles. GDB/shape.
Data attributes	All data is to contain descriptive attributes or columns, including but not limited to the following: • date data was created • version number • who created the data (i.e. the company name) • datum (e.g. GDA2020) • category or stage.
Projection	
Projection	Data can be provided in any projection; however, a geographic projection system is preferred. The datum shall be GDA2020.
Metadata	
Use standards	ISO 19115:2015 ANZLIC ISO 1.1.

Part C EIS content and suggested structure

8. Executive summary

8.1 The executive summary is to describe the project and convey the most important aspects and environmental management options in a concise form. It is to use plain English, avoid jargon, be written as a stand-alone document and structured to align with the EIS.

9. Introduction

9.1 The introduction is to clearly explain the function of the EIS, why it has been prepared and what it sets out to achieve. The introduction is also to include an overview of the structure of the document.

Project proponent

9.2 Describe the following:

(a) proponent's full name, postal address, Australian Business Number and details of any joint venture partners

(b) nature and extent of proponent's business activities

(c) proponent's (including directors) experience in developing comparable major projects or pilot projects

(d) proponent's (including directors) environmental record in Australia, including a list of any breach of, or proceedings against the proponent under, a law of the Commonwealth or State for the protection of the environment or the conservation and sustainable use of natural resources (an environmental law) during the previous ten years

(e) proponent's environmental, health, safety and community policies

(f) experience, qualifications and certification of all suitably qualified consultants and sub-consultants engaged by the proponent to complete the EIS.

The environmental impact assessment process

9.3 Provide an outline of the environmental impact assessment process, including the role of the EIS in the Coordinator General's decision-making process, noting which milestones have been completed, and an estimated completion date for each remaining EIS stage(s). The information in this section is required to ensure readers are informed of the process to be followed and are aware of any opportunities for input and participation.

9.4 Inform the reader how and when properly made public submissions on the EIS are to be addressed and considered in the assessment and decision-making processes under the SDPWO Act and any other relevant legislation.

9.5 Describe the assessment process under the EPBC Act with the accreditation under the SDPWO Act.

10. Project description

Proposed development

10.1 The EIS must describe and illustrate the following about the project:

(a) project title

(b) nature, location and scale of all project components (including the production precinct, logistics and infrastructure corridor and export precinct) and activities (including the production, storage and handling of dangerous goods and hazardous chemicals)

(c) power supply

(d) water supply and management

(e) transport requirements

(f) project staging, proposed timing and schedule of works, and anticipated production life

(g) expected capital expenditure

(h) need and rationale for the project

(i) regional and local infrastructure context for the project including details of any infrastructure and infrastructure easements - whether underground or above, existing or new – that are required for use by the project, to be documented as required with maps at suitable scales

(j) regional infrastructure requirements and interdependencies for the project including but not limited to the supply of renewable energy (e.g. development of renewable energy zones and required electricity grid network upgrades), regional water availability, infrastructure corridor capacity for pipelines, availability of land at the port and capacity for bulk storage of hydrogen and ammonia, export vessel berthing availability and shipping channel navigation limitations

(k) relationship to other known major projects and/or development of which the proponent should reasonably be aware, including other proposed future land-uses in the Gladstone SDA and the Port of Gladstone (including Fisherman's Landing Precinct and existing or proposed wharf infrastructure)

(l) workforce numbers to be employed by the project during all project phases and source of local workforce (include peak, direct workforce numbers, expressed as annual average full-time equivalent positions created during each phase)

(m) where personnel are to be accommodated during construction and operation of the project and proposed travel arrangements to the project sites.

10.2 Detail project components or activities that are proposed to be assessed separately to the EIS, including details of the assessment process and approval.

Design of infrastructure

10.3 Provide details of the alignment options assessed for the water supply pipelines, pipeline infrastructure for hydrogen, ammonia and other chemical products, access road, electricity transmission lines and telecommunications. Provide justification for the preferred and final alignments including a discussion on how the final alignment minimises impacts to environmental values including matters of state environmental significance (MSES) (e.g.

marine plants, waterways providing for fish passage, protected wildlife habitat, regulated vegetation and connectivity areas).

10.4 Map the location and boundaries of the project's footprint, including the project sites (production precinct and export precinct), and all existing and new infrastructure elements required by the project (including but not limited to logistics and infrastructure corridor).

Infrastructure requirements

10.5 Detail the location of works to be undertaken, with concept and layout plans (in plan and cross-section views and to include existing infrastructure within and adjacent to the project sites), requirements for new infrastructure, or the upgrading, retention, relocation and/or decommissioning of existing infrastructure on and offsite to service the project.

10.6 Provide plans for each project component, with sufficient detail to enable the Coordinator-General and relevant agencies to adequately assess the project in the context of the approvals being sought through the EIS process.

10.7 Infrastructure to be considered is to include, but is not limited to:

(a) resource extraction areas, if none are proposed on-site discuss where quarry material for construction will be sourced from

(b) transport corridors, including necessary access roads and tracks

(c) rail including common user loading facilities and connections to existing rail infrastructure

(d) site construction facilities including workforce accommodation and workshops (if proposed)

(e) water supply, treatment, storage and discharge

(f) energy generation, supply, connections and distribution (including any proposed renewable energy sources), generators and fuels (whether gas, liquid and/or solid)

(g) hazardous chemical/material storage

(h) telecommunications

(i) solid waste disposal

(j) wastewater treatment and disposal, sewerage systems (including location and size of the sewage treatment plant, the sewage collection system, wet weather storage and any pipelines and waste disposal areas associated with the plant such as proposed effluent irrigation)

(k) stormwater management systems and flood prevention

(l) waterway barriers or crossings

(m) service corridors and pipelines, including any existing or shared corridors or infrastructure

(n) location of any existing and proposed infrastructure easements and/or service corridors

(o) any onsite infrastructure affected by the project.

10.8 Describe the timing of requirements (from pre-construction through to decommissioning and rehabilitation) for all project related infrastructure.

10.9 Provide details for all proposed export related infrastructure and activities on strategic port land including wharves, stockpiles and loading facilities.

10.10 Consider the vessel type(s) and size(s) with regards to the capacity of the existing port facilities. Consider the need for additional work required to deepen and widen the Targinnie Channel and the Swing Basins for the Fisherman's Landing berths to accommodate intended vessels. Detail processes to be implemented to establish any agreements or approvals required with the Port Authority regarding any additional works.

10.11 Detail whether the infrastructure is permanent or temporary and nominate if it constitutes waterway barrier works or impacts on marine plants.

10.12 Nominate the building and construction standards for the works.

10.13 Describe the process and criteria used to select the preferred design and preferred construction techniques, including a description of staging, if any, of infrastructure works, any infrastructure upgrades that are required off-site to facilitate the safe, orderly and economic development of the site and a description of the arrangements that would be put in place to ensure that these upgrades are implemented in a timely manner and maintained.

10.14 Include names of the required infrastructure and utilities service providers as appropriate, together with evidence as to whether discussions have been held with these providers, regarding the capacity of existing or proposed infrastructure to accommodate or not accommodate project requirements. Any agreements made with third parties regarding shared use of infrastructure or leasing arrangements for privately owned infrastructure (e.g. pipelines) are to be identified and evidenced.

10.15 Identify any ancillary infrastructure alternatives considered and justify selected options with reference to ESD (including energy and water conservation and maintenance of environmental values).

Water

10.16 Identify all potential sources of water being considered for the pre-construction, construction and operational phases of the project (including, raw water, treated wastewater, groundwater, seawater for desalination or seawater electrolysis). Identify if any overland flow water is proposed to be captured and used onsite. Should treated wastewater / stormwater be the preferred option, describe the treatment methods and quality requirements of wastewater / stormwater used in the production of hydrogen via electrolysis. Should desalination of/or seawater be used as a water source, details of the location and design of intake and outfall pipelines and other associated infrastructure should be provided. This includes details of fish friendly screening of extraction points.

10.17 Quantify water supply volumes required for the project, including a breakdown between potable and non-potable and their respective sources, during both the construction and operational phases.

10.18 Detail any proposed on-site water storage and treatment for use by the site workforce during the construction phase, and used by the process facility during operation, and firefighting.

10.19 Detail any proposed sewage infrastructure relevant to environmentally relevant activity (ERA) 63, including the proposed hourly sewage pumping rate (as kilolitres per hour) of the sewage pumps in the pumping station wastewater treatment and any proposed irrigation.

10.20 Detail any proposed water treatment infrastructure relevant to ERA 64, and any proposed releases of waste into the environment.

10.21 Identify the volume and provide a description of the relevant water quality characteristics of brine generated by the project including details of the activities that would generate brine.

Detail any methods and infrastructure required for beneficial reuse and/or disposal such as not to cause environmental harm.

10.22 Describe the service corridors or clearances for sewerage and recycled water mains in relation to other services.

Energy

10.23 Describe any electricity generation and transmission infrastructure (including upgrades) required for the project. Identify where this infrastructure will be constructed and how it will be transported to the site, including details of any necessary road upgrades.

10.24 Detail all energy requirements for the project and where this will be sourced from over the lifetime of the project. Present and illustrate the quantum and timing of available renewable energy in the National Electricity Market compared to electricity requirements and timing of operations.

10.25 The EIS must clearly set out how the project will access renewable-only generated electricity for its power supply and demonstrate that the project demand will not result in additional demand for non-renewable electricity sources by other users (or the project in the event there are insufficient renewable sources available).

10.26 Electricity inputs and outputs for the facility should include maximum demand/production, annual consumption and production, load fluctuations and source.

10.27 Any energy interactions with existing or proposed developments (including network upgrades for transmission and substations) should also be described, within and outside of the Gladstone SDA.

10.28 For any electricity generation facility developed specifically for this project, the EIS should provide details of any proposal to sell electricity into the National Electricity Market (National Grid) and/or any reliance on external electricity supply during times that on-site generation is not operating. The type of cooling system of the electricity generation facility and specific water demands of the proposed cooling system should also be described.

Project staging

10.29 Provide a detailed description of the proposed project activities (pre-construction, construction, operation, decommissioning and rehabilitation), including scope of works (for the production precinct, logistics and infrastructure corridor, export precinct and any other required infrastructure – new and upgraded), disturbance areas, physical layout of the project over time, likely timing of the project including any stages and the sequencing of these stages.

Pre-construction

10.30 Describe the pre-construction activities and their location with appropriately scaled maps, including:

(a) all pre-construction activities including the timing, staging and sequencing (e.g. vegetation clearing, site access, interference with watercourses, waterways, and floodplain areas including wetlands) and days and hours of operation (including night-time works)

(b) proposed infrastructure

(c) proposed vegetation clearing, top- and sub-soil removal and stockpiling

(d) project site access arrangements where access to the site is on tenure not held by the proponent

(e) proposed upgrades, realignments, relocation, deviation or restricted access to roads and other infrastructure including water, power and telecommunications

(f) all ERAs, notifiable activities and land listed on the Environmental Management Register (EMR) and Contaminated Land Register (CLR)

(g) environmental management measures included as part of the project design

(h) the proposed earthworks, construction methods, associated equipment and techniques

(i) pre-disturbance surveys, including geotechnical, contaminated land, flora and fauna, water quality, cultural heritage, air and noise and how this information will be used in the final design and construction of the project

(j) erosion and sediment control measures, water sensitive urban design features, and measures and controls for managing coastal hazards, flooding, actual and potential acid sulfate soils and contaminated land

(k) existing infrastructure and easements on the potentially affected land.

Construction

10.31 Describe the construction activities and their location with appropriate scaled maps, including:

(a) construction timetable, sequencing and staging plans (provide detailed plans, drawings and maps to illustrate these matters, where relevant)

(b) proposed construction methods, associated equipment and techniques

(c) days and hours of operation for proposed construction works (including night-time works)

(d) erosion and sediment control measures, site drainage and stormwater management, measures and controls for managing coastal hazards, flooding, actual and potential acid sulfate soils and contaminated land

(e) proposed infrastructure, including the location, design and capacity of water supply, telecommunications, road infrastructure, power generation and transmission infrastructure requirements for construction facilities

(f) dimensions of earth and rock works and excavations

(g) known locations of new or altered works and structures and infrastructure necessary for the project at all stages of its development, whether on or off the project sites or right of way and intersections required with existing infrastructure (including but not limited to pipeline, rail, road, power)

(h) disturbance areas including buffer zones

(i) changes to watercourses/waterways, flooding and overland flow on or off the site, including water diversions, crossings, waterway barriers, flood levees and bunds, and locations of any proposed water discharge points

(j) type, amount and source of construction materials required for the project

(k) nature and location of workforce accommodation (if proposed), and construction laydown areas

(l) capacity of high-impact plant and equipment, their chemical and physical processes, and chemicals or hazardous materials to be used

(m) any activity that is a prescribed ERA

(n) general construction requirements including blasting, excavation, dredging, haul road establishment, crushing, screening, concrete batching, fuel and chemical storage, workshop facilities, office facilities, lighting, on-site mess and ablutions facilities

(o) location and access to any new or established quarry operations the project may source quarry materials from including haul routes

(p) management, including reuse, of material generated by clearing for construction

(q) the number and type of vehicles, machinery and equipment used for construction activities including the method of transport of construction machinery and materials to and within the site(s)

(r) energy and telecommunications requirements and sources

(s) water sources, use, volumes and storage requirements during construction. For each source of supply, the EIS is to address the quality and quantity, security of supply and resource availability

(t) any take of surface and groundwater (both direct and in-direct)

(u) capture, containment/disposal of construction spoil

(v) wastewater management measures

(w) solid and liquid waste management

(x) public and workforce safety, medical facilities to be provided on site and provision for access to emergency services

(y) allowance for provision of power back-up in emergency and potential impact on local supplies in the area

(z) security services

(aa) construction site demobilisation and rehabilitation.

Operation

10.32 Describe the infrastructure commissioning process, including equipment installation requirements, plant testing, start-up, maintenance, and unscheduled interruptions.

10.33 Describe the operational activities and their location with appropriate scaled maps, including:

(a) operational timetable, sequencing and staging plans (provide detailed plans, drawings and maps to illustrate these matters, where relevant) and days and hours of operation (including night-time works)

(b) proposed chemical processing methods and associated equipment and techniques for each component of the project, including detailed process flow diagrams for the proposed plant clearly showing all unit operations to be carried out. Describe all unit operations and list all process inputs and outputs

(c) arrangements for administration, management and control of the project at each stage

(d) operational arrangements for the project, including, but not limited to on-site staffing, safety requirements for staff, public and routine maintenance, and risk management and emergency response procedures

(e) frequency, scale and duration of activities and emissions

(f) storage and handling of dangerous goods and hazardous substances

(g) environmental management measures during operation

(h) proposed access routes and points

(i) water, energy and telecommunications requirements and sources

(j) expected types and volumes of solid, liquid and gaseous waste generated and proposed methods of treatment, reuse and disposal

(k) transport needs and expected traffic including sources of traffic generated

(l) location and scale of parking requirements

(m) proposed lighting for the production precinct, logistics and infrastructure corridor and export precinct with consideration to avoid light pollution

(n) expected life of the infrastructure and any anticipated major maintenance periods.

Decommissioning and rehabilitation

10.34 Describe the proposed strategies and methods for decommissioning and any rehabilitation including:

(a) site restoration actions, closure and decommissioning works for removal of infrastructure including plant, equipment, concrete footings, hardstand and storage tanks and actions taken to clean up, manage and dispose of contaminated soils (e.g. hydrocarbon contamination)

(b) the options, strategies and methods for rehabilitation of the environment disturbed by the project

(c) how rehabilitation activities will be monitored to ensure milestone criteria have been achieved

(d) actions to be undertaken and processes required to remove land from the environmental management register and/or contaminated land register.

Site description

10.35 Provide all property descriptions for land impacted by the project area, and adjacent properties. Provide details of proposed tenure arrangements for all properties impacted by the project and identify these on a map. Include details of any easements, roads (existing and/or proposed, public and private), leases, reserves, Indigenous cultural practice areas, permits to occupy, mining tenures, protected areas, State forests, native forest and timber reserves, approved state and/or biodiversity offset strategies, Native Title interests, Native Title claims, approved Indigenous land use agreements (ILUAs), state land and strategic port land.

10.36 Describe and illustrate with suitably scaled maps all transport corridors, private roads, local and state-controlled roads, pipelines, private and government owned corporation energy

infrastructure, rail, air services,[4] maritime and other infrastructure or services in the region relevant to the project (permanently or temporarily), including its construction and operation activities.

10.37 Describe the rainfall patterns (including magnitude and seasonal variability of rainfall), overland flow paths, air temperatures, humidity, wind (direction and speed) and any other special factors (e.g. temperature inversions) that may affect management of the project.

10.38 Describe and illustrate the topography of the project site and surroundings on maps and highlight any significant features. Include and name watercourses, lakes, springs and unmapped features in accordance with the *Water Act 2000*. When mapping watercourses, lakes, springs and unmapped features identify any existing relevant watercourse identification maps.[5]

10.39 Provide an updated survey of Highest Astronomical Tide (HAT) within or adjacent to the project's footprint (including pre-construction, construction, maintenance and operational components of the project's footprint).

10.40 Map the location and boundaries of the project's footprint, including the project sites (production precinct, and export precinct), and all existing and new infrastructure elements required by the project (including but not limited to logistics and infrastructure corridor). Show all key aspects including excavations, stockpiles, areas of fill, subsidence areas, services infrastructure, plant locations, levees, water storages and dams, stormwater infrastructure and drainage systems, spill containment bunds, buildings and structures, vents and emission stacks, bridges and culvert, haul and access roads, pipelines (for the transport of hydrogen, ammonia, and other chemical gas including hydrogen carriers if proposed), causeways, stockpile areas, loading and unloading facilities and any areas of dredging for waterway management. Include discussion of any environmental design features of these facilities, including bunding of plant and storage facilities and how the development avoids tidal lands (areas below HAT). Maps are to include a scale and have contours at suitable increments relevant to the scale, location, potential impacts and type of project, shown with respect to AHD and drafted to GDA2020.

10.41 Describe and illustrate specific information about each component of the project including the precise location of the project sites and construction activities in relation to any waterbodies (including coastal and marine), waterways providing for fish passage,[6] protected areas (including but not limited to conservation parks, nature refuges, national parks), State forests, forest reserves, coastal management districts, protected vegetation and marine plants, declared fish habitat areas, strategic port land tidal areas, matters of national, state and local environmental significance, regional biodiversity corridors and regional biodiversity value areas, the location of any sensitive receptors and proposed buffers surrounding the working areas (including separation areas for storage of hazardous materials) and project infrastructure (including pipelines), lands identified for conservation (either through retention in their current natural state or to be rehabilitated) and Traditional Owner land and cultural practice areas (where known). Include maps at a catchment scale illustrating the relationship

[4] As defined in the State Development Assessment Provisions.

[5] Watercourse identification maps (WIP) can be found on the Business Queensland website at: **https://www.business.qld.gov.au/industries/mining-energy-water/water/maps-data/watercourse-map**. Determining the type of water feature using the WIP is important for applying relevant provisions of the *Water Act 2000,* Water Plans and regulatory documents.

[6] Waterways are defined in Schedule 1 under the *Fisheries Act 1994* which includes a river, creek, stream, watercourse, drainage feature or inlet of the sea.

between the project location and upstream and downstream riverine, estuarine, coastal and marine ecosystems.

10.42 Describe and map in plan and cross-sections the geology and landforms of the project sites and surrounds (including the boundaries of water catchment areas). Show geological structures, such as aquifers, faults, economic resources (such as agricultural, timber, quarries, and mining including historic), and any other relevant projects and known development proposals that could have an influence on, or be influenced by, the project and its construction and operational activities.

10.43 Describe, map and illustrate land, soil types and profiles of the project sites including added fill and/or exposed ground surface at a scale relevant to the proposed project and in accordance with relevant guidelines. Identify soils that would require specific management due to wetness, erosivity, depth, acidity, salinity or other features (including acid sulfate soils, contaminated land (including areas where Per- and Polyfluoroalkyl Substances (PFAS) may be present).

10.44 Describe with concept and layout plans, in both plan and cross-section views, requirements for constructing, upgrading or relocating all infrastructure associated with the project. Show the locations of any necessary infrastructure easements on the plans, including infrastructure such as roads, rail (and the rail corridor), jetties, wharves and port uses and infrastructure, tracks and pathways, fencing, dams and weirs, bore fields, energy transmission infrastructure, power lines and other cables, wireless technology (such as microwave telecommunications), and pipelines for any services, whether underground or above.

10.45 Describe the site in the context of planning schemes, the Gladstone SDA development scheme, the Port Overlay for the Priority Port of Gladstone, adopted and published emerging land use plans applicable to the Port of Gladstone, regional plans, state policies and government priorities for the project sites and the region. A description of the hierarchy of government policies in the regional plans is to be included. Plans and drawings provided must be of sufficient detail for the approvals being sought to enable the Coordinator-General and advisory agencies to assess the impacts of the project.

10.46 Describe the findings of the Agricultural Land Audit[7] and any land identified as strategic cropping land, priority agricultural area, priority living area or strategic environmental area for the project site.

10.47 Describe tourist destinations and sites used for recreation in and adjoining to the product and delivery routes along the product logistics and infrastructure corridor.

Project rationale and alternatives

10.48 Demonstrate the need and scale of the project including in a regional, state and national context. The demonstrated need should also consider existing industry and other hydrogen and ammonia projects proposed in the region (where known).

10.49 Describe the objectives and rationale for the project, including strategic, economic, environmental and social implications, technical feasibility and commercial drivers. Assessment of technical feasibility is to demonstrate that the technology is sound, reliable and fit-for-purpose and include details of commissioning and proof of performance plus a description of whether the performance observed for similar facilities (either full-scale or

[7] The Queensland Agricultural Land Audit identifies land important to current and future production and the constraints to development, highlighting the diversity and importance of Queensland's agricultural industries. For more information visit https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/agribusiness/agricultural-land-audit/land-audit.

experimental/demonstration scale facilities) will be applicable to the project in the local environment. Including details of the reference facility and its location.

10.50 Describe the expected benefits and opportunities associated with the project and the relevant recipients of these benefits and opportunities (supported by relative evidence).

10.51 Present feasible alternatives of the project and project's configuration including conceptual, technological, scale and locality alternatives that may improve environmental outcomes. Describe how these alternatives have been considered and why the project is the preferred option. This should include the potential risks and impact of ammonia release into the environment (including waterways, the Great Barrier Reef World Heritage Area (GBRWHA) values, and fisheries resources (fish and marine plants)) and whether the siting of this type of development is the most appropriate to manage this risk.

10.52 Justify the preferred option, including using a cost-benefit analysis. Identify and describe interdependencies of each component of the project, particularly in regard to how infrastructure requirements (both on and off-site, including those provided by third parties) relate to the viability of the project. Describe and evaluate the comparative environmental, social, and economic impacts of each alternative (including the option of not proceeding), with particular regard to the principles of ESD.

10.53 Describe how the selected project configuration avoids and minimises impacts to the environment and results in best-case outcomes for each impact to the most important environmental values over alternative project configurations.

10.54 For unproven elements of the production complex, technology or activity, identify and describe any global leading practice environmental management that relates to the elements, where available. Demonstrate that the design of the project and its predicted outcomes are consistent with best practice environmental management during construction, operation, and decommissioning of the proposed project.

10.55 Discuss the consequences of not proceeding with the project.

11. Planning and legislative requirements

11.1 Identify all government approvals required for the project and detail all approvals for which conditions are being sought through this EIS process, including relevant project stages and components, administering authority and timeframes (using a tabular format). Sufficient information and assessment are required for conditions of approval to be drafted and for the administering authority to decide whether an approval is to be granted. Explain how the EIS process (and the EIS itself) informs the issue of development approvals / leases / licences / permits / consents required for the project. Provide details of any works that are accepted development, and those that are assessable development.

11.2 Identify any government approvals (e.g. development approvals / leases / licences / permits / consents) required for the project for which approval will be sought separate to the EIS, including relevant project stages and components, administering authority and timeframes (using a tabular format).

11.3 Provide an assessment against the relevant planning and development schemes (including the Gladstone SDA development scheme), Central Queensland Regional Plan, other land use plans (Gladstone Regional Planning Scheme 2015), port master plan and overlays for the Priority Port of Gladstone, adopted and emerging land use plans applicable to the Port of Gladstone, state policies and government priorities for the project site and the region.

Consider the provisions relative to the project and address where required, providing evidence where provisions do not apply.

11.4 Identify all approvals and notification requirements under the Work Health and Safety Act and Regulations 2011.

11.5 Provide information about the current activities undertaken to date by the proponent and/or agent(s) acting on the proponent's behalf to progress the project within the administrative areas of Gladstone local government area (LGA), Gladstone SDA and Port of Gladstone including information about current operational approvals (planning, development and environmental approvals) and the extent to which they have been exercised.

11.6 Clearly describe and illustrate the parts of the project in the Gladstone SDA and the parts of the project in the Port of Gladstone Land Use Plan and Port Overlay.

11.7 Describe how the Port of Gladstone overlay interacts with the Gladstone SDA development scheme where development may be proposed in both areas.

11.8 Describe any approvals or entitlements required under the *Water Act 2000* and relevant water plan/s and address relevant legislative requirements and water volume limitations.

11.9 Describe any legislative requirements that would need to be met in relation to the project's potential impacts on protected areas, reserves, declared fish habitat areas and State forests. If the project's potential impacts are considered to be inconsistent with the values of these areas, include a description of any proposed revocation process for changing the boundaries of State forests or other protected areas.

11.10 Demonstrate compliance with the most current *Reef 2050 Long Term Sustainability Plan*.

11.11 Describe any legislative requirements that would need to be met to locate infrastructure on state land or tidal land.

11.12 Identify the legislative requirements to install any utility assets (e.g. pipelines) on or under state-controlled roads and justify locating such assets on public land. For any new pipeline crossings under a state-controlled road, demonstrate compliance with the *Transport Infrastructure Act 1994* and comply with Department of Transport and Main Roads (DTMR) construction standards. Provide Registered Professional Engineer of Queensland certified plans and work methodology compliant with relevant legislation.

11.13 The State Planning Policy (SPP) and the SDAP prescribed in the Planning Regulation 2017 (Planning Regulation) set out the matters of interest to the State for development assessment. The EIS is to:

(a) identify the SPP and SDAP state codes relevant to the project

(b) demonstrate the project's consistency with the relevant SPP.

11.14 Demonstrate the project satisfies the information requirements by providing an assessment against the most up to date version of the relevant SDAP state codes. Further information on SDAP requirements can be accessed from: **https://planning.dsdmip.qld.gov.au/planning/better-development/the-development-assessment-process/the-states-role/state-development-assessment-provisions.**

11.15 The EIS is to provide, where relevant, the information required under section 125 of the EP Act in support of the project's application for any required ERAs. Any ERA to be conducted as part of the project should be listed separately with the appropriate ERA number, activity name and required threshold (see Schedule 2, EP Regulation for a list of ERAs). The assessment and supporting information, where relevant, is to be sufficient for the administering authority to

decide whether an approval should be granted.[8] Environmental values, information and approval requirements are specified in the EP Act, the EP Regulation, EPP and relevant guidelines.

11.16 Describe the assessment process under the bilateral agreement between the Commonwealth and the State of Queensland.

11.17 Describe the approvals process under the EPBC Act.

12. Stakeholder consultation

12.1 In preparing the EIS, consult with directly affected landholders, authorised tenure holders (including but not limited to mining development licence, petroleum pipeline licence), relevant stakeholders including local, state and Commonwealth government agencies, government owned corporations, industry operators, Aboriginal and Torres Strait Islander peoples and potentially affected communities, directly affected communities and indirectly affected key stakeholders.

12.2 Describe in a stakeholder engagement report, the stakeholder engagement activities that have occurred during the preparation of the EIS, identify the issues raised during the consultation, and explain how the responses from stakeholders have been incorporated into the design and outcomes of the project.

13. Assessment of project specific matters

13.1 This section sets out the scope of project specific matters that are to be given detailed treatment in the EIS. Assessment of each matter is to consider the potential direct and indirect (including facilitated/consequential and cumulative) impacts of the project at the local and/or regional scale.

13.2 The proponent is to engage with the Office of the Coordinator-General throughout the development of the EIS to clarify the scope of assessment of each project specific matter.

[8] For technical information requirements see **https://www.business.qld.gov.au/running-business/environment/licences-permits/applying/technical**.

Hazards, health and safety

Objectives and outcomes

The design, construction and operation of the project is to ensure:

(a) the risk of, and adverse impacts from, natural and human-made natural hazards are identified, avoided, minimised or managed and mitigated to protect people, property and the environment

(b) the community's resilience to natural hazards is enhanced

(c) development is appropriately located, designed and constructed to minimise health and safety risks to communities and individuals and adverse effects on the environment

(d) production of hazardous waste is minimised and hazardous wastes are contained until appropriate disposal at an approved facility.

Existing environment

13.3 Describe the vulnerability of the project sites to natural and induced hazards, including drought, coastal erosion, bushfires, heat, severe wind, tsunami, cyclones, earthquakes, storm surge and floods from all sources (including fluvial, tidal, surface waters, groundwater, reservoir, industrial water storages and dams). Consider the relative frequency and magnitude of these events.

13.4 Identify (on a map) and provide a description of any existing or proposed major hazard facilities located within the Gladstone LGA, Gladstone SDA and Port of Gladstone.

13.5 Describe the likelihood and history of flooding (from all sources including tidal inundation) on the project sites and surrounding areas that may be affected by the project or have the potential to impact on the project, including the extent, levels and frequency and current flood risk for a range of annual exceedance probabilities up to the probable maximum flood for potentially affected waterways.

13.6 Identify any potential hazards associated with legacy mining or exploration activities on the project sites and surrounding areas that may be affected by the project or have the potential to impact on the project.

Impact assessment

13.7 Describe the potential risk to people, property, waterways, waterbodies, coastal and marine waters, soil, flora and fauna (including fisheries resources[9]) that may be associated with the site in the form of a preliminary risk assessment for all components of the project including any storage and handling areas, operational aspects and pipelines in accordance with relevant standards. The assessment should include:

(a) the safety of employees during design and planning of the project

(b) identification of all hazardous chemicals to be used, stored, processed or produced, including maximum inventories to be stored on site and in pipelines, and the rate of usage

[9] Includes fish and marine plants.

(c) the proposed plant layout including occupied buildings, location of storage of hazardous substances and infrastructure required for transport of hazardous substances

(d) preliminary design information for equipment for the storage, processing and transport of hazardous substances

(e) process flow diagram(s)

(f) external and on-site risks including transport risks

(g) potential hazards, accidents, spillages, shutdowns, fire and abnormal events that may occur during all stages of the project including estimated probabilities of occurrence

(h) potential natural hazard events (e.g. bushfire, cyclone, flooding, storm surge and tidal inundation, seawater level rises, tsunami, coastal erosion, bushfire, earthquakes and landslides)[10] including:

(i) implications and vulnerabilities related to climate change

(ii) the cumulative impact of a number of natural hazards occurring at the one time

(i) any wildlife hazards

(j) any potential hazards associated with legacy mining or exploration activities

(k) how the project may potentially affect hazards on the project sites and surrounding areas that may be affected by the project (including but not limited to changing flooding characteristics, groundwater and surface water contamination, air quality, bushfire, landslide)

(l) offsite hazards associated with existing and proposed facilities, including mapping.

13.8 Identify any potential aviation safety risks owing to the generation of emission plumes.

13.9 Identify the potential risk and impacts of ammonia release on fisheries resources and how this and other potential impacts to fisheries resources will be avoided and mitigated.

Major hazard facility

13.10 Provide details of potential hazards from the proposed facility, associated infrastructure corridor, pipelines, and port activities.

13.11 Identify the location in both a tabular format (detailing the lot/plans, where infrastructure is to be constructed, activities carried out, and location of major hazard facilities) and on a map. This is to include whether facilities requiring Major Hazard Facility approval are proposed to be established on strategic port land.

13.12 Identify the estimated quantity in tonnes of hydrogen and ammonia and other hazardous chemicals to be:

(a) stored and handled in the production precinct at the key production stages

(b) stored in pipelines between the production and export precincts and any pipelines operated by third parties that contain hydrogen or ammonia generated by the project and supplied as part of any offtake agreements

(c) transported in the infrastructure corridor and stored and loaded in the export precinct.

[10] Refer to relevant Local Disaster Management Group Plans and Queensland Emergency Risk Management Framework, including State risk assessment plans for heatwave, earthquake and severe wind (see **https://www.disaster.qld.gov.au/qermf/Pages/Assessment-and-plans.aspx**).

13.13 Describe how the project design and siting complies with the objectives, performance outcomes and other requirements of the SDAP *State Code 21: Hazardous chemical facilities*. This should include details of how the facility will be designed according to sound engineering principles, Australian Standards related to dangerous goods and hazardous substances (including hydrogen and ammonia) and other good-industry-practice to eliminate or minimise health and safety risks (see Appendix 2).

13.14 Describe how any hazardous chemical facility risk created by the project is proportionate to the sensitivity of the surrounding land uses or zones, as per SDAP State Code 21.

13.15 Provide a preliminary risk assessment of any off-site physical or chemical hazards associated with existing and proposed facilities (identifying these on a map) including existing and proposed future port industry operations (where known).

13.16 Describe how the project design and location provides for adequate protection from an off-site hazard scenario and any natural hazards applicable to the location.

Chemical leaks and spills

13.17 Describe the proposed procedures and safeguards built into the design and management/ operational practices to:

(a) reduce the potential for chemical leaks and spills

(b) enable the detection of spills and leaks and management measures to be implemented to rectify

(c) provide procedures for managing water in containment areas

(d) outline an inventory and describe the characteristics and management involved in the handling, storage, spill management, transport and disposal of all chemicals, products/by-products and potential contaminants as a result of construction, operation, maintenance, commissioning and decommissioning.

13.18 Include identification of buffer zones and all means that will be incorporated to ensure human health and the environment are protected and not impacted.

Coastal management

13.19 Describe and illustrate (with suitably scaled maps) the location of the coastal management district, erosion prone areas and storm tide hazard areas within and adjacent to all components of the project sites.

13.20 Detail how coastal erosion risks are avoided or mitigated and identify and characterise any development free buffers on the proposed project sites.

13.21 Describe storm tide inundation risk to the project for a range of annual exceedance probabilities for all parts of the project. Take into consideration potential sea level rise scenarios.

13.22 Assess (through hydrodynamic modelling) how the project may affect storm tide hazard vulnerability of nearby premises and ecosystems.

13.23 The assessment should consider all infrastructure associated with the project including levees, roads and linear infrastructure (such as pipelines) and all proposed measures to avoid or minimise risks to life, property, community (including damage to other properties) and the environment during storm tide events.

Flooding

13.24 Describe the history of flooding (from all sources including fluvial, tidal, surface waters, groundwater and reservoir) on the project sites (i.e. production precinct, logistics and infrastructure corridor, export precinct) and surrounding areas that may be affected by the project or have the potential to impact on the project.

13.25 Describe, illustrate and assess where any proposed infrastructure for the production precinct, logistics and infrastructure corridor, export precinct (and any other required infrastructure – new and upgraded) would lie in relation to the existing and predicted flood risk from all sources (including fluvial, tidal, surface waters, groundwater and reservoir) for a range of annual exceedance probabilities (including Probable Maximum Flood) for the site(s). Include a discussion on historical events and future flood scenarios.

13.26 Use flood modelling (and any additional data) to assess how the project may potentially change flooding and run-off characteristics on-site and both upstream and downstream of the site. The assessment must consider all infrastructure associated with the proposed project and all proposed measures to avoid or minimise impacts. Include an assessment of in-combination effects for flood and storm surge events. The flood modelling assessment should consider local and regional flooding and all infrastructure associated with or near the project including levees, roads and linear infrastructure and all proposed measures to avoid or minimise impacts and risks to life, property, community (including damage to other properties) and the environment during flooding and storm surge events.

13.27 Describe how infrastructure would be sited to avoid or minimise risks from flooding.

13.28 Demonstrate how the flood management measures will ensure that flood risk is not increased within and offsite.

Mitigation measures

13.29 Provide preliminary design considerations on reducing the risks, so far as reasonably practical, to ensure that:

(a) any off-site physical or chemical hazards and risks associated with a hazardous chemical facility or major hazard facility are identified and managed appropriately to protect human health and safety and the environment, proportionate to the sensitivity of the surrounding land uses, zones and environmental values

(b) the design and siting of the project provides adequate protection from the harmful effects of an offsite hazard scenario at an existing hazardous chemical facility and any natural hazards applicable for the location.

13.30 Detail proposed mitigation strategies and management measures to minimise hydrogen and ammonia, and other chemical (including hydrogen carriers if proposed) hazards (e.g. spills/leaks, toxic dispersion, accidental fire or explosion) during production, handling, storage or transport.

13.31 Describe the proposed procedures and safeguards built into the design, operational practices and management that will reduce the likelihood and severity of hazards, consequences and risks to persons, air, waterways and waters (including surface and groundwater, fresh and tidal), flora and fauna on and off-site (giving consideration to any identified hazards and associated risk as per the preliminary risk assessment) including:

(a) identify how the design, management and operational practices:

(i) avoid and/or reduce the potential for accidental releases (leaks and spills) or hazardous substances including during natural hazard events

(ii) enable the detection of accidental releases and management methods to be implemented to rectify these

(iii) manage water in contaminated areas

(iv) demonstrate that the securing of storage containers of hazardous contaminants during flood events meets the requirements of schedule 8 of the Environmental Protection Regulation 2008

(b) identify and detail composition of buffer zones or separation distances from inhabited areas and other sensitive receptors

(c) provide an outline of the proposed integrated emergency management planning procedures (including evacuation plans if required) for the situations and/or events identified in the risk assessment(s) including strategies to deal with natural disasters during construction and operation, and how resources (including but not limited to food and water) will be maintained at project accommodation facilities where access is restricted in an emergency event

(d) provide an outline of the proposed safety management system(s) that will be used to control the risks during pre-construction, construction, commissioning and operation phases of the plant and include maps showing access and egress to the site for emergency services

(e) as part of the emergency response plan include:

(i) a bushfire management plan, certified by a suitably qualified person, in consultation with the Queensland Fire and Emergency Services addressing construction and operations, and including the following information at a minimum:

- a bushfire hazard analysis
- mitigation strategies to achieve the relevant development outcomes in Part E of the State Planning Policy– Natural Hazards, Risk and Resilience (DILGP 2017)
- provides details of the proposed ongoing management of fuel loads across the project sites

(ii) a safety and emergency management plan addressing construction and operations, and including at a minimum, evacuation plans for the construction and operation phases of the development

(f) safety management plans and emergency response procedures in consultation with the state and regional emergency service providers (including Queensland Fire and Emergency Services) and provide an adequate level of training to staff who will be tasked with emergency management activities

(g) identify the residual risk following application of mitigation measures

(h) present an assessment of the overall acceptability of the impacts of the project, considering the residual uncertainties and risk profile.

13.32 Outline any consultation already undertaken or proposed with the relevant state, district and local emergency response authorities and organisations, including the Local Disaster Management Group.

13.33 Assess compliance of the development with maritime security requirements applicable to port facilities and infrastructure under the *Commonwealth Maritime Transport and Offshore Facilities Security Act 2003* (including a Maritime Security Plan for the project and wharf access arrangements), International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk 1986 (the IGC Code) and the International Maritime Organisation's resolution MSC.420(97) (Interim Recommendations for Carriage of Liquefied Hydrogen in Bulk).

13.34 Describe how the achievement of the health and safety objectives would be monitored, audited and reported and how corrective preventative actions would be managed for all phases of the project.

Land

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid or minimise impacts on the environment and improve environmental outcomes

(b) protect the environmental values of land including soils, subsoils, landforms, waterways and associated flora and fauna

(c) avoid or minimise serious environmental harm on sensitive land uses and sensitive receptors and areas of high conservation value and special significance

(d) contribute to strong and balanced social, economic and environmental sustainability in accordance with best practice environmental management.

The performance outcomes corresponding to these objectives are in Schedule 8, Part 3 of the EP Regulation.

Land use and tenure

Existing environment

13.35 Describe the following:

(a) existing and proposed land uses and infrastructure, in and around the project site that may be impacted by the project (including but not limited to water, sewer, electricity, gas and other industrial land uses) in the Gladstone LGA, Gladstone SDA and Port of Gladstone, urban areas, Traditional Owner land and cultural practice areas, state leasehold land, reserves, unallocated state land, State forests and protected areas, watercourses, easements and road reserves. This should be supported by maps with Lot/Plan descriptions

(b) any tenures, overlying and adjacent to the project sites

(c) planning and development schemes, regional and land use plans, port land use plans, priority port master plan and overlays relevant to the project

(d) the provisions of the planning and development schemes (including land use plans and port overlay) and assessment benchmarks and criteria relating to material changes of use and operational works that apply to the project

(e) state interests identified in the SPP affecting the project alignment

(f) SDAP codes relevant to the project

(g) design and locational factors influencing the selection of the project components and the project sites.

13.36 Describe and map the extent of any known agriculture, petroleum, mining and exploration activities or quarries of commercial significance in the project sites, including, but not limited to:

(a) petroleum and other pipeline infrastructure

(b) registered exploration permits and applications for exploration permits

(c) mineral development licences and applications for mineral development licences

(d) mining leases and applications for mining leases, including access arrangements,

(e) geothermal and greenhouse gas storage tenures

(f) known economic resources and their future availability

(g) active, disused, or abandoned workings on the project sites and surrounding areas that may be affected by the project or have the potential to impact on the project

(h) findings of the Agricultural Land Audit and AgTrends Spatial web mapping app.[11]

Impact assessment

13.37 The assessment of impacts on land is to be in accordance with the Department of Environment and Science (DES) A*pplication requirements for activities with impacts to land* and DES *Land – EIS information guideline* (see Appendix 2). Demonstrate that the project can meet the environmental objectives and performance outcomes relevant to land in Schedule 8 of the EP Regulation.

13.38 Provide a detailed assessment of the project in the context of the Gladstone SDA Development Scheme, Our Place Our Plan Gladstone Regional Council Planning Scheme (including the relevant trigger codes), Land Use Plan for the Port of Gladstone (including any emerging plan) and the Port Overlay for the Priority Port of Gladstone. With reference to the Gladstone SDA development scheme this includes an assessment against the strategic vision, overall objectives, preferred development intent for the relevant precinct/s, and SDA wide assessment criteria.

13.39 Discuss the compatibility of the project with the surrounding area and the Gladstone region, taking into consideration the proposed mitigation measures to avoid or minimise impacts.

13.40 Describe potential impacts of the proposed land uses. Identify any existing or proposed incompatible land uses within and adjacent to the site.

13.41 Identify all state and regional planning interests potentially impacted by the project, and the source of mapping to identify those interests. Where mapping is not available, identify the methodology followed to prepare the mapping and its scale.

13.42 Detail how the construction and operation of the project will change existing and potential land uses of the project sites and adjacent areas.

[11] https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/agribusiness/agtrends-spatial.

13.43 Address impacts on any identified agriculture, petroleum, mining and exploration activities including any consultation undertaken with tenement holders, with respect to accessing land, impact assessment and mitigation measures.

13.44 Identify existing and potential Native Title rights and interests impacted by the project. Detail and illustrate on maps the following Native Title considerations:

(a) current tenure of all land or waters within the project site (which may include creeks)

(b) land or waters where Native Title has been determined to exist by the Federal Court

(c) land or waters that are covered by a Native Title determination application

(d) land or waters that are covered by a registered ILUA.

13.45 Describe potential impacts on existing uses in the State forests and uses either allowed by current tenures or publicly proposed by government.

13.46 Describe the potential direct and indirect impacts on the natural and cultural resources and values of all protected areas and State forests, in the project area arising from the construction and operation of the project.[12]

13.47 Describe any proposed tenures to be applied for as part of this project, including any necessary approvals and/or owners' consent.

13.48 Identify land acquired under contract of sale and any further proposals for land acquisition, lease or other tenure arrangements including the intended approach, any approvals and/or owners' consent, stakeholders and agencies, and anticipated timeline that will be undertaken to secure tenure for the project.

13.49 Identify any opportunities for co-location and leased or shared infrastructure agreements, including the intended approach, stakeholders and agencies, and anticipated timeline that will be undertaken to secure access and usage.

Mitigation measures

13.50 Describe proposed measures to avoid, mitigate or minimise impacts on existing and proposed land uses in the surrounding area.

13.51 Identify the potential measures for managing impacts on existing and potential Native Title rights and interests by ILUAs or other measure in accordance with the *Native Title (Queensland) Act 1993* and consistent with the *Queensland Native Title work procedures* (see Appendix 2).

13.52 Describe alternatives considered to avoid adverse impacts on any State forests and protected areas.

13.53 Where adverse impacts on protected areas and State forests cannot be reasonably avoided, describe:

(a) the legislative mechanisms that would need to be followed for approval of these impacts

(b) how these impacts would be minimised and mitigated

(c) how these impacts would be offset (e.g. what compensatory measures would be provided by the proponent).

[12] Natural resources' 'cultural resources' and 'protected area' within the definitions under the *Nature Conversation Act 1992*.

13.54 Provide a description of how ecological processes and connectivity to habitats, corridors and waterways are maintained between the State forest areas, protected areas and adjoining areas where those adjoining areas are impacted by the project.

Visual amenity

Existing environment

13.55 Describe and illustrate the landscape character and environment, including key natural landscape features, major views, view sheds and outlooks that contribute to the amenity of the area.

Impact assessment and mitigation measures

13.56 Provide an assessment of the potential visual impacts of the development on the amenity of the surrounding area particularly from nearby public receivers and significant vantage points of the broader public domain such as major roads and Mount Larcom. This should include a detailed photomontage analysis of the visual impacts of the development.

13.57 Describe any proposed measures to avoid, minimise or mitigate potential impacts on landscape character and visual amenity including:

(a) how the proposed design of building/structure(s) height, stack/vent(s) height, bulk and scale, signage, reflective surfaces, lighting and the emissions plume have been considered within the context of the locality

(b) justification for the positioning and height of vertical structures (e.g. air separation units) and vent/stack(s), including consideration of options for design and height

(c) details of design measures to ensure a high-quality design and landscape works that will complement and screen the development.

Topography, geology and soils

Existing environment

13.58 Describe, including maps, the geology of the project sites, with particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures within the proposed areas of disturbance.

13.59 Describe the geological properties that could impact upon ground stability and influence the nature and location of project activities.

13.60 Identify and investigate areas of salinity, sodic, dispersive and cracking clay soils, and potential and actual areas of acid sulfate soils of the project sites. Where potential areas are identified, further investigations (including field surveys) are to be undertaken in accordance with accepted industry guidelines and the requirements of the *SPP* – State interest guideline *Emissions and hazardous activities*.

13.61 Detail any known or potential sources of contaminated land that are relevant to the project (on and off-site), including any area which has been or is being used for a 'Notifiable Activity' as listed in Schedule 3 of the EP Act, is potentially contaminated, or is on the Environmental Management Register or Contaminated Land Register.

13.62 Provide details, including maps, existing soil conservation works (including but not limited to contour banks, waterway discharge points) and existing erosion control works, in particular,

those approved as project plans or property plans approved under the provisions of the *Soil Conservation Act 1986*.

Impact assessment

13.63 The assessment of impacts on topography, geology and soils will be in accordance with the DES *Land – EIS information guideline*, *Guideline for soil survey along linear features*, *Guidelines for surveying soil and land resources*, *Australian soil and land survey field handbook*, and *Queensland Soil and Land Resource Survey Information Guideline*. If any quarry material is needed for construction, the DES *Quarry material – EIS information guideline* (see Appendix 2).

13.64 Describe how any proposed land use may result in land becoming contaminated as result of the project.

13.65 Identify activities or operations likely to impact on existing erosion control works and any soil conservation plans, in particular, those approved as project plans or property plans under the *Soil Conservation Act 1986.*

Mitigation measures

13.66 Detail proposed measures taken during the construction and maintenance of the project to avoid and minimise land degradation. Land degradation includes but is not limited to soil erosion, the expression of salinity, waterlogging, and mass movement by gravity of soil or rock.

13.67 Describe the actions to be undertaken to avoid, identify, remediate and manage land that is contaminated or becomes contaminated.

13.68 Describe the measures to avoid, minimise or mitigate potential impacts of the project on soil values.

13.69 Where potential and actual acid sulfate soils have been identified, prepare an acid sulfate soil management plan in accordance with accepted industry guidelines and the requirements of the SPP – state interest guideline *Emissions and hazardous activities* that appropriately manages the disturbance of acid sulfate soils to avoid or minimise the mobilisation and release of acid, iron, or other contaminants.

13.70 Describe likely changes to the natural landform. Show how landforms, during and after disturbance, will meet any requirements of project or property plans approved under the *Soil Conservation Act 1986*.

Water quality

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid, minimise and/or mitigate adverse impacts to water quality

(b) protect environmental values of waters

(c) protect environmental values of wetlands

(d) protect environmental values of groundwater and associated surface ecological systems

(e) maintain or enhance water quality to achieve water quality objectives.

The performance outcomes corresponding to these objectives are in Schedule 8, Part 3 of the EP Regulation.

Existing environment

13.71 With reference to the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 and section 9 the EP Act, identify the environmental values of surface (including wetlands) and groundwaters on the project sites and surrounding areas that may be affected by the project(including tidal waters and immediately downstream), including any human uses and cultural values of water (where known).

13.72 Describe historic and existing surface water and groundwater quality in terms of physical, chemical and biological characteristics of surface waters and groundwater on the project sites and surrounding areas that may be affected by the project(including tidal waters).

13.73 Include a description of water quality variability within the project sites and surrounding areas that may be affected by the project associated with climatic and seasonal factors, variability of freshwater flows and extreme events using suitable reference locations and sufficient data to adequately establish baseline condition and define natural variation, including seasonal variation.

13.74 Describe, using a conceptual model, the hydrology and hydrogeology within the project sites and surrounding areas that may be affected by the project, including adjoining tidal waterways and waters in terms of water levels, discharges and tidal (including brackish) and freshwater flows. Detail the interaction of freshwater flows with different tidal states. Detail groundwater flows and groundwater and surface water interactions.

13.75 The assessment is to include a literature review supplemented by a suitable sampling program supported by sufficient site-specific baseline data. These additional matters are to be discussed:

(a) the relationship of water quality to flow, using local catchment examples

(b) water quality issues (such as stratification, eutrophication and deoxygenation) within and downstream from existing storages in the system

(c) the confirmed or likely causes of present water quality impacts (if any)

(d) the suitability of existing raw water quality for proposed on-site uses and any treatment required

(e) correlate groundwater quality results with surface water data to define interactions and flow directions

(f) identify any water quality variations along the length of any alluvium upstream and downstream of infrastructure, or surface water locations

(g) surface water quality samples must include as a minimum, electrical conductivity, pH, sulphate, fluoride, dissolved oxygen, turbidity, total suspended solids, nutrients, dissolved and total metals and metalloids, total recoverable hydrocarbons and major anions and cations plus any other potential contaminants as a result of the proposed project. Groundwater indicators must include the same indicators (except turbidity and total suspended solids) as a minimum and should allow for all water quality objectives for local groundwater to be assessed.

Impact assessment

13.76 The assessment of impacts on water is to be in accordance with *DES Water - EIS information guideline (DES 2020)*, *Applications for activities with impacts to water (DES 2017)*, *Water quality guideline*s (Queensland Government, 2020), *Monitoring and sampling manual* (DES 2018), G*roundwater quality assessment guideline* (DSITI 2017) and *Using monitoring data to assess groundwater quality and potential environmental impacts* (Queensland Government 2017). Demonstrate the project can meet the environmental objectives and performance outcomes in Schedule 8, Part 3 of the EP Regulation.

13.77 Define the relevant water quality objectives applicable to the environmental values and demonstrate how these will be met by the project during construction, operation, decommissioning and following proposed project completion. Where water quality objectives are not available, local water quality objectives are to be derived according to latest water quality guidelines for waters (see Appendix 2). Spatially identify any semi-permanent or permanent streams and pools, stock watering locations, groundwater aquifers (including where surface water interactions are likely) and other environmental values locations.

13.78 Provide a detailed site water balance, including identification of water requirements for the proposal, water storage and treatment on site, and potential water releases or losses.

13.79 Identify the predicted quantity and quality (including location, timing and duration) of all potential and/or proposed discharges of water and sewage, and desalination (including as concentrate or brine if reverse osmosis is proposed) wastewater by the project, whether as point sources (such as controlled discharges) or diffuse sources (such as irrigation to land of treated sewage effluent or discharges of brine to seawater). Where disposal of brine is required, assess near-field mixing and dispersion, including the potential impacts on water quality and aquatic ecosystem values.

13.80 Provide stream flow data and information on discharge water quality, including any potential variation in discharge water quality that will be used in combination with proposed discharge rates to estimate in-stream dilution and water quality. Chemical and physical properties of any wastewater, including concentrations of constituents, at the point of entering natural surface waters, which includes tidal waters, must be discussed along with toxicity of effluent constituents to human health, aquatic biota and other flora and fauna. Describe the potential impacts of any discharges (point and diffuse) on the quality and quantity of receiving waters (including groundwater) and wetlands taking into consideration the assimilative capacity of the receiving environment given existing water quality and other potential point source discharges in the catchment. The assessment is to include, but not be limited to, the following:

(a) options for controlled discharge at times of natural stream flow must be investigated to ensure that adequate flushing of wastewater is achieved

(b) provide water quality limits that are appropriate to maintain background water quality and protect other water uses

(c) the necessary streamflow conditions in receiving waters under which controlled discharges will be allowed

(d) consider the resultant quality and hydrology of receiving waters and the practices and procedures that would be used to avoid or minimise impacts.

Refer to DES *Receiving environment monitoring program guideline for use with environmentally relevant activities under the EP Act* (see Appendix 2).

13.81 Characterise the nature and extent of any existing surface and groundwater contamination on the project sites. Describe the potential for contaminant interaction with the project and any proposed management measures in accordance with DES *Contaminated land – EIS information Guideline* (see Appendix 2).

Mitigation measures

13.82 Demonstrate how the project will protect environmental values and achieve water quality objectives and ensure that environmental impacts would be avoided or minimised through the implementation of management strategies that comply with the management hierarchy and management intent of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019.

13.83 Demonstrate how the project will meet the outcomes of the Calliope Basin as described in the Great Barrier Reef end-of-basin water quality objectives (under the EPP (Water and Wetland Biodiversity) 2019) for fine sediments and dissolved inorganic nitrogen and the objectives of the Reef 2050 Water Quality Improvement Plan during construction, operation and decommissioning. Demonstrate that releases would meet protection measures and regulation regarding the release of contaminants to the Great Barrier Reef.

13.84 Describe and include in the EMP avoidance and mitigation strategies and contingency plans for:

(a) potential accidental discharges of contaminants and sediments during construction and operation

(b) stormwater run-off from the project facilities and associated infrastructure during operation of the plant

(c) flooding of relevant river systems, the effects of tropical cyclones, tidal surges, sea level rise and other extreme events

(d) erosion and sedimentation during construction, operation and decommissioning of the project with reference to the International Erosion Control Association's Best Practice Erosion and Sediment Control and the former Department of Environment and Resource Management's Urban Stormwater Quality Planning Guidelines 2010

(e) management of acid sulfate, sodic and dispersive soils

(f) impacts to other properties and the environment during flood events

(g) the treatment and disposal processes for all wastewater produced as a result of the project, including construction activities

(h) the proposed management of existing, altered and/or constructed waterbodies including any watercourse, waterway, lake or spring on the project sites to maintain water quality

(i) to avoid and minimise impacts occurring to groundwater.

13.85 Describe how monitoring would be used to demonstrate that surface and groundwater quality objectives, including tidal waters, were being assessed, audited and met. For example, provide measurable criteria, standards and/or indicators that will be used to assess the condition of the ecological values and health of surface water environments. Propose corrective actions to be used if objectives are not likely to be met.

Water resources

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid, minimise and/or mitigate adverse impacts to water resources

(b) ensure equitable, sustainable and efficient use of water resources

(c) maintain environmental flows, water quality objectives, in-stream habitat diversity, habitat connectivity, viability of terrestrial, riverine, wetland, lacustrine and naturally occurring inputs from riparian zones to support aquatic biotic communities

(d) protect or enhance the condition, environmental values and natural functions of waterways, watercourses, lakes, springs, aquifers and other natural water systems and watercourses – including the stability of beds and banks of waterways and watercourses

(e) protect the volumes and quality of water resources so that current lawful uses (such as entitlement holders and stock and domestic users) and other beneficial uses of water (such as spring flows, wetlands and groundwater-dependent ecosystems) are not adversely impacted by the development.

The performance outcomes corresponding to these objectives are in Schedule 8, Part 3 of the EP Regulation.

Existing environment

13.86 Describe water related environmental values, existing surface water resources and adjoining tidal waterways and groundwater aquifer systems within the project sites and surrounding areas that may be affected by the project in terms of water levels, recharge and discharge processes and the flow directions.

13.87 Detail the interaction of freshwater flows with different tidal states.

13.88 Describe existing and potential users and uses of water in areas potentially affected by the proposed project, including municipal, agricultural, industrial, mining, recreational and environmental uses of water.

13.89 Describe any existing and/or constructed waterbodies including any watercourse, waterway, lake or spring within and adjacent to the project.

13.90 Describe the quality, quantity and significance of groundwater within the project sites and surrounding areas that may be affected by the project. Include the following:

(a) characterise the nature, type, geology/stratigraphy and depth to and thickness of the aquifers; their hydraulic properties; and value as water supply sources

(b) analyse the movement of underground water to and from the aquifer(s), including how the aquifer(s) interacts with other aquifers and surface water, and the effect of geological structures on this movement

(c) characterise the quality and volume of the groundwater including seasonal variations of groundwater levels

(d) provide surveys, location and source of existing groundwater supply facilities (e.g. bores, wells, or excavations).

Impact assessment

13.91 The assessment of impacts on water is to be in accordance with DES *Water – EIS information guideline* and *DAFF Environmental impact assessment companion guide* (see Appendix 2).

13.92 Provide details of proposed monitoring, impoundment, extraction, discharge, injection, use or loss of surface water or groundwater (including volumes and rates). Identify any approval or allocation that would be needed under the *Water Act 2000*.

13.93 Provide details of existing and proposed changes to stormwater regimes, including changes to flow paths/patterns such as significant diversion or interception of overland flow and locations of interference/ disturbance of watercourses and floodplain areas. Include maps of suitable scale showing the location of diversions, changes to flow and other water-related infrastructure including water storages, sediment dams, pipes, water treatment plants, levees, drains, diversions, bunds, monitoring points and release points. Identify how this is in accordance with provisions of the *Water Act 2000* and relevant subordinate legislation.

13.94 Provide an assessment of the impact on the receiving environment and aquatic and ecological communities from any interference with waters such as redirection of flood waters through the installation of levees or construction of other facilities and infrastructure.

13.95 Describe any quantitative standards and indicators which will be used to describe the ecological values and health of surface water environments.

13.96 Develop hydrological models as necessary to describe the inputs, movements, exchanges and outputs of surface water and groundwater that may be affected by the project. The models should address the range of climatic conditions that may be experienced at the site throughout all phases of the project. Include:

(a) changes in flow regimes from diversions, water take and discharges

(b) alterations to riparian vegetation and marine plants, bank and channel morphology and wetland processes

(c) direct and indirect impacts arising from the project.

13.97 Provide details on daily, seasonal and/or peak operational requirements during the lifetime of the project:

(a) source(s) of water, including potable water, and agreements made and/or consultations undertaken to secure access to water resources

(b) potable water demand including temporary demands during construction works

(c) quality of water required, including strategies to prevent contamination

(d) quantity of water required from each source (e.g. average and maximum daily and hourly demand, total annual consumption) based on minimum yield scenarios for water reuse, rainwater reuse and any bore water volumes

(e) any additional water supply infrastructure

(f) requirements for fire-fighting or other emergency services.

13.98 Describe any contingency plans for planned and non-planned water supply failures.

13.99 Describe the options for supplying water to the project and assess any potential consequential impacts in relation to any relevant water plan and associated planning documents including the objectives, outcomes and strategies of the relevant water plan, and water management protocol.

Mitigation measures

13.100 Provide details of any water treatment systems proposed to be located on site to be used for the purpose of water supply and how this will be managed (including site layout and conceptual plans/designs). Any intentions to manage water or wastewater jointly for the purpose of water supply with existing or proposed facilities should be detailed. The proposed management of wastewater should make reference to the *Queensland Water Recycling Guidelines* and the *Queensland Water Recycling Strategy* (see Appendix 2).

13.101 Provide detailed designs for all infrastructure utilised in the treatment of on-site water including how any onsite water supplies are to be treated, contaminated water is to be disposed of and any decommissioning requirements and timing of temporary water supply/treatment infrastructure is to occur.

13.102 Provide a stormwater management strategy (including site layout and conceptual plans) that details the proposed stormwater and wastewater management systems and structures including any significant diversion or interception of overland flow, capacity of onsite detention systems, details of water sensitive urban design measures, sediment basins, discharge locations, and measures to treat, reuse or dispose of water. Demonstrate how the stormwater management strategy avoids and mitigates impacts to waterways. The topography of the site and adjacent areas should be discussed if any run-off is expected to leave the site. Demonstrate how the proposed stormwater management systems will ensure that the volume and velocity of surface water flows is not increased elsewhere, including to land accommodating existing infrastructure.

13.103 Demonstrate that stormwater management and site design will prevent contaminated water from leaving the site and in particular flowing into adjacent intertidal and tidal lands and waters. Detail the size and nature any proposed setback and buffers from intertidal and tidal lands.

13.104 Provide confirmation of an adequate and secure water supply and a detailed description of the measures to minimise water use at the site.

13.105 Describe measures that would be used to avoid, minimise or mitigate any impacts on surface water and groundwater resources.

13.106 Describe how the achievement of the water resources objectives would be monitored, audited, reported, and how corrective/ preventative actions would be managed.

13.107 Provide a policy outline of compensation, mitigation and management measures where impacts are identified. Describe how ‘make good’ provisions would apply to any water users that may be adversely affected by the project.

13.108 Provide detail that demonstrates the proposal meets the performance outcomes for SDAP State Code 18: *Constructing or raising waterway barrier works in fish habitats* (see

Appendix 2) in relation to any waterway barrier works that interfere with fish movement throughout waterways.

Flora and fauna

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid, minimise and/or mitigate adverse impacts to flora and fauna

(b) avoid, minimise and/or mitigate adverse and significant residual impacts (SRIs) to flora and fauna which are MSES, and where they cannot be avoided, offset any residual impacts identify and appropriately safeguard MSES to support healthy and resilient ecosystems

(c) ensure the sustainable, long-term conservation of biodiversity

(d) ensure critical habitat receives special management considerations and protection through a management plan for the proposed project

(e) protect all environmental values relevant to adjacent and receiving environmentally sensitive areas

(f) provide for the conservation of the marine environment, particularly the Great Barrier Reef

(g) avoid constructing or raising waterway barrier works in fish habitats, or where this is unreasonably possible ensure the impacts of waterway barrier works in fish habitats are minimised and constructed to maintain connectivity, habitat values and fish passage

(h) avoid development on tidal land except for components that have a functional requirement to be located there (e.g. jetties, pontoons)

(i) result in no potential or actual adverse effect on a wetland as part of carrying out the activity.

General content

13.109 This section should specifically address the project's impacts on MSES and other regionally significant biodiversity, and cultural (where known) and natural environmental values. Where MSES are also matters of national environmental significance (MNES), a cross reference to where they have also been assessed in the MNES chapter should be provided. It is recommended that this section is structured to include separate assessment for each MSES.

13.110 Include details on the scope, methodology, timing, effort and results of field surveys undertaken in the EIS. Ecological survey reports including field proformas and data sheets should be provided.

13.111 Using maps at a suitable scale, illustrate the context of the project sites in relation to surrounding MSES. This includes the location of:

(a) existing and proposed infrastructure (including water discharge points)

(b) proposed buffers (including firebreak and safety buffers)

(c) access tracks (including existing) required for construction and maintenance

(d) any areas of disturbance required for sourcing quarry material and the establishment of temporary non-resident workforce accommodation and construction laydown areas

(e) HAT.

13.112 When identifying impacts ensure impact figures are provided for each activity/component and stages of the project.

Existing environment

13.113 Identify and describe MSES,[13] state and regionally significant biodiversity, and natural environmental values of the terrestrial and aquatic ecology (including marine) likely to be impacted by the project.

13.114 Describe the existing quality and suitability of habitat for species that are known and have the potential to occur in the project sites. Provide the area of existing habitat (ha) for each species in the project sites.

13.115 The location of fauna and flora of cultural, local and state environmental significance within the project sites and surrounding areas that may be affected by the project, are to be shown on maps in relation to their habitat and connectivity in the landscape (including upstream and downstream of the project, including tidal lands and waters). Show areas of:

(a) regulated vegetation including prescribed regional ecosystems and essential habitat

(b) wetlands (including wetlands of high ecological significance), watercourses and drainage features

(c) threatened species records

(d) connectivity areas

(e) protected wildlife habitat

(f) waterways

(g) marine plants

(h) protected areas, State forests and conservation areas (including coastal and marine).

13.116 Describe, using relevant literature and the results of surveys, the natural and existing upstream and downstream movement and habitat requirements of all aquatic and terrestrial flora and fauna within the project sites and surrounding areas that may be affected by the project. Identify sensitivity to change of aquatic and terrestrial flora and fauna groups and of significant species.

Impact assessment

13.117 Provide a description of all relevant impacts (direct, indirect, cumulative and facilitated) on the biodiversity and natural environmental values of affected areas (such as breeding, roosting, nesting and foraging habitat) arising over the lifetime of the project (including potential/likely and known impacts) in accordance with DES guidelines (see Appendix 2). This should include detail on the likely magnitude, duration and frequency of the impacts. The assessment is to include, but not be limited to:

(a) identification of all significant flora and fauna species (including but not limited to the koala, greater glider, powerful owl, lesser sand plover, beach stone curlew.) and ecological communities in both terrestrial and aquatic environments (including marine

[13] Where a MSES is also a MNES, specific cross referencing to where it has been assessed in the MNES chapter should be provided.

plants), wetlands (including tidal and intertidal), and in sensitive areas, biodiversity values, connectivity and supporting ecological processes[14]

(b) fauna and flora of cultural significance to Aboriginal and Torres Strait Islander Peoples

(c) terrestrial and aquatic ecosystems including groundwater-dependent ecosystems, wetlands (tidal and intertidal), coastal and marine ecosystems and their interaction

(d) alterations to riparian vegetation, habitat availability, connectivity, bank and channel morphology

(e) the area (m^2) of permanent and temporary impacts to marine plants

(f) the existing integrity of ecological processes, including habitats of listed threatened, near-threatened or special least-concern species

(g) connectivity of habitat and ecosystems

(h) integrity of landscapes and places, including wilderness, reserves and similar natural places

(i) chronic, low-level exposure to contaminants or the bio-accumulation of contaminants

(j) terrestrial and aquatic species and ecosystems whether due to vegetation clearing, hydrological changes, discharges of contaminants to water, air or land, noise and other relevant matters

(k) edge effects of cleared vegetation and access to food resources

(l) actions of the project that require an authority under the *Nature Conservation Act 1992* and *Water Act 2000* (e.g. riverine protection permit), assessable development under the *Planning Act 2016*, *Vegetation Management Act 1999*, *Fisheries Act 1994,* an authority and/or permit under the EP Act, and SDA assessable development or SDA self-assessable development under the Gladstone SDA development scheme

(m) biological diversity including listed flora and fauna species and regional ecosystems

(n) protected areas, State forests and biodiversity offset areas approved by the state or commonwealth governments

(o) impacts on native fauna during construction and operation of the project due to their proximity to the project site (e.g. light, noise, vibration, waste, discharges or overflow of contaminants to water, hydrological changes, vegetation clearing, interaction with transmission lines (e.g. bird strike risk) and vehicle movements.

(p) if desalination of/or seawater is proposed as a water source for the project, identify the location and design of any intake and outfall pipelines and other infrastructure and assess the potential impacts on aquatic/marine ecosystems (including fisheries resources).

13.118 In a tabular format, identify all impacted MSES on the project sites and surrounding areas that may be affected by the project quantify (ha) any overlaps between MSES and MNES, and identify relevant legislation and assessment requirements.

13.119 If relevant, identify and discuss where proposed clearing is excluded development under the GSDA development scheme or is exempt or considered accepted development for the project under the Planning Regulation, including but not limited to matters outlined in Schedule 21,

[14] Where a MSES is also a MNES, specific cross referencing to where it has been assessed in the MNES chapter should be provided.

Part 1 – section 1(1), section 1(10)(a), section 1(10)(b). Where relevant, clearly state what exemptions apply to the clearing of vegetation for the project. Identify the requirements that need to be met/have been met to enable those clearing exemptions to apply or for the proposed clearing of vegetation to be considered accepted development.

13.120 Provide an assessment against SDAP State Code 16: *Native vegetation clearing* addressing the relevant assessment benchmarks for a coordinated project for all other purposes.

13.121 Provide detail regarding proposed stabilisation works to waterways providing for fish passage and marine plants. Provide details of any waterway barrier works that are accepted development, and those that are assessable development in accordance with the Department of Agriculture and Fisheries (DAF) guidance (see Appendix 2). For any infrastructure that constitutes assessable waterway barrier works, provide cross-sections of the waterway that show the barrier in relation to the bed and banks, and long-sections of the waterway that show the barrier in relation to the bed upstream and downstream of the structure. Describe how the barrier and hydrological conditions provide for safe, bi-directional fish passage for all members of the fish community.

Mitigation measures

13.122 Describe how the achievement of the flora and fauna objectives are to be monitored and audited, and how corrective actions are to be managed for all phases of the project.

13.123 Demonstrate how the proposal avoids native vegetation clearing, or where avoidance is not reasonably possible, minimises clearing to conserve vegetation, avoid land degradation and maintain ecological processes.

13.124 Propose practical measures (based on demonstrated successful methodologies) to avoid, minimise, mitigate and/or offset direct or indirect impacts on ecological environmental values, including measures for protecting or enhancing natural values and assess how the nominated quantitative indicators and standards may be achieved for nature conservation management. In particular, address measures to protect or preserve any listed threatened, near-threatened or special least concern species. Discuss the effectiveness of these measures and reference relevant studies and literature which support the effectiveness of these measures.

13.125 Assess the need for safety fire breaks and the need for buffer zones and the retention, rehabilitation or planting of movement corridors. The assessment must take into account the role of buffer zones in maintaining and enhancing riparian vegetation and wetlands to promote habitat connectivity, protect from site emissions including emissions to air, water, light and noise, and provide habitat.

13.126 Demonstrate how the project will be designed, constructed and operated to avoid impacts on waterways[15], tidal lands and tidal waters, and wetlands. Describe the proposed measures to mitigate impacts where impacts cannot be avoided.

13.127 For any infrastructure impacting waterways providing for fish passage, describe how these will be constructed in accordance with the Department of Agriculture and Fisheries' factsheet, '*What is not a waterway barrier work*'. If the infrastructure is likely to be a waterway barrier, discuss the alternate approval processes including but not limited to environmental impacts, mitigation, and identification of any SRIs.

[15] Waterways are defined in Schedule 1 of the *Fisheries Act 1994.* Further information can be found here: https://www.daf.qld.gov.au/business-priorities/fisheries/habitats/policies-guidelines/factsheets/what-is-not-a-waterway-barrier-work.

13.128 Propose rehabilitation criteria, in relation to natural values, that would be used to measure progressive rehabilitation of disturbed areas. Describe how the achievement of the objectives will be monitored and audited, and how corrective actions will be managed. Proposals for rehabilitation of disturbed areas must incorporate suitable habitat.

13.129 Demonstrate how any areas of marine plants that are temporarily impacted can be restored to their pre-disturbance condition within 5 years of being impacted. Provide details of any active restoration proposed including a monitoring program. Any monitoring program should clearly describe what successful restoration means, how it will be measured, and remediation actions should restoration benchmarks not be achieved.

13.130 If desalination is proposed as a water source for the project, identify design features (e.g. fish friendly screening on extraction points or measures to mitigate potential impacts on aquatic/marine ecosystems including fisheries resources). Discuss any monitoring and remediation measures should monitoring identify adverse impacts.

Offsets

13.131 After demonstrating that all reasonable on-site avoidance and mitigation measures have been applied, identify whether the project will result in a significant residual impact (SRI) on MSES, requiring an offset with reference to the *Queensland Environmental Offsets Policy*, *Queensland Environmental Offsets Policy: Significant Residual Impact Guideline* or the *Significant Residual Impact Guideline for matters of state environmental significance and prescribed under the Sustainable Planning Act 2009 – Queensland Environmental Offsets Policy* (see Appendix 2) and the Queensland Environmental Offsets framework.

13.132 Address both state and Commonwealth offset obligations in accordance with relevant state and Commonwealth legislation and policies, and clearly identify where there are overlaps across jurisdictions.

13.133 Describe and quantify any SRI and demonstrate any proposed offset sites and their capacity and habitats, or alternative offsets, are consistent with the latest version of the *Queensland Environmental Offsets Policy* (see Appendix 2).

13.134 Provide as an appendix to the EIS an offset strategy that outlines the proposed offset delivery approach to address the project's SRI on MSES and MNES.[16] The offset delivery approach is to include:

(a) identified SRI offset obligations for MSES and MNES across the state and Commonwealth jurisdictions. The extent of any SRI overlap between MNES and MSES should be identified, described and illustrated, noting that any SRI to marine plants (MSES) does not overlap with any MNES as these are separate matters. This could be provided in the form of a table and maps

(b) for staged offsets, take into account the full extent of potential impacts on prescribed environmental matters for the entire project as part of the SRI assessment

(c) an assessment of the vulnerability of any proposed offset site/s under climate change scenarios (e.g. reduced water availability, increased bushfire risk, sea level rise)

(d) an evaluation of how the proposed offset will achieve a conservation outcome for the impacted matter

[16] A single strategy addressing MNES and MSES can be provided, however there should be a clear delineation between State and Commonwealth obligations and overlaps should be clearly identified.

(e) identification of whether SRI to MSES will be addressed through a financial or proponent driven offset, including an offset delivery plan for any proponent driven offsets.

13.135 Describe any active restoration actions that would be undertaken to improve, enhance and manage native vegetation or threatened species habitat on a proposed offset site (note: applying high intensity management to low condition sites is most relevant to habitat reconstruction). Describe how the achievement of the offset strategy will be monitored and audited, and how corrective actions will be managed.

13.136 Describe any proposed measures that would be used to avoid, minimise or mitigate any impact on agricultural values when meeting environmental offset requirements required for the project.

Biosecurity

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid, minimise and/or mitigate the spread of terrestrial, aquatic and marine pest/invasive animals and weeds, disease, pathogens and contaminants

(b) control and manage existing terrestrial and aquatic weeds, terrestrial and aquatic pest animals and diseases

(c) comply with relevant provisions of the *Biosecurity Act 2014,* Commonwealth animal and pest strategies, biosecurity plans, weeds of national significance and designated pests under the *Public Health Act 2005* and relevant policies, legislation and guidelines.

Supply sufficient evidence (through studies and proposed management measures) to show these outcomes can be achieved.

Existing environment

13.137 Survey terrestrial, aquatic and marine pest/invasive animals and weeds within the project sites and surrounding areas that may be affected by the project identified as containing listed flora, fauna and ecological communities of MNES or MSES and describe their current distribution and abundance.

13.138 Survey terrestrial, aquatic and marine pest/invasive animals and weeds and describe their current distribution and abundance within the project sites and surrounding areas that may be affected by the project. This includes prohibited and restricted matters listed in the *Biosecurity Act 2014* and Biosecurity Regulation 2016, Weeds of National Significance, pests declared under Gladstone Regional Council local law and designated pests under the *Public Health Act 2005*. See Appendix 2 for relevant guidelines.

Impact assessment

13.139 Describe the project's construction and operational impacts on the spread of terrestrial, aquatic and marine pest/invasive animals and weeds and disease within the project sites and surrounding areas that may be affected by the project.

13.140 Conduct a biosecurity risk assessment for both animal and plant disease and a pest risk analysis in accordance with relevant industry guidelines.

Mitigation measures

13.141 Propose detailed measures to control and limit the spread of pests, weeds and diseases on the project sites and surrounding areas that may be affected by the project. Detail any relevant LGA biosecurity plans.

13.142 All proposed measures are to be in accordance with any relevant biosecurity surveillance or prevention measures authorised under *the Biosecurity Act 2014* and any requirements under the *Vegetation Management Act 1999* and *Planning Act 2016*.

13.143 Detail a monitoring program that would audit the success of biosecurity measures, identify whether objectives have been met, and describe corrective actions to be used if monitoring indicates objectives are not being met.

Economic

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid or mitigate adverse economic impacts arising from the project

(b) capitalise on opportunities potentially available for capable local businesses and communities

(c) create a net economic benefit to the region and State.

Existing environment

13.144 Describe the existing economic environment consistent with Coordinator-General's *Economic Impact Assessment Guideline* (see Appendix 2). The analysis is to describe the local and regional economies likely to be impacted by the project and identify the relevant stakeholders, and include:

(a) map(s) illustrating the local and regional economies that could be potentially impacted by the project

(b) population of relevant LGAs

(c) the regional economy's key industries and their contribution to regional output

(d) relevant economic indicators (e.g. agriculture, water prices, energy prices)

(e) predicted electricity supply and demand, transmission and the strategic direction of the region and the State in relation to electricity supply and demand

(f) existing electricity infrastructure in the region and any plans for connection to the project

(g) existing and proposed water infrastructure in the region

(h) existing and proposed energy, hydrogen and ammonia projects in the Gladstone LGA, Gladstone SDA and Port of Gladstone.

13.145 Describe the preferred project delivery model (including funding sources) and expected timeframes, outlining assumptions on economic externalities that have the potential to impact on the delivery model and/or expected timeframes.

Impact assessment

13.146 Identify the net economic impacts of the project on the local and regional area and the State ensuring the analysis is consistent with the Coordinator-General's *Economic Impact Assessment Guideline*.

13.147 The economic impact assessment is to address matters including, but not limited to:

(a) labour demand, including the ability for labour (including specialists) to be drawn from the existing local, regional and state workforce, and the potential effects this may have on local and regional businesses

(b) raw input demand, including the ability for existing local, regional and state suppliers to provide relevant raw and manufactured inputs

(c) anticipated impacts the project will have on water prices, grazing, agriculture, domestic, small business and industrial energy prices, wages, economic growth, renewable energy projects

(d) the anticipated value of offsets required for all components of the project.

13.148 Provide an analysis of the project's contribution to climate change-related economic and financial risks and benefits to Queensland based on best practice assessment frameworks, such as the Task Force on Climate-related Financial Disclosures (TCFD) framework. This analysis must be based on a scenario consistent with achieving the goals of the Paris Agreement (of which Australia is a signatory) to limit global warming to as close to 1.5°C as possible. Additional scenarios can be included for comparison, however, the central assessment should be aligned with 1.5°C.

13.149 Quantify the employment (including an estimate of supply chain employment) and value-added contribution of the project to the local, regional and state economies in a regional impact assessment (RIA) using computable general equilibrium modelling. The RIA is to estimate the changes in key indicators including:

(a) gross regional project

(b) gross state product

(c) employment by industry

(d) energy prices for residential, small business and large industrial users

(e) water prices for residential and industrial users

(f) gross value added by industry.

13.150 Provide a demand analysis for the project as justification for the scale and scope of the proposal, with emphasis on the following:

(a) demand for energy (including renewables), hydrogen and ammonia projects within the Gladstone LGA and Gladstone SDA and Port of Gladstone having regard to existing and proposed facilities

(b) impacts that the proposal will have on the uptake of alternative renewable energy projects within the region

(c) timeframe for uptake of demand.

13.151 Undertake a cost-benefit analysis (CBA) that identifies the structure of the project and the relevant direct costs and benefits from the project. The CBA is to consider:

(a) key construction inputs and milestones

(b) the project timeline

(c) relevant renewal costs related to the project (including projected repair/replacement of infrastructure)

(d) operational costs, including all input costs of production

(e) benefits, including revenue projections (and stipulating unit/price assumptions)

(f) expected project life and any residual value over the assessment period.

13.152 In addition, the CBA framework is to identify all direct private, indirect, and external social costs and benefits. These would include:

(a) external net benefits (such as third parties who are providing inputs such as water and energy) to the project

(b) external net costs (to third parties, community, local and State government) as a direct result of the project

(c) comparisons of all direct, indirect and external costs and benefits and valuing those direct, indirect and external costs and benefits in monetary terms

(d) assumptions for benefits and costs, including risk assessments

(e) all beneficiaries (e.g. individuals, the community, local and State Government) of the project should be clearly described and incorporated in the expanded CBA framework . If there are specific issues related to the cost of water, these should be identified as external costs and benefits.

13.153 The economic impact assessment is to address matters including, but not limited to:

(a) labour demand, including the ability for labour (including specialists) to be drawn from the existing local, regional and state workforce, and the potential effects this may have on local and regional businesses

(b) raw input demand, including the ability for existing local, regional and state suppliers to provide relevant raw and manufactured inputs

(c) anticipated impacts the project will have on domestic and industrial energy prices, wages, economic growth, and existing and proposed energy (including renewable), hydrogen and ammonia projects within the Gladstone LGA, Gladstone SDA and Port of Gladstone

(d) any impacts the project may have on surrounding energy infrastructure or the reliability of electricity supply to Gladstone

(e) potential for common use infrastructure

(f) the anticipated value of offsets required for all components of the project.

Social

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid and/or mitigate adverse social impacts arising from the project

(b) enhance opportunities and benefits for local and regional communities.

Existing environment

13.154 Identify and describe people, communities, and key stakeholders[17] directly or indirectly affected by the project.

13.155 Include a social baseline study of the project's potentially affected communities in accordance with the Coordinator-General's *Social Impact Assessment (SIA) Guideline* (see Appendix 2).

13.156 Use the latest qualitative and quantitative data in the social baseline study and supplement it through stakeholder engagement processes. Identify and reference relevant data contained in local and state government publications, reports, plans and documentation, including regional and community plans.

Impact assessment and mitigation measures

13.157 Prepare an SIA for the project that is informed by a consultative and inclusive stakeholder engagement program[18] in accordance with section 14 – Stakeholder consultation and consistent with the relevant requirements of the Coordinator-General's *SIA Guideline,* having regard to the requirements of Building Queensland's *Social Impact Evaluation Guide* (see Appendix 2).

13.158 The SIA must include a social impact management plan (SIMP) with solutions to mitigate the impacts identified and enhance social benefits in accordance with the SIA guideline. The SIMP must:

(a) provide solutions for barriers that may impact choice for people in local and regional communities to engage in project employment opportunities, and for workers to permanently reside in local and regional communities during the construction and operational phases of the project

(b) provide solutions to accommodate workers to ensure availability and affordability of local and regional housing is not adversely impacted.

13.159 Describe the outcomes of consultation with directly affected people, communities and key stakeholders including but not limited to landholders, Aboriginal and Torres Strait Islander peoples, local governments, state agencies, local and regional commerce and community development groups, social and public service providers (including but not limited to Queensland Health, Queensland Emergency Services and Queensland Police Service).

13.160 Describe the project's potential social impacts (both beneficial and adverse) on potentially affected people, communities, and key stakeholders. This should include direct and indirect impacts from any existing projects (including other existing development and/or proposed

[17] See Appendix 2 of the *SIA Guideline* for a list of key stakeholders.
[18] It is recommended that the proponent is to commence engaging at the earliest possible stage with all potentially affected stakeholders to discuss and explain the project and to identify and respond to issues and concerns identified as social impacts.

development of which the proponent should reasonably be aware in the Gladstone LGA, Gladstone SDA and Port of Gladstone) and the project including an assessment of the size, significance, and likelihood of these impacts at the local and regional level, including:

(a) key population/demographic shifts and effects to existing lifestyles, the health and social wellbeing of families and communities

(b) the needs of vulnerable groups including those that are socially disadvantaged, the aged and people with a disability

(c) the potential social benefits of the project on the local and regional area in relation to the alternatives

(d) assess the perception of risk from the proposed activity on the community and determine factors that influence this

(e) the significance of health and community well-being impacts and/or benefits

(f) potential project impacts (including cumulative impacts) on health and well-being

(g) discuss the longitudinal cumulative impacts, or 'project fatigue', where the community in the Gladstone LGA has been subject to a number of large-scale projects in recent years

(h) identify any special strategies that might be deployed by the proponent during the construction and operation of the project to mitigate impacts.

13.161 Describe any potential impacts on the use of and access for recreational, natural and culturally important areas, waterways and landscapes (Aboriginal and non-Aboriginal) potentially affected by the project.

13.162 Identify the percentage of workers likely to be sourced from potentially affected communities, including Aboriginal and Torres Strait Islander peoples, for the construction and operational phases and the proposed methodologies for workforce recruitment.

13.163 Describe the housing strategy to accommodate construction and operational workers.

13.164 Include a social impact management plan that describes management measures developed in consultation with potentially affected people, communities and key stakeholders to avoid and mitigate the project's potential adverse impacts and enhance the potential benefits.

13.165 Describe the framework to monitor the effectiveness of proposed management measures, including timeframes and key performance indicators for implementing these measures. The framework must identify roles and responsibilities, and relevant stakeholders.

Cultural heritage

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid, minimise, and/or mitigate adverse impacts on Aboriginal and Torres Strait Islander People's cultural heritage

(b) achieve the purposes of the *Aboriginal Cultural Heritage Act 2003*

(c) ensure that the nature and scale of the project does not compromise the cultural heritage significance of a heritage place or heritage area.

Existing environment

13.166 Identify the Traditional Owners of the land within the project area.

13.167 Undertake a cultural heritage assessment and describe the existing cultural heritage values of Aboriginal and Torres Strait Islander peoples that may be affected by the project and the environmental values of the cultural landscapes of the affected area in terms of the physical and cultural integrity of the landforms.

13.168 For aspects of non-Indigenous historical heritage identified through the *Queensland Heritage Act 1992*, undertake a study of, and describe, the known and potential historical cultural, archaeological, underwater cultural heritage artefacts and landscape heritage values of the area potentially affected by the project in accordance with the latest version of *Non-Indigenous cultural heritage – EIS information guideline* (see Appendix 2). Identify values at local and state thresholds and assess the significance of identified values using recognised criteria.

Impact assessment and mitigation measures

13.169 Undertake an impact assessment on Aboriginal and Torres Strait Islander People's cultural heritage in accordance with the latest version of DES *Aboriginal and Torres Strait Islander cultural heritage – EIS information guideline* (see Appendix 2).

13.170 Unless section 86 of the *Aboriginal Cultural Heritage Act 2003* applies, the proponent must develop a Cultural Heritage Management Plan (CHMP) in accordance with the requirements of Part 7 of the *Aboriginal Cultural Heritage Act 2003* and any associated agreements that have been reached. The CHMP must be informed by the results of a cultural heritage study.

13.171 For non-Indigenous historical heritage identified under the *Queensland Heritage Act 1992*, undertake a study of, and describe, the known and potential historical cultural and landscape heritage values of the area potentially affected by the project in accordance with latest version of *Non-Indigenous cultural heritage – EIS information guideline* (see Appendix 2). Any such study is to be conducted by an appropriately qualified cultural heritage practitioner.

13.172 Provide strategies to mitigate and manage all impact on indigenous and non-indigenous cultural heritage values. Include a strategy to address unexpected archaeological discoveries and cultural places in accordance with the relevant part of the non-indigenous cultural heritage guideline in Appendix 2.

Climate

Objectives and outcomes

The design, construction, operation and decommissioning of the project are to:

(a) avoid, minimise and/or mitigate the risk of, and adverse impacts to the project from projected climate change (e.g. changing patterns of temperature, rainfall, hydrology and extreme weather events), with particular reference to any additional environmental management measures required, and how those measures may change over time

(b) contribute toward Queensland's greenhouse gas (GHG) emission reduction and renewable energy targets by developing and implementing decarbonisation measures for the project.

Existing environment – climate change

13.173 Conduct the assessment in accordance with the latest version of the DES Climate – EIS Information Guideline – EIS information guideline (see Appendix 2).

13.174 Describe the project area's climate patterns that are relevant to the environmental impact assessment, particularly the project's discharges to water and air, and propagation of noise.

13.175 Provide climate data in a statistical form, including long-term averages and extreme values reflecting extreme weather events (e.g. droughts, floods, cyclones and bushfires), as necessary and illustrated using bar charts, wind rose diagrams or other relevant graphic means as necessary.

Impact assessment and mitigation measures – climate change

13.176 Assess the project's vulnerabilities to projected climate change (e.g. changing patterns of temperature, rainfall, hydrology, and extreme weather events). Demonstrate how the proposal accounts for climate change impacts and builds in resistance and resilience measures. The assessment of climate hazards and risks should reference relevant climate projection data (e.g. Queensland Future Climate high-resolution climate projection data[19]) and employ an appropriate climate risk assessment methodology.

13.177 Describe the adaptation strategies and/or activities designed to minimise climate change impacts to the project, subsequent land uses on the project site (e.g. rehabilitation projects) and surrounding land uses. Adaptation activities are to be designed to avoid perverse outcomes, such as increased emissions of greenhouse gases or maladaptive outcomes for surrounding land uses.

Note:

DES is developing the draft Industry Decarbonisation Plan Policy in accordance with the Queensland Resources Industry Development Plan, which will be subject to industry and community consultation. Accordingly, the Decarbonisation Plan Policy may change prior to finalisation of the EIS for the project. The proponent will be required to be consistent with the Industry Decarbonisation Plan Policy once finalised.

[19] Available from **https://longpaddock.qld.gov.au/qld-future-climate/dashboard**.

Existing environment – greenhouse gas emissions

13.178 Describe the existing local and regional air shed environment of GHGs.

Impact assessment – greenhouse gas emissions

13.179 Provide an inventory of projected annual emissions for the life of the project for each GHG, with total emission expressed in 'CO2 equivalent terms' for the following categories as per the National Greenhouse and Energy Reporting Scheme (NGER Scheme):

(a) scope 1 emissions – direct emissions of greenhouse gases from sources within the boundary of the facility and as a result of the facilities (including emissions from vegetation clearing, diesel, gas or petrol combustion)

(b) scope 2 emissions – emissions of greenhouse gases from the production of electricity, heat or steam that the facility will consume, but that are physically produced by another facility

(c) scope 3 emissions – emissions of greenhouse gases which occur as a consequence of the activities of a facility, but from sources not owned or controlled by that facility's business.

Estimate both unmitigated emissions and predicted emissions after all avoidance and mitigation measures have been accounted. Describe the methods used to make the estimates.

13.180 Describe the reporting obligations for the operation of the project facilities under the Australian *National Greenhouse and Energy Reporting Act 2007* (NGER Act). Information regarding GHG emissions and energy production and consumption provided in the EIS must be consistent with requirements of the NGER Act and its subordinate legislation.

Mitigation measures – greenhouse gas emissions

13.181 Address the following matters in a Decarbonisation Plan for the life of the project, with key targets, commitment to measures and transparent reporting of progress:

(a) how the project will assist in meeting Queensland's and Australia's emissions reduction targets

(b) how the project will be consistent with the relevant published Industry Decarbonisation Plan Policy (once finalised)

(c) measures (preferred and alternatives) proposed to avoid and/or minimise scope 1 and scope 2 GHG emissions of the project, including through renewable energy use and innovation

(d) how the preferred measures minimise emissions and achieve energy efficiency; quantify the emissions expected to be abated for each avoidance and mitigation measure

(e) any opportunities to further offset GHG emissions through accredited and verified offsets that represent genuine emissions reductions within Australia (i.e. will be recognised in the National Greenhouse Accounts)

(f) any voluntary initiatives or research into reducing the lifecycle and embodied energy carbon intensity of the proposed project's processes or products

(g) a process for regularly reviewing new technologies to identify opportunities to further reduce greenhouse gas emissions and use energy efficiently, consistent with best practice environmental management

(h) describe the practicality, effectiveness and risks for each avoidance, reduction and mitigation or offsets measure, with the consideration of best practice environmental management

(i) monitoring, auditing and transparent public reporting on:

(i) GHG emissions from all relevant activities

(ii) the success of mitigation measures outlined in the Decarbonisation Plan

(iii) ongoing training and capacity building around decarbonisation options, technology and reporting.

Air

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid, minimise and/or mitigate adverse air impacts to sensitive receptors

(b) protect or enhance the environmental values of the airshed

(c) protect the health and biodiversity of ecosystems

(d) protect human health and wellbeing.

The performance outcomes corresponding to these objectives are in Schedule 8, Part 3 of the EP Regulation.

Existing environment

13.182 Describe the existing air quality environment that may be affected by the project in the context of environmental values.

13.183 Discuss the existing local and regional air shed environment, including:

(a) background/ambient levels and sources of particulates, gaseous and odorous compounds, any major constituent and contaminants. Include all available data from any site-specific air monitoring, the National Pollutant Inventory (NPI) reporting, and/or ambient air quality monitoring undertaken by the Queensland Government

(b) pollutants

(c) baseline monitoring results

(d) locations of sensitive receptors (including ecologically significant species and habitats).

13.184 Provide baseline data on local meteorology and ambient levels of pollutants for later modelling of air quality. Parameters should include air temperature, wind speed and directions, atmospheric stability, mixing depth and other parameters necessary for input to the model.

13.185 The assessment of environmental values is to describe and map at a suitable scale the location of all sensitive air receptors adjacent to all project components. An estimate of typical background air quality levels should be based on surveys at representative sites where data from existing DES monitoring stations cannot be reliably extrapolated.

Impact assessment

13.186 The assessment of impacts on air from all components of the project (i.e. within the project sites and surrounding areas that may be affected by the project) is to be in accordance with

DES *Air – EIS information guideline* and *Application requirements for activities with impacts to air* (see Appendix 2). Demonstrate the project can meet the environmental objectives and performance outcomes in Schedule 8 of the EP Regulation.

13.187 Describe the characteristics of any contaminants or materials that may be released, and the release rate, as a result of the construction or operations of the project, including point source and fugitive emissions (e.g. equipment and pipe leaks, storage tanks and wastewater treatment systems), treatment and discharge systems. An emissions inventory (point source and fugitive) during construction, commissioning, operations, maintenance and a range of possible/likely upset conditions is to be included for the project sites (including the production precinct, logistics and infrastructure corridor and export precinct).

13.188 Provide an estimate of emission rates, duration and frequency based on measurements of samples taken from similar facilities; either full-scale facilities or experimental/demonstration scale facilities (including details of the facility and its location). Describe the proposed technology and discuss whether the performance observed at the reference facility is applicable to the project. Where this is not possible, use published emission factors and/or data supplied by manufacturers of process and control equipment.

13.189 Provide the model input parameters for both point and fugitive emission sources. For point sources, present concentrations at standard temperature and pressure. Include relevant information on pollutant mass emission rate, stack height, exit velocity, stack temperature and diameter, flue gas volume flow rates and its oxygen content. Compare the point source emissions against the best practice national and international source emission standards including the New South Wales Protection of the Environment Operations (Clean Air) Regulation 2010.

13.190 Predict the potential impacts of the releases to air from project activities on environmental values of the receiving environment using established and accepted methods and in accordance with the EP Regulation, Environmental Protection (Air) Policy 2019 (EPP (Air)) and the latest version of the department's *Air - EIS information guideline* (Appendix 2) and *Applications for activities with impacts to air* (Appendix 2).

13.191 Describe the background ambient air concentration from the existing sources in the airshed and evaluate the cumulative impact on the receiving environment. Address both incremental and cumulative impacts by considering the project in conjunction with existing, known and anticipated emission sources within the region.

13.192 The description of impacts should take into consideration the sensitivity and assimilative capacity of the receiving environment and the practices and procedures that would be used to avoid or minimise impacts. The impact prediction is to:

(a) address residual impacts on the environmental values (including appropriate indicators and air quality objectives) of the air receiving environment, with reference to sensitive receptors, using recognised quality assured methods. This should include all relevant values potentially impacted by the activity, under the EP Act, EP Regulation and Environmental Protection (Air) Policy 2019 (EPP (Air))

(b) quantify the human health risk and amenity impacts associated with emissions from the project for all contaminants whether or not they are covered by the National Environmental Protection (Ambient Air Quality) Measure or the EPP (Air).

13.193 Identify worst-case air emissions that may occur at start-up, shutdown or during accidental release. If these emissions are significantly higher or likely to be significantly higher than those for normal operations, it will be necessary to evaluate the worst-case impact, as a separate

exercise to determine whether the planned buffer distance(s) between the facility and neighbouring sensitive receptors will be adequate.

13.194 Address the compatibility of the proposed project's air emissions with existing or potential land uses in surrounding areas. Where a government plan is relevant to the project activities or site where the activity is proposed, describe the activity's consistency with that plan.

13.195 Where there is potential for nuisance odours to impact on sensitive receptors, an odour impact assessment should be undertaken in accordance with *Guideline Odour Impact Assessment from Developments* (see Appendix 2).

Mitigation measures

13.196 Provide evidence of consideration to appropriate siting and buffer distances required to protect environmental values, sensitive places and commercial places from any potential impacts resulting from unexpected or accidental emissions (e.g., a failure of the facility design, management or abnormal weather conditions). Note that buffer distances should be considered as a contingency measure and not as an alternative to appropriate management practices.

13.197 Describe how the proposed project will avoid and/or minimise potential impacts to air quality, dust and odour management. Identify measures to be implemented on-site to control and mitigate impacts and describe how the proposed project activities will be consistent with best practice environmental management.

13.198 Describe the procedures and practices that would be implemented to control emissions and demonstrate a commitment to continual improvement with respect to emission control techniques and practices.

13.199 Describe how the achievement of the air quality goals and objects are to be monitored, audited and reported, and how corrective/preventative actions will be managed for all phases of the project.

Noise and vibration

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid, minimise and/or mitigate adverse noise impacts to sensitive receptors

(b) protect or enhance the environmental values of the acoustic environment

(c) protect the health and biodiversity of ecosystems

(d) protect human health and wellbeing.

The performance outcomes corresponding to these objectives are in Schedule 8, Part 3 of the EP Regulation.

Existing environment

13.200 Describe the existing noise and vibration sources within the project site (e.g. agricultural machinery, traffic, industry and other noise sources that are accepted as part of the existing environment).

13.201 Describe and map the locations of any sensitive receptors that are listed in Schedule 1 of the Environmental Protection (Noise) Policy 2019 (EPP (Noise)) and estimate typical background

noise and vibration levels based on surveys at representative sites. Also describe any other environmental values that could be impacted by emissions from the proposed project.

Impact assessment

13.202 The assessment of impacts on noise and vibration is to be in accordance with DES *Application requirements for activities with noise impacts* and *Noise and vibration - EIS information* guideline (see Appendix 2). The assessment must address low-frequency (<200 Hz) noise emissions. Demonstrate that the project can meet the environmental objectives and performance outcomes in Schedule 8 of the EP Regulation.

13.203 Describe the characteristics of the noise and vibration sources (construction, operational and transport noise) expected to be emitted by the project (point source and general emissions) during construction, commissioning, and operation (including upset conditions).

13.204 Describe the project's noise and vibration impacts on sensitive receivers in accordance with Schedule 1 of the EPP (Noise). The EIS must address the compatibility of the project's noise emissions with existing or potential land uses in surrounding areas.

Mitigation measures

13.205 Describe how the environmental management objectives for noise and vibration would be monitored, audited and reported, and how corrective/preventative actions would be managed for the life of the project.

13.206 Describe how the proposed activity would be managed to be consistent with best practice environmental management, including the control of background creep in noise as outlined in the EPP (Noise).

13.207 Describe any expected exceedances of the acoustic quality objectives following the provision and/or application of avoidance and mitigation measures, and how any residual impacts would be addressed.

Waste management

Objectives and outcomes

The design, construction and operation of the project are to:

(a) avoid, minimise and/or mitigate adverse impacts of hazardous contaminants and waste generated by the project

(b) manage any waste transported, generated, or received as part of carrying out the activity in a way that protects all environmental values

(c) ensure upgrades to waste infrastructure are funded by the proponent.

The performance outcomes corresponding to these objectives are in Schedule 8, Part 3 of the EP Regulation.

Existing environment

13.208 Describe existing waste infrastructure including location, capacity and accepted waste streams relevant to the project.

Impact assessment

13.209 The assessment of impacts on waste is to be in accordance with the latest version of DES *Waste – EIS information guideline* and *Application requirements for activities with waste impacts* (see Appendix 2). Demonstrate the project can meet the environmental objectives and performance outcomes in Schedule 8 of the EP Regulation.

13.210 Provide an assessment against relevant regional land use plans including the Gladstone Regional Council Trade Waste Management Plan. Consider the provisions relative to the project and address where required, providing evidence where provisions do not apply.

13.211 Describe all the expected waste streams generated from the proposed activities over the lifetime of the project, including from dredging if required. Include the quantity, and physical and chemical characteristics, any attributes that may affect its dispersal into the environment, environmental hazard rating and toxicity, and its associated risk of causing environmental harm.

13.212 Provide information on existing and proposed sewage infrastructure for ERA 63, by referring to relevant department policies and guidelines, depending on the sewage collection and treatment infrastructure proposed and the reuse and/or disposal of treated wastewater and sewage wastes generated.

13.213 Detail waste management planning for the project especially how these plans are to be applied to prevent or minimise environmental impacts from waste for each stage of the project. Waste management planning is to include detail of all identified waste types, waste volumes, handling and proposed locations for waste disposal.

13.214 Provide details on natural resource-use efficiency (such as energy and water), integrated processing design, and any co-generation of power and by-product reuse as shown in a material/energy flow analysis.

13.215 Provide details on any proposed structures for holding waste (if any). If structures are to be regulated, describe how the design, construction, operation, modification and decommissioning meets standards for regulated structures in Appendix 2.

Mitigation measures

13.216 Detail waste management planning for the project especially how these plans are to be applied to prevent or minimise environmental impacts from waste for each stage of the project. Waste management planning is to include detail of all identified waste types, waste volumes and proposed locations for waste disposal.

13.217 Assess and describe the proposed management measures against the preferred waste management hierarchy, namely: avoid waste generation; cleaner production; recycle; reuse; reprocess and reclaim; waste to energy; treatment; disposal. This includes the generation and storage of waste and an assessment of whether any saleable by-products are likely to become waste streams and describe contingencies.

13.218 Identify end of waste options for the project using the relevant parts of the End of Waste framework and comply with relevant parts of the DES Guideline - *Waste Reduction and Recycling Act 2011* End of Waste (EOW) and Waste Management and Resource Recovery Strategy (see Appendix 2).

13.219 Describe how nominated quantitative standards and indicators may be achieved for waste management, and how the achievement of the objectives would be monitored, audited,

reported and how corrective/preventative actions would be managed during all phases of the project.

13.220 Define and describe the objectives and practical measures for protecting or enhancing environmental values from impacts from waste streams.

13.221 If the production of hazardous contaminants and waste is unavoidable, describe proposed treatment and/or storage of hazardous contaminants until they can be disposed at an approved facility.

Traffic

Objectives and outcomes

The design, construction and operation of the project are to address transport infrastructure requirements in respect of:

(a) maintenance of the safety and efficiency of all affected transport modes for the project workforce and other transport system users
(b) avoidance or mitigation of impacts to the condition and operation of existing and planned transport infrastructure
(c) impact mitigation works are compatible with transport infrastructure planning.

General content

13.222 The EIS should include a clear summary of the total transport task for the project, including workforce, inputs and outputs during the construction and operational phases.

13.223 Present the transport assessment in separate sections for each project-affected mode (road, rail, air and sea) as appropriate for each phase of the project, including the proposed transportation and delivery of pre-assembled modules to site.

Existing environment

13.224 Include a description of the existing and future (as planned by state or local government) transport network and corridors including detailed maps to appropriate scales showing relevant:

(a) construction laydown areas
(b) road and railway corridors
(c) road and rail infrastructure
(d) airports, airstrips
(e) sea ports.

Impact assessment

13.225 Describe transport activities for the project, including workforce movement and haulage operations during construction and operational phases.

13.226 Provide a detailed description and tabular summaries of the total transport activities associated with all stages of the project (from pre-construction through to decommissioning). The information is to include but not be limited to:

(a) background traffic growth, and existing traffic data

(b) expected annual volumes and weights and origins/destinations of materials, products, hazardous goods and wastes

(c) details concerning road transportation for each major transport task (for example, fuel, plant and equipment, consumables, wastes) such as, heavy vehicles classification, load size, number of trips, service frequency and duration

(d) details concerning rail transportation including types of material and products being transported, number of trips, load size, service frequency and duration

(e) maps of routes to be used for all project transport tasks

(f) over-mass or oversized loads, including the number and type of vehicles, with a description of the likely timing and routes of those loads highlighting any vulnerable bridges or other structures along the proposed routes

(g) traffic generated by workforce personnel and service providers for all phases of the project

(h) details of anticipated medium and long-term exports related maritime operations, including export volumes, expected changes to shipping numbers, berthing requirements, types of vessels and sizes required and estimated traffic including the frequency, route and piloting requirements through the Port of Gladstone

(i) an assessment of the suitability of existing wharf facilities for export of all proposed products i.e. ammonia, hydrogen and nitrogen, if relevant, and identification of upgrades or new port infrastructure being necessary.

13.227 Identify all project sites vehicle access points to/from public roads (e.g. Reid Road) including their suitability for the proposed use and required upgrades in accordance with relevant local and/or state policies, standards and manuals.

13.228 Present the traffic impact assessment in separate sections for each project-affected mode (road, rail, air services, port and maritime) as appropriate for each phase of the project.

13.229 Provide a detailed assessment by a Registered Professional Engineer of Queensland engineering consultant of how the existing and future safety, condition and performance of transport infrastructure will be impacted by the project's construction and operational phases, including anticipated medium and long-term export related maritime operations (e.g. existing and future local and state-controlled roads, railway corridors, port and air services).

13.230 Provide a detailed assessment and propose mitigation measures for the project's impacts in accordance with the latest DTMR Guide to Traffic Impact Assessment (GTIA) (see Appendix 2) and any practice notes, guidelines and documents referred to in the GTIA. This assessment must assess the project's impacts on all impact types (road safety, access and frontage, intersection delay, road link capacity, pavement, and transport infrastructure) as detailed in GTIA.

13.231 Demonstrate that any necessary transport impact mitigation works will not compromise existing and future transport corridors planning and works, with reference to the latest version of DTMR's Queensland Transport and Roads Investment Program.

13.232 Demonstrate that any stormwater management plan would not result in worsening or actionable nuisance to the State-controlled road (Hanson Road) or local road (Reid Road).

13.233 Provide a detailed assessment for the project's impacts on local government roads, including existing and future transport corridor planning and works, in accordance with the relevant local government's impact assessment methodology.

13.234 Identify, assess and address the project's impacts on all existing and future railway corridors, particularly railway level crossings and any interfacing or interfering with existing and future railway corridors in accordance with relevant standards and requirements such as the SDAP, the *Guide for Development in a Transport Environment: Rail, the Manual of Uniform Traffic Control Devices, Part 7: Railways and railway manager standards*. This should include the construction and operation impacts of the project. Traffic data should be provided for development generated traffic during construction and operation, background traffic growth and timelines for development staging, construction and delivery.

13.235 Identify the location of all temporary and permanent waterway crossings and whether they are waterway barrier works. Provide a cross reference to the assessment provided in the flora and fauna section on impacts to waterways providing fish passage.

Mitigation measures

13.236 Demonstrate how project impacts will be mitigated. Mitigation measures are to be prepared in consultation with relevant transport authorities (e.g. local governments, DTMR, Maritime Safety Queensland and Gladstone Ports Corporation).

13.237 Demonstrate how the project impacts will be mitigated in accordance with the *Guide to Traffic Impact Assessment* and any practice notes, guidelines and documents referred to in the GTIA.

Cumulative assessment of project specific matters

Objectives and outcomes

The design, construction and operation of the project are to avoid, minimise and/or mitigate potential adverse impacts arising from the combined effects of past, present and reasonably foreseeable projects on the environmental, social, economic, and cultural values and the Great Barrier Reef.

13.238 Potential cumulative environmental, social (including health), economic, and cultural impacts are to be considered for the design, construction, and operational phases of the project.

13.239 The cumulative impact assessment must detail the intra-project (all project components) and inter-project potential impacts (project in conjunction with existing development and potential future development of which the proponent should reasonably be aware and where there is sufficient detail available on which to assess).

13.240 Describe the cumulative impacts of the project, in conjunction with existing development and known future development (as described by approved plans and existing project approvals) to the following matters:

(a) proposed land uses, including impacts from contaminants, materials or wastes associated with existing development and future known development

(b) capacity of infrastructure corridors and resources (including but not limited to pipelines, energy, water, renewable energy) intended to be accessed by the proponent

(c) soils

(d) health and resilience of terrestrial and aquatic (including marine) ecosystems

(e) surface and groundwater quality

(f) surface and groundwater resources for all phases of the project (including post decommissioning phase), including management of impacts on underground water rights under the *Water Act 2000*

(g) release of contaminants, materials or wastes

(h) air quality

(i) noise

(j) impact and disposal of waste

(k) natural hazards occurring at the same time

(l) public health and safety.

13.241 Describe measures that would be used to avoid, minimise or mitigate any identified cumulative impacts.

14. Matters of national environmental significance

On 25 March 2022, the delegate of the Minister for the Environment determined the proposed project to be a controlled action under the Commonwealth EPBC Act (EPBC reference 2021/9049).

The controlling provisions for the project are:

(a) World Heritage properties (sections 12 and 15A)
(b) National Heritage places (sections 15B and 15C)
(c) Listed threatened species and communities (sections 18 and 18A)
(d) Listed migratory species (section 20 and section 20A).

The project will be assessed by EIS under the assessment bilateral agreement between the Commonwealth and Queensland governments (section 45 of the EPBC Act).

The MNES section of the TOR should be a stand-alone chapter that primarily focuses on the MNES listed above. This section (the 'MNES section') is to contain sufficient information to be read alone with reference to technical data or supplementary reports where appropriate. Any detailed technical information to support the text in the MNES section is to be included as appendices to the EIS.

Ensure habitat definitions for listed threatened species are in accordance with Commonwealth definitions available in the EPBC Act Guidelines or other relevant statutory documents (e.g., referral guidelines, approved listing advice(s), approved conservation advice(s), recovery plan(s), threat abatement plan(s) or comparable policy guidelines, and information contained in relevant Commonwealth databases such as the SPRAT database). Ensure that the habitat definitions also take into account all relevant Queensland regional ecosystems and other available information. The most up to date documentation needs to be used.

General content

14.1 The MNES section is to take into consideration the *EPBC Act Significant Impact Guidelines* (see Appendix 2).

14.2 The proponent is to ensure that the MNES section assesses compliance of the action with principles of ESD and the objects of the EPBC Act (see Chapter 1 Part 1 of the EPBC Act).

14.3 Each controlling provision must be addressed as a separate section of the chapter.

Specific content

Note

Where 'action' is used below, it is to mean the project (all components) in the MNES section of the EIS.

Where a controlling provision does not apply to a proposed action, the information requirements in the TOR are not required in the assessment.

General information

14.4 Provide the background and context of the action including:

(a) the title of the action

(b) the full name and postal address of the designated proponent

(c) a clear outline of the objective of the action

(d) the location of the action and regional context

(e) the background to the development of the action

(f) how the action relates to and/or potentially interacts with any other actions (of which the proponent should reasonably be aware) that have been, are currently, or will be, taken or that have been approved in the region

(g) the current status of the action

(h) the consequences of not proceeding with the action.

14.5 Separately discuss the description, impact, avoidance, mitigation and compensatory measures (including offset) for each MNES triggered.

Description of the action

14.6 All components of the action are to be described in detail, including pre-construction, construction, commissioning, operation, maintenance, decommissioning and rehabilitation. This is to include the precise location of all works to be undertaken, structures to be built or elements of the action that may have impacts on MNES. It is suggested that each component of the action is discussed in a separate section.

14.7 The description of the action is to also include details on how the works are to be undertaken (including stages of development and their timing) and design parameters for those aspects of the structures or elements of the action that may have relevant impacts. At a minimum, this section is to also include details of:

(a) all infrastructure proposed to be constructed and construction methods

(b) ancillary or supporting infrastructure, associated works or safety works including new construction and upgrades

(c) realignment or replacement of services, structures, access etc. required as a result of the action

(d) re-establishment of existing quarries (if applicable) and establishment of new quarries (resource extraction areas) which includes location, size, method of extraction of materials and transport of materials

(e) treatment of contaminated land, including method of treatment, disposal of waste and contaminated material, standards and minimum thresholds required for removal/disposal

(f) maximum life of the action, including construction, operation, maintenance, decommissioning and rehabilitation

(g) number of jobs for the life of the action, including number of jobs for Indigenous employees

(h) associated works and supporting infrastructure deemed necessary as part of the action or safety works

(i) other such actions, including, but not limited to, changes to hydrological flow, concrete batching plant, material storage, construction facilities, fines and dust control management, waste management generally and management of spills/contaminants/pollutants (e.g. prevention from entering waterways and groundwater).

14.8 The description of the action is to provide the total size (in hectares) of the project sites and the total size (in hectares) of the project's disturbance areas. If the disturbance area is the same as the project sites, the MNES section is to include a statement to this effect.

14.9 The MNES section is to include a map (or maps) that clearly identifies all components of the action and their location within the project sites.

Feasible alternatives

14.10 Outline any feasible alternatives to the action to the extent reasonably practicable, including:

(a) if relevant, the alternative of taking no action

(b) a comparative description of the impacts of each alternative on listed threatened species and communities, listed migratory species, the Great Barrier Reef World Heritage Area (GBRWHA) and the Great Barrier Reef National Heritage Place (GBRNHP)

(c) sufficient detail to make clear why any alternative is preferred to another

(d) short, medium and long-term advantages and disadvantages of the options.

Description of the environment

14.11 Describe the environment of the project sites and surrounding areas that may be affected by the action. At a minimum, this section is to include details of:

(a) terrestrial and aquatic ecosystems, including key vegetation communities and relevant watercourses (e.g. Calliope River catchment area, Port Curtis Bay, GBRWHA)

(b) estuarine and coastal environments, including inshore coastal areas, vegetation, underwater ecological features, key habitats, Calliope River and catchment areas, Port Curtis Bay and inshore reefs

(c) native flora and fauna, both terrestrial and aquatic/marine

(d) pest species and weeds

(e) important habitat areas, recognised populations and habitat, and aggregations of listed species

(f) surface water and groundwater hydrology and quality, including the Calliope River, and Port Curtis Bay

(g) environment and conservation values of the GBRWHA and GBRNHP

(h) cultural heritage values, people and communities and other relevant social considerations

(i) historical anthropogenic uses of the project sites (if relevant) and existing condition of the overall environment within, adjacent to, downstream and upstream of the project sites.

14.12 For each triggered MNES matter, include a brief description, status of matter in the region and the key threatening processes.

Relevant impacts

14.13 All relevant impacts of the action are to be assessed in accordance with relevant Commonwealth policies and guidelines, and information provided in the Species Profile and Threats (SPRAT) Database, including but not limited to habitat clearance (including facilitated clearing for generating renewable energy to power the project), fragmentation and degradation, introduction and increase in numbers of pests, impacts to water quality and hydrological regimes, waste and chemical pollution and greenhouse gas emissions.

14.14 The MNES section is to include a description of all relevant impacts of the action (direct, indirect, cumulative and facilitated), including the magnitude, duration and frequency of the impacts. Relevant impacts are the impacts that the action will have, or is likely to have, on MNES. All stages and components of the action must be addressed, and the following information provided:

(a) a detailed assessment of the nature and extent of the likely short-term and long-term relevant impacts

(b) a statement, with supporting evidence, whether any relevant impacts are likely to be unknown, unpredictable or irreversible

(c) any technical data and other information used or needed to make a detailed assessment of the relevant impacts.

14.15 The MNES section is to provide a detailed assessment of any likely impact that the action may have on (at the local, regional, state, national and international scale) the MNES above.

14.16 The MNES section is to identify and assess the cumulative and facilitated impacts on MNES (terrestrial, aquatic and marine) created by the existing and proposed adjacent, upstream and downstream relevant developments, water users and land users.

14.17 Establish and describe clear spatial and temporal boundaries for the assessment of cumulative and facilitated impacts.

14.18 The MNES section is to address the potential cumulative impact of the project on ecosystem resilience. The cumulative effects of climate change impacts on the environment must also be considered in the assessment of ecosystem resilience. Where relevant to the potential impact, a risk assessment is to be conducted and documented.

Avoidance, mitigation and management measures

14.19 The MNES section is to include detailed descriptions of measures proposed to be undertaken by the proponent to avoid, mitigate and manage relevant impacts of all stages of the action on MNES. The proposed measures are to be based on best available practices, appropriate standards and supported by scientific evidence (including but not limited to outcomes of successful field trials, research papers, other projects). The MNES section is to include:

(a) proposed measures to be undertaken to avoid and mitigate the relevant impacts of the proposed action on MNES, including those required by other Commonwealth, state and local government approvals

(b) an assessment of the predicted effectiveness of the proposed measures

(c) any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice/s, and a discussion on whether the proposed measures are not inconsistent with relevant recovery plans and threat abatement plans

(d) details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures

(e) details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure

(f) information on the timing, frequency and duration of the measures to be implemented

(g) the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.

14.20 The MNES section is not to just state proposed management plans and/or broad objectives to describe avoidance, mitigation and management measures. The MNES section is to include detailed measures that will be implemented to avoid, mitigate and manage impacts on MNES. Committed language (i.e. 'will') rather than non-committal language (i.e. 'may', 'where possible', 'if required', etc.) is to be used.

14.21 The SPRAT Database, and associated statutory documents, may provide some relevant mitigation measures for listed threatened species and ecological communities. All proposed measures for MNES must consider the 'S.M.A.R.T' principle:

(a) S – Specific (what and how)

(b) M – Measurable (baseline information, number/value, auditable)

(c) A – Achievable (timeframe, money, personnel)

(d) R – Relevant (conservation advices, recovery plans, threat abatement plans)

(e) T – Time-bound (specific timeframe to complete).

14.22 An outline of an Environmental Management Plan (EMP) that sets out the framework for management, mitigation and monitoring of relevant impacts of the proposed actions, including any provisions for independent environmental auditing, may be included as an appendix to the EIS.

Environmental offsets[20]

Note

According to the EPBC Act *Environmental Offsets Policy* (2012) (Offsets Policy), environmental offsets are measures that compensate for the residual adverse impacts of an action on the environment. Offsets provide environmental benefits to counterbalance the impacts that remain after avoidance and mitigation measures. It is important to consider environmental offsets early in the assessment process and correspondence with the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) regarding offsetting is highly encouraged.

It is DCCEEW's standard practice that if environmental offsets are required, a draft Offset Strategy and/or a draft Offset Area Management Plan (OAMP) are included in the EIS for assessment and approval. Further, it is DCCEEW's expectation that the environmental offset is legally secured under relevant Queensland legislation prior to the commencement of the action. Where this is not achievable, DCCEEW will recommend to the Minister (or delegate) that the conditions of approval require the environmental offset/s or the OAMP be approved, and legally secured, prior to the commencement of the action.

14.23 The MNES chapter is to include an assessment[21] of the likelihood of residual significant impacts occurring on MNES after avoidance, mitigation and management measures have been applied.

14.24 If it is determined that a residual significant impact is likely, include a draft Offset Strategy as an appendix to the EIS that provides, at a minimum:

(a) a summary of residual significant impacts for each MNES and identify and quantify (ha) any overlap(s) with offset requirements for MSES in a tabular format

(b) where an SRI to a MSES is identified as also being a MNES, evidence is to be provided on why/how the MNES is the same or substantially the same prescribed matter and impact, in addition any potential duplication of offset requirements should be identified

(c) details of the environmental offset(s)[22] (in hectares) for residual significant impacts of the action on relevant MNES, and/or their habitat. This should be broken down into attributes (e.g. breeding and foraging habitat) and detail how the environmental offset(s) meets the principles of the EPBC Act Environmental Offsets Policy (2012) (EPBC Act Offset Policy), including the Offsets Assessments Guide, in particular how the proposed environmental offset/s will achieve an overall conservation outcome for the EPBC protected matter

(d) specific details of the nature of the conservation gain to be achieved for relevant MNES, including the creation, restoration and revegetation of habitat in the proposed offset area(s)

[20] It is important to consider environmental offsets early in the assessment process. If environmental offsets are required, it is standard practice that a draft Offset Strategy and/or a draft Offset Area Management Plan (OAMP) are to be included in the assessment documentation for assessment and approval.
[21] It is recommended that environmental offset requirements are discussed separately for each MNES after the detailed assessment of impacts, discussion of proposed avoidance and mitigation measures and assessment of residual significant impacts.
[22] The Department expects that an EPBC Act protected matter is present in the proposed environmental offset/s if it is present in the project sites to align with the EPBC Act Offsets Policy.

(e) details of a strategy for the staging of environmental offset(s) for each project stage (if proposed)

(f) details of appropriate offset area/s (including a map) to compensate for the residual significant impact on relevant MNES, and/or their habitat

(g) the methodology, justification and supporting evidence, used to inform the inputs to the Commonwealth Offsets assessment guide in relation to the project impact site for each relevant MNES, including:

  (i) quantum of impact – area (ha)

  (ii) quantum of impact – quality (e.g. using the *Queensland Guide to determining terrestrial habitat quality: Methods for assessing habitat quality under the Queensland Environmental Offsets Policy.* Before undertaking habitat quality assessments consult with OCG regarding which version of the guide should be used.

(h) the methodology, adequate justification and supporting evidence, used to inform the inputs to the Commonwealth Offsets Assessment Guide in relation to each potential offset area/s for each relevant MNES, including:

  (i) time over which loss is averted (max. 20 years)

  (ii) time until ecological benefit

  (iii) risk of loss (%) without offset

  (iv) risk of loss (%) with offset

  (v) confidence in result (%)

(i) evidence that the relevant MNES, and/or their habitat, can be present in the potential offset area/s

(j) information about how the proposed offset/s area provides connectivity with other relevant habitats and biodiversity corridors

(k) details of the mechanism to legally secure the environmental offset/s (under Queensland legislation or equivalent) to provide protection for the offset area/s against development incompatible with conservation.[23]

14.25 Where offset area/s have been nominated, include a draft OAMP as an appendix to the EIS which includes information to demonstrate how the environmental offset/s compensate for residual significant impacts of the action on relevant MNES, and/or their habitat, in accordance with the principles of the Offsets Policy and all requirements of the Offsets Assessment Guide. The draft OAMP must include:

(a) specific, committal and measurable environmental outcomes which detail the nature of the conservation gain to be achieved for relevant MNES, including the creation, restoration and revegetation of habitat in the proposed offset area/s.

(b) details, with supporting evidence, to demonstrate how the environmental offset/s compensate for residual significant impacts of the proposed action on relevant MNES,

[23] It is expected that the environmental offset is legally secured under relevant Queensland legislation prior to the commencement of the action. Where this is not achievable, DCCEEW will recommend to the Minister (or delegate) that the conditions of approval require the environmental offset/s or the OAMP be approved, and legally secured, prior to the commencement of the action.

and/or their habitat, in accordance with the principles of the Offsets Policy and all requirements of the Offsets Assessment Guide including:

(i) time over which loss is averted (max. 20 years)

(ii) time until ecological benefit

(iii) risk of loss (%) without offset

(iv) risk of loss (%) with offset

(v) confidence in result (%).

(c) a description of the environmental offset/s, including location, size, condition, environmental values present and surrounding land uses

(d) baseline data, including from field validation surveys, and quantifiable ecological data on habitat quality and other supporting evidence that documents the presence or potential for presence of the relevant MNES, and the quality of their habitat within the environmental offsets

(e) an assessment of the site habitat quality for the offset area/s using an appropriate methodology, with justification and supporting evidence, (e.g. using the Queensland *Guide to determining terrestrial habitat quality: Methods for assessing habitat quality under the Queensland Environmental Offsets Policy.* Before undertaking habitat quality assessments consult with OCG regarding which version of the guide should be used.)

(f) details of how the environmental offset/s will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the relevant listed threatened species and communities, and/or listed migratory species

(g) maps and shapefiles to clearly define the location and boundaries of the environmental offset/s, accompanied by the offset attributes (e.g. physical address of the offset area/s, coordinates of the boundary points in decimal degrees, the listed threatened species and communities that the environmental offset/s compensates for, and the size of the environmental offset/s in hectares)

(h) specific offset completion criteria derived from the site habitat quality to demonstrate the improvement in the quality of habitat in the environmental offset/s over a specified timeframe

(i) details of the management actions, and timeframes for implementation, to be carried out to meet the offset completion criteria

(j) interim milestones that set targets at 5-yearly intervals for progress towards achieving the offset completion criteria

(k) details of the nature, timing and frequency of monitoring to inform progress against achieving the 5-yearly interim milestones (the frequency of monitoring must be sufficient to track progress towards each set of milestones, and sufficient to determine whether the environmental offset/s are likely to achieve those milestones in adequate time to implement all necessary corrective actions)

(l) proposed timing for the submission of internal monitoring reports that provide evidence demonstrating whether the interim milestones have been achieved

(m) timing for the implementation of corrective actions if monitoring activities indicate the interim milestones will not or have not been achieved

(n) risk analysis and a risk management and mitigation strategy for all risks to the successful implementation of the OAMP and timely achievement of the offset completion criteria, including a rating of all initial and post-mitigation residual risks in accordance with an appropriate risk assessment matrix

(o) if proposed for listed threatened species and communities, evidence of how the management actions and corrective actions take into account relevant approved conservation advice and are consistent with relevant recovery plans and threat abatement plans

(p) details of the legal mechanism for legally securing the proposed offset area/s, such that legal security remains in force over the offset area/s for at least 20 years to provide enduring protection for the offset area/s against development incompatible with conservation.

14.26 The draft OAMP is to be prepared by a suitably qualified person and in accordance with the Commonwealth *Environmental Management Plan Guidelines (*2014).

14.27 The draft OAMP is to provide evidence, derived from field validation surveys and vegetation assessments, to demonstrate that an EPBC Act protected matter (e.g. listed threatened species, ecological community or listed migratory species) is or can be present in the proposed environmental offset/s. Field validation surveys must be undertaken in accordance with Commonwealth guidelines, state guidelines and/or best practice survey methodologies.

14.28 Supporting evidence is to be included in the draft OAMP to justify how proposed management action/s are additional to the existing requirements of the landholder in managing their land (including but not limited to weed and pest management requirements under the Queensland *Biosecurity Act 2014*, existing grazing regimes) as required by the principles of the EPBC Act Offsets Policy.

14.29 The draft OAMP is to include robust scientific evidence (including but not limited to published research, pilot studies, previously successful projects/programs) to demonstrate the success of proposed measures to create, revegetate, regenerate and/or improve habitat (including but not limited to tree planting, nest boxes, artificial hollows) in the proposed environmental offset/s for a listed threatened species or ecological community, or a listed migratory species.

14.30 Where the proposed environmental offset/s supports an offset for multiple MNES, proposed management action/s for one EPBC Act protected matter must not be detrimental (i.e. have an impact) to other EPBC Act protected matters.

14.31 Where an environmental offset/s is proposed, with a completed Offsets Assessment Guide[25] calculation, all inputs are to be supported by robust scientific evidence and/or supporting evidence (including but not limited to historical grazing regimes, satellite imagery, statements from landholders).

World Heritage properties (section 12 and 15A)

14.32 The primary purpose of management of natural heritage and cultural heritage of a declared World Heritage property is to be, in accordance with Australia's obligations under the World Heritage Convention, to identify, protect, conserve, present, transmit to future generations and, if appropriate, rehabilitate the World Heritage values of the property.

Information requirements

14.33 The assessment of the GBRWHA in the MNES section is to have the following structure and detail.

(a) Description

(b) Impact assessment[24]

(c) Avoidance, mitigation and management[25]

(d) Statutory requirements

(e) Significant impact assessment.[26]

Description

14.34 Identify and describe the world heritage values of the GBRWHA that are likely to be impacted by the action. The relevant world heritage values are those described in *Statement of outstanding universal value for the Great Barrier Reef World Heritage Area*.

Impact assessment[27]

14.35 Describe and assess all impacts (direct, indirect, facilitated and cumulative) of the action on the values and/or integrity of the GBRWHA including, but not limited to:

(a) water quality impacts from stormwater runoff containing sediment and nutrients and other contaminants (e.g from disturbed acid sulfate and contaminated soils, PFAS)

(b) water quality impacts from potential accidental spillage, leakage and discharge of hazardous material and contaminants

(c) modification of coastal, estuarine, and marine habitats and waterways including alteration of hydrological regimes, erosional and depositional processes

(d) water resource and water quality impacts from procuring water for hydrogen production via electrolysis

(e) introduction, spread and/or increase in number/area of animal pest species and weeds

(f) impacts on listed threatened and migratory species, and marine species

(g) impacts on visual amenity and cultural heritage values

(h) increased shipping traffic associated with exporting hydrogen and ammonia generated by the project.

14.36 Assess the impacts of the action against relevant reports and documents including, but not limited to:

(a) *EPBC Act referral guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area* (2014)

(b) *The Reef 2050 Long-Term Sustainability Plan* (2018)[28]

(c) *Reef 2050 Water Quality Improvement Plan 2017-2022* (2018)

(d) *Cumulative Impact Management Policy* (2018)

(e) *Net Benefit Policy* (2018)

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[24] The impact assessment must meet the requirements outlined in the 'Relevant Impacts' section above.
[25] As outlined at the 'Avoidance, Mitigation and Management Measures' section above.
[26] As outlined at the 'Environmental Offsets' sections above.
[27] The impact assessment is to include consideration of the requirements in the 'Relevant Impacts' section above.
[28] Guidance on ship vetting guideline to assist industry in achieving action item MTR EBA 1 is available online **https://www.msq.qld.gov.au/About-us/News-and-stories/Ship-vetting-guideline-for-bulk-carriers-moving-through-the-Great-Barrier-Reef**

(f) Great Barrier Reef Strategic Assessment Reports

(g) Great Barrier Reef Outlook Reports

(h) *National Light Pollution Guidelines for Wildlife* (2020).

14.37 Describe how the provisions of the port master plan and overlays for the Priority Port of Gladstone and *Sustainable Ports Development Act 2015* interact with the relevant report and documents as discussed above.

14.38 MNES section is to demonstrate how the action contributes to an overall or 'net' improvement to ecosystem health, water quality and the condition of the affected values, consistent with *The Reef 2050 Long-Term Sustainability Plan*.

Avoidance, mitigation and management[29]

14.39 Describe all relevant measures proposed to avoid, mitigate and manage potential impacts on the GBRWHA.

Statutory requirements

14.40 Demonstrate that the action will not be inconsistent with:

(a) Australia's obligations under the World Heritage Convention

(b) the Australian World Heritage management principles

(c) a plan that has been prepared for the management of a declared World Heritage property under section 316 or as described in section 321 of the EPBC Act.

Significant impact assessment[30]

14.41 After consideration of proposed avoidance, mitigation and management measures, provide an assessment of the likelihood of residual significant impacts on the GBRWHA. The significant impact assessment is to consider the Commonwealth *Significant impact guidelines 1.1* (2013).

14.42 The MNES section is to provide a clear and definitive conclusion (i.e. 'likely' or 'unlikely'), including the extent and nature, of residual significant impacts on the GBRWHA to align with the *EPBC Act Environmental Offsets Policy* (2012).

14.43 Overall, the MNES section is to demonstrate how, with detailed supporting justification, the integrity of the outstanding universal value of the GBRWHA will be maintained throughout the undertaking of the proposed action and after the action has been decommissioned.

National Heritage places (section 15B and 15C)

14.44 The objective in managing National Heritage places is to identify, protect, conserve, present and transmit, to all generations, their National Heritage values.

Information requirements

14.45 The assessment of the GBRNHP in the MNES section is to have the following structure and detail:

(a) Description

[29] As required in the 'Avoidance, Mitigation and Management Measures' section above.
[30] As outlined at the 'Environmental Offsets' section above.

(b) Impact assessment[31]

(c) Avoidance, mitigation and management[32]

(d) Statutory requirements

(e) Significant impact assessment.[33]

Description

14.46 Identify and provide a comprehensive description of the place, including information about its location, physical features, condition, historical context and current uses; and describe the national heritage values of the GBRNHP that are likely to be impacted by the action.

Impact assessment[34]

14.47 Describe and assess all impacts (direct, indirect, facilitated and cumulative) of the action on the values and/or integrity of the GBRNHP including, but not limited to:

(a) water quality impacts from stormwater runoff containing sediment and nutrients and other contaminants (e.g from disturbed acid sulfate, contaminated soils and Per- and Polyfluoroalkyl Substances (PFAS))

(b) water quality impacts from potential accidental spillage, leakage and discharge of hazardous material and contaminants

(c) modification of coastal, estuarine, marine habitats and waterways including alteration of hydrological regimes

(d) water resource and quality impacts from procuring water for hydrogen production via electrolysis

(e) introduction, spread and/or increase in number/area of animal pest species and weeds

(f) impacts on listed threatened and migratory species, and marine species

(g) impacts on visual amenity and cultural heritage values

(h) increased shipping traffic associated with exporting hydrogen and ammonia generated by the project.

14.48 Assess the impacts of the action against relevant reports and documents including, but not limited to:

(a) *The Reef 2050 Long-Term Sustainability Plan* (2018)

(b) *Reef 2050 Water Quality Improvement Plan 2017-2022* (2018)

(c) *Cumulative Impact Management Policy* (2018)

(d) *Net Benefit Policy* (2018)

(e) Great Barrier Reef Strategic Assessment Reports

(f) Great Barrier Reef Outlook Reports

(g) *National Light Pollution Guidelines for Wildlife* (2020).

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[31] The impact assessment must meet the requirements outlined in the 'Relevant Impacts' section above.
[32] As outlined at the 'Avoidance, Mitigation and Management Measures' section above.
[33] As outlined at the 'Environmental Offsets' section above.
[34] The impact assessment is to include consideration of the requirements in the 'Relevant Impacts' sections above.

14.49 The MNES section is to demonstrate how the action contributes to an overall or 'net' improvement to ecosystem health, water quality and the condition of the affected values, consistent with *The Reef 2050 Long-Term Sustainability Plan*.

Avoidance, mitigation and management[35]

14.50 Describe all relevant measures proposed to avoid, mitigate and manage potential impacts on the GBRNHP.

Statutory requirements

14.51 Demonstrate that the action will not be inconsistent with:

(a) the National Heritage management principles

(b) an agreement to which the Commonwealth is party in relation to a National Heritage place

(c) a plan that has been prepared for the management of a National Heritage place under section 324S or as described in section 324X of the EPBC Act.

Significant impact assessment[36]

14.52 After consideration of proposed avoidance, mitigation and management measures, provide an assessment of the likelihood of residual significant impacts on the GBRNHP. The significant impact assessment is to consider Commonwealth *Significant impact guidelines 1.1* (2013).

14.53 The MNES section is to provide a clear and definitive conclusion (i.e. 'likely' or 'unlikely'), including the extent and nature, of residual significant impacts on the GBRNHP to align with the *EPBC Act Environmental Offsets Policy* (2012).

14.54 Overall, the MNES section is to demonstrate how, with detailed supporting justification, the integrity of the outstanding heritage value of the GBRNHP will be maintained throughout the undertaking of the proposed action and after the action has been decommissioned.

Listed threatened species and communities (section 18 and 18A)

14.55 The MNES section is to address impacts on listed threatened species and communities which may include, but is not limited to, those identified at Appendix 1 based on the likelihood of significant impacts.[37]

Information requirements

14.56 The assessment of listed threatened species and communities in the MNES section is to have the following structure and detail:

(a) Description

(b) Desktop analysis

(c) Survey effort

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[35] As required in the 'Avoidance, Mitigation and Management Measures' section above.
[36] As outlined at the 'Environmental Offsets' section above.
[37] This may not be a complete list of listed threatened species and ecological communities that will or are likely be impacted by the action. It is the proponent's responsibility to ensure that any listed threatened species and ecological communities at the time of the controlled action decision, which will or are likely to be impacted by the project, are assessed for the Minister's consideration. If the listing or up-listing of a species occurs after the controlled action decision (25 March 2022) the species will continue to be assessed under the level of threatened status it was before this event. However, any new recovery plans and other updated documentation must be still considered in the assessment.

(d) Survey outcomes

(e) Habitat assessment

(f) Impact assessment[38]

(g) Avoidance, mitigation and management[39]

(h) Rehabilitation requirements

(i) Statutory requirements

(j) Significant impact assessment.[40]

Description

14.57 Describe each listed threatened species and ecological communities (including but not limited to EPBC Act listing status, distribution, habitat, life history, threatening processes); these descriptions are to align with the information in the SPRAT Database and relevant Commonwealth documents.[41]

Desktop analysis

14.58 Describe the desktop assessment methodology used to inform the field surveys within, adjacent to, downstream and upstream of the project sites where appropriate to adequately assess impacts on relevant MNES. The MNES section is to identify and describe known historical records of listed threatened species and ecological communities in the broader region (this may also include downstream of the project sites). All known records are to be supported by an appropriate source (i.e. Commonwealth and state databases, published research, publicly available survey reports, etc.), the year of the record and a brief description of the habitat in which the record was identified.

Survey effort

14.59 Provide details of the scope, methodology, timing and effort of field surveys (to be undertaken by qualified species experts with demonstrated experienced in detecting the relevant listed threatened species and ecological communities) within, adjacent to, downstream and upstream of the project sites where appropriate to adequately assess impacts on relevant MNES. Provide details of:

(a) how surveys were undertaken in accordance with relevant Commonwealth and state guidelines or best practice survey guidelines at the time of the surveys

(b) if relevant, the justification for divergence from relevant Commonwealth and state guidelines or best practice survey guidelines at the time of the surveys.

14.60 Surveys are to be of a suitable standard, including the scope, timing and spatial and temporal replication, to be able to detect cryptic or difficult to detect terrestrial and aquatic species. Surveys are to also target areas upstream, downstream and adjacent to the project sites,

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[38] The impact assessment must meet the requirements outlined in the 'Relevant Impacts' sections above.
[39] As outlined at the 'Avoidance, Mitigation and Management Measures' sections above.
[40] As outlined at the 'Environmental Offsets' sections above.
[41] The habitat assessment should be undertaken in line with the habitat descriptions outlined in SPRAT Database and relevant DCCEEW documents (e.g. recovery plans and conservation advice). However, the proponent may deviate from the information available in the SPRAT Database when undertaking the habitat assessments if appropriate. Any variation in habitat assessment approach must be discussed with DCCEEW prior to the submission of the EIS and must be supported by scientific evidence including published research, independent expert advice and information derived from field surveys (DCCEEW does not accept the consideration of Queensland Regional Ecosystem mapping to determine habitat for listed threatened species).

particularly for species which regularly disperse through the landscape or aquatic environments (particularly seasonally) and/or have large home ranges, and where this is appropriate to adequately assess impacts on the relevant MNES.

Survey outcomes

14.61 State the total number of records (individuals and evidence of presence) of listed threatened species and ecological communities within, adjacent to, upstream and/or downstream of the project sites. All records are to include the year of the record and a brief description of the habitat in which the record was identified.

Habitat assessment

14.62 Provide a robust assessment of the potential habitat available within, adjacent to, upstream and/or downstream of the project sites for listed threatened species and ecological communities. This is to include the assessment of specific habitat attribute/s relevant to each listed threatened species and ecological community (including but not limited to breeding, foraging, dispersal, important habitat, roosting).

14.63 Habitat assessments are to be derived from information obtained from:

(a) field surveys and vegetation assessments (e.g. hollow-bearing tree surveys)

(b) the SPRAT Database

(c) relevant DCCEEW documents (including but not limited to approved conservation advices, recovery plans, listing advices, draft referral guidelines)

(d) published research and other relevant sources.

14.64 Detailed mapping of habitat type/s for relevant listed threatened species and ecological communities that are found to be, or may potentially be, present within, adjacent to, upstream and/or downstream of the project sites are to be included in the MNES section, and must:

(a) be specific to the habitat assessment undertaken for each listed threatened species and ecological community

(b) include an overlay of the project's areas of disturbance

(c) include known records of individuals (or evidence of individuals) derived from desktop analysis and/or field surveys.

14.65 The MNES section is not to just consider Queensland regional ecosystem (RE) mapping to determine habitat for listed threatened species – habitat assessments must consider and align with the information in the SPRAT Database and relevant DCCEEW documents. However, some Queensland REs align with the descriptions for some ecological communities and therefore the use of Queensland REs is acceptable in these cases.

14.66 Provide the total amount of each type of habitat (in hectares) within, adjacent to, upstream and downstream of the project sites that may be affected by the project for each listed threatened species and ecological community.

14.67 The number of features that provide suitable habitat (e.g. number of tree hollows) for listed threatened species should be provided.

14.68 The MNES section is to also include a detailed habitat assessment for the listed threatened species and communities at Appendix 1 that may be significantly impacted and any other listed threatened species and/or ecological communities identified during desktop analysis and/or field surveys.

14.69 It is considered reasonable that a species may use a project site at some point in time if the vegetation and/or habitat feature/s to support its requirements are present. As such, even if a listed threatened species and/or community is not recorded during field surveys, the potential for occurrence of listed threatened species and communities is to also be considered and assessed in the MNES section.

Impact assessment[42]

14.70 Describe and assess all impacts (direct, indirect, facilitated and cumulative) to listed threatened species and ecological communities and any other listed threatened species and communities that are found to be or may potentially be present in areas that may be impacted by the action, including potential impacts from procuring water for hydrogen production via electrolysis. This includes listed threatened species and communities in downstream catchment areas and wetlands, including estuarine, coastal and marine environments.

14.71 Identify which component/s and stage/s of the action and/or consequential actions are of relevance to each listed threatened species and/or ecological community.

14.72 For threatened ecological communities, the total direct impact (in hectares) to each identified patch within and adjacent to the project sites are to be provided in the MNES section compared to its current extent. Further, the impact assessment for ecological communities must include a discussion on the post-impact viability of each individual patch within and adjacent to the project sites to be directly impacted from fragmentation as a result of vegetation clearance.

14.73 Provide the total amount of each type of habitat (in hectares) in the proposed areas of disturbance for each listed threatened species and ecological community.

14.74 Assess how the action impacts the outcomes, objectives, and targets of relevant reports and documents including, but not limited to:

(a) *The Reef 2050 Long-Term Sustainability Plan* (2018)

(b) *Reef 2050 Water Quality Improvement Plan 2017-2022* (2018)

(c) *Cumulative Impact Management Policy* (2018)

(d) *Net Benefit Policy* (2018).

Avoidance, mitigation and management[43]

14.75 Describe all relevant species-specific measures proposed to avoid, mitigate and manage potential impacts on listed threatened species and ecological communities.

14.76 The MNES section is not to just state proposed management plans and/or broad objectives to describe avoidance, mitigation and management measures. The MNES section is to include detailed measures that will be implemented to avoid, mitigate and manage impacts on listed threatened species and ecological communities. Committed language (i.e. 'will') rather than non-committal language (i.e. 'may', 'where possible', 'if required', etc.) is to be used.

[42] The impact assessment must meet the requirements outlines in the 'Relevant Impacts' section above.
[43] Appropriate measures may be detailed on the SPRAT Database for relevant listed threatened species and ecological communities. All proposed measures must consider the 'S.M.A.R.T' principle (see below) and as outlined at the 'Avoidance, Mitigation and Management Measures' section above.

Statutory requirements

14.77 Where relevant, discuss how the proponent has had regard to relevant approved conservation advice/s.

14.78 The MNES section is to demonstrate, with supporting evidence, that the action will not be inconsistent with Australia's obligations under:

(a) the Biodiversity Convention

(b) the Convention on Conservation of Nature in the South Pacific (Apia Convention)

(c) the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

(d) a recovery plan or threat abatement plan.

Significant impact assessment[44]

14.79 After consideration of proposed avoidance, mitigation and management measures, provide an assessment of the likelihood of residual significant impacts on relevant listed threatened species and ecological communities. The significant impact assessment is to consider the DCCEEW *Significant impact guidelines 1.1* (2013).

14.80 The MNES section is to provide a clear and definitive conclusion (i.e. 'likely' or 'unlikely'), including the extent and nature, of residual significant impacts on relevant listed threatened species and ecological communities to align with the *EPBC Act Environmental Offsets Policy* (2012).

Listed migratory species (section 20 and 20A)

14.81 The MNES section is to address impacts on listed migratory species which may include, but is not limited to, those identified at Appendix 1 based on the likelihood of significant impacts.[45]

14.82 Similar to the 'Listed threatened species and communities' section, the assessment of listed migratory species in the MNES section is to have the following structure and detail. Where there are different requirements to the listed threatened species and communities' section, these are outlined:

(a) description

(b) desktop analysis

(c) survey effort

(d) survey outcomes

(e) habitat assessment

(f) impact assessment[46]

(g) avoidance, mitigation and management[47]

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[44] As outlined at the 'Environmental Offsets' section above.
[45] This may not be a complete list of listed migratory species that will or are likely be impacted by the action. It is the proponent's responsibility to ensure that any listed migratory species at the time of the controlled action decision, which will or are likely to be impacted by the action, are assessed for the Minister's consideration. Any listing events that occur after the controlled action decision (28 August 2020) do not affect the assessment and approval process.
[46] The impact assessment must meet the requirements outlined in the 'Relevant Impacts' sections 16.11 – 16.19 above.
[47] As outlined at the 'Avoidance, Mitigation and Management Measures' sections 16.21 – 16.23 above.

(h) statutory requirements

(i) the MNES section must demonstrate, with supporting evidence, that the action will not be inconsistent with Australia's obligations under:

(i) the Bonn Convention

(ii) China-Australia Migratory Bird Agreement

(iii) Japan-Australia Migratory Bird Agreement

(iv) an international agreement approved under subsection 209(4) of the EPBC Act

(j) significant impact assessment.[48]

Other approvals and conditions

14.83 The MNES section is to include information on any other approvals or requirements for approvals and any conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action. This is to include:

(a) details of any local or State Government planning scheme, or plan or policy under any local or State Government planning system that deals with the proposed action, including:

(i) what environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy

(ii) how the scheme provides for the prevention, minimisation and management of any relevant impacts

(b) a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the EPBC Act), including any conditions that apply to the action

(c) a statement identifying any additional approval that is required

(d) a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.

Environmental record of person(s) proposing to take the action

14.84 The information provided is to include details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:

(a) the person proposing to take the action

(b) for an action for which a person has applied for a permit, the person making the application.

14.85 If the person proposing to take the action is a corporation, details of the corporation's environmental policy and planning framework must also be included.

[48] As outlined at the 'Environmental Offsets' sections 16.24 – 16.31.

Economic and social matters

14.86 The economic and social impacts of the action, both positive and negative, are to be analysed in the MNES section. Matters of interest may include:

(a) details of any public consultation activities undertaken, including any consultation with Indigenous stakeholders, and their outcomes

(b) projected economic costs (e.g. capital investment) and benefits of the action, including the basis for their estimation through cost/benefit analysis or similar studies

(c) employment opportunities expected to be generated by the action (including construction and operational phases), including number of jobs for Indigenous employees.

14.87 Economic and social impacts are to be considered at the local, regional and national levels. Details of the relevant cost and benefits of alternative options to the action, as identified above, are to also be included.

Principles of Ecologically Sustainable Development (ESD)

14.88 Provide a discussion of how the project will conform to the principles of ESD,[49] as described under Part 1, Section 3A of the EPBC Act:

(a) decision making processes should effectively integrate both long term and short term economic, environmental, social and equitable considerations

(b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation

(c) the principle of inter generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations

(d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making

(e) improved valuation, pricing and incentive mechanisms should be promoted.

Information sources provided in the MNES section

14.89 For information given in the MNES section, the MNES section is to state:

(a) the source of the information

(b) how recent the information is

(c) how the reliability of the information was tested

(d) what uncertainties (if any) are in the information.

15. Appendices to the EIS

15.1 Appendices are to provide the complete technical evidence used to develop assumptions, statements and findings in the main text of the EIS.

[49] Refer to the National Strategy for Ecologically Sustainable Development (1992) at **https://environment.gov.au/about-us/esd.**

15.2 No significant issue or matter is to be mentioned for the first time in an appendix. Such matters are to be addressed in the main text of the EIS.

15.3 Include a table listing the section of the EIS where each requirement of the TOR is addressed.

15.4 Include a list citing all reference material used or relied on in the EIS.

15.5 Include a glossary of terms and a list of acronyms and abbreviations.

Part D Acronyms and abbreviations

The following acronyms and abbreviations have been in this document.

Acronym/abbreviation	Definition
AHD	Australian height datum
CBA	cost benefit analysis
CHMP	Cultural Heritage Management Plan
CLR	Contaminated land register
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO_2	carbon dioxide
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DES	Department of Environment and Science
dpi	dots per inch
DTMR	Queensland Department of Transport and Main Roads
e.g.	For example
EIS	environmental impact statement
EMP	environmental management plan
EMR	Environmental management register
EOW	End of Waste
EP Act	*Environmental Protection Act 1994*
EP Regulation	Environmental Protection Regulation 2019
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPP	Environmental Protection Policy
EPP (Air)	Environmental Protection (Air) Policy 2019
EPP (Noise)	Environmental Protection (Noise) Policy 2019
EPP (Water and Wetland Biodiversity)	Environmental Protection (Water and Wetland Biodiversity) Policy 2019
ERA	environmentally relevant activity
ESD	ecologically sustainable development
GBRNHP	Great Barrier Reef National Heritage Place
GBRWHA	Great Barrier Reef World Heritage Area
GDA2020	Geocentric Datum of Australia 2020
GHG	greenhouse gas emission
Gladstone SDA	Gladstone State Development Area
GTIA	*Guide to Traffic Impact Assessment*
ISO	International Organization for Standardization
MB	Megabyte

Acronym/abbreviation	Definition
MNES	matters of national environmental significance
MSES	matters of state environmental significance
NPI	National Pollutant Inventory
OAMP	Offset Area Management Plan
PDF	portable document format
PFAS	per- and polyfluoroalkyl substances
Planning Regulation	Planning Regulation 2017
RE	regional ecosystem
REZ	renewable energy zone
RIA	regional impact analysis
SDAP	State Development Assessment Provisions
SDPWO Act	*State Development and Public Works Organisation Act 1971*
SIA	social impact assessment
SIMP	social impact management plan
SPP	*State Planning Policy 2017*
SPRAT database	Species Profile and Threats Database
SRI	significant residual impact

Appendix 1. MNES listed threatened species and communities and migratory species

The following list includes the listed threatened ecological communities and species and listed migratory species relevant to the controlled action under the EPBC Act, which at a minimum, the project's potential impacts are to be assessed in the MNES section of the EIS.

The list below may not be a complete list of listed threatened species and ecological communities that will or are likely be impacted by the action. It is the proponent's responsibility to ensure that any listed threatened species and ecological communities at the time of the controlled action decision, which will or are likely to be impacted by the action, are assessed for the Minister's consideration. If the listing or up-listing of a species occurs after the controlled action decision (25 March 2022) the species will continue to be assessed under the level of threatened status it was before this event. However any new recovery plans and other updated documentation must be still considered in the assessment.

Listed threatened ecological communities

- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community
- Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland
- Lowland Rainforest of Subtropical Australia
- Poplar Box Grassy Woodland on Alluvial Plains
- Subtropical and Temperate Coastal Saltmarsh
- Weeping Myall Woodland

Listed threatened species

Listed threatened plants

- Yarwun whitewood (*Atalaya collina*)
- Three-leaved bosistoa (*Bosistoa transversa*)
- *Cossinia australiana*
- Wedge-leaf Tuckeroo (*Cupaniopsis shirleyana*)
- *Cycas megacarpa*
- *Cycas ophiolitica*
- Bluegrass (*Dichanthium setosum*)
- Black Ironbox (*Eucalyptus raveretiana*)
- Macadamia Nut (*Macadamia integrifolia*)
- *Quassia Samadera bidwillii*

Listed threatened fauna

Terrestrial

- Greater glider (*Petauroides volans*)

- Yellow-bellied glider (south-eastern) (*Petaurus australis australis*)
- Koala (*Phascolarctos cinereus*) (combined populations of Qld, NSW and the ACT)
- Water mouse (*Xeromys myoides*)
- Northern quoll (*Dasyurus hallucatus*)
- Ghost bat (*Macroderma gigas*)
- Large-eared pied bat (*Chalinolobus dwyeri*)
- Grey-headed flying-fox (*Pteropus poliocephalus*)
- Collared delma (*Delma torquata*)
- Dunmall's snake (*Furina dunmalli*)
- Yakka skink (*Egernia rugosa*)

Birds

- Coxen's fig-parrot (*Cyclopsitta diophthalma coxeni*)
- Capricorn yellow chat (*Epthianura crocea macgregori*)
- Red goshawk (*Erythrotriorchis radiatus*)
- Grey falcon (*Falco hypoleucos*)
- Star finch (eastern) (*Neochmia ruficauda ruficauda*)
- Squatter pigeon (southern) (*Geophaps scripta scripta*)
- Black-breasted button-quail (*Turnix melanogaster*)
- Australian painted snipe (*Rostratula australis*)
- Lesser sand plover (*Charadrius mongolus*)
- Red knot (*Calidris canutus*)
- Curlew sandpiper (*Calidris ferruginea*)
- Great knot (*Calidris tenuirostris*)
- Greater sand plover (*Charadrius leschenaultii*)
- White-bellied storm-petrel (*Fregetta grallaria grallaria*)
- White-throated needletail (*Hirundapus caudacutus*)
- Nunivak bar-tailed godwit (*Limosa lapponica baueri*)
- Southern giant-petrel (*Macronectes giganteus*)
- Eastern curlew (*Numenius madagascariensis*)
- Fairy prion (southern) (*Pachyptila turtur subantarctica*)
- Kermadec petrel (western) (*Pterodroma neglecta neglecta*)
- Campbell albatross (*Thalassarche impavida*)

Marine fauna

- Loggerhead turtle (*Caretta caretta*)
- Green turtle (*Chelonia mydas*)
- Leatherback turtle (*Dermochelys coriacea*)

- Hawksbill turtle (*Eretmochelys imbricata*)
- Olive ridley turtle (*Lepidochelys olivacea*)
- Flatback turtle (*Natator depressus*)
- Great white shark (*Carcharodon carcharias*)
- Green sawfish (*Pristis zijsron*)
- Whale shark (*Rhincodon typus*)
- Scalloped hammerhead (*Sphyrna lewini*)
- Blue whale (*Balaenoptera musculus*)

Migratory marine birds

- Common noddy (*Anous stolidus*)
- Fork-tailed swift (*Apus pacificus*)
- Lesser frigatebird (*Fregata ariel*)
- Great frigatebird (*Fregata minor*)
- Southern giant-petrel (*Macronectes giganteus*)
- White-tailed tropicbird (*Phaethon lepturus*)
- Little tern (*Sternula albifrons*)
- Campbell albatross (*Thalassarche impavida*)

Migratory marine species

- Narrow sawfish (*Anoxypristis cuspidata*)
- Bryde's whale (*Balaenoptera edeni*)
- Blue whale (*Balaenoptera musculus*)
- Oceanic whitetip shark (*Carcharhinus longimanus*)
- Great white shark (*Carcharodon carcharias*)
- Loggerhead turtle (*Caretta caretta*)
- Green turtle (*Chelonia mydas*)
- Salt-water crocodile (*Crocodylus porosus*)
- Leatherback Turtle (*Dermochelys coriacea*)
- Dugong (*Dugong dugon*)
- Hawksbill turtle (*Eretmochelys imbricata*)
- Porbeagle (*Lamna nasus*)
- Olive Ridley turtle (*Lepidochelys olivacea*)
- Humpback whale (*Megaptera novaeangliae*)
- Reef manta ray (*Mobula alfredi as Manta alfredi*)
- Giant manta ray (*Mobula birostris as Manta birostris*)
- Flatback turtle (*Natator depressus*)

- Australian snubfin dolphin (*Orcaella heinsohni*)
- Killer whale (*Orcinus orca*)
- Green sawfish (*Pristis zijsron*)
- Whale shark (*Rhincodon typus*)
- Australian humpback dolphin (*Sousa sahulensis as Sousa chinensis*)

Migratory terrestrial species

- Oriental cuckoo (*Cuculus optatus*)
- White-throated needletail (*Hirundapus caudacutus*)
- Black-faced monarch (*Monarcha melanopsis*)
- Satin flycatcher (*Myiagra cyanoleuca*)
- Rufous fantail (*Rhipidura rufifrons*)
- Spectacled monarch (*Symposiachrus trivirgatus as Monarcha trivirgatus*)

Migratory wetlands species

- Common sandpiper (*Actitis hypoleucos*)
- Ruddy turnstone (*Arenaria interpres*)
- Sharp-tailed sandpiper (*Calidris acuminata*)
- Red knot (*Calidris canutus*)
- Curlew sandpiper (*Calidris ferruginea*)
- Pectoral sandpiper (*Calidris melanotos*)
- Red-necked stint (*Calidris ruficollis*)
- Great knot (*Calidris tenuirostris*)
- Greater sand plover (*Charadrius leschenaultii*)
- Lesser sand plover (*Charadrius mongolus*)
- Latham's snipe (*Gallinago hardwickii*)
- Asian dowitcher (*Limnodromus semipalmatus*)
- Bar-tailed godwit (*Limosa lapponica*)
- Eastern curlew (*Numenius madagascariensis*)
- Whimbrel (*Numenius phaeopus*)
- Osprey (*Pandion haliaetus*)
- Pacific golden plover (*Pluvialis fulva*)
- Grey plover (*Pluvialis squatarola*)
- Grey-tailed tattler (*Tringa brevipes*)
- Common greenshank (*Tringa nebularia*)
- Marsh sandpiper (*Tringa stagnatilis*)
- Terek Sandpiper (*Xenus cinereus*)

Appendix 2. Policies and guidelines

This list is not exhaustive and any policies and guidelines which come into effect after the TOR has been finalised, must be considered regardless of whether or not they have been listed in the TOR. The currency of these policies and guidelines should be reviewed during the EIS process to ensure the correct material is used for the assessment.

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Gladstone Ports Corporation, *Port of Gladstone Land Use Plan,*[50] **https://engagegpc.com.au/gladstone-land-use-plan**

Gladstone Regional Council, Our Place Our Plan Gladstone Regional Council Planning Scheme Version 2, **https://www.grcplanningscheme.com.au/downloads/file/137/grc-planning-scheme**

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Queensland Government, *State Code 21: Hazardous chemical facilities, State Development Assessment Provisions,* Version 3.0, Department of State Development, Infrastructure, Local Government and Planning, **https://dsdmipprd.blob.core.windows.net/general/sdap-2-6-state-code-21.pdf**

[50] A draft Land use plan for the Port of Gladstone is currently being prepared. The future land use plan must be considered in the draft EIS.

Land

Australian Government, *National Acid Sulfate Soils Guidance – A synthesis,* 2018, Water Quality Australia, **https://www.waterquality.gov.au/issues/acid-sulfate-soils/a-synthesis**

International Erosion Control Association, *Best Practice Erosion and Sediment Control*, 2008, **https://austieca.com.au/publications/best-practice-erosion-and-sediment-control-bpesc-document**

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